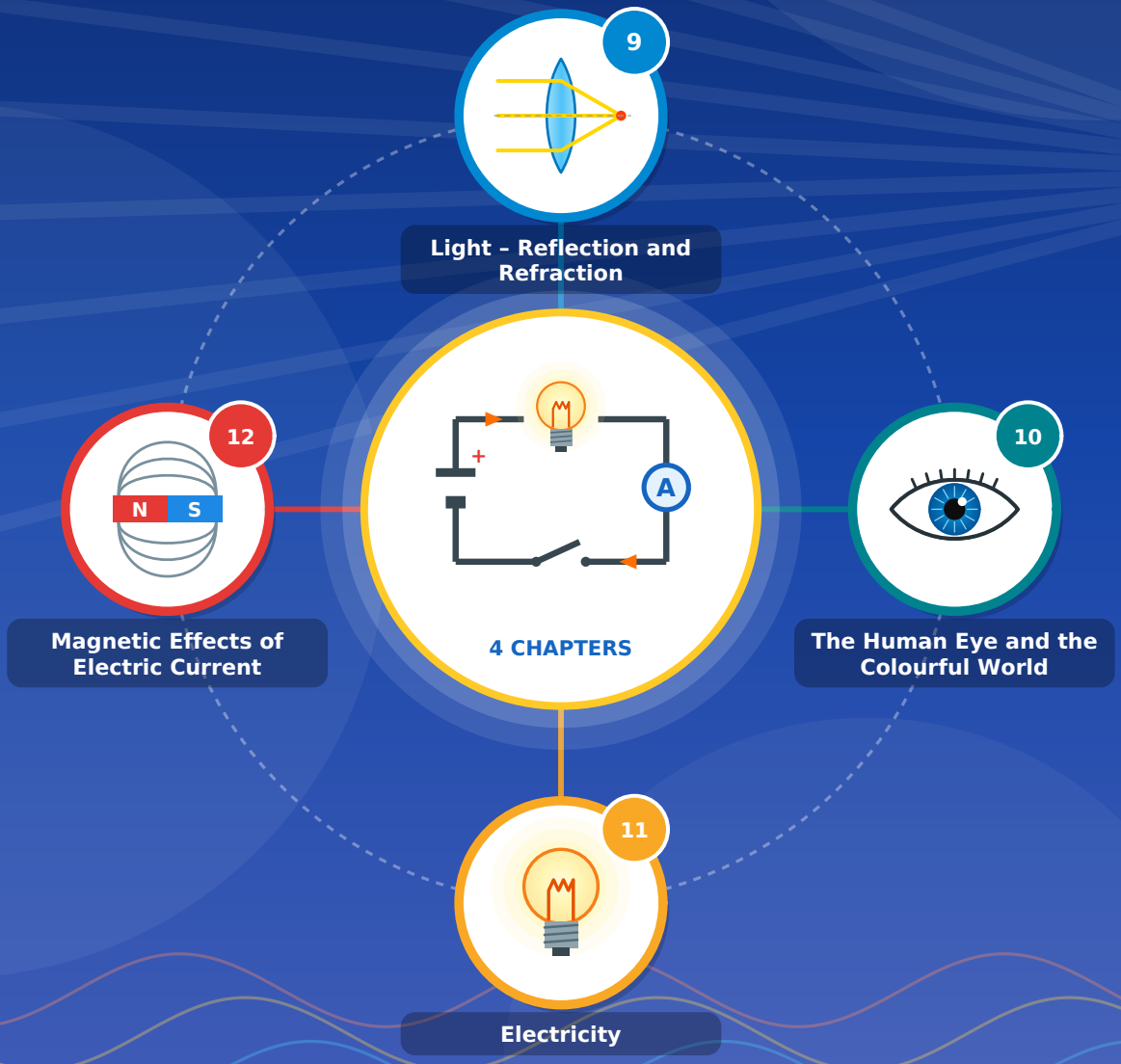
Science with Abhishek Sir

★ PYQ HUNT ★

PHYSICS

Chapterwise Question Bank

CLASS 10 · CBSE SCIENCE (086) · SESSION 2026-27



Prepared by

Abhishek Das

TGT (Science)

sciencewithabhisheksir.in

84	715	4	★
Board papers checked	**Questions** picked	**Chapters** in this book	**Most asked** marked

A Message from the Creator

To my dear students of Class 10

Dear Students,

Every year the CBSE Board asks many questions from the same topics again and again. If you know these questions well, you already know a large part of your Science paper. This book is made to help you do exactly that.

I went through the Board question papers of past years, picked every Physics question that is still in your 2026-27 syllabus, and arranged them chapter by chapter, in the same order as your NCERT textbook. Questions that came many times are marked with stars, so you know what is asked the most.

All answers are written in the words of your NCERT book. Learn them in the same way. Draw the diagrams neatly and label them. Board examiners look for correct terms, neat diagrams and complete points.

For numerical questions, first write the formula, then put the values with their units, and give the final answer with the correct SI unit. Draw ray diagrams with a scale and a sharp pencil, and always show the direction of rays with arrows.

Work a little every day. Ask your teacher when you are stuck. I am sure you will do well.

HOW TO USE THIS BOOK

1. **Read the chapter** in NCERT first
2. **Try the question** on your own
3. **Check the answer** in the green box
4. **Revise mistakes** and ★ questions

With best wishes,

Abhishek Das
TGT (Science)

Science with Abhishek Sir

Contents

Chapter numbers are the same as in your NCERT Science textbook, Class 10

FRONT PAGES

ii Message from the Creator
iii Contents
iv How to Read a Question Box
v Exam at a Glance

CHAPTERS IN THIS BOOK

CHAPTER 9 — Light – Reflection and Refraction — Unit III: Natural Phenomena · Section C · Physics — PAGE 1

CHAPTER 10 — The Human Eye and the Colourful World — Unit III: Natural Phenomena · Section C · Physics — PAGE 82

CHAPTER 11 — Electricity — Unit IV: Effects of Current · Section C · Physics — PAGE 147

CHAPTER 12 — Magnetic Effects of Electric Current — Unit IV: Effects of Current · Section C · Physics — PAGE 211

END PAGES

★ Top Questions of the Book
✓ Revision Checklist
✎ My Notes

Top Questions of the Book – page 259 · Revision Checklist – page 261 · My Notes – page 262

⚠ **Note:** Some chapter numbers are skipped because they follow NCERT: Ch 1–4 are in the Chemistry book; Ch 5, 6, 7, 8 and 13 are in the Biology book. All chapters in this book come in **Section C (Physics)** of the Board paper, which carries 25 marks: Unit III Natural Phenomena (12) + Unit IV Effects of Current (13).

How to Read a Question Box

Every question in this book sits in a box like the one below

Q41 · MCQ · 1 mark ★ Board ×2 2 papers

The magnetic field inside a long straight current carrying solenoid

(a) is zero.

(b) decreases as we move towards its end.

(c) increases as we move towards its end.

(d) is same at all points.

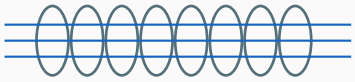


Figure from the question paper

Source: CBSE 2023, 31/6/2 Q3 and 31/6/3 Q13

✔ **Answer**

(d) is same at all points. [1]

⚠ Note: the field inside is uniform — lines are parallel.

1. **Header colour** tells the type of question (see the colour key below).
2. **Stars ★** ★★★ asked in 6 or more papers · ★★ in 3–5 · ★ in 1–2.
3. **Board ×n** number of CBSE Board papers that asked it.
4. **Question** in the same words as the paper, with its options.
5. **Figure** cut from the question paper, or neatly re-drawn.
6. **Source strip** the papers where the question came.
7. **Green box** the answer, in NCERT words, with marks [ ].
8. **Red note** a point to be careful about.

HEADER COLOUR = TYPE OF QUESTION

MCQ · 1 mark | Assertion-Reason · 1 mark | Very Short Answer · 2 marks | Short Answer · 3 marks | Long Answer · 5 marks | Case-based · 4 marks

BORDER COLOUR = THEME OF THE CHAPTER

1st theme | 2nd theme | 3rd theme

Themes follow the order of the NCERT chapter. Each theme starts with a coloured banner and a **“Picture it”** box that shows the main diagram of that part.

GOOD TO KNOW

- **Each chapter opens with its own cover** – how many papers were checked, a concept map, a theme map and a **Must-do top 20** list.
- **Same idea, many papers** – when a question came again in other papers, it is shown once; the other papers are listed in the Source strip (Ch 11 also gives them as “More questions on this idea”).
- **Each chapter ends with** – a summary table and a **Top 10** list for last-minute revision. All the Top 10 lists are collected again at the end of this book.

Exam at a Glance

Where Physics stands in your Class 10 Science Board paper (086), 2026-27

THE SCIENCE PAPER · 80 MARKS · 3 HOURS

Section A · Biology	Section B · Chemistry	Section C · Physics
30 marks	25 marks	25 marks

The paper has 39 questions with internal choice. Internal assessment carries another 20 marks. This book covers **Section C · Physics**.

SECTION C · PHYSICS = 25 MARKS

Unit III · Natural Phenomena — 12 marks

- Ch 9 · Light – Reflection and Refraction
- Ch 10 · The Human Eye and the Colourful World

Unit IV · Effects of Current — 13 marks

- Ch 11 · Electricity
- Ch 12 · Magnetic Effects of Electric Current

TYPES OF QUESTIONS AND WHAT TO WRITE

MCQ	1	Choose one option. Read all four options before you choose.
Assertion–Reason	1	First check A, then R, then ask: does R explain A?
Very Short Answer	2	Two clear points, or one point with a small diagram.
Short Answer	3	Three points; numericals: formula → values with units → answer.
Long Answer	5	Full answer with a neat, labelled diagram; use the marks as a guide.
Case-based	4	Read the passage carefully; answers are often in the passage itself.

WHAT THE PAPERS ASKED · CHAPTERS IN THIS BOOK

Ch 9 — Light – Reflection & Refraction	287 times asked	246 questions
Ch 10 — Human Eye & Colourful World	350 times asked	139 questions
Ch 11 — Electricity	302 times asked	237 questions
Ch 12 — Magnetic Effects of Current	122 times asked	93 questions

Remember in Physics: write the formula first, then put the values with units, and give the answer with the SI unit. Draw ray diagrams with a ruler and show the direction of rays with arrows. State rules (right-hand thumb rule, Fleming's left-hand rule) in full.

CHAPTER



Light – Reflection and Refraction

Unit III: Natural Phenomena · Section C · Physics

85	287	246
papers with this chapter	times the questions came	questions in this chapter

WHAT IS INSIDE

- Reflection and spherical mirrors
- Refraction and refractive index
- Lenses, power and lab skills

Starts with its own cover, concept map and Must-do top 20 · 80 pages

Science with Abhishek Sir

PYQ HUNT · CBSE Class 10 Science (086) · 2026-27 syllabus

Chapter 9

Light – Reflection and Refraction

Chapterwise Question Bank with Answers (previous year questions, clubbed)

Prepared by Abhishek Das, TGT (Science)

3,578	85	287	246
PDF pages searched (10 files, incl. OCR of scans)	papers with a Light question	question appearances found	unique questions after clubbing

What I went through

What I went through	Appearances of Light questions	Questions in this bank
CBSE board (main)	67	57
CBSE board – older papers	46	43
CBSE board – visually impaired	19	19
CBSE supplementary	4	4
CBSE competency items	23	23
KVS pre-boards / tests	67	57
Sample / practice papers	61	59

How to read a question box
• Coloured strip on top = question type (purple MCQ, teal A–R, blue VSA, green SA, red LA, orange case-based), marks and stars.
• ★★★ asked in 6+ papers · ★★ 3–5 papers · ★ 1–2 papers. **Board ×n** = asked in n CBSE board papers.
• Grey strip = where it was asked (paper, set, question no., file and page). Green box = answer in NCERT words, marks in [ ].
• Red strip = a correction or a point to be careful about. Border colour = theme: green mirrors, blue refraction, orange lenses.

Concept map – what is asked from this chapter

Concept (NCERT section)	Qs	Papers	Board	Most asked
Laws of reflection and terms of spherical mirrors	13	15	8	Q6: Define the term principal focus of a concave mirror. If the distance between the pole...
Image formation by spherical mirrors (ray diagrams)	36	42	13	Q14: No matter how far you stand from a mirror, your image appears erect. The mirror is li...
Uses of spherical mirrors	17	19	7	Q60: Name the type of mirror used in the following situations: (a) Solar furnace (b) Side/...
Sign convention, mirror formula and magnification	30	38	17	Q67: An object is placed at a distance of 30 cm from the pole of a concave mirror. If its ...
Laws of refraction and the glass slab	24	28	15	Q108: Write the two laws of refraction of light.
Refractive index and speed of light	21	23	11	Q121: If the absolute refractive indices of two media X and Y are 6/4 and 5/3 respectively,...
Image formation by lenses (ray diagrams)	34	42	19	Q142: Rays from the sun converge at a point 25 cm behind a convex lens. The distance at whi...
Lens formula and magnification	29	34	16	Q178: A convex lens forms an 80 cm long image of a 20 cm long object kept at 60 cm from the...
Power of a lens	18	20	8	Q215: Define power of a lens. The focal length of a lens is +10 cm (or +25 cm). Write the n...
Lab skills: focal length, glass slab	24	26	22	Q223: To determine the focal length of a convex lens by obtaining a sharp image of a distan...

Theme map

Reflection and spherical mirrors
- Laws of reflection and terms of spherical mirrors – 13 questions
- Image formation by spherical mirrors (ray diagrams) – 36 questions
- Uses of spherical mirrors – 17 questions
- Sign convention, mirror formula and magnification – 30 questions

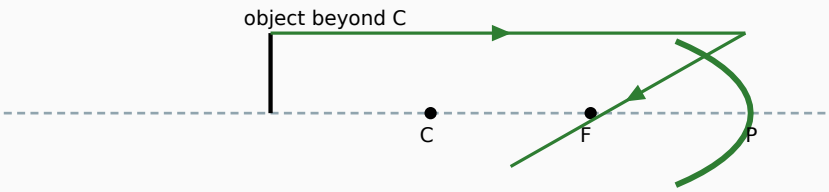
Refraction and refractive index
- Laws of refraction and the glass slab – 24 questions
- Refractive index and speed of light – 21 questions

Lenses, power and lab skills
- Image formation by lenses (ray diagrams) – 34 questions
- Lens formula and magnification – 29 questions
- Power of a lens – 18 questions
- Lab skills: focal length, glass slab – 24 questions

Must-do top 20 (most repeated, board first)

#	Q no.	Question (short)	Papers	Board
1	Q142	Rays from the sun converge at a point 25 cm behind a convex lens. The distance at which an object should be pl...	3	3
2	Q149	(a) Out of the two lenses, one concave and the other convex, state which one will diverge a parallel beam of l...	3	3
3	Q108	Write the two laws of refraction of light.	3	2
4	Q6	Define the term principal focus of a concave mirror. If the distance between the pole and focus of a concave m...	2	2
5	Q15	When a convergent beam of light is incident on a convex mirror, the reflected rays appear to be coming from a ...	2	2
6	Q67	An object is placed at a distance of 30 cm from the pole of a concave mirror. If its real and inverted image i...	2	2
7	Q68	The image formed by a concave mirror of focal length 50 cm is real and of magnification 1. In this case the di...	2	2
8	Q78	A student has focussed the image of an object of height 3 cm on a white screen using a concave mirror of focal...	2	2
9	Q93	(Case on concave mirror – sun's image on cardboard / principal focus) (c) OR: An object 10 cm in size is place...	2	2
10	Q116	(a) Observe the given ray diagram and compare (i) the speed of light in medium A and medium B; (ii) the optica...	2	2
11	Q121	If the absolute refractive indices of two media X and Y are 6/4 and 5/3 respectively, then the refractive inde...	2	2
12	Q166	(a) Draw a ray diagram to show the path of the refracted ray when a ray of light incident on a concave lens is...	2	2
13	Q178	A convex lens forms an 80 cm long image of a 20 cm long object kept at 60 cm from the optical centre. If the o...	2	2
14	Q215	Define power of a lens. The focal length of a lens is +10 cm (or +25 cm). Write the nature of the lens and fin...	2	2
15	Q223	To determine the focal length of a convex lens by obtaining a sharp image of a distant object, the steps (a) h...	2	2
16	Q224	A student focussed the image of a distant object using a device X on a white screen S. The screen is 40 cm fro...	2	2
17	Q165	(a) One-half of a convex lens is covered with a black paper. Will this lens produce an image of the complete o...	3	1
18	Q7	(a) List four properties of the images formed by a plane mirror....	2	1
19	Q32	Assertion (A): The magnification of the virtual images produced by concave mirrors is always more than +1....	2	1
20	Q60	Name the type of mirror used in the following situations: (a) Solar furnace (b) Side/rear-view mirror of a veh...	2	1

Theme A · Reflection and spherical mirrors



Picture it
• Concave mirror: ray parallel to axis → passes through F.
• Ray through C → comes back on the same path.
• R = 2f ; 1/v + 1/u = 1/f ; m = h'/h = –v/u
• Erect image at every distance ⇒ plane or convex mirror.

Laws of reflection and terms of spherical mirrors

13 questions · 8 board appearances · Prepared by Abhishek Das, TGT (Science)

Multiple Choice

Q1 · Multiple Choice · 1 mark · ★ Board ×1 · 1 paper

A ray of light is incident on a plane mirror at an angle of incidence of 15°. The deviation in the ray produced by the mirror is:

Source: CBSE VI 11-31(B), Q1 [2-compressed, PDF p.121]

✔ Answer
150°. Deviation = 180° – 2i = 180° – 30° = 150°.

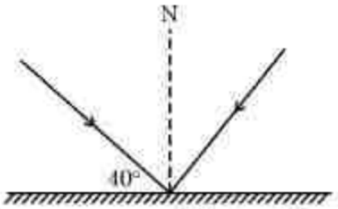
⚠ **Note:** Options were not in the text layer; answer worked out.

Q2 · Multiple Choice · 1 mark · ★ Board ×1 · 1 paper

In the given ray diagram the values of the angle of incidence and the angle of reflection are:

(a) i = 50°, r = 40°
(b) i = 40°, r = 50°
(c) i = 40°, r = 40°
(d) i = 50°, r = 50°

31. In the given ray diagram the values of the angle of incidence and the angle of reflection are : 1



(A) i = 50°, r = 40°
(B) i = 40°, r = 50°
(C) i = 40°, r = 40°
(D) i = 50°, r = 50°

Figure from the question paper

Source: CBSE 2026 31/8/1, Q31 [4-compressed, PDF p.113]

✔ Answer
(D) i = 50°, r = 50°. The 40° shown is between the ray and the mirror; angles are measured from the normal: 90° – 40° = 50°, and i = r.

Q3 · Multiple Choice · 1 mark · ★ · 1 paper

The focal length of a concave mirror whose radius of curvature is 32 cm will be –

(a) +64 cm (b) –64 cm
(c) +16 cm (d) –16 cm

Source: KV Sitapur PT-I 2023, Q5 [X SCIENCE-merged, PDF p.13]

✓ Answer
(d) –16 cm. f = R/2 = 32/2 = 16 cm; for a concave mirror f is negative.

Q4 · Multiple Choice · 1 mark · ★ · 1 paper

Which of the following characteristics of a spherical mirror is given by the ratio of the size of the image to the size of the object?

(a) aperture (b) magnification
(c) focal length (d) radius of curvature

Source: CBSE Competency Focused Practice Qs, Q35 [6_compressed, PDF p.32]

✓ Answer
(B) magnification.

Assertion-Reason

Q5 · Assertion-Reason · 1 mark · ★ · 1 paper

Assertion (A): The centre of curvature is not a part of the mirror. It lies outside its reflecting surface.
Reason (R): The reflecting surface of a spherical mirror forms a part of a sphere. This sphere has a centre.

(a) Both A and R are true and R is the correct explanation of A. (b) Both A and R are true but R is not the correct explanation of A. (c) A is true but R is false. (d) A is false but R is true.

Source: KVS Lucknow Monthly Exam Oct 2024-25, Q8 [X SCIENCE-merged, PDF p.4]

✓ Answer
(a) Both A and R are true and R explains A. The centre of curvature is the centre of the sphere of which the mirror is a part, so it lies outside the mirror.

Very Short Answer

Q6 · Very Short Answer · 2 marks · ★ Board ×2 · 2 papers

Define the term principal focus of a concave mirror. If the distance between the pole and focus of a concave mirror is 12 cm (or 15 cm), what is the radius of curvature of the mirror?

Source: CBSE VI 31(B)/S, CDBA/S, Q39(a)(b) [1-compressed, PDF p.27] | CBSE 2023 31/1/1, 31/1/2, 31/1/3, Q39/37/38(b) [1-compressed, PDF p.27]
Also asked as: Also asked with 15 cm (2023 31/1 case on 'principal focus' – sun's image on cardboard).

✓ Answer
Principal focus: the point on the principal axis where rays parallel to the principal axis meet after reflection from the concave mirror [1].
R = 2f = 2 × 12 = 24 cm (for 15 cm: R = 30 cm) [1].

Q7 · Very Short Answer · 2 marks · ★ Board ×1 · 2 papers

(a) List four properties of the images formed by a plane mirror.
OR (b) Write the definitions of the following terms in the context of a concave mirror: (i) Pole (ii) Centre of curvature (iii) Radius of curvature (iv) Principal focus.

Source: CBSE VI 31(B) CDBA, Q21 [2-compressed, PDF p.133] | Vedantu Sample Paper (F4), Q36(a) [4-compressed, PDF p.576]

✔ Answer
(a) Virtual and erect; same size as the object; as far behind the mirror as the object is in front; laterally inverted [½ × 4].
OR (b) (i) Pole – centre of the reflecting surface. (ii) Centre of curvature – centre of the sphere of which the mirror is a part. (iii) Radius of curvature – radius of that sphere (R = 2f). (iv) Principal focus – point on the principal axis where rays parallel to the axis meet after reflection [½ × 4].

Q8 · Very Short Answer · 1 mark · ★ Board ×1 · 1 paper

Explain why a ray of light passing through the centre of curvature of a concave mirror gets reflected along the same path.

Source: CBSE (old) 31/1/1, Q3 (OCR) [6_compressed, PDF p.139]

✔ Answer
A ray through C falls along the normal to the mirror (the radius is normal to the surface), so angle of incidence = 0 and angle of reflection = 0; it goes back along the same path [1].

Q9 · Very Short Answer · 2 marks · ★ · 1 paper

The radius of curvature of a spherical mirror is 20 cm. What is its focal length?

Source: KVS Lucknow 1st Pre-Board, Q26 [X SCIENCE-merged, PDF p.56]

✔ Answer
f = R/2 = 20/2 = 10 cm [1]. (NCERT intext question) For a concave mirror f = –10 cm; for a convex mirror f = +10 cm [1].

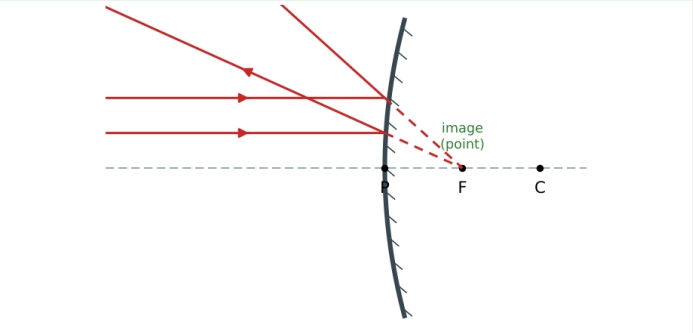
Short Answer

Q10 · Short Answer · 3 marks · ★ Board ×1 · 1 paper

Define the following terms in the context of a diverging mirror: (i) Principal focus (ii) Focal length. Draw a labelled ray diagram to illustrate your answer.

Source: CBSE 2023 31/4/1, Q30(A) [1-compressed, PDF p.369]
Also asked as: 2023 31/4/2 Q30 OR asks the same for a diverging (concave) lens – see L3/L1.

✔ Answer
(i) Principal focus of a convex (diverging) mirror: the point on the principal axis behind the mirror from which rays parallel to the principal axis appear to diverge after reflection [1].
(ii) Focal length: distance between the pole and the principal focus [1].
Diagram: two rays parallel to the axis reflected outward; dotted extensions meet at F behind the mirror [1].



Q11 · Short Answer · 4 marks · ★ · 1 paper

Match the following.
Column A: (a) Laws of reflection (b) Regular reflection (c) Refractive index (d) Spherical mirror
Column B: (p) Real image formation (q) Angle of incidence = angle of reflection (r) Speed of light change (s) Mirror-like surface

Source: KV Sitapur PT-2 2024-25, Q15 [X SCIENCE-merged, PDF p.2]

✔ Answer
(a)–(q), (b)–(s), (c)–(r), (d)–(p).

⚠ **Note:** Asked as a 4-mark 'match the following'; column B letters re-labelled p–s to avoid clash with column A.

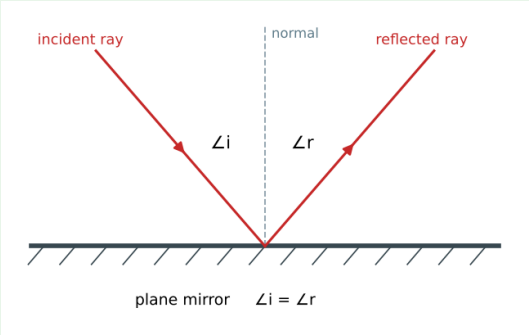
Long Answer

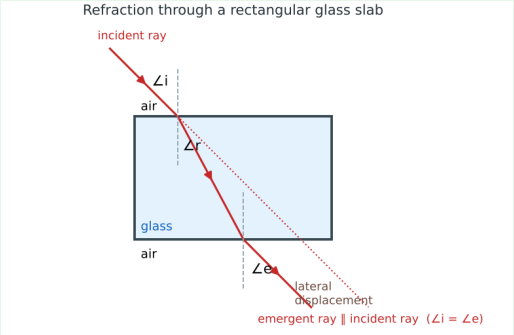
Q12 · Long Answer · 5 marks · ★ · 1 paper

Define reflection and refraction and state the laws of reflection.

Source: KV Sitapur PT-I 2024, LA Q2 [X SCIENCE-merged, PDF p.9]

✔ Answer
Reflection: bouncing back of light from a polished surface such as a mirror [1]. Refraction: change in direction of light when it goes from one medium to another [1].
Laws of reflection: (i) angle of incidence = angle of reflection; (ii) incident ray, normal at the point of incidence and reflected ray lie in the same plane [2]. Diagram of reflection with i and r marked [1].





Case / Source-based

Q13 · Case / Source-based · 4 marks · ★ Board ×1 · 1 paper

A highly polished surface which reflects most of the light falling on it is called a mirror ... (case on plane and spherical mirrors)
(a) State the laws of reflection of light. (b) Define the term principal axis of a concave mirror. (c) (i) Write the path of (I) a ray moving parallel to the principal axis and (II) a ray incident obliquely towards the pole, after reflection from a concave mirror. OR (ii) An object is placed at 18 cm in front of a concave mirror of focal length 12 cm. Use the mirror formula to find the position of the image.

Source: CBSE VI 31(B)/S, EFGH/S, Q39 [1-compressed, PDF p.54]

✔ Answer
(a) (i) Angle of incidence = angle of reflection. (ii) The incident ray, the normal at the point of incidence and the reflected ray all lie in the same plane [1].
(b) The straight line passing through the pole and the centre of curvature of the mirror [1].
(c)(i) (I) After reflection it passes through the principal focus. (II) It is reflected obliquely, making equal angle with the principal axis [2].
OR (ii) u = –18 cm, f = –12 cm; 1/v = 1/f – 1/u = –1/12 + 1/18 = –1/36 ⇒ v = –36 cm. Image is 36 cm in front of the mirror (real, inverted) [2].

Image formation by spherical mirrors (ray diagrams)

36 questions · 13 board appearances · Prepared by Abhishek Das, TGT (Science)

Multiple Choice

Q14 · Multiple Choice · 1 mark · ★★ · 3 papers

No matter how far you stand from a mirror, your image appears erect. The mirror is likely to be

(a) only plane
(b) only concave
(c) only convex
(d) either plane or convex

Source: KV Sitapur PT-I 2023, Q1 [X SCIENCE-merged, PDF p.13] | KVS Lucknow 1st Pre-Board 2022-23, Q2 [X SCIENCE-merged, PDF p.15] | KVS Lucknow 1st Pre-Board, Case Q39(ii) [X SCIENCE-merged, PDF p.58]

✔ Answer
(d) either plane or convex. (NCERT exercise Q)

Q15 · Multiple Choice · 1 mark · ★ Board ×2 · 2 papers

When a convergent beam of light is incident on a convex mirror, the reflected rays appear to be coming from a point 20 cm behind the mirror and retrace their path. The focal length of the mirror is

(a) 20 cm
(b) 10 cm
(c) 40 cm
(d) 30 cm

Source: CBSE 2026 31/8/1, Q30 [4-compressed, PDF p.113] | CBSE 2026 31/8/2, Q30 [4-compressed, PDF p.143]

✔ Answer
(B) 10 cm. Rays retrace their path only if they were heading towards C, so R = 20 cm and f = R/2 = 10 cm.

Q16 · Multiple Choice · 1 mark · ★ Board ×1 · 1 paper

From the following options choose the one which gives negative magnification greater than one:

(a) Concave mirror; image real
(b) Concave mirror; image virtual
(c) Convex mirror; image real
(d) Convex mirror; image virtual

Source: CBSE 2026 31/2/1, Q30 [2-compressed, PDF p.331,401,469]

✔ Answer
(A) Concave mirror; nature of image – real. Negative m means real and inverted; |m| > 1 means enlarged – only a concave mirror gives this (object between F and C).

⚠ **Note:** Same paper sits in F2, F3 and F9 – counted once.

Q17 · Multiple Choice · 1 mark · ★ Board ×1 · 1 paper

An object is placed in front of a convex mirror at infinity. According to the New Cartesian Sign Convention, the sign of the focal length and the sign of the image distance in this case are respectively:

(a) +, –
(b) –, +
(c) –, –
(d) +, +

Source: CBSE 2023 31/2/1 Q13, 31/2/2 Q16, 31/2/3 Q9 [1-compressed, PDF p.186,215,238]

✔ Answer
(d) +, +. Focus of a convex mirror is behind the mirror; the image is formed at F behind the mirror.

Q18 · Multiple Choice · 1 mark · ★ Board ×1 · 1 paper

An optical device always forms images of magnification m = +1. This device is:

(a) Concave mirror
(b) Plane mirror
(c) Convex lens
(d) Concave lens

Source: CBSE VI 31(B)/S, EFGH/S, Q13 [1-compressed, PDF p.36]

✔ Answer
(B) Plane mirror.

Q19 · Multiple Choice · 1 mark · ★ Board ×1 · 1 paper

For an object, a convex mirror always forms an image which is:

(a) Virtual, erect and magnified
(b) Virtual, erect and diminished
(c) Virtual, inverted and diminished
(d) Real, erect and diminished

Source: CBSE VI 31(B) CDBA, Q2 [2-compressed, PDF p.123]

✔ Answer
(B) Virtual, erect and diminished.

Q20 · Multiple Choice · 1 mark · ★ Board ×1 · 1 paper

Identify from the following the ray diagram which shows the correct path of the reflected ray for the ray incident on a concave mirror as shown.

(a) A
(b) B
(c) C
(d) D

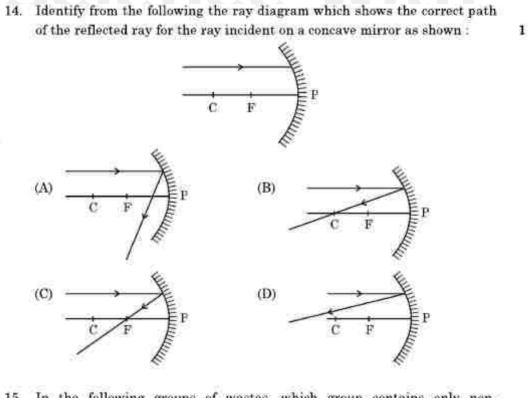


Figure from the question paper

Source: CBSE 2025 31/6/3, Q14 [4-compressed, PDF p.11]

✔ Answer
(C) – a ray parallel to the principal axis passes through the principal focus F after reflection.

Q21 · Multiple Choice · 1 mark · ★ · 1 paper

When an object is placed beyond C in front of a concave mirror, the position of the image will be –

(a) At F
(b) Between C and F
(c) At C
(d) Between P and F

Source: KV Sitapur PT-I 2023, Q4 [X SCIENCE-merged, PDF p.13]

✔ Answer
(b) Between C and F (real, inverted, diminished).

Q22 · Multiple Choice · 1 mark · ★ · 1 paper

A student wants to obtain an erect image of an object using a concave mirror of 10 cm focal length. What will be the distance of the object from the mirror?

(a) less than 10 cm
(b) 10 cm
(c) between 10 cm and 20 cm
(d) more than 20 cm

Source: KVS Lucknow Pre-Board 2025-26 (A), Q30 [X SCIENCE-merged, PDF p.75]

✔ Answer
(a) less than 10 cm (object between P and F).

Q23 · Multiple Choice · 1 mark · ★ · 1 paper

Which of the following statements is not true in reference to the diagram shown? (a) Image formed is real (b) Image formed is enlarged (c) Image formed at a distance equal to double the focal length (d) Image formed is inverted

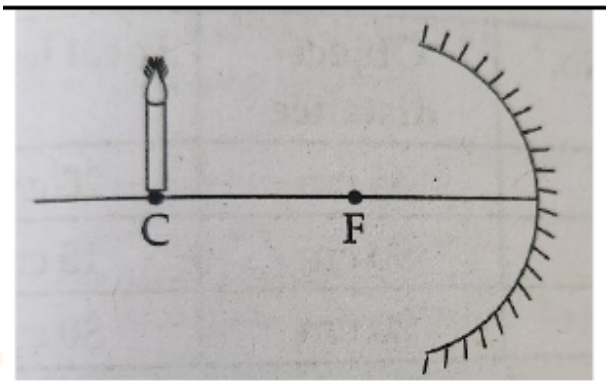
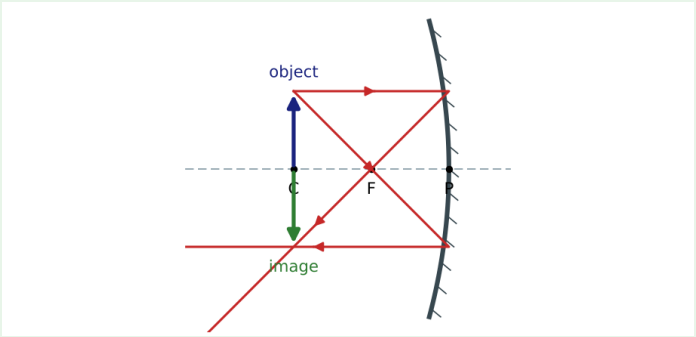


Figure from the question paper

Source: KVS Lucknow Pre-Board 2025-26 (A), Q31 [X SCIENCE-merged, PDF p.76]

✔ Answer
(b) Image formed is enlarged. The object is at C of a concave mirror, so the image is at C – real, inverted and of the same size (at 2f from the mirror). So 'enlarged' is not true.



Q24 · Multiple Choice · 1 mark · ★ · 1 paper

Which of these is the condition in which a concave mirror produces a virtual image?

(a) When object is located within the focal length
(b) When object is at the centre of curvature
(c) When object is between infinity and C
(d) When object is between C and F

Source: CBSE Competency Items (Ch 10 Light), Q3 [5-compressed, PDF p.420]

✔ Answer
(A) When the object is located within the focal length.

Q25 · Multiple Choice · 1 mark · ★ · 1 paper

Arnav wrote: I. Concave mirrors can produce both real and virtual images depending on the position of the object. II. Convex mirrors always produce real, inverted images. III. In both mirrors the image can be found using the mirror formula 1/f = 1/v + 1/u. The correct statements are:

(a) I and II
(b) I, II and III
(c) II and III
(d) I and III

Source: CBSE Sample Question Paper 2025-26, Q30 [6_compressed, PDF p.235]

✔ Answer
(D) I and III. (Convex mirrors always give virtual, erect images, so II is wrong.)

Q26 · Multiple Choice · 1 mark · ★ · 1 paper

A real image is formed by the light rays after reflection or refraction when they: A. actually meet or intersect with each other. B. actually converge at a point. C. appear to meet when produced backwards. D. appear to diverge from a point.

Source: Sample Paper (F6), Q30 [6_compressed, PDF p.404]

✔ Answer
A and B (rays actually meet / converge). C and D describe a virtual image.

⚠ **Note:** Option letters for combinations were not readable; answer given as the correct statements.

Q27 · Multiple Choice · 1 mark · ★ · 1 paper

Under which of the following conditions is the real image formed by a concave mirror larger than the object?

Source: Sample Paper (F5), Q9 [5-compressed, PDF p.239]

✔ Answer
When the object is between F and C (or at F – image at infinity). Real and enlarged image needs the object between F and C.

⚠ **Note:** Options were cut in the text layer; answer given in words.

Q28 · Multiple Choice · 1 mark · ★ · 1 paper

If the student wishes to point the mirror (concave) to another object so as to obtain a virtual enlarged image, where should the object be with respect to the mirror?

(a) at principal focus
(b) at centre of curvature
(c) between pole and principal focus
(d) between centre of curvature and principal focus

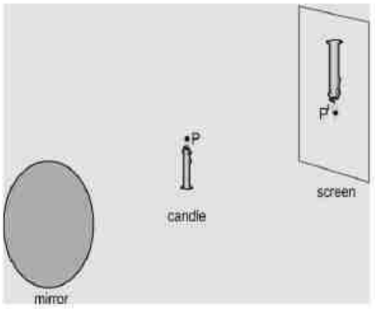
Source: CBSE Competency Items (Light), Q7 [4-compressed, PDF p.760]

✔ Answer
Between the pole and the principal focus.

Q29 · Multiple Choice · 1 mark · ★ · 1 paper

The image of a candle formed by reflection from a concave mirror is obtained on a screen (figure). How many light rays from the point P on the candle flame can be drawn to the corresponding point P′ on the image?

Q: 9 **The diagram below shows the image of a candle, as formed through reflection from a concave mirror, obtained on a screen.** [1]



How many light rays from the point P on the candle flame can be drawn to the

Figure from the question paper

Source: CBSE Competency Items (Light), Q9 [4-compressed, PDF p.760]

✔ Answer
Infinitely many – every ray from P that falls on the mirror passes through P′ after reflection.

Q30 · Multiple Choice · 1 mark · ★ · 1 paper

If a man is standing in front of a concave mirror between the centre of curvature and the focus, then the image formed is

(a) at the centre of curvature
(b) at the focus
(c) beyond the centre of curvature
(d) between C and F

Source: Sample Paper (F8), Q13 [8_compressed, PDF p.250]

✔ Answer
(c) beyond the centre of curvature (real, inverted, enlarged).

Q31 · Multiple Choice · 1 mark · ★ · 1 paper

For a convex mirror the image distance (v) = 5 cm, focal length (f) = 10 cm and height of the image (h) = 7.5 cm. The correct representation according to sign conventions is:

(a) v = –5 cm, f = –10 cm and h′ = –7.5 cm
(b) v = –5 cm, f = +10 cm and h′ = –7.5 cm
(c) v = +5 cm, f = –10 cm and h′ = +7.5 cm
(d) v = +5 cm, f = +10 cm and h′ = +7.5 cm

Source: KVS Ahmedabad Pre-Board 2025-26, Q30 [9-compressed (full, 524 p), PDF p.510]

✔ Answer
(D) v = +5 cm, f = +10 cm and h′ = +7.5 cm. For a convex mirror the focus and the image are behind the mirror (positive), and the virtual image is erect (height positive).

Assertion–Reason

Q32 · Assertion–Reason · 1 mark · ★ Board ×1 · 2 papers

Assertion (A): The magnification of the virtual images produced by concave mirrors is always more than +1.
Reason (R): The virtual images formed by concave mirrors are erect and magnified.

(a) Both A and R are true and R is the correct explanation of A. (b) Both A and R are true but R is not the correct explanation of A. (c) A is true but R is false. (d) A is false but R is true.

Source: CBSE VI 31(B)/S, EFGH/S, Q20 [1-compressed, PDF p.40] | KVS Ahmedabad Pre-Board 2025-26, Q32 [9-compressed (full, 524 p), PDF p.510]

✔ Answer
(a) Both A and R are true and R is the correct explanation of A.

Q33 · Assertion-Reason · 1 mark · ★ · 1 paper

Assertion (A): A concave mirror can form a real image of an object.
Reason (R): Concave mirrors converge parallel light rays to a point.

(a) Both A and R are true and R is the correct explanation of A. (b) Both A and R are true but R is not the correct explanation of A. (c) A is true but R is false. (d) A is false but R is true.

Source: KV Sitapur PT-I 2024, A-R Q1 [X SCIENCE-merged, PDF p.7]

✔ Answer
(b) Both are true, but R is not the correct explanation of A. (R explains why the mirror is called converging; a real image forms because reflected rays actually meet, which depends on object position.)

⚠ **Note:** (b) is kept: R is true but does not explain why a real image is formed for an object beyond F.

Q34 · Assertion-Reason · 1 mark · ★ · 1 paper

Assertion (A): A convex mirror always forms an image behind it and the image formed is virtual.
Reason (R): According to the sign convention, the focal length of a convex mirror is positive.

(a) Both A and R are true and R is the correct explanation of A. (b) Both A and R are true but R is not the correct explanation of A. (c) A is true but R is false. (d) A is false but R is true.

Source: Sample Paper 2024-25 (F6), Q19 [6_compressed, PDF p.449]

✔ Answer
(b) Both are true, but R does not explain A. The image is virtual because the reflected rays diverge and only appear to meet behind the mirror.

Q35 · Assertion-Reason · 1 mark · ★ · 1 paper

Assertion (A): A point object is placed at a distance of 26 cm from a convex mirror of focal length 26 cm. The image will not form at infinity.
Reason (R): For the above system the mirror equation $1/v + 1/u = 1/f$ gives a finite v.

(a) Both A and R are true and R is the correct explanation of A. (b) Both A and R are true but R is not the correct explanation of A. (c) A is true but R is false. (d) A is false but R is true.

Source: Sample Paper (F5), Q32 [5-compressed, PDF p.292]

✔ Answer
(a) Both true, R explains A. $u = -26$, $f = +26 \Rightarrow 1/v = 1/26 + 1/26 \Rightarrow v = +13$ cm (behind the mirror). A convex mirror never forms the image at infinity.

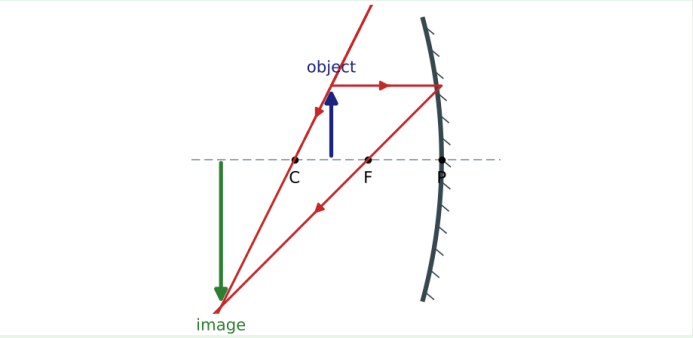
Very Short Answer

Q36 · Very Short Answer · 2 marks · ★ · 2 papers

Draw a labelled ray diagram for the image formation by a concave mirror when an object is placed between its centre of curvature and focus.

Source: KVS Ahmedabad Pre-Board 2025-26, Q33 [9-compressed (full, 524 p), PDF p.510] | KV Sitapur PT-I 2023, Case (c) [X SCIENCE-merged, PDF p.13]
Also asked as: KV Sitapur PT-I 2024 asked the same for object at C (image at C, real, inverted, same size).

✔ Answer
Ray parallel to axis → after reflection passes through F; ray through C → reflected back along the same path. Image: beyond C, real, inverted, enlarged [diagram 2].



Q37 · Very Short Answer · 2 marks · ★ Board ×1 · 1 paper

List four characteristics of the images formed by convex mirrors.

Source: CBSE VI 31(B)/S, EFGH/S, Q24 [1-compressed, PDF p.42]

✔ Answer
Image formed by a convex mirror is always (i) virtual, (ii) erect, (iii) diminished, and (iv) formed behind the mirror between P and F [½ × 4].

Q38 · Very Short Answer · 2 marks · ★ Board ×1 · 1 paper

Write any two differences between the images formed by a convex mirror and a plane mirror.

Source: CBSE VI 2026 31(B), LMNK2, Q33 [1-compressed, PDF p.77]

✔ Answer
Convex mirror: image is diminished; formed between P and F behind the mirror. Plane mirror: image is of the same size; formed as far behind the mirror as the object is in front [1 + 1].

Q39 · Very Short Answer · 2 marks · ★ · 1 paper

List four characteristics of the images formed by plane mirrors.

Source: KVS Delhi Pre-Board-II 2024-25, Q36(b) [X SCIENCE-merged, PDF p.92]

✔ Answer
(i) Virtual and erect, (ii) same size as the object, (iii) as far behind the mirror as the object is in front, (iv) laterally inverted [½ × 4].

Q40 · Very Short Answer · 2 marks · ★ · 1 paper

The diagram shows the reflection of light from a mirror. (a) Identify the type of mirror used. (b) If the object is moved closer to the mirror, what happens to the position and size of the image?

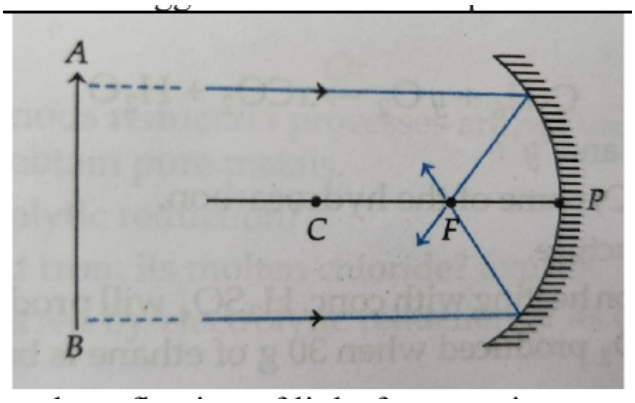
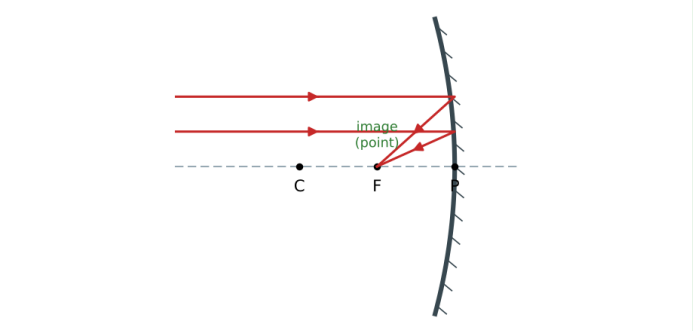


Figure from the question paper

Source: KVS Lucknow Pre-Board 2025-26 (A), Q33 [X SCIENCE-merged, PDF p.76]

✔ Answer

(a) Concave mirror – rays parallel to the principal axis meet at F after reflection [1].
(b) The object AB is very far (image at F). As the object is moved closer (towards C), the image moves away from the mirror (from F towards C) and its size increases [1].



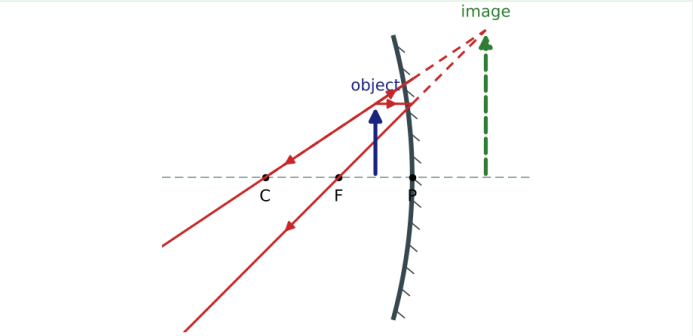
Q41 · Very Short Answer · 2 marks · ★ · 1 paper

Name two characteristics of the image formed by a concave mirror when the object is placed between the focus and the pole. Draw a ray diagram to support your answer.

Source: Vedantu Sample Paper (F4), Q21 [4-compressed, PDF p.557]

✔ Answer

Image is virtual and erect, enlarged, behind the mirror [1]. Ray diagram [1].



Short Answer

Q42 · Short Answer · 3 marks · ★ · 2 papers

(i) Name the spherical mirror used as (a) shaving mirror (b) rear-view mirror in vehicles (c) reflector in search-light. (ii) Write any three differences between a real and a virtual image.

Source: Sample Paper (F8), Q31 [8_compressed, PDF p.54] | Sample Paper (F6) key [6_compressed, PDF p.485]

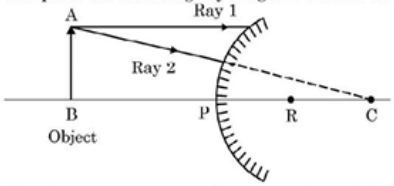
✔ Answer

(i) (a) Concave (b) Convex (c) Concave [1½].
(ii) Real image: rays actually meet; can be taken on a screen; inverted. Virtual image: rays only appear to meet; cannot be taken on a screen; erect [1½].

Q43 · Short Answer · 3 marks · ★ Board ×1 · 1 paper

(a) Complete the following ray diagram to show the formation of image.
(b) Mention the nature, position and size of the image formed in this case.
(c) State the sign of the image distance in this case using the Cartesian sign convention.

30. (a) Complete the following ray diagram to show the formation of image : 3



(b) Mention the nature, position and size of the image formed in this case.

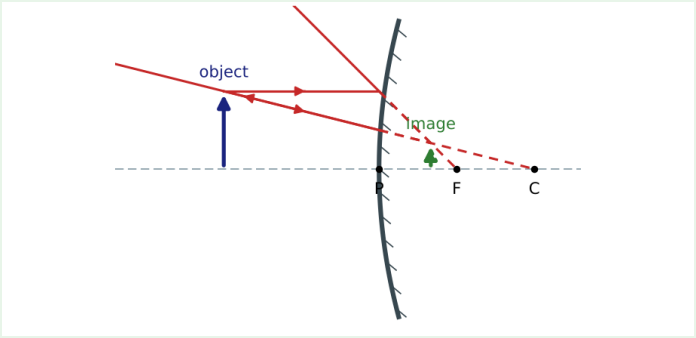
(c) State the sign of the image distance in this case using the Cartesian sign convention.

Figure from the question paper · Your screenshot – 1-compressed p.102

Source: CBSE 2023 31/1/1, Q30 [1-compressed, PDF p.102]

✔ Answer

The mirror is a convex mirror (C is behind it; R is its principal focus F).
(a) Ray 1 (parallel to the principal axis) after reflection appears to come from F (R). Ray 2 (directed towards C) is reflected back along the same path. Produce both reflected rays backwards (dotted) – they meet behind the mirror between P and R; draw the image there [1].
(b) Image is virtual and erect, behind the mirror between P and F, diminished [1].
(c) Image distance is positive (image is behind the mirror) [1].



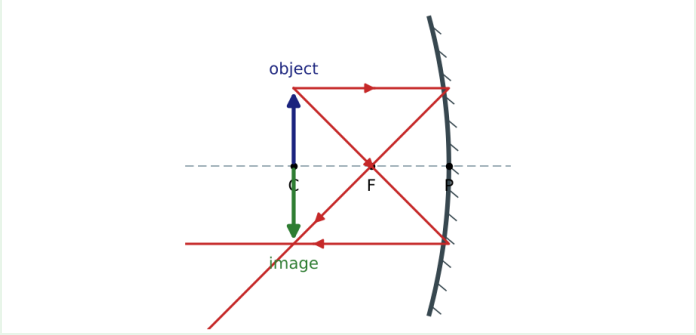
Q44 · Short Answer · 3 marks · ★ Board ×1 · 1 paper

Draw the ray diagram and state the position, the relative size and the nature of the image formed by a concave mirror when the object is placed at the centre of curvature.

Source: CBSE (old) 31/1, Q16 (OCR) [6_compressed, PDF p.173]

✔ Answer

Image at C, same size as the object, real and inverted [1½]. Ray diagram [1½].



Q45 · Short Answer · 3 marks · ★ · 1 paper

Differentiate between a virtual image formed by a concave mirror and that formed by a convex mirror.

Source: Sample Paper (F8 SQP set), Q31 [8_compressed, PDF p.119,126]

✔ Answer

Concave mirror: virtual image only when object is between P and F; image is enlarged; erect, behind the mirror [1½].
Convex mirror: always virtual for every position of object; image is diminished; erect, between P and F behind the mirror [1½].

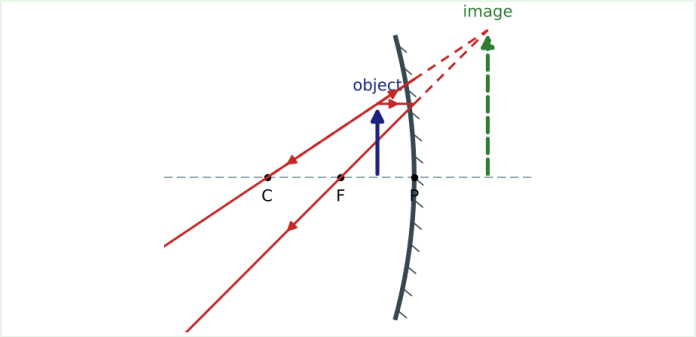
Q46 · Short Answer · 3 marks · ★ · 1 paper

(i) To construct a ray diagram we use two rays which are so chosen that it is easy to know their directions after reflection from the mirror. List two such rays and state their path after reflection in case of concave mirrors. Use them to locate the image of an object placed between the pole and focus.

Source: Vedantu Sample Paper (F5), Q36 OR [5-compressed, PDF p.322,323,362]

✔ Answer

Ray parallel to principal axis → passes through F after reflection; ray through C → returns along the same path (or ray through F → becomes parallel; ray at pole → reflected at equal angle) [2]. Ray diagram: image behind mirror, virtual, erect, enlarged [1].



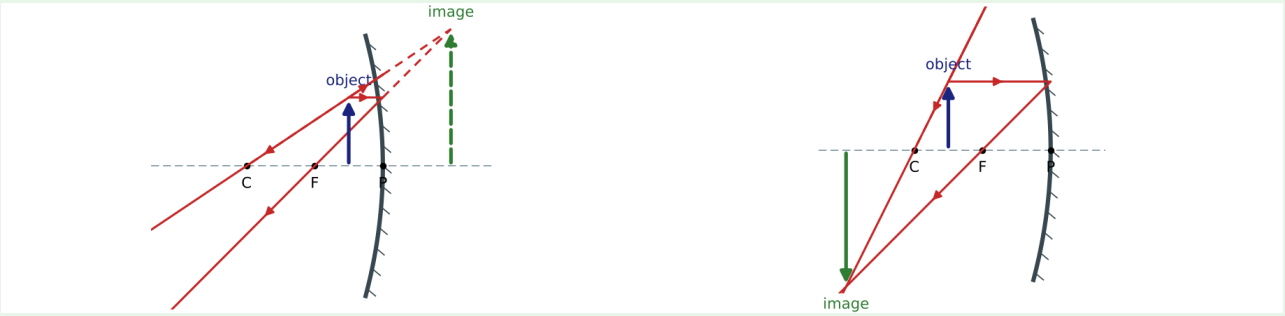
Q47 · Short Answer · 3 marks · ★ · 1 paper

"A concave mirror of focal length f can form a magnified, erect as well as an inverted image of an object placed in front of it." Justify this statement stating the position of the object with respect to the mirror in each case.

Source: Sample Paper (F6), Q31 [6_compressed, PDF p.494]

✔ Answer

Magnified, erect (virtual): object between P and F [1½]. Magnified, inverted (real): object between F and C (beyond C image) [1½]. Ray diagrams for both.



Long Answer

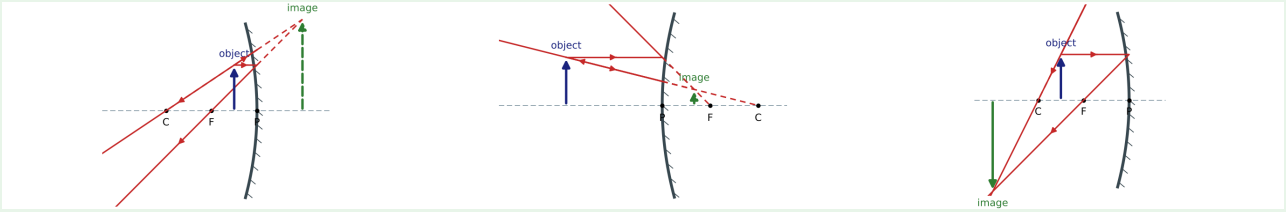
Q48 · Long Answer · 5 marks · ★ Board ×1 · 1 paper

(a) Name the type of mirror that should be used to obtain (i) a magnified and virtual image, (ii) a diminished and virtual image of an object. (b) Draw labelled ray diagrams to justify your answers. (c) Which of these mirrors can also form a magnified and real image? State the position of the object in this case.

Source: CBSE 2023 31/2/2, Q36 [1-compressed, PDF p.227]

✔ Answer

(a) (i) Concave mirror (object between P and F) (ii) Convex mirror [1+1].
(b) Two ray diagrams: concave mirror with object between P and F (virtual, erect, enlarged behind mirror); convex mirror with object anywhere (virtual, erect, diminished between P and F) [2].
(c) Concave mirror; object between F and C (or at F for highly enlarged image at infinity) [1].



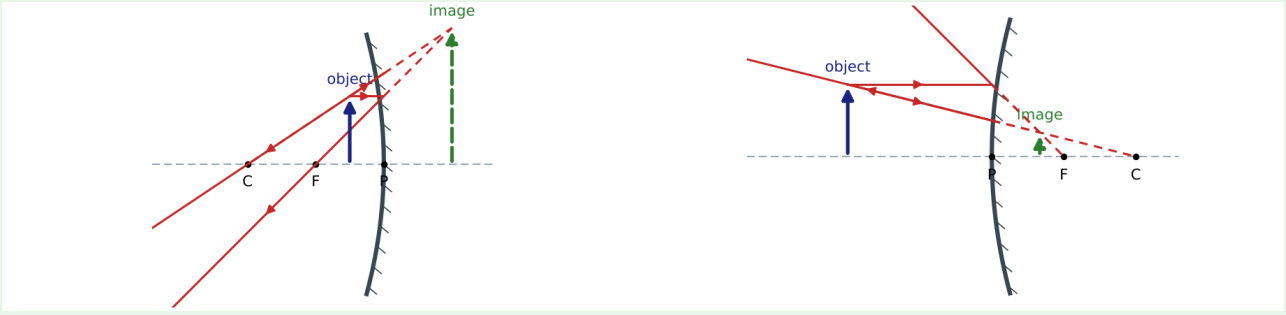
Q49 · Long Answer · 5 marks · ★ · 1 paper

(a) Draw the ray diagram in each case to show the position and nature of the image formed when the object is placed (i) between the pole P and focus F of a concave mirror (ii) in front of a convex mirror.
(b) An object is 2 m from a lens which forms an erect image one-fourth (exactly) the size of the object. Determine the focal length of the lens. What type of lens is this?

Source: KVS Delhi Pre-Board-II 2024-25, Q36 OR [X SCIENCE-merged, PDF p.39,93]

✔ Answer

(a) Two ray diagrams [2+1].
(b) m = v/u = +1/4, u = –2 m ⇒ v = –0.5 m. 1/f = 1/v – 1/u = –1/0.5 + 1/2 = –2 + 0.5 = –1.5 ⇒ f = –0.67 m (≈ –66.7 cm). Concave lens [2].



Uses of spherical mirrors

17 questions · 7 board appearances · Prepared by Abhishek Das, TGT (Science)

Multiple Choice

Q50 · Multiple Choice · 1 mark · ★ · 2 papers

Rear-view mirror of a vehicle is of which type –

(a) plane
(b) concave
(c) convex
(d) either plane or concave

Source: KV Sitapur PT-I 2023, Q3 [X SCIENCE-merged, PDF p.10,13] | KV Sitapur PT-II (2024-25), Q3 [X SCIENCE-merged, PDF p.10]

✔ **Answer**
(c) convex – it always gives an erect, diminished image and a wider field of view.

Q51 · Multiple Choice · 1 mark · ★ Board ×1 · 1 paper

Mirror X is used to concentrate sunlight in a solar furnace and mirror Y is fitted on the side of a vehicle to see the traffic behind. Which statements are true? (i) Image by X is real, diminished and at its focus. (ii) Image by Y is virtual, diminished and erect. (iii) Image by X is virtual, diminished and erect. (iv) Image by Y is real, diminished and at its focus.

(a) (i) and (ii)
(b) (ii) and (iii)
(c) (iii) and (iv)
(d) (i) and (iv)

Source: CBSE 2025 31/1/3, Q16 [2-compressed, PDF p.190,233,278]

✔ **Answer**
(A) (i) and (ii).

⚠ **Note:** Year read from paper layout (5-section, A–R at 17–20); series code to be confirmed.

Q52 · Multiple Choice · 1 mark · ★ Board ×1 · 1 paper

Concave mirror finds its application in which of the following cases?

(a) A solar furnace
(b) A rear-view mirror in vehicles
(c) To view full size erect image of distant tall buildings
(d) To produce divergent beam of light

Source: CBSE Suppl. 31/S/3, Q15 [4-compressed, PDF p.332]

✔ **Answer**
(A) A solar furnace.

Q53 · Multiple Choice · 1 mark · ★ Board ×1 · 1 paper

In torch lights and head lights of vehicles, the bulb is placed

(a) between the pole and the focus of the reflector
(b) very near to the focus of the reflector
(c) between the focus and centre of curvature
(d) at the centre of curvature of the reflector

Source: CBSE 2023 31/6/3, Q7 [9-compressed-1-64 OCR, PDF p.41]

✔ **Answer**
(b) very near to the focus of the reflector – the reflected light then goes out as a strong parallel beam.

Q54 · Multiple Choice · 1 mark · ★ · 1 paper

Dentists use which type of mirror –

(a) plane
(b) concave
(c) convex
(d) either plane or convex

Source: KV Sitapur PT-I 2023, Q2 [X SCIENCE-merged, PDF p.13]

✔ **Answer**
(b) concave – it gives an erect, enlarged image of the teeth.

Q55 · Multiple Choice · 1 mark · ★ · 1 paper

In which of the following is a concave mirror used?

(a) A solar cooker
(b) A rear view mirror in vehicles
(c) A safety mirror in shopping malls
(d) Viewing full size image of distant tall buildings

Source: KVS Lucknow Monthly Exam Oct 2024-25, Q5 [X SCIENCE-merged, PDF p.3]

✓ Answer
(a) A solar cooker.

Q56 · Multiple Choice · 1 mark · ★ · 1 paper

Find the incorrect statement:

(a) Convex mirrors are used by the dentist to see large images of teeth
(b) Convex mirrors are used as rear-view mirrors
(c) Concave mirrors are used for shaving
(d) Concave mirrors are used by doctors to focus light

Source: Sample Paper (F6), Q30 [6_compressed, PDF p.309]

✓ Answer
(A) – dentists use CONCAVE mirrors (enlarged image), not convex.

Q57 · Multiple Choice · 1 mark · ★ · 1 paper

Which of the following is NOT a common use of the concave mirror used by the student (sunlight focused to burn paper)?

(a) solar cooker
(b) car headlights
(c) rear-view mirror
(d) shaving mirrors

Source: CBSE Competency Items (Light), Q8 [4-compressed, PDF p.760]

✓ Answer
Rear-view mirror (that is a convex mirror).

Q58 · Multiple Choice · 1 mark · ★ · 1 paper

Sunrays concentrated to a point by a spherical mirror burn a paper. What is the term for the distance between the mirror and the paper, and what kind of image is formed on the paper?

Source: CBSE Competency Items (Light), Q4–Q5 [4-compressed, PDF p.759]

✓ Answer
Focal length; the image of the sun is real and diminished (point-sized).

Q59 · Multiple Choice · 1 mark · ★ · 1 paper

The student wants to depict the above experiment (sunrays focused by a concave mirror) as a ray diagram. Which diagram should he draw?

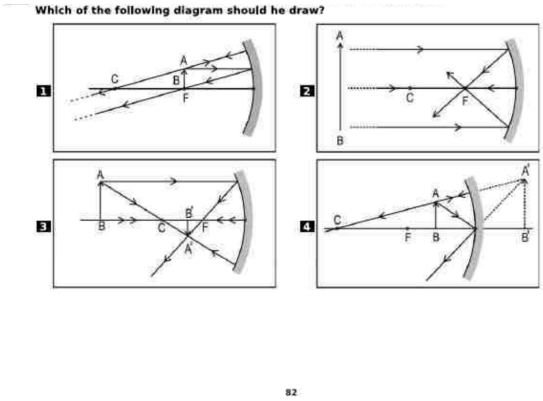


Figure from the question paper

Source: CBSE Competency Items (Light), Q6 [4-compressed, PDF p.759]

✔ Answer
Diagram 2 – rays parallel to the principal axis converge at F after reflection.

Very Short Answer

Q60 · Very Short Answer · 2 marks · ★ Board ×1 · 2 papers

Name the type of mirror used in the following situations: (a) Solar furnace (b) Side/rear-view mirror of a vehicle (c) Headlights of a car. Support your answer with reason.

Source: CBSE (old) BRH/2 31/2/1, Q20 [Merged OCR, PDF p.48] | KVS Lucknow 1st Pre-Board 2022-23, Q26 OR [X SCIENCE-merged, PDF p.17]

✔ Answer
(a) Concave – converges sunlight to a point (focus) to produce heat. (b) Convex – erect, diminished image, wider field of view. (c) Concave – bulb at focus gives a powerful parallel beam.

Q61 · Very Short Answer · 2 marks · ★ Board ×1 · 1 paper

State the type of mirror preferred as (i) rear-view mirror in vehicles, (ii) shaving mirror. Justify your answer giving two reasons in each case.

Source: CBSE (old) BRH/1 31/1, Q20 [Merged OCR, PDF p.8]

✔ Answer
(i) Convex mirror – always erect image; diminished, so gives a wider field of view [1].
(ii) Concave mirror – when held close (object within F) gives erect and enlarged image, so fine details are seen [1].

Q62 · Very Short Answer · 2 marks · ★ Board ×1 · 1 paper

(a) List two applications of concave mirror. (b) If the distance between the mirror and the principal focus is 15 cm, find the radius of curvature of the mirror.

Source: CBSE 2023 31/1/1 Q39, 31/1/2 Q37, 31/1/3 Q38 (a)(b) [1-compressed, PDF p.112]

✔ Answer
(a) Shaving mirrors, dentists' mirrors, torches/headlights reflectors, solar furnaces (any two) [1].
(b) R = 2f = 30 cm [1].

Short Answer

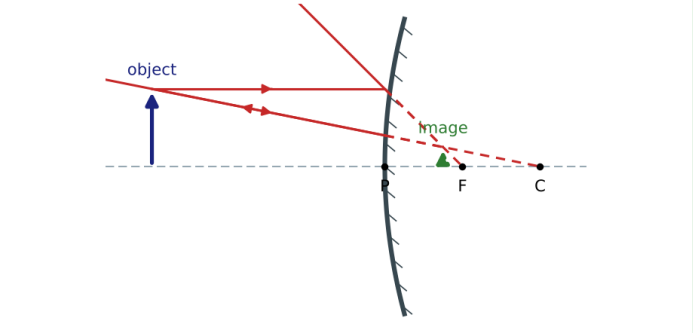
Q63 · Short Answer · 3 marks · ★ Board ×1 · 1 paper

A mirror used for rear-view of an automobile has a focal length of 2.0 m. If a car is located at 8.0 m from the mirror, (a) find the position of the image of this car as seen in the mirror; (b) draw the ray diagram for image formation by the rear-view mirror.

Source: CBSE 2026 31/4/3, Q37 [4-compressed, PDF p.452]

✔ Answer

(a) Convex mirror: f = +2 m, u = –8 m. 1/v = 1/f – 1/u = 1/2 + 1/8 = 5/8 ⇒ v = +1.6 m – image 1.6 m behind the mirror, virtual, erect, diminished (m = +0.2) [2].
(b) Ray diagram [1].



Q64 · Short Answer · 3 marks · ★ · 1 paper

(a) A security mirror used in a big showroom has a radius of curvature 5 m. If a customer is standing at a distance of 20 m from the cash counter, find the position, nature and size of the image. (b) State the nature of the mirror used by a dentist and the reason for its use.

Source: Vedantu Sample Paper (F5), Q34 OR [5-compressed, PDF p.321,360]

✔ Answer

(a) Convex mirror: R = +5 m, f = +2.5 m, u = –20 m. 1/v = 1/f – 1/u = 1/2.5 + 1/20 = 9/20 ⇒ v = +2.22 m behind the mirror; virtual, erect, diminished (m = –v/u = +0.11) [2].
(b) Concave mirror – gives erect, enlarged image of teeth [1].

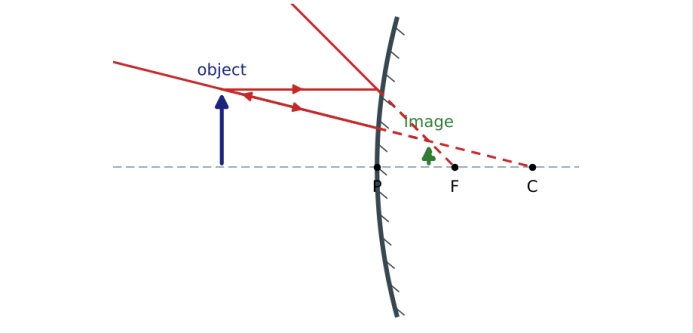
Q65 · Short Answer · 3 marks · ★ · 1 paper

A convex mirror used on a bus has a focal length of 200 cm. If a scooter is located at 400 cm from this mirror, find the position, nature and magnification of the image.

Source: Sample Paper (F8), Q33 [8_compressed, PDF p.254]

✔ Answer

f = +200, u = –400: 1/v = 1/200 + 1/400 = 3/400 ⇒ v = +133.3 cm (behind the mirror) [1½]. m = –v/u = +0.33 – virtual, erect, diminished [1½].



Case / Source-based

Q66 · Case / Source-based · 4 marks · ★ · 1 paper

The spherical mirror forms different types of images ... A concave mirror is used as doctor's head mirror; a convex mirror is used as rear-view mirror.
(i) When an object is placed at the centre of curvature of a concave mirror, where is the image formed? (ii) No matter how far you stand from a mirror, your image appears erect. What type of mirror is it? (iii) A child finds the image of her head bigger, the middle portion of her body of the same size and that of the legs smaller in a magic mirror. Write the types of mirrors from the top.

Source: KVS Lucknow 1st Pre-Board, Q39 [X SCIENCE-merged, PDF p.59]

✔ **Answer**
(i) At C – real, inverted, same size [1]. (ii) Plane or convex mirror [1]. (iii) Concave, plane, convex [2].

Sign convention, mirror formula and magnification

30 questions · 17 board appearances · Prepared by Abhishek Das, TGT (Science)

Multiple Choice

Q67 · Multiple Choice · 1 mark · ★ Board ×2 · 2 papers

An object is placed at a distance of 30 cm from the pole of a concave mirror. If its real and inverted image is formed at 60 cm in front of the mirror, the focal length of the mirror is:

(a) –15 cm
(b) –20 cm
(c) +20 cm
(d) +15 cm

Source: CBSE 2025 31/2/1, Q12 [2-compressed, PDF p.346] | CBSE 2025 31/2/2, Q15 [2-compressed, PDF p.416]

✔ **Answer**
(B) –20 cm. 1/f = 1/v + 1/u = –1/60 – 1/30 = –3/60 ⇒ f = –20 cm.

Q68 · Multiple Choice · 1 mark · ★ Board ×2 · 2 papers

The image formed by a concave mirror of focal length 50 cm is real and of magnification 1. In this case the distance between the object and its own image is:

(a) 50 cm
(b) 100 cm
(c) 200 cm
(d) Zero

Source: CBSE 2026 31/8/3, Q13 [4-compressed, PDF p.193] | CBSE Suppl. 31/S/2, Q12 [4-compressed, PDF p.247]

✔ **Answer**
(D) Zero. A real image of the same size (m = –1) forms when the object is at C, and the image is also at C.

Q69 · Multiple Choice · 1 mark · ★ Board ×1 · 1 paper

To obtain a magnification of 2 with a concave mirror of radius of curvature 60 cm, the object distance must be

(a) –90 cm
(b) –45 cm
(c) –30 cm
(d) –15 cm

Source: CBSE 2023 31/6/2, Q7 [9-compressed-1-64 OCR, PDF p.7]

✔ **Answer**
(b) –45 cm. f = –30 cm. For a real image m = –2 ⇒ v = 2u; 1/(2u) + 1/u = –1/30 ⇒ 3/(2u) = –1/30 ⇒ u = –45 cm. (For m = +2, u = –15 cm, virtual.)

⚠ **Note:** Options (b) and (d) both fit, for real (m = –2) and virtual (m = +2) image. Key follows the CBSE marking scheme; check the scheme page.

Q70 · Multiple Choice · 1 mark · ★ Board ×1 · 1 paper

A 5 cm long rod is placed vertically in front of a concave mirror. If its 5 cm long image is formed at 20 cm in front of the mirror, the focal length of the mirror is

(a) –20 cm
(b) –10 cm
(c) –5 cm
(d) +20 cm

Source: CBSE Suppl. 31/S/1, Q11 [4-compressed, PDF p.220]

✓ Answer
(B) –10 cm. Same-size real image ⇒ object and image at C: R = 20 cm, f = –10 cm.

Q71 · Multiple Choice · 1 mark · ★ Board ×1 · 1 paper

What is the nature of the image formed by a concave mirror if the magnification produced by the mirror is +3?

Source: CBSE (old) 31/1/1, Q4 (OCR) [6_compressed, PDF p.140]

✓ Answer
Virtual, erect and three times enlarged (object between P and F).

Q72 · Multiple Choice · 1 mark · ★ · 1 paper

In the following, which is the mirror formula?

(a) 1/v – 1/u = 1/f
(b) 1/v + 1/u = 1/f
(c) 1/u – 1/v = 1/f
(d) 1/u × 1/v = 1/f

Source: KV Sitapur PT-II (2024-25), Q2 [X SCIENCE-merged, PDF p.10]

✓ Answer
(b) 1/v + 1/u = 1/f.

Q73 · Multiple Choice · 1 mark · ★ · 1 paper

A spherical mirror and a thin spherical lens have each a focal length of –15 cm. The mirror and the lens are likely to be –

(a) both concave
(b) mirror concave and lens convex
(c) both convex
(d) mirror convex and lens concave

Source: KV Sitapur PT-II (2024-25), Q1 [X SCIENCE-merged, PDF p.10]

✓ Answer
(a) both concave. (NCERT exercise) Negative f: concave mirror and concave lens.

Q74 · Multiple Choice · 1 mark · ★ · 1 paper

A mirror magnifies the image of an object by –1.5 times. Which is true about the image?

Source: CBSE Competency Items (Ch 10 Light), Q7 [5-compressed, PDF p.421]

✓ Answer
The image is real, inverted and larger than the object (concave mirror).

⚠ **Note:** Options were cut in the text layer; answer written from the value m = –1.5.

Q75 · Multiple Choice · 1 mark · ★ · 1 paper

The focal length of the concave mirror in the experimental set-up shown equals

(a) 11.0 cm
(b) 12.2 cm
(c) 1.7 cm
(d) 10.3 cm

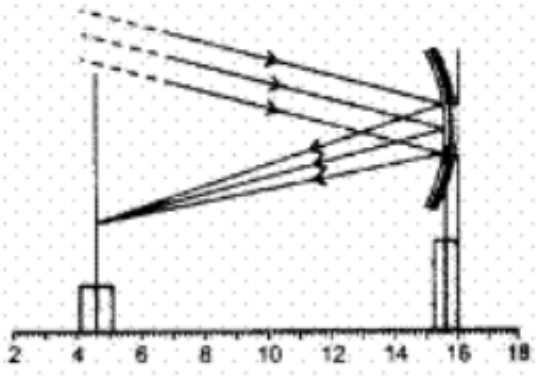


Figure from the question paper

Source: Sample Paper (F6), Q31 [6_compressed, PDF p.388]

✔ Answer
(a) 11.0 cm – mirror at 15.6 cm mark, screen at 4.6 cm mark: 15.6 – 4.6 = 11.0 cm.

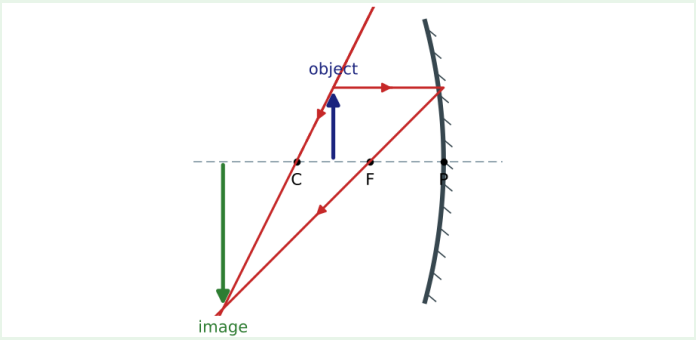
Very Short Answer

Q76 · Very Short Answer · 2 marks · ★ · 1 paper

An object of size 7.0 cm is placed 27 cm in front of a concave mirror of focal length 18 cm. At what distance should the screen be placed to get a sharp image? Find the size and nature of the image.

Source: Sample Paper (F8), Q24 [8_compressed, PDF p.53]

✔ Answer
u = –27, f = –18: 1/v = 1/f – 1/u = –1/18 + 1/27 = –1/54 ⇒ v = –54 cm (screen 54 cm in front of the mirror) [1]. m = –v/u = –2 ⇒ h′ = –14 cm: real, inverted, enlarged [1]. (NCERT exercise)



Q77 · Very Short Answer · 2 marks · ★ · 1 paper

A concave mirror produces two times magnified real image of an object placed at 20 cm in front of it. What is the position of the image?

Source: Sample Paper (F8), Q24 [8_compressed, PDF p.227]

✔ Answer
Real ⇒ m = –2 = –v/u ⇒ v = 2u = –40 cm. Image 40 cm in front of the mirror [2].

Short Answer

Q78 · Short Answer · 3 marks · ★ Board ×2 · 2 papers

A student has focussed the image of an object of height 3 cm on a white screen using a concave mirror of focal length 12 cm. If the distance of the object from the mirror is 18 cm, find (i) the distance of the image from the mirror (ii) the height of the image.

Source: CBSE 2023 31/2/1 Q31, 31/2/2 Q29, 31/2/3 Q30 [1-compressed, PDF p.17,196,221] | CBSE 2024 31/3/1 Q36(b), 31/3/2 Q34(b), 31/3/3 Q34(b) [1-compressed, PDF p.17,196,221]
Also asked as: 2024 31/3 asks the same with a 1.5 cm candle flame ⇒ v = –36 cm, h' = –3 cm.

✔ Answer
u = –18 cm, f = –12 cm. 1/v = 1/f – 1/u = –1/12 + 1/18 = –1/36 ⇒ v = –36 cm [1½]. m = –v/u = –36/18 = –2 ⇒ h' = –2 × 3 = –6 cm (inverted, 6 cm tall) [1½].

Q79 · Short Answer · 3 marks · ★ · 2 papers

A concave mirror produces three times magnified (enlarged) real image of an object placed at 10 cm in front of it. Where is the image located?

Source: KV Sitapur PT-I 2023, Q7 [X SCIENCE-merged, PDF p.13,56] | KVS Lucknow 1st Pre-Board, Q31 [X SCIENCE-merged, PDF p.13,56]
Also asked as: Old CBSE BRH/1 Q25: 3× real image, object 16 cm ⇒ v = –48 cm, f = –12 cm (with sign conventions). Vedantu SQP: object 20 cm, 3× image on screen ⇒ screen 60 cm from mirror, 40 cm from object.

✔ Answer
Real image ⇒ m = –3. m = –v/u ⇒ v = 3u = 3 × (–10) = –30 cm [2]. Image is 30 cm in front of the mirror, real and inverted [1]. (NCERT exercise Q)

Q80 · Short Answer · 3 marks · ★ · 2 papers

An object is placed at a distance of 10 cm from a convex mirror of focal length 15 cm. Find the position and nature of the image.

Source: KVS Lucknow 1st Pre-Board 2022-23, Q27 [X SCIENCE-merged, PDF p.17] | KVS Lucknow Pre-Board-2 2024-25, Q21 [X SCIENCE-merged, PDF p.22]
Also asked as: CBSE 2025 31/1/3 Q21 (Hindi page): object 10 cm from a CONCAVE mirror of focal length 15 cm ⇒ v = +30 cm, virtual, erect, 3× enlarged.

✔ Answer
u = –10 cm, f = +15 cm. 1/v = 1/f – 1/u = 1/15 + 1/10 = 5/30 ⇒ v = +6 cm [2]. Image is 6 cm behind the mirror; virtual, erect, diminished (m = +0.6) [1].

Q81 · Short Answer · 3 marks · ★ · 2 papers

An object 5 cm high is placed at a distance of 20 cm in front of a convex mirror of radius of curvature 30 cm. Find the nature, position and size of the image.

Source: KVS Lucknow Pre-Board-I 2023-24, Q29 [X SCIENCE-merged, PDF p.44] | KV Pre-Board (F5), Q33 [5-compressed, PDF p.256]

✔ Answer
f = +15 cm, u = –20 cm. 1/v = 1/15 + 1/20 = 7/60 ⇒ v = +8.57 cm [1½]. m = –v/u = 8.57/20 = +0.43 ⇒ h' = 0.43 × 5 = +2.14 cm [1]. Virtual, erect, diminished, behind the mirror [½].

Q82 · Short Answer · 3 marks · ★ · 2 papers

A concave mirror has a focal length of 20 cm. At what distance from the mirror should a 4 cm tall object be placed so that it forms a (real) image at a distance of 30 cm from the mirror? Also calculate the size of the image formed.

Source: KVS Lucknow Monthly Exam Oct 2024-25, Q14 [X SCIENCE-merged, PDF p.92] | KVS Delhi Pre-Board-II 2024-25, Q36(a) [X SCIENCE-merged, PDF p.92]

✔ Answer
f = –20 cm, v = –30 cm. 1/u = 1/f – 1/v = –1/20 + 1/30 = –1/60 ⇒ u = –60 cm [1½]. m = –v/u = –30/60 = –0.5 ⇒ h' = –2 cm (real, inverted, diminished) [1½].

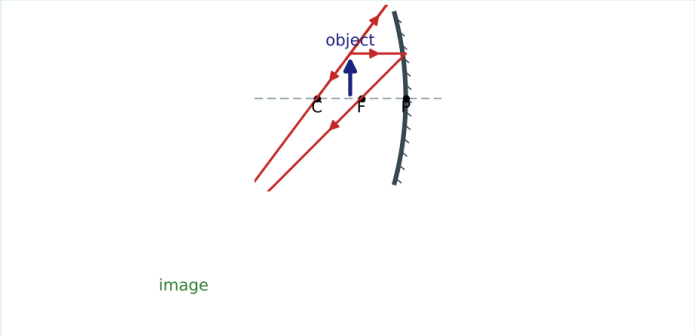
Q83 · Short Answer · 3 marks · ★ Board ×1 · 1 paper

A student wants to project the image of a candle flame on a screen 60 cm in front of a mirror by keeping the candle at a distance of 15 cm from its pole. (a) Name the type of mirror. (b) Calculate (i) magnification (ii) distance between object and image. (c) Draw a ray diagram.

Source: CBSE 2023 31/1/3, Q29 [1-compressed, PDF p.166]

✔ Answer

(a) Concave mirror (real image on screen) [½]. (b) (i) u = –15, v = –60 ⇒ m = –v/u = –4 [1]; (ii) 60 – 15 = 45 cm [½]. (c) Object between F and C (f = –12 cm), image beyond C, real, inverted, enlarged [1].



Q84 · Short Answer · 3 marks · ★ Board ×1 · 1 paper

The magnification produced when an object is placed at a distance of 20 cm from a spherical mirror is +1/2. Where should the object be placed to reduce the magnification to +1/3?

Source: CBSE 2023 31/4/3, Q29 [1-compressed, PDF p.444]

✔ Answer

m = +1/2 (erect, diminished) ⇒ convex mirror. v = –mu = –(1/2)(–20) = +10 cm; 1/f = 1/10 – 1/20 ⇒ f = +20 cm [1½].
For m = +1/3: v = –u/3; 1/f = 1/v + 1/u = –3/u + 1/u = –2/u = 1/20 ⇒ u = –40 cm. Object at 40 cm in front of the mirror [1½].

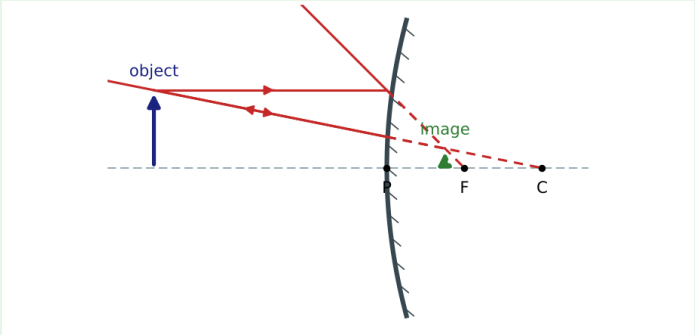
Q85 · Short Answer · 3 marks · ★ Board ×1 · 1 paper

(i) In which mirror can we always see the full image of a distant object? Support with a ray diagram. (ii) A convex mirror forms an erect image of an object one-third of the size of the object. Find the position of the object if the radius of curvature of the mirror is 30 cm.

Source: CBSE 2026 31/8/1, Q36(A) [4-compressed, PDF p.119]

✔ Answer

(i) Convex mirror – it always gives a diminished, erect image, so a large object fits [1]. Ray diagram [½].
(ii) f = +15 cm, m = +1/3 = –v/u ⇒ v = –u/3. 1/v + 1/u = –3/u + 1/u = –2/u = 1/15 ⇒ u = –30 cm. Object 30 cm in front of the mirror [1½].



Q86 · Short Answer · 3 marks · ★ · 1 paper

The image formed by a spherical mirror is real, inverted and its magnification is –2. If the image is at a distance of 30 cm from the mirror, where is the object placed? Find the focal length of the mirror. List two characteristics of the image formed if the object is moved 10 cm towards the mirror.

Source: KVS Lucknow Pre-Board-II 2023-24, Q30 [X SCIENCE-merged, PDF p.38]

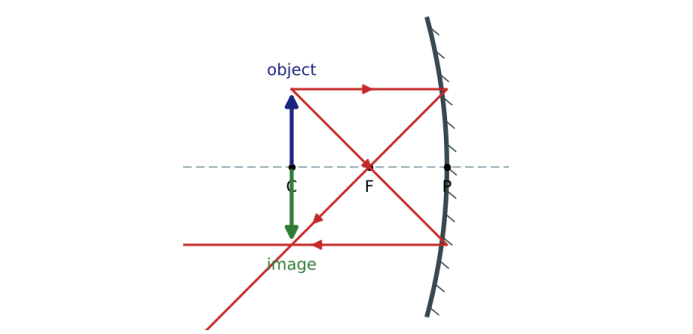
✔ Answer
v = –30 cm, m = –v/u = –2 ⇒ u = –15 cm [1]. 1/f = 1/v + 1/u = –1/30 – 1/15 = –3/30 ⇒ f = –10 cm (concave) [1]. Object moved to 5 cm (between P and F): image virtual, erect, enlarged, behind the mirror [1].

Q87 · Short Answer · 3 marks · ★ · 1 paper

A spherical mirror produces an image of magnification –1.0 on a screen placed at a distance of 30 cm from the pole. (i) Type of mirror? (ii) Focal length? (iii) Nature of image? (iv) Draw the ray diagram.

Source: KVS Lucknow Pre-Board SET-1, Q36 [X SCIENCE-merged, PDF p.50]

✔ Answer
(i) Concave [1]. (ii) m = –1 ⇒ u = v = –30 cm (object at C); f = R/2 = –15 cm [2]. (iii) Real, inverted, same size [1]. (iv) Ray diagram with object and image at C [1].

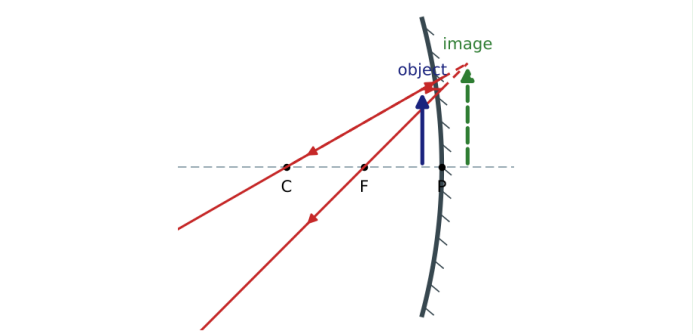


Q88 · Short Answer · 3 marks · ★ · 1 paper

A 10 cm long pencil is placed 5 cm in front of a concave mirror having a radius of curvature of 40 cm. (i) Determine the position of the image. (ii) What is the size of the image? (iii) Draw a ray diagram.

Source: KVS Lucknow 1st Pre-Board 2024-25, Q35 OR [X SCIENCE-merged, PDF p.32]

✔ Answer
f = –20 cm, u = –5 cm. 1/v = 1/f – 1/u = –1/20 + 1/5 = 3/20 ⇒ v = +6.67 cm (behind the mirror) [2]. m = –v/u = +1.33 ⇒ h' = +13.3 cm, virtual, erect, enlarged [1]. Ray diagram [2].



Q89 · Short Answer · 3 marks · ★ · 1 paper

A 2 cm tall object gives a real image 3 cm tall when placed 16 cm in front of a concave mirror. Find (i) the position of the image (ii) the focal length of the mirror.

Source: Sample Paper (F8), Q36 OR [8_compressed, PDF p.87,120]

✔ Answer
m = h'/h = –3/2 = –1.5 = –v/u ⇒ v = 1.5u = –24 cm [1½]. 1/f = 1/v + 1/u = –1/24 – 1/16 = –5/48 ⇒ f = –9.6 cm [1½].

Q90 · Short Answer · 3 marks · ★ · 1 paper

Smriti is looking at herself in a convex mirror in a science museum, standing 2 m away from the mirror. Her image appears to be around half her actual height. Estimate the focal length of the mirror.

Source: CBSE Competency Items (Light), Q12 [4-compressed, PDF p.761]

✔ Answer

u = –2 m, m = +1/2 = –v/u ⇒ v = +1 m [1½]. 1/f = 1/v + 1/u = 1 – 1/2 = 1/2 ⇒ f = +2 m [1½].

Long Answer

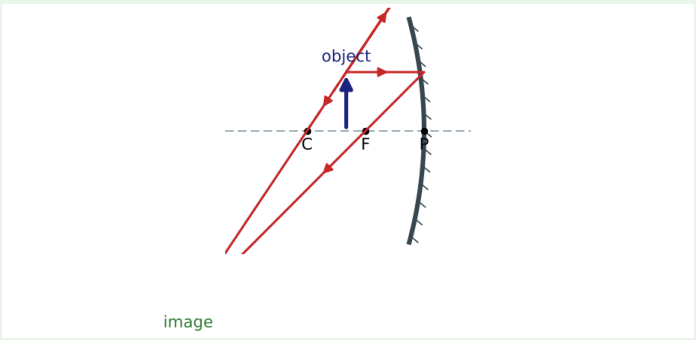
Q91 · Long Answer · 5 marks · ★ Board ×1 · 1 paper

List the sign conventions for reflection of light by spherical mirrors. Draw a diagram and apply these conventions in the determination of focal length of a spherical mirror which forms a three times magnified real image of an object placed 16 cm in front of it.

Source: CBSE (old) BRH/1 31/1, Q25 [Merged OCR, PDF p.10,50]

✔ Answer

Sign conventions: object on left; distances measured from pole; along incident light +, opposite –; heights above axis +, below – [2].
m = –3, u = –16 cm ⇒ v = 3u = –48 cm; 1/f = 1/v + 1/u = –1/48 – 1/16 = –4/48 ⇒ f = –12 cm, concave mirror [2]. Diagram [1].



Q92 · Long Answer · 5 marks · ★ · 1 paper

What are the Cartesian sign conventions used for spherical mirrors? What is the mirror formula?
OR A student has three concave mirrors A, B and C of focal lengths 20 cm, 15 cm and 10 cm. For each he tries object distances of 30 cm, 10 cm and 20 cm. (i) Which mirror forms an image equal in size to the object? Give one object distance. (ii) Which mirror would be preferred for shaving? (iii) For mirror B draw ray diagrams for any two object distances.

Source: Sample Paper (F8), Q36 [8_compressed, PDF p.23]

✔ Answer

Sign conventions: object on the left; all distances from the pole; distances along the incident light +, against it –; heights above the axis +, below – [3]. Mirror formula 1/v + 1/u = 1/f [2].
OR (i) Mirror B with u = 30 cm (= 2f) and mirror C with u = 20 cm (= 2f) [2]. (ii) Mirror A – an object at 10 cm is within its focal length (20 cm), giving an erect, enlarged image [1]. (iii) Mirror B: u = 30 cm (at C – same size, real, inverted); u = 10 cm (inside F – virtual, erect, enlarged) [2].



Case / Source-based

Q93 · Case / Source-based · 4 marks · ★ Board ×2 · 2 papers

(Case on concave mirror – sun's image on cardboard / principal focus) (c) OR: An object 10 cm in size is placed at 100 cm in front of a concave mirror. If its image is formed at the same point where the object is located, find (i) focal length of the mirror, and (ii) magnification of the image with sign.

Source: CBSE 2023 31/1/1 Q39, 31/1/2 Q37, 31/1/3 Q38 (c) OR [1-compressed, PDF p.112,142,174] | CBSE VI 31(B)/S, CDBA/S, Q39(c)(ii) [1-compressed, PDF p.112,142,174]
Also asked as: CDBA/S version: 3 cm candle flame at 40 cm ⇒ f = –20 cm, m = –1.

✔ Answer
Image at the object ⇒ object at C: u = v = –100 cm, R = 100 cm ⇒ f = –50 cm [1]. m = –v/u = –1 (real, inverted, same size) [1].

Q94 · Case / Source-based · 4 marks · ★ Board ×1 · 1 paper

(Case: a student directs a concave mirror towards the sun ...) (c)(i) List two properties of the image formed by a concave mirror of focal length 15 cm when the object distance is (1) 20 cm (2) 10 cm.

Source: CBSE VI 31(B)/S, CDBA/S, Q39(c)(i) [1-compressed, PDF p.17,27,565]

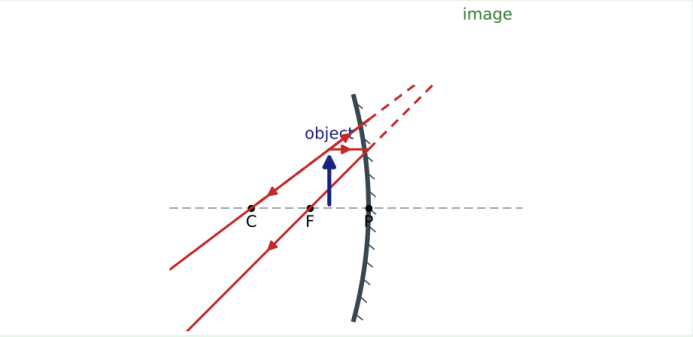
✔ Answer
(1) Object between F and C: image real, inverted, enlarged, beyond C [1]. (2) Object between P and F: image virtual, erect, enlarged, behind the mirror [1].

Q95 · Case / Source-based · 4 marks · ★ Board ×1 · 1 paper

A student took three concave mirrors of different focal lengths and placed an object at different distances: Case I: u = 45 cm, f = 20 cm; Case II: u = 30 cm, f = 15 cm; Case III: u = 20 cm, f = 30 cm. (a) List two properties of the image formed in Case I. (b) In which case will the mirror form a real image of the same size, and why? (c) Name the type of mirror used by dentists and give reason. OR (c) Which case resembles the use of a concave mirror as a shaving mirror? Draw a ray diagram.

Source: CBSE 2023 31/6/2 Q37, 31/6/3 Q37 [9-compressed-1-64 OCR, PDF p.27,59]

✔ Answer
(a) Object beyond C (45 > 40): image real, inverted, diminished, between F and C [1].
(b) Case II – object at C (30 = 2 × 15), so image at C, same size [1].
(c) Concave mirror – erect, enlarged image of teeth [2]. OR Case III – object (20 cm) within f (30 cm): virtual, erect, enlarged image; ray diagram [2].



Q96 · Case / Source-based · 4 marks · ★ · 1 paper

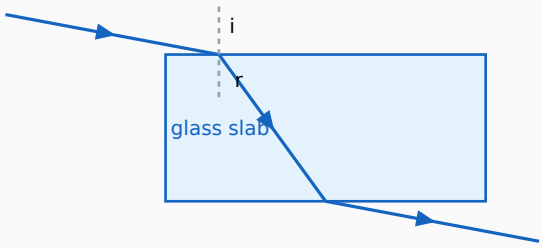
A concave mirror forms an image of an object thrice its size on a screen. (a) Describe the nature of the image. (b) If the object is at X distance from the pole, find the image distance. (c) Write the relation between u, v and f if R is the radius of curvature. OR (d) Two uses of a concave mirror.

Source: KV Pre-Board (F5), Q38 [5-compressed, PDF p.554]

✔ Answer
(a) On a screen ⇒ real and inverted, enlarged (m = –3) [1]. (b) v = 3X in front of the mirror (v = –3X) [1]. (c) 1/v + 1/u = 1/f = 2/R [2]. OR (d) shaving mirror, dentist's mirror / headlights [2].

⚠ **Note:** The source writes m = size of object / size of image – a typing error; m = h'/h. Corrected here.

Theme B · Refraction and refractive index



Picture it
• Air → glass: bends towards the normal (r < i).
• Glass → air: bends away from the normal.
• Emergent ray ∥ incident ray (∠i = ∠e), shifted sideways.
• n = c/v = sin i/sin r ; $n_{21} = v_1/v_2$

Laws of refraction and the glass slab

24 questions · 15 board appearances · Prepared by Abhishek Das, TGT (Science)

Multiple Choice

Q97 · Multiple Choice · 1 mark · ★ · 2 papers

A light ray enters from medium A to medium B as shown in the figure. The refractive index of medium B relative to A will be

(a) greater than unity
(b) less than unity
(c) equal to unity
(d) zero

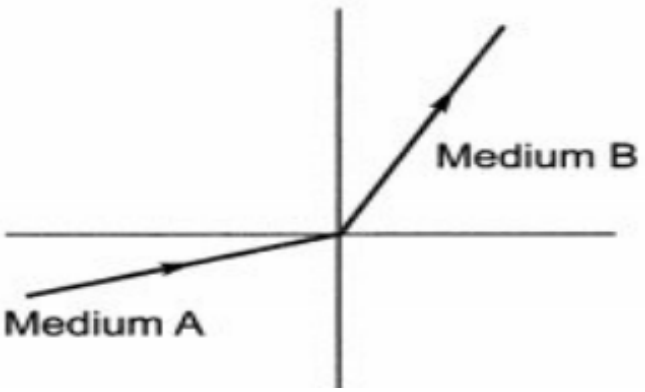


Figure from the question paper

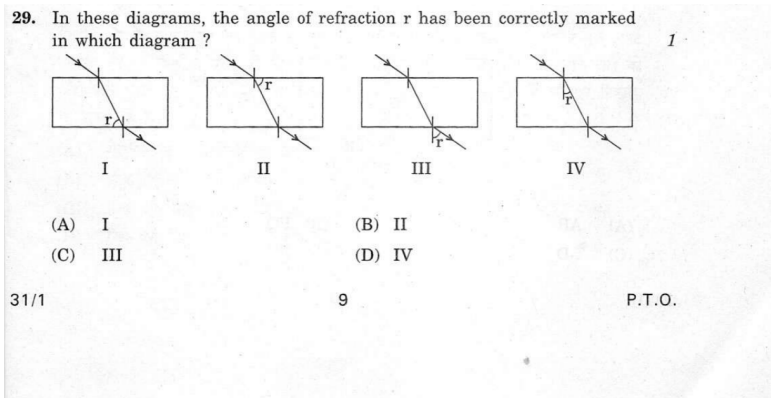
Source: KVS Lucknow Pre-Board SET-1, Q9 [X SCIENCE-merged, PDF p.48,87] | KVS Delhi Pre-Board-II 2024-25, Q11 [X SCIENCE-merged, PDF p.48,87]

✔ Answer
(a) greater than unity. In medium B the ray bends towards the normal, so B is optically denser than A; n_BA = v_A / v_B > 1.

Q98 · Multiple Choice · 1 mark · ★ Board ×1 · 1 paper

In these diagrams, the angle of refraction r has been correctly marked in which diagram?

(a) I
(b) II
(c) III
(d) IV


29. In these diagrams, the angle of refraction r has been correctly marked in which diagram ? 1

I II III IV

(A) I (B) II
(C) III (D) IV

31/1 9 P.T.O.

Figure from the question paper

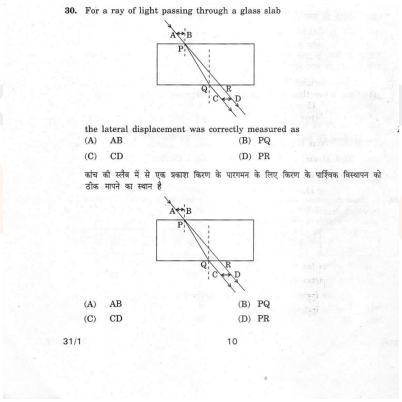
Source: CBSE (old) 31/1 RHB, Q29 [6_compressed, PDF p.199]

✔ Answer
(B) II – r is the angle between the refracted ray inside the slab and the normal at the point of incidence.

Q99 · Multiple Choice · 1 mark · ★ Board ×1 · 1 paper

For a ray of light passing through a glass slab, the lateral displacement was correctly measured as

(a) AB (b) PQ
(c) CD (d) PR


30. For a ray of light passing through a glass slab

the lateral displacement was correctly measured as
(A) AB (B) PQ
(C) CD (D) PR

31/1 10

Figure from the question paper

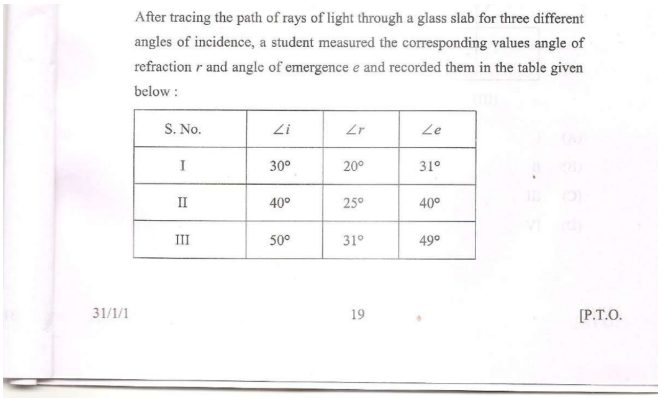
Source: CBSE (old) 31/1 RHB, Q30 [6_compressed, PDF p.200]

✔ Answer
(C) CD – the distance between the emergent ray and the incident ray produced, measured at the exit side.

⚠ **Note:** Lateral displacement is strictly the perpendicular distance between the two parallel rays; of the four, CD is the one drawn between them.

Q100 · Multiple Choice · 1 mark · ★ Board ×1 · 1 paper

After tracing the path of rays through a glass slab for three angles of incidence, a student recorded: I – 30°, 20°, 31°; II – 40°, 25°, 40°; III – 50°, 31°, 49° (∠i, ∠r, ∠e). The correct observations are:



After tracing the path of rays of light through a glass slab for three different angles of incidence, a student measured the corresponding values angle of refraction r and angle of emergence e and recorded them in the table given below :

S. No.	$\angle i$	$\angle r$	$\angle e$
I	30°	20°	31°
II	40°	25°	40°
III	50°	31°	49°

31/1/1 19 [P.T.O.

Figure from the question paper

Source: CBSE (old) 31/1/1, Q32 (OCR) [6_compressed, PDF p.123]

✔ Answer

All three are acceptable: ∠e = ∠i within 1° and sin i/sin r ≈ 1.5 in each (1.46, 1.52, 1.49) – i.e. I, II and III.

⚠ **Note:** Option letters were not readable in the scan. If your options are 'I and II / II and III / I and III / I, II and III', mark 'I, II and III'.

Q101 · Multiple Choice · 1 mark · ★ Board ×1 · 1 paper

Rahim recorded: I – 45°, 41°, 45°; II – 40°, 38°, 38°; III – 45°, 41°, 40°; IV – 41°, 45°, 41° (angle of incidence, refraction, emergence). The correct observation is recorded at serial number:

(a) I
(b) II
(c) III
(d) IV

Source: CBSE (old) 31/1/1, Q (OCR) [6_compressed, PDF p.183]

✔ Answer

(1) I – ∠e = ∠i and ∠r < ∠i. (II and III have ∠e ≠ ∠i; IV has ∠r > ∠i, impossible from air to glass.)

Q102 · Multiple Choice · 1 mark · ★ Board ×1 · 1 paper

Four students A, B, C and D traced the paths of incident ray and emergent ray by fixing pins P, Q (incident) and R, S (emergent) for a ray passing through a glass slab. The correct emergent ray was traced by the student:

(a) A
(b) B
(c) C
(d) D

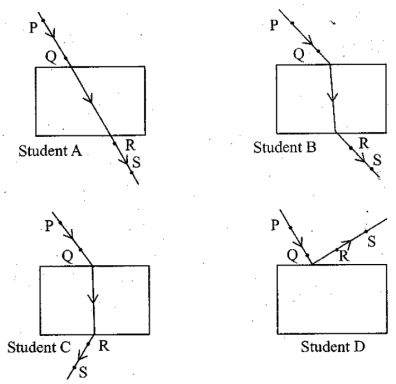


Figure from the question paper

Source: CBSE (old) 31/1/1, Q29 (OCR) [6_compressed, PDF p.181]

✔ Answer

(2) B – the emergent ray RS is parallel to the incident ray PQ and shifted sideways.

Q103 · Multiple Choice · 1 mark · ★ · 1 paper

When light passes from air into water, it undergoes:

(a) Refraction
(b) Reflection
(c) Diffraction
(d) Dispersion

Source: KV Sitapur PT-I 2024, Q4 [X SCIENCE-merged, PDF p.6]

✔ Answer
(a) Refraction.

Q104 · Multiple Choice · 1 mark · ★ · 1 paper

Which law describes the relationship between the angles of incidence and refraction?

(a) Law of reflection
(b) Snell's law
(c) Law of conservation of energy
(d) Newton's law

Source: KV Sitapur PT-2 2024-25, Q7 [X SCIENCE-merged, PDF p.1]

✔ Answer
(b) Snell's law.

Q105 · Multiple Choice · 1 mark · ★ · 1 paper

Which of the following statement is incorrect? A. A ray from optically rarer to denser medium bends away from the normal. B. A ray from denser to rarer bends away from the normal. C. A ray from rarer to denser bends towards the normal. D. A ray from denser to rarer bends towards the normal.

(a) A, B and D
(b) B and C
(c) A and C
(d) A and D

Source: Sample Paper (F6), Q31 [6_compressed, PDF p.360]

✔ Answer
(d) A and D are incorrect.

Q106 · Multiple Choice · 1 mark · ★ · 1 paper

When an incident ray of light enters a medium from air, it bends towards the normal. Which is TRUE about the refractive index of the medium (n_m) compared to air (n_a)?

Source: CBSE Competency Items (Light), Q2 [4-compressed, PDF p.758]

✔ Answer
n_m is more than n_a.

Assertion-Reason

Q107 · Assertion-Reason · 1 mark · ★ Board ×1 · 1 paper

Assertion (A): For a medium of given refractive index, the value of the angle of refraction corresponding to an angle of incidence is not a constant.
Reason (R): With change in angle of incidence, the value of angle of refraction changes. Hence, the ratio of sine of angle of incidence to sine of angle of refraction remains constant.

(a) Both A and R are true and R is the correct explanation of A. (b) Both A and R are true but R is not the correct explanation of A. (c) A is true but R is false. (d) A is false but R is true.

Source: CBSE 2026 31/7/1, Q32 [4-compressed, PDF p.44,58,82]

✔ Answer
(a) Both A and R are true and R is the correct explanation of A.

⚠ **Note:** Strictly, R does not prove A; the CBSE key reported is (a). Check the marking scheme.

Very Short Answer

Q108 · Very Short Answer · 2 marks · ★★ Board ×2 · 3 papers

Write the two laws of refraction of light.

Source: KV Sitapur PT-I 2023, Q6 [X SCIENCE-merged, PDF p.13] | CBSE (old) BRH/2 31/2/1, Q25 OR [Merged OCR, PDF p.50] | CBSE (old) BRH/1 31/1, Q25 OR [Merged OCR, PDF p.10]

✔ Answer

(i) The incident ray, the refracted ray and the normal to the interface at the point of incidence all lie in the same plane [1]. (ii) The ratio of sine of angle of incidence to the sine of angle of refraction is a constant for a given colour of light and given pair of media (Snell's law): sin i / sin r = constant [1].

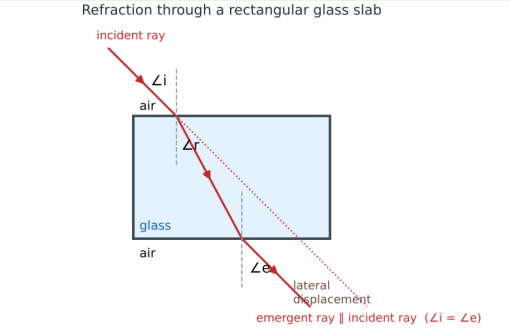
Q109 · Very Short Answer · 2 marks · ★ Board ×1 · 2 papers

"A ray of light incident on a rectangular glass slab immersed in any medium emerges parallel to itself." Draw a labelled ray diagram to justify the statement.

Source: CBSE (old) 31/1, Q (OCR) [6_compressed, PDF p.108] | Sample Paper (F5), Q27 [5-compressed, PDF p.243]

✔ Answer

At the first face light bends from medium into glass and at the second face from glass into the same medium; the bending at the two parallel faces is equal and opposite, so ∠e = ∠i and the emergent ray is parallel to the incident ray (laterally shifted) [1 + 1 diagram].



Q110 · Very Short Answer · 2 marks · ★ Board ×1 · 1 paper

When a ray of light passes from water to air, (I) will the angle of refraction in air (r) be greater or less than the angle of incidence in water (i)? (II) When we increase the angle of incidence in water, will r increase or decrease? What is the limiting value of r?

Source: CBSE VI 2026 31(B), LMNK2, Q34(b) [1-compressed, PDF p.77]

✔ Answer

(I) r > i, because light bends away from the normal going from denser (water) to rarer (air) medium [1]. (II) r increases; its limiting value is 90° [1].

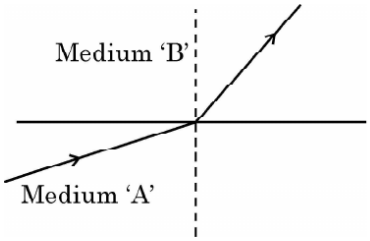
⚠ **Note:** 'Limiting value' (critical angle idea) is beyond NCERT text; answer only as far as r = 90°.

Q111 · Very Short Answer · 2 marks · ★ Board ×1 · 1 paper

A light ray enters from medium A to medium B as shown in the figure. (a) Which one of the two media is denser w.r.t. the other? Justify. (b) If the speed of light in medium A is v_1 and in medium B is v_2, what is the refractive index of B with respect to A?

OR (a) A ray of light from diamond is incident on the interface between diamond and water. Draw a labelled ray diagram. (b) Absolute refractive indices of diamond and water are 2.42 and 1.33. Find the refractive index of water w.r.t. diamond.

22. A light ray enters from medium A to medium B as shown in the figure.



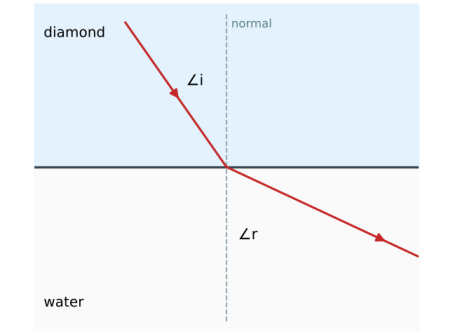
(a) Which one of the two media is denser w.r.t. other medium ? Justify.

Figure from the question paper

Source: CBSE 2023 31/6/2 Q22, 31/6/3 Q22 [9-compressed-1-64 OCR, PDF p.17,51]

✔ Answer

(a) Medium B is denser – the ray bends towards the normal on entering B (angle of refraction < angle of incidence) [1].
(b) n_BA = speed of light in A / speed of light in B = v_1/v_2 [1].
OR (a) Ray from diamond (denser) into water (rarer) bends away from the normal [1]. (b) n(water w.r.t. diamond) = 1.33/2.42 = 0.55 [1].



Q112 · Very Short Answer · 2 marks · ★ Board ×1 · 1 paper

When an incident ray of light enters a medium X from medium Y, it bends away from the normal. Comment on (a) the speed of light in X with respect to Y, (b) the optical density of X with respect to Y. Give reasons.

Source: CBSE 2026 31/5/3, Q33 [4-compressed, PDF p.546]

✔ Answer

(a) Speed in X is more than in Y [1]. (b) X is optically rarer than Y – a ray bends away from the normal when it goes from a denser to a rarer medium, where it travels faster [1].

Q113 · Very Short Answer · 2 marks · ★ NEW · 1 paper

Why does a pencil partly dipped in water in a glass tumbler appear to be bent at the surface of water?

Source: NEW – based on NCERT text (refraction) [—]

✔ Answer

Light from the part of the pencil inside water travels from water (denser) to air (rarer) and bends away from the normal at the surface. So the part under water appears raised and the pencil looks bent [2].

Q114 · Very Short Answer · 2 marks · ★ · 1 paper

State Snell's law of refraction of light. Write an expression for the absolute refractive index of a medium in terms of speed of light.

Source: Sample Paper (F6), Q33 [6_compressed, PDF p.360]

✔ Answer

Snell's law: the ratio of sine of angle of incidence to the sine of angle of refraction is a constant for light of a given colour and a given pair of media, sin i/sin r = constant [1]. Absolute refractive index n = c/v (speed of light in vacuum / speed in the medium) [1].

Q115 · Very Short Answer · 2 marks · ★ · 1 paper

The ray of light emerging from a rectangular glass slab into air is shown (along the normal). Copy the diagram and draw the path of the same ray as it enters from air and passes through the slab.

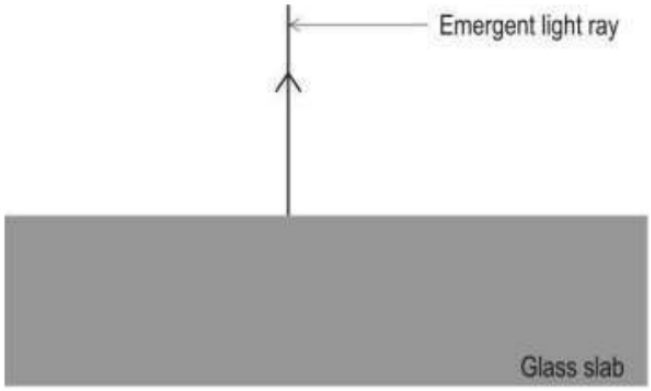


Figure from the question paper

Source: CBSE Competency Focused Practice Qs, Q148 [6_compressed, PDF p.80]

✔ Answer

The emergent ray is along the normal, so inside the slab it also travels along the normal, and it must have entered the slab along the normal (angle of incidence 0°) – a straight vertical line with no bending [2].

Short Answer

Q116 · Short Answer · 3 marks · ★ Board ×2 · 2 papers

(a) Observe the given ray diagram and compare (i) the speed of light in medium A and medium B; (ii) the optical densities of medium B and medium C. (b) Draw a ray diagram for refraction where the optical density of A becomes equal to C and B is greater than both.

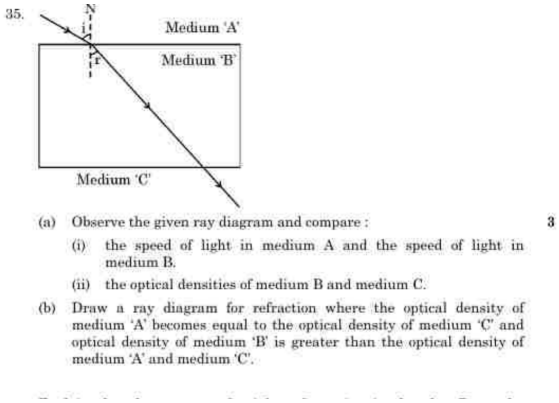


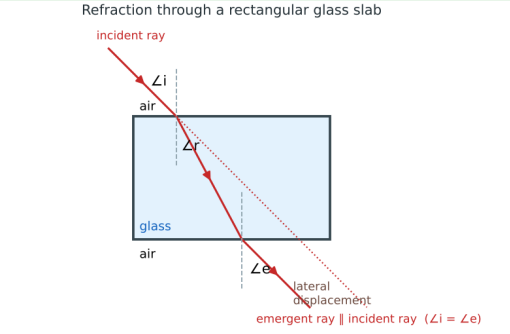
Figure from the question paper

Source: CBSE 2026 31/4/1, Q35 [4-compressed, PDF p.388] | CBSE 2026 31/4/2, Q36 [4-compressed, PDF p.420]

✔ Answer

(a)(i) From A to B the ray bends towards the normal, so B is denser: speed in A > speed in B [1]. (ii) From B to C the ray goes on without bending, so optical density of B = optical density of C [1].

(b) Like a glass slab in air: ray bends towards the normal in B and away in C; emergent ray parallel to incident ray [1].



Q117 · Short Answer · 3 marks · ★ · 1 paper

A light ray is incident on the wall of a glass tank filled with water as shown. Draw a rough diagram of the path of the ray as it passes through the glass tank and the water and emerges again into air. Draw the normal at each interface.

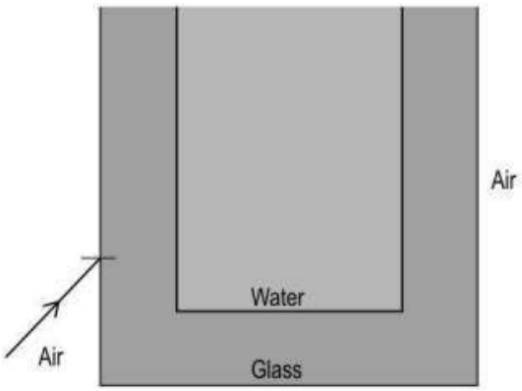


Figure from the question paper

Source: CBSE Competency Focused Practice Qs, Q153 [6_compressed, PDF p.81]

✔ Answer

Air → glass: bends towards the normal. Glass → water: bends away from the normal (water is rarer than glass). Water → glass: towards the normal. Glass → air: away from the normal; the final ray is parallel to the incident ray (all faces parallel) [3].

Q118 · Short Answer · 3 marks · ★ · 1 paper

A pencil dipped in water in a glass tumbler appears bent at the interface of air and water. Will the pencil appear bent to the same extent if, instead of water, we use liquids like kerosene or turpentine? Support with reasons.

Source: Sample Paper (F8), Q31 [8_compressed, PDF p.102]

✔ Answer

No [1]. The bending is due to refraction, and the amount of bending depends on the refractive index of the liquid. Kerosene and turpentine have refractive indices different from (higher than) water, so the pencil appears bent by a different (larger) amount [2].

Long Answer

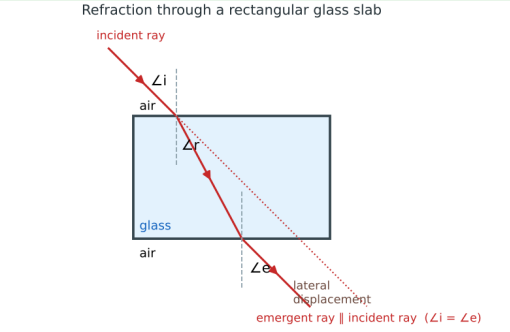
Q119 · Long Answer · 5 marks · ★ · 1 paper

(a) Show the course of a light ray through a rectangular glass slab. Mark the various angles and rays.
(b) The refractive indices of media A, B, C, D are 1.3, 1.7, 1.4 and 1.5. In which medium is the angle of refraction (i) minimum (ii) maximum (for the same angle of incidence from air)?

Source: KVS Lucknow Pre-Board-I 2023-24, Q36 [X SCIENCE-merged, PDF p.45]

✔ Answer

(a) Diagram: incident ray bends towards normal on entering glass, away from normal on leaving; emergent ray parallel to incident ray, laterally shifted; mark i, r, e (i = e) [3].
(b) Higher n ⇒ more bending ⇒ smaller r. (i) Minimum r in B (1.7) (ii) Maximum r in A (1.3) [2].



Case / Source-based

Q120 · Case / Source-based · 4 marks · ★ Board ×1 · 1 paper

Two students performed refraction through a glass slab and through a prism ... (a) When white light passes through a glass slab it does not show dispersion, while it shows dispersion through a prism. Why? (b) Why do we get a spectrum when white light passes through tiny water droplets? (c)(i) For a given pair of media, if we change the angle of incidence gradually, will it change the speed of light in that medium? OR (c)(ii) Calculate the speed of light in a medium if the angle of incidence in air is 60° and angle of refraction in the medium is 30°. (speed in air = 3×10^8 m/s)

Source: CBSE 2026 31/7/1, Q38 [4-compressed, PDF p.46,60,86]

✔ Answer

(a) In a slab the two faces are parallel, so colours separated at the first face recombine at the second face and come out parallel [1]. (b) Droplets act like small prisms – dispersion (Ch 10) [1].
(c)(i) No. Speed of light depends only on the medium (its refractive index), not on the angle of incidence [2].
OR (ii) $n = \sin 60°/\sin 30° = (\sqrt{3}/2)/(1/2) = \sqrt{3} = 1.732$; $v = c/n = 3 \times 10^8/1.732 = 1.73 \times 10^8$ m/s [2].

⚠ **Note:** Part (b) belongs to Ch 10; kept because the case is mainly about refraction.

Refractive index and speed of light

21 questions · 11 board appearances · Prepared by Abhishek Das, TGT (Science)

Multiple Choice

Q121 · Multiple Choice · 1 mark · ★ Board ×2 · 2 papers

If the absolute refractive indices of two media X and Y are 6/4 and 5/3 respectively, then the refractive index of Y with respect to X will be:

(a) 10/9
(b) 9/10
(c) 9/8
(d) 8/9

Source: CBSE 2025 31/2/1, Q11 [2-compressed, PDF p.346] | CBSE 2025 31/2/3, Q13 [2-compressed, PDF p.488]

✔ **Answer**
(A) 10/9. n_YX = n_Y/n_X = (5/3)/(6/4) = 20/18 = 10/9.

Q122 · Multiple Choice · 1 mark · ★ Board ×1 · 1 paper

Absolute refractive index of glass and water is 3/2 and 4/3 respectively. If the speed of light in glass is 2×10^8 m/s, the speed of light in water is:

(a) $9/4 \times 10^8$ m/s
(b) $5/2 \times 10^8$ m/s
(c) $7/3 \times 10^8$ m/s
(d) $16/9 \times 10^8$ m/s

Source: CBSE 2024 31/4/1, Q13 [1-compressed, PDF p.385]

✔ **Answer**
(A) $9/4 \times 10^8$ m/s = 2.25×10^8 m/s. c = $1.5 \times 2 \times 10^8 = 3 \times 10^8$; v_water = c ÷ 4/3 = 2.25×10^8 m/s.

⚠ **Note:** Fractions in the options were broken in the text layer; read as 9/4, 5/2, 7/3, 16/9 (the numerators/denominators printed beside them).

Q123 · Multiple Choice · 1 mark · ★ · 1 paper

Which of the following statement is/are true? A. The speed of all colours is the same in air or vacuum. B. The speed of all colours is different in denser media. C. Speed of light in air is 3×10^8 m/s. D. Refractive index has no unit.

(a) A and B
(b) B and D
(c) All of these
(d) A, B and C

Source: Sample Paper (F6), Q30 [6_compressed, PDF p.327]

✔ **Answer**
(c) All of these.

Assertion-Reason

Q124 · Assertion-Reason · 1 mark · ★ Board ×1 · 1 paper

Assertion (A): When light passes from one medium to another medium, the speed of light may increase or decrease.
Reason (R): Refractive index of one medium with respect to the other medium may be greater or less than 1.

(a) Both A and R are true and R is the correct explanation of A. (b) Both A and R are true but R is not the correct explanation of A. (c) A is true but R is false. (d) A is false but R is true.

Source: CBSE VI 2026 31(B), LMNK2, Q32 [1-compressed, PDF p.75]

✔ **Answer**
(a) Both A and R are true and R is the correct explanation of A ($n_{21} = v_1/v_2$).

Q125 · Assertion-Reason · 1 mark · ★ · 1 paper

Assertion (A): The refractive index of water is greater than that of glass.
Reason (R): The speed of light is more in water than in glass.

(a) Both A and R are true and R is the correct explanation of A. (b) Both A and R are true but R is not the correct explanation of A. (c) A is true but R is false. (d) A is false but R is true.

Source: KVS Lucknow Pre-Board 2025-26 (B), Q32 [X SCIENCE-merged, PDF p.83]

✔ **Answer**
(d) A is false but R is true. (n water 1.33 < n glass 1.5; light is faster in water.)

Very Short Answer

Q126 · Very Short Answer · 2 marks · ★ Board ×1 · 1 paper

With the help of the given ray diagram, calculate the refractive index of Medium 2 with respect to Medium 1. (Given that √3 = 1·732)

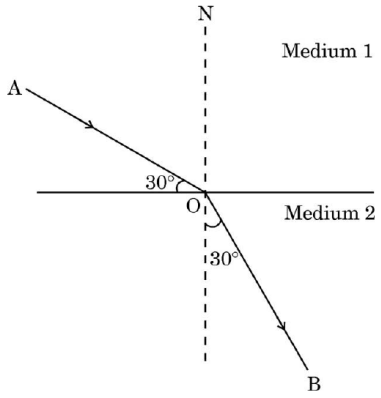


Figure from the question paper

Source: CBSE 2026 31/2/1, Q33 [2-compressed, PDF p.333]

✔ Answer

The incident ray AO makes 30° with the surface, so angle of incidence i = 90° – 30° = 60° [½]. The refracted ray OB makes 30° with the normal, so r = 30° [½].
n_{21} = sin i / sin r = sin 60° / sin 30° = (√3/2)/(1/2) = √3 = 1.732 [1].

Q127 · Very Short Answer · 2 marks · ★ Board ×1 · 1 paper

(a) Relate the speed of light in a medium with its optical density. (b) Speeds of light: A 2.25×10^8, B 2×10^8, C 2.08×10^8 m/s. Arrange A, B and C in ascending order of optical density.

Source: CBSE 2026 31/5/1, Q33 [4-compressed, PDF p.482]

✔ Answer

(a) Greater the optical density (refractive index), smaller the speed of light: v = c/n [1]. (b) A < C < B [1].

Q128 · Very Short Answer · 2 marks · ★ Board ×1 · 1 paper

(a) Define absolute refractive index of an optical medium. (b) Refractive indices: A 1.50, B 1.46, C 1.31, D 1.77. Arrange these in increasing order of speed of light through them.

Source: CBSE 2026 31/5/2, Q33 [4-compressed, PDF p.516]

✔ Answer

(a) n = speed of light in vacuum / speed of light in the medium [1]. (b) D < A < B < C (larger n, smaller speed) [1].

Q129 · Very Short Answer · 2 marks · ★ · 1 paper

What is refractive index? Describe the medium of refraction (optically denser and rarer medium).

Source: KV Sitapur PT-2 2024-25, Q18 [X SCIENCE-merged, PDF p.2]

✔ Answer

Refractive index of medium 2 w.r.t. medium 1, n_{21} = speed of light in medium 1 / speed of light in medium 2 [1]. A medium with larger refractive index is optically denser; light travels slower in it and bends towards the normal on entering it; the other is optically rarer [1].

Q130 · Very Short Answer · 2 marks · ★ · 1 paper

Define absolute refractive index. Determine the speed of light in diamond if its refractive index with respect to vacuum is 2.42 ($c = 3 \times 10^8$ m/s).

Source: Sample Paper (F5), Q26 [5-compressed, PDF p.301]

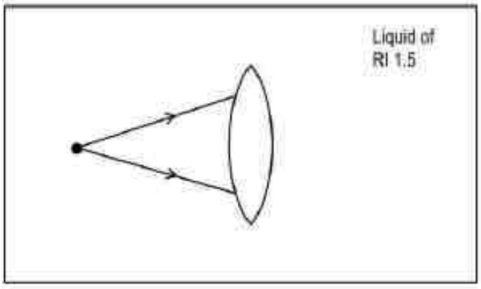
✔ Answer

n = c/v [1]. v = 3×10^8 / 2.42 = 1.24×10^8 m/s [1].

Q131 · Very Short Answer · 2 marks · ★ · 1 paper

A lens made of material of refractive index 1.5 is immersed in a liquid of refractive index 1.5. Two rays are incident on the lens (figure). Copy the diagram and draw the rays after they pass through the lens. Justify.

The diagram below shows two rays incident on the lens when it is immersed in the liquid.



Copy the diagram and draw the light rays after they pass through the lens. Justify your

Figure from the question paper

Source: CBSE Competency Items (Light), Q17 [4-compressed, PDF p.762]

✔ Answer

The rays go straight through without any bending [1]. Lens and liquid have the same refractive index, so there is no refraction at the surfaces – the lens behaves like the liquid itself [1].

Short Answer

Q132 · Short Answer · 3 marks · ★ Board ×1 · 1 paper

State the law of refraction that defines the refractive index of a medium with respect to the other. Express it mathematically. How is the refractive index of A w.r.t. B related to the speed of light in A and B? The refractive indices of glass and water w.r.t. vacuum are 3/2 and 4/3. If the speed of light in glass is 2×10^8 m/s, find the speed of light in (i) vacuum (ii) water.

Source: CBSE (old) BRH/1 31/1, Q25 OR [Merged OCR, PDF p.10]

✔ Answer

Snell's law: sin i / sin r = constant = n_{21} [1]. n_AB = v_B / v_A [1]. (i) c = 3/2 × 2 × 10^8 = 3 × 10^8 m/s; (ii) v_w = 3 × 10^8 × 3/4 = 2.25 × 10^8 m/s [1].

⚠ **Note:** Same numerical as the 2024 31/4 case (iii)(B).

Q133 · Short Answer · 3 marks · ★ Board ×1 · 1 paper

The refractive index of a medium x with respect to y is 2/3 and the refractive index of medium y with respect to z is 4/3. Calculate the refractive index of medium z with respect to x.

Source: CBSE (old) BRH/2 31/2/1, Q25 OR [Merged OCR, PDF p.10,50]

✔ Answer

$n_{xy} \times n_{yz} = n_{xz} = 2/3 \times 4/3 = 8/9$ [2]. $n_{zx} = 1/n_{xz} = 9/8 = 1.125$ [1].

Q134 · Short Answer · 3 marks · ★ Board ×1 · 1 paper

Define 'refractive index of a transparent medium'. What is its unit? Which has a higher refractive index, glass or water?

Source: CBSE (old) 31/1, Q17 (OCR) [6_compressed, PDF p.173]

✔ Answer

Refractive index of a medium = speed of light in vacuum (air) / speed of light in the medium [1]. It has no unit (ratio of two speeds) [1]. Glass (1.5) has a higher refractive index than water (1.33) [1].

Q135 · Short Answer · 3 marks · ★ · 1 paper

Light enters from air to glass having refractive index 1.50. What is the speed of light in the glass? The speed of light in vacuum is 3×10^8 m/s.

Source: KVS Lucknow 1st Pre-Board, Q30 [X SCIENCE-merged, PDF p.56]

✔ Answer

$n = c/v \Rightarrow v = c/n = 3 \times 10^8 / 1.5 = 2 \times 10^8$ m/s. (NCERT intext Q)

Q136 · Short Answer · 3 marks · ★ · 1 paper

The refractive indices of three media are: A 1.6, B 1.8, C 1.5. A ray of light travels from A to B and another from B to C. (a) In which case does the refracted ray bend towards the normal? (b) In which case does the speed of light increase in the second medium?

Source: KVS Lucknow 1st Pre-Board 2024-25, Q23 [X SCIENCE-merged, PDF p.31]

✔ Answer

(a) A → B (rarer to denser, 1.6 → 1.8) [1]. (b) B → C (denser to rarer, light speeds up) [1].

Q137 · Short Answer · 3 marks · ★ · 1 paper

The image below shows the refraction of light in three transparent rectangular blocks X, Y and Z, made of different materials, placed in air. The angle of incidence is different in each case but the angle of refraction is the same in all three blocks. Compare the speed of light in the three blocks. Justify your answer.

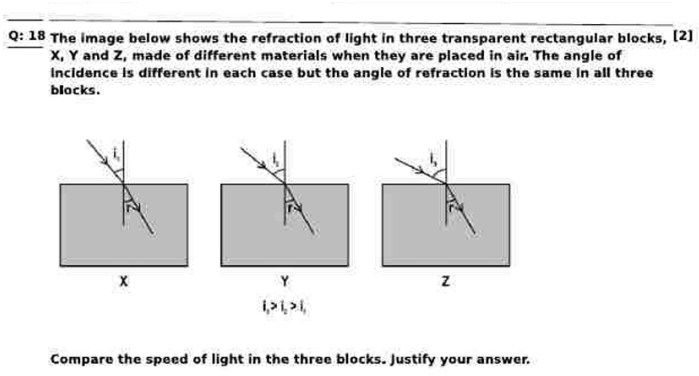


Figure from the question paper · Your screenshot – 4-compressed p.763

Source: CBSE Competency Bank (F4), Light Q18 [4-compressed, PDF p.763]

✔ Answer

Speed in X > speed in Y > speed in Z [½].

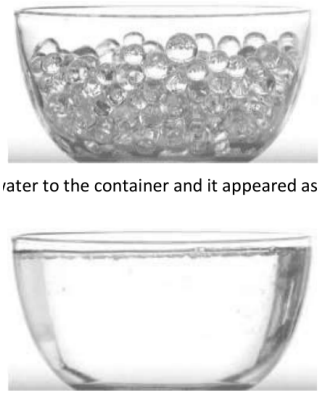
n = sin i / sin r. The angle of refraction is the same in all three, and the angle of incidence is smallest for X and largest for Z, so n is least for X and greatest for Z [1].

n = c/v, so the speed of light is greatest in X and least in Z [½].

⚠ **Note:** The caption under the figure is printed as '$i_1 > i_2 > i_3$', but the drawing (and the CBSE key) shows the smallest angle of incidence for X. The key is followed here.

Q138 · Short Answer · 3 marks · ★ · 1 paper

Neeti soaked clear gel beads in water; in a glass bowl they were clearly visible. When she added water, the beads could not be seen. (a) Why are the gel beads not visible on adding water? (b) Would they be visible if placed in oil instead of water? Give reason.



ater to the container and it appeared as

Figure from the question paper

Source: CBSE Competency Focused Practice Qs, Q147 [6_compressed, PDF p.79]

✔ Answer

(a) The beads are mostly water, so their refractive index is almost the same as that of water; light passes from water into the beads without bending or reflecting, so we cannot see their edges [1].
(b) Yes – oil has a different refractive index, so light bends at the bead surface and the beads become visible [1].

Q139 · Short Answer · 3 marks · ★ · 1 paper

A ray of light passes from air into glass at an angle of 30° with the normal. The refractive index of glass is 1.5. Calculate the angle of refraction.

Source: Vedantu Practice Bank (F4), Q47 [4-compressed, PDF p.673]

✔ Answer

sin r = sin i / n = sin 30° / 1.5 = 0.5/1.5 = 0.333 ⇒ r ≈ 19.5° [3].

⚠ **Note:** Uses a sine value beyond the usual board numericals; good for practice.

Case / Source-based

Q140 · Case / Source-based · 4 marks · ★ Board ×1 · 2 papers

The ability of a medium to refract light is expressed in terms of its optical density ... (i) Determine the speed of light in diamond if its refractive index is 2.42 (c = 3 × 10^8 m/s). (ii) Refractive indices of glass, water and carbon disulphide are 1.5, 1.33 and 1.62. If a ray is incident in these media at the same angle, write the increasing order of the angle of refraction. (iii)(A) Speed of light in glass is 2 × 10^8 m/s and in water 2.25 × 10^8 m/s. (a) Which is optically denser and why? (b) A ray is incident normally at the water–glass interface. What happens to its path in glass? OR (iii)(B) Absolute refractive indices of water and glass are 4/3 and 3/2. If the speed of light in glass is 2 × 10^8 m/s, find the speed in (i) vacuum (ii) water.

Source: CBSE 2024 31/4/1 Q39, 31/4/2 Q37, 31/4/3 Q38 [1-compressed, PDF p.377,424,450] | KVS Lucknow Pre-Board 2025-26 (A), Q38 [X SCIENCE-merged, PDF p.77]

✔ Answer

(i) v = c/n = 3 × 10^8/2.42 = 1.24 × 10^8 m/s [1].
(ii) Higher n, smaller r: carbon disulphide < glass < water [1].
(iii)(A)(a) Glass – light travels slower in glass [1]. (b) It goes straight without bending (angle of incidence 0°) [1].
OR (B) (i) c = n_g × v_g = 1.5 × 2 × 10^8 = 3 × 10^8 m/s [1]; (ii) v_w = c/n_w = 3 × 10^8 ÷ 4/3 = 2.25 × 10^8 m/s [1].

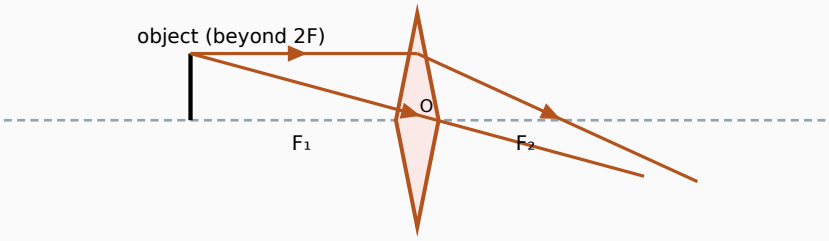
Q141 · Case / Source-based · 4 marks · ★ · 1 paper

When a ray of light moving in a medium enters obliquely in another medium, it bends ... (a) Define the term absolute refractive index of a medium. (b) Refractive indices of glass, water and carbon disulphide are 1.50, 1.33 and 1.62. In which medium is the speed of light (i) highest, (ii) lowest? (c) Absolute refractive indices of glass and water are 3/2 and 4/3. If the speed of light in water is 2.25 × 10^8 m/s, find the speed in (I) vacuum (II) glass. OR (c) Find the refractive index of water with respect to glass.

Source: KVS Ahmedabad Pre-Board 2025-26, Q38 [9-compressed (full, 524 p), PDF p.512]

✔ Answer
(a) n = speed of light in air (vacuum) / speed of light in the medium [1]. (b) (i) Water (lowest n) (ii) Carbon disulphide (highest n) [1].
(c) (I) c = (4/3) × 2.25 × 10^8 = 3 × 10^8 m/s; (II) v_g = 3 × 10^8 ÷ 3/2 = 2 × 10^8 m/s [2]. OR n_{wg} = n_w/n_g = (4/3)/(3/2) = 8/9 = 0.89 [2].

Theme C · Lenses, power and lab skills



Picture it
• Convex lens: parallel ray → through F_2 ; ray through O → undeviated.
• 1/v – 1/u = 1/f ; m = h'/h = v/u
• P = 1/f (f in m) ; unit dioptre (D); convex +, concave –
• Concave lens: image always virtual, erect, diminished.

Image formation by lenses (ray diagrams)

34 questions · 19 board appearances · Prepared by Abhishek Das, TGT (Science)

Multiple Choice

Q142 · Multiple Choice · 1 mark · ★★ Board ×3 · 3 papers

Rays from the sun converge at a point 25 cm behind a convex lens. The distance at which an object should be placed in front of the lens to get a virtual image is:

(a) 20 cm
(b) 40 cm
(c) 50 cm
(d) More than 50 cm

Source: CBSE 2026 31/5/1, Q30 [4-compressed, PDF p.482] | CBSE 2026 31/5/2, Q30 [4-compressed, PDF p.514] | CBSE 2026 31/5/3, Q30 [4-compressed, PDF p.544]

✔ Answer
(A) 20 cm – a convex lens gives a virtual image only when the object is within F (f = 25 cm).

Q143 · Multiple Choice · 1 mark · ★ · 1 paper

The lens which is thinner in the middle than at the edges is:

(a) Convex
(b) Concave
(c) Biconvex
(d) Biconcave

Source: KV Sitapur PT-I 2024, Q6 [X SCIENCE-merged, PDF p.7]

✔ Answer
(b) Concave (also correct: biconcave; 'concave' is the expected answer).

Q144 · Multiple Choice · 1 mark · ★ · 1 paper

A convex lens forms a real, inverted and magnified image of an object. The object is placed:

(a) At the focus
(b) At the centre of curvature
(c) Between focus and optical centre
(d) Between focus and centre of curvature

Source: Vedantu Practice Bank (F4), Q6 [4-compressed, PDF p.668]

✔ Answer
(d) Between focus and 2F (centre of curvature) of the lens.

Q145 · Multiple Choice · 1 mark · ★ · 1 paper

When a lens placed at Q forms a sharp, real, inverted and diminished image on a fixed screen, it is moved to P (nearer the object) where another sharp image is formed. What is the nature of the image when the lens is at P?

(a) magnified and upright
(b) diminished and inverted
(c) magnified and inverted
(d) diminished and upright

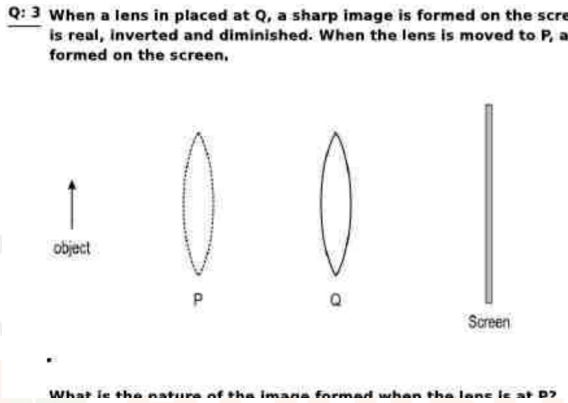


Figure from the question paper

Source: CBSE Competency Items (Light), Q3 [4-compressed, PDF p.758]

✔ Answer
Magnified and inverted (the object and image distances interchange).

⚠ **Note:** The key page lists option 1 for this item; a real image on a screen is always inverted, so 'magnified and inverted' is kept.

Q146 · Multiple Choice · 1 mark · ★ · 1 paper

A bottle is viewed through a convex lens; it appears inverted at first. The bottle is moved slowly towards the lens. At which of the marked points will the image appear upright?

(a) P
(b) Q
(c) R
(d) S

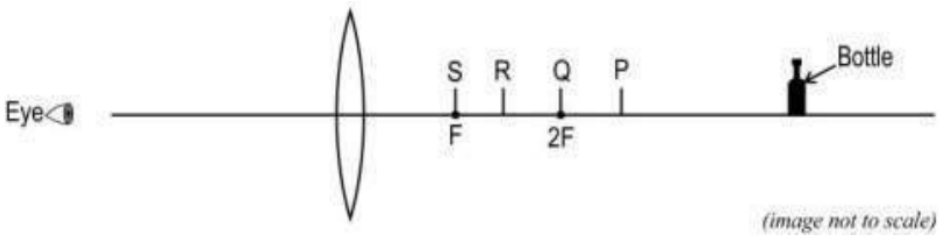


Figure from the question paper

Source: CBSE Competency Focused Practice Qs, Q144 [6_compressed, PDF p.78]

✔ Answer
(D) S – nearest to the lens (CBSE key). The image becomes upright once the bottle comes inside F.

⚠ **Note:** In the figure S is marked at F; strictly the image turns upright just after the bottle crosses F towards the lens.

Q147 · Multiple Choice · 1 mark · ★ · 1 paper

The correct labelling of the given ray diagram (MN lens, object AB, image A′B′, O) is:

Source: Sample Paper (F8), Q14 [8_compressed, PDF p.224]

✔ Answer
(c) MN – concave lens, AB – object, A′B′ – image, O – optical centre (image virtual, erect, diminished on the same side).

⚠ **Note:** Answer from the sample-paper key (8_compressed p.234); the figure shows a diverging lens.

Assertion-Reason

Q148 · Assertion-Reason · 1 mark · ★ · 1 paper

Assertion (A): A convex lens has a virtual focus.
Reason (R): All light rays pass through the focus of a convex lens.

(a) Both A and R are true and R is the correct explanation of A. (b) Both A and R are true but R is not the correct explanation of A. (c) A is true but R is false. (d) A is false but R is true.

Source: Sample Paper (F8), Q20 [8_compressed, PDF p.225]

✔ Answer
(d) A is false but R is true. A convex lens has a real focus because rays parallel to the axis actually pass through it.

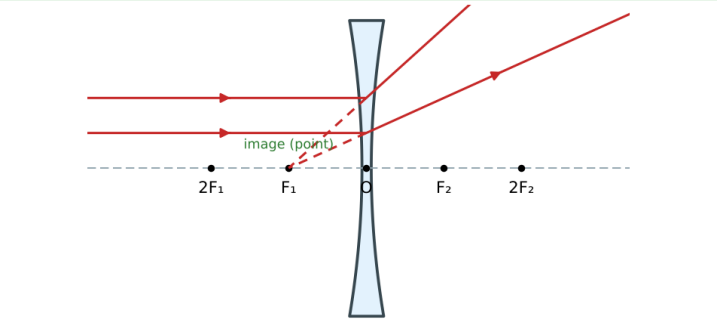
Very Short Answer

Q149 · Very Short Answer · 2 marks · ★★ Board ×3 · 3 papers

(a) Out of the two lenses, one concave and the other convex, state which one will diverge a parallel beam of light. Draw a ray diagram to show the principal focus of the lens.
OR (b) A ray of light after refraction from a convex lens emerges parallel to its principal axis. (i) Draw a labelled ray diagram. (ii) Name the point on the principal axis through which the incident ray passed.

Source: CBSE 2025 31/2/1, Q25 [2-compressed, PDF p.352] | CBSE 2025 31/2/2, Q25–26 [2-compressed, PDF p.420] | CBSE 2025 31/2/3, Q25–26 [2-compressed, PDF p.492]

✔ Answer
(a) Concave lens; diagram: parallel rays diverge, dotted extensions meet at F_1 on the same side [2].
OR (b) (i) Ray from the left passing through F_1 emerges parallel [1]. (ii) The principal focus F_1 [1].



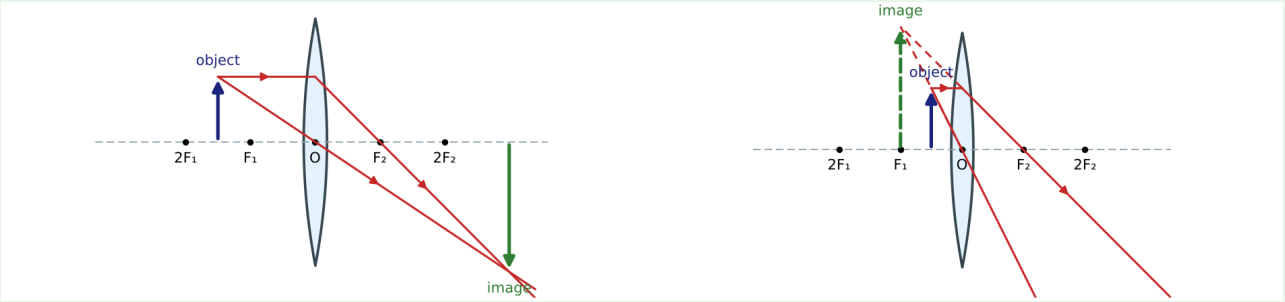
Q150 · Very Short Answer · 2 marks · ★ · 2 papers

Draw ray diagrams to show the formation of (a) a magnified real image, and (b) a magnified virtual image of an object by a converging lens.

Source: KVS Delhi Pre-Board-II 2024-25, Q26 [X SCIENCE-merged, PDF p.90] | Vedantu Sample Paper (F5), Q36(i) [5-compressed, PDF p.361]

✔ Answer

(a) Object between F_1 and $2F_1$: image beyond $2F_2$, real, inverted, enlarged [1]. (b) Object between F_1 and O: image on the same side, virtual, erect, enlarged [1].



Q151 · Very Short Answer · 2 marks · ★ Board ×1 · 1 paper

How is a virtual image formed by a convex lens different from that formed by a concave lens? Under what conditions do they form virtual images?

Source: CBSE 2023 31/5/1, Q39(c) OR [1-compressed, PDF p.480,503,532]

✔ Answer

Convex lens: virtual image is enlarged, only when object is between F and O. Concave lens: virtual image is always diminished, for all positions of the object [2].

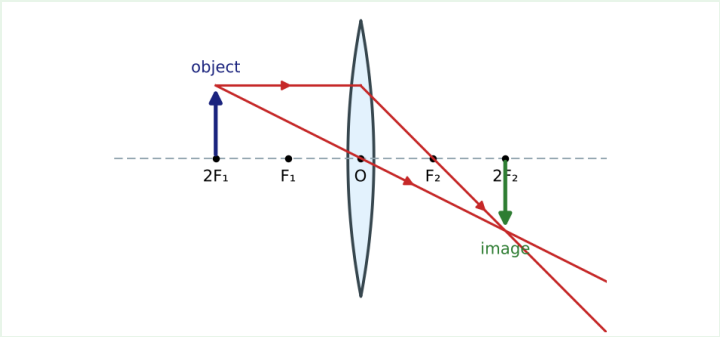
Q152 · Very Short Answer · 2 marks · ★ · 1 paper

Draw a ray diagram showing the image formation by a convex lens when an object is placed at twice the focal length of the lens.

Source: Sample Paper (F6), Q33 [6_compressed, PDF p.435]

✔ Answer

Image at $2F_2$, real, inverted, same size [2].

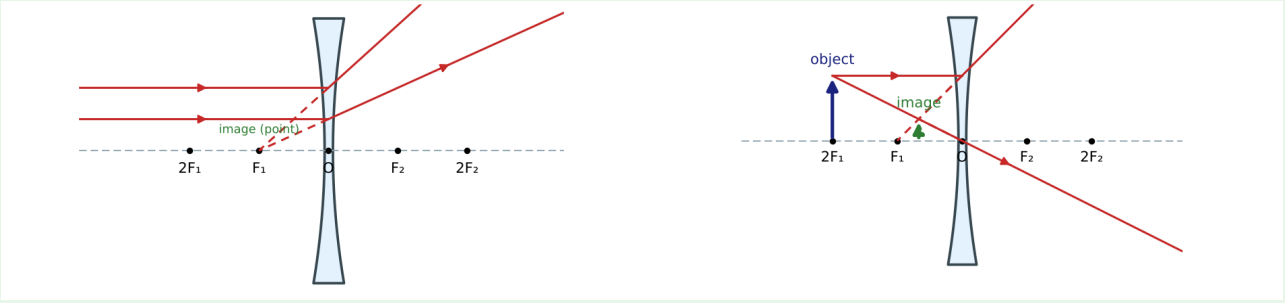


Q153 · Very Short Answer · 2 marks · ★ · 1 paper

With the help of a ray diagram explain image formation by a concave lens for different positions of the object. List two characteristics of the image in each case.

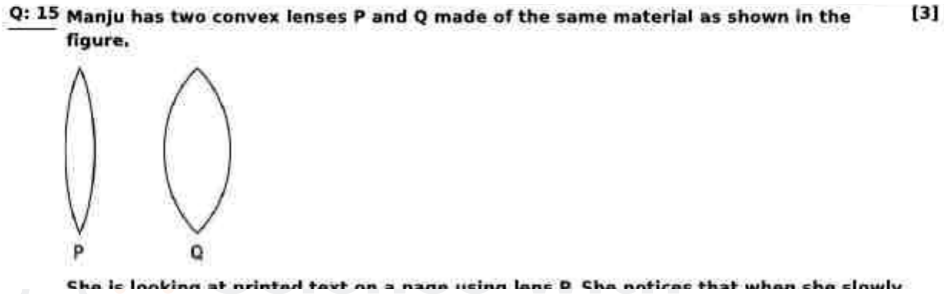
Source: Vedantu Practice Bank (F4), Q84 [4-compressed, PDF p.675]

✔ Answer
Object at infinity: image at F_1, virtual, erect, highly diminished. Object anywhere between infinity and O: image between F_1 and O, virtual, erect, diminished [2].



Q154 · Very Short Answer · 2 marks · ★ · 1 paper

Manju looks at printed text with convex lens P; when she takes the lens away from the page the text turns upside down at 10 cm. (a) What does 10 cm signify? (b) For a thicker lens Q of the same material, will the inversion happen at less than, equal to or more than 10 cm? Justify.


Q: 15 Manju has two convex lenses P and Q made of the same material as shown in the figure. [3]

P Q

She is looking at printed text on a page using lens P. She notices that when she slowly

Figure from the question paper

Source: CBSE Competency Items (Light), Q15 [4-compressed, PDF p.762]

✔ Answer
(a) The focal length of lens P [1]. (b) Less than 10 cm – a thicker (more curved) lens has a smaller focal length [1].

Q155 · Very Short Answer · 2 marks · ★ · 1 paper

The diagram shows an object O and its image I (erect, enlarged, same side). Without drawing the ray diagram state: (i) type of lens; (ii) two optical instruments where such an image is obtained; (iii) three characteristics of the image if this lens is replaced by a concave mirror of focal length f and the object is placed at f/2 in front of it.

Source: Sample Paper (F8), Q24 [8_compressed, PDF p.102]

✔ Answer
(i) Converging (convex) lens [½]. (ii) Magnifying glass; spectacles for hypermetropia / simple microscope [½]. (iii) Virtual, erect, enlarged (behind the mirror) [1].

Short Answer

Q156 · Short Answer · 3 marks · ★ Board ×1 · 1 paper

(a) If the image formed by a lens is diminished for all positions of the object, what type of lens is it? (b) Name the point on the lens through which a ray passes undeviated. (c) An object is placed 30 cm from a convex lens of focal length 20 cm. Find the position and magnification of the image.

Source: CBSE (old) 31/1/1 (F6 OCR), Q? (5 marks) [6_compressed, PDF p.176]

✔ Answer
(a) Concave lens [1]. (b) Optical centre [1]. (c) $1/v = 1/20 - 1/30 = 1/60 \Rightarrow v = +60$ cm; $m = v/u = 60/(-30) = -2$ (real, inverted, enlarged) [3].

⚠ **Note:** Question number lost in OCR.

Q157 · Short Answer · 3 marks · ★ Board ×1 · 1 paper

Using the data, compare the properties of images formed by a convex lens (u = 20 cm, f = 10 cm, h = 6 cm) and a concave mirror (u = 30 cm, f = 10 cm, h = 6 cm) in terms of position and nature.

Source: CBSE VI 2026 31(B), LMNK2, Q36 [1-compressed, PDF p.77]

✔ Answer

Convex lens: object at 2F ⇒ image at $2F_2$ (v = +20 cm), real, inverted, same size (6 cm) [1½].
Concave mirror: object beyond C (30 > 20) ⇒ 1/v = –1/10 + 1/30 ⇒ v = –15 cm, between F and C; real, inverted, diminished (3 cm) [1½].

Q158 · Short Answer · 3 marks · ★ Board ×1 · 1 paper

List two differences in the properties of the virtual images formed by the two types of spherical lenses (concave and convex). How are these properties used in the correction of myopia and hypermetropia?

Source: CBSE 2023 31/4/2, Q29 [1-compressed, PDF p.420]

✔ Answer

Convex lens: virtual image enlarged, formed only when object is within F. Concave lens: virtual image diminished, formed for all positions [2].
Concave lens diverges light – used for myopia; convex lens converges light – used for hypermetropia [1].

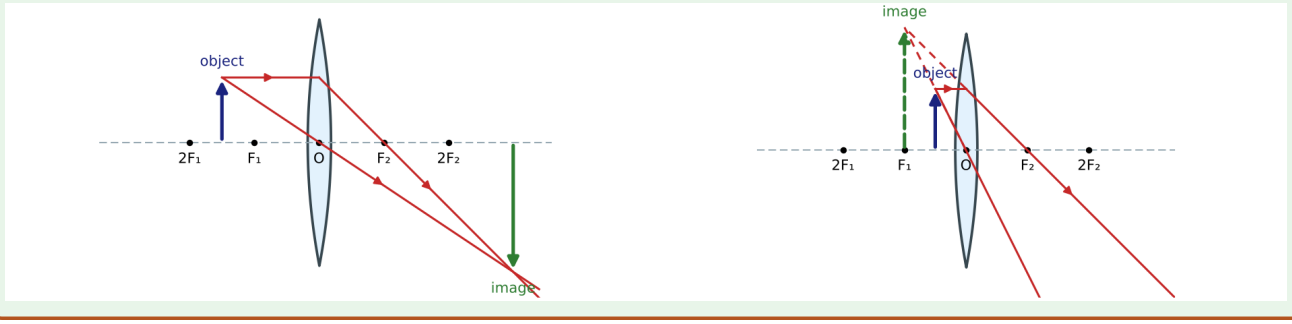
Q159 · Short Answer · 3 marks · ★ Board ×1 · 1 paper

(a) Compare the magnification of a concave lens and a convex lens when both form virtual images.
OR A convex lens of focal length 10 cm can form (i) a real, inverted, magnified image and (ii) a virtual, erect, magnified image. What is the range of object distance in both cases? Draw ray diagrams.

Source: CBSE 2023 31/5/2, Q30(b) [1-compressed, PDF p.499]

✔ Answer

(a) Concave lens: m positive and less than 1 (diminished). Convex lens: m positive and more than 1 (enlarged) [3].
OR (i) Between 10 cm and 20 cm (between F_1 and $2F_1$); (ii) less than 10 cm (between O and F_1) [1 + 2 diagrams].



Q160 · Short Answer · 3 marks · ★ · 1 paper

Observe the incomplete ray diagram where the image A′B′ is formed after refraction from a convex lens (image between F_2 and $2F_2$). (i) The position of object AB would have been ... (ii) Size of the object would have been ... than the size of the image.

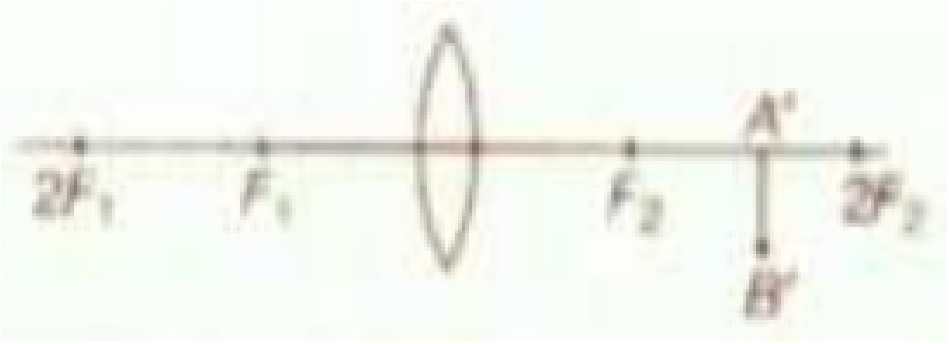
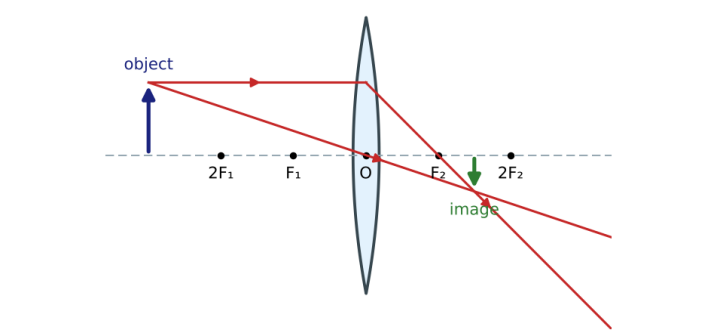


Figure from the question paper

Source: Sample Paper (F6), Q37 [6_compressed, PDF p.389]

✔ Answer

(i) Beyond $2F_1$ [1½]. (ii) Larger (bigger) [1½].



Q161 · Short Answer · 3 marks · ★ · 1 paper

The image shows the formation of an image with an optical instrument (rectangle): object at 20 cm, image at 10 cm on the same side. A. Identify the instrument. B. Type of image? C. Calculate its focal length.

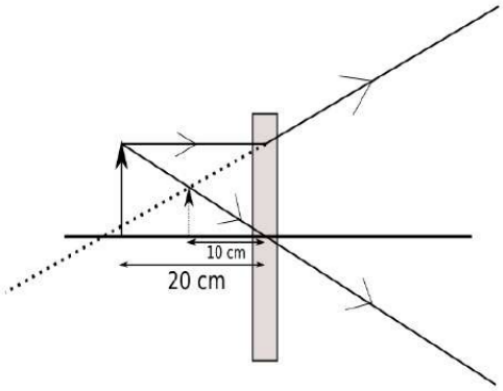
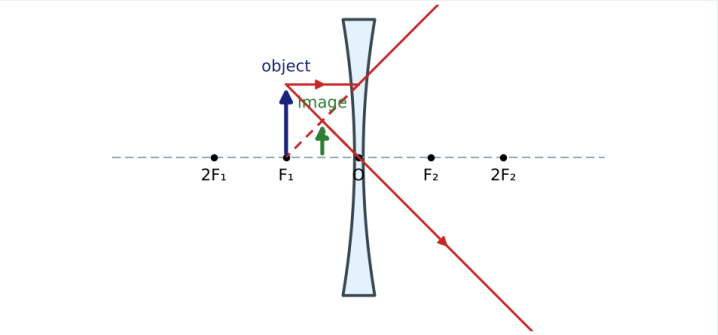


Figure from the question paper

Source: CBSE Sample Question Paper 2025-26, Q33 [6_compressed, PDF p.236]

✔ Answer
A. Concave lens (rays diverge after passing through) [1]. B. Virtual, erect, diminished [½]. C. u = –20, v = –10: 1/f = 1/v – 1/u = –1/10 + 1/20 = –1/20 ⇒ f = –20 cm [1½].



Q162 · Short Answer · 3 marks · ★ · 1 paper

Sudha finds that the sharp image of the window pane of her laboratory is formed at 15 cm from the lens. She now tries to focus the building outside without disturbing the lens. In which direction should she move the screen? What will be the nature of the image?

Source: Sample Paper (F8), Q31 [8_compressed, PDF p.23]

✔ Answer
The building is much farther than the window, so its image forms closer to the lens (near F) – move the screen towards the lens [2]. Image: real, inverted, diminished [1].

Q163 · Short Answer · 3 marks · ★ · 1 paper

An object is kept at 18 cm, 20 cm and 30 cm from a lens of power +5 D. (i) In which case(s) do you get a magnified image? (ii) Which magnified image can be got on a screen? (b) Two uses of a convex lens.

Source: Sample Paper (F8), Q31 [8_compressed, PDF p.38]

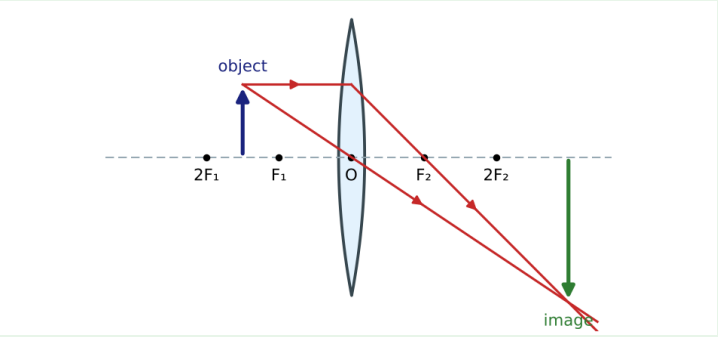
✔ Answer
f = 1/5 m = 20 cm (convex). (i) 18 cm (inside F – virtual, enlarged) and 30 cm (between F and 2F – real, enlarged); at 20 cm (at F) the image is at infinity, highly magnified [1½]. (ii) Only for 30 cm – real image [½]. (b) Magnifying glass, camera, spectacles for hypermetropia, microscope [1].

Q164 · Short Answer · 3 marks · ★ · 1 paper

What should be the position of an object with respect to the focus of a convex lens of focal length 20 cm, so that its real and magnified image is obtained?

Source: Sample Paper (F8), Q31 [8_compressed, PDF p.71]

✔ Answer
Between F_1 and $2F_1$ – i.e. between 20 cm and 40 cm from the lens [3].



Long Answer

Q165 · Long Answer · 5 marks · ★★ Board ×1 · 3 papers

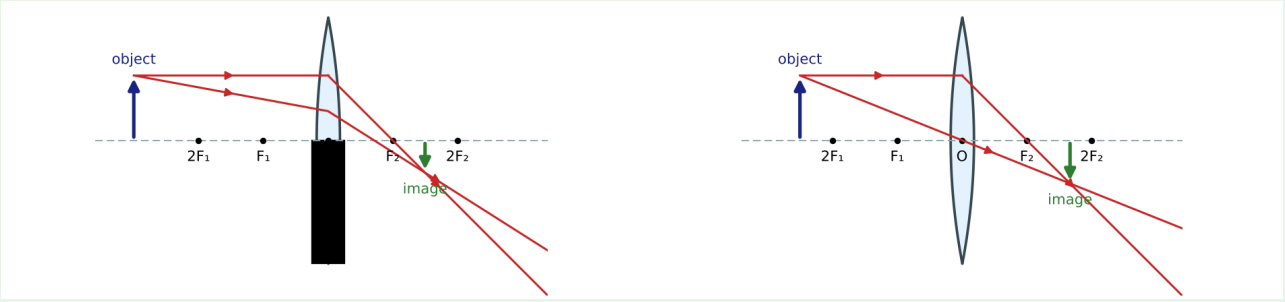
(a) One-half of a convex lens is covered with a black paper. Will this lens produce an image of the complete object? Support with a ray diagram. (b) An object 5 cm high is held 25 cm away from a converging lens of focal length 10 cm. (i) Draw the ray diagram (ii) calculate the position and size of the image (iii) What is the nature of the image?

Source: CBSE (old) 31/1/1 (F6 OCR), Q? OR [6_compressed, PDF p.279,287] | KV Sitapur PT-II (2024-25), Q6 [X SCIENCE-merged, PDF p.10] | Sample Paper (F8), Q36 OR (half lens, f 10 cm, 30 cm) [8_compressed, PDF p.120]

✔ Answer

(a) Yes – the complete image is formed; it is less bright, because the uncovered half still refracts rays from every point of the object [2].

(b) 1/v = 1/10 – 1/25 = 3/50 ⇒ v = +16.7 cm [1]; m = v/u = 16.7/(–25) = –0.67 ⇒ h' = –3.3 cm [1]; real, inverted, diminished [1].



Q166 · Long Answer · 5 marks · ★ Board ×2 · 2 papers

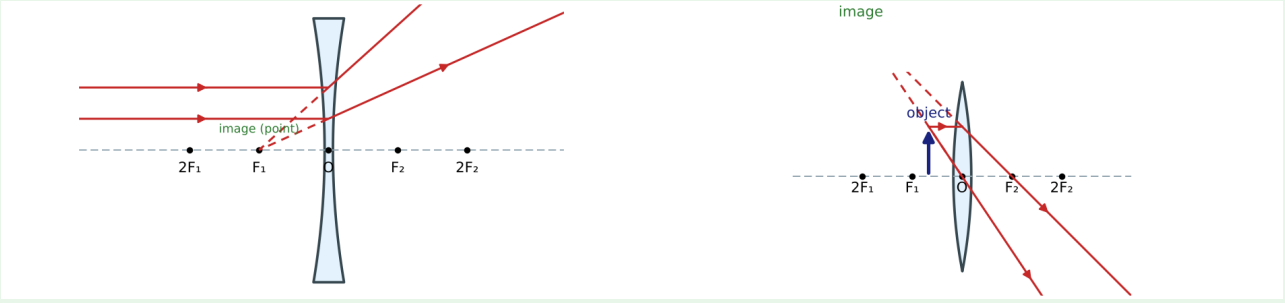
(a) Draw a ray diagram to show the path of the refracted ray when a ray of light incident on a concave lens is (1) parallel to its principal axis (2) directed towards its principal focus. (b) A 4 cm tall object is placed perpendicular to the principal axis of a convex lens of focal length 24 cm. The distance of the object from the lens is 16 cm. Find the position and size of the image.

Source: CBSE 2024 31/3/1 Q36(a), 31/3/2 Q34(a), 31/3/3 Q34(a) [1-compressed, PDF p.283,311,345] | CBSE (old) BRH/2 31/2/1, Q21 [Merged OCR, PDF p.48]

✔ Answer

(a) (1) Appears to diverge from F_1 on the same side. (2) Emerges parallel to the principal axis [2].

(b) f = +24, u = –16. 1/v = 1/f + 1/u = 1/24 – 1/16 = –1/48 ⇒ v = –48 cm (same side as object) [1½]. m = v/u = 3 ⇒ h' = +12 cm; virtual, erect, enlarged [1½].



Q167 · Long Answer · 5 marks · ★ Board ×1 · 1 paper

(b) OR: Draw a ray diagram to show the path of the reflected ray when a ray of light incident on a convex mirror is (1) parallel to its principal axis (2) directed towards its principal focus.

Source: CBSE 2024 31/3/1 Q36(b), 31/3/2 Q34(b), 31/3/3 Q34(b) [1-compressed, PDF p.283,313,345]

✔ Answer

(1) Appears to diverge from F behind the mirror. (2) Reflected parallel to the principal axis [2]. (Numerical part: see 3 cm / 1.5 cm flame, f 12 cm, u 18 cm.)



Q168 · Long Answer · 5 marks · ★ Board ×1 · 1 paper

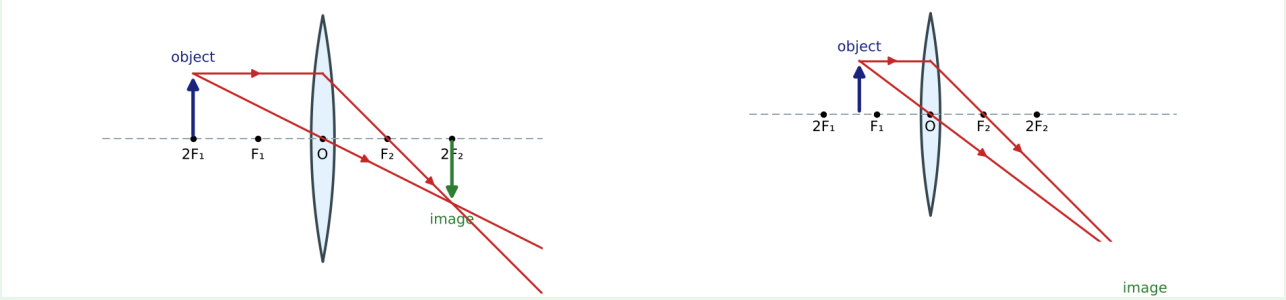
(a) An object is placed in front of a convex lens of focal length f at a distance 2f. Draw a ray diagram and write the value of magnification. (b) A candle flame 2 cm long is at 16 cm from a convex lens of focal length 12 cm. Calculate (i) image distance (ii) length of image.

Source: CBSE 2023 31/2/1, Q36 [1-compressed, PDF p.200,215]

✔ Answer

(a) Image at $2F_2$, real, inverted, same size; m = –1 [2].

(b) 1/v = 1/f + 1/u = 1/12 – 1/16 = 1/48 ⇒ v = +48 cm [1½]. m = v/u = 48/(–16) = –3 ⇒ h' = –6 cm (6 cm, inverted) [1½].



Q169 · Long Answer · 5 marks · ★ · 1 paper

Copy the scaled ray diagram (pencil 4 cm long, lying along the axis, its point 5 cm from a convex lens of focal length 3 cm, 2 cm above the axis). (a) Draw more incident rays to show the image of the whole pencil. (b) Distance of the image of the pointed end from the lens? (c) Length of the image of the pencil?

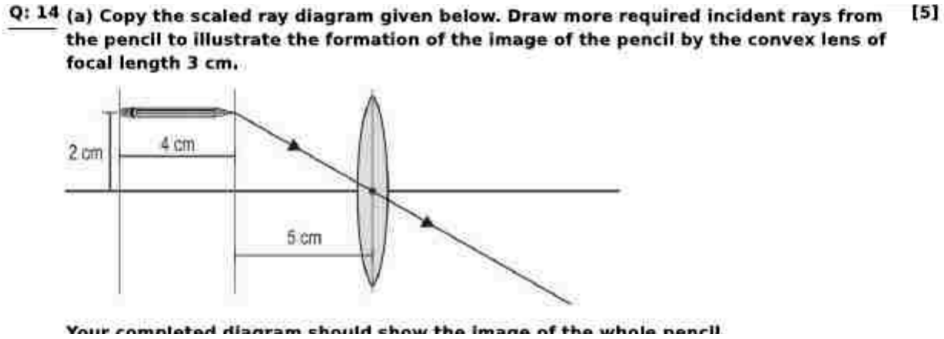


Figure from the question paper

Source: CBSE Competency Items (Light), Q14 [4-compressed, PDF p.761]

✔ Answer

(a) For each end draw the ray parallel to the axis (through F_2 after the lens) and the ray through O; where they meet is the image of that end [3].

(b) About 7.5 cm (1/v = 1/3 – 1/5 ⇒ v = 7.5 cm) [1]. (c) About 3.6 cm [1].

Q170 · Long Answer · 5 marks · ★ · 1 paper

Rishi went to a palmist who used a special lens. (i) State the nature of the lens and the reason for its use. (ii) Where should the palmist hold the lens to have a real and magnified image? (iii) If f = 10 cm and the lens is held 5 cm from the palm, find the position and size of the image.
OR An object 4.0 cm high is placed at 30 cm from a concave lens of focal length 20 cm. Draw a ray diagram to find the position and size of the image; mark O and F; find the ratio of image size to object size.

Source: Sample Paper (F8), Q36 [8_compressed, PDF p.104]

✔ Answer

(i) Convex lens – held within its focal length it gives a virtual, erect, magnified image [1].
(ii) Between F_1 and $2F_1$ (the image is then real and magnified, on the other side – needs a screen) [1].
(iii) $1/v = 1/10 - 1/5 = -1/10 \Rightarrow v = -10$ cm; $m = v/u = 2$ – virtual, erect, twice the size [3].
OR $1/v = -1/20 - 1/30 = -5/60 \Rightarrow v = -12$ cm; $m = 12/30 = 0.4 \Rightarrow h' = 1.6$ cm; ratio 2 : 5 [5].



Case / Source-based

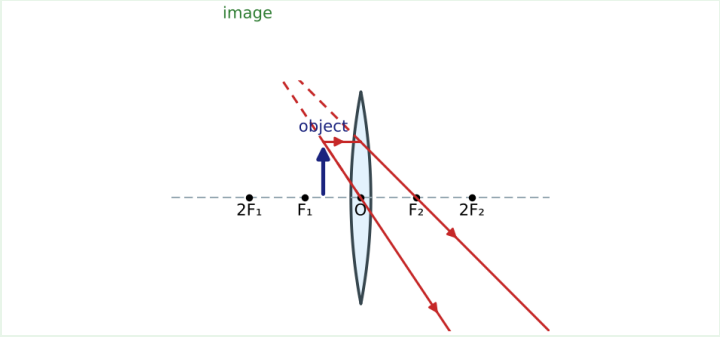
Q171 · Case / Source-based · 4 marks · ★ Board ×1 · 1 paper

In our laboratories we use compound microscopes ... (a) The image by a convex lens of focal length 2 cm is real, inverted and magnified. What is the range of object distance? (b) Image by a convex lens of focal length 6 cm is virtual, erect and magnified. Range of object distance? (c)(i) An object is placed 12 cm from a convex lens of focal length 18 cm. Draw a labelled ray diagram. OR (ii) The image formed by a convex lens is real, inverted and of the same size. If the distance between object and image is 60 cm, find the focal length.

Source: CBSE Suppl. 31/S/2, 31/S/3 (EFGH/S), Q39 [4-compressed, PDF p.209,269,323]

✔ Answer

(a) Between F and 2F: 2 cm < u < 4 cm [1]. (b) Between O and F: 0 < u < 6 cm [1].
(c)(i) Object within F: image virtual, erect, enlarged on the same side (v = –36 cm) [2]. OR (ii) Same size ⇒ object and image at 2F; 2f + 2f = 60 ⇒ f = 15 cm [2].



Q172 · Case / Source-based · 4 marks · ★ Board ×1 · 1 paper

A student has three convex lenses: A (f 50 cm, object 25 cm), B (f 20 cm, object 60 cm), C (f 15 cm, object 30 cm).
(i) Two properties of the image by lens B. (ii) In which case is a real image of the same size formed, and why? (iii)(a) Lens used for hypermetropia and its role. OR (iii)(b) Use the lens formula to find the image distance for lens A.

Source: CBSE VI 11-31(B) CDBA, Q37 [2-compressed, PDF p.145]

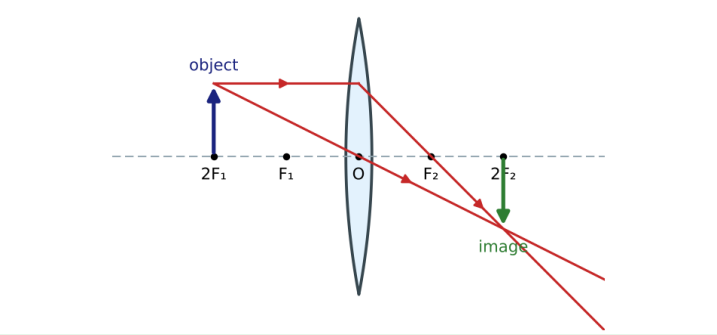
✓ Answer
(i) Object beyond $2F_1$ (60 > 40): image real, inverted, diminished, between F_2 and $2F_2$ [1].
(ii) Lens C – object at $2F_1$ (30 = 2 × 15), so image at $2F_2$, same size [1].
(iii)(a) Convex lens – converges rays so the image of a near object falls on the retina [2].
OR (b) f = +50, u = –25: 1/v = 1/50 – 1/25 = –1/50 ⇒ v = –50 cm (virtual, same side) [2].

Q173 · Case / Source-based · 4 marks · ★ Board ×1 · 1 paper

A simple magnifier is a convex lens of small focal length ... a compound microscope uses two convex lenses.
(b) Two properties of the final image from a compound microscope. (c) An object is placed at 2f from a convex lens. List two properties of the image and the value of magnification. OR (c) Object beyond 2f.

Source: CBSE VI ZWYX 31(B), Q39 [2-compressed, PDF p.116]

✓ Answer
(b) Virtual, inverted (w.r.t. object), highly magnified [1].
(c) Image at $2F_2$, real, inverted, same size; m = –1 [2]. OR Beyond 2f: image between F_2 and $2F_2$, real, inverted, diminished; m is negative and less than 1 in size (–1 < m < 0) [2].



Q174 · Case / Source-based · 4 marks · ★ · 1 paper

The lenses form different types of images ... (a) Location of the image when the object is at infinity in front of a convex lens. (b) Size of the image when the object is at the focus. (c) Location of image when the object is at 2F. (d) Two uses of a convex lens.

Source: KVS Lucknow Pre-Board 2025-26 (B), Q38 [X SCIENCE-merged, PDF p.84]

✓ Answer
(a) At focus F_2 [1]. (b) Highly magnified (image at infinity) [1]. (c) At $2F_2$ on the other side [1]. (d) Magnifying glass, camera, microscope, spectacles for hypermetropia (any two) [1].

Q175 · Case / Source-based · 4 marks · ★ · 1 paper

In an experiment, the image of object AB placed in front of a convex lens is shown with an incomplete ray diagram (AB between F_1 and O). (a) If the object is at infinity, where is the image? (b) Nature and size of the image in the figure. OR f = 8 cm, object at 12 cm – find the image position.

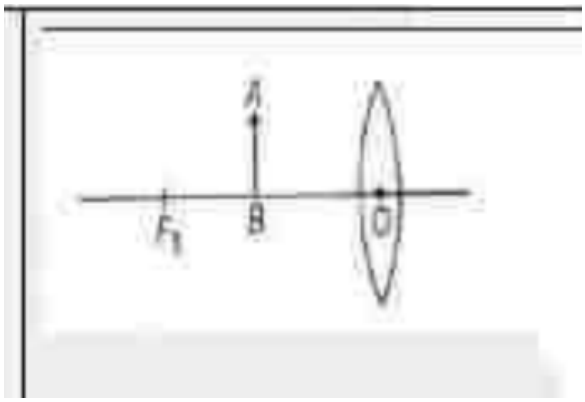
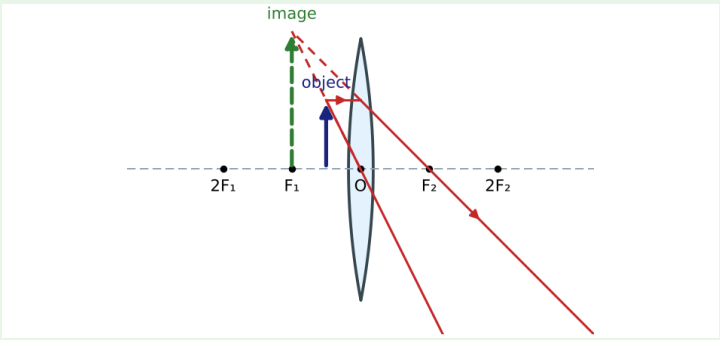


Figure from the question paper

Source: Vedantu Sample Paper (F4), Q37 [4-compressed, PDF p.576]

✔ Answer

(a) At the focus F_2 (point-sized) [1]. (b) Virtual, erect and enlarged, on the same side as the object [1].
OR $1/v = 1/8 - 1/12 = 1/24 \Rightarrow v = +24$ cm (real, inverted, enlarged) [2].



Lens formula and magnification

29 questions · 16 board appearances · Prepared by Abhishek Das, TGT (Science)

Very Short Answer

Q176 · Very Short Answer · 2 marks · ★ · 1 paper

Rishi went to a palmist. The palmist used a lens of focal length 10 cm held at 5 cm from the palm. Use the lens formula to find the position and size of the image.

Source: KVS Lucknow Pre-Board 2025-26 (B), Q33 [X SCIENCE-merged, PDF p.83]

✔ Answer

Convex lens, $u = -5$, $f = +10$: $1/v = 1/10 - 1/5 = -1/10 \Rightarrow v = -10$ cm (same side) [1]. $m = v/u = 2$ – virtual, erect, twice the size [1].

Q177 · Very Short Answer · 2 marks · ★ · 1 paper

A convex lens forms a real and inverted image of a needle at 50 cm from it. Where is the needle placed if the image is equal to the size of the object? Also find the power of the lens.

Source: Vedantu Sample Paper (F4), Q25 [4-compressed, PDF p.572]

✔ Answer

Same size $\Rightarrow m = -1 \Rightarrow u = -50$ cm [1]. $1/f = 1/50 + 1/50 \Rightarrow f = 25$ cm $= 0.25$ m; $P = +4$ D [1].

Short Answer

Q178 · Short Answer · 3 marks · ★ Board ×2 · 2 papers

A convex lens forms an 80 cm long image of a 20 cm long object kept at 60 cm from the optical centre. If the object and the image are on the same side of the lens, find (i) the nature of the image (ii) the position of the image (iii) the focal length of the lens.

Source: CBSE 2025 31/2/1, Q33 [2-compressed, PDF p.354] | CBSE 2025 31/2/2, Q33 [2-compressed, PDF p.424]

✔ Answer
(i) Same side ⇒ virtual and erect; m = +80/20 = +4 [1]. (ii) v = mu = 4 × (–60) = –240 cm (240 cm on the object side) [1]. (iii) 1/f = 1/v – 1/u = –1/240 + 1/60 = 3/240 ⇒ f = +80 cm [1].

Q179 · Short Answer · 3 marks · ★ Board ×1 · 2 papers

An object of height 10 cm is placed 25 cm away from the optical centre of a converging lens of focal length 15 cm. Calculate the image distance and height of the image formed.

Source: CBSE 2023 31/4/1, Q30(B) [1-compressed, PDF p.369] | KVS Lucknow Monthly Exam Oct 2024-25, Q12 [X SCIENCE-merged, PDF p.4]

✔ Answer
u = –25, f = +15. 1/v = 1/f + 1/u = 1/15 – 1/25 = 2/75 ⇒ v = +37.5 cm [1½]. m = v/u = –1.5 ⇒ h' = –15 cm (real, inverted, enlarged) [1½].

Q180 · Short Answer · 3 marks · ★ · 2 papers

An object 4 cm (or 2.5 cm) high is placed 20 cm (or 30 cm) from a concave lens of focal length 10 cm. Use the lens formula to find the position (and size) of the image.

Source: Vedantu Sample Paper (F5), Q36(ii) [5-compressed, PDF p.322,323,362] | Vedantu Sample Paper (F5), Q24 [5-compressed, PDF p.322,323,362]

✔ Answer
u = –20, f = –10: 1/v = –1/10 – 1/20 = –3/20 ⇒ v = –6.67 cm; m = v/u = 0.33 ⇒ h' = 1.33 cm, virtual, erect, diminished.
(u = –30: v = –7.5 cm, m = 0.25, h' = 0.625 cm for 2.5 cm object.)

Q181 · Short Answer · 3 marks · ★ Board ×1 · 1 paper

A student has focussed the image of an object of height 5 cm on a screen using a convex lens of focal length 20 cm. If the object distance is 30 cm, find (i) the image distance (ii) the height of the image.

Source: CBSE VI 31(B)/S, CDBA/S, Q31(a) [1-compressed, PDF p.17,196,221]

✔ Answer
1/v = 1/20 – 1/30 = 1/60 ⇒ v = +60 cm [1½]. m = 60/(–30) = –2 ⇒ h' = –10 cm [1½].

Q182 · Short Answer · 3 marks · ★ Board ×1 · 1 paper

The image of a candle flame placed at 45 cm from a spherical lens is formed on a screen placed 90 cm from the lens. Identify the type of lens and calculate its focal length. If the height of the flame is 2 cm, find the height of its image.

Source: CBSE (old) BRH/1 31/1, Q21 [Merged OCR, PDF p.8]

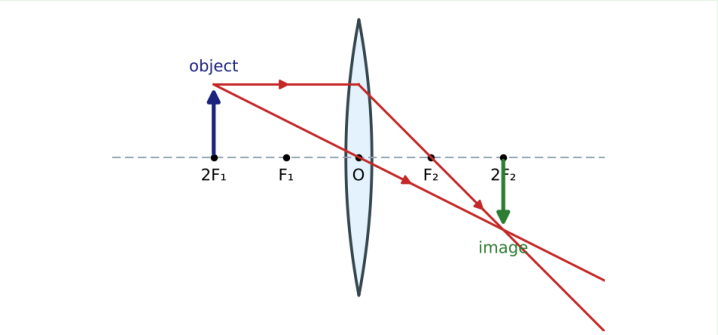
✔ Answer
Image on screen ⇒ real ⇒ convex lens [½]. u = –45, v = +90: 1/f = 1/90 + 1/45 = 3/90 ⇒ f = +30 cm [1½]. m = v/u = –2 ⇒ h' = –4 cm [1].

Q183 · Short Answer · 3 marks · ★ Board ×1 · 1 paper

(a) The image of an object formed by a lens is of the same size but inverted. If the object distance is 30 cm, calculate (i) the distance between object and image (ii) focal length. (b) Draw a ray diagram.

Source: CBSE 2023 31/1/2, Q30 [1-compressed, PDF p.136]

✔ Answer
Same size, inverted ⇒ convex lens, object at 2F: v = +30 cm. (i) 30 + 30 = 60 cm [1]. (ii) 2f = 30 ⇒ f = 15 cm [1]. (b) Ray diagram, object and image at 2F [1].



Q184 · Short Answer · 3 marks · ★ Board ×1 · 1 paper

(a) Write the expression for the magnification produced by a lens in terms of object distance and image distance. (b) A 4 cm high object is placed perpendicular to the principal axis of a convex lens of focal length 20 cm. Calculate the size of the image if the object is at 10 cm from the lens.

Source: CBSE 2026 31/2/1, Q35 [2-compressed, PDF p.333]

✔ Answer
(a) m = h'/h = v/u [1]. (b) 1/v = 1/20 – 1/10 = –1/20 ⇒ v = –20 cm; m = (–20)/(–10) = +2 ⇒ h' = +8 cm (virtual, erect) [2].

Q185 · Short Answer · 3 marks · ★ Board ×1 · 1 paper

An object of 5 cm height is placed at 20 cm from the optical centre of a concave lens of focal length 18 cm. Calculate (1) image distance (2) magnification.

Source: CBSE 2023 31/5/2, Q30(a) [1-compressed, PDF p.499]

✔ Answer
u = –20, f = –18: 1/v = 1/f + 1/u = –1/18 – 1/20 = –38/360 ⇒ v = –9.47 cm [1½]. m = v/u = 0.47; h′ = 2.4 cm, virtual, erect [1½].

Q186 · Short Answer · 3 marks · ★ Board ×1 · 1 paper

A 4 cm tall object is placed on the principal axis of a convex lens at 12 cm from the optical centre; its sharp image is formed at 24 cm on the other side. If the object is moved a little away from the lens, in which way will the screen have to be moved to get a sharp image again? How will the magnification be affected?

Source: CBSE (old) RLH 31/1, Q36 [2-compressed, PDF p.165]

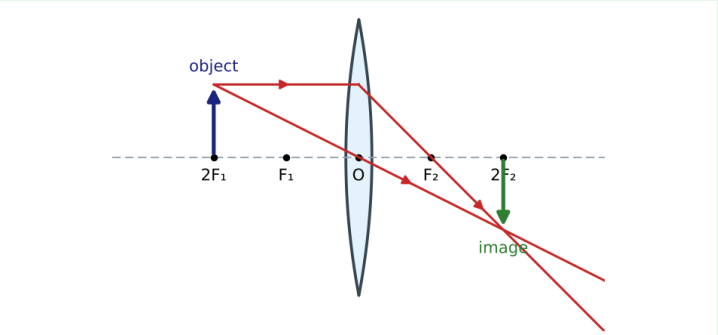
✔ Answer
f: 1/f = 1/24 + 1/12 = 3/24 ⇒ f = 8 cm [1]. Moving the object away from the lens brings the image closer – move the screen towards the lens [1]. Magnification (v/u) decreases – image becomes smaller [1].

Q187 · Short Answer · 3 marks · ★ Board ×1 · 1 paper

An object is placed at 30 cm in front of a convex lens of focal length 15 cm. Use the lens formula to determine the position of the image. What will be the size of the image?

Source: CBSE 2026 31/5/2, Q36 [4-compressed, PDF p.516]

✔ Answer
1/v = 1/15 – 1/30 = 1/30 ⇒ v = +30 cm (at $2F_2$) [2]. m = v/u = –1 – image same size, real, inverted [1].

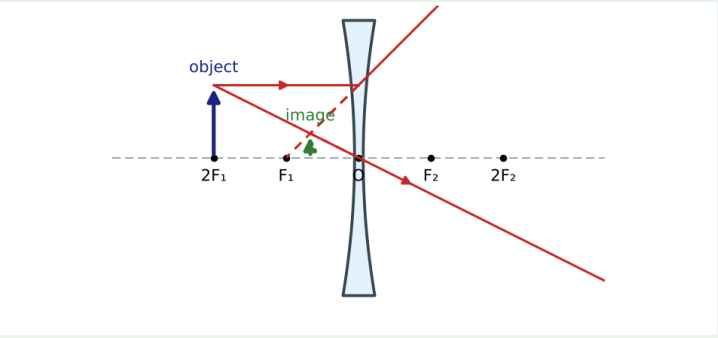


Q188 · Short Answer · 3 marks · ★ Board ×1 · 1 paper

An object of height 6 cm is placed at 30 cm from the optical centre of a concave lens of focal length 15 cm. Use the lens formula to determine (a) the image distance (b) the height of the image.

Source: CBSE 2026 31/5/3, Q36 [4-compressed, PDF p.548]

✔ Answer
(a) 1/v = 1/f + 1/u = –1/15 – 1/30 = –3/30 ⇒ v = –10 cm (same side) [2]. (b) m = v/u = 1/3 ⇒ h′ = +2 cm, virtual, erect [1].



Q189 · Short Answer · 3 marks · ★ Board ×1 · 1 paper

At what distance should an object be placed from a convex lens of focal length 18 cm to obtain an image at 24 cm from it on the other side? What will be the magnification?

Source: CBSE (old) 31/1/1, Q13 (OCR) [6_compressed, PDF p.144]

✔ Answer
1/u = 1/v – 1/f = 1/24 – 1/18 = –1/72 ⇒ u = –72 cm [2]. m = v/u = 24/(–72) = –1/3 [1].

Q190 · Short Answer · 3 marks · ★ Board ×1 · 1 paper

A student placed a candle flame at different distances from a convex lens and focused its image on a screen: (u, v in cm) 1: –90, +18; 2: –60, +20; 3: –40, +24; 4: –30, +30; 5: –24, +40; 6: –20, +60; 7: –18, +90; 8: –12, +120. Without calculation: (a) What is the focal length of the lens? Give reason. (b) Which set of observations is not correct and why? Draw a ray diagram for any correct set.

29. A student placed a candle flame at different distances from a convex lens and focused its image on a screen. He recorded his observation in tabular form as given below :

S.No.	Distance of flame from the lens (cm)	Distance of the image from the lens
1	– 90	+ 18
2	– 60	+ 20
3	– 40	+ 24
4	– 30	+ 30
5	– 24	+ 40
6	– 20	+ 60
7	– 18	+ 90
8	– 12	+ 120

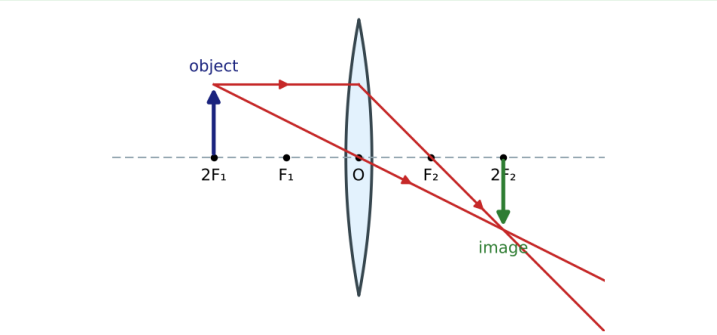
31/6/3 19 [P.T.O.]

Figure from the question paper

Source: CBSE 2025 31/6/3, Q29 [4-compressed, PDF p.19]

✔ Answer

(a) In set 4, u = v = 30 cm ⇒ object at 2F ⇒ 2f = 30 cm, f = 15 cm [1].
(b) Set 8: the object (12 cm) is inside F (15 cm), so the image must be virtual (on the same side, v negative); a real image on a screen at +120 cm is not possible [1]. Ray diagram for set 4 (object at $2F_1$, image at $2F_2$) [1].



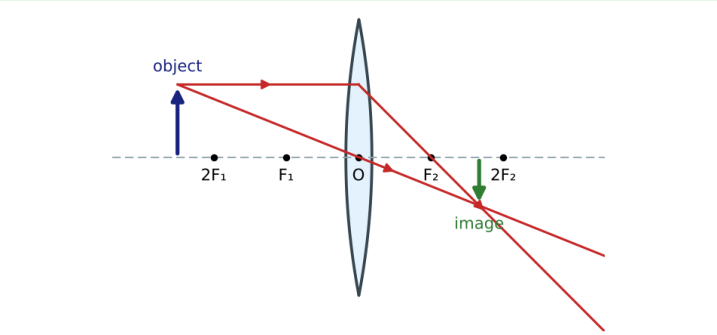
Q191 · Short Answer · 3 marks · ★ · 1 paper

An object 5 cm long is held 25 cm away from a converging lens of focal length 10 cm. Draw the ray diagram and find the position, size and nature of the image.

Source: KV Sitapur PT-II (2024-25), Q6 [X SCIENCE-merged, PDF p.10]

✔ Answer

1/v = 1/10 – 1/25 = 3/50 ⇒ v = 16.7 cm; m = –0.67, h' = –3.3 cm; real, inverted, diminished (NCERT exercise).



⚠ **Note:** Same numerical as the 'half-covered lens' LA; kept separately because it is a 2-mark item here.

Q192 · Short Answer · 3 marks · ★ · 1 paper

A concave lens has focal length of 20 cm. At what distance from the lens should a 5 cm tall object be placed so that it forms a virtual image at 15 cm from the lens? Also calculate the size of the image.

Source: KVS Lucknow 1st Pre-Board 2024-25, Q23 OR [X SCIENCE-merged, PDF p.31]

✔ Answer

f = –20, v = –15: 1/u = 1/v – 1/f = –1/15 + 1/20 = –1/60 ⇒ u = –60 cm [1½]. m = v/u = 0.25 ⇒ h' = +1.25 cm (virtual, erect, diminished) [1½]. (NCERT exercise)

Q193 · Short Answer · 3 marks · ★ · 1 paper

A 4 cm tall object is placed perpendicular to the principal axis of a convex lens of focal length 20 cm at 15 cm from the lens. Find the nature, position and size of the image.

Source: Sample Paper (F8), Q36 OR(ii) [8_compressed, PDF p.21]

✔ Answer

1/v = 1/20 – 1/15 = –1/60 ⇒ v = –60 cm; m = v/u = 4 ⇒ h' = +16 cm; virtual, erect, enlarged, on the same side.

Q194 · Short Answer · 3 marks · ★ · 1 paper

An object is placed 30 cm from a concave lens of focal length 30 cm. Find the image distance, magnification and four characteristics of the image.

Source: Practice Paper (F6), Q36 [6_compressed, PDF p.477,478]

✔ Answer

u = –30, f = –30: 1/v = –1/30 – 1/30 = –2/30 ⇒ v = –15 cm; m = v/u = +0.5. Image virtual, erect, diminished, 15 cm on the same side as the object.

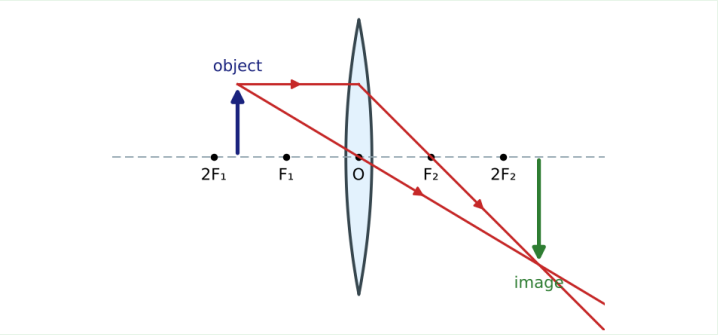
Q195 · Short Answer · 3 marks · ★ · 1 paper

An object 6 cm in size is placed at 50 cm in front of a convex lens of focal length 30 cm. At what distance should a screen be placed to obtain a sharp image? Find the nature and size of the image and draw the ray diagram.

Source: Sample Paper (F6), Q39 [6_compressed, PDF p.361]

✔ Answer

1/v = 1/30 – 1/50 = 2/150 ⇒ v = +75 cm [1½]. m = 75/(–50) = –1.5 ⇒ h′ = –9 cm: real, inverted, enlarged [1½]. Ray diagram.



Q196 · Short Answer · 3 marks · ★ · 1 paper

A convex lens forms a real and inverted image of finite size at 50 cm from it. Where is the object placed? Give all possible positions with reason.

Source: Sample Paper (F6), Q36(b) [6_compressed, PDF p.329]

✔ Answer
A real image of finite size needs the object beyond F_1. If f < 25 cm, the object is between F_1 and $2F_1$ or beyond $2F_1$ depending on f; e.g. if the image is the same size, object at 50 cm ($2F_1$). General answer: anywhere beyond F_1 – between F_1 and $2F_1$ (image beyond $2F_2$, enlarged), at $2F_1$ (same size), beyond $2F_1$ (diminished) [3].

⚠ **Note:** Question gives no focal length, so the answer lists the cases.

Q197 · Short Answer · 3 marks · ★ · 1 paper

The image of an object placed at 60 cm in front of a lens is obtained on a screen 120 cm from it. Find the focal length of the lens. What would be the height of the image if the object is 5 cm high?

Source: Sample Paper (F8), Q32 [8_compressed, PDF p.254]

✔ Answer
Real image ⇒ convex lens. 1/f = 1/v – 1/u = 1/120 + 1/60 = 3/120 ⇒ f = +40 cm [2]. m = v/u = –2 ⇒ h′ = –10 cm [1].

Long Answer

Q198 · Long Answer · 5 marks · ★ · 2 papers

The image shows a thin lens of focal length 5 m. (i) What kind of lens is it? (ii) If a real, inverted image is to be formed at 7 m from the optical centre, show with calculation where the object should be placed. (iii) Draw a labelled diagram.

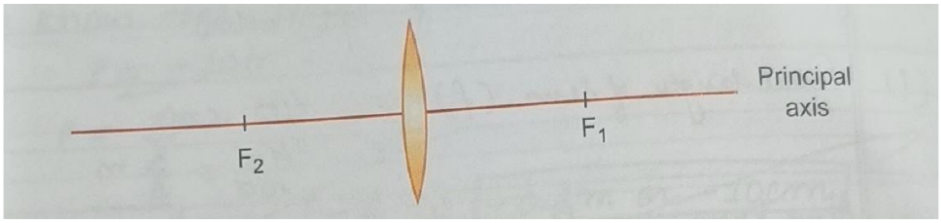
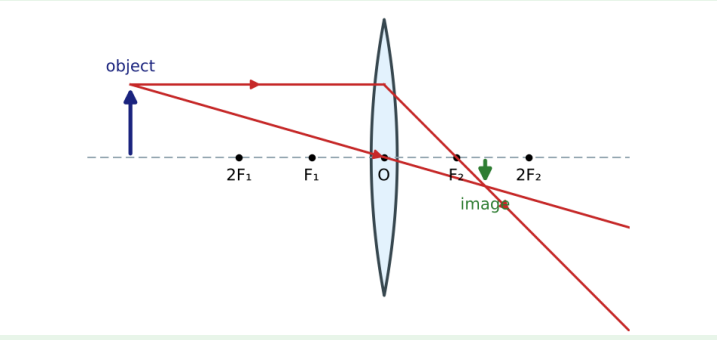


Figure from the question paper

Source: KVS Lucknow 1st Pre-Board 2024-25, Q35 [X SCIENCE-merged, PDF p.26,32] | KVS Lucknow Pre-Board-2 2024-25, Q36 [X SCIENCE-merged, PDF p.26]

✔ Answer
(i) Convex (converging) lens – thicker in the middle [1].
(ii) f = +5 m, v = +7 m: 1/u = 1/v – 1/f = 1/7 – 1/5 = –2/35 ⇒ u = –17.5 m. Object is 17.5 m in front of the lens [2].
(iii) Object beyond $2F_1$ (17.5 m > 10 m): image between F_2 and $2F_2$, real, inverted, diminished [2].



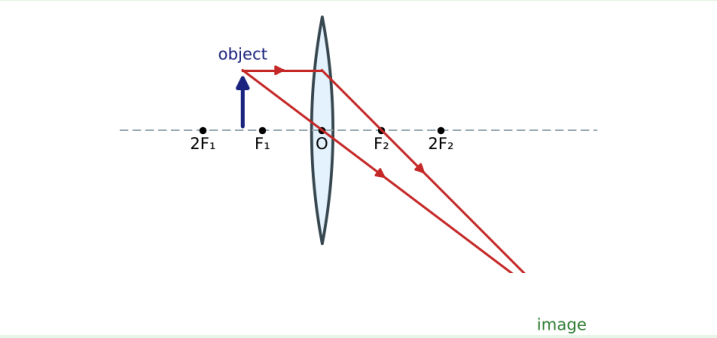
Q199 · Long Answer · 5 marks · ★ Board ×1 · 1 paper

List the sign conventions followed for refraction of light through spherical lenses. Draw a diagram and apply them to find the nature and focal length of a spherical lens which forms a three times magnified real image of an object placed 16 cm from the lens.

Source: CBSE (old) BRH/2 31/2/1, Q25 [Merged OCR, PDF p.50]

✔ Answer

Sign conventions (distances from optical centre; along incident light +; heights above axis +) [2]. m = –3, u = –16 ⇒ v = +48 cm; 1/f = 1/v – 1/u = 1/48 + 1/16 = 4/48 ⇒ f = +12 cm, convex lens [2]. Diagram [1].



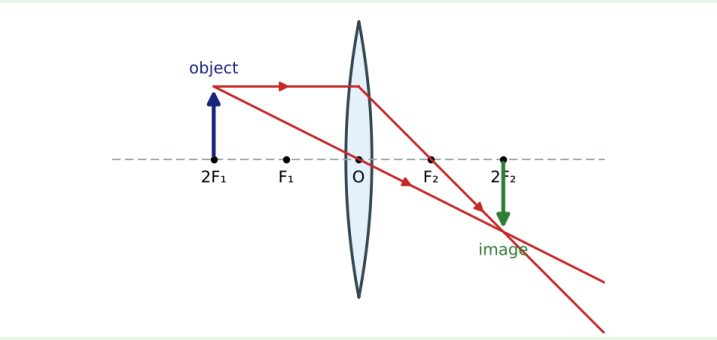
Q200 · Long Answer · 5 marks · ★ Board ×1 · 1 paper

(i) Define the optical centre of a lens. (ii) Light from an object on a metre scale at the 8 cm mark is focused on a screen at the 92 cm mark by a converging lens at the 50 cm mark. Find the focal length. (I) Find the position of the image if the object is shifted to the 29 cm mark. (II) Nature of the image if the object is shifted further towards the lens.

Source: CBSE 2026 31/8/1, Q36(B) [4-compressed, PDF p.119]
Also asked as: 31/8/2 (4-compressed p.151): (I) image at 71 cm mark ⇒ v = +21 cm = f ⇒ object at infinity (very far); (II) object at 36 cm mark ⇒ u = –14 cm, inside F ⇒ virtual, erect, enlarged.

✔ Answer

(i) Optical centre: the central point of a lens; a ray passing through it goes undeviated [1].
(ii) u = 8 – 50 = –42 cm, v = 92 – 50 = +42 cm. Object and image at equal distances ⇒ object at 2F ⇒ 2f = 42 cm, f = 21 cm [2].
(I) Object at 29 cm mark: u = –21 cm = –f ⇒ image at infinity [1]. (II) Object inside F: image virtual, erect, enlarged on the same side [1].



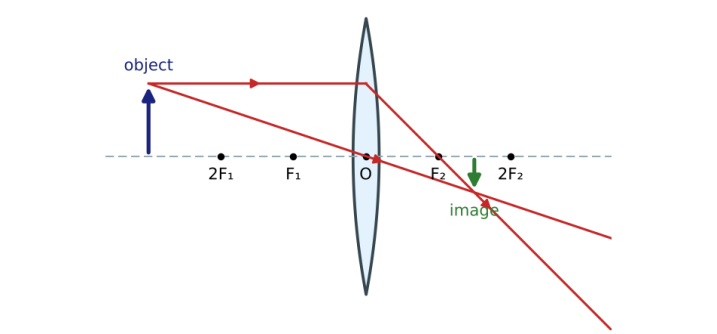
Q201 · Long Answer · 5 marks · ★ · 1 paper

(Table) Observation table of u and v for a convex lens: (1) –100, +25 (2) –60, +30 (3) –40, +40 (4) –30, +60 (5) –25, +100 (6) –15, +120. (a) What is the focal length? Give reason (no calculation). (b) Which observation is not correct and why? (c) Draw ray diagram for S.No. 2 and find magnification.

Source: Vedantu Sample Paper (F5), Q34 [5-compressed, PDF p.321,360]
Also asked as: KVS Lucknow PB-II 2023-24 Q35: (–90,+18),(–60,+20),(–30,+30),(–20,+60),(–18,+90),(–10,+100) ⇒ f = 15 cm, P = +6.7 D; S.No. 6 wrong; S.No. 3 same size; S.No. 4 real, inverted, enlarged.

✔ Answer

(a) At S.No. 3, u = v = 40 cm ⇒ object at 2F ⇒ f = 20 cm [2]. (b) S.No. 6: object (15 cm) is within F, so the image should be virtual (v negative) – a real image at +120 cm is not possible [2]. (c) m = v/u = 30/(–60) = –0.5 [1].



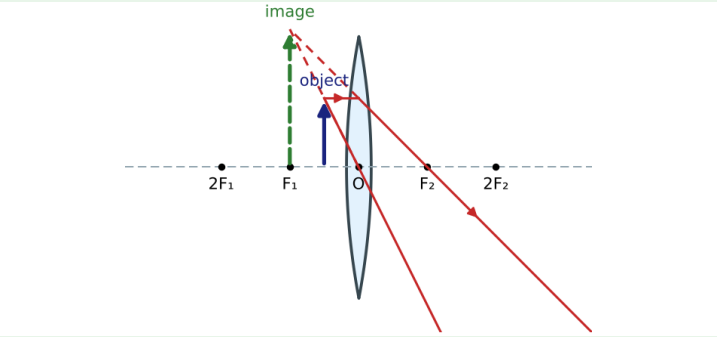
Q202 · Long Answer · 5 marks · ★ · 1 paper

A student focussed the image of a candle flame on a white screen using a convex lens: candle at 12.0 cm, lens at 50.0 cm, screen at 88.0 cm. (i) Focal length? (ii) Where will the image form if the candle is shifted to 31.0 cm? (iii) Nature of image if shifted further towards the lens. (iv) Ray diagram for (iii).

Source: Sample Paper (F6), Q36 [6_compressed, PDF p.496]

✔ Answer

(i) u = v = 38 cm ⇒ object at 2F ⇒ f = 19 cm [1]. (ii) u = –19 cm = F ⇒ image at infinity [1]. (iii) Virtual, erect, enlarged [1]. (iv) Ray diagram (object inside F) [2].



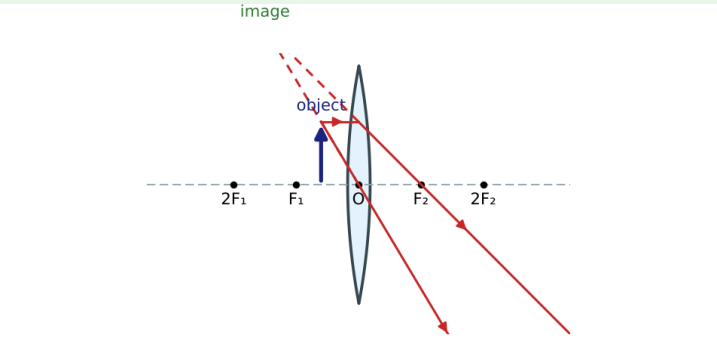
Case / Source-based

Q203 · Case / Source-based · 4 marks · ★ Board ×1 · 2 papers

Observation table for a convex lens (u, v in cm): 1: –150, +30; 2: –75, +37.5; 3: –50, +50; 4: –37.5, +75; 5: –30, +150; 6: –15, +37.5. (i) Focal length without calculation; (ii) which observation is wrong and why – draw its ray diagram; (iii) magnification for u = 30 cm.
OR (b) (i) Define principal axis; ray diagram for a ray parallel to the axis through a concave lens. (ii) Concave lens f 20 cm – where should a 5 cm object be placed for the image at 15 cm? Size of image?

Source: CBSE 2024 31/4/1, Q36 [1-compressed, PDF p.399] | Sample Paper (F6), Q39 key [6_compressed, PDF p.321]

✔ Answer
(i) Obs. 3: u = v = 50 cm ⇒ object at 2F ⇒ f = 25 cm [1]. (ii) Obs. 6: object (15 cm) inside F, so the image must be virtual (v negative) – a real image at +37.5 cm is impossible [2]. (iii) m = v/u = 150/(–30) = –5 [1]. OR (ii) 1/u = 1/v – 1/f = –1/15 + 1/20 = –1/60 ⇒ u = –60 cm; m = 0.25 ⇒ h′ = 1.25 cm [2].



⚠ **Note:** Decimal points are lost in the text layer ('375' read as 37.5). Values set so that obs. 1–5 fit f = 25 cm.

Q204 · Case / Source-based · 4 marks · ★ · 1 paper

A camera lens forms an image ... (A) Type of lens. (B) Nature of image. (C) f = 50 mm, v = 60 mm: find u. OR (D) Image height –20 mm, object height 80 mm, u = –150 mm: find magnification, v and f.

Source: Sample Paper (F8), Q38 [8_compressed, PDF p.328]

✔ Answer
(A) Convex [1]. (B) Real, inverted [1]. (C) 1/u = 1/v – 1/f = 1/60 – 1/50 = –1/300 ⇒ u = –300 mm [2]. OR (D) m = –20/80 = –0.25; v = m × u = +37.5 mm; 1/f = 1/37.5 + 1/150 = 5/150 ⇒ f = 30 mm [2].

⚠ **Note:** The source key writes 'm = –0.25 mm' and v = –0.25 × –150 = 37.5 – magnification has no unit; written correctly here.

Power of a lens

18 questions · 8 board appearances · Prepared by Abhishek Das, TGT (Science)

Multiple Choice

Q205 · Multiple Choice · 1 mark · ★ Board ×1 · 1 paper

A convex lens and a concave lens having focal lengths 10 cm and 20 cm respectively are placed in contact. The lens combination will behave like:

(a) a plane glass slab
(b) a convex lens
(c) a concave lens
(d) a cylindrical lens

Source: CBSE VI 11-31(B), Q31 [2-compressed, PDF p.83]

✔ Answer
(B) a convex lens. P = 1/0.1 – 1/0.2 = 10 – 5 = +5 D (positive).

Q206 · Multiple Choice · 1 mark · ★ · 1 paper

A doctor has prescribed a corrective lens of –3.0 D. Which type of lens is this?

(a) diverging lens
(b) converging lens
(c) bifocal lens
(d) plane lens

Source: KVS Lucknow Pre-Board 2025-26 (B), Q31 [X SCIENCE-merged, PDF p.83]

✔ Answer
(a) Diverging (concave) lens – negative power. f = 1/(–3) = –33.3 cm.

Q207 · Multiple Choice · 1 mark · ★ · 1 paper

Which of the following statements is true?

(a) A concave lens has 4 D power, focal length 0.25 m
(b) A concave lens has –8 D power, focal length 0.25 m
(c) A convex lens has –4 D power, focal length 0.25 m
(d) A convex lens has 4 D power, focal length 0.25 m

Source: Practice Paper (F6), Section C Q29/30 [6_compressed, PDF p.262,294,433]

✔ Answer
(d) A convex lens has +4 dioptre power having a focal length 0.25 m. (P = 1/f = 1/0.25 = +4 D)

⚠ **Note:** OCR merged the options of Q29 and Q30; question number to be confirmed.

Q208 · Multiple Choice · 1 mark · ★ · 1 paper

Two convex lenses P and Q have focal lengths 0.50 m and 0.40 m. Which is TRUE about the combined power?

(a) equal to 4.5 D
(b) less than 4.5 D
(c) more than 4.5 D
(d) cannot be determined

Source: CBSE Competency Items (Light), Q1 [4-compressed, PDF p.758]

✔ Answer
P is equal to 4.5 D (2 D + 2.5 D).

Q209 · Multiple Choice · 1 mark · ★ · 1 paper

Which of the following does the negative sign in the power –3 D signify?

(a) Focus on the same side as the object
(b) Focus on the opposite side
(c) Focus outside the principal axis
(d) Focal length smaller on one side

Source: CBSE Competency Focused Practice Qs, Q36 [6_compressed, PDF p.32]

✔ Answer
(A) The focus is on the same side of the lens as the object (concave lens).

Q210 · Multiple Choice · 1 mark · ★ · 1 paper

Which among the two lenses with power –3 D and 4 D can form a real image?

(a) only –3 D
(b) only 4 D
(c) both
(d) neither

Source: CBSE Competency Focused Practice Qs, Q37 [6_compressed, PDF p.32]

✔ Answer
(B) Only the lens with power 4 D (convex).

Q211 · Multiple Choice · 1 mark · ★ · 1 paper

The formula for calculating the power of a lens is:

Source: Vedantu Practice Bank (F4), Q7 [4-compressed, PDF p.668]

✔ Answer
(a) P = 1/f (f in metres).

Very Short Answer

Q212 · Very Short Answer · 2 marks · ★ · 1 paper

Define 1 dioptre of power of a lens. Find the power of a concave lens of focal length 2 m.

Source: KVS Lucknow 1st Pre-Board 2022-23, Q26 [X SCIENCE-merged, PDF p.17]

✓ Answer
1 dioptre is the power of a lens whose focal length is 1 metre (1 D = 1 m^{-1}) [1]. P = 1/f = 1/(–2) = –0.5 D [1].

Q213 · Very Short Answer · 2 marks · ★ · 1 paper

What is meant by power of a lens? Write its SI unit. A student uses a lens of focal length +40 cm and another of –20 cm. Write the nature and power of each lens.

Source: KV Sitapur PT-II (2024-25), Q7 [X SCIENCE-merged, PDF p.10]
Also asked as: Practice paper (F6): lenses of +10 cm and –10 cm ⇒ +10 D (convex) and –10 D (concave).

✓ Answer
Power = reciprocal of focal length (in m); SI unit dioptre (D) [1]. f = +40 cm: convex, P = +2.5 D; f = –20 cm: concave, P = –5 D [1]. (NCERT)

Q214 · Very Short Answer · 2 marks · ★ · 1 paper

(i) Define the power of a lens. (ii) Name the lens that has (a) negative power (b) positive power.

Source: Vedantu Sample Paper (F5), Q22 [5-compressed, PDF p.318]

✓ Answer
(i) Reciprocal of its focal length in metres (P = 1/f) [1]. (ii)(a) Concave lens (b) Convex lens [1].

Short Answer

Q215 · Short Answer · 3 marks · ★ Board ×2 · 2 papers

Define power of a lens. The focal length of a lens is +10 cm (or +25 cm). Write the nature of the lens and find its power. If an object is placed at 20 cm (50 cm) from the optical centre, what will be the sign of magnification / two properties of the image?

Source: CBSE 2023 31/2/1 Q31(b), 31/2/2 Q29(b), 31/2/3 Q30(b) [1-compressed, PDF p.17,196,221] | CBSE VI 31(B)/S, CDBA/S, Q31(b) [1-compressed, PDF p.17,196,221]

✓ Answer
Power: reciprocal of focal length in metres, P = 1/f, unit dioptre [1].
f = +10 cm: convex (converging); P = 100/10 = +10 D. Object at 20 cm = 2F ⇒ real, inverted image ⇒ magnification negative [2].
(f = +25 cm: P = +4 D; object at 50 cm = 2F ⇒ image real, inverted, same size at 2F.)

⚠ **Note:** 2023 paper prints 'focal length of a lens is 10 cm'; sign taken as + (as in the scheme).

Q216 · Short Answer · 3 marks · ★ · 2 papers

Find the focal length of a lens of power –2.0 D. What type of lens is this?

Source: Sample Paper (F6), Q35 [6_compressed, PDF p.279] | KVS pre-board (X SCIENCE-merged) [X SCIENCE-merged, PDF p.39]

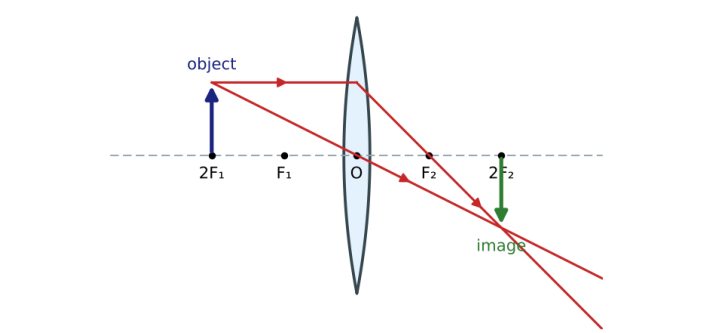
✓ Answer
f = 1/P = 1/(–2) = –0.5 m = –50 cm [2]. Negative focal length ⇒ concave (diverging) lens [1]. (NCERT exercise)

Q217 · Short Answer · 3 marks · ★ Board ×1 · 1 paper

The power of a lens is +4 D. Find its focal length. An object is placed at 50 cm from the optical centre. State the nature and magnification of the image and draw a ray diagram.

Source: CBSE 2023 31/4/1, Q31 [1-compressed, PDF p.369]

✔ Answer
f = 1/P = 1/4 m = 25 cm (convex) [1]. Object at 50 cm = 2F ⇒ image at 2F on the other side; real, inverted, same size; m = –1 [1]. Ray diagram [1].



Q218 · Short Answer · 3 marks · ★ Board ×1 · 1 paper

(a) What is meant by power of a lens? (b) State and define the SI unit of power. (c) A convex lens of focal length 25 cm and a concave lens of focal length 10 cm are placed in close contact. Calculate the power of the combination.

Source: CBSE (old) RHB 31/1, Q24 [6_compressed, PDF p.196]

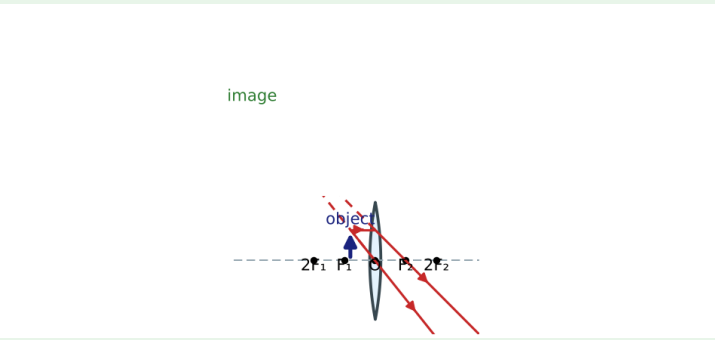
✔ Answer
(a) Power = reciprocal of focal length (in m); it shows the degree of convergence or divergence [1]. (b) Dioptre (D): power of a lens of focal length 1 m [1]. (c) P = 1/0.25 – 1/0.10 = 4 – 10 = –6 D [3].

Q219 · Short Answer · 3 marks · ★ Board ×1 · 1 paper

What is meant by power of a lens? Define its SI unit. Two lenses A and B have focal lengths +10 cm and –10 cm. State the nature and power of each. Which will form a virtual and magnified image of an object placed 8 cm from the lens? Draw a ray diagram.

Source: CBSE (old) RLH 31/1, Q22 [2-compressed, PDF p.156]

✔ Answer
Power = 1/f (m); unit dioptre – power of a lens of focal length 1 m [1]. A: convex, +10 D; B: concave, –10 D [1]. Lens A (object within its focal length) forms a virtual, magnified image; ray diagram [1].



Q220 · Short Answer · 3 marks · ★ Board ×1 · 1 paper

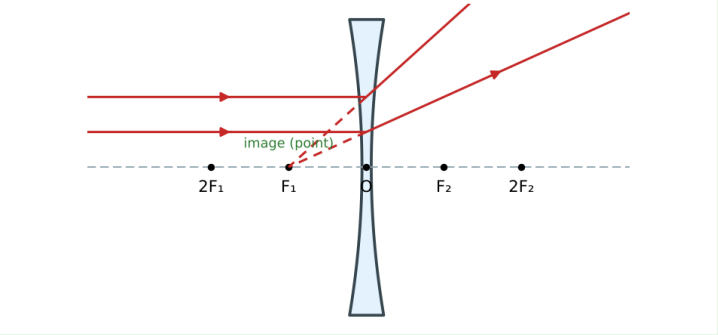
An object is kept at 1 m from a lens of power +2 D. (i) Identify the lens. (ii) Calculate its focal length and the image distance.
OR Define (i) principal focus (ii) focal length of a diverging lens with a labelled ray diagram.

Source: CBSE 2023 31/4/2, Q30 [1-compressed, PDF p.420]

✔ Answer

(i) Convex lens (positive power) [1]. (ii) f = 1/2 m = 50 cm; u = –100 cm (2F) ⇒ 1/v = 1/50 – 1/100 ⇒ v = +100 cm [2].

OR (i) Point on the axis from which rays parallel to the axis appear to diverge after refraction through a concave lens. (ii) Distance from optical centre to principal focus [3].



Q221 · Short Answer · 3 marks · ★ · 1 paper

A concave lens has a power of –2.0 D. It forms an image of an object at 10 cm from the lens. (a) Find the object distance. (b) Find the magnification.

Source: CBSE Competency Focused Practice Qs, Q152 [6_compressed, PDF p.81]

✔ Answer

f = 1/(–2) = –50 cm [1]. (a) 1/u = 1/v – 1/f = –1/10 + 1/50 = –4/50 ⇒ u = –12.5 cm [2]. (b) m = v/u = –10/–12.5 = 0.8 [1].

Case / Source-based

Q222 · Case / Source-based · 4 marks · ★ Board ×1 · 1 paper

Many optical instruments consist of a number of lenses ... P = P₁ + P₂ + P₃ ... (simple additive property of power of lenses).

(a) What is the nature (convergent/divergent) of the combination of a convex lens of power +4 D and a concave lens of power –2 D?

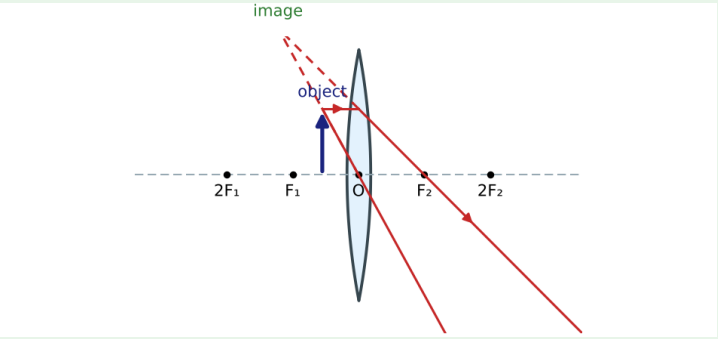
(b) Calculate the focal length of a lens of power –2·5 D.

(c) Draw a ray diagram to show the nature and position of an image formed by a convex lens of power +0·1 D, when an object is placed at a distance of 20 cm from its optical centre.

OR (c) How is a virtual image formed by a convex lens different from that formed by a concave lens? Under what conditions do a convex and a concave lens form virtual images?

Source: CBSE 2023 31/5/1, Q39 [1-compressed, PDF p.480,503,532]

✔ Answer
(a) P = +4 D + (–2 D) = +2 D. Positive power ⇒ the combination is convergent [1].
(b) f = 1/P = 1/(–2.5) m = –0.4 m = –40 cm (concave lens) [1].
(c) f = 1/0.1 = +10 m = 1000 cm. The object at 20 cm is between the optical centre and F, so the image is virtual, erect and magnified, on the same side as the object (v ≈ –20.4 cm, almost at the object) [1 + 1 for diagram].
OR (c) Convex lens: virtual image is erect and enlarged, formed only when the object is between O and F_1. Concave lens: virtual image is erect and diminished, formed for every position of the object [2].



Lab skills: focal length, glass slab

24 questions · 22 board appearances · Prepared by Abhishek Das, TGT (Science)

Multiple Choice

Q223 · Multiple Choice · 1 mark · ★ Board ×2 · 2 papers

To determine the focal length of a convex lens by obtaining a sharp image of a distant object, the steps (a) hold the lens between object and screen (b) measure the distance between lens and screen (c) select a well-lit distant object (d) place a screen opposite the object (e) adjust the lens for a sharp image – the correct sequence is

(a) c, a, d, e, b
(b) c, d, a, e, b
(c) c, d, e, a, b
(d) c, a, e, d, b

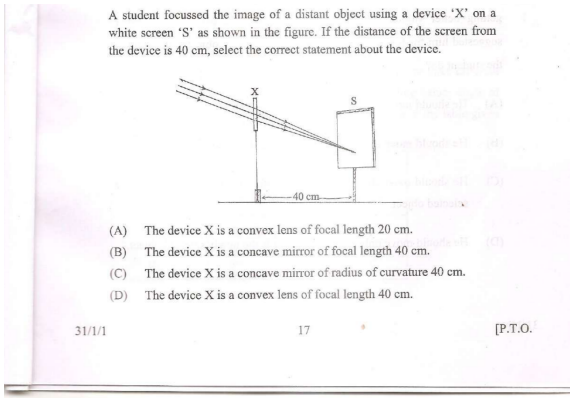
Source: CBSE (old) BRH/1 31/1, Section B [Merged OCR, PDF p.16,61] | CBSE (old) RHB 31/1, Q28 [6_compressed, PDF p.199]
Also asked as: RHB 31/1 Q28 gives the same steps as I–IV: answer III, I, II, IV.

✔ Answer
(B) c, d, a, e, b.

Q224 · Multiple Choice · 1 mark · ★ Board ×2 · 2 papers

A student focussed the image of a distant object using a device X on a white screen S. The screen is 40 cm from the device. Select the correct statement.

(a) convex lens of focal length 20 cm
(b) concave mirror of focal length 40 cm
(c) concave mirror of radius of curvature 40 cm
(d) convex lens of focal length 40 cm


A student focussed the image of a distant object using a device 'X' on a white screen 'S' as shown in the figure. If the distance of the screen from the device is 40 cm, select the correct statement about the device.

X S 40 cm

(A) The device X is a convex lens of focal length 20 cm.
(B) The device X is a concave mirror of focal length 40 cm.
(C) The device X is a concave mirror of radius of curvature 40 cm.
(D) The device X is a convex lens of focal length 40 cm.

31/1/1 17 [P.T.O.

Figure from the question paper

Source: CBSE (old) 31/1/1, Q30 (OCR) [6_compressed, PDF p.121] | CBSE (old) BRH/2 31/2/1, Q31 [Merged OCR, PDF p.53]

✔ Answer
(D) X is a convex lens of focal length 40 cm (light passes through X; image of a distant object forms at F).

Q225 · Multiple Choice · 1 mark · ★ Board ×1 · 1 paper

To determine the focal length of a concave mirror, a student obtains the image of a well-lit distant object on a screen. He needs to measure the distance between

(a) mirror and the object
(b) mirror and the screen
(c) screen and the object
(d) screen and the object and also mirror and the screen

Source: CBSE (old) BRH/1 31/1, Q? (Section B) [Merged OCR, PDF p.14]

✔ Answer
(B) mirror and the screen.

Q226 · Multiple Choice · 1 mark · ★ Board ×1 · 1 paper

Three students X, Y and Z find the focal length of a concave mirror. X obtains the image of the window grill, Y of a distant white building, Z a point-size image of the sun. The most correct value is obtained by

(a) X
(b) Y
(c) Z
(d) X and Y both

Source: CBSE (old) BRH/2 31/2/1, Q33 [Merged OCR, PDF p.54]

✔ Answer
(C) Z – the sun is the most distant object, so its image forms almost exactly at F.

Q227 · Multiple Choice · 1 mark · ★ Board ×1 · 1 paper

To find the focal length of a concave mirror Rahul focuses a distant object. The chosen object should be

(a) a tree
(b) a building
(c) a window
(d) the sun

Source: CBSE (old) 31/1/1 (F6 OCR), Q26 [6_compressed, PDF p.179]

✔ Answer
(4) the sun (most distant, well lit).

Q228 · Multiple Choice · 1 mark · ★ Board ×1 · 1 paper

For finding the focal length of a convex lens by obtaining the image of a distant object, one should use as the object

(a) a well-lit distant tree
(b) grill in the classroom
(c) any distant tree
(d) a lighted candle at the other end of the table

Source: CBSE (old) 31/1/1 (F6 OCR), Q27 [6_compressed, PDF p.179]

✔ Answer
(1) a well-lit distant tree.

Q229 · Multiple Choice · 1 mark · ★ Board ×1 · 1 paper

To find the focal length of a convex lens using a distant object, which measures give better results? a. lens of small diameter b. lens of larger diameter c. object very far d. object far but not very far e. all room lights on f. minimum room lights on

(a) a, c and e
(b) b, d and f
(c) a, d and f
(d) b, d and e

Source: CBSE (old) BRH/2 31/2/1, Q32 [Merged OCR, PDF p.54]

✔ Answer
(B) b, d and f. (A bigger lens gives a brighter image; the object should be far but clearly visible; dim room light makes the image clear on the screen.)

Q230 · Multiple Choice · 1 mark · ★ Board ×1 · 1 paper

A student traces the path of a ray of light through a rectangular glass slab for different values of angle of incidence. On analysing the measurements, which conclusion is he likely to draw?

(a) $\angle i = \angle e < \angle r$
(b) $\angle i < \angle e < \angle r$
(c) $\angle i > \angle e > \angle r$
(d) $\angle i = \angle e > \angle r$

Source: CBSE 31/1 (practical-skill section), Q32 [2-compressed, PDF p.163,164]

✔ Answer
(D) $\angle i = \angle e > \angle r$.

⚠ **Note:** Year not confirmed (old paper with practical-skill MCQs).

Q231 · Multiple Choice · 1 mark · ★ Board ×1 · 1 paper

In an experiment to trace the path of a ray of light through a glass slab for different angles of incidence, a student would find that the emergent ray

(a) is parallel to the incident ray
(b) is perpendicular to the incident ray
(c) is parallel to the refracted ray
(d) bends at an angle to the incident ray

Source: CBSE (old) 31/1/1 (F6 OCR), Q35 [6_compressed, PDF p.128]

✔ Answer
(A) is parallel to the incident ray.

Q232 · Multiple Choice · 1 mark · ★ Board ×1 · 1 paper

While tracing the path of a ray through a rectangular glass slab a student tabulated: I: 60°, 40°, 61°; II: 50°, 36°, 51°; III: 40°, 28°, 39°; IV: 30°, 20°, 31° ($\angle i$, $\angle r$, $\angle e$). The correct observation is

While tracing the path of a ray of light passing through a rectangular glass slab a student tabulated his observations as given below :

S. No.	∠i	∠r	∠e
I	60°	40°	61°
II	50°	36°	51°
III	40°	28°	39°
IV	30°	20°	31°

Figure from the question paper

Source: CBSE (old) 31 (Merged OCR), Q35 [Merged OCR, PDF p.18]

✔ Answer

(D) IV. ∠e is about equal to ∠i in every row (within 1°), so the check is ∠r: for glass (n ≈ 1.5), sin i/sin r should be about 1.5. Only row IV gives this (sin 30°/sin 20° = 1.46); rows I–III give 1.30–1.37.

⚠ **Note:** The printed table really has ∠e one degree off ∠i in every row. The key is worked out from ∠r; check with the marking scheme if you have it.

Q233 · Multiple Choice · 1 mark · ★ Board ×1 · 1 paper

A student traces the path of a ray of white light through a rectangular glass slab and marks the angles of incidence (∠i), refraction (∠r) and emergence (∠e) as shown. Which angle(s) has he not marked correctly?

(a) ∠i only
(b) ∠i and ∠r
(c) ∠i and ∠e
(d) ∠r and ∠e

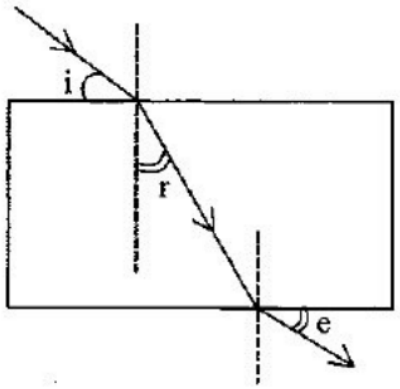


Figure from the question paper

Source: CBSE (old) 31 (Merged OCR), Q34 [Merged OCR, PDF p.17]

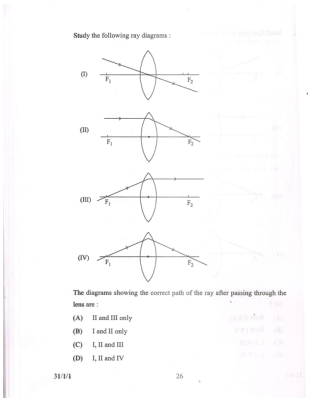
✔ Answer

(C) ∠i and ∠e. Angles must be measured from the normal. ∠r is marked between the refracted ray and the normal (correct), but ∠i and ∠e are marked from the surface of the slab (wrong).

Q234 · Multiple Choice · 1 mark · ★ Board ×1 · 1 paper

Study the following ray diagrams (I–IV) for a convex lens. The diagrams showing the correct path of the ray after passing through the lens are:

(a) II and III only
(b) I and II only
(c) I, II and III
(d) I, II and IV


Study the following ray diagrams :

(I)

(II)

(III)

(IV)

The diagrams showing the correct path of the ray after passing through the lens are :

(A) II and III only
(B) I and II only
(C) I, II and III
(D) I, II and IV

31/1/1 26

Figure from the question paper · Your screenshot – 6_compressed p.130

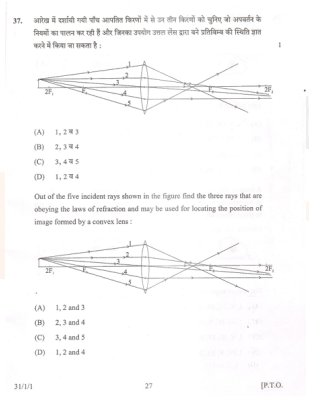
Source: CBSE (old) 31/1/1 (F6 OCR), Q36 [6_compressed, PDF p.130]

✔ Answer

(C) I, II and III. (I) ray through the optical centre goes undeviated; (II) ray parallel to the axis passes through F_2; (III) ray through F_1 emerges parallel. In (IV) a ray through F_1 cannot pass through F_2.

Q235 · Multiple Choice · 1 mark · ★ Board ×1 · 1 paper

Out of the five incident rays shown in the figure, find the three rays that obey the laws of refraction and may be used for locating the image formed by a convex lens.


37.

(A) 1, 2 व 3
(B) 2, 3 व 4
(C) 3, 4 व 5
(D) 1, 2 व 4

Out of the five incident rays shown in the figure find the three rays that are obeying the laws of refraction and may be used for locating the position of image formed by a convex lens :

(A) 1, 2 and 3
(B) 2, 3 and 4
(C) 3, 4 and 5
(D) 1, 2 and 4

31/1/1 27 [P.T.O.

Figure from the question paper · Your screenshot – 6_compressed p.131

Source: CBSE (old) 31/1/1 (F6 OCR), Q37 [6_compressed, PDF p.131]

✔ Answer

(B) 2, 3 and 4 – ray 2 is parallel to the principal axis (passes through F_2 after refraction), ray 3 goes through the optical centre undeviated, and ray 4 passes through F_1 and emerges parallel.

⚠ **Note:** Read from the figure: 2 is parallel, 3 heads to the optical centre, 4 passes through F_1. Rays 1 and 5 are not standard rays.

Q236 · Multiple Choice · 1 mark · ★ Board ×1 · 1 paper

Select from the following the best set-up for tracing the path of a ray of light through a rectangular glass slab (four figures).

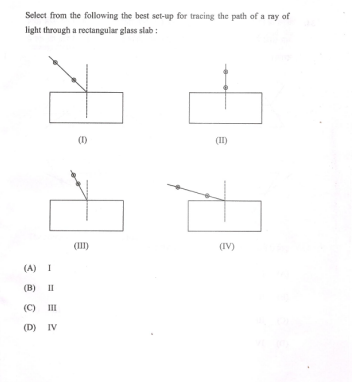


Figure from the question paper · Your screenshot – 6_compressed p.125

Source: CBSE (old) 31/1/1 (F6 OCR), Q33 [6_compressed, PDF p.125]

✔ Answer
(A) I – the pins are fixed far apart on an oblique line at a moderate angle (30°–60°) to the normal. II is along the normal (no bending seen), III has pins too close and angle too small, IV is almost grazing.

Q237 · Multiple Choice · 1 mark · ★ Board ×1 · 1 paper

A student used a device (X) to obtain/focus the image of a well illuminated distant building on a screen (S) as shown in the diagram. Select the correct statement about the device (X).

(a) concave lens of focal length 8 cm
(b) convex mirror of focal length 8 cm
(c) convex lens of focal length 4 cm
(d) convex lens of focal length 8 cm

A student used a device (X) to obtain/focus the image of a well illuminated distant building on a screen (S) as shown below in the diagram. Select the correct statement about the device (X).

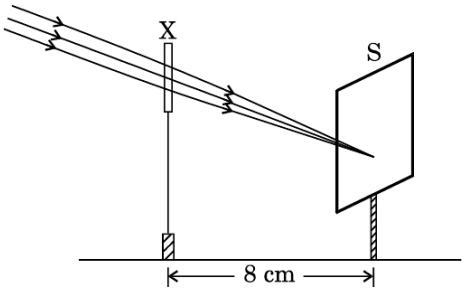


Figure from the question paper

Source: CBSE 31/1 (practical-skill section), Q31 [2-compressed, PDF p.163]

✔ Answer
(D) Convex lens of focal length 8 cm. Light passes through X and forms a real image of a distant object on the screen, so X is a convex lens; the image of a distant object forms at F, so f = 8 cm.

Q238 · Multiple Choice · 1 mark · ★ Board ×1 · 1 paper

Mohan obtained a sharp inverted image of a distant tree on the screen placed behind the lens. He then moved the screen and tried to look through the lens in the direction of the object. He would see:

(a) a blurred image on the wall of the laboratory
(b) an erect image of the tree on the lens
(c) no image as the screen has been removed
(d) an inverted image of the tree at the focus of the lens

Source: CBSE (old) 31/1/1 (F6 OCR), Q28 [6_compressed, PDF p.180]

✓ Answer
(4) An inverted image of the tree at the focus of the lens – the real image is still formed at F; without the screen the eye sees it there.

Q239 · Multiple Choice · 1 mark · ★ Board ×1 · 1 paper

A student obtains a sharp image of the distant window (W) on the screen (S) using the concave mirror (M) to determine its focal length. Which distance should he measure?

(a) MW
(b) MS
(c) SW
(d) MW – MS

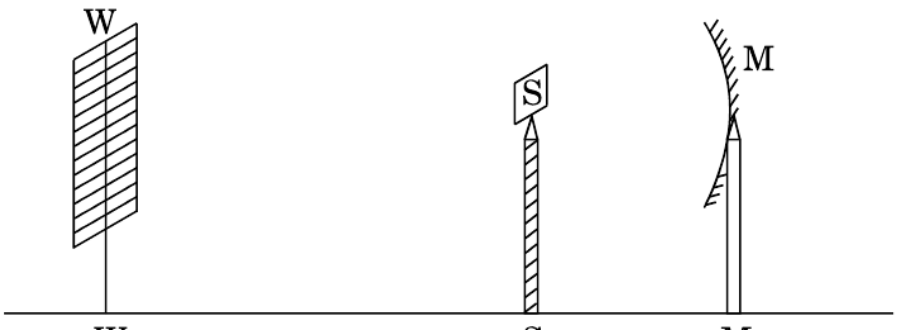


Figure from the question paper

Source: CBSE (old) RLH 31/1, Q31 [2-compressed, PDF p.162]

✓ Answer
(B) MS – the distance between the mirror and the screen.

Q240 · Multiple Choice · 1 mark · ★ Board ×1 · 1 paper

To find the focal length of a concave mirror, Sita should choose which set-up?

(a) A mirror holder and a screen holder
(b) A screen holder and a scale
(c) A mirror holder, a screen holder and a scale
(d) A screen, a mirror, holders for them and a scale

Source: CBSE (old) RHB 31/1, Q26 [6_compressed, PDF p.198]

✓ Answer
(D) A screen, a mirror, holders for them and a scale.

Q241 · Multiple Choice · 1 mark · ★ Board ×1 · 1 paper

Using a convex lens, a student obtained a sharp image of the classroom window grill on a screen. In which direction should he move the lens to focus a distant tree instead?

(a) Towards the screen
(b) Away from the screen
(c) Very far away from the screen
(d) Behind the screen

Source: CBSE (old) RHB 31/1, Q27 [6_compressed, PDF p.198]

✓ Answer
(A) Towards the screen – a more distant object forms its image nearer the lens (at F).

Q242 · Multiple Choice · 1 mark · ★ Board ×1 · 1 paper

To get better value of focal length of a concave mirror, the teacher suggested focusing a well illuminated distant object (instead of a near one). What should the student do?

(a) Move the mirror away from the screen
(b) Move the mirror slightly towards the screen
(c) Move mirror and screen towards the new object
(d) Move only the screen towards the new object

Source: CBSE (old) 31/1/1, Q31 (OCR) [6_compressed, PDF p.122]

✔ Answer
(B) Move the mirror slightly towards the screen – the image of a more distant object forms nearer the mirror.

Q243 · Multiple Choice · 1 mark · ★ · 1 paper

A teacher sets up a convex lens of focal length 15 cm at the 42 cm mark on an optical bench. Students suggest screen positions 12, 29, 57, 72 cm to get a distinct image of a distant tree. The correct position was suggested by

(a) Student A
(b) Student B
(c) Student C
(d) Student D

Source: KVS Lucknow 1st Pre-Board 2024-25, Q10 [X SCIENCE-merged, PDF p.30]

✔ Answer
(c) Student C – 57 cm (42 + 15; image of a distant object forms at F).

Q244 · Multiple Choice · 1 mark · ★ · 1 paper

Four students A, B, C and D performed the experiment to determine the focal length of a concave mirror by obtaining the image of a distant tree on a screen. They measured the distances between the screen and the mirrors as shown in the diagrams. The correct value of image will be obtained by:

(a) A
(b) B
(c) C
(d) D

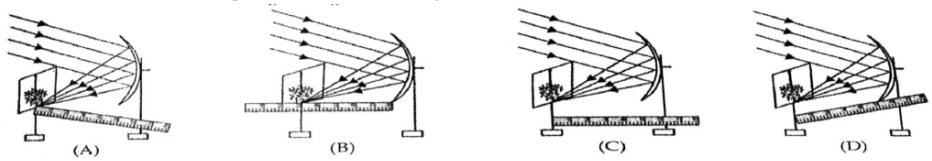


Figure from the question paper

Source: KVS Lucknow Pre-Board 2025-26 (B), Q30 [X SCIENCE-merged, PDF p.83]

✔ Answer
(B) – the scale must lie along the principal axis and the distance must be read between the screen and the pole of the mirror, with both holders on the scale (as in B).

⚠ **Note:** Look at the four set-ups: the correct one has the screen and the mirror both standing on the scale and the reading taken from the mirror to the screen.

Q245 · Multiple Choice · 1 mark · ★ · 1 paper

A student finds the focal length of a concave mirror. He gets the sharp image of a distant tree when the mirror holder and screen holder are 26.8 cm apart. The focal length is

Source: Sample Paper (F5), Q27 [5-compressed, PDF p.279]

✔ Answer
(a) 26.8 cm (for a distant object, image distance = focal length).

Q246 · Multiple Choice · 1 mark · ★ · 1 paper

A student obtains a blurred image of an object on a screen using a convex lens. To obtain a sharp image he has to shift the screen

Source: Sample Paper (F5), Q33 [5-compressed, PDF p.281]

✔ Answer

(c) either towards or away from the lens depending on the position of the object.

Science with Abhishek Sir

Summary – sub-theme × question type

Sub-theme	MCQ	AR	VSA	SA	LA	CASE	Total
Laws of reflection and terms of spherical mirrors	4	1	4	2	1	1	13
Image formation by spherical mirrors (ray diagrams)	18	4	6	6	2	0	36
Uses of spherical mirrors	10	0	3	3	0	1	17
Sign convention, mirror formula and magnification	9	0	2	13	2	4	30
Laws of refraction and the glass slab	10	1	8	3	1	1	24
Refractive index and speed of light	3	2	6	8	0	2	21
Image formation by lenses (ray diagrams)	6	1	7	9	6	5	34
Lens formula and magnification	0	0	2	20	5	2	29
Power of a lens	7	0	3	7	0	1	18
Lab skills: focal length, glass slab	24	0	0	0	0	0	24
Total	91	9	41	71	17	17	246

Top 10 – revise these the night before

#	Question	Remember
1	Q142 · Rays from the sun converge at a point 25 cm behind a convex lens. The distance at which an	(A) 20 cm – a convex lens gives a virtual image only when the object is within F (f = 25 cm).
2	Q149 · (a) Out of the two lenses, one concave and the other convex, state which one will diverge	(a) Concave lens; diagram: parallel rays diverge, dotted extensions meet at F_1 on the same side [2].
3	Q108 · Write the two laws of refraction of light.	(i) The incident ray, the refracted ray and the normal to the interface at the point of incidence all lie in t
4	Q6 · Define the term principal focus of a concave mirror. If the distance between the pole and	Principal focus: the point on the principal axis where rays parallel to the principal axis meet after reflecti
5	Q15 · When a convergent beam of light is incident on a convex mirror, the reflected rays appear	(B) 10 cm. Rays retrace their path only if they were heading towards C, so R = 20 cm and f = R/2 = 10 cm.
6	Q67 · An object is placed at a distance of 30 cm from the pole of a concave mirror. If its real	(B) –20 cm. 1/f = 1/v + 1/u = –1/60 – 1/30 = –3/60 ⇒ f = –20 cm.
7	Q68 · The image formed by a concave mirror of focal length 50 cm is real and of magnification 1.	(D) Zero. A real image of the same size (m = –1) forms when the object is at C, and the image is also at C.
8	Q78 · A student has focussed the image of an object of height 3 cm on a white screen using a con	u = –18 cm, f = –12 cm. 1/v = 1/f – 1/u = –1/12 + 1/18 = –1/36 ⇒ v = –36 cm [1½]. m = –v/u = –36/18 = –2 ⇒ h'
9	Q93 · (Case on concave mirror – sun's image on cardboard / principal focus) (c) OR: An object 10	Image at the object ⇒ object at C: u = v = –100 cm, R = 100 cm ⇒ f = –50 cm [1]. m = –v/u = –1 (real, inverted
10	Q116 · (a) Observe the given ray diagram and compare (i) the speed of light in medium A and mediu	(a)(i) From A to B the ray bends towards the normal, so B is denser: speed in A > speed in B [1]. (ii) From B

CHAPTER



The Human Eye and the Colourful World

Unit III: Natural Phenomena · Section C · Physics

84	350	139
papers with this chapter	times the questions came	questions in this chapter

WHAT IS INSIDE

- The Human Eye and its Defects
- Glass Prism, Dispersion and Rainbow
- Atmospheric Refraction and Scattering

Starts with its own cover, concept map and Must-do top 20 · 64 pages

PYQ HUNT · CBSE CLASS 10 SCIENCE (086) · 2026-27

Chapter 10 · The Human Eye and the Colourful World

Chapterwise Question Bank with Answers – from board papers, sample papers and pre-boards

Prepared by Abhishek Das, TGT (Science)
Science with Abhishek Sir

90	84	350	139
papers gone through	papers with this chapter	question appearances found	unique questions after clubbing

How to read a question box

Q7 Type · marks ★★☆ **Board ×3** 5 papers

■ **Border colour** = theme (green: eye & defects, blue: prism & rainbow, orange: atmosphere & scattering)

■ **Header colour** = type: MCQ, A–R, VSA, SA, LA, Case

★★★ asked in 6+ papers · ★★ 3–5 · ★ 1–2

Board ×n = number of different CBSE board exams (sets of one exam = 1)

Source strip = paper, question no. and [file, PDF page]

Green box = answer in CBSE marking-scheme style; **red strip** = teacher's note

Concept map – how often each idea is asked

A. Parts of the human eye
20 Qs | 21 papers | 8 board

Most asked: Q15 – State one function of iris in human eye.

B. Power of accommodation
15 Qs | 20 papers | 13 board

Most asked: Q33 – Define the term power of accommodation of human eye. What happens to the image distance in the eye when we inc...

C. Myopia (near-sightedness)
13 Qs | 31 papers | 13 board

Most asked: Q44 – State reasons for Myopia. With the help of ray diagrams, show the (a) image formation by a myopic eye, and (b)...

D. Hypermetropia (far-sightedness)
10 Qs | 16 papers | 8 board

Most asked: Q53 – A person cannot read newspaper placed nearer than 50 cm from his eyes. Name the defect of vision he is sufferi...

E. Presbyopia, bifocal lens and cataract
10 Qs | 22 papers | 10 board

Most asked: Q65 – What are the common defects of vision that can be corrected by the use of suitable eyeglasses or spectacles?

F. Lens power and the defect (numericals)
9 Qs | 11 papers | 4 board

Most asked: Q70 – A person needs a lens of power −4·5 D for correction of her vision. (a) What kind of defect in vision is she s...

A. Refraction of light through a prism
8 Qs | 11 papers | 8 board

Most asked: Q78 – A student traces the path of a ray of light through a triangular glass prism for different values of angle of ...

B. Dispersion of white light and recombination
18 Qs | 28 papers | 14 board

Most asked: Q94 – (a) Name the phenomenon due to which a prism splits the incident white light into a band of colours. State the...

C. Rainbow
6 Qs | 24 papers | 13 board

Most asked: Q108 – Explain the phenomenon of rainbow formation in the sky. Draw the labelled ray diagram in support of your expla...

A. Atmospheric refraction – twinkling of stars
9 Qs | 16 papers | 4 board

Most asked: Q113 – Explain why the planets do not twinkle but the stars twinkle.

B. Scattering of light – Tyndall effect, blue sky, red signals
21 Qs | 28 papers | 15 board

Most asked: Q137 – Name and explain the phenomenon of light due to which the path of a beam of light becomes visible when it ente...

Theme map (NCERT section order)

Theme	Sub-theme	NCERT	Questions	MCQ	A–R	VSA	SA	LA	Case
1. The Human Eye and its Defects	A. Parts of the human eye	10.1	**20**	12	2	4	2		
1. The Human Eye and its Defects	B. Power of accommodation	10.1.1	**15**	7		5	3		
1. The Human Eye and its Defects	C. Myopia (near-sightedness)	10.2 (a)	**13**	1	3	4	5		
1. The Human Eye and its Defects	D. Hypermetropia (far-sightedness)	10.2 (b)	**10**	2		2	5	1	
1. The Human Eye and its Defects	E. Presbyopia, bifocal lens and cataract	10.2 (c)	**10**	4		2	3	1	

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▸ continued

1. The Human Eye and its Defects	F. Lens power and the defect (numericals)	10.2 + Ch 9 power	**9**	1		2	4	2	
2. Glass Prism, Dispersion and Rainbow	A. Refraction of light through a prism	10.3	**8**	4	1	2	1		
2. Glass Prism, Dispersion and Rainbow	B. Dispersion of white light and recombination	10.4	**18**	8		5	2		3
2. Glass Prism, Dispersion and Rainbow	C. Rainbow	10.4 (rainbow)	**6**	1	1	2	2		
3. Atmospheric Refraction and Scattering	A. Atmospheric refraction – twinkling of stars	10.5	**9**	2	1	3	2		1
3. Atmospheric Refraction and Scattering	B. Scattering of light – Tyndall effect, blue sky, red signals	10.6	**21**	8	3	7	3		

Must-do top 20

#	Q	Question	Type · marks	Papers	Board
1	Q44	State reasons for Myopia. With the help of ray diagrams, show the (a) image formation by a myopic eye, and (b) correction of myopia using an appropria…	SA · 3	8	5
2	Q108	Explain the phenomenon of rainbow formation in the sky. Draw the labelled ray diagram in support of your explanation.	SA · 3	8	4
3	Q53	A person cannot read newspaper placed nearer than 50 cm from his eyes. Name the defect of vision he is suffering from. Draw a ray diagram to illustrat…	SA · 3	6	5
4	Q94	(a) Name the phenomenon due to which a prism splits the incident white light into a band of colours. State the reason of the phenomenon also.	VSA · 2	6	4
5	Q137	Name and explain the phenomenon of light due to which the path of a beam of light becomes visible when it enters a smoke filled room through a small h…	SA · 3	6	4
6	Q104	The Phenomena of light involved in the formation of a rainbow in the sky are	MCQ · 1	5	2
7	Q40	Observe the following diagram and answer the questions following it : (i) Identify the defect of vision shown. (ii) List its two causes. (iii) Name th…	VSA · 2	5	1
8	Q33	Define the term power of accommodation of human eye. What happens to the image distance in the eye when we increase the distance of an object from the…	SA · 3	4	4
9	Q45	A person cannot see distinctly the object placed beyond 5 m from his eyes. Name the defect of vision the person is suffering from. Draw a ray diagram …	SA · 3	4	3
10	Q106	(a) When and where does a rainbow appear in the sky ? Draw a labelled ray diagram to show its formation.	VSA · 2	4	3
11	Q15	State one function of iris in human eye.	VSA · 1	4	2
12	Q113	Explain why the planets do not twinkle but the stars twinkle.	VSA · 2	4	2
13	Q130	(b) What is scattering of light ? Why does the clear sky appear blue ?	VSA · 2	4	2
14	Q131	(b) "The colour of the clear sky from the earth appears blue but the sky appears dark to the passengers flying at very high altitudes." Explain.	VSA · 2	4	2

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15	Q86	In the following diagram showing dispersion of white light by a glass prism, the colours 'P' and 'Q' respectively are –	MCQ · 1	4	1
16	Q65	What are the common defects of vision that can be corrected by the use of suitable eyeglasses or spectacles?	SA · 3	4	0
17	Q21	The change in focal length of an eye lens in human beings is caused by the action of	MCQ · 1	3	3
18	Q66	Draw a labelled diagram of a common type of bifocal lens. State the function of each of its parts. Name the defect for the correction of which it is u...	SA · 3	3	3
19	Q109	(b) When and where does a rainbow appear in the sky ? Write sequence-wise the phenomena of light responsible for the formation of a rainbow. List two ...	SA · 3	3	3
20	Q63	A person suffering from presbyopia needs spectacles having bifocal lenses. If the power of two lenses used in his spectacles is +2·0 D and −0·5 D, whi...	VSA · 2	3	2

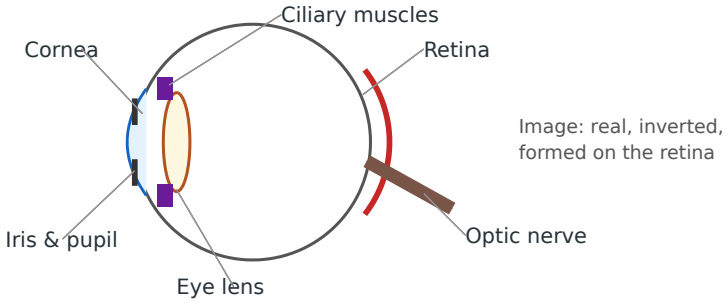
Science with Abhishek Sir

Theme 1 · The Human Eye and its Defects

A. Parts of the human eye

20 questions · 21 papers · 8 board papers · NCERT 10.1 · Prepared by Abhishek Das, TGT (Science) – Science with Abhishek Sir

🔍 **Picture it**



Multiple Choice (12)

Q1 Multiple Choice · 1 mark ★☆☆ **Board ×1** 2 papers

In the human eye, most of the refraction for the light rays entering the eye occurs at the surface of :

(A) Cornea
(B) Crystalline lens
(C) Pupil
(D) Aqueous humor

Source: CBSE 2025 31/2/2 (GHF2E), Q13 [F9 p.416] · CBSE Competency Based Test Items 2021 (CBSE & Sri Aurobindo Society), Q2 [F5 p.423]

Also asked as:
- Which part of the eye produces maximum refraction of light rays? A. Lens B. Pupil C. Retina D. Cornea (Competency item SAS21S101102)

✓ **Answer**
(A) Cornea. Most of the refraction of light rays entering the eye occurs at the outer surface of the cornea.

Q2 Multiple Choice · 1 mark ★☆☆ 2 papers

The human eye forms the image of an object at its –

(a) cornea
(b) iris
(c) pupil
(d) retina

Source: KV Sitapur PT-II, Q4 [FM p.10] · Vedantu Sample Paper Set 6, Q8 [F4 p.555]

Also asked as:
- The human eye forms the image of an object at: (a) Iris (b) Lens (c) Retina (d) Cornea

✓ **Answer**
(d) Retina. The eye lens forms a real, inverted image of the object on the retina.

Q3 Multiple Choice · 1 mark ★☆☆ Board ×1 1 paper

In human eye the part which allows light to enter into the eye is –

(a) Retina
(b) Pupil
(c) Eye lens
(d) Cornea

Source: CBSE 2023 31/6/1 (Z1XYW/6), Q16 [F1 p.547]; CBSE 2023 31/6/2 (Z1XYW/6), Q11 [F9ocr p.11]

✓ Answer
(b) Pupil. The pupil is the opening in the iris that lets light into the eye; the iris changes its size to control how much light enters.

⚠ Note: NCERT also says light enters 'through a thin membrane called the cornea'. The board expects (b) pupil (the opening that admits light).

Q4 Multiple Choice · 1 mark ★☆☆ Board ×1 1 paper

The pair of eye parts responsible for admitting different amount of light in to the eyes is

(A) Iris and pupil
(B) Ciliary muscles and pupil
(C) Retina and Iris
(D) Ciliary muscles and cornea

Source: CBSE 2026 31/4/1 (LN4MK), Q30 [F4 p.386]; CBSE 2026 31/4/2 (LN4MK), Q31 [F4 p.418]; CBSE 2026 31/4/3 (LN4MK), Q30 [F4 p.450]

✓ Answer
(A) Iris and pupil. The iris controls the size of the pupil; the pupil regulates and controls the amount of light entering the eye.

Q5 Multiple Choice · 1 mark ★☆☆ Board ×1 1 paper

Select the correct statements from the following in the context of the human eye : (i) Most of the refraction of light rays entering the eye occurs at the crystalline lens. (ii) The diameter of the eye ball is about 2·3 cm. (iii) Iris is a dark muscular diaphragm which controls the size of the pupil. (iv) While focusing on the objects at different distances, the distance between the lens and the retina is adjusted by the ciliary muscles.

(A) (i) and (iv)
(B) (ii) and (iii)
(C) (i), (ii) and (iv)
(D) (ii), (iii) and (iv)

Source: CBSE Suppl. VI 31(B)/S, Series EFGH/S (yr?), Q14 [F1 p.38]

✓ Answer
(B) (ii) and (iii). (i) is wrong – most refraction is at the cornea. (iv) is wrong – the ciliary muscles change the focal length (curvature) of the eye lens, not the lens–retina distance.

Q6 Multiple Choice · 1 mark ★☆☆ Board ×1 1 paper

Consider the following statements : i. Ciliary muscles adjust for changing the intensity of light entering the eye. ii. Myopic eye can be corrected by converging lenses of suitable power. iii. The function of the pupil is to regulate the quantity of light entering the eye. iv. When ciliary muscles are completely relaxed, the focal length of the eye lens is maximum. The correct statements are :

(A) i, ii and iv
(B) i, ii and iii
(C) iii and iv
(D) ii and iv

Source: CBSE VI 11-31(B) (yr?), Q5 [F9 p.125]

continued on next page ▸

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✔ Answer
(C) iii and iv. The iris (not ciliary muscles) controls light; myopia is corrected by a diverging (concave) lens.

Q7 Multiple Choice · 1 mark ★★★ 1 paper

What part of the eye is responsible for focusing light?

a) Cornea
b) Retina
c) Lens
d) Iris

Source: PM SHRI KV Sitapur PT-2 (2024-25), Q9 [FM p.1]

✔ Answer
c) Lens. The eye lens (crystalline lens) provides the finer adjustment of focal length needed to focus objects at different distances on the retina.

Q8 Multiple Choice · 1 mark ★★★ 1 paper

Which statement about the human eye is correct?

A. Muscles in the iris change the size of the lens
B. Muscles in the iris change the size of the pupil
C. Muscles in the pupil change the size of the iris
D. Muscles in the pupil change the size of the lens

Source: British Council assessment items (Science 10), ST1 [F5 p.223]

✔ Answer
B. The iris is a dark muscular diaphragm that controls the size of the pupil.

Q9 Multiple Choice · 1 mark ★★★ 1 paper

Which of the following can be directly affected if the iris does not function properly?

(1) identification of colours
(2) the amount of light entering the eye
(3) transmission of visual information to the brain
(4) finer adjustments for focussing the objects

Source: Competency-based test items (chapter-wise booklet), Q5 [F4 p.770]

✔ Answer
(2) The amount of light entering the eye – the iris controls the size of the pupil.

Q10 Multiple Choice · 1 mark ★★★ 1 paper

The diagram shows how a human eye sees a candle. What type of image is formed on the retina?

A. Virtual and inverted
B. Real and inverted
C. Virtual and erect
D. Real and erect

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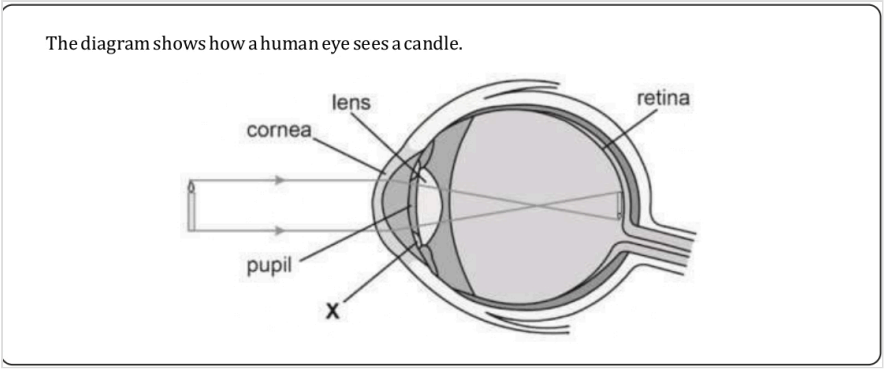


Figure from the question paper – CBSE Competency Based Test Items 2021, page 39

Source: CBSE Competency Based Test Items 2021 (CBSE & Sri Aurobindo Society), Q3 [F5 p.424]

Also asked as:

- What would the size of the image formed on the retina depend on? A. Age of the person B. Curvature of the lens C. Focal length of the lens D. Distance of the candle from the eyes — Ans D (SAS21S101104)

✔ Answer

B. Real and inverted.

Q11 Multiple Choice · 1 mark ★★★ 1 paper

Diabetic retinopathy causes damage to blood vessels in the retina. Which of the following would NOT happen in a person having diabetic retinopathy?

A. Focussing on objects at different distances
B. Formation of a clear image of the object
C. Change in the size of the pupil
D. Entry of light into the eye

Source: CBSE Competency Focused Practice Questions (CFPQ), Q143 [F6 p.78]

✔ Answer

B. Formation of a clear image – the image is formed on the retina, so a damaged retina cannot give a clear image.

Q12 Multiple Choice · 1 mark ★★★ 1 paper

Which eye is likely to be in the brightest light?

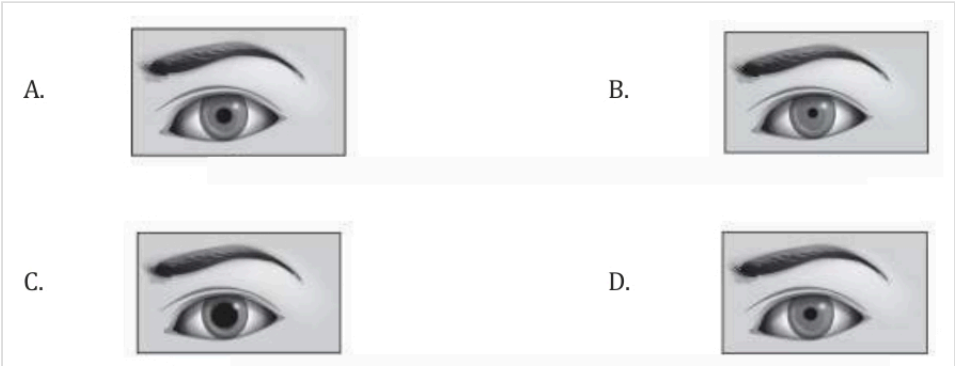


Figure from the question paper – CBSE Competency Based Test Items 2021, page 40

continued on next page ▸

▸ continued

Source: CBSE Competency Based Test Items 2021 (CBSE & Sri Aurobindo Society), Q5 [F5 p.424]

✔ Answer
B – in bright light the iris makes the pupil smallest to let in less light (key: B).

Assertion–Reason (2)

Q13 Assertion–Reason · 1 mark ★☆☆ 1 paper

Assertion (A): The human eye is one of the most valuable and sensitive sense organs. Reason (R): Eye enables us to see the wonderful world and the colours around us.

Source: Practice Paper B (F6), Q32 [F6 p.278]

✔ Answer
(a) Both A and R are true and R is the correct explanation of A (NCERT opening line of the chapter).

Q14 Assertion–Reason · 1 mark ★☆☆ 1 paper

Assertion: The retina contains both rod and cone cells. Reason: Rod cells are responsible for color vision, while cone cells detect light intensity.

Source: PM SHRI KV Sitapur PT-2 (2024-25), Q13 [FM p.2]

✔ Answer
(c) Assertion is true, but Reason is false. Cones respond to colour; rods respond to the intensity (dim) light.

⚠ Note: Rods and cones are not named in the rationalised NCERT text (it says 'light-sensitive cells'); keep as enrichment.

Very Short Answer (4)

Q15 Very Short Answer · 1 mark ★★☆ Board ×2 4 papers

State one function of iris in human eye.

Source: CBSE 31/1, Series BRH (SA-II era, yr?), Q2 [F6ocr p.4] · CBSE 31/2/1, Series BRH/2 (SA-II era, yr?), Q2 [F5ocr p.44] · CBSE Competency Based Test Items 2021 (CBSE & Sri Aurobindo Society), Q6 [F5 p.424] · Practice Paper K (F6), Q26 [F6 p.477]

Also asked as:
- State one function of the crystalline lens in the human eye. — It provides the finer adjustment of focal length to focus objects at different distances on the retina.
- Which part of the eye controls the size of the pupil? — Iris (Competency item SAS21S101106)

✔ Answer
The iris controls the size of the pupil and so regulates the amount of light entering the eye. (1)

Q16 Very Short Answer · 2 marks ★★☆ Board ×1 3 papers

Write the main function of each of the following in the human eye : (i) Cornea (ii) Iris (iii) Retina (iv) Ciliary muscles

Source: CBSE VI 31(B), Series ZWYX (yr?), Q25(b) [F9 p.106] · Practice Paper B (F6), Q36(1) [F6 p.279] · Practice Paper I (F6), Q35(1) [F6 p.420]

Also asked as:

- Write the function of each of the following parts of human eye : cornea, iris, crystalline lens, ciliary muscles (with an eye-donation values part)

✔ Answer

(i) Cornea – light enters through it; most of the refraction of light occurs at its outer surface. (½)
(ii) Iris – dark muscular diaphragm that controls the size of the pupil (amount of light entering). (½)
(iii) Retina – light-sensitive screen on which the image is formed; its cells send electrical signals to the brain through the optic nerves. (½)
(iv) Ciliary muscles – change the curvature, i.e. the focal length, of the eye lens. (½)

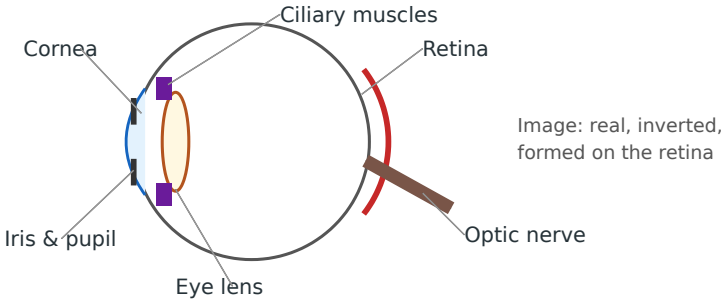
Q17 Very Short Answer · 2 marks ★☆☆ 1 paper

Draw a labelled diagram of human eye. What is the significance of the blind spot?

Source: Practice Paper P (F8), Q26 [F8 p.70]

✔ Answer

Diagram with labels: cornea, iris, pupil, eye lens (crystalline lens), ciliary muscles, retina, optic nerve. (1)
Blind spot: the point where the optic nerve leaves the retina; it has no light-sensitive cells, so an image formed there is not seen. (1)



Answer diagram – drawn for this question bank

⚠ Note: Blind spot is not in the rationalised NCERT text – enrichment.

Q18 Very Short Answer · 1 mark ★☆☆ 1 paper

The diagram shows how a human eye sees a candle. What is X?

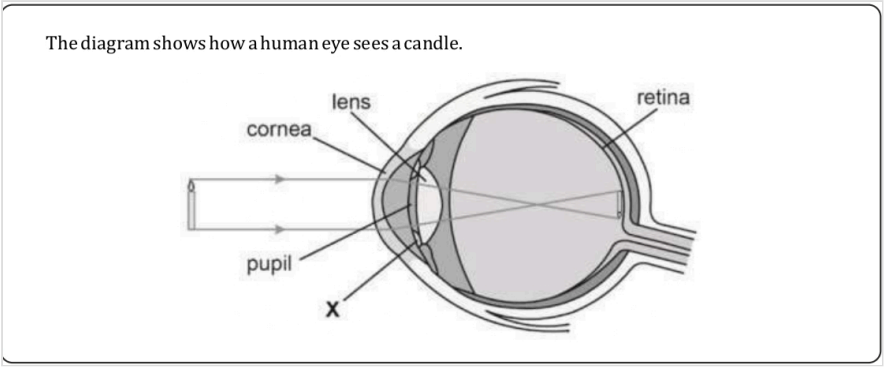


Figure from the question paper – CBSE Competency Based Test Items 2021, page 39

Source: CBSE Competency Based Test Items 2021 (CBSE & Sri Aurobindo Society), Q1 [F5 p.423]

✓ Answer

X is the iris – the dark muscular diaphragm that controls the size of the pupil. (1)

Short Answer (2)

Q19 Short Answer · 3 marks ★☆☆ 1 paper

When one enters a less lighted room from a place of intense light, he is not able to see anything for sometime, but after sometime the things become somewhat visible. Explain how this happens?

Source: Practice Paper G (F6), Q36 [F6 p.389]

✓ Answer

In bright light the iris makes the pupil small to allow less light. (1)

On entering the dim room the pupil is still small, so very little light enters and we see nothing. (1)

The iris takes some time to widen (dilate) the pupil; then more light enters and things become visible. (1)

Q20 Short Answer · 3 marks ★☆☆ 1 paper

A camera in many ways is similar to the human eye, still, there are some basic differences in image formation between the two. Explain.

Source: Practice Paper D (F6), Q36 [F6 p.328]; Practice Paper D (F6, second copy), Q36 [F6 p.344]

✓ Answer

Both use a convex lens to form a real, inverted image on a screen (retina / film). (1)

Camera: focal length of lens is fixed; focusing is done by changing the lens–film distance. Eye: lens–retina distance is fixed; ciliary muscles change the focal length of the eye lens. (1)

The image on the film is a permanent record; the image on the retina is temporary and is sent to the brain. (1)

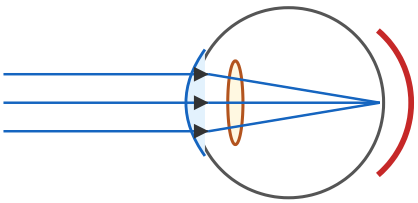
⚠ Note: Two copies of the same practice paper – counted once. Camera comparison is enrichment.

B. Power of accommodation

15 questions · 20 papers · 13 board papers · NCERT 10.1.1 · Prepared by Abhishek Das, TGT (Science) – Science with Abhishek Sir

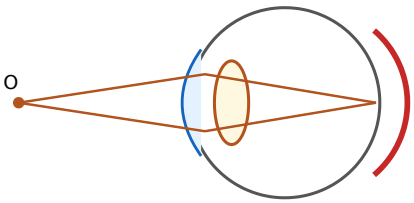
🔍 Picture it

Distant object – ciliary muscles relax



thin lens · focal length longest

Near object – ciliary muscles contract



thick lens · focal length shorter

Multiple Choice (7)

Q21 Multiple Choice · 1 mark ★★☆ Board ×3 3 papers

The change in focal length of an eye lens in human beings is caused by the action of

(a) optic nerves
(b) ciliary muscles
(c) retina
(d) cornea

Source: CBSE 2023 31/6/3 (Z1XYW/6), Q12 [F9ocr p.43] · CBSE 2025 31/2/3 (GHF2E), Q13 [F9 p.488] · CBSE 2026 VI 31(B), Series E7FDG, Q31 [F9 p.83]

Also asked as:

- The part of the human eye which can modify the curvature of the eye lens to some extent is : (A) Pupil (B) Cornea (C) Ciliary muscles (D) Aqueous humour
- The part of eye which causes change in the focal length of eye lens to provide it exceptional accommodation power is : (A) Aqueous humour (B) Ciliary muscles (C) Pupil (D) Iris

✔ Answer

(b) Ciliary muscles. They change the curvature (thickness) of the eye lens and so its focal length.

Q22 Multiple Choice · 1 mark ★★☆ 3 papers

The least distance of distinct vision for a young adult with normal vision is about

(a) 25 m
(b) 2.5 cm
(c) 25 cm
(d) 2.5 m

Source: KVS Lucknow Pre-Board 1 (2022-23), Q4 OR [FM p.15] · KV Sitapur PT-II, Q5 [FM p.10] · Vedantu Sample Paper Set 6, Q19 [F4 p.557]

✔ Answer

(c) 25 cm (near point of a normal eye).

Q23 Multiple Choice · 1 mark ★☆☆ 2 papers

The human eye can focus on objects at different distances by adjusting the focal length of the eye lens. This is due to

(a) presbyopia.
(b) near-sightedness.
(c) accommodation.
(d) far-sightedness.

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Source: KVS Lucknow Pre-Board 1 (2022-23), Q4 [FM p.15] · Vedantu Sample Paper Set 7, Q17 [F4 p.670]

Also asked as:

- The ability of the eye to see near and distant objects clearly is called: (a) Myopia (b) Hypermetropia (c) Accommodation (d) Presbyopia

✔ Answer

(c) Accommodation – the ability of the eye lens to adjust its focal length.

Q24 Multiple Choice · 1 mark ★☆☆ Board ×1 1 paper

The curvature of eye lens of human eye

(A) is fixed.
(B) can be increased.
(C) can be decreased.
(D) increases or decreases as the case may be.

Source: CBSE 2025 31/6/3 (GF6HE), Q13 [F4 p.9]

✔ Answer

(D) The ciliary muscles increase the curvature for near objects and decrease it for distant objects.

Q25 Multiple Choice · 1 mark ★☆☆ 1 paper

A person views an object placed at a certain distance from him. Under which of the following scenarios will the ciliary muscles contract to make the eye lens thicker?

A. Amount of light falling on the object is increased
B. Amount of light falling on the object is decreased
C. Object is moved closer to the eye
D. Object is moved away from the eye

Source: CBSE Competency Focused Practice Questions (CFPQ), Q85 [F6 p.52]

✔ Answer

C. For a nearer object the ciliary muscles contract, the lens becomes thicker and its focal length decreases.

⚠ Note: Option D is on the next page of the booklet (p.49) – not seen; written as the natural fourth option. Answer C is not affected.

Q26 Multiple Choice · 1 mark ★☆☆ 1 paper

Which of the following actions helps the eye in focusing on distant objects?

A. Pupil dilation
B. Thickening of the eye lens
C. Relaxation of the ciliary muscles
D. Contraction of the ciliary muscles

Source: CBSE Competency Focused Practice Questions (CFPQ), Q90 [F6 p.53]

✔ Answer

C. Relaxation of the ciliary muscles – the lens becomes thin and its focal length increases.

Q27 Multiple Choice · 1 mark ★☆☆ 1 paper

Which of the following correctly gives the sequence of events that take place when human eye changes its focus from a distant object to an object closer to the eye?

(1) ciliary muscles relax → curvature of eye lens increases → focal length of eye lens increases
(2) ciliary muscles contract → curvature of eye lens decreases → focal length of eye lens increases
(3) ciliary muscles relax → curvature of eye lens decreases → focal length of eye lens decreases
(4) ciliary muscles contract → curvature of eye lens increases → focal length of eye lens decreases

Source: Competency-based test items (chapter-wise booklet), Q8 [F4 p.771]

Also asked as:
- The near point and the far point are determined with regards to the function of which part of the eye? pupil / retina / eye-ball / ciliary muscles — Ans: ciliary muscles (Q2)

✓ Answer
(4) Ciliary muscles contract → curvature increases → focal length decreases.

Very Short Answer (5)

Q28 Very Short Answer · 2 marks ★☆☆ Board ×1 2 papers

(A) (i) How does the change in curvature of the eye lens helps us in the process of seeing the nearby objects clearly? (ii) State the range of the power of accommodation of a normal human eye.

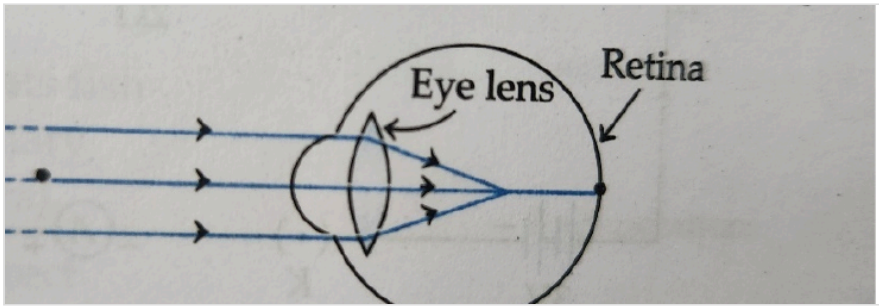


Figure from the question paper – Figure for part (b): KVS Lucknow PB 2025-26 A, Q35(b) (X SCIENCE-merged.pdf, PDF p.77)

Source: CBSE 2026 31/5/1, Q34(A) [F4 p.484]; CBSE 2026 31/5/2, Q34(A) [F4 p.516]; CBSE 2026 31/5/3, Q34(A) [F4 p.548] · KVS Lucknow Pre-Board (2025-26) A, Q35(a) [FM p.77]

Also asked as:
- (a) Define the terms (i) Accommodation of eye (ii) Range of normal human eye (b) Identify the defect of vision and list its two causes as shown in the figure. (KVS Lucknow PB 2025-26 – figure shows myopia)

✓ Answer
(i) For a nearby object the ciliary muscles contract, curvature of the eye lens increases, the lens becomes thicker and its focal length decreases, so the image forms on the retina. (1)
(ii) A normal eye can see clearly from 25 cm (near point) to infinity (far point). (1)

Q29 Very Short Answer · 1 mark ★☆☆ Board ×1 1 paper

Name the part of our eyes that helps us to focus near and distant objects in quick succession.

Source: CBSE 31/1/1, Series LRH/1 (SA era, yr?; 2 copies), Q6 [F6ocr p.2]

✓ Answer
Ciliary muscles (which change the focal length of the eye lens). (1)

⚠ Note: LRH/1 appears twice in the OCR file – counted once.

Q30 Very Short Answer · 2 marks ★☆☆ **Board ×1** 1 paper

(b) Name the muscles present in the human eye which enable it to focus on objects at varied distances (i.e., distant as well as nearby objects). Explain how it happens.

Source: CBSE Suppl. 31/S Set 1 (no series, yr?), Q25(b) [F4 p.199]; CBSE Suppl. 31/S Set 2 (no series, yr?), Q24(b) [F4 p.255]; CBSE Suppl. 31/S Set 3 (no series, yr?), Q23(b) [F4 p.307]

✓ Answer
Ciliary muscles. (½)
Distant object: ciliary muscles relax, lens becomes thin, focal length increases. (½ + ½)
Nearby object: ciliary muscles contract, lens becomes thick, focal length decreases. (½)

Q31 Very Short Answer · 2 marks ★☆☆ **Board ×1** 1 paper

(a) How does the focal length of eye lens change as the distance of the object from the eyes is altered ? Explain.

Source: CBSE 2026 31/2/1, Q34(a) [F9 p.333]; CBSE 2026 31/2/2, Q34(a) [F9 p.403]; CBSE 2026 31/2/3, Q34(a) [F9 p.473]

✓ Answer
Object far away: ciliary muscles relax, eye lens becomes thin, focal length increases. (1)
Object brought near: ciliary muscles contract, curvature increases, lens becomes thick, focal length decreases – so the image always forms on the retina. (1)

Q32 Very Short Answer · 2 marks ★☆☆ **Board ×1** 1 paper

(a) (i) What is the (I) least distance of distinct vision, and (II) far point of a normal human eye ? (ii) A student is unable to see distinctly a chart hanging on the wall of his classroom. Name the defect of vision he is suffering from and the type of corrective lens he must use in his spectacles.

Source: CBSE VI 31(B), Series ZWYX (yr?), Q25(a) [F9 p.106]

✓ Answer
(i) (I) About 25 cm (½) (II) Infinity (½)
(ii) Myopia (near-sightedness) (½); concave (diverging) lens of suitable power (½)

Short Answer (3)

Q33 Short Answer · 3 marks ★★☆ **Board ×4** 4 papers

Define the term power of accommodation of human eye. What happens to the image distance in the eye when we increase the distance of an object from the eye ? Name and explain the role of the part of human eye responsible for it in this case.

Source: CBSE 2024 31/4/1 (D4CBA/4), Q31 [F1 p.393] · CBSE Suppl. VI 31(B)/S, Series EFGH/S (yr?), Q31 [F1 p.46] · CBSE 2023 31/5/1 (Z1XYW/5), Q31 [F1 p.470] · CBSE Suppl. 31/S/1 (EFGH/S, yr?), Q35(a)(i) [F4 p.232]; CBSE Suppl. 31/S/3 (EFGH/S, yr?), Q35(a)(i) [F4 p.342]

Also asked as:
- Define 'power of accommodation'. Write the name of the part of eye which plays a major role in this process and explain what happens when the human eye focuses (i) on nearby objects, and (ii) on distant objects. (VI paper)
- (a) State one important function of: (i) Retina (ii) Pupil (b) State the role of ciliary muscles in focussing objects at varying distances from the eye. (2023 31/5/1)

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✔ Answer
The ability of the eye lens to adjust its focal length to see near and far objects clearly is called power of accommodation. (1)
The image distance does not change – it stays equal to the distance between eye lens and retina (about 2.3 cm). (1)
Ciliary muscles: as the object moves away they relax, the lens becomes thinner and its focal length increases, so the image still forms on the retina. (1)

Q34 Short Answer · 3 marks ★★★ 1 paper

Nia looked at an object X that was kept near her. She could see it clearly. She then looked at object Y which was kept farther away. She could see object Y also clearly. (a) Which part of the eye enables a person to see clearly, both, objects that are near and those that are far away? Why? (b) Describe the eye changes that enable nearby objects to be seen clearly. (c) Describe the eye changes that enable far-away objects to be seen clearly.

Source: CBSE Competency Focused Practice Questions (CFPQ), Q112 [F6 p.59]

✔ Answer
(a) The eye lens, because its focal length can be changed (by the ciliary muscles). (1)
(b) Near object X: ciliary muscles contract, curvature increases, lens becomes thicker, focal length decreases. (1)
(c) Far object Y: ciliary muscles relax, lens becomes thin, focal length increases. (1)

Q35 Short Answer · 3 marks ★★★ 1 paper

In a human eye, the distance between the lens and the retina is 17 mm. The light entering the eye gets refracted at the cornea and then at the lens. Ciliary muscles in the eye can control the focal length of the lens by changing its shape. (a) Diana is looking at the Moon. What is the focal length of the combination of cornea and the lens in Diana's eyes at this time? (b) Diana is reading a book kept at a distance of 20 cm from her eyes. What is the focal length of the combination at this time? (c) When Diana brings the book closer to her eyes, the letters appear blurry to her. Explain why.

Source: Competency-based test items (chapter-wise booklet), Q13 [F4 p.761]

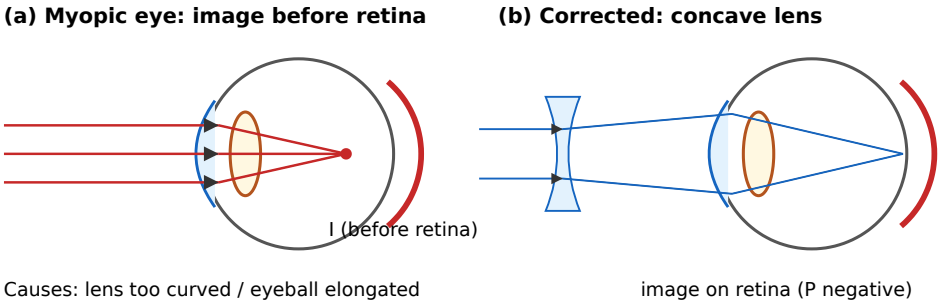
✔ Answer
(a) Object at infinity, image on retina: f = v = 17 mm. (1)
(b) u = −200 mm, v = +17 mm; 1/f = 1/v − 1/u = 1/17 + 1/200 = 217/3400 → f ≈ 15.7 mm. (1)
(c) The book is now nearer than her near point; the lens cannot decrease its focal length further, so the image forms behind the retina and looks blurred. (1)

⚠ Note: Key shows '18.6 mm' (OCR); recomputed value is 15.7 mm.

C. Myopia (near-sightedness)

13 questions · 31 papers · 13 board papers · NCERT 10.2 (a) · Prepared by Abhishek Das, TGT (Science) – Science with Abhishek Sir

🔍 **Picture it**



Multiple Choice (1)

Q36 Multiple Choice · 1 mark ★☆☆ 2 papers

Gautam notices that Geeta wears spectacles that contain concave lens. Which of the following conditions could she be suffering from?

A. Myopia
B. Hypermetropia
C. Presbyopia
D. Night blindness

Source: CBSE Competency Focused Practice Questions (CFPQ), Q87 [F6 p.53] · KVS Lucknow Pre-Board (2025-26) B, Q31 [FM p.83]

Also asked as:
- A doctor has prescribed a corrective lens of −3.0 D. Which type of lens is this? (a) diverging lens (b) converging lens (c) bi-focal lens (d) plane lens — Ans (a)

✔ **Answer**
A. Myopia – corrected by a concave (diverging) lens.

Assertion–Reason (3)

Q37 Assertion–Reason · 1 mark ★☆☆ Board ×1 1 paper

Assertion (A) : A person suffering from myopia cannot see the distant objects clearly. Reason (R) : A converging lens is used for the correction of myopic eye as it can form real as well as virtual images of the objects placed in front of it.

Source: CBSE 2023 31/2/1 (Z1XYW/2), Q19 [F1 p.190]; CBSE 2023 31/2/2 (Z1XYW/2), Q20 [F1 p.217]

✔ **Answer**
(c) A is true, but R is false. Myopia is corrected by a concave (diverging) lens.

Q38 Assertion–Reason · 1 mark ★☆☆ 1 paper

Assertion (A): Convex lenses are diverging in nature. Reason (R): Diverging lenses are used to correct myopia.

Source: Bangalore Sahodaya Pre-Board 1 (2024-25), Q19 [F5 p.17]

✔ **Answer**
(d) A is false, but R is true. Convex lenses are converging; concave (diverging) lenses correct myopia.

Q39 Assertion–Reason · 1 mark ★☆☆ 1 paper

Assertion: Myopia is the defect of the eye in which only nearer objects are seen by the eye. Reason: The eyeball is elongated.

Source: KVS Lucknow Pre-Board II (2023-24), Q20 [FM p.37]

✔ Answer

(a) Both true; elongation of the eyeball is a cause of myopia, so R explains A.

⚠ Note: Wording of A is loose (a myopic person sees nearby objects clearly, distant ones blurred). Accept (a).

Very Short Answer (4)

Q40 Very Short Answer · 2 marks ★★☆ Board ×1 5 papers

Observe the following diagram and answer the questions following it : (i) Identify the defect of vision shown. (ii) List its two causes. (iii) Name the type of lens used for the correction of this defect.

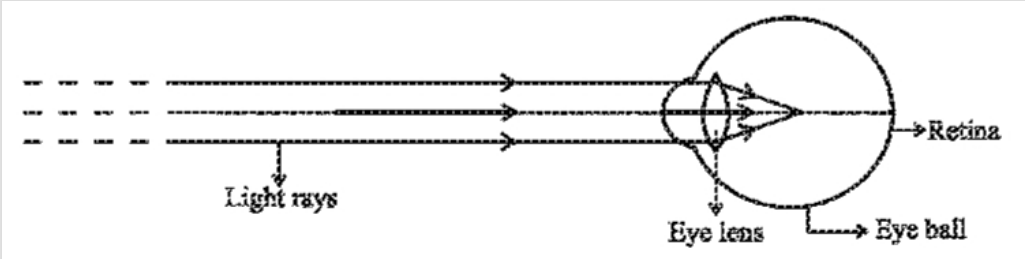


Figure from the question paper – CBSE 2023 31/4/1 Q25(A), page 13

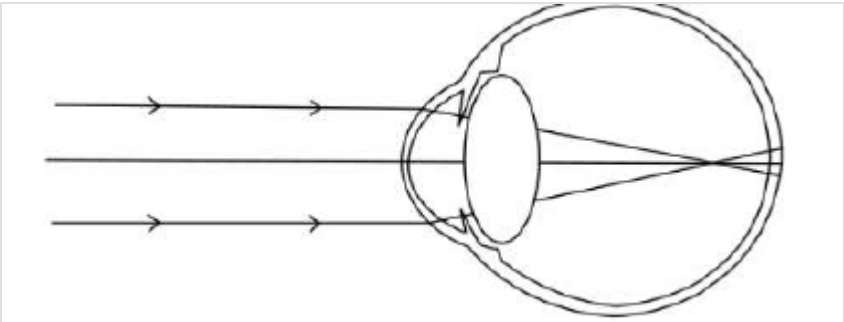


Figure from the question paper – KVS Raipur 2nd Pre-Board 2025-26 Q32

Source: CBSE 2023 31/4/1 (Z1XYW/4), Q25(A) [F1 p.367]; CBSE 2023 31/4/2 (Z1XYW/4), Q22(A) [F1 p.416]; CBSE 2023 31/4/3 (Z1XYW/4), Q26(A) [F1 p.442] · KVS Lucknow Monthly Exam Oct (2024-25), Q11 [FM p.4] · KVS Lucknow Pre-Board (2025-26) A, Q35(b) [FM p.77] · KVS Raipur 2nd Pre-Board (2025-26), Q32 [F5 p.301]; KVS Raipur 2nd Pre-Board (2025-26), Q32 [F5 p.307] · KVS Ahmedabad Set A, Q35 [F9 p.511]; KVS Ahmedabad Set B, Q35 [F9 p.523]

Also asked as:

- Observe the diagram (KVS Raipur): (a) Name the defect of vision shown in figure. What will be the optical experience of the person? (b) Give two possible reasons (c) Draw a labelled diagram to show how the defect is rectified. — Myopia; distant objects look blurred, near objects clear.
- KVS Lucknow Monthly Oct 2024-25 Q11 and KVS Lucknow PB 2025-26 Q35(b) use the same type of figure (image in front of retina).

✔ Answer

(i) Myopia (near-sightedness) – parallel rays from a distant object meet in front of the retina. (½)

(ii) Excessive curvature of the eye lens; elongation of the eyeball. (1)

(iii) Concave (diverging) lens of suitable power. (½)

⚠ Note: All figures seen show the image IN FRONT of the retina → myopia (2023 31/4/1, KVS Raipur, KVS Ahmedabad Q35).

Q41 Very Short Answer · 2 marks ★★☆ **Board ×1** 3 papers

(b) Why is the concave lens used as a corrective lens for a myopic eye ?

Source: CBSE 2026 31/2/1, Q34(b) [F9 p.333]; CBSE 2026 31/2/2, Q34(b) [F9 p.403]; CBSE 2026 31/2/3, Q34(b) [F9 p.473] · Vedantu Sample Paper Set 2, Q26 [F5 p.319] · Vedantu Sample Paper Set 4, Q26 [F5 p.358]

Also asked as:
- What type of lens we wear if we are suffering from myopia ? (2)

✔ Answer
In a myopic eye the image of a distant object forms in front of the retina (eye lens too converging / eyeball elongated). (1)
A concave lens of suitable power diverges the rays first, so the image is moved back on to the retina. (1)

Q42 Very Short Answer · 2 marks ★★☆ **Board ×2** 2 papers

(a) The far point of a defective eye is nearer than infinity. (i) Identify the defect of vision. (ii) List two possible causes responsible for this defect. (iii) Name the type of lens (converging/diverging) used for the correction of this defect.

Source: CBSE Suppl. VI 31(B)/S, Series CDBA/S (yr?), Q25(a) [F1 p.13] · CBSE 2023 31/1/2 (Z1XYW/1), Q29 [F1 p.136]

Also asked as:
- A person is suffering from an eye defect in which the far point of the eye is nearer than infinity. Identify the defect. List two main causes of this defect. Draw a ray diagram to show how this defect is corrected by using a suitable lens. (3 marks, 2023 31/1/2)

✔ Answer
(i) Myopia (near-sightedness). (½)
(ii) Excessive curvature of the eye lens; elongation of the eyeball. (½ + ½)
(iii) Diverging (concave) lens. (½)

Q43 Very Short Answer · 1 mark ★☆☆ 1 paper

The eyeball of a person has become slightly larger. Which kind of lens should the person wear to correct the defect in the vision caused by this change in the size of the eyeball?

Source: Competency-based test items (chapter-wise booklet), Q10 [F4 p.760]

✔ Answer
A concave (diverging) lens – an elongated eyeball causes myopia. (1)

Short Answer (5)

Q44 Short Answer · 3 marks ★★★ Board ×5 8 papers

State reasons for Myopia. With the help of ray diagrams, show the (a) image formation by a myopic eye, and (b) correction of myopia using an appropriate lens.

Source: CBSE 2023 31/6/1 (Z1XYW/6), Q31 [F1 p.557]; CBSE 2023 31/6/2 (Z1XYW/6), Q28 [F9ocr p.19] · CBSE 2026 31/7/1 (E7FDG), Q35 [F4 p.45]; CBSE 2026 31/7/3 (E7FDG), Q37 [F4 p.86] · CBSE 2026 31/4/2 (LN4MK), Q37 [F4 p.422] · CBSE 31/1, Series RHB (SA era, yr?), Q18 [F6 p.195] · CBSE 31/2/1, Series BRH/2 (SA-II era, yr?), Q22 [F5ocr p.48] · KVS Varanasi SA-II (2016-17), Q19 [F5 p.261] · Practice Paper Q (F8), Q26 [F8 p.85] · NCERT Exemplar Sample Question Paper II, Q33 [F5 p.244]

Also asked as:

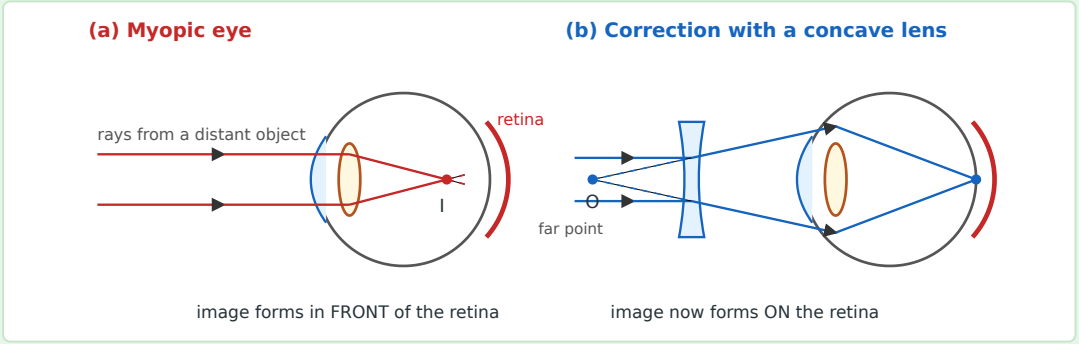
- A person is suffering from a defect of vision due to the elongation of his/her eye ball. (a) Write the name of the defect of vision and write the other possible cause. (b) Draw the ray diagram for correction of this defect. (2026 31/4/2)
- What eye defect is myopia ? Describe with a neat diagram how this defect of vision can be corrected by using a suitable lens. (RHB)
- Draw a diagram to show why distant objects cannot be seen distinctly by a myopic eye. List two reasons... OR A person with a myopic eye cannot see objects clearly beyond 2 m. Name the corrective lens and draw a ray diagram of correction. (BRH/2)
- List two main causes of a person developing near sightedness. Show with the help of a ray diagram how this defect can be corrected. (2)
- When do we consider a person to be myopic or hypermetropic? Explain using diagrams how the defects can be corrected. (5, Exemplar)

✔ Answer

Reasons: (i) excessive curvature of the eye lens; (ii) elongation of the eyeball. (1)

(a) Ray diagram: parallel rays from a distant object meet at I in front of the retina. (1)

(b) Ray diagram: concave lens placed before the eye diverges the rays so that they meet on the retina. (1)



Answer diagram – drawn for this question bank

Q45 Short Answer · 3 marks ★★☆ Board ×3 4 papers

A person cannot see distinctly the object placed beyond 5 m from his eyes. Name the defect of vision the person is suffering from. Draw a ray diagram to illustrate this defect. List its two possible causes. Name the lens used for the correction of this defect.

Source: CBSE 2023 31/1/3 (Z1XYW/1), Q33 [F1 p.170] · CBSE 31/1/1, Series BRH/1 (SA-II era, yr?), Q22 [F5ocr p.8] · KVS Delhi Pre-Board II (2024-25), Q30(A) [FM p.90] · CBSE Suppl. 31/S/1 (EFGH/S, yr?), Q35(a)(ii) [F4 p.232]; CBSE Suppl. 31/S/3 (EFGH/S, yr?), Q35(a)(ii) [F4 p.342]

Also asked as:

- A student cannot see a chart hanging on a wall placed at a distance of 3 m from him. Name the defect, how it can be corrected; ray diagrams for defect and correction. (BRH/1)
- A 14 year old student is not able to see clearly the questions written on the black board placed at a distance of 5 m from him. (i) Name the defect (ii) labelled ray diagram of correction (iii) type of lens. (KVS Delhi PB-II)

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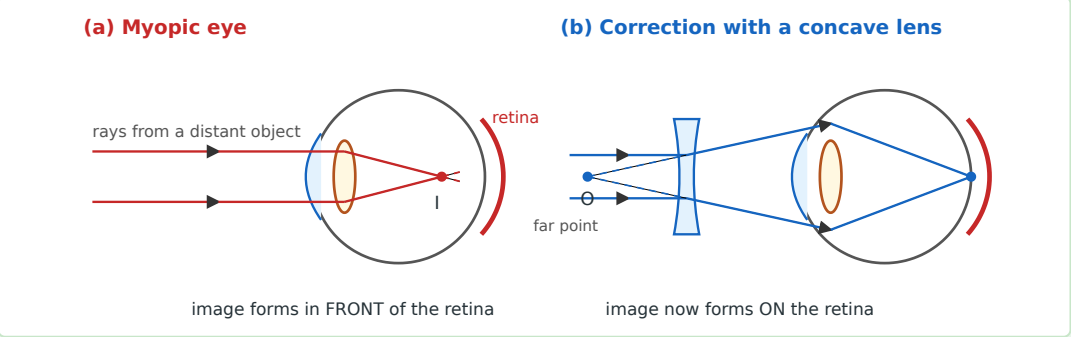
✔ Answer

Myopia (near-sightedness). (½)

Ray diagram: image of a distant object forms in front of the retina. (1)

Causes: excessive curvature of the eye lens; elongation of the eyeball. (1)

Correction: concave lens of suitable power (here f = −5 m, P = −0.2 D). (½)



Answer diagram – drawn for this question bank

Q46 Short Answer · 3 marks ★★☆ Board ×1 3 papers

A person is unable to see clearly a poster fixed on a distant wall. He however sees it clearly when standing at a distance of about 2 m from the wall. (a) Draw ray diagram to show the formation of image by his eye lens when he is far away from the wall. (b) List two possible reasons of this defect of vision. (c) Draw ray diagram to show the correction of this defect using appropriate lens.

Source: CBSE 2023 31/6/3 (Z1XYW/6), Q31 [F9ocr p.55] · Vedantu Sample Paper Set 5, Q21 [F4 p.639] · Practice Paper L (F6), Q26 [F6 p.494]; Practice Paper L (F8 copy), Q26 [F8 p.5]

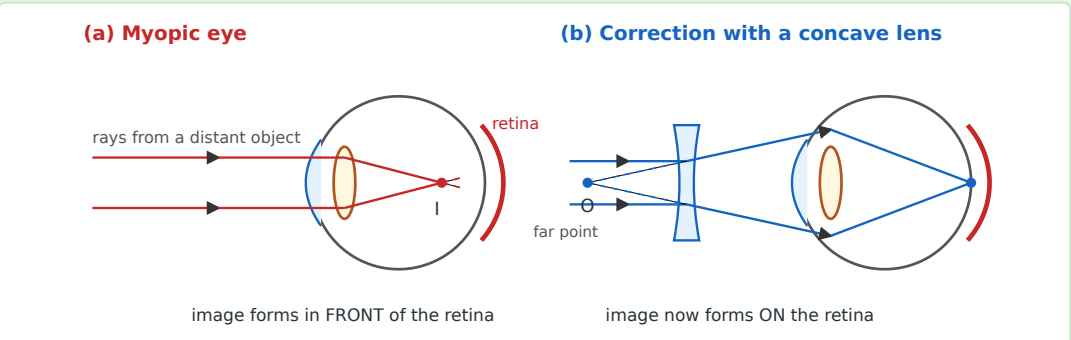
✔ Answer

Defect: myopia (far point = 2 m).

(a) Ray diagram: rays from the distant poster meet in front of the retina. (1)

(b) Excessive curvature of the eye lens; elongation of the eyeball. (1)

(c) Ray diagram: concave lens (f = −2 m, P = −0.5 D) makes the rays appear to come from the far point and meet on the retina. (1)



Answer diagram – drawn for this question bank

⚠ Note: F6 p.490 and F8 p.1 are the same practice paper – counted once.

Q47 Short Answer · 3 marks ★★☆ Board ×1 3 papers

Ravi, a Class 10 student, is facing difficulty in reading text written on the blackboard while sitting at the back of the classroom. However, he can comfortably read books placed close to his eyes. His parents take him to an eye specialist. (a) Identify the vision defect Ravi is suffering from. (b) Mention two possible causes of this defect. (c) Name the type of lens used to correct this defect.

Source: KVS Lucknow Pre-Board (2025-26) B, Q37 [FM p.83] · Bangalore Sahodaya Pre-Board 1 (2025-26), Q35 [F5 p.554] · CBSE 31/1 (SA era, values-based, yr?), Q24 (second part) [F9 p.158]

Also asked as:
- While sitting in the last row, a student has difficulty in reading the blackboard clearly. (a) defect (b) two causes (c) labelled diagram of the defect before correction. (Bangalore PB-1 2025-26)
- Akshay, sitting in the last row, could not see the words on the blackboard... (a) Which defect? Which lens? (b) Values shown by the teacher and Salman (c) How can Akshay express gratitude? (old values-based board paper)

✔ Answer

(a) Myopia (near-sightedness). (1)

(b) Excessive curvature of the eye lens; elongation of the eyeball. (1)

(c) Concave (diverging) lens of suitable power. (1)

Q48 Short Answer · 3 marks ★★☆ 1 paper

An autorefractor, which is used to automatically measure the refractive errors in a person's eye, makes use of the Scheiner principle. Parallel rays of light from a distant object are limited to two parallel bundles of light using a disc with two pinholes. For an eye with no refractive error, the rays would be focused on the retina, where only one spot can be observed. (a) For a myopic eye, how many spots will be observed on the retina? (b) Draw a diagram showing how the light rays fall on the retina of a myopic eye. (c) What could be the reason for the observation?

Source: CBSE Competency Focused Practice Questions (CFPQ), Q24 [F6 p.23]

✔ Answer

(a) Two spots. (1)

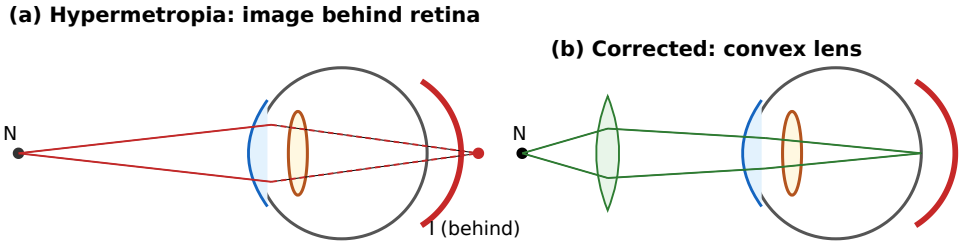
(b) Diagram: the two bundles cross in front of the retina and reach the retina at two separate points. (1)

(c) Rays meet before the retina because of elongation of the eyeball or excessive curvature of the eye lens. (1)

D. Hypermetropia (far-sightedness)

10 questions · 16 papers · 8 board papers · NCERT 10.2 (b) · Prepared by Abhishek Das, TGT (Science) – Science with Abhishek Sir

🔍 Picture it



Causes: focal length of eye lens too long / eyeball too small

Multiple Choice (2)

Q49 Multiple Choice · 1 mark ★☆☆ Board ×1 1 paper

To restore clear vision in persons whose size of the eye ball has reduced, he/she is suggested to use suitable

(A) Converging lens
(B) Diverging lens
(C) Bifocal lens
(D) Cylindrical lens

Source: CBSE 2026 31/5/1, Q31 [F4 p.482]; CBSE 2026 31/5/2, Q30 [F4 p.514]; CBSE 2026 31/5/3, Q31 [F4 p.546]

✔ Answer
(A) Converging lens – a small eyeball causes hypermetropia, corrected by a convex lens.

Q50 Multiple Choice · 1 mark ★☆☆ 1 paper

Which of these is a reason why a far-sighted person needs a convex lens to correct his vision?

(1) The image forms in front of his retina.
(2) The image forms behind the retina.
(3) The image forms below the retina.
(4) The image forms on the retina.

Source: Competency-based test items (chapter-wise booklet), Q3 [F4 p.770]

Also asked as:
- Under which of these can myopia and hypermetropia be classified? breakdown of tissues / incorrect bending of light in the eye / incorrect reflection of light by surfaces / incorrect coordination with brain for colour — Ans: incorrect bending (refraction) of light in the eye (Q4)

✔ Answer
(2) The image of a nearby object forms behind the retina.

Very Short Answer (2)

Q51 Very Short Answer · 2 marks ★☆☆ Board ×1 2 papers

Observe the following diagram showing an image formation in an eye : (a) Identify the defect of vision shown in the figure. (b) List its two causes and suggest a suitable corrective lens to overcome this defect.

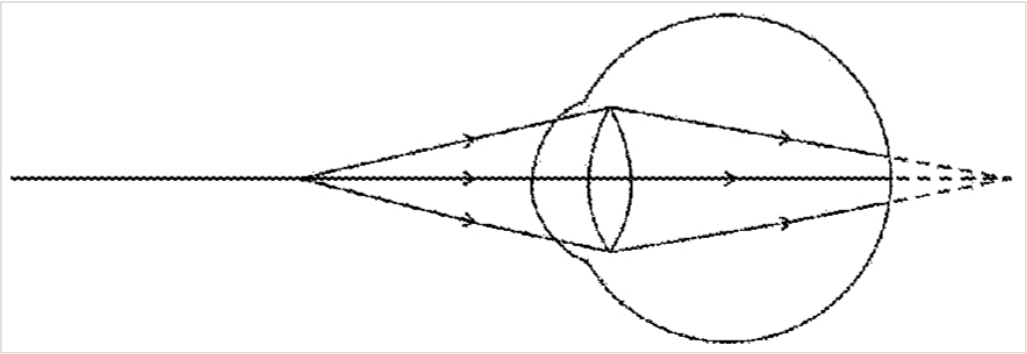


Figure from the question paper – CBSE 2023 31/5/1 Q25, page 15

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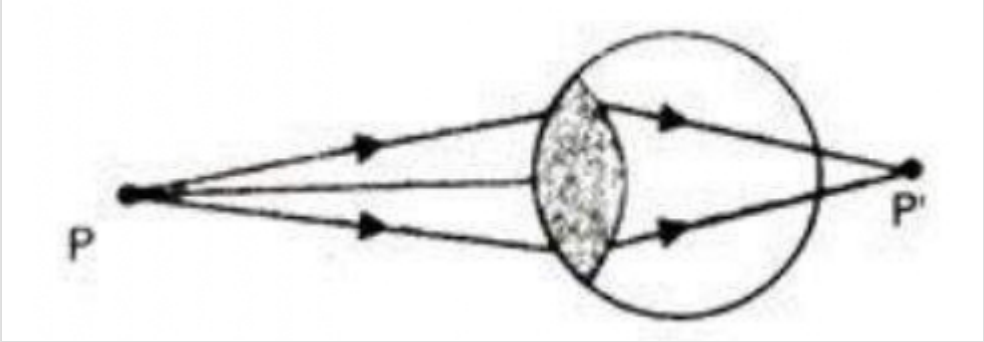


Figure from the question paper – Bangalore Sahodaya PB-1 2024-25 Q39

Source: CBSE 2023 31/5/1 (Z1XYW/5), Q25 [F1 p.468]; CBSE 2023 31/5/2 (Z1XYW/5), Q22 [F1 p.495]; CBSE 2023 31/5/3 (Z1XYW/5), Q26 [F1 p.524] · Bangalore Sahodaya Pre-Board 1 (2024-25), Q39 [F5 p.11]

Also asked as:

- Study the diagram given below: (i) Identify the defect of vision (ii) State two possible causes (iii) How can we rectify this defect? (iv) Name and define the unit of power of a lens. (4 marks, Bangalore PB-1 2024-25) — (iv) dioptre: power of a lens of focal length 1 m.

✔ Answer

(a) Hypermetropia (far-sightedness) – rays from a nearby object meet behind the retina. (½)

(b) Causes: focal length of the eye lens is too long; the eyeball has become too small. (1)

Corrective lens: convex (converging) lens of suitable power. (½)

Q52 Very Short Answer · 2 marks ★★★ Board ×1 1 paper

When do we say that a particular person is suffering from hypermetropia ? List two causes of this defect. Name the type of lens used to correct this defect.

Source: CBSE 2024 31/3/1 (DAA1B/3), Q24 [F1 p.275]; CBSE 2024 31/3/2 (DAA1B/3), Q22 [F1 p.305]; CBSE 2024 31/3/3 (DAA1B/3), Q25 [F1 p.339]

✔ Answer

When the person can see distant objects clearly but cannot see nearby objects distinctly (near point farther than 25 cm). (½)

Causes: (i) focal length of the eye lens is too long; (ii) eyeball has become too small. (1)

Corrected by a convex (converging) lens of suitable power. (½)

Short Answer (5)

Q53 Short Answer · 3 marks ★★★ Board ×5 6 papers

A person cannot read newspaper placed nearer than 50 cm from his eyes. Name the defect of vision he is suffering from. Draw a ray diagram to illustrate the defect. List two possible causes of this defect also.

Source: CBSE 2026 31/8/2 (8DEFG), Q37 [F4 p.147] · CBSE 31/1/1, Series RSH/1 (SA-II era, yr?), Q24(a) [F6ocr p.1] · CBSE 31/1/1, Series RHB/1 (SA-I, yr?), Q18 [F6ocr p.3] · CBSE 2026 31/7/2 (E7FDG), Q35 [F4 p.59] · KVS Varanasi SA-II (2014-15), Q24 [F5 p.278] · CBSE Suppl. 31/S/2 (EFGH/S, yr?), Q35(b)(i) [F4 p.290]

Also asked as:

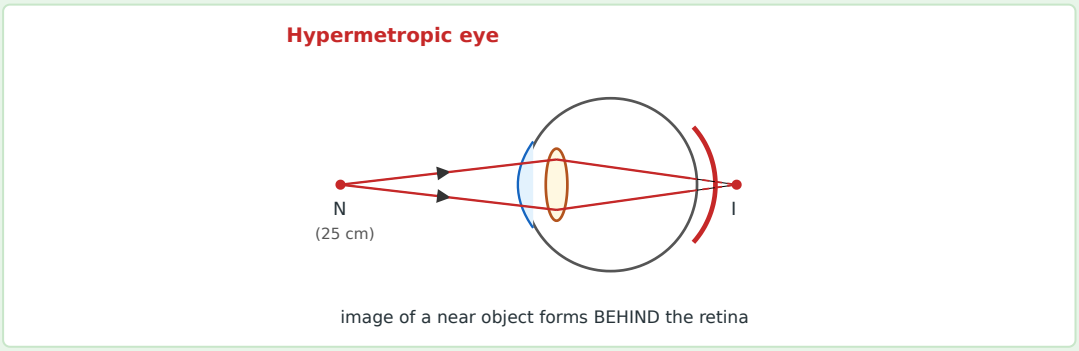
- What eye defect is hypermetropia ? Describe with a ray diagram how this defect of vision can be corrected by using an appropriate lens. (RHB/1)
- (a) State the causes of hypermetropia. (b) With the help of ray diagram, show the (i) image formation by hypermetropic eye, and (ii) correction of hypermetropia. (2026 31/7/2)
- What is Far-sightedness? Give two causes. Draw ray diagrams for the defective and corrected eye. (5, KVS Varanasi)
- What is hypermetropia? List its two possible causes. Name the type of lens used to correct this defect and state its role. (EFGH/S 31/S/2)

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✔ Answer

Hypermetropia (far-sightedness); near point N' = 50 cm. (½)
Ray diagram: rays from a near object N (at 25 cm) meet behind the retina. (1)
Causes: focal length of the eye lens too long; eyeball too small. (1)
(Correction, if asked: convex lens that makes rays from 25 cm appear to come from 50 cm: f = +50 cm, P = +2 D.) (½)



Answer diagram – drawn for this question bank

Q54 Short Answer · 3 marks ★★★ 2 papers

A child while playing with his father's spectacles burnt a hole in a piece of paper by focusing a small image of the sun on it. (i) What defect of vision his father is suffering from? (ii) Write two causes for this defect? (iii) Name the corrective lens used for correction of above defect.

Source: KVS Lucknow Pre-Board II (2023-24), Q31 [FM p.38] · KVS Lucknow Pre-Board I (2023-24), Q32 [FM p.44]; KVS Lucknow Pre-Board I (2023-24), Q32 [F5 p.256]

✔ Answer

(i) The lens converges sunlight, so it is a convex lens → the father has hypermetropia. (1)
(ii) Focal length of eye lens too long; eyeball too small. (1)
(iii) Convex (converging) lens of suitable power (draw the correction diagram if asked). (1)

⚠ Note: FM p.44 and F5 p.256 are the same KVS Lucknow PB-I 2023-24 paper – counted once. Presbyopia (also corrected by convex lens) is accepted by some keys.

Q55 Short Answer · 3 marks ★★★ 1 paper

A. What is the fundamental difference between hypermetropia and myopia in terms of the optical experience of a person? B. The diagram below shows a special case of an eye defect. (i) What is the defect that is shown in the figure? (ii) State one cause for such a defect. (iii) Explain with reason if a concave lens can be used to correct the defect.

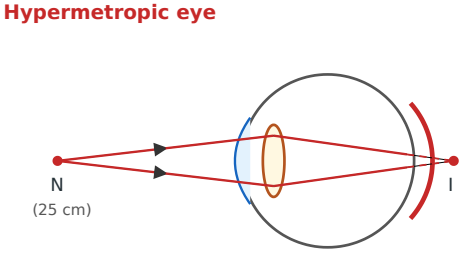


Illustration drawn for this question bank – the figure in the paper was not available

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Source: CBSE SQP 2024-25 (+ marking scheme), Q31 [F6 p.453]

✔ Answer

A. Hypermetropia: distant objects seen clearly, nearby objects blurred. Myopia: nearby objects clear, distant objects blurred. (1)

B. (i) Hypermetropia (½) (ii) Eyeball too small / focal length of eye lens too long (½) (iii) No – a concave lens would diverge the rays and push the image further behind the retina; a convex lens is needed. (1)

⚠ Note: Defect named from the CBSE SQP 2024-25 marking scheme (p.465). The paper's figure was not available, so an illustration of the defect is drawn. VI alternative: causes of myopia.

Q56 Short Answer · 3 marks ★★★ 1 paper

The above image shows a corrective measure for a particular defect of vision. (i) Identify the defect of vision and state what kind of lens is used to correct this deficiency. (ii) Draw and label a ray diagram that shows the defect of vision in the above case before correction.

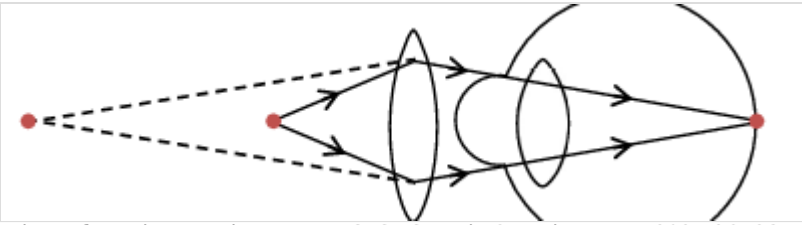


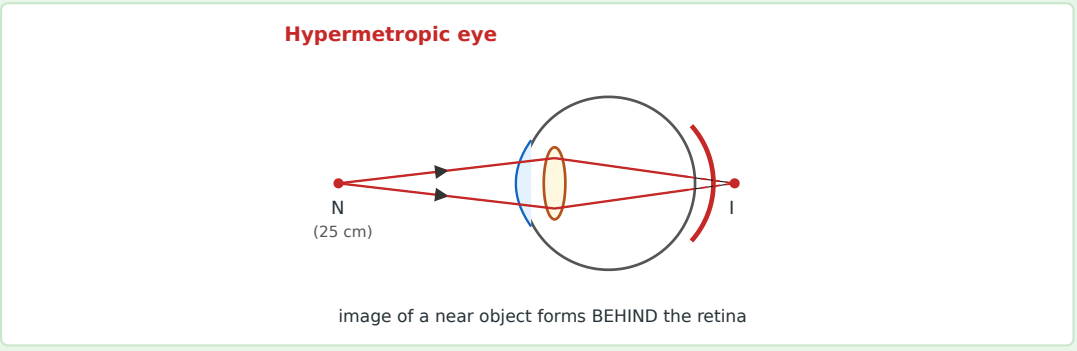
Figure from the question paper – CBSE Sample Question Paper 2025-26, Q35

Source: CBSE SQP 2025-26, Q35 [F6 p.237]; CBSE SQP 2025-26 (copy, + marking scheme), Q35 [F8 p.315]; PNCF copy of CBSE SQP 2025-26, Q35 [F5 p.294]

✔ Answer

(i) Hypermetropia; convex (converging) lens. (1 + ½)

(ii) Ray diagram: rays from a near object N meet behind the retina; near point N' is farther than 25 cm. (1½)



Answer diagram – drawn for this question bank

⚠ Note: CBSE SQP 2025-26 (three copies, counted once). VI alternative: (i) What is dispersion? (ii) Condition for dispersion (iii) One reason for presbyopia.

Q57 Short Answer · 3 marks ★★★ 1 paper

Case Study: Smita's grandmother has been advised to use spectacles with convex lenses for reading. She finds it difficult to see objects up close. (a) Name the vision defect she is suffering from. (b) Draw a labeled diagram showing the correction of this defect using convex lenses. (c) State one likely cause for this defect.

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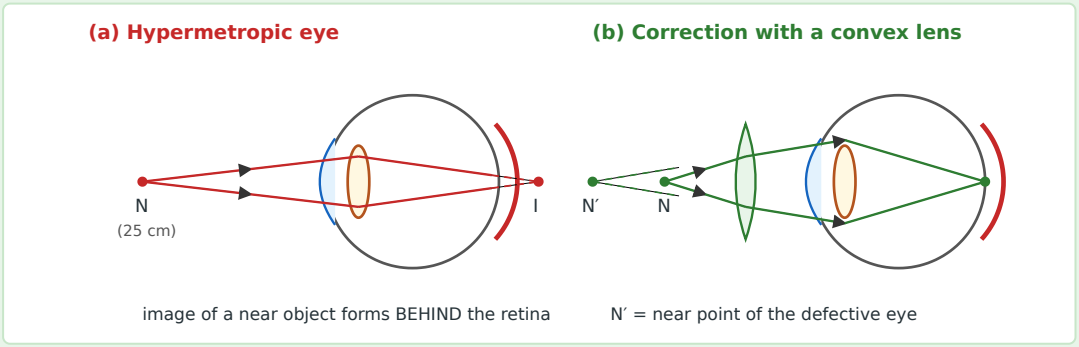
Source: Vedantu Sample Paper Set 7, Q62 [F4 p.674]

✔ Answer

(a) Hypermetropia (in old age: presbyopia). (1)

(b) Diagram: convex lens makes rays from 25 cm appear to come from her near point, so they meet on the retina. (1)

(c) Gradual weakening of ciliary muscles / reduced flexibility of eye lens with age (or focal length too long, eyeball too small). (1)



Answer diagram – drawn for this question bank

Long Answer (1)

Q58 Long Answer · 5 marks ★★★ **Board ×1** 1 paper

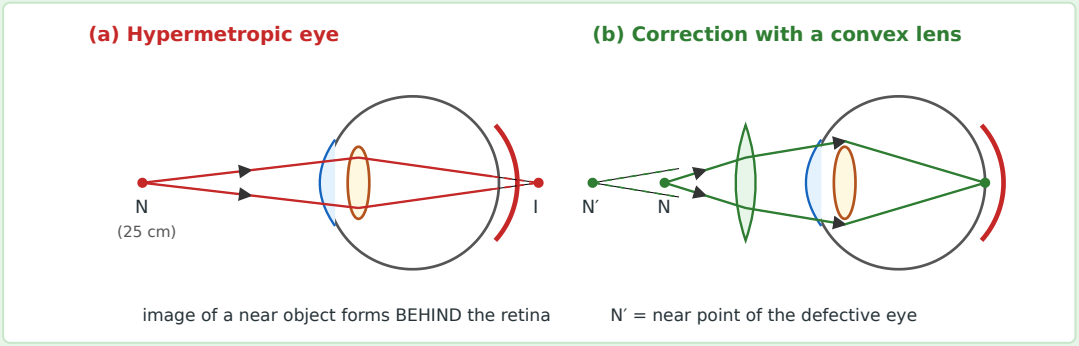
(a) A person cannot read newspaper placed nearer than 50 cm from his eyes. Name the defect of vision he is suffering from. Draw a ray diagram to illustrate this defect. List its two possible causes. Draw a ray diagram to show how this defect may be corrected using a lens of appropriate focal length. (b) We see advertisements for eye donation on television or in newspapers. Write the importance of such advertisements.

Source: CBSE 31/1/1, Series RSH/1 (SA-II era, yr?), Q24 [F6ocr p.1]

✔ Answer

(a) Hypermetropia (½); diagram of defect – image of near object behind the retina (1); causes: focal length of eye lens too long, eyeball too small (1); diagram of correction with convex lens (f = +50 cm) (1½).

(b) Such advertisements make people aware that the eyes of a dead person can give sight to people with corneal blindness; they motivate people to pledge eye donation. (1)

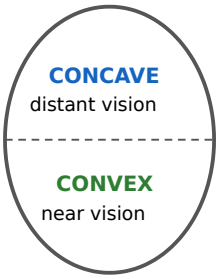


Answer diagram – drawn for this question bank

E. Presbyopia, bifocal lens and cataract

10 questions · 22 papers · 10 board papers · NCERT 10.2 (c) · Prepared by Abhishek Das, TGT (Science) – Science with Abhishek Sir

🔍 Picture it



Presbyopia
- old age: ciliary muscles weaken, eye lens loses flexibility
- near point recedes; may also have myopia
- corrected by BIFOCAL lens

Cataract
- eye lens becomes milky and cloudy; corrected by surgery

Multiple Choice (4)

Q59 Multiple Choice · 1 mark ★☆☆ Board ×2 2 papers

An old person is suffering from an eye defect caused by weakening of ciliary muscles and diminishing flexibility of the eye lens. If the defect of vision is 'a' which can be corrected by lens 'b', then 'a' and 'b' respectively are :

(A) hypermetropia and convex lens
(B) presbyopia and bifocal lens
(C) myopia and concave lens
(D) myopia and bifocal lens

Source: CBSE 2025 31/1/1 (1GEFH), Q14 [F9 p.192] · CBSE 2026 31/4/1 (LN4MK), Q31 [F4 p.386]; CBSE 2026 31/4/2 (LN4MK), Q30 [F4 p.418]; CBSE 2026 31/4/3 (LN4MK), Q31 [F4 p.450]

Also asked as:
- The vision defect which arises due to gradual weakening of the ciliary muscles and diminishing flexibility of eye lens is (A) Myopia (B) Hypermetropia (C) Presbyopia (D) Myopia and hypermetropia both — Ans (C) (2026 31/4)

✓ Answer
(B) Presbyopia and bifocal lens.

Q60 Multiple Choice · 1 mark ★☆☆ 2 papers

In bifocal lenses used for correction of Presbyopia:

A) The upper portion is of convex lens for the near vision and the lower part is of concave lens for the distant vision.
B) The upper part is of convex lens for the distant vision and the lower part is of concave lens for the near vision.
C) The upper portion is of concave lens for the near vision and the lower part is of convex lens for the distant vision.
D) The upper portion is of concave lens for the distant vision and the lower part is of convex lens for the near vision.

Source: KVS Lucknow Pre-Board 2 (2024-25), Q8 [FM p.21] · Practice Paper I (F6), Q30 [F6 p.419]

Also asked as:
- An old person is unable to see clearly nearby objects as well as distant objects. To correct the vision, what kind of lens will he require? (a) Concave lens (b) Convex lens (c) Bifocal lens whose upper portion is convex and lower portion concave (d) Bifocal lens whose upper portion is concave and lower portion is convex — Ans (d)

✓ Answer
D) Upper portion concave (distant vision), lower portion convex (near vision).

Q61 Multiple Choice · 1 mark ★☆☆ 1 paper

A person's near point is at 45 cm and far point is at 2 m. What kind of corrective lens is BEST suited for his vision defect?

(1) convex (2) concave
(3) bifocal (4) plano-convex

Source: Competency-based test items (chapter-wise booklet), Q9 [F4 p.771]

✓ Answer
(3) Bifocal – he needs a concave part for distant vision and a convex part for near vision.

Q62 Multiple Choice · 1 mark ★☆☆ 1 paper

Exposure to ultraviolet radiation causes eye disease like:

a) Conjunctivitis b) Cataract
c) Short-sightedness d) Colour blindness

Source: Practice Paper M (F8), Q16 [F8 p.21]

✓ Answer
b) Cataract – the crystalline lens becomes milky and cloudy.

Very Short Answer (2)

Q63 Very Short Answer · 2 marks ★★☆ Board ×2 3 papers

A person suffering from presbyopia needs spectacles having bifocal lenses. If the power of two lenses used in his spectacles is +2·0 D and −0·5 D, which one of the two lenses is for the correction of his distant vision and what is its focal length?

Source: CBSE Suppl. 31/S/1 (EFGH/S, yr?), Q35(b)(ii) [F4 p.232]; CBSE Suppl. 31/S/3 (EFGH/S, yr?), Q35(b)(ii) [F4 p.344]; CBSE Suppl. 31/S/2 (EFGH/S, yr?), Q35(b)(ii) [F4 p.290] · CBSE 2024 31/4/1 (D4CBA/4), Q25 [F1 p.391] · KVS Delhi Pre-Board II (2024-25), Q30(B) [FM p.91]

Also asked as:
- Same with +2·5 D and −0·25 D → −0·25 D lens, f = −4 m. (EFGH/S 31/S/2)
- Same with −4·0 D and +2·0 D → −4·0 D lens, f = −0·25 m = −25 cm. (2024 31/4/1)
- A person is suffering from both myopia and hypermetropia. (i) What kind of lenses can correct this? (ii) How are they prepared? (iii) +3 D for near vision and −3 D for distant vision: focal lengths? → bifocal; f = +33.3 cm and −33.3 cm. (KVS Delhi PB-II)

✓ Answer
The concave lens of power −0·5 D corrects distant vision. (1)
f = 1/P = 1/(−0·5) m = −2 m (= −200 cm). (1)

⚠ Note: Powers confirmed from the papers: +2·0 D / −0·5 D (31/S/1), +2·5 D / −0·25 D (31/S/2), −4·0 D / +2·0 D (2024 31/4/1).

Q64 Very Short Answer · 2 marks ★★☆ Board ×1 3 papers

(b) It is observed that the power of an eye to see nearby objects as well as far off objects diminishes with age. (i) Give reason for the above statement. (ii) Name the defect that is likely to arise in the eyes in such a condition. (iii) Draw a labelled ray diagram to show the type of corrective lens used for restoring the vision of such an eye.

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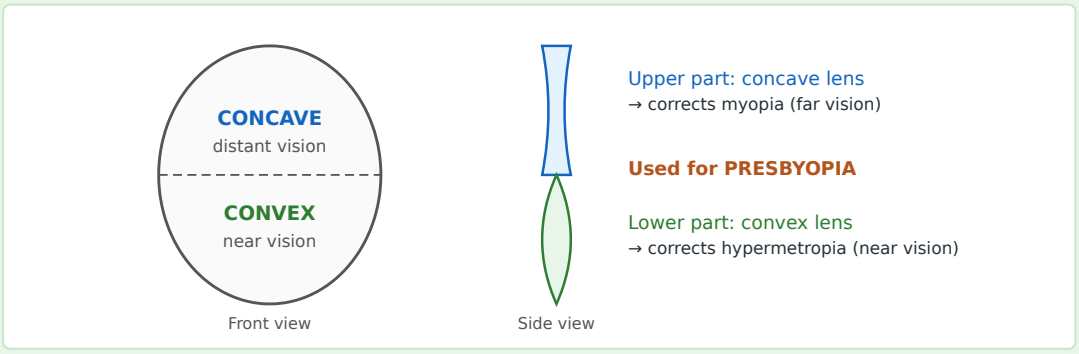
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Source: CBSE 2023 31/1/1 (Z1XYW/1), Q25(b) [F1 p.100]; CBSE 2023 31/1/2 (Z1XYW/1), Q22(b) [F1 p.132]; CBSE 2023 31/1/3 (Z1XYW/1), Q26(b) [F1 p.166] · CBSE Competency Based Test Items 2021 (CBSE & Sri Aurobindo Society), Q7 [F5 p.424] · PNCF copy of CBSE SQP 2025-26, Q35 VI(iii) [F5 p.294]

Also asked as:
- What is the primary cause of presbyopia? — Ageing (Competency item SAS21S101107)

✔ Answer

(i) With age the ciliary muscles weaken gradually and the eye lens loses flexibility. (½)
(ii) Presbyopia. (½)
(iii) Labelled diagram of a bifocal lens: upper part concave (distant vision), lower part convex (near vision). (1)



Answer diagram – drawn for this question bank

Short Answer (3)

Q65 Short Answer · 3 marks ★★☆ 4 papers

What are the common defects of vision that can be corrected by the use of suitable eyeglasses or spectacles?

Source: Practice Paper E (F6), Q35 [F6 p.360] · Practice Paper F (F6), Q35 [F6 p.375] · Practice Paper J (F6), Q35 [F6 p.435] · PM SHRI KV Sitapur PT-2 (2024-25), Q21 [FM p.2]

Also asked as:
- Defects of vision and their correction ? (5 marks, KV Sitapur PT-2)
- Case: There are mainly three common defects of vision – myopia, hypermetropia and presbyopia. What is meant by power of accommodation? What is myopia/hypermetropia/presbyopia and how is each corrected? (4, KV Sitapur PT-II)

✔ Answer

(i) Myopia (near-sightedness) – concave lens. (1)
(ii) Hypermetropia (far-sightedness) – convex lens. (1)
(iii) Presbyopia – bifocal lens. (1)

Q66 Short Answer · 3 marks ★★☆ Board ×3 3 papers

Draw a labelled diagram of a common type of bifocal lens. State the function of each of its parts. Name the defect for the correction of which it is used and state its main cause.

Source: CBSE 2023 31/5/2 (Z1XYW/5), Q29 [F1 p.499] · CBSE 31/1 (SA era, values-based, yr?), Q24 (first part) [F9 p.158] · CBSE 2026 31/8/1 (8DEFG), Q36 [F4 p.115]; CBSE 2026 31/8/3 (8DEFG), Q35 [F4 p.179]

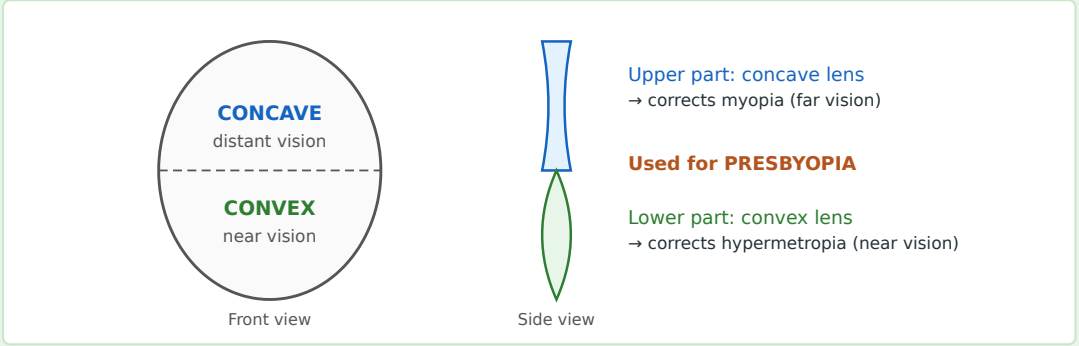
Also asked as:
- Write the importance of ciliary muscles in the human eye. Name the defect of vision that arises due to gradual weakening of the ciliary muscles in old age. What type of lenses are required? (old board paper)
- (A) The elderly people may have both near sightedness and far sightedness. Write the possible solutions for correction of their eye defect. (B) How does the eye control the amount of light entering into it? (2026 31/8/1)
- (A) What is meant by presbyopia? Write the causes of presbyopia also. (B) Draw the ray diagram for correction of presbyopia by using an appropriate lens. (2026 31/8/3)

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✔ Answer

Diagram: one lens with upper part concave and lower part convex. (1)
Upper (concave) part – distant vision; lower (convex) part – near vision. (1)
Defect: presbyopia; cause: gradual weakening of ciliary muscles and diminishing flexibility of the eye lens with age. (1)



Answer diagram – drawn for this question bank

Q67 Short Answer · 3 marks ★★★ Board ×2 2 papers

An old man cannot see objects closer than 1 m from the eye clearly. Name the defect of vision he is suffering from. How can it be corrected? Draw ray diagrams for the (i) defect of vision and also (ii) for its correction.

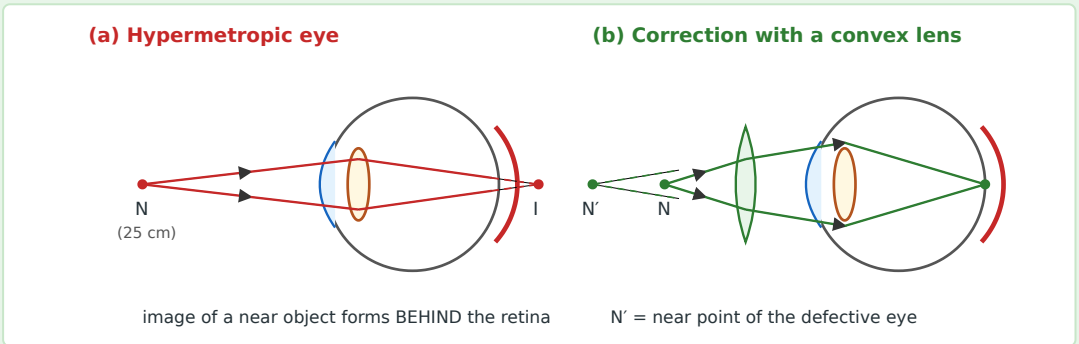
Source: CBSE 31/1, Series BRH (SA-II era, yr?), Q22 [F6ocr p.4] · CBSE 2026 31/5/1, Q34 OR [F4 p.484]; CBSE 2026 31/5/2, Q34 OR [F4 p.516]; CBSE 2026 31/5/3, Q34 OR [F4 p.548]

Also asked as:

- OR Draw a ray diagram to show the correction of eye defect of an old man who can not see an object placed closer than 1 m from his eye, clearly. (2026 31/5)

✔ Answer

Defect: presbyopia (near point has receded to 1 m – the hypermetropic part of old-age vision). (1)
Correction: convex lens of suitable power, f = +33·3 cm (P = +3 D) for reading at 25 cm. (1)
(i) Diagram: rays from 25 cm meet behind the retina. (ii) Diagram: convex lens makes rays from 25 cm appear to come from 1 m and meet on the retina. (1)



Answer diagram – drawn for this question bank

Long Answer (1)

Q68 Long Answer · 5 marks ★★★ 2 papers

1. Write the function of each of the following parts of human eye : cornea, iris, crystalline lens, ciliary muscles. 2. Millions of people of the developing countries of world are suffering from corneal blindness. These people can be cured by replacing the defective cornea with the cornea of a donated eye. A charitable society of your city has organised a campaign in your neighbourhood in order to create awareness about this fact. (i) State the objective of organising such campaigns. (ii) List two arguments which you would give to motivate the people to donate their eyes after death. (iii) List two values which are developed in the persons who actively participate and contribute in such programme.

Source: Practice Paper B (F6), Q36 [F6 p.279] · Practice Paper I (F6), Q35 [F6 p.420]

✔ Answer

1. Cornea – light enters, most refraction; iris – controls pupil size; crystalline lens – fine focusing on retina; ciliary muscles – change focal length of eye lens. (2)
2. (i) To make people aware that corneal blindness can be cured by eye donation and to get pledges. (1)
(ii) One donated pair of eyes can give sight to up to four people; eyes are removed within 4–6 hours of death without disfiguring the face. (1)
(iii) Compassion / social responsibility / concern for others. (1)

F. Lens power and the defect (numericals)

9 questions · 11 papers · 4 board papers · NCERT 10.2 + Ch 9 power · Prepared by Abhishek Das, TGT (Science) – Science with Abhishek Sir

🔍 **Picture it**

P = 1 / f (f in metres) **1 D = 1 m⁻¹**

P negative → concave lens → MYOPIA

P positive → convex lens → HYPERMETROPIA (and near vision in presbyopia)

Two powers (one −, one +) → BIFOCAL lens → PRESBYOPIA

e.g. −0.5 D → f = −2 m ; +2 D → f = +0.5 m = 50 cm

Multiple Choice (1)

Q69 Multiple Choice · 1 mark ★★★ Board ×1 1 paper

A person is advised to use lenses of power −0·25 D for the correction of his defect of vision. It implies that the person is suffering from

(A) hypermetropia and he has to use converging lens of focal length 25 cm in his spectacles.
(B) hypermetropia and he has to use diverging lens of focal length 4 m in his spectacles.
(C) myopia and he has to use diverging lens of focal length 4 m in his spectacles.
(D) myopia and he has to use diverging lens of focal length 25 cm in his spectacles.

Source: CBSE Suppl. 31/S Set 2 (no series, yr?), Q14 [F4 p.249]

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✔ Answer
(C) f = 1/P = 1/(−0·25) = −4 m: diverging lens → myopia.

⚠ Note: Confirmed from the paper: −0·25 D.

Very Short Answer (2)

Q70 Very Short Answer · 2 marks ★★★ 2 papers

A person needs a lens of power −4·5 D for correction of her vision. (a) What kind of defect in vision is she suffering from? (b) What is the focal length of the corrective lens? (c) What is the nature of the corrective lens?

Source: NCERT Exemplar Sample Question Paper II, Q28 [F5 p.243] · Competency-based test items (chapter-wise booklet), Q16 [F4 p.762]

Also asked as:
- A person needs a lens of power −5.0 D for correction of his vision. (a) possible vision defect (b) focal length of the corrective lens — myopia; f = −0.2 m

✔ Answer
(a) Myopia. (½)
(b) f = 1/P = 1/(−4·5) m = −0·22 m (−22·2 cm). (1)
(c) Concave (diverging) lens. (½)

Q71 Very Short Answer · 2 marks ★★★ 1 paper

A student uses spectacles of focal length −2·5 m. i. Name the defect of vision he is suffering from. ii. Which lens is used for the correction of this defect? iii. List two main causes of developing this defect. iv. Compute the power of this lens.

Source: Practice Paper N (F8), Q26 [F8 p.38]

✔ Answer
i. Myopia (½) ii. Concave lens (½) iii. Excessive curvature of eye lens; elongation of eyeball (½) iv. P = 1/f = 1/(−2·5) = −0·4 D (½)

⚠ Note: Printed key in the paper gives −2·5 D; correct value is −0·4 D.

Short Answer (4)

Q72 Short Answer · 3 marks ★★★ Board ×1 1 paper

A person uses lenses of power −0·5 D in his spectacles for the correction of his vision. (a) Name the defect of vision the person is suffering from. (b) List two causes of this defect. (c) Determine the focal length of the lenses used in the spectacles.

Source: CBSE 2025 31/6/3 (GF6HE), Q32 [F4 p.21]

✔ Answer
(a) Myopia (negative power → concave lens). (1)
(b) Excessive curvature of the eye lens; elongation of the eyeball. (1)
(c) f = 1/P = 1/(−0·5) m = −2 m = −200 cm. (1)

Q73 Short Answer · 3 marks ★★★ **Board ×1** 1 paper

Two persons, A and B are using lenses of power +1·5 D and −1·5 D respectively in their spectacles. Write the names of eye defects from which A and B are suffering. Write two causes for each defect of vision.

Source: CBSE 2026 VI 31(B), Series E7FDG, Q36 [F9 p.87]

✔ Answer

A (+1·5 D, convex): hypermetropia – focal length of eye lens too long; eyeball too small. (1½)

B (−1·5 D, concave): myopia – excessive curvature of eye lens; elongation of eyeball. (1½)

Q74 Short Answer · 3 marks ★★★ 1 paper

The image given below indicates defective vision in Ram. (a) Based on the given information, what could be the nature of the eye defect? (b) State the type of lens to be used to correct his vision. Justify your choice. (c) The near point of Ram's eye is 75 cm. Calculate the focal length and power of the lens he should use while reading a book kept at a distance of 25 cm from the eye.

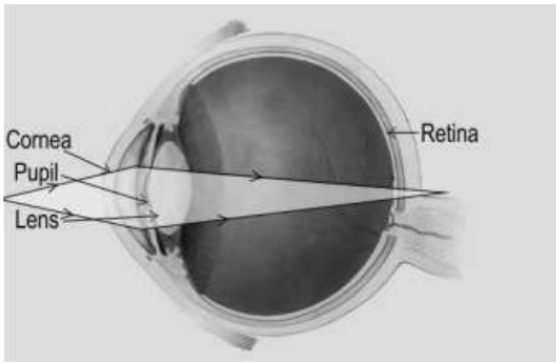


Figure from the question paper – Competency Focused Practice Questions (CBSE), Q146, page 75

Source: CBSE Competency Focused Practice Questions (CFPQ), Q146 [F6 p.79]

✔ Answer

(a) Hypermetropia. (1)

(b) Convex lens – it converges the rays so that the image of a nearby object moves from behind the retina on to the retina. (1)

(c) u = −25 cm, v = −75 cm. 1/f = 1/v − 1/u = −1/75 + 1/25 = 2/75 → f = +37·5 cm. P = 100/37·5 = +2·67 D. (1)

⚠ Note: Printed key gives P = 5 D (uses f = 20 cm) – wrong. Recomputed: f = +37.5 cm, P ≈ +2.67 D. Figure: rays meet behind the retina → hypermetropia.

Q75 Short Answer · 3 marks ★★★ 1 paper

Answer the following: (a) What is the advantage of having two eyes instead of one? (b) Explain the function of the iris. (c) What is the difference in the defect of a person wearing spectacles of +1 D to a person wearing spectacles of −1 D?

Source: Sample Question Paper 11, 2024-25 (+ solutions), Q31 [F8 p.140]; Sample Question Paper 11, 2024-25 (2nd copy), Q31 [F8 p.169]; Sample Question Paper 11, 2024-25 (3rd copy), Q31 [F8 p.198]

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✔ Answer

(a) Two eyes give a wider field of view and a sense of depth (three-dimensional picture); we can still see if one eye is damaged. (1)

(b) The iris is a dark muscular diaphragm that controls the size of the pupil – in bright light it makes the pupil small, in dim light it opens it up. So it controls the amount of light entering the eye. (1)

(c) +1 D: positive power → convex lens → the person has hypermetropia (far-sightedness). −1 D: negative power → concave lens → the person has myopia (near-sightedness). (1)

⚠ Note: Part (a) 'advantage of two eyes' is not in the rationalised NCERT text – keep as enrichment; (b) and (c) are in the syllabus. Solution checked (F8 p.153).

Long Answer (2)

Q76 Long Answer · 5 marks ★★★ 2 papers

OR i. A person suffering from myopia (near-sightedness) was advised to wear the corrective lens of power −2.5 D. A spherical lens of the same focal length was taken in the laboratory. At what distance should a student place an object from this lens so that it forms an image at a distance of 10 cm from the lens? ii. Draw a ray diagram to show the position and nature of the image formed in the above case.

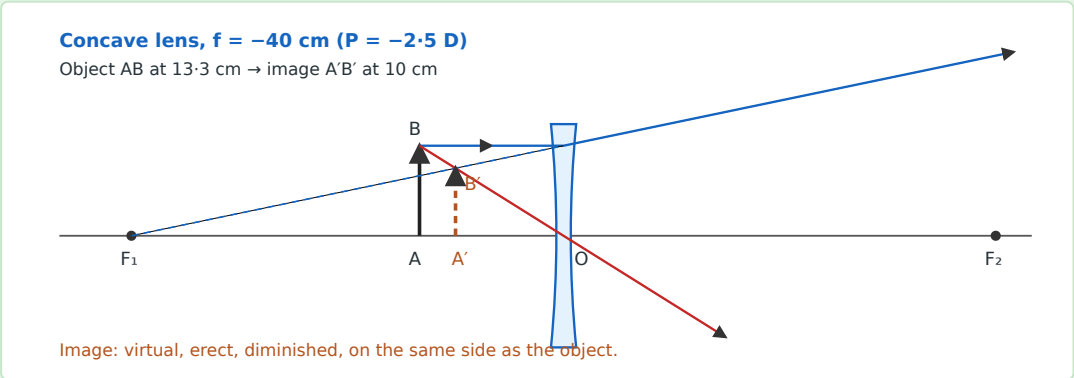
Source: Practice Paper E (F6), Q39 OR [F6 p.361] · Practice Paper H (F6), Q35 OR [F6 p.406]

✔ Answer

i. f = 1/P = −0·4 m = −40 cm (concave lens). Image is virtual, on the same side: v = −10 cm. (1)

1/u = 1/v − 1/f = −1/10 + 1/40 = −3/40 → u = −13·3 cm. (2)

ii. Ray diagram for a concave lens: virtual, erect, diminished image between F and O on the object side. (2)



Answer diagram – drawn for this question bank

Q77 Long Answer · 5 marks ★★★ Board ×1 1 paper

(a) (i) The power of a lens 'X' is −2·5 D. Name the lens and determine its focal length in cm. For which eye defect of vision will an optician prescribe this type of lens as a corrective lens ? (ii) 'The value of magnification m for a lens is −2.' Using new Cartesian Sign Convention and considering that an object is placed at a distance of 20 cm from the optical centre of this lens, state : (I) the nature of the image formed; (II) size of the image compared to the size of the object; (III) position of the image, and (IV) sign of the height of the image. (iii) The numerical values of the focal lengths of two lenses A and B are 10 cm and 20 cm respectively. Which one of the two will show higher degree of convergence/divergence ? Give reason.

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Source: CBSE 2025 31/1/1 (1GEFH), Q36(a) [F9 p.204]; CBSE 2025 31/1/2 (1GEFH), Q34(a) [F9 p.243]; CBSE 2025 31/1/3 (1GEFH), Q34(a) [F9 p.286]

✔ Answer

(i) Concave lens (½); f = 1/P = 1/(−2·5) m = −0·4 m = −40 cm (1); prescribed for myopia (½).
(ii) m = −2: (I) real and inverted (½) (II) twice the size of the object (½) (III) v = m × u = −2 × (−20) = +40 cm, i.e. 40 cm on the other side of the lens (½) (IV) negative (½).
(iii) Lens A – shorter focal length means greater power (P = 1/f), so more convergence/divergence. (1)

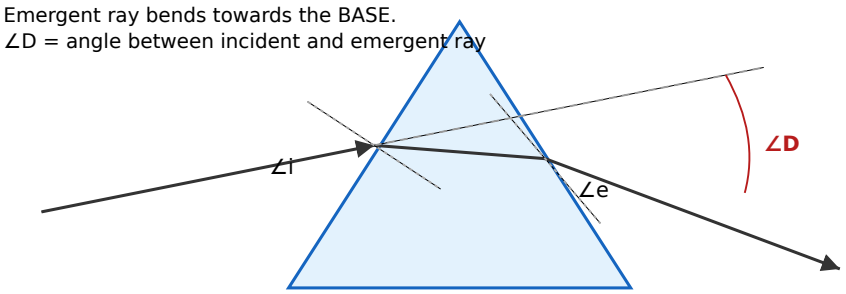
⚠ Note: Only part (i) is from this chapter; (ii)–(iii) are Ch 9.

Theme 2 · Glass Prism, Dispersion and Rainbow

A. Refraction of light through a prism

8 questions · 11 papers · 8 board papers · NCERT 10.3 · Prepared by Abhishek Das, TGT (Science) – Science with Abhishek Sir

🔍 **Picture it**



Multiple Choice (4)

Q78 Multiple Choice · 1 mark ★★☆ **Board ×2** 3 papers

A student traces the path of a ray of light through a triangular glass prism for different values of angle of incidence. On analysing the ray diagrams, which one of the following conclusions is he likely to draw ?

(A) The emergent ray is parallel to the incident ray.
(B) The emergent ray bends at an angle to the direction of the incident ray.
(C) The emergent ray and the refracted ray are at right angles to each other.
(D) The emergent ray is perpendicular to the incident ray.

Source: CBSE 31/1 (SA era, values-based, yr?), Q33 [F9 p.164] · CBSE 31/1/1, Series RSH/1 (SA-II era, yr?), Q35 [F6ocr p.1] · KVS Varanasi SA-II (2014-15), Q32 [F5 p.280]

Also asked as:

- To trace the path of ray of light through a triangular glass prism, a student mostly observes that the emergent ray has (a) bent away from the base (b) bent towards the base (c) moved perpendicular... — Ans (b) towards the base

✔ Answer

(B) The emergent ray bends at an angle (angle of deviation) to the direction of the incident ray.

Q79 Multiple Choice · 1 mark ★☆☆ Board ×1 2 papers

While performing the experiment to trace the path of a ray of light passing through a glass prism, four students marked the incident ray and the emergent ray in their diagrams in the manner shown below. The correct path of the ray has been shown by :

(A) I
(B) II
(C) III
(D) IV

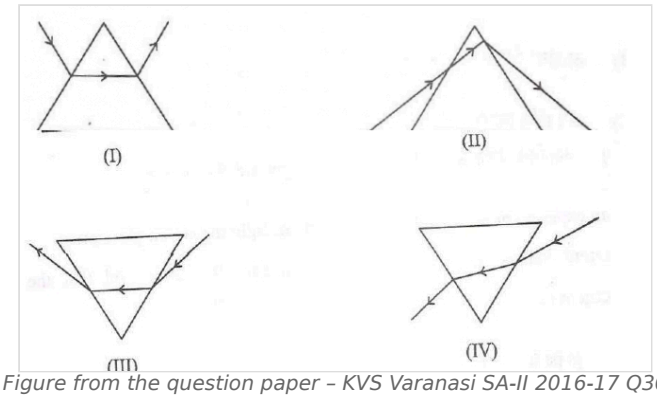


Figure from the question paper – KVS Varanasi SA-II 2016-17 Q30

Source: CBSE 31/1/1, Series RSH/1 (SA-II era, yr?), Q34 [F6ocr p.1] · KVS Varanasi SA-II (2016-17), Q30 [F5 p.262]

✓ Answer

(c) III. The emergent ray must bend towards the BASE of the prism. In III (prism with base at the top) the ray comes out bending upwards, towards the base. In I and IV it bends towards the apex; II does not pass through the prism properly.

⚠ Note: Figure seen for KVS Varanasi. The RSH/1 board version (File 6, about p.127) may number the diagrams differently – check before using the key.

Q80 Multiple Choice · 1 mark ★☆☆ 2 papers

In the following ray diagram the correctly marked angles are -

(a) ∠i and ∠e
(b) ∠A and ∠D
(c) ∠i, ∠e and ∠D
(d) ∠r, ∠A and ∠D

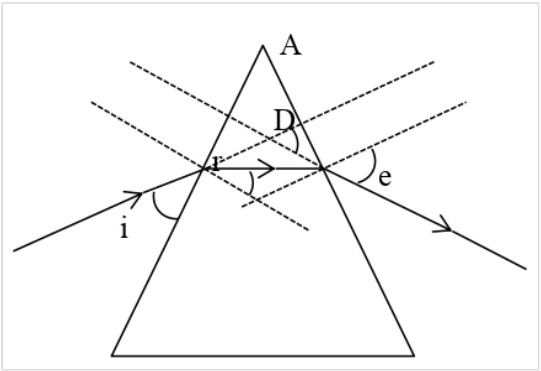


Figure from the question paper – KVS Varanasi SA-II 2016-17 Q31

Source: Practice Paper E (F6), Q30 [F6 p.359] · KVS Varanasi SA-II (2016-17), Q31 [F5 p.262]

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✔ Answer
(d) ∠r, ∠A and ∠D. ∠i is marked between the ray and the face of the prism, not the normal, so every option with ∠i is wrong; ∠r (between refracted ray and normal) and ∠A (angle of prism) are correct.

⚠ Note: Answer by elimination from the KVS Varanasi figure (∠i wrongly marked). The F6 p.359 practice version (Q30) has the same wording; its figure is on the next page – not seen.

Q81 Multiple Choice · 1 mark ★☆☆ Board ×1 1 paper

Angle of deviation in refraction of light through a glass prism is the :

(A) Angle between the normal at the face on the emerging side of the prism and the emergent ray.
(B) Angle between the normal at the face on the emerging side of the prism and the incident ray.
(C) Angle between the incident ray and the refracted ray.
(D) Angle between the directions of incident ray and emergent ray.

Source: CBSE 2026 VI 31(B), Series LMNK2, Q31 [F1 p.75]

✔ Answer
(D) Angle between the directions of the incident ray and the emergent ray.

Assertion–Reason (1)

Q82 Assertion–Reason · 1 mark ★☆☆ Board ×1 1 paper

Assertion (A) : The angle through which a ray of light bends on passing through a prism is called the angle of deviation. Reason (R) : The peculiar shape of a prism makes the emergent ray bend at an angle to the direction of the incident ray.

Source: CBSE 2023 31/2/3 (Z1XYW/2), Q19 [F1 p.242]

✔ Answer
(a) Both true and R explains A – NCERT: 'The peculiar shape of the prism makes the emergent ray bend at an angle to the direction of the incident ray. This angle is called the angle of deviation.'

⚠ Note: Some keys give (b). NCERT wording supports (a).

Very Short Answer (2)

Q83 Very Short Answer · 2 marks ★☆☆ Board ×2 2 papers

Draw a ray diagram to show the path of a ray of light which falls obliquely on one of the faces of an equilateral triangular prism made of glass and mark on it the angle of incidence (∠i) and the angle of deviation (∠D).

Source: CBSE Suppl. 31/S/1 (EFGH/S, yr?), Q26 [F4 p.226]; CBSE Suppl. 31/S/2 (EFGH/S, yr?), Q24 [F4 p.282]; CBSE Suppl. 31/S/3 (EFGH/S, yr?), Q21 [F4 p.336] · CBSE 31/1, Series RHB (SA era, yr?), Q8 [F6 p.193]

Also asked as:
- Draw a ray diagram to show the refraction of light through a glass prism. Mark on it (a) the incident ray, (b) the emergent ray and (c) the angle of deviation. (RHB)

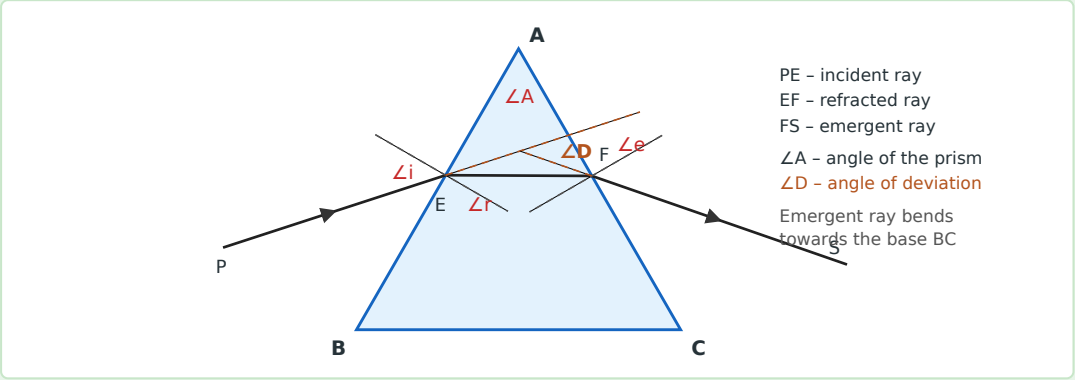
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✔ Answer

Diagram: incident ray PE, refracted ray EF bending towards the normal inside, emergent ray FS bending away from the normal and towards the base. (1)

Mark ∠i between incident ray and normal; ∠D between the extended incident ray and the emergent ray. (1)



Answer diagram – drawn for this question bank

Q84 Very Short Answer · 2 marks ★★★ 1 paper

List two factors on which angle of deviation of prism depends?

Source: KVS Varanasi SA-II (2014-15), Q36 [F5 p.281]

✔ Answer

Any two: angle of the prism; nature (refractive index) of the material of the prism; angle of incidence. (1 + 1)

⚠ Note: Practical-skill question; factors are beyond the NCERT text.

Short Answer (1)

Q85 Short Answer · 3 marks ★★★ Board ×2 2 papers

Draw a ray diagram to show the refraction of a ray of light through a triangular glass prism and mark on it (i) angle of incidence (∠i), (ii) angle of emergence (∠e), and (iii) angle of deviation (∠D). What would happen, if instead of a ray, a beam of white light falls on the prism ? Give reason for the phenomenon that occurs in this case.

Source: CBSE Suppl. 31/S Set 1 (no series, yr?), Q33 [F4 p.203]; CBSE Suppl. 31/S Set 3 (no series, yr?), Q33 [F4 p.315] · CBSE 2026 31/5/1, Q35 [F4 p.484]; CBSE 2026 31/5/2, Q37 [F4 p.518]; CBSE 2026 31/5/3, Q35 [F4 p.548]

Also asked as:

- (a) Draw the ray diagram for refraction of light through a glass prism and mark angle of refraction and angle of deviation. (b) When the path of a light ray refracted through a glass prism is reversed how will the angle of deviation change? Explain. (2026 31/5) — Reversed ray retraces the same path, so the angle of deviation stays the same.

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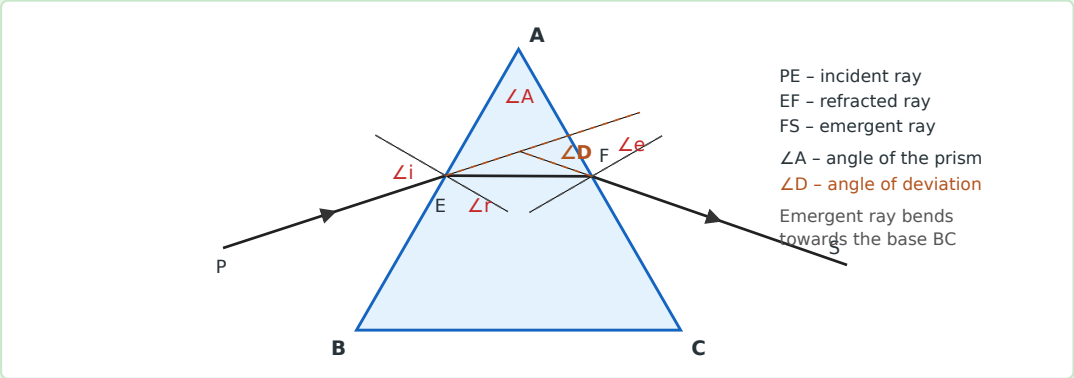
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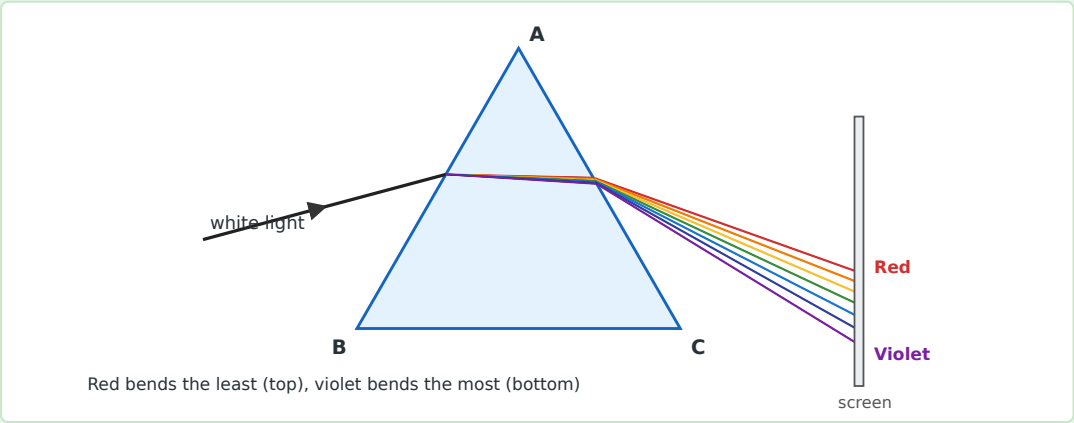
✔ Answer

Labelled ray diagram with ∠i, ∠e and ∠D marked. (1½)

A beam of white light splits into its seven colours (VIBGYOR) – dispersion. (½)

Reason: different colours bend through different angles with respect to the incident ray; red bends least, violet most. (1)



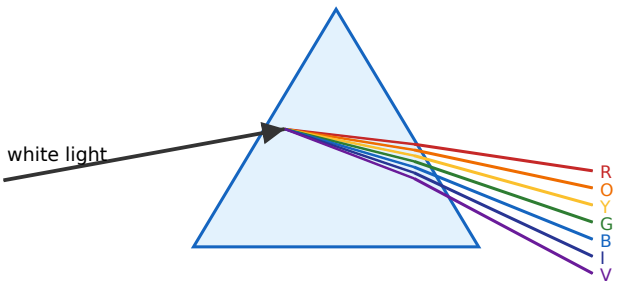


Answer diagram – drawn for this question bank

B. Dispersion of white light and recombination

18 questions · 28 papers · 14 board papers · NCERT 10.4 · Prepared by Abhishek Das, TGT (Science) – Science with Abhishek Sir

🔍 Picture it



Dispersion

splitting of white light into its 7 colours (VIBGYOR)

Red bends LEAST (top)
Violet bends MOST (bottom)

Inverted 2nd prism → colours recombine to white

Multiple Choice (8)

Q86 Multiple Choice · 1 mark ★★☆ Board ×1 4 papers

In the following diagram showing dispersion of white light by a glass prism, the colours 'P' and 'Q' respectively are –

(a) Red and Violet
(b) Violet and Red
(c) Red and Blue
(d) Orange and Green

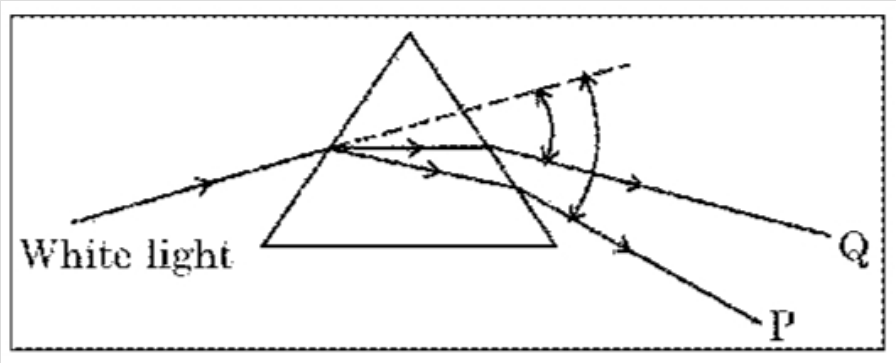


Figure from the question paper – CBSE 2023 31/6/1 Q13, page 11

Source: CBSE 2023 31/6/1 (Z1XYW/6), Q13 [F1 p.545]; CBSE 2023 31/6/3 (Z1XYW/6), Q14 [F9ocr p.45] · Practice Paper A (F6), Q31 [F6 p.262]; Practice Paper A (F6, second copy), Q31 [F6 p.294] · Practice Paper D (F6), Q31 [F6 p.327]; Practice Paper D (F6, second copy), Q31 [F6 p.343] · Practice Paper H (F6), Q31 [F6 p.405]

✓ Answer

(b) Violet and Red. In the figure P is the ray bent more towards the base (violet bends most) and Q is the ray bent least (red).

⚠ Note: Figure checked in 2023 31/6/1 and 31/6/3: P is the ray bent more (violet), Q bent less (red). Practice-paper versions use the same options.

Q87 Multiple Choice · 1 mark ★☆☆ Board ×1 1 paper

A thin beam of white light falls on a face of a glass prism and a spectrum is obtained on a screen. Which of the following options is the correct sequence of colours from top to bottom on the screen ?

(A) Red, Green, Yellow, Violet, Blue
(B) Red, Yellow, Green, Blue, Violet
(C) Violet, Blue, Green, Yellow, Red
(D) Violet, Red, Green, Yellow, Blue

Source: CBSE 2026 31/2/1, Q31 [F9 p.331]; CBSE 2026 31/2/2, Q30 [F9 p.401]; CBSE 2026 31/2/3, Q31 [F9 p.469]

✓ Answer

(B) Red, Yellow, Green, Blue, Violet – red bends least (top), violet most (bottom).

Q88 Multiple Choice · 1 mark ★☆☆ Board ×1 1 paper

The white light entering a glass prism, gets split into its constituent colours. It is observed that :

(A) Red light deviates the most.
(B) Violet light deviates the least.
(C) Yellow light deviates more than the blue light.
(D) Green light deviates more than the orange light.

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Source: CBSE 2025 31/1/2 (1GEFH), Q13 [F9 p.233]

✔ Answer
(D) Green deviates more than orange (order of bending: violet most ... red least).

Q89 Multiple Choice · 1 mark ★★★ 1 paper

When a narrow beam of white light passes through a glass prism it splits into its component colours. This phenomenon is called :

(A) Diffusion of light
(B) Total reflection of light
(C) Scattering of light
(D) Dispersion of light

Source: KVS Ahmedabad Set A, Q31 [F9 p.510]; KVS Ahmedabad Set B, Q30 [F9 p.522]

✔ Answer
(D) Dispersion of light.

Q90 Multiple Choice · 1 mark ★★★ 1 paper

Which of the following colors of light has the shortest wavelength?

a) Red
b) Green
c) Blue
d) Violet

Source: PM SHRI KV Sitapur PT-2 (2024-25), Q8 [FM p.1]

✔ Answer
d) Violet.

Q91 Multiple Choice · 1 mark ★★★ 1 paper

In a medium like glass, the velocity of light increases as the wavelength increases. Which of the following light would be the fastest in glass?

(1) blue
(2) violet
(3) green
(4) red

Source: Competency-based test items (chapter-wise booklet), Q7 [F4 p.771]

✔ Answer
(4) Red – it has the longest wavelength (and bends least).

Q92 Multiple Choice · 1 mark ★★★ 1 paper

A ray of light passes through a glass prism. When do the light rays get refracted? Circle 'Yes' or 'No' : As the light ray enters the prism from the air – Yes/No; As the light rays travel inside the prism – Yes/No; As the light rays move from the prism into the air – Yes/No

Source: CBSE Competency Based Test Items 2021 (CBSE & Sri Aurobindo Society), Q9 [F5 p.425]

✔ Answer
Yes; No; Yes – refraction happens only at the two surfaces (air → glass and glass → air), not inside the glass.

⚠ Note: 1-mark competency item (complex MCQ). Printed key reads 'No Yes Yes' – order looks scrambled; correct order is Yes, No, Yes.

Q93 Multiple Choice · 1 mark ★☆☆ 1 paper

Which of the following statements is/are true in dispersion? I: Refractive index for violet colour is maximum. II: Deviation produced for red colour is minimum. III: The wavelength for green colour is greater than that for blue colour.

(a) I and II only
(b) II and III only
(c) I and III only
(d) All the statements

Source: Sample Question Paper 17, 2024-25 (+ solutions), Q14 [F8 p.250]; Sample Question Paper 17, 2024-25 (2nd copy), Q14 [F8 p.279]

✓ Answer

(d) All the statements. Violet bends the most (highest refractive index), red bends the least (least deviation), and the wavelength order is red > orange > yellow > green > blue > indigo > violet, so green is longer than blue.

⚠ Note: Statements I and III go a little beyond the NCERT text (refractive index for each colour, wavelength order); key checked with the paper's solution (F8 p.261).

Very Short Answer (5)

Q94 Very Short Answer · 2 marks ★★★ Board ×4 6 papers

(a) Name the phenomenon due to which a prism splits the incident white light into a band of colours. State the reason of the phenomenon also.

Source: CBSE 2026 VI 31(B), Series LMNK2, Q34(a) [F1 p.77] · CBSE 31/1/1, Series RHB/1 (SA-I, yr?), Q8 [F6ocr p.3] · CBSE 31/1, Series BRH (SA-II era, yr?), Q10 [F6ocr p.4] · CBSE 31/1/1, Series LRH/1 (SA era, yr?; 2 copies), Q9 [F6ocr p.2] · KVS Lucknow Pre-Board 1 (2022-23), Q24 OR [FM p.17] · Practice Paper S (F8), Q26 [F8 p.118]; Practice Paper S (F8), Q26 [F8 p.124]

Also asked as:

- What is meant by the dispersion of white light ? Draw a diagram to show dispersion of white light by the glass prism. (RHB/1)
- Draw a labelled ray diagram to illustrate the dispersion of a narrow beam of white light when it passes through a glass prism. (BRH)
- In the figure a narrow beam of white light passes through a triangular prism and forms spectrum XY on a screen. (a) Name the colours at X and Y. (b) Why do different colours bend through different angles? (LRH/1, figure)
- What do you understand by spectrum? Which colour wavelength bends the (a) least (b) most? (KVS Lucknow PB-1 2022-23)

✓ Answer

Dispersion of white light. (1)

Reason: the different colours of white light bend through different angles with respect to the incident ray as they pass through the prism – red least, violet most. (1)

Q95 Very Short Answer · 2 marks ★★☆ Board ×1 3 papers

When we place a glass prism in the path of a narrow beam of white light a spectrum is obtained. What happens when a second identical prism is placed in an inverted position with respect to the first prism ? Draw a labelled ray diagram to illustrate it.

Source: CBSE 31/1/1, Series BRH/1 (SA-II era, yr?), Q10 [F5ocr p.5] · Practice Paper O (F8), Q26 [F8 p.53] · KVS Lucknow 1st Pre-Board (yr?), Q25 [FM p.56]

Also asked as:

- How will you use two identical prisms so that a narrow beam of white light incident on one prism emerges out of the second prism as white light? Draw the diagram.
- What happens to a beam of white light when it gets refracted through glass prism? Which colour deviates the most and the least? What is likely to happen if a second identical prism is placed in an inverted position? (2)

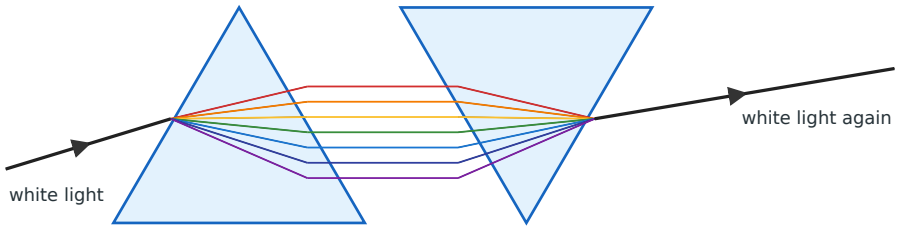
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✓ Answer

The colours of the spectrum recombine and white light emerges from the second prism (Newton's experiment). (1)

Diagram: two identical prisms, the second inverted; spectrum from the first enters the second and a beam of white light comes out. (1)



Newton: the second identical prism, placed upside down, recombines the colours into white light.

Answer diagram – drawn for this question bank

Q96 Very Short Answer · 2 marks ★★★ Board ×1 2 papers

(a) A narrow beam XY of white light is passing through a glass prism ABC as shown in the diagram. Trace it on your answer sheet and show the path of the emergent beam as observed on the screen PQ. Name the phenomenon observed and state its cause.

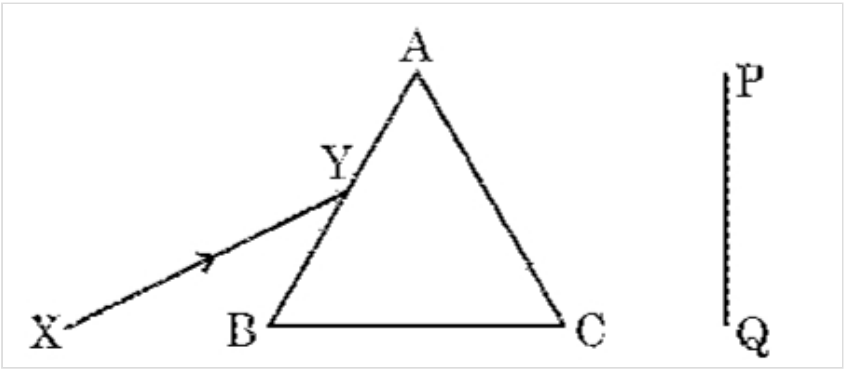


Figure from the question paper – CBSE 2023 31/1/1 Q25(a), page 19

Source: CBSE 2023 31/1/1 (Z1XYW/1), Q25(a) [F1 p.100]; CBSE 2023 31/1/2 (Z1XYW/1), Q22(a) [F1 p.132]; CBSE 2023 31/1/3 (Z1XYW/1), Q26(a) [F1 p.164] · Practice Paper A (F6), Q36 [F6 p.262]; Practice Paper A (F6, second copy), Q36 [F6 p.294]

Also asked as:

- A narrow beam PQ of white light is passing through a glass prism ABC as shown in the diagram. Trace it ... screen DE. (i) Write the name and cause of the phenomenon (ii) where it is seen in nature (iii) conclusions (3, practice paper)

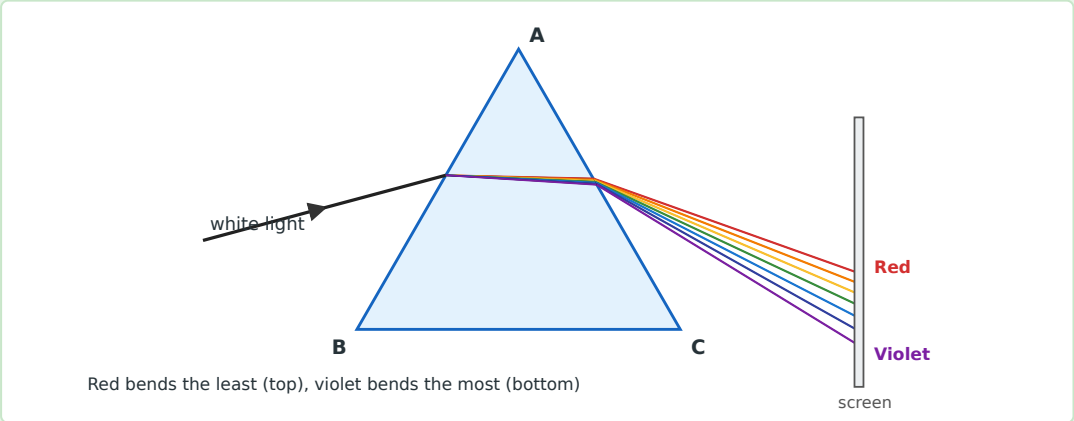
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✓ Answer

Diagram: the beam bends towards the base at face AB, splits inside the prism and comes out of face AC as a band of colours – red nearest P (top, least bent) and violet nearest Q (bottom, most bent). (1)

Phenomenon: dispersion of white light. Cause: different colours of light bend through different angles with respect to the incident ray (they travel with different speeds in glass). (½ + ½)



Answer diagram – drawn for this question bank

Q97 Very Short Answer · 2 marks ★☆☆ Board ×1 1 paper

(b) Match the items given in Column I with the correct option given in Column II : 1. Mirror – Refraction of light; 2. Lens – Dispersion of light; 3. Prism – Tyndall effect; 4. Scattering of light – Reflection of light

Source: CBSE 2026 VI 31(B), Series E7FDG, Q34(b) [F9 p.87]

✓ Answer

1. Mirror – reflection of light; 2. Lens – refraction of light; 3. Prism – dispersion of light; 4. Scattering of light – Tyndall effect. (½ × 4)

Q98 Very Short Answer · 2 marks ★☆☆ 1 paper

The images formed by an ordinary convex lens suffer from a defect, called chromatic defect, which leads to false coloured edges in the images. This happens because light rays of different colours bend differently as they enter and leave the lens. If a parallel white light beam passes through a convex lens, the light of which colour (among violet to red in the spectrum) will converge at a point closest to the lens? Justify your answer.

Source: Competency-based test items (chapter-wise booklet), Q11 [F4 p.760]

✓ Answer

Violet. (1)

Violet bends the most (greatest deviation) on refraction, so it meets the principal axis closest to the lens. (1)

Short Answer (2)

Q99 Short Answer · 3 marks ★★★ Board ×2 2 papers

(a) Define the term dispersion of white light. State the colour of light which bends (i) the least, (ii) the most, while passing through a glass prism. Also, state the cause of dispersion of a narrow beam of white light when it passes through a prism.

Source: CBSE Suppl. VI 31(B)/S, Series CDBA/S (yr?), Q32(a) [F1 p.17] · CBSE 2023 31/4/3 (Z1XYW/4), Q33(A) [F1 p.446]

Also asked as:

- (A) Define the term dispersion of white light. State the colour which bends (i) the most, (ii) the least while passing through a glass prism. Draw a diagram to show the dispersion of white light. (2023 31/4/3)

✓ Answer

Splitting of white light into its component colours is called dispersion. (1)

(i) Red bends the least; (ii) violet bends the most. (1)

Cause: different colours of light bend through different angles with respect to the incident ray (different speeds in glass). (1)

Q100 Short Answer · 3 marks ★★★ 1 paper

(Radiation from the Sun passes through a prism and comes out as yellow light and blue light – see figure.) A) State the phenomenon observed in the above diagram. Explain with reference to the diagram. B) Which of the two lights given above will have higher wavelength? C) Which colour of light scatter the most out of these two?

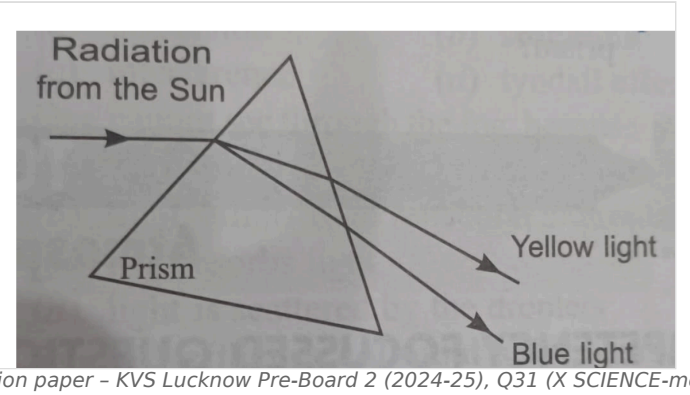


Figure from the question paper – KVS Lucknow Pre-Board 2 (2024-25), Q31 (X SCIENCE-merged.pdf, PDF p.25)

Source: KVS Lucknow Pre-Board 2 (2024-25), Q31 [FM p.25]

✓ Answer

A) Dispersion of white light – the prism bends different colours through different angles; blue is bent more than yellow, so they separate. (1)

B) Yellow light has the higher (longer) wavelength. (1)

C) Blue light (shorter wavelength) is scattered the most. (1)

Case / Source-based (3)

Q101 Case / Source-based · 4 marks ★★★ **Board ×1** 1 paper

A person allowed a narrow beam of white light from the sun to enter a dark room through a small aperture and placed a glass prism in its path in such a manner that the beam falls on the face AB of the prism as shown in the figure. A screen S is placed on the other side of the prism, facing AC. On turning the prism slowly, a beautiful band of colours is obtained on the screen. It is the spectrum of sunlight. (a) Name the phenomenon due to which a prism splits the incident white light into a band of colours. (1) (b) State the reason of getting a band of seven colours in the above case. (1) (c) (i) Explain with the help of a labelled ray diagram, an experimental arrangement to show the recombination of the spectrum of white light. (2) OR (c) (ii) Draw a labelled ray diagram to show the formation of a rainbow. (2)

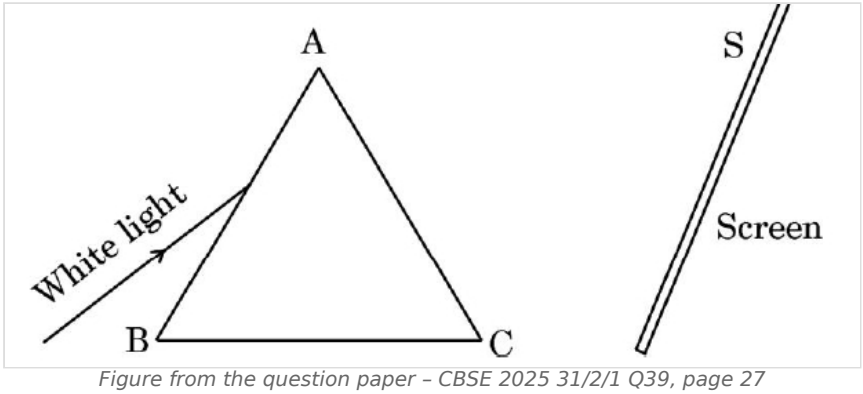


Figure from the question paper – CBSE 2025 31/2/1 Q39, page 27

Source: CBSE 2025 31/2/1 (GHF2E), Q39 [F9 p.364]; CBSE 2025 31/2/2 (GHF2E), Q39 [F9 p.434]; CBSE 2025 31/2/3 (GHF2E), Q38 [F9 p.502]

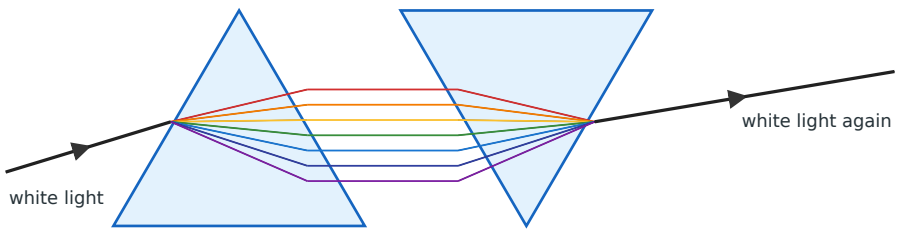
✓ Answer

(a) Dispersion of white light. (1)

(b) Different colours bend through different angles with respect to the incident ray – red least, violet most. (1)

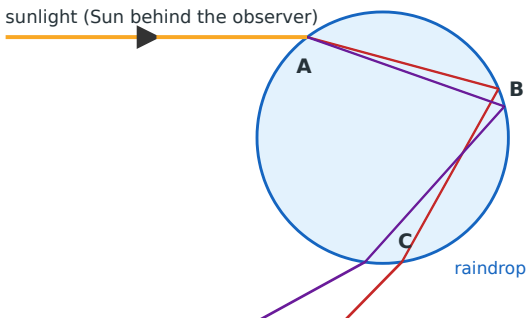
(c)(i) Place a second identical prism inverted next to the first; the colours recombine and white light emerges (labelled diagram). (2)

OR (c)(ii) Diagram of a raindrop: refraction and dispersion on entering, internal reflection at the back, refraction on leaving; red and violet reaching the observer, Sun behind. (2)



Prism 1: splits (disperses) Prism 2 (inverted): recombines

Newton: the second identical prism, placed upside down, recombines the colours into white light.



Answer diagram – drawn for this question bank

⚠ Note: Figure checked in 31/2/1. 31/2/2 Q39 and 31/2/3 Q38 are the same question.

Q102 Case / Source-based · 4 marks ★★★ Board ×1 1 paper

Two students, A and B were performing an activity on refraction through glass slab and refraction through prism respectively. Student 'A' observed that the emergent light ray is parallel to the direction of incident ray, while student 'B' observed that the emergent ray is making a certain angle with respect to the direction of the incident ray in the prism, called angle of deviation. He also noted that the angle of deviation is different for different colours of light. (a) When white light passes through a glass slab, it does not show dispersion, while it shows dispersion when it passes through a glass prism. Why? (b) Why do we get spectrum when white light passes through tiny water droplets present in air? (c) (i) For a given pair of mediums, if we change the angle of incidence gradually, will it change the speed of light in that medium? Explain. OR (ii) Calculate the speed of light in a given medium if angle of incidence in air is 60° and angle of refraction in the medium is 30°. Speed of light in air is 3×10^8 m/s.

Source: CBSE 2026 31/7/1 (E7FDG), Q38 [F4 p.46]; CBSE 2026 31/7/2 (E7FDG), Q38 [F4 p.60]; CBSE 2026 31/7/3 (E7FDG), Q38 [F4 p.86]

✓ Answer

(a) In a slab the two refracting faces are parallel: colours that separate at the first face recombine at the second and emerge parallel, so no spectrum is seen. A prism has inclined faces, so colours separate further and emerge in different directions. (1)
(b) Water droplets act like tiny prisms – they refract and disperse sunlight (rainbow). (1)
(c)(i) No; speed of light depends only on the medium, not on the angle of incidence. (2)
OR (ii) $n = \sin 60°/\sin 30° = (\sqrt{3}/2)/(1/2) = \sqrt{3} = 1{\cdot}732$; $v = c/n = 3\times10^8/1{\cdot}732 \approx 1{\cdot}73 \times 10^8$ m/s. (2)

Q103 Case / Source-based · 4 marks ★★★ 1 paper

When white light is incident on one refracting surface of the prism, the light splits up into constituent colours violet, indigo, blue, green, yellow, orange and red. The process of splitting of white light into its seven constituent colours is called dispersion. When the dispersed white light is made to fall on a screen, we get the band of seven colours called the spectrum of white light. Red colour bends the least on passing through the prism and violet colour bends through maximum angle. (i) The splitting of white light can be done by (a) lens (b) prism (c) mirror (d) none of these (ii) Which property of light is used by prism to form a spectrum? (a) Reflection (b) Refraction (c) Dispersion (d) Scattering (iii) Identify the X and Y in the given diagram. (iv) The danger signs made red in colour, because (a) the red light can be seen from farthest distance (b) the scattering of red light is least (c) both (a) and (b) (d) none of these

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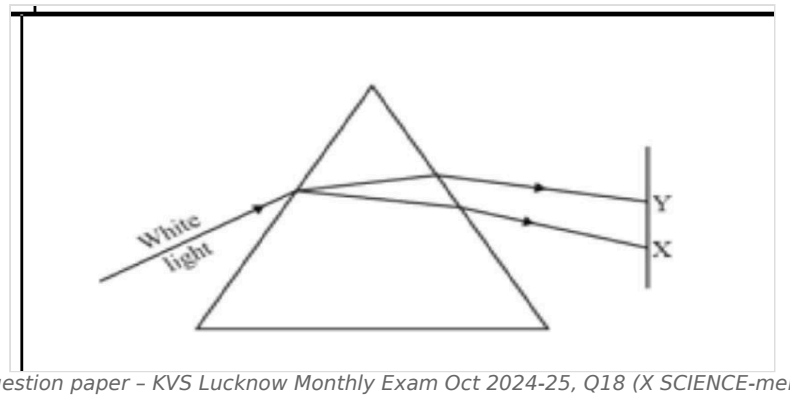


Figure from the question paper – KVS Lucknow Monthly Exam Oct 2024-25, Q18 (X SCIENCE-merged.pdf, PDF p.5)

Source: KVS Lucknow Monthly Exam Oct (2024-25), Q18 [FM p.5]

✔ Answer

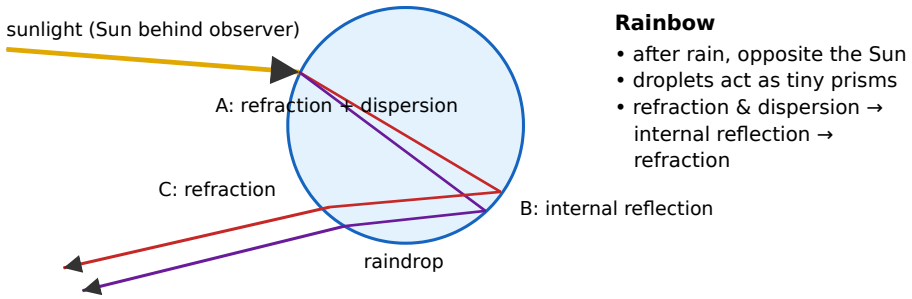
(i) (b) prism (1) (ii) (b) refraction – different colours are refracted (bent) by different amounts (1) (iii) Y (upper ray, bent least) = red; X (lower ray, bent most) = violet (1) (iv) (c) both (a) and (b) (1)

⚠ Note: For (ii) some keys give (c) dispersion; dispersion is the result, refraction is the property used.

C. Rainbow

6 questions · 24 papers · 13 board papers · NCERT 10.4 (rainbow) · Prepared by Abhishek Das, TGT (Science) – Science with Abhishek Sir

🔍 **Picture it**



Multiple Choice (1)

Q104 Multiple Choice · 1 mark ★★☆ Board ×2 5 papers

The Phenomena of light involved in the formation of a rainbow in the sky are

(A) Refraction, dispersion and reflection
(B) Refraction, dispersion and total internal reflection
(C) Dispersion, scattering and reflection
(D) Dispersion, refraction and internal reflection

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Source: CBSE 2024 31/3/1 (DAA1B/3), Q13 [F1 p.269]; CBSE 2024 31/3/2 (DAA1B/3), Q14 [F1 p.301] · CBSE 2023 31/6/2 (Z1XYW/6), Q13 [F9ocr p.11] · Vedantu Sample Paper Set 1, Q13 [F4 p.568] · KVS Delhi Pre-Board II (2024-25), Q12 [FM p.87] · Bangalore Sahodaya Pre-Board 1 (2025-26), Q31 [F5 p.552]

Also asked as:

- (2023 31/6/2) (a) Refraction, dispersion and scattering (b) Refraction, reflection and dispersion (c) Refraction, dispersion and internal reflection (d) Reflection, dispersion and total internal reflection — Ans (c)
- Correct sequential order for a primary rainbow: (a) Refraction, Internal reflection, Dispersion (b) Dispersion, Refraction, Internal reflection (c) Refraction, Dispersion, Internal reflection (d) Dispersion, Internal reflection, Refraction — Ans (c)

✓ Answer

(A) Refraction (with dispersion), internal reflection, refraction again – NCERT order.

⚠ Note: Vedantu key gives (a) 'Reflection, refraction and dispersion' for a version whose option (c) is 'Refraction, dispersion, and internal reflection' – corrected to (c).

Assertion–Reason (1)

Q105 Assertion–Reason · 1 mark ★☆☆ 1 paper

Assertion(A): A rainbow is sometimes seen in the sky in the rainy season only when the observer's back is towards the Sun. Reason(R): Internal reflection in the water droplets can cause scattering and final rays are in backward direction.

Source: Bangalore Sahodaya Pre-Board 1 (2024-25), Q19 [F5 p.5]

✓ Answer

(c) A is true, but R is false – the droplets disperse (not scatter) the light; internal reflection sends it back towards the observer.

Very Short Answer (2)

Q106 Very Short Answer · 2 marks ★★☆ Board ×3 4 papers

(a) When and where does a rainbow appear in the sky ? Draw a labelled ray diagram to show its formation.

Source: CBSE 2023 31/2/1 (Z1XYW/2), Q24(a) [F1 p.192]; CBSE 2023 31/2/2 (Z1XYW/2), Q21(a) [F1 p.217]; CBSE 2023 31/2/3 (Z1XYW/2), Q25(a) [F1 p.246] · CBSE 31/2/1, Series BRH/2 (SA-II era, yr?), Q10 [F5ocr p.45] · CBSE Suppl. 31/S Set 1 (no series, yr?), Q25(a) [F4 p.199]; CBSE Suppl. 31/S Set 2 (no series, yr?), Q24(a) [F4 p.255]; CBSE Suppl. 31/S Set 3 (no series, yr?), Q23(a) [F4 p.307] · Practice Paper D (F6), Q33 [F6 p.327]; Practice Paper D (F6, second copy), Q33 [F6 p.343]

Also asked as:

- Draw a ray diagram to show the formation of a rainbow in the sky. Mark on the diagram three points A, B and C: A – where dispersion of light occurs, B – where internal reflection of dispersed light occurs, C – where refraction of dispersed light occurs. (31/S)
- Draw a ray diagram to show the formation of a rainbow and mark the point where (i) dispersion, (ii) internal reflection occurs. (BRH/2)
- Write the conditions for observing a rainbow. Show, by drawing a suitable diagram, how one understands the formation of a rainbow. (practice paper)

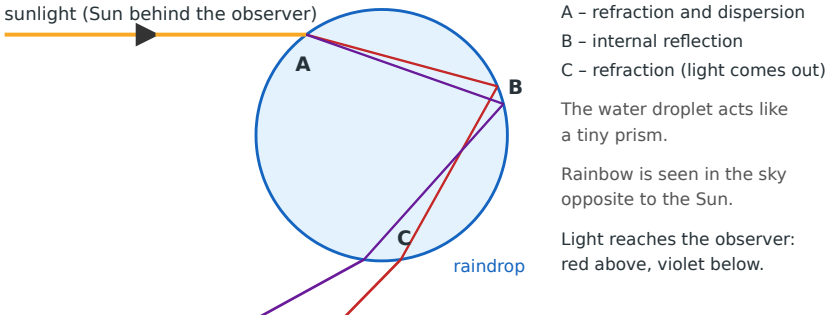
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✔ Answer

A rainbow appears after a rain shower, in the sky opposite to the Sun (observer's back towards the Sun). (1)

Labelled diagram of a raindrop: sunlight refracted and dispersed on entering, internally reflected, refracted again on leaving; red and violet rays reaching the observer. (1)



Answer diagram – drawn for this question bank

Q107 Very Short Answer · 2 marks ★★☆ Board ×1 3 papers

(b) What is a rainbow ? "We see a rainbow in the sky only after the rainfall." Why ?

Source: CBSE 2025 31/6/3 (GF6HE), Q23(b) [F4 p.15] · Vedantu Sample Paper Set 6, Q39 [F4 p.559] · Competency-based test items (chapter-wise booklet), Q11 [F4 p.772]

Also asked as:

- Why do we see a rainbow only in the morning or evening and not at noon? (Vedantu) — the Sun must be low and behind the observer; at noon the Sun is overhead, so the arc lies below the horizon.
- Mars's atmosphere has negligible water vapour. Explain why rainbow formation is impossible on Mars. — No water droplets to refract and disperse sunlight. (Competency)

✔ Answer

A rainbow is a natural spectrum of sunlight seen in the sky as an arc of seven colours. (1)

After rain, tiny water droplets remain in the air; they act like small prisms that refract, disperse and internally reflect sunlight. (1)

Short Answer (2)

Q108 Short Answer · 3 marks ★★★ Board ×4 8 papers

Explain the phenomenon of rainbow formation in the sky. Draw the labelled ray diagram in support of your explanation.

Source: CBSE 2026 31/4/1 (LN4MK), Q36 [F4 p.388]; CBSE 2026 31/4/3 (LN4MK), Q35 [F4 p.452] · CBSE 2026 31/8/1 (8DEFG), Q33(B) [F4 p.115]; CBSE 2026 31/8/2 (8DEFG), Q34(B) [F4 p.145]; CBSE 2026 31/8/3 (8DEFG), Q34(B) [F4 p.179] · CBSE 2023 31/4/3 (Z1XYW/4), Q33(B) [F1 p.446] · CBSE 2023 31/5/3 (Z1XYW/5), Q33 [F1 p.528] · KVS Lucknow First Pre-Board (2024-25), Q32(a) [FM p.32] · KVS Varanasi SA-II (2016-17), Q18(i) [F5 p.261] · KVS Varanasi SA-II (2014-15), Q18 [F5 p.277] · British Council assessment items (Science 10), 1(c) [F5 p.205]

Also asked as:

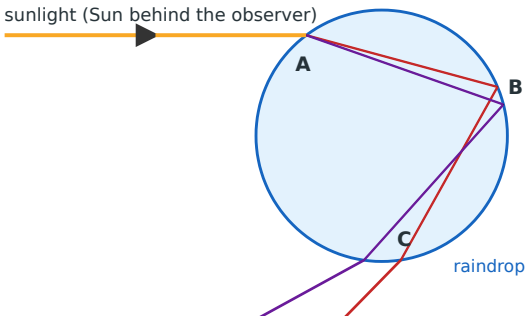
- With the help of a ray diagram, explain a phenomenon of formation of spectrum in nature. (2026 31/8)
- Draw a labelled diagram to show (i) dispersion of a beam of white light, and (ii) formation of a rainbow. (2023 31/5/3)
- (a) Name a phenomenon taking place in nature where light rays are dispersed. When, where and how does this phenomenon happen ? (VI E7FDG Q34(a))

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✓ Answer

A rainbow is a natural spectrum formed by tiny water droplets acting as small prisms. (1)
Sunlight is refracted and dispersed on entering a droplet, reflected internally at its back, and refracted again on coming out; the colours reach the observer's eye. (1)
Labelled diagram: Sun behind observer, raindrop, red and violet rays. (1)



A – refraction and dispersion
B – internal reflection
C – refraction (light comes out)

The water droplet acts like a tiny prism.

Rainbow is seen in the sky opposite to the Sun.

Light reaches the observer: red above, violet below.

Answer diagram – drawn for this question bank

Q109 Short Answer · 3 marks ★★☆ **Board ×3** 3 papers

(b) When and where does a rainbow appear in the sky ? Write sequence-wise the phenomena of light responsible for the formation of a rainbow. List two essential conditions for observing a rainbow.

Source: CBSE Suppl. VI 31(B)/S, Series CDBA/S (yr?), Q32(b) [F1 p.17] · CBSE VI 11-31(B) (yr?), Q28 [F9 p.139] · CBSE Suppl. 31/S/2 (EFGH/S, yr?), Q35(a) [F4 p.288]

Also asked as:

- When and where does a rainbow appear in the sky? List the phenomena of light in proper sequence... Why can a rainbow not be seen from the surface of the moon? (VI paper) — no atmosphere, no water droplets on the moon.
- LA part (EFGH/S 31/S/2): (i) When and where ... sequence ... labelled diagram (ii) two conditions; why not from the moon.

✓ Answer

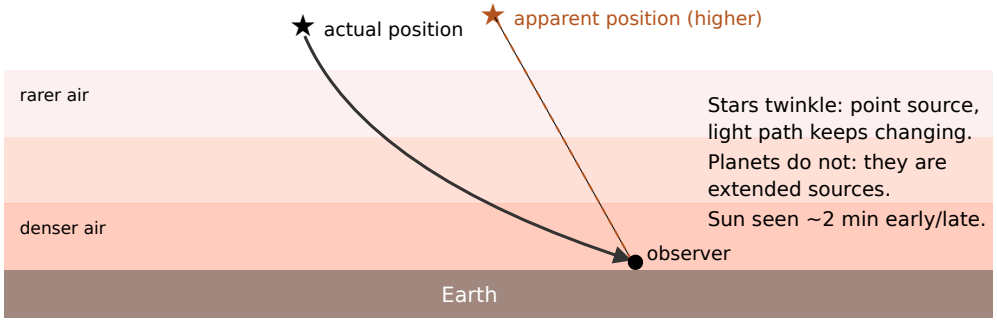
After rain, in the direction opposite to the Sun. (1)
Sequence: refraction and dispersion (entering the drop) → internal reflection → refraction (leaving the drop). (1)
Conditions: water droplets present in the air; the Sun must be behind the observer (and low in the sky). (1)

Theme 3 · Atmospheric Refraction and Scattering

A. Atmospheric refraction – twinkling of stars

9 questions · 16 papers · 4 board papers · NCERT 10.5 · Prepared by Abhishek Das, TGT (Science) – Science with Abhishek Sir

Picture it



Multiple Choice (2)

Q110 Multiple Choice · 1 mark ★★☆ 3 papers

The phenomenon of twinkling of stars is due to:

a). Dispersion
b). Tyndall effect
c). Atmospheric refraction
d). Reflection

Source: KVS Lucknow Pre-Board I (2023-24), Q13 [FM p.42]; KVS Lucknow Pre-Board I (2023-24), Q13 [F5 p.254] · PM SHRI KV Sitapur PT-1 (2024), Q5 [FM p.6] · KVS Lucknow Monthly Exam Oct (2024-25), Q6 [FM p.3]

Also asked as:
- The phenomenon due to which stars appear to twinkle is: a) Dispersion b) Refraction c) Diffraction d) Scattering — Ans b
- Why do stars appear to twinkle at night? (a) light travels in a different medium (b) distance varies as earth rotates (c) star changes position (d) the atmosphere refracts the light at different angles — Ans d

✓ Answer
c) Atmospheric refraction.

⚠ Note: FM p.42 and F5 p.254 are the same KVS Lucknow PB-I 2023-24 paper – counted once.

Q111 Multiple Choice · 1 mark ★☆☆ 1 paper

What causes atmospheric refraction?

a) Change in temperature.
b) Change in altitude.
c) Change in density of air.
d) Change in pressure

Source: PM SHRI KV Sitapur PT-2 (2024-25), Q10 [FM p.1]

✓ Answer
c) Change in (optical) density of air layers – air at different temperatures has different refractive index.

Assertion-Reason (1)

Q112 Assertion–Reason · 1 mark ★☆☆ 2 papers

Assertion (A): The stars twinkle while the planets do not. Reason (R): The stars are much bigger in size than the planets.

Source: KVS Lucknow Pre-Board (2025-26) A, Q32 [FM p.76] · Practice Paper G (F6), Q32 [F6 p.388]

✓ Answer
(c) A is true, but R is false. Stars twinkle because they are very far and act as point sources; planets are much closer and act as extended sources.

Very Short Answer (3)

Q113 Very Short Answer · 2 marks ★★☆ Board ×2 4 papers

Explain why the planets do not twinkle but the stars twinkle.

Source: CBSE 31/1/1, Series RHB/1 (SA-I, yr?), Q9 [F6ocr p.3] · KVS Lucknow Pre-Board 1 (2022-23), Q24 [FM p.17] · Practice Paper 2020-21, Q21 [F5 p.272] · CBSE 31/1/1, Series BRH/1 (SA-II era, yr?), Q11 [F5ocr p.5]

Also asked as:
- Why do stars twinkle in nights? Give reason. (Practice Paper 2020-21)
- A star sometimes appears brighter and some other times fainter. What is this effect called ? State the reason for this effect. (BRH/1) — twinkling, due to atmospheric refraction.

✔ Answer

Starlight passes through layers of air of changing optical density; the star is so far that it is a point source, so its apparent position and brightness keep changing – it twinkles. (1)

Planets are much closer and act as extended sources (many point sources); the changes from all points average out to zero, so planets do not twinkle. (1)

Q114 Very Short Answer · 2 marks ★☆☆ Board ×1 2 papers

A star appears slightly higher (above) than its actual position in the sky. Illustrate it with the help of a labelled diagram.

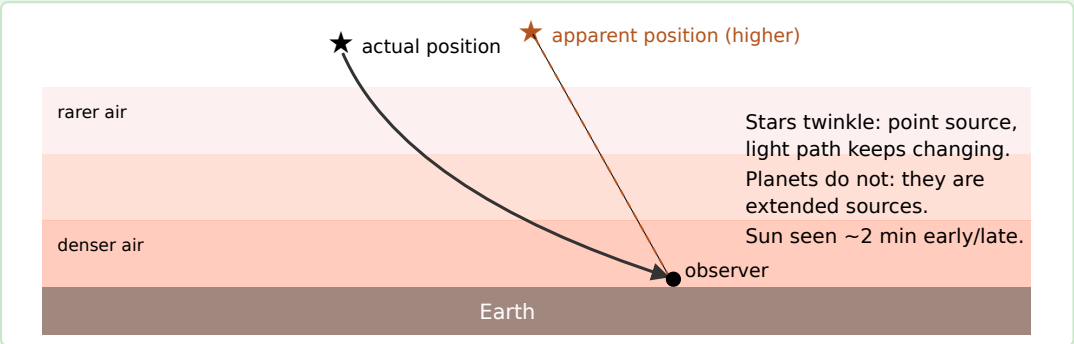
Source: CBSE 31/1, Series BRH (SA-II era, yr?), Q11 [F6ocr p.4] · Practice Paper R (F8), Q26 [F8 p.109]

Also asked as:
- Is the position of a star as seen by us its true position? Justify your answer. (practice paper)

✔ Answer

Starlight bends towards the normal as it enters denser layers of air nearer the Earth (atmospheric refraction). (1)

Diagram: actual position of star, curved path of light through layers, apparent position higher, observer on Earth. (1)



Answer diagram – drawn for this question bank

Q115 Very Short Answer · 2 marks ★☆☆ 1 paper

From the figure given above (actual and apparent position of the Sun, horizon, observer, Earth, atmosphere), explain the phenomena of advanced sunrise and delayed sunset.

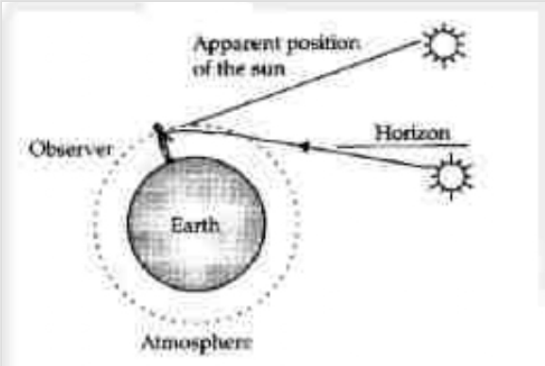


Figure from the question paper – Vedantu Sample Paper Set 1, Q25 OR

Source: Vedantu Sample Paper Set 1, Q25 OR [F4 p.572]

✓ Answer

Light from the Sun just below the horizon bends towards the Earth as it passes through denser layers of air, so the Sun appears above the horizon. (1)

Hence the Sun is seen about 2 minutes before actual sunrise and about 2 minutes after actual sunset. (1)

Short Answer (2)

Q116 Short Answer · 3 marks ★☆☆ Board ×1 1 paper

What is meant by atmospheric refraction of light ? Explain the following natural phenomenon by using the concept of atmospheric refraction : (a) Twinkling of stars (b) Flickering of objects seen through a turbulent stream of hot air

Source: CBSE 2026 31/7/1 (E7FDG), Q36 [F4 p.45]; CBSE 2026 31/7/2 (E7FDG), Q37 [F4 p.60]

✓ Answer

Bending of light as it passes through layers of the atmosphere of changing optical density. (1)

(a) Starlight is refracted continuously; the star, a point source, seems to change position and brightness – it twinkles. (1)

(b) Hot air above a fire is optically rarer than the cooler air; its refractive index keeps changing, so the apparent position of objects seen through it wavers (flickers). (1)

Q117 Short Answer · 3 marks ★☆☆ 1 paper

Tina was star gazing. She observed celestial objects P and Q. They were visible brightly in the night sky. She concluded that one was a star and the other was a planet. (a) What could she have observed to arrive at her conclusion? (b) If these celestial objects P and Q were to be observed from the moon, would Tina be able to distinguish them as a star and a planet? Why or why not?

Source: CBSE Competency Focused Practice Questions (CFPQ), Q111 [F6 p.59]

continued on next page ▸

▸ continued

✔ Answer
(a) One object was twinkling (the star) and the other was not (the planet). (1)
(b) No. The moon has no atmosphere, so there is no atmospheric refraction and the star would not twinkle either. (2)

Case / Source-based (1)

Q118 Case / Source-based · 4 marks ★★★ 1 paper

Atmospheric refraction is the phenomenon of bending of light on passing through earth's atmosphere. As we move above the surface of earth, density of air goes on decreasing. Local conditions like temperature etc. also affect the optical density of earth's atmosphere. On account of atmospheric refraction, stars seen appear higher than they actually are; advanced sunrise; delayed sunset, oval appearance of the sun at sunrise and sunset; stars twinkle, planets do not. Q.1 Due to atmospheric refraction, apparent length of the day (a) increases (b) decreases (c) remains the same (d) all of these Q.2 Apparent position of the star appears raised due to (a) atmospheric refraction (b) scattering of light (c) both (d) none Q.3 The sun appears oval shaped or flattened due to (a) dispersion (b) scattering (c) atmospheric refraction (d) cannot say Q.4 Twinkling of stars and non-twinkling of planets is accounted for by (a) scattering of light (b) dispersion of light (c) atmospheric refraction (d) none of these

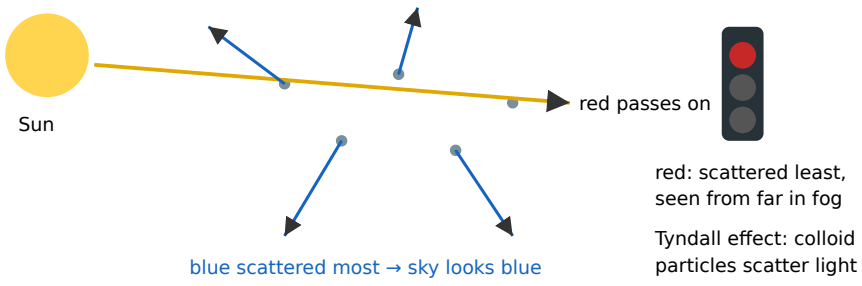
Source: KVS Lucknow Set-1 (yr?), Q37 [FM p.50]

✔ Answer
Q.1 (a) increases (by about 4 minutes) (1) Q.2 (a) atmospheric refraction (1) Q.3 (c) atmospheric refraction (1) Q.4 (c) atmospheric refraction (1)

B. Scattering of light – Tyndall effect, blue sky, red signals

21 questions · 28 papers · 15 board papers · NCERT 10.6 · Prepared by Abhishek Das, TGT (Science) – Science with Abhishek Sir

🔍 **Picture it**



Multiple Choice (8)

Q119 Multiple Choice · 1 mark ★★★ Board ×1 2 papers

The phenomenon responsible for making the smoke particles visible when a beam of sunlight enters a smoke filled room through a narrow hole is :

(A) scattering of light
(B) dispersion of light
(C) reflection of light
(D) internal reflection of light

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Source: CBSE 2025 31/1/3 (1GEFH), Q15 [F9 p.276] · KVS Lucknow First Pre-Board (2024-25), Q5 [FM p.29]

Also asked as:
- When light enters the atmosphere it strikes on extremely fine particles, which deflect the rays of light in all possible directions. This is due to – a) reflection b) atmospheric refraction c) scattering of light d) dispersion — Ans c

✔ Answer
(A) Scattering of light (Tyndall effect).

Q120 Multiple Choice · 1 mark ★☆☆ 2 papers

Choose the correct option from the below which explains the reason for us to perceive the day sky as blue.

(A) As sunlight passes through the atmosphere, shorter wavelengths, such as blue are scattered more than other colors.

(B) The sky appears blue because all colors are scattered equally, but blue light is stronger and more visible to the human eye.

(C) The blue colour of the sky is due to longer wavelengths like red and orange scattering more than shorter wavelengths, making blue stand out more.

(D) The atmosphere contains blue-coloured particles that give the sky its blue appearance.

Source: CBSE SQP 2025-26, Q31 [F6 p.235]; CBSE SQP 2025-26 (copy, + marking scheme), Q31 [F8 p.313]; PNCF copy of CBSE SQP 2025-26, Q31 [F5 p.292] · Vedantu Sample Paper Set 7, Q12 [F4 p.669]

Also asked as:
- Which phenomenon explains the blue colour of the sky? (a) Reflection (b) Refraction (c) Scattering (d) Dispersion — Ans c

✔ Answer
(A) Shorter wavelengths (blue) are scattered more by the fine particles of air.

⚠ Note: CBSE SQP 2025-26 (three copies) counted once.

Q121 Multiple Choice · 1 mark ★☆☆ Board ×1 1 paper

When a beam of white light passes through a region having very fine dust particles, the colour of light mainly scattered in that region is :

(A) Red (B) Orange
(C) Blue (D) Yellow

Source: CBSE 2024 31/4/1 (D4CBA/4), Q12 [F1 p.385]

✔ Answer
(C) Blue – very fine particles scatter mainly shorter wavelengths.

Q122 Multiple Choice · 1 mark ★☆☆ 1 paper

The danger signals installed at the top of tall buildings are red in colour. These can be easily seen from a distance because among all other colours, the red light

(a) is scattered the most by smoke or fog (b) is scattered the least by smoke or fog
(c) is absorbed the most by smoke or fog (d) moves fastest in air

Source: KVS Raipur 2nd Pre-Board (2025-26), Q3 [F5 p.298]; KVS Raipur 2nd Pre-Board (2025-26), Q3 [F5 p.304]

✔ Answer
(b) Red light is scattered the least by fog or smoke, so it is seen in the same colour from far.

⚠ Note: Two copies of the KVS Raipur paper – counted once.

Q123 Multiple Choice · 1 mark ★☆☆ 1 paper

Which of the following statement(s) is/are correct regarding scattering of light? i. Scattering is responsible for the bluish appearance of the sky. ii. Clouds having droplets of water scatter all wavelengths almost equally and so are generally white. iii. Advanced sunrise and delayed sunset are due to atmospheric reflection.

a) (i), (ii) and (iii)
b) Only (ii) and (iii)
c) Only (i) and (ii)
d) Only (iii)

Source: Practice Paper J (F6), Q30 [F6 p.435]

✔ Answer
c) Only (i) and (ii). Advanced sunrise/delayed sunset are due to atmospheric refraction.

Q124 Multiple Choice · 1 mark ★☆☆ 1 paper

Rohan lit an incense stick in his room and after an hour observed that when a beam of sunlight entered his room through a small gap in the window, he was able to see the path of the beam. Which of the following is most likely TRUE about the air present in the room?

(1) It is a pure substance.
(2) It is a compound.
(3) It is a solution.
(4) It is a colloid.

Source: Competency-based test items (chapter-wise booklet), Q6 [F4 p.771]

✔ Answer
(4) It is a colloid – the fine smoke particles scatter light (Tyndall effect).

Q125 Multiple Choice · 1 mark ★☆☆ 1 paper

What is the observed colour of sky as seen from the moon surface?

a) None of these
b) Black
c) Blue
d) Red

Source: Practice Paper F (F6), Q30 [F6 p.374]

✔ Answer
(b) Black – there is no atmosphere on the moon to scatter sunlight.

Q126 Multiple Choice · 1 mark ★☆☆ 1 paper

If the Earth did not have an atmosphere, which of the following shows what you would see if you looked at the Sun? (Note: You should never look at the Sun directly.)

A. Yellow colour (sky)
B. Red colour (sky)
C. Black colour (sky)
D. Blue colour (sky)

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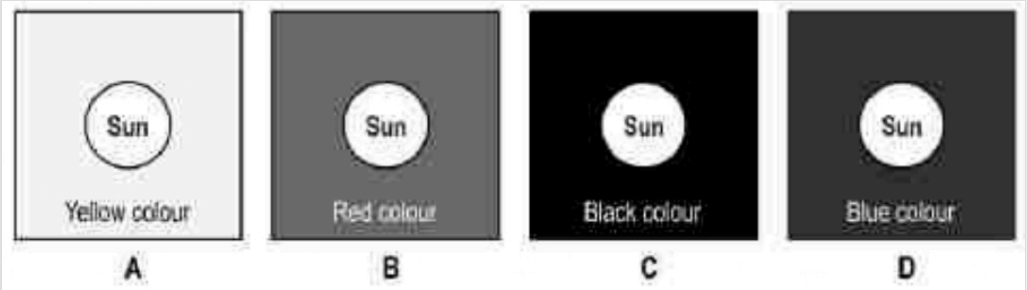


Figure from the question paper – Competency booklet, Human Eye Q1, page 92

Source: Competency-based test items (chapter-wise booklet), Q1 [F4 p.769]

✓ Answer

C – the Sun would look white against a BLACK sky, because without an atmosphere there is nothing to scatter sunlight (key: option 3).

Assertion–Reason (3)

Q127 Assertion–Reason · 1 mark ★★★ **Board ×1** 1 paper

Assertion (A): Red light signals are used to stop the vehicles on the road. Reason (R) : Red coloured light is scattered the most so as to be visible from a large distance.

Source: CBSE 2024 31/3/1 (DAA1B/3), Q19 [F1 p.273]; CBSE 2024 31/3/2 (DAA1B/3), Q18 [F1 p.305]; CBSE 2024 31/3/3 (DAA1B/3), Q17 [F1 p.337]

✓ Answer

(C) A is true, but R is false – red light is scattered the least by fog or smoke.

Q128 Assertion–Reason · 1 mark ★★★ **Board ×1** 1 paper

Assertion (A) : Due to scattering of sunlight, the clear sky predominantly appears blue. Reason (R) : The wavelength of blue light is nearly 1·8 times the wavelength of red light.

Source: CBSE Suppl. 31/S/1 (EFGH/S, yr?), Q20 [F4 p.222]; CBSE Suppl. 31/S/2 (EFGH/S, yr?), Q17 [F4 p.280]; CBSE Suppl. 31/S/3 (EFGH/S, yr?), Q19 [F4 p.334]

✓ Answer

(C) A is true, but R is false – the wavelength of red light is about 1·8 times that of blue light.

Q129 Assertion–Reason · 1 mark ★★★ 1 paper

Assertion (A): For making danger signals and signs that are at a distance, a colour with a longer wavelength is used. Reason (R): Colours with longer wavelengths travel faster than the other colours.

Source: CBSE Competency Focused Practice Questions (CFPQ), Q145 [F6 p.78]

✓ Answer

(C) A is true, but R is false. All colours travel at the same speed in air; red is used because it is scattered the least.

⚠ Note: CFPQ key gives (B). Corrected to (C): R is not a true statement for air.

Very Short Answer (7)

Q130 Very Short Answer · 2 marks ★★☆ Board ×2 4 papers

(b) What is scattering of light ? Why does the clear sky appear blue ?

Source: CBSE 2023 31/2/1 (Z1XYW/2), Q24(b) [F1 p.192]; CBSE 2023 31/2/2 (Z1XYW/2), Q21(b) [F1 p.217]; CBSE 2023 31/2/3 (Z1XYW/2), Q25(b) [F1 p.246] · CBSE 31/1 (SA era, values-based, yr?), Q17 [F9 p.155] · CBSE Competency Focused Practice Questions (CFPQ), Q109 [F6 p.59] · Practice Paper 2020-21, Q12 [F5 p.269]

Also asked as:
- What is meant by scattering of light ? Use this phenomenon to explain why the clear sky appears blue [or the sun appears reddish at sunrise]. (old board 31/1 – sunrise part out of syllabus)
- Ria: The sky appears blue as the blue light scatters the most. Lipa: The sky is blue because it reflects the blue of the seas and oceans. Who is correct? Justify. (CFPQ) — Ria.

✓ Answer

Scattering: the spreading of light in different directions when it strikes very fine particles. (1)

The molecules of air and other fine particles are smaller than the wavelength of visible light; they scatter blue (shorter wavelength) light much more than red. This scattered blue light enters our eyes. (1)

Q131 Very Short Answer · 2 marks ★★☆ Board ×2 4 papers

(b) "The colour of the clear sky from the earth appears blue but the sky appears dark to the passengers flying at very high altitudes." Explain.

Source: CBSE Suppl. VI 31(B)/S, Series CDBA/S (yr?), Q25(b) [F1 p.13] · CBSE 2023 31/4/1 (Z1XYW/4), Q25(B) [F1 p.367]; CBSE 2023 31/4/3 (Z1XYW/4), Q26(B) [F1 p.442] · KVS Lucknow First Pre-Board (2024-25), Q32(b) [FM p.32] · KVS Varanasi SA-II (2016-17), Q18(ii) [F5 p.261]

Also asked as:
- The colour of clear sky from the earth appears blue but from the space it appears black. Why ? (2023 31/4)
- Why does the sky appear dark instead of blue to an astronaut?

✓ Answer

Near the Earth, air molecules scatter blue light (shorter wavelength) most, and this scattered light reaches our eyes, so the sky looks blue. (1)

At very high altitudes there is hardly any air to scatter sunlight, so no scattered light reaches the eye and the sky looks dark. (1)

Q132 Very Short Answer · 2 marks ★☆☆ Board ×1 2 papers

(a) Give reasons : (i) The sky appears dark to passengers flying at very high altitude. (ii) 'Danger' signal lights are red in colour.

Source: CBSE 2025 31/6/3 (GF6HE), Q23(a) [F4 p.15] · Practice Paper H (F6), Q33 [F6 p.405]

Also asked as:
- State reasons: a. Our eye is more sensitive to yellow colour but even then danger signals are red in colour. b. Violet colour is seen at the bottom of the spectrum. (practice paper)

✓ Answer

(i) At such heights there is almost no atmosphere, so sunlight is not scattered – the sky looks dark. (1)

(ii) Red light has the longest wavelength and is scattered the least by fog or smoke, so it can be seen in the same colour from a distance. (1)

Q133 Very Short Answer · 1 mark ★☆☆ Board ×1 1 paper

What is Tyndall effect ?

Source: CBSE 31/1/1, Series RHB/1 (SA-I, yr?), Q2 [F6ocr p.3]; CBSE 31/1, Series RHB (SA era, yr?), Q2 [F6 p.193]

Also asked as:
- Give an example of a phenomenon where Tyndall effect can be observed. — A beam of sunlight entering a smoke-filled room through a small hole; sunlight passing through a canopy of a dense forest. (RHB)

✓ Answer

The phenomenon of scattering of light by the colloidal particles, which makes the path of a beam of light visible. (1)

Q134 Very Short Answer · 2 marks ★☆☆ 1 paper

Nanda saw rays of sunlight entering into a dark room. He then did something to the air in the room after which he was NOT able to see the rays of sunlight in the room. What is it that Nanda could have done to make the rays of sunlight invisible? Justify your answer.



Figure from the question paper – Competency booklet, Human Eye Q10, page 95

Source: Competency-based test items (chapter-wise booklet), Q10 [F4 p.772]

✓ Answer

He removed the dust/smoke particles from the air (e.g. by passing the air through a very fine filter). (1)

Without these particles there is no scattering of light (Tyndall effect), so the path of the rays is not seen. (1)

Q135 Very Short Answer · 2 marks ★☆☆ 1 paper

Space is mostly vacuum, devoid of any medium. (a) What colour does the Sun appear to the astronauts on International Space Station? (b) Give reason for your answer to (a).

Source: Competency-based test items (chapter-wise booklet), Q12 [F4 p.772]

✓ Answer

(a) White. (1)

(b) There is no medium to scatter (or disperse) sunlight, so all colours reach the eye together. (1)

Q136 Very Short Answer · 2 marks ★☆☆ 1 paper

While walking along the riverbank, Trupti found a smooth, milky white stone. When a ray of sunlight fell upon it, she observed that the stone appeared bluish in colour and the light that passed through it appeared orange in colour. (a) Identify the phenomenon that Trupti observed. (b) How would the size of the stone particles compare with the wavelength of visible light?

Source: CBSE Competency Focused Practice Questions (CFPQ), Q154 [F6 p.81]

✓ Answer

(a) Scattering of light. (1)

(b) The particles are smaller than the wavelength of visible light, so they scatter blue light more; the light passing through loses blue and looks orange. (1)

Short Answer (3)

Q137 Short Answer · 3 marks ★★★ Board ×4 6 papers

Name and explain the phenomenon of light due to which the path of a beam of light becomes visible when it enters a smoke filled room through a small hole. Also state the dependence of colour of the light we receive on the size of the particle of the medium through which the beam of light passes.

Source: CBSE 2024 31/3/1 (DAA1B/3), Q31 [F1 p.279]; CBSE 2024 31/3/2 (DAA1B/3), Q32 [F1 p.311]; CBSE 2024 31/3/3 (DAA1B/3), Q33 [F1 p.345] · CBSE Suppl. 31/S/1 (EFGH/S, yr?), Q35(b)(i) [F4 p.232]; CBSE Suppl. 31/S/3 (EFGH/S, yr?), Q35(b)(i) [F4 p.342] · CBSE 2026 VI 31(B), Series LMNK2, Q35 [F1 p.77] · CBSE 2026 31/8/1 (8DEFG), Q33(A) [F4 p.115]; CBSE 2026 31/8/2 (8DEFG), Q34(A) [F4 p.145]; CBSE 2026 31/8/3 (8DEFG), Q34(A) [F4 p.179] · PM SHRI KV Sitapur PT-2 (2024-25), Q19 [FM p.2] · KVS Varanasi SA-II (2014-15), Q12 [F5 p.277]

Also asked as:

- (a) Explain the Tyndall effect with the help of one suitable example. (b) What happens when white light gets scattered from (i) very fine particles (ii) larger size particles? (2026 VI LMNK2)
- (A) What is meant by scattering of light? How do our observations differ when white light (sun light) is scattered from (i) very fine particles of the medium and (ii) very large particles of the medium? (2026 31/8)
- What is scaterring of light and Tyndall effect? (KV Sitapur PT-2)
- Define Tyndall effect and give reasons for the following: a. The colour of sky is blue. b. Danger signals are made of red colour. (KVS Varanasi)

✓ Answer

Tyndall effect – scattering of light by colloidal particles. (1)

The fine smoke particles scatter the light in all directions; this scattered light reaches our eyes and the path becomes visible. (1)

Very fine particles scatter mainly blue light; larger particles scatter longer wavelengths too; very large particles scatter all colours, so the light looks white. (1)

Q138 Short Answer · 3 marks ★☆☆ Board ×2 2 papers

What is scattering of light ? How is scattering of light different from reflection of light ? Explain.

Source: CBSE 2026 31/2/1, Q36 [F9 p.333]; CBSE 2026 31/2/2, Q37 [F9 p.405]; CBSE 2026 31/2/3, Q36 [F9 p.473] · CBSE 2026 31/7/3 (E7FDG), Q36 [F4 p.86]

Also asked as:

- (a) What is meant by Tyndall effect? (b) How is scattering of light different from reflection of light? (c) What will happen if white light (sunlight) is scattered from (i) very small particles of medium, and (ii) very large particles of medium? (2026 31/7/3)

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✔ Answer

Scattering: when light strikes very fine particles (molecules, dust, smoke), it is sent out in all directions. (1)

Reflection: light falling on a smooth surface returns in one definite direction obeying the laws of reflection. (1)

Scattering depends on the size of the particle compared with the wavelength (fine particles scatter blue more); reflection happens at a surface and does not depend on wavelength in this way. (1)

Q139 Short Answer · 3 marks ★★★ Board ×1 1 paper

Give reasons for the following : (a) Danger signals installed at airports and at the top of tall buildings are of red colour. (b) The sky appears dark to the passengers flying at very high altitudes. (c) The path of a beam of light passing through a colloidal solution is visible.

Source: CBSE 2023 31/1/1 (Z1XYW/1), Q31 [F1 p.104]

✔ Answer

(a) Red light is scattered the least by fog or smoke, so it is seen in the same colour from far. (1)

(b) At very high altitude there is almost no air to scatter sunlight. (1)

(c) Colloidal particles scatter light (Tyndall effect); the scattered light reaches our eyes. (1)

Science with Abhishek Sir

Summary – questions by sub-theme and type

Sub-theme	MCQ	A–R	VSA	SA	LA	Case	Total	Appearances
A. Parts of the human eye	12	2	4	2			**20**	31
B. Power of accommodation	7		5	3			**15**	31
C. Myopia (near-sightedness)	1	3	4	5			**13**	46
D. Hypermetropia (far-sightedness)	2		2	5	1		**10**	26
E. Presbyopia, bifocal lens and cataract	4		2	3	1		**10**	32
F. Lens power and the defect (numericals)	1		2	4	2		**9**	15
A. Refraction of light through a prism	4	1	2	1			**8**	19
B. Dispersion of white light and recombination	8		5	2		3	**18**	45
C. Rainbow	1	1	2	2			**6**	33
A. Atmospheric refraction – twinkling of stars	2	1	3	2		1	**9**	18
B. Scattering of light – Tyndall effect, blue sky, red signals	8	3	7	3			**21**	54
Total	**50**	**11**	**38**	**32**	**4**	**4**	**139**	**350**

Top 10 – revise these first

#	Q	Question	Type · marks	Papers	Board
1	Q44	State reasons for Myopia. With the help of ray diagrams, show the (a) image formation by a myopic eye, and (b) correction of myopia using an appropria…	SA · 3	8	5
2	Q108	Explain the phenomenon of rainbow formation in the sky. Draw the labelled ray diagram in support of your explanation.	SA · 3	8	4
3	Q53	A person cannot read newspaper placed nearer than 50 cm from his eyes. Name the defect of vision he is suffering from. Draw a ray diagram to illustrat…	SA · 3	6	5
4	Q94	(a) Name the phenomenon due to which a prism splits the incident white light into a band of colours. State the reason of the phenomenon also.	VSA · 2	6	4
5	Q137	Name and explain the phenomenon of light due to which the path of a beam of light becomes visible when it enters a smoke filled room through a small h…	SA · 3	6	4
6	Q104	The Phenomena of light involved in the formation of a rainbow in the sky are	MCQ · 1	5	2
7	Q40	Observe the following diagram and answer the questions following it : (i) Identify the defect of vision shown. (ii) List its two causes. (iii) Name th…	VSA · 2	5	1
8	Q33	Define the term power of accommodation of human eye. What happens to the image distance in the eye when we increase the distance of an object from the…	SA · 3	4	4
9	Q45	A person cannot see distinctly the object placed beyond 5 m from his eyes. Name the defect of vision the person is suffering from. Draw a ray diagram …	SA · 3	4	3
10	Q106	(a) When and where does a rainbow appear in the sky ? Draw a labelled ray diagram to show its formation.	VSA · 2	4	3

CHAPTER



Electricity

Unit IV: Effects of Current · Section C · Physics

82	302	237
papers with this chapter	times the questions came	questions in this chapter

WHAT IS INSIDE

- Electric Current, Potential Difference and Ohm's Law
- Resistance and Combination of Resistors
- Heating Effect, Electric Power and Energy

Starts with its own cover, concept map and Must-do top 20 · 63 pages

Science with Abhishek Sir

Chapter 11 · Electricity

Class 10 Science (NCERT 2026-27 numbering; old Chapter 12) · Previous-year and practice paper questions, clubbed and answered

Prepared by Abhishek Das, TGT (Science)

98	82	302	237
papers and item banks gone through	papers with an Electricity question	question appearances found	unique questions, grouped into 108 ideas

What I went through

Kind of paper	Gone through	With Electricity questions
CBSE board papers	24	19
CBSE board papers (visually impaired)	6	6
CBSE sample question papers	2	2
KVS pre-boards and tests	23	13
Other practice and sample papers	38	38
CBSE competency / item banks	5	4
Total	**98**	**82**

Sets of one exam (e.g. 31/1/1, 31/1/2, 31/1/3) are counted as one paper. Duplicate copies and answer keys are not counted.

How to read a question box

Q B2-1 · the idea tested · ★★★ · Board ×2 · 13 papers · 8 questions

SA · 3 marks
Question in the words of the paper, with options and the real figure.

Source: the papers it came in, with question numbers.

✔ **Answer** – NCERT wording, value points with marks.

⚠ **Note** – a common mistake or a wrong key in some papers.

More questions on this idea – the same idea asked in other papers, each with its source and answer (B2-1.1, B2-1.2 …).

Stars (how often the idea was asked):
★★★ = 6 or more papers
★★ = 3 – 5 papers
★ = 1 – 2 papers

Board ×n = asked in n CBSE board papers

Header colour = type: MCQ · A–R · VSA · SA · LA · Case
Box border = theme: A green · B blue · C orange

Concept map · what the papers ask

Theme A · Electric Current, Potential Difference and Ohm's Law (NCERT 11.1 - 11.4)

A1 · Electric current and charge

5 questions · 3 ideas · 8 papers · 0 board

Most asked: Q = It and number of electrons (4 papers) ★★

A2 · Potential difference and volt

5 questions · 3 ideas · 5 papers · 4 board

Most asked: Work done to move a charge, W = QV (2 papers) ★

A3 · Circuit diagram, symbols, ammeter and voltmeter

19 questions · 9 ideas · 15 papers · 4 board

Most asked: Ammeter in series, voltmeter in parallel (6 papers) ★★★

A4 · Ohm's law and V-I graph

21 questions · 11 ideas · 21 papers · 7 board

Most asked: R from a V-I table or the slope of the graph (5 papers) ★★

Theme B · Resistance and Combination of Resistors (NCERT 11.5 - 11.6)

B1 · Factors on which resistance depends; resistivity

44 questions · 17 ideas · 38 papers · 17 board

Most asked: Compare wires: R increases with length, decreases with area (7 papers) ★★★

B2 · Resistors in series

16 questions · 5 ideas · 23 papers · 4 board

Most asked: Series circuit: total R, current and pd across each (13 papers) ★★★

B3 · Resistors in parallel

22 questions · 11 ideas · 25 papers · 7 board

Most asked: Parallel circuit: Rp, branch currents and total current (13 papers) ★★★

B4 · Mixed networks and circuit-based cases

34 questions · 19 ideas · 34 papers · 12 board

Most asked: R in series with a parallel pair (10 papers) ★★★

Theme C · Heating Effect, Electric Power and Energy (NCERT 11.7 - 11.8)

C1 · Heating effect of current and Joule's law

17 questions · 9 ideas · 21 papers · 9 board

Most asked: Heating effect; derive H = I²Rt (7 papers) ★★★

C2 · Electric power

27 questions · 11 ideas · 24 papers · 9 board

Most asked: From the rating: I = P/V and R = V²/P (9 papers) ★★★

C3 · Electrical energy, kWh and electricity bill

14 questions · 4 ideas · 19 papers · 6 board

Most asked: Energy in kWh and electricity bill (11 papers) ★★★

C4 · Power rating, current drawn and fuse rating

13 questions · 6 ideas · 13 papers · 8 board

Most asked: Fuse rating from I = P/V (8 papers) ★★★

Must-do top 20

The ideas that came in the most papers. Do these first – each box also has more questions on the same idea.

#	Q no.	Idea / question	Qs	Papers	Board	Stars
1	**B3-1**	Parallel circuit: Rp, branch currents and total current	9	13	3	★★★
2	**B2-1**	Series circuit: total R, current and pd across each	8	13	2	★★★
3	**C3-1**	Energy in kWh and electricity bill	7	11	3	★★★
4	**B4-1**	R in series with a parallel pair	5	10	2	★★★
5	**C2-1**	From the rating: I = P/V and R = V^2/P	8	9	3	★★★
6	**C4-1**	Fuse rating from I = P/V	7	8	8	★★★
7	**B1-1**	Compare wires: R increases with length, decreases with area	6	7	5	★★★
8	**C1-1**	Heating effect; derive H = I^2Rt	4	7	3	★★★
9	**B1-2**	Find the length of a wire	4	6	2	★★★
10	**B4-2**	Parallel arms with resistors in series	4	6	1	★★★
11	**A3-1**	Ammeter in series, voltmeter in parallel	6	6	1	★★★
12	**B1-3**	New resistance when length or area changes	5	6	–	★★★
13	**B4-3**	Arrange given resistors to get a required value	5	5	4	★★
14	**C2-2**	Power in series vs parallel	5	5	3	★★
15	**B4-4**	Series chain with a parallel pair	3	5	2	★★
16	**A4-1**	R from a V-I table or the slope of the graph	4	5	2	★★
17	**B2-2**	What stays the same in series and in parallel	3	5	1	★★
18	**B1-5**	Find resistivity from R, l and A	4	4	2	★★
19	**C3-2**	kWh and joule	3	4	2	★★
20	**B1-4**	Alloys and nichrome in heating devices	4	4	2	★★

Theme map · questions by type

Sub-theme	MCQ	A-R	VSA	SA	LA	Case	Total	Papers	Board
A1 Electric current and charge	1		2		1	1	5	8	0
A2 Potential difference and volt	1		1	2		1	5	5	4
A3 Circuit diagram, symbols, ammeter and voltmeter	10		7	1		1	19	15	4
A4 Ohm's law and V-I graph	4	1	5	3	4	4	21	21	7
B1 Factors on which resistance depends; resistivity	14	2	8	11	6	3	44	38	17
B2 Resistors in series	8		1	5	1	1	16	23	4
B3 Resistors in parallel	3		6	5	4	4	22	25	7
B4 Mixed networks and circuit-based cases	6		4	10	11	3	34	34	12
C1 Heating effect of current and Joule's law	6		4	2	2	3	17	21	9
C2 Electric power	5		7	5	6	4	27	24	9
C3 Electrical energy, kWh and electricity bill		1		7	5	1	14	19	6
C4 Power rating, current drawn and fuse rating	4		4	4		1	13	13	8
Total	**62**	**4**	**49**	**55**	**40**	**27**	**237**	**82**	**25**

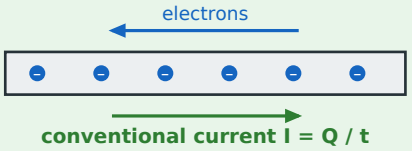
Theme A · Electric Current, Potential Difference and Ohm's Law

NCERT 11.1 - 11.4 · Prepared by Abhishek Das, TGT (Science)

A1 · Electric current and charge

5 questions · 3 ideas · 8 papers
Prepared by Abhishek Das, TGT (Science)

Picture it
Electric current is the rate of flow of charge: I = Q/t. 1 ampere = 1 coulomb per second. 1 C is the charge of about 6 x 10^{18} electrons (e = 1.6 x 10^{-19} C). Conventional current flows opposite to the flow of electrons.



Q A1-1 · Q = It and number of electrons · ★★ · 4 papers · 3 questions

LA · 5 marks
(a) What is an electric circuit?
(b) Calculate the number of electrons that flow per second to constitute a current of one ampere. (Charge on an electron = 1.6 × 10^{-19} C)
(c) Draw an electric circuit for studying Ohm's law. Label the circuit components used to measure electric current and potential difference.
OR
A heater connected to a 230 V source draws 5.5 A current. Calculate (i) the electric power of the heater, (ii) the resistance of the heater, (iii) the cost of operating this heater for 20 hours if one unit costs Rs 4.

Source: Practice Paper 2024-25 (14) Q36 · Practice Paper 2024-25 (15) Q36

✔ **Answer** (a) A continuous and closed path of an electric current is called an electric circuit. (1)
(b) Q = It = 1 A × 1 s = 1 C; n = Q/e = 1/(1.6 × 10^{-19} = 6.25 × 10^{18} electrons (2)
(c) Diagram: cell/battery, plug key, ammeter in series, resistor (nichrome wire XY), rheostat in series, voltmeter in parallel across the resistor; ammeter and voltmeter labelled. (2)
OR (i) P = VI = 230 × 5.5 = 1265 W (2)
(ii) R = V/I = 230/5.5 = 41.8 Ω (1½)
(iii) Energy = 1.265 kW × 20 h = 25.3 kWh; cost = 25.3 × 4 = Rs 101.20 (1½)

More questions on this idea (2) – same method, other papers

A1-1.1 · VSA · 1 mark · CBSE Curriculum Aligned Competency Based Test Items Q5
A current of 1 A flows through an electric bulb for 5 minutes. What is the amount of electric charge that flows through the bulb? Show your calculation.
✔ Given: I = 1 A, t = 5 min = 300 s (½)
Q = I × t = 1 A × 300 s = 300 C (½)

A1-1.2 · VSA · 2 marks · KVS Ahmedabad Region paper (Set B) (2025-26) Q34
A current of 10 A flows through a conductor for two minutes.
(i) Calculate the amount of charge passing through the conductor.
(ii) If the charge of an electron is 1.6 × 10^{-19} C, calculate the total number of electrons flowing through the conductor.
✔ (i) Q = It = 10 A × 120 s = 1200 C (1)
(ii) n = Q/e = 1200/(1.6 × 10^{-19} = 7.5 × 10^{21} electrons (1)

Q A1-2 · ★★ · 3 papers

MCQ · 1 mark

Match the column I with column II and select the correct option from the codes given.
Column I: (a) Electric current (b) emf (c) Resistance (d) Resistivity
Column II: (i) volt (ii) ohm (iii) ohm-metre (iv) ampere

a) (a) – (iii), (b) – (i), (c) – (ii), (d) – (iv)
b) (a) – (iv), (b) – (ii), (c) – (i), (d) – (iii)
c) (a) – (iv), (b) – (i), (c) – (ii), (d) – (iii)
d) (a) – (iii), (b) – (iv), (c) – (i), (d) – (ii)

Source: Vedantu Sample Paper Set 3 (2026-27) Q14 · Vedantu Sample Paper Set 5 (2026-27) Q16 · Practice Paper 2024-25 (7) Q14

✔ **Answer** c) (a) – (iv), (b) – (i), (c) – (ii), (d) – (iii)

Q A1-3 · ★ · 1 paper

Case · 4 marks

Read the passage and answer: Electric current is defined by the amount of charge flowing through a particular area in unit time. In other words, it is the rate of flow of electric charges. In circuits using metallic wires, electrons constitute the flow of charges. Conventionally, the direction of electric current is taken as opposite to the direction of the flow of electrons.
(i) If a net charge Q flows across any cross-section of a conductor in time t, then the current I through the cross-section is given by which formula? (1)
(ii) What is the SI unit of electric charge? It is equivalent to how many electrons? (1)
(iii) In which unit is electric current expressed? Define the unit. (2)
OR
(iii) If the amount of charge passing through a cell in 4 seconds is 12 C, find the current supplied by the cell. (2)

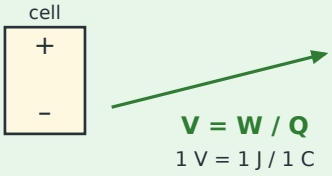
Source: Practice Paper 2025-26 (I) Q38

✔ **Answer** (i) I = Q/t (1)
(ii) Coulomb (C); 1 C is nearly equal to the charge of 6×10^{18} electrons. (½ + ½)
(iii) Ampere (A) (1). One ampere is the flow of one coulomb of charge per second, 1 A = 1 C/1 s. (1)
OR (iii) I = Q/t = 12 C/4 s = 3 A (2)

A2 · Potential difference and volt

5 questions · 3 ideas · 5 papers
Prepared by Abhishek Das, TGT (Science)

Picture it
Potential difference V = W/Q (work done per unit charge). 1 volt = 1 joule per coulomb. A cell or battery keeps up the potential difference that makes charges flow.



Q A2-1 · Work done to move a charge, W = QV · ★ · Board ×2 · 2 papers · 2 questions

VSA · 2 marks

(a) Define volt, the unit of potential difference.
(b) Calculate the work done required to move an electron between two points A and B located at a potential difference of 100 V in an electric field.

Source: CBSE 31/4/1 (2026) Q34 · CBSE 31/4/3 (2026) Q34

✔ **Answer** (a) One volt is the potential difference between two points when 1 J of work is done to move a charge of 1 C from one point to the other. (1)
(b) $W = QV = 1.6 \times 10^{-19}$ C × 100 V = 1.6×10^{-17} J (1)

Q A2-1 · Work done to move a charge, W = QV · ★ · Board ×2 · 2 papers · 2 questions

More questions on this idea (1) – same method, other papers

A2-1.1 · MCQ · 1 mark · CBSE 31(B) (VI) Series LMNK2 (2026) Q30

Work done in displacing an electron between two points having potential difference of 1 V is:
(A) -1.6×10^{-19} C (B) -1.6×10^{-19} J (C) $+1.6 \times 10^{-19}$ J (D) -1.6×10^{-19} V

✔ (B) -1.6×10^{-19} J

[W = QV; for an electron Q = -1.6×10^{-19} C, so W = -1.6×10^{-19} C × 1 V = -1.6×10^{-19} J. Option A and D have wrong units.]

⚠ Options A and D have the wrong units. Between B and C the sign depends on direction; with Q of an electron taken as negative, W = QV gives option B.

Q A2-2 · Define 1 volt; circuit and symbols · ★ · Board ×2 · 2 papers · 2 questions

SA · 3 marks

(a) Explain the statement "Potential difference between two points is 1 volt".
(b) What do the symbols given below represent in an electric circuit? Write one function of each.



Figure from the question paper

Source: CBSE 31/6/3 (GF6HE) (2025) Q33

✔ **Answer** (a) The potential difference between two points is 1 volt if 1 joule of work is done to move a charge of 1 coulomb from one point to the other. 1 V = 1 J/1 C. (1)
(b) (i) Ammeter – measures the electric current in a circuit (connected in series). (1)
(ii) Variable resistance (rheostat) – changes/regulates the current in the circuit. (1)

More questions on this idea (1) – same method, other papers

A2-2.1 · SA · 3 marks · CBSE 31/1/3 (1GEFH) (2025) Q27

(a) Define one volt potential difference between two points in an electric field.
(b) Draw a schematic diagram of an electric circuit of a cell of 1.5 V, 5 Ω and 10 Ω resistors and a plug key, all connected in series. Calculate the current drawn from the cell when the key is closed.

✔ (a) 1 V = 1 J of work done to move 1 C of charge between the two points. (1)
(b) Diagram: cell, plug key, 5 Ω and 10 Ω in series. (1)
R = 5 + 10 = 15 Ω; I = V/R = 1.5/15 = 0.1 A (1)

Q A2-3 · ★ · 1 paper

Case · 4 marks

The rate of flow of charge is called electric current. The SI unit of electric current is ampere (A). The amount of work done in bringing a unit positive charge from one point to another point in an electric field is defined as potential difference, V = W/q. The SI unit of potential difference is volt.
(i) Write the formula of voltage in terms of work done, current and time. (1)
(ii) What is the number of electrons flowing per second in a conductor if 1 A current is passing through it? (1)
(iii) What would be the potential difference between the two terminals of a battery, if 100 joules of work is required to transfer 20 coulombs of charge from one terminal to the other? (2)
OR
(iii) 2 C of charge flows through a conductor in 100 ms. Find the current. (2)

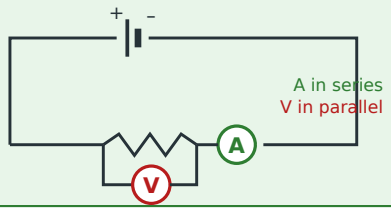
Source: Practice Paper 2025-26 (F) Q38

✔ **Answer** (i) V = W/q = W/(It) (1)
(ii) q = 1 C in 1 s; n = 1/(1.6×10^{-19}) = 6.25×10^{18} electrons (1)
(iii) V = W/q = 100 J/20 C = 5 V (2)
OR (iii) I = q/t = 2 C/0.1 s = 20 A (2)

A3 · Circuit diagram, symbols, ammeter and voltmeter

19 questions · 9 ideas · 15 papers
Prepared by Abhishek Das, TGT (Science)

Picture it
Ammeter: low resistance, always in SERIES. Voltmeter: high resistance, always in PARALLEL across the part. Rheostat (variable resistance) changes the current. Learn the symbols: cell, battery, plug key, wire joint, bulb, resistor, rheostat, ammeter, voltmeter.



Q A3-1 · Ammeter in series, voltmeter in parallel · ★★★ · Board ×1 · 6 papers · 6 questions

MCQ · 1 mark
For verifying Ohm's law, we design an electric circuit diagram in which we show the arrangement of different circuit components. We find that with respect to the resistor, the:
(a) ammeter is connected in parallel and the voltmeter in series.
(b) ammeter is connected in series and the voltmeter in parallel.
(c) ammeter and voltmeter are both connected in series.
(d) ammeter and voltmeter are both connected in parallel.

Source: CBSE 31/2/1 (Z1XYW/2) (2023) Q14 · CBSE 31/2/2 (Z1XYW/2) (2023) Q10 · CBSE 31/2/3 (Z1XYW/2) (2023) Q8

✔ **Answer** (b) ammeter is connected in series and the voltmeter in parallel.

More questions on this idea (5) – same method, other papers

A3-1.1 · **MCQ · 1 mark** · CBSE Competency Focused Practice Questions (CFPQ) Vol 2 Q18

Kishore connects two resistors in parallel. He wants to measure the total current through the two resistors. Which of the following shows the correct arrangement to measure the current through ammeter 'A'?

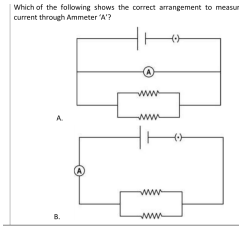


Figure from the question paper

✔ B. (the ammeter is in the main line, in series with the battery, before the current divides)

A3-1.2 · **MCQ · 1 mark** · CBSE Competency-Based Education item bank (Science10 items) Q1
Which row of the table shows the instrument used to measure current and how it is connected in a circuit?
A Ammeter – parallel B Ammeter – series C Voltmeter – parallel D Voltmeter – series
✔ B – Ammeter, series

A3-1.3 · **MCQ · 1 mark** · Practice Paper 2025-26 (B) Q30
Which statement/statements is/are correct?
(a) An ammeter is not connected in series in a circuit and a voltmeter is connected in line
(b) An ammeter is connected in series in a circuit and a voltmeter is connected in parallel
(c) An ammeter has a high resistance
(d) A voltmeter has a low resistance
✔ (b) An ammeter is connected in series in a circuit and a voltmeter is connected in parallel.

A3-1.4 · **VSA · 1 mark** · CBSE Competency item bank (chapter-wise, with answer key) Q8

Suresh arranges the electric circuit shown below to measure the current flowing through and the potential difference of a bulb. Is the circuit correct? If not, then identify the mistake.

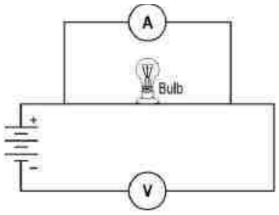


Figure from the question paper

✔ The circuit is incorrect. (½) The positions of the ammeter and voltmeter have been interchanged: the ammeter should be in series with the bulb and the voltmeter in parallel across it. (½)

Q A3-1 · Ammeter in series, voltmeter in parallel · ★★★ · Board ×1 · 6 papers · 6 questions

A3-1.5 · **VSA · 2 marks** · NCERT Exemplar Sample Question Paper-II Q24

A child has drawn the electric circuit to study Ohm's law as shown in the figure. His teacher told that the circuit diagram needs correction. Study the circuit diagram and redraw it after making all corrections.

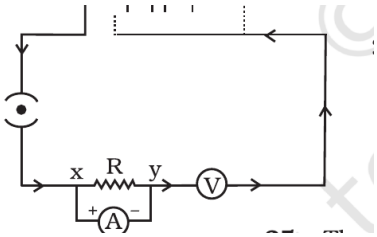


Figure from the question paper

✔ Corrections: the ammeter must be connected in series with the resistor and the voltmeter in parallel across the resistor (between x and y); the + terminals of the ammeter and voltmeter go towards the + terminal of the cell. Redraw: cell – plug key – ammeter – resistor in series, voltmeter across the resistor. (2)

Q A3-2 · Circuit symbols and their use · ★★ · Board ×2 · 3 papers · 3 questions

VSA · 2 marks

What do the symbols given below represent in an electric circuit? Write one function of each.



Figure from the question paper

Source: CBSE 31/4/2 (2026) Q34

✔ **Answer** (i) Voltmeter – measures the potential difference across a component; connected in parallel. (1)
(ii) Resistor (resistance) – opposes/controls the flow of current in the circuit. (1)

More questions on this idea (2) – same method, other papers

A3-2.1 · **MCQ · 1 mark** · CBSE Curriculum Aligned Competency Based Test Items Q4

What does the symbol shown mean in an electric circuit?
A. Switch B. Wire joint C. Electric bulb D. Variable resistance



Figure from the question paper

✔ D. Variable resistance (rheostat)
⚠ The answer key printed in the item bank for this item belongs to another question; the answer here is from the symbol.

A3-2.2 · **VSA · 2 marks** · CBSE 31/8/2 Exam-2 (8DEFG) (2026) Q33

(A) In the given electric circuit of Ohm's law experiment, identify P and X.
(B) Write the uses of Q and X in the given circuit.

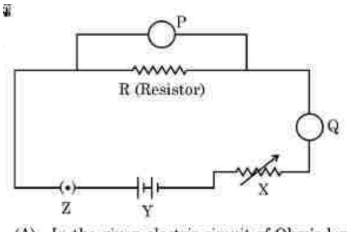


Figure from the question paper

✔ (A) P – voltmeter; X – rheostat (variable resistance). (½ + ½)
(B) Q (ammeter) measures the current through the resistor; X (rheostat) changes the current in the circuit. (½ + ½)

Q A3-3 · Resistance of ammeter and voltmeter · ★★ · 3 papers · 3 questions

SA · 3 marks

Should the resistance of an ammeter be low or high? Give reason.

Source: Practice Paper 2025-26 (F) Q36

✔ **Answer** The resistance of an ammeter should be low. (1) An ammeter is connected in series with the circuit to measure current. (1) If its resistance is not very low, its inclusion will reduce the current to be measured; an ideal ammeter has zero resistance. (1)

More questions on this idea (2) – same method, other papers

A3-3.1 · MCQ · 1 mark · Practice Paper 2025-26 (G) Q30

Which of the following statements is/are incorrect?
A. A neutron has a positive charge of $+1.6 \times 10^{-19}$ C.
B. An ammeter is a low resistance device.
C. The resistance of semiconductors decreases with temperature.
D. One ampere is equal to 10^{-6} μA.
(a) A and C (b) A, B and C (c) A and D (d) A and B
✔ (c) A and D [A neutron has no charge; 1 μA = 10^{-6} A, so 1 A = 10^{6} μA.]

A3-3.2 · VSA · 1 mark · CBSE Competency Focused Practice Questions (CFPQ) Vol 2 Q156

Of all the components in the circuit shown below, the current flowing through the voltmeter is the least. Explain why.

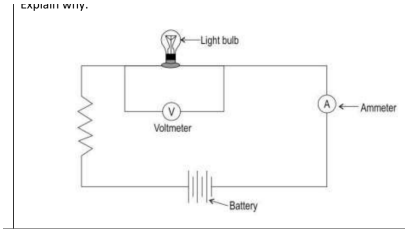


Figure from the question paper

✔ Of all the components, the voltmeter has the highest resistance, so the least current flows through it. (1)

Q A3-4 · Reading a meter: least count · ★ · Board ×1 · 2 papers · 2 questions

MCQ · 1 mark

In the following diagram, the position of the needle is shown on the scale of a voltmeter. The least count of the voltmeter and the reading shown by it respectively are:

(a) 0.15 V and 1.6 V (b) 0.05 V and 1.6 V
(c) 0.15 V and 1.8 V (d) 0.05 V and 1.8 V

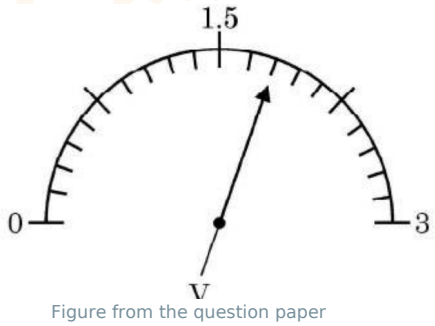


Figure from the question paper

Source: CBSE 31/1/1 (Z1XYW/1) (2023) Q15

✔ **Answer** (c) 0.15 V and 1.8 V
[0 to 3 V is divided into 20 divisions, so least count = 3/20 = 0.15 V. The needle is 2 divisions after 1.5 V: 1.5 + 2 × 0.15 = 1.8 V.]

More questions on this idea (1) – same method, other papers

A3-4.1 · VSA · 2 marks · Bangalore Sahodaya Pre-Board 1 (2025-26) Q34

A. The current flowing through a resistor connected in an electrical circuit and the potential difference developed across its ends are shown in the given ammeter and voltmeter.
a) Determine the least count of the voltmeter and ammeter.
b) What is the voltage and the current across the given resistor?
(OR)
B. Three 2 Ω resistors, A, B, and C, are connected as shown in the figure. Each of them dissipates energy and can withstand a maximum power of 18 W without melting. Determine the maximum current that can flow through the three resistors.

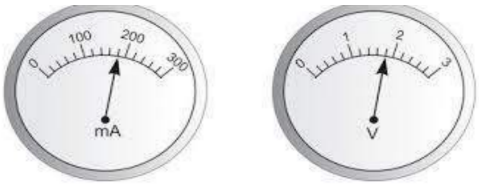


Figure from the question paper

✔ A. a) Ammeter: 100 mA has 5 divisions, least count = 20 mA. Voltmeter: 1 V has 5 divisions, least count = 0.2 V. (1)
b) V = 1.8 V; I = 180 mA (= 0.18 A) (1)
OR B. Through A: P = I^2R, 18 = $I^2 \times 2$, I = 3 A; this divides equally, 1.5 A each through B and C. (2)
⚠ Readings are taken from the printed dials (NCERT Exemplar type).

Q A3-5 · ★ · 1 paper

MCQ · 1 mark

The electric circuit below consists of a voltmeter, a battery and three bulbs X, Y and Z. The reading on the voltmeter represents the potential difference across which bulb(s)?

A. Only X
B. Both X and Y
C. Both X and Z
D. All X, Y and Z

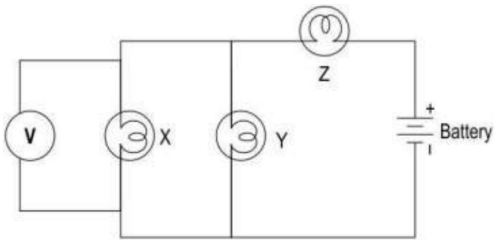


Figure from the question paper

Source: CBSE Competency Focused Practice Questions (CFPQ) Vol 2 Q155

✔ **Answer** B. Both X and Y

Q A3-6 · ★ · 1 paper

MCQ · 1 mark

A cell, a resistor, a key and an ammeter are arranged as shown in the circuit diagrams (i), (ii) and (iii). The current recorded in the ammeter will be:

(a) maximum in (i)
(b) maximum in (ii)
(c) maximum in (iii)
(d) the same in all the cases

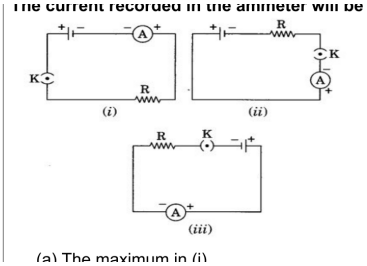


Figure from the question paper

Source: KVS Delhi Region Pre-Board-II (2024-25) Q13

✔ **Answer** (d) the same in all the cases [in a series circuit the current is the same at every point, whatever the position of the ammeter]

Q A3-7 · ★ · 1 paper

MCQ · 1 mark

The picture shows an electric circuit. Which of these is true about the circuit? (Yes/No)
(i) The circuit is open. (ii) The circuit has double batteries. (iii) The circuit has an ammeter and a voltmeter parallel to each other.

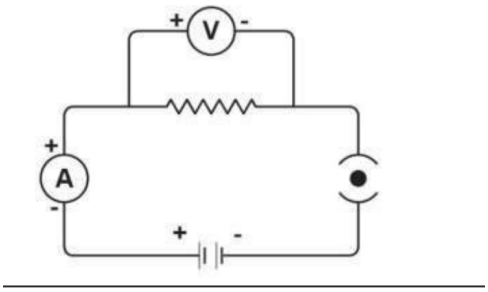


Figure from the question paper

Source: CBSE Curriculum Aligned Competency Based Test Items Q7

✔ **Answer** (i) No (ii) Yes (iii) No [the voltmeter is in parallel with the resistor and the ammeter is in series]

Q A3-8 · ★ · 1 paper

VSA · 2 marks

Before cleaning the light bulb in his room, Gautam turned off the light by turning the switch off. Yet he received an electric shock while cleaning the bulb. Explain why the bulb connection was live though the switch was off.

Source: CBSE Competency Focused Practice Questions (CFPQ) Vol 2 Q158

✔ **Answer** The switch was connected in the neutral wire instead of the live wire, so the bulb holder stayed connected to the live wire even when the switch was off. (2)

Q A3-9 · ★ · 1 paper

Case · 4 marks

Flow of charge is the electric current. (i) Unit of electric current is – (a) Ampere (b) Volt (c) Ohm (d) Rho
(ii) Resistivity depends on – (a) length of wire (b) cross-sectional area of wire (c) material of the wire (d) none
(iii) Rheostat is used to – (a) control the resistance (b) control the current (c) measure the voltage (d) all of the above
(iv) Unit of resistance is – (a) Rho (b) Ohm (c) Coulomb (d) Ampere
(v) Which equation denotes series arrangement of resistances? (a) 1/R = R1 + R2 (b) R = R1 + R2 (c) 1/R = 1/R1 + 1/R2 (d) None

Source: Practice Paper 2020-21 Q19

✔ **Answer** (i) (a) Ampere (ii) (c) material of the wire (iii) (b) control the current (by changing resistance) (iv) (b) Ohm (v) (b) R = R1 + R2

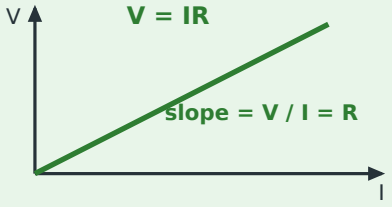
⚠ **Note:** In (iii) a rheostat changes the resistance in order to regulate the current; NCERT: 'a component used to regulate current without changing the voltage source'. Accept (a) or (b).

A4 · Ohm's law and V-I graph

21 questions · 11 ideas · 21 papers
Prepared by Abhishek Das, TGT (Science)

Picture it

Ohm's law: V is directly proportional to I at constant temperature, V = IR. The V-I graph is a straight line through the origin. Slope of a V-I graph (V on y-axis) = R. If I is on the y-axis, the steeper line has the SMALLER resistance.



Q A4-1 · R from a V-I table or the slope of the graph · ★★ · Board ×2 · 5 papers · 4 questions

SA · 3 marks

The values of current I flowing in a given resistor for the corresponding values of potential difference V applied across the ends of resistor are given below:
I (A): 0.4, 0.8, 1.2, 1.6, 2.0
V (V): 1.2, 2.4, 3.6, 4.8, 6.0
Plot a graph between V and I and calculate the resistance of that resistor.

Source: CBSE 31/2/1 (LMNK2) (2026) Q37 · CBSE 31/2/2 (LMNK2) (2026) Q36 · CBSE 31/2/3 (LMNK2) (2026) Q37

✔ **Answer** Graph: V on y-axis, I on x-axis; points lie on a straight line through the origin. (1½)
R = slope = V/I = 6.0/2.0 = 3 Ω (also 1.2/0.4 = 3 Ω) (1½)

⚠ **Note:** This is NCERT Exercise 13 (I: 0.5 to 4 A); same method.

More questions on this idea (3) – same method, other papers

A4-1.1 · MCQ · 1 mark · KVS Lucknow Pre-Board Set-1 Q20 · KVS Lucknow 1st Pre-Board Q13
The slope of voltage (V) versus current (I) graph is called:
(a) resistance (b) conductance (c) resistivity (d) conductivity
✔ (a) resistance

Q A4-1 · R from a V-I table or the slope of the graph · ★★ · Board ×2 · 5 papers · 4 questions

A4-1.2 · **LA · 5 marks** · CBSE 31/5/1 (Z1XYW/5) (2023) Q36
(a) State Ohm's law.
(b) Name and define the physical quantity determined by the slope of the V–I curve given in the diagram (V: 1.5, 3.0, 4.5, 6.0 V for I: 0.2, 0.4, 0.6, 0.8 A). Use this graph to find the value of this physical quantity in SI units.
(c) Establish the relationship between 1 kWh and 1 joule.
✔ (a) V ∝ I at constant temperature; V = IR. (1)
(b) Slope of V–I graph = V/I = resistance R. (1) Resistance is the property of a conductor to resist the flow of charges through it. (½)
R = 6.0 V/0.8 A = 7.5 Ω (1½)
(c) 1 kWh = 1000 W × 3600 s = 3.6 × 10^6 J (1)

A4-1.3 · **Case · 4 marks** · Practice Paper 2024-25 (13) Q39
Observe the table of current through a conductor for corresponding values of potential difference:
I (A): 0.1, 0.2, 0.4, 0.8, 1.0; V (V): 2.5, 5.0, 10.0, 20.0, 25.0
(a) Plot a graph between current and voltage. (1)
(b) What is the nature of the graph? (1)
(c) What will be the value of current when potential difference is 15 V? (2)
OR
(c) Calculate the resistance of the conductor. (2)
✔ (a) V on y-axis, I on x-axis. (1)
(b) Straight line through the origin. (1)
(c) I = 15/25 = 0.6 A (2)
OR (c) R = V/I = 10.0/0.4 = 25 Ω (2)

Q A4-2 · Effect of temperature on resistance · ★★ · 4 papers · 3 questions

VSA · 2 marks
Draw a V–I graph for a conductor at two different temperatures. What conclusion do you draw from your graph for the variation of resistance of conductor with temperature?

Source: Practice Paper 2024-25 (14) Q24 · Practice Paper 2024-25 (15) Q24

✔ **Answer** Two straight lines through the origin; the line for the higher temperature T1 is steeper (V on y-axis). (1)
Resistance of a conductor increases with increase in temperature. (1)

More questions on this idea (2) – same method, other papers

A4-2.1 · **MCQ · 1 mark** · CBSE Competency Focused Practice Questions (CFPQ) Vol 2 Q14
The graph shows the variation of resistivity of copper with temperature. Kishore constructs a simple circuit with a resistor made of copper. He then heats the copper resistor. What will happen to the current flowing through the circuit? Why?
A. The current will increase because the resistance of copper increases with an increase in temperature.
B. The current will increase because the resistance of copper decreases with an increase in temperature.
C. The current will decrease because the resistance of copper increases with an increase in temperature.
D. The current will decrease because the resistance of copper decreases with an increase in temperature.
✔ C. The current will decrease because the resistance of copper increases with an increase in temperature.

A4-2.2 · **A–R · 1 mark** · Vedantu Sample Paper Set 6 (2026-27) Q11
Assertion (A): The resistance of a conductor increases with the increase in temperature.
Reason (R): On heating, the number of free electrons decreases in the conductor.
✔ (c) A is true, but R is false. [The number of free electrons does not decrease; on heating, the vibrating atoms obstruct the flow of electrons more.]

Q A4-3 · State Ohm's law; V-I graph is a straight line · ★★ · Board ×2 · 3 papers · 3 questions

VSA · 2 marks
State Ohm's law. Give reason why the shape of voltage versus current (V–I) graph for a conductor should be a straight line passing through the origin.

Source: CBSE 31(B)/S (VI) Series EFGH/S Q25

✔ **Answer** Ohm's law: the potential difference V across the ends of a metallic wire is directly proportional to the current I through it, provided its temperature remains the same; V = IR. (1)
Since V ∝ I (V/I = R is constant), the graph is a straight line; when V = 0, I = 0, so it passes through the origin. (1)

Q A4-3 · State Ohm's law; V-I graph is a straight line · ★★ · Board ×2 · 3 papers · 3 questions

More questions on this idea (2) – same method, other papers

A4-3.1 · **MCQ · 1 mark** · Vedantu Mock Paper 7 (2026-27) Q18 · Vedantu Mock Paper 7 (2026-27) Q4

Which law states that the current passing through a conductor is directly proportional to the potential difference across its ends?

(a) Joule's law (b) Ohm's law (c) Faraday's law (d) Lenz's law

Also asked as: Which of the following correctly represents Ohm's law? – V = IR

✔ (b) Ohm's law

A4-3.2 · **VSA · 2 marks** · CBSE 31/4/3 (2026) Q34

(a) State the law which gives the relation between the electric current flowing through a given conductor and the potential difference applied across it.

(b) Draw V–I graph for a given conductor as per the law stated in (a).

✔ (a) Ohm's law: V ∝ I, V = IR, at constant temperature. (1)

(b) A straight line through the origin with V on the y-axis and I on the x-axis. (1)

Q A4-4 · Circuit to verify Ohm's law · ★★ · Board ×1 · 3 papers · 3 questions

LA · 5 marks

(i) How is electric current related to the potential difference across the terminals of a conductor? Draw a labelled circuit diagram to verify this relationship.

(ii) Why should an ammeter have low resistance?

(iii) Two V–I graphs A and B for series and parallel combinations of two resistors are as shown. Giving reason, state which graph shows (a) series, (b) parallel combination of the resistors.

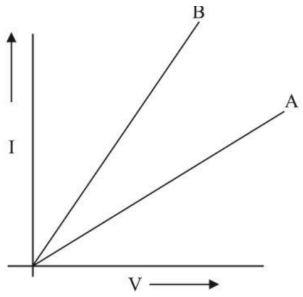


Figure from the question paper

Source: CBSE 31/4/1 (Z1XYW/4) (2023) Q36 · CBSE 31/4/2 (Z1XYW/4) (2023) Q34 · CBSE 31/4/3 (Z1XYW/4) (2023) Q35

✔ **Answer** (i) I ∝ V at constant temperature (Ohm's law). (1) Labelled circuit: battery, plug key, ammeter (series), nichrome wire/resistor, rheostat, voltmeter across the resistor. (2)

(ii) An ammeter is joined in series; if its resistance is high it will itself reduce the current to be measured. (1)

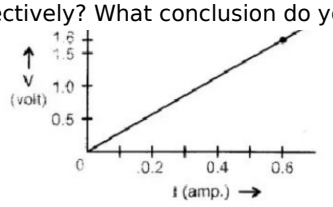
(iii) Here I is on the y-axis, so slope = I/V = 1/R. B has the greater slope, so the smaller resistance: B – parallel; A – series (larger resistance). (1)

More questions on this idea (2) – same method, other papers

A4-4.1 · **SA · 3 marks** · KVS Delhi Region Pre-Board-II (2024-25) Q31

(i) Draw a closed circuit diagram consisting of a 0.5 m long nichrome wire XY, an ammeter, a voltmeter, four cells of 1.5 V each and a plug key.

(ii) The graph was plotted between V and I values. What would be the values of V/I ratios when the potential difference is 0.8 V, 1.2 V and 1.6 V respectively? What conclusion do you draw from these values?



What would be the values of V/I ratios, when the potent

Figure from the question paper

✔ (i) Four cells in series, plug key, ammeter and nichrome wire XY in series; voltmeter across XY. (1)

(ii) From the straight line graph V/I has the same value at 0.8 V, 1.2 V and 1.6 V (about 2.7 Ω, read from the graph). (1)

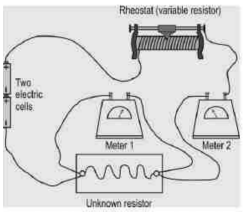
Conclusion: V/I = R is constant; the wire obeys Ohm's law. (1)

⚠ Read the exact current values from the printed graph; the ratio must come out the same each time.

Q A4-4 · Circuit to verify Ohm's law · ★★ · Board ×1 · 3 papers · 3 questions

A4-4.2 · LA · 5 marks · CBSE Competency item bank (chapter-wise, with answer key) Q6

The diagram shows how Amita had connected a circuit to verify Ohm's law.
(a) Identify which of the devices in the circuit is an ammeter. Justify your answer.
(b) Draw a circuit diagram with appropriate symbols for the circuit shown in the diagram.
(c) Amita forgot to put a switch in the circuit. During the experiment, the wire labelled 'Unknown resistor' became hot. The resistivity of the material of the wire increases with temperature. Draw two potential difference vs current graphs (in the same diagram): (i) as expected by Amita, (ii) as based on actual observation she would make.



(a) Identify which of the devices in the circuit i

Figure from the question paper

✔ (a) Meter 2 (½), because it is connected in series with the unknown resistor through which the current is to be measured. (½)
(b) Correct connections of cells, unknown resistor and rheostat (½); correct connections of the two meters (½); correct symbols (1).
(c) (i) Straight line passing through the origin. (1) (ii) Curved line with increasing slope (resistance increases as the wire heats up). (1)

Q A4-5 · Ohm's law experiment case · ★ · Board ×1 · 2 papers · 2 questions

Case · 4 marks

Four cells, a thin wire AB, a voltmeter, an ammeter, a plug key and some thick connecting wires are taken. The circuit is set up as shown. The key is inserted and readings of ammeter (I) and voltmeter (V) are noted. Then the plug key is removed. Now two cells are connected in series and the new values of V and I are noted. The experiment is repeated with three cells and then four cells.
(A) Why was the plug key removed after each measurement of V and I and inserted again for the next step? (1)
(B) What change takes place in the reading of the voltmeter when a new cell is added in series in the circuit? Give reason. (1)
(C) In which case will the readings of voltmeter and ammeter be maximum? What conclusion can be drawn from the straight line graph between V and I? (2)
OR
(C) Suppose this experiment is carried out using only one cell but wires of same length and thickness made of different materials like nichrome, fuse wire, copper and iron are replaced one by one. Out of V and I which will change and why? (2)

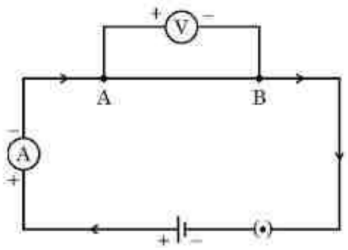


Figure from the question paper

Source: CBSE 31/8/1 Exam-2 (8DEFG) (2026) Q38 · CBSE 31/8/2 Exam-2 (8DEFG) (2026) Q38 · CBSE 31/8/3 Exam-2 (8DEFG) (2026) Q38

✔ **Answer** (A) To avoid heating of the wire; heating changes the resistance, and current should flow only while reading. (1)
(B) The voltmeter reading increases, because the potential difference of cells in series adds up. (1)
(C) Maximum with four cells. (1) The straight line through the origin shows V ∝ I, i.e. V/I = R is constant (Ohm's law). (1)
OR (C) The current I will change, because resistance depends on the material (resistivity) of the wire; the voltage of the cell remains the same. (2)

Q A4-5 · Ohm's law experiment case · ★ · Board ×1 · 2 papers · 2 questions

More questions on this idea (1) – same method, other papers

A4-5.1 · Case · 4 marks · KVS Lucknow Pre-Board I (2023-24) Q38

A student connects a battery, key, rheostat, voltmeter, ammeter and resistor to study the dependence of electric current on potential difference. Initially the rheostat is adjusted to get the minimum reading in ammeter A and voltmeter V. The current is increased gradually by moving the sliding terminal of the rheostat, and the values are recorded and a graph of current against potential difference is plotted.
(a) What does the plotted graph between V and I suggest?
(b) Does the electric resistance depend on the length of the conductor?
(c) Which of the given statements is NOT TRUE regarding the set-up for verification of Ohm's law: (i) the voltmeter is connected in parallel with the known resistance (ii) the ammeter is connected in series (iii) the rheostat can only increase the resistance in the circuit (iv) the single key is used to switch on/off the circuit.
(d) What device is used to measure electric current flowing in the circuit?

✔ (a) A straight line through the origin: $V \propto I$, so $V/I = R$ is constant. (1)
(b) Yes, $R \propto l$. (1)
(c) (iii) – a rheostat can increase as well as decrease the resistance. (1)
(d) Ammeter. (1)

Q A4-6 · ★ · Board ×1 · 1 paper

VSA · 2 marks

Let the resistance of an electrical device remain constant, while the potential difference across its two ends decreases to one fourth of its initial value. What change will occur in the current through it? State the law which helps us in solving the above stated question.

Source: CBSE 31/6/1 (Z1XYW/6) (2023) Q24 · CBSE 31/6/3 (Z1XYW/6) (2023) Q21

✔ **Answer** $I = V/R$; if V becomes V/4 with R constant, the current becomes one fourth of its initial value. (1)
Ohm's law: $V \propto I$ at constant temperature ($V = IR$). (1)

Q A4-7 · ★ · 1 paper

MCQ · 1 mark

A student plots the current–voltage graphs of three samples of nichrome wire with resistances R1, R2 and R3. The student writes three conclusions: 1. R3 has the lowest resistance 2. The resistors are ohmic 3. R3 dissipates the most power. Which conclusions are correct?

A. 1, 2 and 3
B. 1 and 2 only
C. 1 and 3 only
D. 2 and 3 only

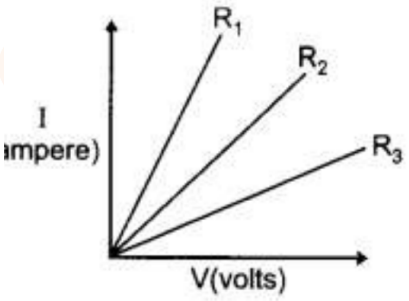


Figure from the question paper

Source: CBSE Competency-Based Education item bank (Science10 items) Q1

✔ **Answer** D. 2 and 3 only
[I is on the y-axis, so R3 (least slope) has the HIGHEST resistance – conclusion 1 is wrong. Straight lines – ohmic. For the same current, $P = I^2R$ is largest for R3.]

Q A4-8 · ★ · 1 paper

VSA · 2 marks

Calculate the resistance of a wire if a current of 0.5 A flows through it when the potential difference across its ends is 2 V.

Source: Vedantu Sample Paper Set 6 (2026-27) Q26

✔ **Answer** $R = V/I = 2\ V/0.5\ A = 4\ \Omega$ (2)

Q A4-9 · ★ · 1 paper

SA · 3 marks

(a) State Ohm's law. (b) How is an ammeter connected in an electric circuit? (c) The power of a lamp is 100 W. Find the energy consumed by it in 1 minute.

Source: KVS Lucknow 1st Pre-Board (2022-23) Q29

✔ **Answer** (a) V ∝ I at constant temperature; V = IR. (1)
(b) In series. (1)
(c) E = P × t = 100 W × 60 s = 6000 J (1)

Q A4-10 · ★ · 1 paper

LA · 5 marks

State and explain Ohm's law. Define resistance and give its SI unit. What is meant by 1 ohm resistance? Calculate the resistivity of the material of a wire of length 1 m, radius 0.01 cm and resistance 20 ohms.

Source: KVS Lucknow Pre-Board Set-1 Q35

✔ **Answer** Ohm's law: V ∝ I at constant temperature, V = IR; V–I graph is a straight line through origin. (1½)
Resistance: the property of a conductor to resist the flow of charges; SI unit ohm (Ω). (1)
1 Ω: resistance of a conductor when a pd of 1 V across it gives a current of 1 A. (1)
$A = \pi r^2 = 3.14 \times (1 \times 10^{-4}\ m)^2 = 3.14 \times 10^{-8}\ m^2$; $\rho = RA/l = 20 \times 3.14 \times 10^{-8}/1 = 6.28 \times 10^{-7}\ \Omega\ m$ (1½)

Q A4-11 · ★ · 1 paper

Case · 4 marks

In 1827, Georg Simon Ohm found the relationship between the current I flowing in a metallic wire and the potential difference across its terminals. The resistance of a circuit is the ratio between the voltage applied and the current flowing through it, R = V/I.
(i) What is the unit of electrical resistance? (1)
(ii) Define Ohm's law. (1)
(iii) From the graph (I–V lines R1, R2, R3), which resistance is high? (2)
OR
(iii) What does the slope of V–I graph at any point represent? (2)

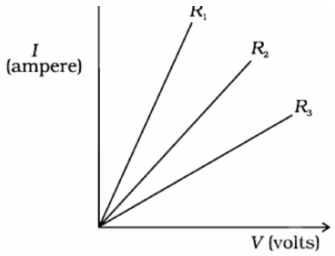


Figure from the question paper

Source: Practice Paper 2025-26 (E) Q38

✔ **Answer** (i) Ohm (Ω) (1)
(ii) V ∝ I at constant temperature, V = IR. (1)
(iii) R3 – the I–V line with the least slope has the highest resistance (R = V/I). (2)
OR (iii) Resistance. (2)

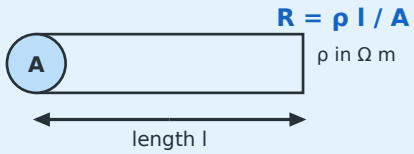
Theme B · Resistance and Combination of Resistors

NCERT 11.5 - 11.6 · Prepared by Abhishek Das, TGT (Science)

B1 · Factors on which resistance depends; resistivity

44 questions · 17 ideas · 38 papers
Prepared by Abhishek Das, TGT (Science)

Picture it
R = rho l/A. R increases with length and decreases with area of cross-section; depends on material and temperature. Resistivity rho (ohm metre) depends only on the material (and temperature), not on length or thickness. Alloys have higher resistivity than their metals.



Q B1-1 · Compare wires: R increases with length, decreases with area · ★★★ · Board ×5 · 7 papers · 6 questions

MCQ · 1 mark
In case of four wires of same material, the resistance will be minimum if the diameter and length of the wire respectively are:
(A) D/2 and L/4 (B) D/4 and 4L
(C) 2D and L (D) 4D and 2L

Also asked as: Four wires a, b, c, d of the same material; least resistance has length 2l and radius 4r (other options: l and 2r; 4l and r/4; l/4 and r/2). [F1 p38 Q15, VI paper EFGH/S]

Source: CBSE 31/3/1 (DAA1B/3) (2024) Q14 · CBSE 31/3/2 (DAA1B/3) (2024) Q8 · CBSE 31/3/3 (DAA1B/3) (2024) Q13 · CBSE 31(B)/S (VI) Series EFGH/S Q15

✔ **Answer** (D) 4D and 2L
[$R \propto L/D^2$: (A) 1; (B) 64; (C) 0.25; (D) 2/16 = 0.125 (in units of L/D^2)]

More questions on this idea (5) – same method, other papers

B1-1.1 · MCQ · 1 mark · CBSE 31(B)/S (VI) Series CDBA/S Q14
You have four resistance wires of same material. Select the wire which will offer the least resistance to the flow of current in an electric circuit:
(A) Length 2l and diameter 2d (B) Length l and diameter d
(C) Length l/2 and diameter d/2 (D) Length l/4 and diameter d/4
✔ (A) Length 2l and diameter 2d
[$R \propto l/d^2$. (A) $2l/4d^2 = 0.5$; (B) 1; (C) $(l/2)/(d^2/4) = 2$; (D) $(l/4)/(d^2/16) = 4$ (in units of l/d^2)]

B1-1.2 · MCQ · 1 mark · CBSE 31(B) (VI) Series ZWYX Q14
You have a thin resistance wire having a thick plastic insulation. A decrease in the resistance of this wire would be produced if somehow we increase the:
(a) thickness of the plastic insulation
(b) temperature of the wire
(c) length of the wire
(d) diameter of the wire
✔ (d) diameter of the wire

B1-1.3 · MCQ · 1 mark · CBSE Curriculum Aligned Competency Based Test Items Q6
Which of these decides the resistance of a wire? Circle Yes or No: (i) Length of the wire (ii) Thickness of the wire (iii) Material of the cover on the wire
✔ (i) Yes (ii) Yes (iii) No

B1-1.4 · VSA · 2 marks · CBSE 31/4/1 (DACBA/4) (2024) Q26
Two wires A and B of same material, having same lengths and diameters 0.2 mm and 0.3 mm respectively, are connected one by one in a circuit. Which one of these two wires will offer more resistance to the flow of current in the circuit? Justify your answer.
✔ Wire A (diameter 0.2 mm) offers more resistance. (1)
$R = \rho l/A$; for the same material and length, $R \propto 1/A \propto 1/d^2$, so the thinner wire has more resistance. (1)

Q B1-1 · Compare wires: R increases with length, decreases with area · ★★★ · Board ×5 · 7 papers · 6 questions

B1-1.5 · VSA · 2 marks · CBSE Competency-Based Education item bank (Science10 items) Q1
The diagram shows a thick copper wire A and a thin copper wire B. Both wires have the same length. State and explain the difference, if any, in the resistance of the wires.
✔ Wire A has less resistance than wire B (1), because it has a larger area of cross-section, so there are more paths for the movement of electrons (R ∝ 1/A). (1)

Q B1-2 · Find the length of a wire · ★★★ · Board ×2 · 6 papers · 4 questions

SA · 3 marks
(a) List the factors on which the resistance of a uniform cylindrical conductor of a given material depends.
(b) The resistance of a wire of 0.01 cm radius is 10 Ω. If the resistivity of the wire is 50 × 10^{-8} Ω m, find the length of this wire.

Source: Vedantu Sample Paper Set 1 (2026-27) Q32 · CBSE 31/2/2 Term-II (QQCRR/2) (2022) Q9 · CBSE 31/2/3 Term-II (QQCRR/2) (2022) Q13

✔ **Answer** (a) Directly proportional to length; inversely proportional to area of cross-section; depends on temperature. (1)
(b) A = πr² = 3.14 × (10^{-4})² = 3.14 × 10^{-8} m²; l = RA/ρ = 10 × 3.14 × 10^{-8}/(50 × 10^{-8} = 0.628 m (2)

More questions on this idea (3) – same method, other papers

B1-2.1 · VSA · 2 marks · Practice Paper 2025-26 (H) Q34 · KVS Lucknow 1st Pre-Board Q36
A copper wire has diameter 0.5 mm and resistivity 1.6 × 10^{-8} Ω m. What will be the length of this wire to make its resistance 10 Ω? How much does the resistance change if the diameter is doubled?
✔ A = πd²/4 = 3.14 × (5 × 10^{-4})²/4 = 1.96 × 10^{-7} m²; l = RA/ρ = 10 × 1.96 × 10^{-7}/(1.6 × 10^{-8} = 122.7 m (1½)
R ∝ 1/d²: doubling d makes R one-fourth = 2.5 Ω, i.e. it decreases by 7.5 Ω. (½)
⚠ NCERT Exercise Q7 (11.5).

B1-2.2 · SA · 3 marks · CBSE 31/1/2 (1GEFH) (2025) Q27
(a) Define one ampere.
(b) The resistance of a wire of 0.01 cm radius is 14 Ω. If the resistivity of the material of the wire is 44 × 10^{-8} Ω m, find the length of the wire. (Given π = 22/7)
Also asked as: Find the length of a wire of resistance 21 Ω, diameter 0.02 cm, resistivity 66 × 10^{-8} Ω m (π = 22/7) – answer 1 m. [9-compressed p91, VI paper E7FDG Q39 (b)]
✔ (a) One ampere is the current when one coulomb of charge flows in one second (1 A = 1 C/1 s). (1)
(b) A = (22/7) × (10^{-4})² = (22/7) × 10^{-8} m²; l = RA/ρ = 14 × (22/7) × 10^{-8}/(44 × 10^{-8} = 1 m (2)

B1-2.3 · SA · 3 marks · CBSE Sample Question Paper (3-section) (2025-26) Q36 · CBSE Sample Question Paper (2025-26) Q36 · CBSE Sample Question Paper 2025-26 (ALLEN copy) Q36
A student needs to make a 0.12 Ω resistor. She has some copper wire of 0.80 mm diameter. Resistivity of copper is 1.8 × 10^{-8} Ω m.
(i) Determine the cross-sectional area of the wire.
(ii) Calculate the length of wire required for the 0.12 Ω resistor.
✔ (i) r = 0.40 mm = 4 × 10^{-4} m; A = πr² = 3.14 × 16 × 10^{-8} = 5.03 × 10^{-7} m² (1½)
(ii) l = RA/ρ = 0.12 × 5.03 × 10^{-7}/(1.8 × 10^{-8} = 3.35 m (1½)

Q B1-3 · New resistance when length or area changes · ★★★ · 6 papers · 5 questions

VSA · 2 marks
A wire of given material having length l and area of cross-section A has a resistance of 4 Ω. What would be the resistance of another wire of the same material having length l/2 and area of cross-section 2A?
OR
Calculate the resistance of an electric bulb which allows a 10 A current when connected to a 220 V power source.

Also asked as: A wire has resistance 16 Ω; a wire of the same material with length 0.5 l and area 2A has resistance 4 Ω. [British Council item, 5-compressed p162]

Source: Practice Paper 2025-26 (G) Q34 · CBSE Competency-Based Education item bank (Science10 items) Q1

✔ **Answer** R2 = ρ(l/2)/(2A) = ¼ × ρl/A = ¼ × 4 = 1 Ω (2)
OR R = V/I = 220/10 = 22 Ω (2)

Q B1-3 · New resistance when length or area changes · ★★★ · 6 papers · 5 questions

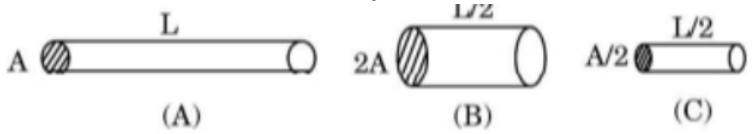
More questions on this idea (4) – same method, other papers

B1-3.1 · **MCQ · 1 mark** · Practice Paper 2024-25 (2) Q14
The resistance of a conductor is R. If the length is doubled by stretching the wire, then its new resistance will be:
(a) R (b) 4R (c) 8R (d) 2R
✔ (b) 4R
[On stretching, volume stays the same: l becomes 2l and A becomes A/2, so R' = ρ(2l)/(A/2) = 4R]

B1-3.2 · **MCQ · 1 mark** · CBSE Competency Focused Practice Questions (CFPQ) Vol 2 Q16
A cylindrical copper wire X of length l and radius r has a resistance R and resistivity ρ. Another copper wire Y has a length 2l and a radius 2r. Which row shows the correct resistance and resistivity of wire Y?
I: R/2, ρ II: R, ρ III: R/2, ρ/2 IV: R, ρ/2
A. I B. II C. III D. IV
✔ A. I (R/2 and ρ)
[R' = ρ(2l)/(π·4r²) = R/2; resistivity depends only on the material, so it stays ρ]

B1-3.3 · **VSA · 1 mark** · CBSE Curriculum Aligned Competency Based Test Items Q8
Will there be any change in the ammeter reading if the length of the wire in the circuit is doubled? Explain your answer.
✔ Yes. The ammeter reading will decrease to one-half, because the resistance doubles (R ∝ l) and I = V/R. (1)

B1-3.4 · **SA · 3 marks** · Practice Paper 2024-25 (5) Q32
(i) In the figure, three cylindrical conductors A, B and C are shown along with their lengths and areas of cross-section (A: L, A; B: L/2, 2A; C: L/2, A/2). If these are made of the same material and RA, RB, RC are their resistances, find (a) RA/RB and (b) RA/RC.
(ii) If conductor A is made of copper and conductor C of constantan (alloy of copper and nickel), which one will have more electrical resistance and why?



If the conductor A is made of copper and the conductor C is mad

Figure from the question paper

✔ (i)(a) RB = ρ(L/2)/(2A) = RA/4, so RA/RB = 4. (1)
(b) RC = ρ(L/2)/(A/2) = RA, so RA/RC = 1. (1)
(ii) C – the alloy constantan has higher resistivity than copper. (1)

Q B1-4 · Alloys and nichrome in heating devices · ★★ · Board ×2 · 4 papers · 4 questions

A–R · 1 mark
Assertion (A): Nichrome is an alloy which is commonly used in electrical heating devices such as electric irons, toasters, etc.
Reason (R): The resistivity of nichrome is high and its resistance decreases with increase in temperature.

Source: CBSE 31/2/1 (GHF2E) (2025) Q19 · CBSE 31/2/2 (GHF2E) (2025) Q18 · CBSE 31(B) (VI) Series E7FDG (2026) Q32

✔ **Answer** (C) A is true, but R is false. [Resistivity of nichrome is high, but its resistance INCREASES with increase in temperature.]

More questions on this idea (3) – same method, other papers

B1-4.1 · **MCQ · 1 mark** · CBSE 31/2/2 (GHF2E) (2025) Q14
The resistivity of a wire made of an alloy is generally:
(A) Lower than that of its constituent metals.
(B) Higher than that of its constituent metals.
(C) Decreases with increase in its area of cross-section.
(D) Increases with increase in its length.
✔ (B) Higher than that of its constituent metals.

B1-4.2 · **MCQ · 1 mark** · Practice Paper 2024-25 (1) Q14
The elements of electric heating devices are usually made of:
a) nichrome b) bronze c) argon d) tungsten
✔ a) nichrome

Q B1-4 · Alloys and nichrome in heating devices · ★★ · Board ×2 · 4 papers · 4 questions

B1-4.3 · MCQ · 1 mark · CBSE Curriculum Aligned Competency Based Test Items Q3

Why is nichrome wire used in many electrical heating devices?

A. It has low resistivity and low melting point.
B. It has high resistivity and low melting point.
C. It has low resistivity and high melting point.
D. It has high resistivity and high melting point.

✔ D. It has high resistivity and high melting point.

Q B1-5 · Find resistivity from R, l and A · ★★ · Board ×2 · 4 papers · 4 questions

SA · 3 marks

(a) List two factors on which the resistance of a conductor in the shape of a straight cylinder depends. Write the relation between resistance (R) and the resistivity (ρ) of the material of the conductor. Use this relation to obtain the SI unit of resistivity.
(b) Resistance of a metal wire of length 1 m is 40 Ω. If the area of cross-section of the wire is 6.5×10^{-8} m², find the resistivity of the material of the wire.

Source: CBSE 31(B)/S (VI) Series CDBA/S Q36

✔ **Answer** (a) Length of the conductor; area of cross-section (also nature of material, temperature). (1)
R = ρl/A (1); ρ = RA/l, unit = Ω × m²/m = Ω m (1)
(b) $\rho = RA/l = 40 \times 6.5 \times 10^{-8}/1 = 2.6 \times 10^{-6}$ Ω m (2)

More questions on this idea (3) – same method, other papers

B1-5.1 · VSA · 2 marks · Vedantu Sample Paper Set 6 (2026-27) Q38

If a wire of length 4 m and area of cross-section 2 mm² has a resistance of 8 Ω, what will be the resistivity of its material? Give answer in S.I. units.

✔ A = 2 mm² = 2×10^{-6} m²; $\rho = RA/l = 8 \times 2 \times 10^{-6}/4 = 4 \times 10^{-6}$ Ω m (2)

B1-5.2 · SA · 3 marks · CBSE 31/2/2 (GHF2E) (2025) Q32

Resistance of a wire of length 1 m is 35 Ω at 20 °C. If the diameter of the wire is 0.2 mm, determine the resistivity of the material of the wire at that temperature. How will the resistivity of the wire change if the length and diameter of the wire both are doubled? Justify your answer. (Given π = 22/7)

✔ r = 0.1 mm = 10^{-4} m; A = (22/7) × 10^{-8} m² (1)
$\rho = RA/l = 35 \times (22/7) \times 10^{-8}/1 = 1.1 \times 10^{-6}$ Ω m (1)
No change – resistivity depends only on the material and temperature. (1)

B1-5.3 · SA · 3 marks · Bangalore Sahodaya Pre-Board 1 Set 2 (2024-25) Q32

Compute the resistivity of the given material whose resistance is 2 Ω; area of cross-section and length are 25 cm² and 15 cm respectively. Define 1 Ω m.

✔ A = 25 cm² = 25×10^{-4} m²; l = 0.15 m (1)
$\rho = RA/l = 2 \times 25 \times 10^{-4}/0.15 = 3.33 \times 10^{-2}$ Ω m (1)
1 Ω m is the resistivity of a material if a conductor of it 1 m long and 1 m² in area has a resistance of 1 Ω. (1)

Q B1-6 · Resistivity depends only on material and temperature · ★★ · Board ×1 · 4 papers · 3 questions

MCQ · 1 mark

Which one of the following factors affects the electrical resistivity of a conductor?

(A) Temperature
(B) Length
(C) Shape
(D) Thickness

Also asked as: Electrical resistivity of a given metallic wire depends upon (a) its length (b) its thickness (c) its shape (d) nature of the material – Answer (d). [X SCIENCE-merged p48 Q13]

Source: CBSE 31/S/1 Supplementary (EFGH/S) Q13 · CBSE 31/S/2 Supplementary (EFGH/S) Q13 · CBSE 31/S/3 Supplementary (EFGH/S) Q14 · KVS Lucknow Pre-Board Set-1 Q13

✔ **Answer** (A) Temperature

More questions on this idea (2) – same method, other papers

B1-6.1 · MCQ · 1 mark · KVS Lucknow Pre-Board II (2023-24) Q13

The resistivity of a metallic wire does not change if:

(a) the material is changed
(b) the shape of the resistor is changed
(c) the temperature is changed
(d) both material and temperature are changed

✔ (b) the shape of the resistor is changed

Q B1-6 · Resistivity depends only on material and temperature · ★★ · Board ×1 · 4 papers · 3 questions

B1-6.2 · MCQ · 1 mark · Bangalore Sahodaya Pre-Board 1 Set 1 (2024-25) Q15

A student wants to draw a graph to show how the resistivity (ρ) of a wire changes with the length (l) of the wire. What should the graph look like?

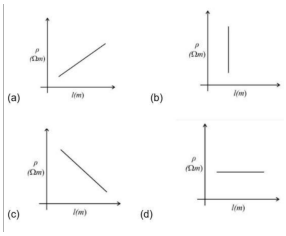


Figure from the question paper

✔ (d) A horizontal straight line – resistivity does not depend on the length of the wire.

Q B1-7 · Relation R = ρl/A and SI unit of resistivity · ★★ · Board ×2 · 3 papers · 2 questions

SA · 3 marks

(a) Write the relationship between resistivity and resistance of a cylindrical conductor of length l and area of cross-section A. Hence derive the SI unit of resistivity.
(b) Why are alloys used in electrical heating devices?

Also asked as: SQP 2024-25 Q32: State the relationship between R, l and A; use symbols to arrive at the formula; define resistivity. [6_compressed p453]

Source: CBSE 31/1/1 (1GEFH) (2025) Q33 · CBSE Sample Question Paper (2024-25) Q32

✔ **Answer** (a) R = ρl/A; ρ = RA/l; unit = Ω m²/m = Ω m. (2)
(b) Alloys have higher resistivity than their metals and do not oxidise (burn) readily at high temperatures. (1)

More questions on this idea (1) – same method, other papers

B1-7.1 · SA · 3 marks · CBSE 31(B) (VI) Series LMNK2 (2026) Q39

Write the relationship between resistance (R) of a wire with its area of cross-section (A) and length (l). With the help of this relation, define resistivity of the material of the wire. (Also asked with: In an electric circuit 2 A flows through a 40 Ω resistor for 50 s – heat produced.)

✔ R ∝ l and R ∝ 1/A, so R = ρl/A. (1) If l = 1 m and A = 1 m², R = ρ: resistivity is the resistance of a conductor of unit length and unit area of cross-section. (1)
Heat: H = I²Rt = 4 × 40 × 50 = 8000 J (1)

Q B1-8 · ★★ · Board ×1 · 3 papers

MCQ · 1 mark

SI unit of electrical resistivity is:

(a) ohm metre
(b) ohm per metre
(c) ohm/metre²
(d) ohm/metre³

Also asked as: Write the SI unit of resistivity (1 mark) – Ω m. [5-compressed p269 Q13; p426 SAS item 2]

Source: CBSE 31(B) (VI) Series ZWYX Q13 · Practice Paper 2020-21 Q13 · CBSE Curriculum Aligned Competency Based Test Items Q2

✔ **Answer** (a) ohm metre

Q B1-9 · Find R from ρ, l and A · ★★ · Board ×1 · 3 papers · 2 questions

SA · 3 marks

(a) Calculate the resistance of a metal wire of length 2 m and area of cross-section 1.55×10^{-6} m². (Resistivity of the metal is 2.8×10^{-8} Ω m)
(b) Why are alloys preferred over pure metals to make the heating elements of electrical heating devices?

Source: CBSE 31/1/2 Term-II (QQARR/1) (2022) Q10

✔ **Answer** (a) R = ρl/A = $2.8 \times 10^{-8} \times 2/(1.55 \times 10^{-6}$ = 0.036 Ω (2)
(b) Higher resistivity; do not oxidise (burn) readily at high temperatures. (1)

More questions on this idea (1) – same method, other papers

B1-9.1 · SA · 3 marks · KVS Lucknow Pre-Board (2025-26) Q37 · CBSE Sample Question Paper (3-section) (2025-26) Q34

A student is using a copper wire to make a resistor. The wire has a length of 2 m and a cross-sectional area of 0.5 mm². The resistivity of copper is 1.7×10^{-8} Ω m.
(i) Calculate the resistance of the wire.
(ii) If the wire's length is doubled but the cross-sectional area remains the same, what will be the new resistance?

Also asked as: SQP 2025-26 Q34 (VI students, B): resistance of a copper wire of twice the length – 0.136 Ω.

✔ (i) R = ρl/A = $1.7 \times 10^{-8} \times 2/(0.5 \times 10^{-6}$ = 0.068 Ω (2)
(ii) R ∝ l, so R' = 2 × 0.068 = 0.136 Ω (1)

Q B1-10 · LA: relation R = ρl/A, SI unit of ρ, find ρ · ★ · Board ×2 · 2 papers · 3 questions

LA · 5 marks

(a) (i) Write the relation between the electrical resistivity ρ and the resistance R of a cylindrical conductor of length l and area of cross-section A. Use this relationship to determine the SI unit of ρ.
(ii) Find the electrical resistivity of the material of a wire of length 120 cm and diameter 0.4 mm. The resistance of this wire is 3 Ω.
OR
(b) (i) What is meant by heating effect of electric current? Derive an expression for the amount of heat produced in a conductor of resistance R through which a current I flows for a time t.
(ii) Calculate the amount of heat produced in a conductor of resistance 10 Ω through which a current of 2 A flows for 100 seconds.

Source: CBSE 31/S/1 Supplementary (EFGH/S) Q36 · CBSE 31/S/3 Supplementary (EFGH/S) Q34

✔ **Answer** (a)(i) R = ρl/A; ρ = RA/l; SI unit Ω m. (2)
(ii) r = 0.2 mm = 2×10^{-4} m; A = πr² = $3.14 \times 4 \times 10^{-8} = 1.256 \times 10^{-7}$ m²; l = 1.2 m
ρ = RA/l = $3 \times 1.256 \times 10^{-7}/1.2 = 3.14 \times 10^{-7}$ Ω m (3)
OR (b)(i) When current flows through a resistor, electrical energy is changed into heat – heating effect. (1) Work done to move charge Q through pd V: W = VQ = VIt; this energy appears as heat, H = VIt = I²Rt (using V = IR). (2)
(ii) H = I²Rt = $2^2 \times 10 \times 100$ = 4000 J (2)

More questions on this idea (2) – same method, other papers

B1-10.1 · LA · 5 marks · CBSE 31(B) (VI) Series CDBA Q34

(a) (i) Write the relation between resistivity (ρ) and resistance (R) for a uniform metallic conductor of length (l) and area of cross-section (A). Use this relation to obtain the SI unit of resistivity.
(ii) The resistance of a metallic wire of 100 m is 20 Ω. If the radius of the wire is 5 mm, find the resistivity of the metal of the wire.
OR
(b) (i) Obtain an expression for the amount of heat produced in a conductor of resistance R when a steady current I flows through it for a time t.
(ii) An electrical heater of resistance 10 Ω draws a steady current of 5 A from the service mains for 2 hours. Find the power of this heater and the amount of energy consumed in kilowatt hour.
✔ (a)(i) R = ρl/A; ρ = RA/l; unit Ω m. (2)
(ii) A = πr² = $3.14 \times (5 \times 10^{-3})^2 = 7.85 \times 10^{-5}$ m²; ρ = RA/l = $20 \times 7.85 \times 10^{-5}/100 = 1.57 \times 10^{-5}$ Ω m (3)
OR (b)(i) H = VIt = I²Rt (derivation as in NCERT). (2)
(ii) P = I²R = $5^2 \times 10$ = 250 W (1½); E = 0.25 kW × 2 h = 0.5 kWh (1½)

B1-10.2 · LA · 5 marks · CBSE 31/S/2 Supplementary (EFGH/S) Q36

(a) (i) State Ohm's law. Draw V–I graph for an ohmic conductor.
(ii) Electrical resistance of a metal wire of length 1 km is 200 Ω. If the area of cross-section of the wire is 40×10^{-8} m², determine the electrical resistivity of the material of the wire.
OR
(b) (i) You have three resistors R1, R2 and R3. If the equivalent resistances of their series and parallel combinations are Rs and Rp, write the relationship to determine Rs and Rp.
(ii) In the given circuit (three 30 Ω resistors in parallel, in series with 20 Ω, battery 3 V): (I) Write the relationship between the readings of the two ammeters A1 and A2. Give reason. (II) What is the equivalent resistance of the parallel combination? (III) What is the value of current flowing in the circuit?

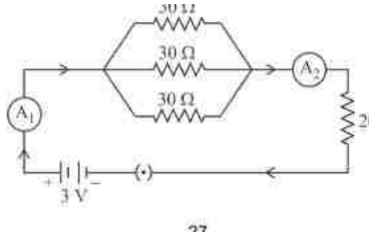


Figure from the question paper

✔ (a)(i) V ∝ I at constant temperature; straight-line graph through origin. (2)
(ii) ρ = RA/l = $200 \times 40 \times 10^{-8}/1000 = 8 \times 10^{-8}$ Ω m (3)
OR (b)(i) Rs = R1 + R2 + R3; 1/Rp = 1/R1 + 1/R2 + 1/R3 (1)
(ii)(I) A1 = A2, both are in series in the main line, same current. (1)
(II) 1/Rp = 3/30, Rp = 10 Ω (1)
(III) R = 10 + 20 = 30 Ω; I = 3/30 = 0.1 A (2)

Q B1-11 · V-I graphs of two wires: which has higher resistivity · ★ · Board ×1 · 2 papers · 2 questions

VSA · 2 marks

V–I graph for two conducting wires A and B are as shown. If both wires are of the same length and same diameter, which of the two is made of a material of high resistivity? Give reasons to justify your answer.

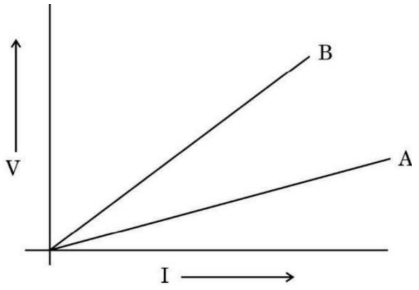


Figure from the question paper

Source: CBSE 31/2/1 (Z1XYW/2) (2023) Q25 · CBSE 31/2/3 (Z1XYW/2) (2023) Q21

✔ **Answer** Wire B. (1) V is on the y-axis, so slope = V/I = R. B has the greater slope, so greater resistance; for the same length and area, R ∝ ρ, so B has higher resistivity. (1)

More questions on this idea (1) – same method, other papers

B1-11.1 · **Case · 4 marks** · Vedantu Sample Paper Set 1 (2026-27) Q39

The V–I graphs for two wires A and B are shown. The slope of the V–I graph gives the resistance of the conductor.
(a) If wires A and B are of the same material having equal length, which wire is thicker?
(b) If wires A and B are of the same material and have the same diameter, which wire is shorter?
(c) If both wires are of the same length and the same diameter, which wire has maximum resistivity?
OR
If the temperature of wire A is more than the temperature of wire B, which one has the least resistance?

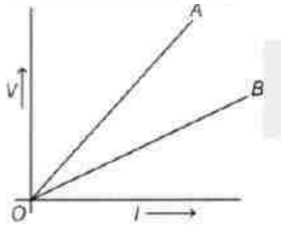


Figure from the question paper

✔ Slope of A > slope of B, so RA > RB. (1)
(a) B is thicker (R ∝ 1/A). (1)
(b) B is shorter (R ∝ l). (1)
(c) A has maximum resistivity. (1)
OR B has the least resistance (lower temperature, lower R).

Q B1-12 · ★ · Board ×1 · 2 papers

LA · 5 marks

(a) (i) What is meant by resistance of a conductor? Define its SI unit.
(ii) List two factors on which the resistance of a rectangular conductor depends.
(iii) How will the resistance of a wire be affected if its (1) length is doubled, and (2) radius is also doubled? Give justification for your answer.
OR
(b) In an electric circuit three bulbs of 100 W each are connected in series to a source. In another circuit, a set of three bulbs of the same wattage are connected in parallel to the same source.
(i) Will the bulbs in the two circuits glow with the same brightness? Justify your answer.
(ii) Now, let one bulb in both the circuits get fused. Will the rest of the bulbs continue to glow in each circuit? Give reason for your answer.

Also asked as: Practice Paper 2025-26 (G) Q39 OR uses the same (a) part.

Source: CBSE 31/6/1 (Z1XYW/6) (2023) Q36 · CBSE 31/6/2 (Z1XYW/6) (2023) Q35 · CBSE 31/6/3 (Z1XYW/6) (2023) Q34 · Practice Paper 2025-26 (G) Q39

✔ **Answer** (a)(i) Resistance is the property of a conductor to resist the flow of charges through it; SI unit ohm – resistance of a conductor is 1 Ω when a pd of 1 V across it gives a current of 1 A. (2)
(ii) Length; area of cross-section (also material, temperature). (1)
(iii) $R' = \rho(2l)/(\pi(2r)^2) = (2/4) \times \rho l/\pi r^2 = R/2$ – resistance becomes half. (2)
OR (b)(i) No. In parallel, each bulb gets the full voltage and gives 100 W; in series the voltage is shared, the current is smaller, so the bulbs glow dimmer. Parallel bulbs glow brighter. (3)
(ii) In series – the circuit breaks, the other bulbs stop glowing. In parallel – the other bulbs continue to glow, as each has its own path. (2)

Q B1-13 · Experiments on factors of resistance · ★ · Board ×1 · 2 papers · 2 questions

Case · 4 marks

Three students Shweta, Ayesha and Samridhi were performing an experiment to understand the factors on which the resistance of a conductor depends. Each one of them completed an electric circuit with a cell, an ammeter, a plug key and a wire. Shweta put nichrome wire of length l; Ayesha put nichrome wire of same thickness but twice the length, 2l; Samridhi took copper wire of length l and same thickness.
(a) If the ammeter reading is X ampere with nichrome wire of length l, what will be the ammeter reading if the length of nichrome wire is doubled with same area of cross-section? (1)
(b) What happens to the ammeter reading if the area of cross-section of nichrome wire is doubled, keeping the length l the same? (1)
(c) Define 'resistivity'. Write its SI unit. Compare the resistivity of an alloy with its constituent metals. (2)
OR
(c) Give reason: (i) Tungsten is used almost exclusively for making the filament of electric lamps. (ii) Conductors of bread-toasters are made of an alloy rather than a pure metal. (2)

Source: CBSE 31/5/1 (2026) Q38 · CBSE 31/5/2 (2026) Q38 · CBSE 31/5/3 (2026) Q38

✔ **Answer** (a) R doubles, so reading = X/2 ampere. (1)
(b) R becomes half, so reading = 2X ampere. (1)
(c) Resistivity is the resistance of a conductor of unit length and unit area of cross-section (ρ = RA/l); SI unit Ω m. (1) Resistivity of an alloy is generally higher than that of its constituent metals. (1)
OR (c)(i) Tungsten has a very high melting point (3380 °C) and high resistivity, so it can be kept very hot without melting. (1)
(ii) Alloys have higher resistivity and do not oxidise (burn) readily at high temperatures. (1)

More questions on this idea (1) – same method, other papers

B1-13.1 · **LA · 5 marks** · KVS Lucknow Pre-Board (2025-26) Q39

A student, Rohan, is conducting an experiment to investigate the relationship between the length of a wire and its resistance. He uses nichrome wires of different lengths and measures the resistance. He observes that as the length increases, the resistance also increases.
(a) What is the relationship between length and resistance? (b) If Rohan doubles the length, what happens to the resistance? (c) What would happen to the resistance if he uses a wire of the same length but larger area of cross-section? (d) Suggest two ways to reduce the resistance of the wire. (e) If he uses copper instead of nichrome, how will it affect the resistance? Explain.

✔ (a) R ∝ l (directly proportional). (1)
(b) Resistance doubles. (1)
(c) Resistance decreases (R ∝ 1/A). (1)
(d) Use a shorter wire; use a thicker wire (or a material of lower resistivity). (1)
(e) Resistance decreases, because copper has much lower resistivity than nichrome. (1)

Q B1-14 · Resistivity tables · ★ · 2 papers · 2 questions

Case · 4 marks

Study the table of materials and their resistivity (silver, copper, aluminium, tungsten, nichrome, glass, etc.) and answer:
(a) Which material is used in transmission wires?
(b) Which is the best conducting metal?
(c) Which of the following is used as filament in electric bulbs: (i) Nichrome (ii) Tungsten (iii) Manganin (iv) Silver
(d) What is the range of resistivity of metals (good conductors)? (i) 10^{-8} to 10^{-6} Ω m (ii) 10^{-6} to 10^{-4} Ω m (iii) 10^{10} to 10^{14} Ω m (iv) 10^{12} to 10^{14} Ω m

Source: KVS Lucknow 1st Pre-Board (2022-23) Q39

✔ **Answer** (a) Copper (and aluminium) – low resistivity. (1)
(b) Silver. (1)
(c) (ii) Tungsten. (1)
(d) (i) 10^{-8} to 10^{-6} Ω m. (1)

⚠ **Note:** NCERT Table 11.2 values are used for this case.

Q B1-14 · Resistivity tables · ★ · 2 papers · 2 questions

More questions on this idea (1) – same method, other papers

B1-14.1 · MCQ · 1 mark · CBSE Curriculum Aligned Competency Based Test Items Q1

The table shows four different materials and their resistivity: Material 1 – 1.62×10^{-8} Ω m; Material 2 – 100×10^{-6} Ω m; Material 3 – 6.84×10^{-8} Ω m; Material 4 – 44×10^{-6} Ω m. Which material is the best conductor of electricity?

A. Material 1 B. Material 2 C. Material 3 D. Material 4

✔ A. Material 1 (least resistivity)

Q B1-15 · ★ · Board ×1 · 1 paper

A–R · 1 mark

Assertion (A): The bending of a wire in the form of a coil of several turns does not affect its electrical resistance.

Reason (R): The electrical resistance of a wire is directly proportional to its electrical resistivity.

Source: CBSE 31/2/3 (GHF2E) (2025) Q19

✔ **Answer** (B) Both A and R are true, but R is not the correct explanation of A. [Bending does not change length or area, so R is unchanged.]

Q B1-16 · ★ · Board ×1 · 1 paper

LA · 5 marks

(a) (i) What is meant by resistance in an electric circuit?

(ii) In a series electric circuit comprising a resistor made of a metallic wire, the ammeter reads 500 mA. If the length of wire is doubled and area of cross-section is made half, what will be the new reading of the ammeter?

(iii) How will the resistivity of a wire be affected if both the length of the wire and its area of cross-section are doubled? Justify your answer.

OR

(b) (i) State Ohm's law. (ii) Derive an expression for equivalent resistance of parallel combination of three resistors having resistances R1, R2 and R3. (iii) V–I graph is given for two wires having identical shapes and sizes, but made of two different materials A and B. Out of A and B, which one is a better choice for making a heating element? Justify your answer.

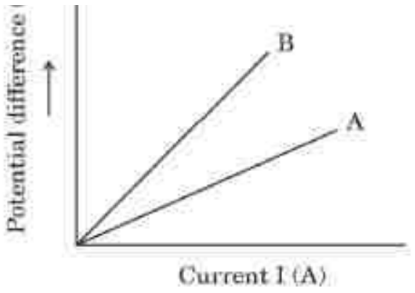


Figure from the question paper

Source: CBSE 31/7/3 Exam-2 (E7FDG) (2026) Q39

✔ **Answer** (a)(i) Resistance is the property of a conductor to resist the flow of charges; R = V/I. (1)

(ii) R' = ρ(2l)/(A/2) = 4R; I' = I/4 = 500/4 = 125 mA (2)

(iii) No change – resistivity depends only on the nature of the material (and temperature), not on length or area. (2)

OR (b)(i) V ∝ I at constant temperature. (1) (ii) I = I1 + I2 + I3; V/Rp = V/R1 + V/R2 + V/R3, so 1/Rp = 1/R1 + 1/R2 + 1/R3. (2)

(iii) B – its V–I line (V on y-axis) is steeper, so it has higher resistance, i.e. higher resistivity; heating elements need high resistivity. (2)

Q B1-17 · ★ · 1 paper

VSA · 2 marks

Priya has a copper wire and an aluminium wire of the same length. Can the electrical resistance of the two wires be the same? Justify your answer.

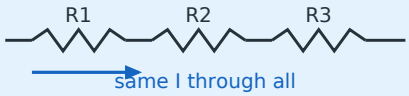
Source: CBSE Competency item bank (chapter-wise, with answer key) Q10

✔ **Answer** Yes (no marks without justification). (½) R = ρl/A; the two wires can have the same resistance if their areas of cross-section (thickness) are different in the right ratio. (1½)

B2 · Resistors in series

16 questions · 5 ideas · 23 papers
Prepared by Abhishek Das, TGT (Science)

Picture it
Series: Rs = R1 + R2 + R3. Same current through every resistor; voltage divides (V = V1 + V2 + V3). Rs is more than the largest resistance.



Rs = R1 + R2 + R3

Q B2-1 · Series circuit: total R, current and pd across each · ★★★ · Board ×2 · 13 papers · 8 questions

SA · 3 marks

Draw a schematic diagram of a circuit consisting of a battery of four dry cells of 1.5 V each, a 2 Ω resistor, a 6 Ω resistor, a 16 Ω resistor and a plug key all connected in series. Put an ammeter to measure the current in the circuit and a voltmeter across the 16 Ω resistor. Use Ohm's law to determine (a) ammeter reading, and (b) voltmeter reading when key is closed.

Also asked as: NCERT Exercise 10: three cells of 2 V each, 5 Ω, 8 Ω and 12 Ω in series – ammeter 0.24 A, voltmeter across 12 Ω = 2.88 V. [Practice Paper 2025-26 (J) Q36]

Source: CBSE 31/3/3 (DAA1B/3) (2024) Q32 · Practice Paper 2025-26 (J) Q36

✔ **Answer** Diagram (1)
V = 4 × 1.5 = 6 V; R = 2 + 6 + 16 = 24 Ω
(a) I = V/R = 6/24 = 0.25 A (1)
(b) V = IR = 0.25 × 16 = 4 V (1)

More questions on this idea (7) – same method, other papers

B2-1.1 · **MCQ · 1 mark** · Practice Paper 2024-25 (10) Q14 · Practice Paper 2024-25 (11) Q14 · Practice Paper 2024-25 (12) Q14
Two resistors 4 Ω and 2 Ω are connected in series, and a potential difference of 12 V is applied across the combination. The current through the circuit is:
(a) 4 A (b) 2 A (c) 1 A (d) 4.5 A
✔ (b) 2 A [R = 6 Ω; I = 12/6 = 2 A]

B2-1.2 · **MCQ · 1 mark** · KVS Delhi Region Pre-Board-II (2024-25) Q14
Three resistors of 2 ohms, 3 ohms and 6 ohms are connected in series. What is the potential difference across the 3 ohm resistor if the total voltage is 11 V?
(a) 3 V (b) 4 V (c) 5 V (d) 2 V
✔ (a) 3 V [R = 11 Ω; I = 11/11 = 1 A; V = IR = 1 × 3 = 3 V]

B2-1.3 · **SA · 3 marks** · Practice Paper 2020-21 Q33 · KVS Raipur Second Pre-Board (2025-26) Q35 · Practice Paper 2025-26 (B) Q34 · Practice Paper 2025-26 (I) Q34
An electric lamp of resistance 20 Ω and a conductor of resistance 4 Ω are connected to a 6 V battery in series. Calculate (i) the total resistance of the circuit, (ii) the current through the circuit, (iii) the potential difference across the electric lamp (and conductor).
Also asked as: KVS Raipur PB-2 2025-26 Q35 (5 marks) adds: power of lamp P = VI = 5 × 0.25 = 1.25 W; OR torch bulb 6 V, 600 mA – P = 3.6 W, R = 10 Ω, energy in 3.5 h = 3.6 × 12600 = 45360 J. (NCERT Example 11.3)
✔ (i) R = 20 + 4 = 24 Ω (1)
(ii) I = 6/24 = 0.25 A (1)
(iii) V(lamp) = 0.25 × 20 = 5 V; V(conductor) = 0.25 × 4 = 1 V (1)

B2-1.4 · **SA · 3 marks** · CBSE 31/S/1 Supplementary (EFGH/S) Q31 · CBSE 31/S/2 Supplementary (EFGH/S) Q32 · CBSE 31/S/3 Supplementary (EFGH/S) Q29

In the given circuit (2 Ω, 4 Ω and 6 Ω in series with a 6 V battery; voltmeter across the 4 Ω resistor), when key is closed, determine: (i) Total resistance offered by the three resistors (ii) Reading of the ammeter (iii) Reading of the voltmeter

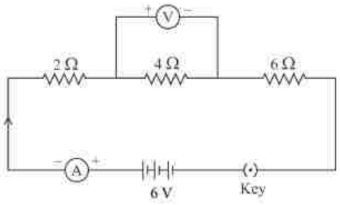


Figure from the question paper

✔ (i) R = 2 + 4 + 6 = 12 Ω (1)
(ii) I = V/R = 6/12 = 0.5 A (1)
(iii) V = IR = 0.5 × 4 = 2 V (1)

Q B2-1 · Series circuit: total R, current and pd across each · ★★★ · Board ×2 · 13 papers · 8 questions

B2-1.5 · **SA · 3 marks** · Practice Paper 2024-25 (2) Q33
Calculate: (i) the effective resistance of the circuit and the current in the circuit (ii) potential difference across 10 Ω resistor of the circuit shown (5 Ω and 10 Ω in series with a 2 V cell).
✔ (i) R = 5 + 10 = 15 Ω; I = 2/15 = 0.133 A (2)
(ii) V = IR = (2/15) × 10 = 1.33 V (1)

B2-1.6 · **SA · 3 marks** · KVS Lucknow Pre-Board (2025-26 (2)) Q36
Three resistors of 5 Ω, 10 Ω and 15 Ω are connected in series and the combination is connected to a battery of 30 V. Ammeter and voltmeter are connected in the circuit. (a) Draw a circuit diagram to connect all the devices in proper order. (b) What is the current flowing and the potential difference across the 10 Ω resistance?
✔ (a) Diagram: ammeter in series, voltmeter across 10 Ω. (1)
(b) R = 30 Ω; I = 30/30 = 1 A (1); V = 1 × 10 = 10 V (1)

B2-1.7 · **LA · 5 marks** · Practice Paper 2024-25 (10) Q36 · Practice Paper 2024-25 (11) Q36 · Practice Paper 2024-25 (12) Q36
Suppose a bulb of resistance 20 Ω is connected in series with a resistor of value 6 Ω and a 12 V constant power supply. (a) Draw the circuit diagram. (b) Find the total resistance of the circuit. (c) Find the total current of the circuit. (d) Find the potential difference across the 6 Ω resistance wire. (e) Find the potential difference across the bulb.
✔ (a) Diagram (1)
(b) R = 20 + 6 = 26 Ω (1)
(c) I = 12/26 = 0.46 A (1)
(d) V = 0.46 × 6 = 2.77 V (1)
(e) V = 0.46 × 20 = 9.23 V (1)

Q B2-2 · What stays the same in series and in parallel · ★★ · Board ×1 · 5 papers · 3 questions

MCQ · 1 mark
Two LED bulbs of 12 W and 6 W are connected in series. If the current through 12 W bulb is 0.06 A, the current through 6 W bulb will be:
(a) 0.04 A (b) 0.06 A
(c) 0.08 A (d) 0.12 A

Also asked as: Two LED bulbs of 10 W and 5 W in series; current through 5 W bulb 0.005 A; current through 10 W bulb = 0.005 A. [31/4/2 2023 Q16; Practice Papers 2024-25 (3) and (9) Q14]

Source: CBSE 31/4/1 (Z1XYW/4) (2023) Q13 · CBSE 31/4/3 (Z1XYW/4) (2023) Q14 · CBSE 31/4/2 (Z1XYW/4) (2023) Q16 · Practice Paper 2024-25 (3) Q14 · Practice Paper 2024-25 (9) Q14

✔ **Answer** (b) 0.06 A – in series the same current flows through every component.

More questions on this idea (2) – same method, other papers

B2-2.1 · **MCQ · 1 mark** · Practice Paper 2024-25 (6) Q14
When more than one resistors are in series, the quantity that remains same in them is:
(a) Potential difference (b) Ammeter (c) Resistance (d) Current
✔ (d) Current

B2-2.2 · **MCQ · 1 mark** · KVS Lucknow Pre-Board I (2023-24) Q3
The value of the following physical quantity remains same in the parallel connection:
(a) Electric charge (b) Electric resistance (c) Electric current (d) Voltage
✔ (d) Voltage

Q B2-3 · Equivalent resistance in series · ★★ · 3 papers · 3 questions

VSA · 2 marks
Draw a circuit diagram to show the combination of three resistors of 2 Ω, 4 Ω and 6 Ω connected in series. Calculate the total resistance.

Source: Vedantu Mock Paper 7 (2026-27) Q43

✔ **Answer** Diagram (1); Rs = 2 + 4 + 6 = 12 Ω (1)

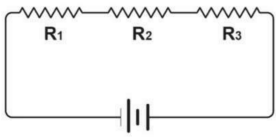
More questions on this idea (2) – same method, other papers

B2-3.1 · **MCQ · 1 mark** · NCERT Exemplar Sample Question Paper-II Q12
What is the maximum resistance which can be made using five resistors each of 1/5 Ω?
(a) 1/5 Ω (b) 10 Ω (c) 5 Ω (d) 1 Ω
✔ (d) 1 Ω [all in series: 5 × 1/5 = 1 Ω]

Q B2-3 · Equivalent resistance in series · ★★ · 3 papers · 3 questions

B2-3.2 · MCQ · 1 mark · CBSE Curriculum Aligned Competency Based Test Items Q9

Leena creates an electric circuit with three resistors R1 = 2 Ω, R2 = 3 Ω and R3 = 4 Ω connected in series. What is the equivalent resistance of the circuit?
A. 3 Ω B. 4 Ω C. 5 Ω D. 9 Ω



R1	R2	R3
2Ω	3Ω	4Ω

Figure from the question paper

✔ D. 9 Ω

Q B2-4 · ★ · Board ×1 · 1 paper

MCQ · 1 mark

Two wires of same metal have the same length but their cross-sectional areas are in the ratio of 4 : 1. They are joined in series. The resistance of the thicker wire is 20 Ω. The total resistance of the combination is:

(A) 25 Ω (B) 100 Ω
(C) 16 Ω (D) 340 Ω

Source: CBSE 31(B) (VI) Series CDBA Q4

✔ **Answer** (B) 100 Ω [thinner wire has ¼ the area, so 4 × 20 = 80 Ω; total 20 + 80 = 100 Ω]

Q B2-5 · ★ · 1 paper

Case · 4 marks

Two or more resistances are connected in series or in parallel or both, depending upon whether we want to increase or decrease the circuit resistance. Resistances are in series if the current through each is the same.
(i) When three resistors each of resistance R ohm are connected in series, what will be the equivalent resistance? (1)
(ii) A wire of length 20 cm having resistance 20 Ω is cut into 4 equal pieces and then joined in series. What is the equivalent resistance? (1)
(iii) In the circuit (five resistors R in series between A and B, R = 2 Ω), find the equivalent resistance between A and B. (2)
OR
(iii) In the given circuit (1 Ω, 2 Ω, 3 Ω in series with 18 V), what is the current in each resistor? (2)

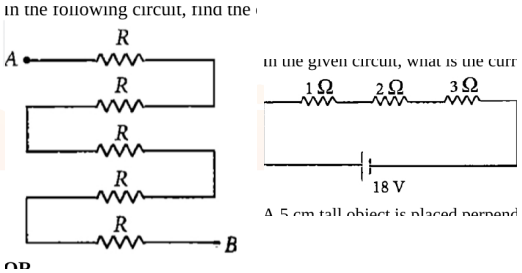


Figure from the question paper

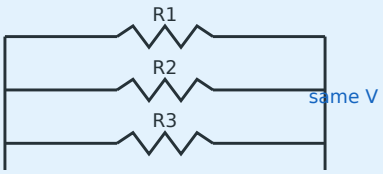
Source: Practice Paper 2025-26 (A) Q38

✔ **Answer** (i) 3R (1)
(ii) Each piece 5 Ω; series 4 × 5 = 20 Ω (1)
(iii) 5R = 5 × 2 = 10 Ω (2)
OR (iii) R = 6 Ω; I = 18/6 = 3 A in each resistor (series) (2)

B3 · Resistors in parallel

22 questions · 11 ideas · 25 papers
Prepared by Abhishek Das, TGT (Science)

Picture it
Parallel: 1/Rp = 1/R1 + 1/R2 + 1/R3. Same voltage across every resistor; current divides (I = I1 + I2 + I3). Rp is less than the smallest resistance. Home appliances are in parallel.



1/Rp = 1/R1 + 1/R2 + 1/R3

Q B3-1 · Parallel circuit: Rp, branch currents and total current · ★★★ · Board ×3 · 13 papers · 9 questions

LA · 5 marks
There are three resistors of 10 Ω, 20 Ω and 30 Ω joined in parallel in a circuit. The potential difference across the electric circuit is 10 V. (a) Draw a circuit diagram for the above case. (b) Find the total resistance of the combination of resistors. (c) Calculate the electric current drawn from the same source.

Also asked as: With a 12 V battery (NCERT Example 11.8): currents 1.2 A, 0.6 A, 0.4 A; total 2.2 A; Rp = 5.45 Ω. [Practice Paper 2025-26 (B) Q34]

Source: CBSE 31/5/2 (Z1XYW/5) (2023) Q34 · Practice Paper 2025-26 (B) Q34

✔ **Answer** (a) Diagram (1)
(b) 1/Rp = 1/10 + 1/20 + 1/30 = (6 + 3 + 2)/60 = 11/60; Rp = 60/11 = 5.45 Ω (2)
(c) I = V/Rp = 10 × 11/60 = 1.83 A (2)

More questions on this idea (8) – same method, other papers

B3-1.1 · **MCQ · 1 mark** · CBSE Curriculum Aligned Competency Based Test Items Q10
The same resistors R1 = 2 Ω, R2 = 3 Ω, R3 = 4 Ω are connected in a parallel combination. What is the equivalent resistance of the circuit?
A. Less than 1 Ω B. 1 Ω C. 2 Ω D. More than 2 Ω
✔ A. Less than 1 Ω [1/Rp = 1/2 + 1/3 + 1/4 = 13/12; Rp = 0.92 Ω]

B3-1.2 · **MCQ · 1 mark** · CBSE 31(B) (VI) Series CDBA Q3
Two resistors of 1 Ω and 3 Ω are connected in parallel in a circuit. If a current of 1 ampere is flowing through the circuit, the current flowing through the 3 Ω resistor is:
(A) 1.0 A (B) 0.75 A (C) 0.33 A (D) 0.25 A
✔ (D) 0.25 A [Rp = 3/4 Ω; V = 1 × 3/4 = 0.75 V; I = 0.75/3 = 0.25 A]

B3-1.3 · **VSA · 2 marks** · Practice Paper 2020-21 Q26
Calculate the equivalent resistance of the circuit in which two 20 ohm resistances are connected in parallel.
✔ 1/Rp = 1/20 + 1/20 = 2/20; Rp = 10 Ω (2)

B3-1.4 · **SA · 3 marks** · Vedantu Sample Paper Set 3 (2026-27) Q32 · Vedantu Sample Paper Set 5 (2026-27) Q32 · Practice Paper 2024-25 (2) Q32

In the circuit diagram given here (2 Ω, 5 Ω and 10 Ω in parallel with a 6 V battery), calculate: (i) the total effective resistance and the total current (ii) the current through each resistor.

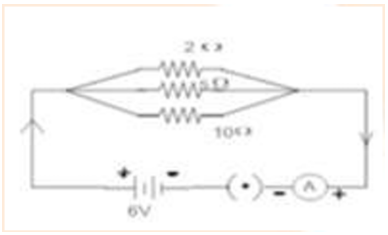


Figure from the question paper (screenshot)

✔ (i) 1/R = 1/2 + 1/5 + 1/10 = 8/10; R = 1.25 Ω (1); I = 6/1.25 = 4.8 A (1)
(ii) I1 = 6/2 = 3 A; I2 = 6/5 = 1.2 A; I3 = 6/10 = 0.6 A (1)

B3-1.5 · **SA · 3 marks** · Practice Paper 2024-25 (14) Q31 · Practice Paper 2024-25 (15) Q31
In the circuit given below, three resistors of 5 Ω, 10 Ω and 20 Ω, respectively, are connected across a battery of 12 V (in parallel). Calculate: a) Current through each resistor b) Total current in the circuit c) Total resistance of the circuit
✔ a) Same 12 V across each: I1 = 12/5 = 2.4 A; I2 = 12/10 = 1.2 A; I3 = 12/20 = 0.6 A (1)
b) I = 2.4 + 1.2 + 0.6 = 4.2 A (1)
c) R = V/I = 12/4.2 = 2.86 Ω [check: 1/R = 1/5 + 1/10 + 1/20 = 7/20] (1)

Q B3-1 · Parallel circuit: Rp, branch currents and total current · ★★★ · Board ×3 · 13 papers · 9 questions

B3-1.6 · **SA · 3 marks** · Practice Paper 2025-26 (E) Q36

In the circuit (3 V battery, key, ammeter; 10 Ω and 15 Ω in parallel), (i) how much current is flowing through (a) 10 Ω and (b) 15 Ω resistor? (ii) What is the ammeter reading?

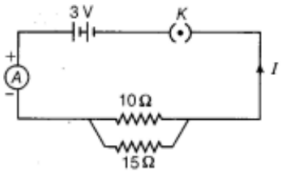


Figure from the question paper

✔ (i)(a) I = 3/10 = 0.3 A (1) (b) I = 3/15 = 0.2 A (1)
(ii) 0.3 + 0.2 = 0.5 A (1)

B3-1.7 · **LA · 5 marks** · CBSE 31/4/3 (2026) Q39

(A) (i) Derive an expression for the equivalent resistance of three resistors connected in parallel with a battery as shown (R1 = 2 Ω, R2 = 4 Ω, R3 = 6 Ω, 12 V).
(ii) Find the values of the electric currents flowing through the resistors R1, R2 and R3.
OR
(B) (i) Define electrical resistivity of a material.
(ii) How will the resistivity and resistance of a conducting wire change if the length and area of cross-section of the wire both are doubled? Justify.
(iii) Calculate the electric current flowing through a 4 Ω resistor that produces 100 J of heat every second.

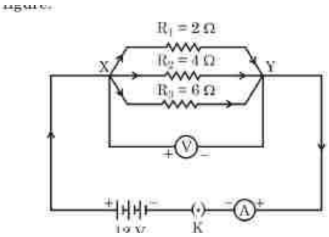


Figure from the question paper

✔ (A)(i) Derivation: I = I1 + I2 + I3 = V/R1 + V/R2 + V/R3 = V/Rp, so 1/Rp = 1/R1 + 1/R2 + 1/R3. (2)
(ii) I1 = 12/2 = 6 A; I2 = 12/4 = 3 A; I3 = 12/6 = 2 A (3)
OR (B)(i) Resistivity is the resistance of a conductor of unit length and unit area of cross-section; ρ = RA/l. (1)
(ii) Resistivity: no change (depends on material). Resistance: R' = ρ(2l)/(2A) = R, no change. (2)
(iii) P = I²R; 100 = I² × 4; I = 5 A (2)

B3-1.8 · **LA · 5 marks** · CBSE Competency item bank (chapter-wise, with answer key) Q11

Three resistors in a circuit are attached as shown. The resistances of F and G are 10 ohm and 5 ohm respectively. The resistance of E is unknown. They are connected to a battery of 6 V. (a) What is the term used to describe such an arrangement of resistors? (b) What is the resistance of E if 0.3 A current flows through it? (c) What is the total current flowing in the circuit?

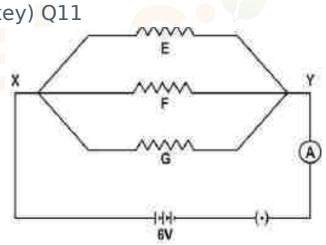


Figure from the question paper

✔ (a) Parallel arrangement. (1)
(b) RE = V/I = 6/0.3 = 20 Ω (2)
(c) I = 6/20 + 6/10 + 6/5 = 0.3 + 0.6 + 1.2 = 2.1 A (2)

Q B3-2 · Wire cut into equal parts · ★★ · Board ×1 · 4 papers · 2 questions

VSA · 2 marks

(a) A wire of resistance R is cut into three equal parts. If these three parts are then joined in parallel, calculate the total resistance of the combination so formed.
OR
(b) Define electric power. When do we say that the power consumed in an electric circuit is 1 watt?

Source: CBSE 31/1/1 (1GEFH) (2025) Q25

✔ **Answer** (a) Each part = R/3; 1/Rp = 3/(R/3) = 9/R; Rp = R/9 (2)
OR (b) Electric power is the rate at which electric energy is consumed. (1) 1 W is the power consumed when 1 A flows at a pd of 1 V (1 J/s). (1)

Q B3-2 · Wire cut into equal parts · ★★ · Board ×1 · 4 papers · 2 questions

More questions on this idea (1) – same method, other papers

B3-2.1 · **SA · 3 marks** · Bangalore Sahodaya Pre-Board Set 1 (2023-24) Q32 · KVS Ahmedabad Region paper (Set A) (2025-26) Q36 · KVS Ahmedabad Region paper (Set B) (2025-26) Q36

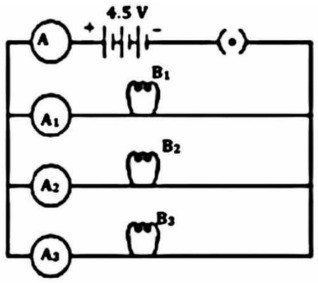
(i) Consider a conductor of resistance R, length L, thickness d and resistivity ρ. Now this conductor is cut into four equal parts. What will be the new resistivity of each of these parts? Why?
(ii) Find the resistance if all of these parts are connected in (a) parallel (b) series.

✔ (i) Resistivity does not change; it depends only on the nature of the material. (1)
(ii) Each part = R/4. (a) Parallel: (R/4)/4 = R/16 (1) (b) Series: 4 × R/4 = R (1)

Q B3-3 · Bulbs in parallel: one fuses, the rest glow · ★★ · 4 papers · 3 questions

Case · 4 marks

Study the circuit in which three identical bulbs B1, B2 and B3 are connected in parallel with a battery of 4.5 V (ammeters A1, A2, A3 in the branches, A in the main line).
(a) If bulb B3 gets fused, then the bulbs B1 and B2 will: (a) glow with same brightness (b) stop working (c) B1 will glow and B2 will not glow (d) B2 will glow and B1 will not glow
(b) If the wattage of each bulb is 1.5 W and all bulbs glow simultaneously, the ammeter A will show: (a) 1 A (b) 2 A (c) 3 A (d) 4 A
(c) What is the total resistance of the given circuit?
OR
(d) How many resistors of 88 Ω can be connected in parallel to carry 10 A current on a 220 V line?



Study the above circuit diagram in which the
Figure from the question paper

Source: Practice Paper 2024-25 (14) Q39 · Practice Paper 2024-25 (15) Q39

✔ **Answer** (a) (a) glow with same brightness – parallel branches are independent. (1)
(b) (a) 1 A [P = 3 × 1.5 = 4.5 W; I = 4.5/4.5] (1)
(c) R = V/I = 4.5/1 = 4.5 Ω (2)
OR (d) Rp needed = 220/10 = 22 Ω; 88/n = 22, n = 4 (2)

⚠ **Note:** The paper prints '88 W'; it should read 88 Ω (NCERT Exercise 12 uses 176 Ω and 5 A).

More questions on this idea (2) – same method, other papers

B3-3.1 · **VSA · 2 marks** · KVS Lucknow Pre-Board (2025-26) Q34

Neha decorates the window of her room using three identical bulbs B1, B2 and B3 as shown. When all the three bulbs glow, a current of 3 A is recorded by ammeter A. (i) If the resistance of each bulb is 4.5 ohm, find the equivalent resistance of the combination of bulbs. (ii) Draw the above diagram with a voltmeter connected in the circuit.

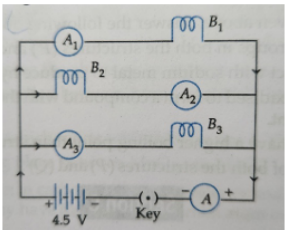


Figure from the question paper (screenshot)

✔ (i) 1/Rp = 3/4.5; Rp = 1.5 Ω (1)
(ii) Same diagram with a voltmeter connected across the battery (in parallel with the bulbs). (1)

B3-3.2 · **Case · 4 marks** · Vedantu Mock Paper 7 (2026-27) Q64

Case: Ravi connected two bulbs in parallel to a battery. He observed that even when one bulb fused, the other continued to glow.
(a) Why do bulbs in a parallel circuit continue to glow when one is fused?
(b) Draw a circuit diagram showing parallel connection of two bulbs and a battery.
(c) Write one advantage of parallel arrangement over series arrangement in household circuits.

✔ (a) Each bulb is on a separate path across the battery; when one fuses, the other path is still complete. (1)
(b) Diagram: two bulbs connected between the same two points across the battery, with a key. (2)
(c) Each appliance gets the full voltage / can be switched on or off independently. (1)

Q B3-4 · ★ · Board ×1 · 2 papers

LA · 5 marks

Derive the following equations for the series and parallel arrangement of resistances: (i) R = R1 + R2 + R3 (ii) 1/R = 1/R1 + 1/R2 + 1/R3

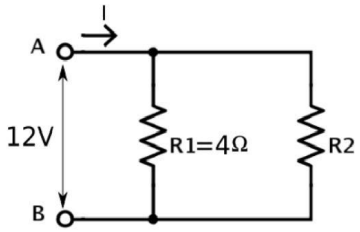
Source: Practice Paper 2020-21 Q36 · CBSE old papers (RSH/1, LRH/1) (pre-2020) Q18

✔ **Answer** (i) Series: same current I; V = V1 + V2 + V3 = IR1 + IR2 + IR3 = I(R1 + R2 + R3); V = IRs, so Rs = R1 + R2 + R3. (2½)
(ii) Parallel: same V; I = I1 + I2 + I3 = V/R1 + V/R2 + V/R3; I = V/Rp, so 1/Rp = 1/R1 + 1/R2 + 1/R3. (2½)

Q B3-5 · ★ · 2 papers

VSA · 2 marks

(A) A student has two resistors – 2 Ω and 3 Ω. She has to put one of them in place of R2 as shown in the circuit (12 V, R1 = 4 Ω in parallel with R2). The current that she needs in the entire circuit is exactly 9 A. Show by calculation which of the two resistors she should choose.



which of the two resistors she should choose.

Figure from the question paper

Source: KVS Ahmedabad Region paper (Set A) (2025-26) Q34 · KVS Ahmedabad Region paper (Set B) (2025-26) Q34

✔ **Answer** Current through R1 = 12/4 = 3 A; so current needed through R2 = 9 – 3 = 6 A. (1)
R2 = 12/6 = 2 Ω – she should choose the 2 Ω resistor. (1)

Q B3-6 · ★ · Board ×1 · 1 paper

MCQ · 1 mark

If four identical resistors, of resistance 8 ohm, are first connected in series so as to give an effective resistance Rs, and then connected in parallel so as to give an effective resistance Rp, then the ratio Rs/Rp is:

(a) 32 (b) 2
(c) 0.5 (d) 16

Source: CBSE 31/1/1 (Z1XYW/1) (2023) Q13 · CBSE 31/1/2 (Z1XYW/1) (2023) Q16 · CBSE 31/1/3 (Z1XYW/1) (2023) Q14

✔ **Answer** (d) 16 [Rs = 32 Ω, Rp = 2 Ω]

Q B3-7 · ★ · Board ×1 · 1 paper

Case · 4 marks

Study the circuit in which two resistors X and Y of resistances 3 Ω and 6 Ω respectively are joined in series with a battery of 2 V.
(I) Draw a circuit diagram showing the above two resistors X and Y joined in parallel with the same battery and same ammeter and voltmeter. (1)
(II) In which combination of resistors will (i) the potential difference across X and Y and (ii) the current through X and Y be the same? (1)
(III)(a) Find the current drawn from the battery by the series combination. (2)
OR (III)(b) Determine the equivalent resistance of the parallel combination. (2)

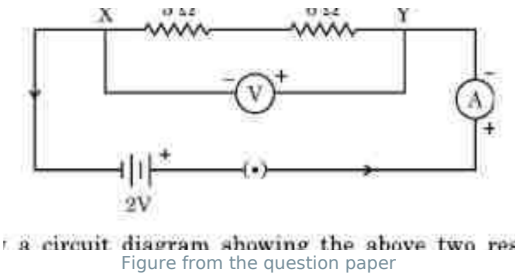


Figure from the question paper

Source: CBSE 31/6/3 (GF6HE) (2025) Q39

✔ **Answer** (I) Diagram with X and Y side by side between the same two points, ammeter in main line, voltmeter across them. (1)
(II) (i) pd same – parallel; (ii) current same – series. (1)
(III)(a) R = 3 + 6 = 9 Ω; I = 2/9 = 0.22 A (2)
OR (b) 1/Rp = 1/3 + 1/6 = 1/2; Rp = 2 Ω (2)

Q B3-8 · ★ · 1 paper

VSA · 1 mark

Study the circuit diagram. You are given one extra resistor. By drawing a new circuit diagram, show how you can connect the extra resistor to increase the reading on the ammeter.

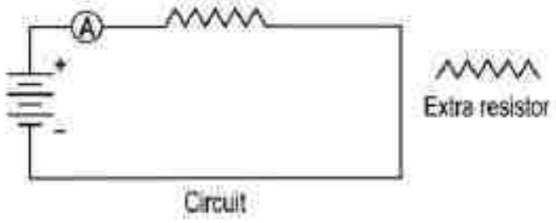


Figure from the question paper

Source: CBSE Competency item bank (chapter-wise, with answer key) Q9

✔ **Answer** Connect the extra resistor in parallel with the resistor in the circuit; total resistance decreases, so the current increases. (1)

Q B3-9 · ★ · 1 paper

VSA · 1 mark

The circuit has a bulb, three resistors R1, R2, R3 (each with a switch S1, S2, S3) in parallel, and two ammeters A1 and A2 in the main line. How will the reading on ammeter A2 compare with the reading on A1 when (i) all three switches are closed? (ii) one switch is closed?

switches S1, S2 and S3. There are also two ammeter

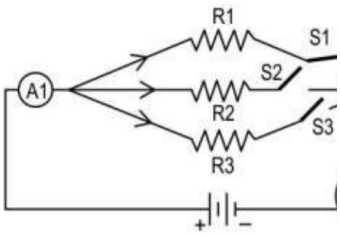


Figure from the question paper

Source: CBSE Competency Focused Practice Questions (CFPQ) Vol 2 Q157

✔ **Answer** (i) Same (ii) Same – both ammeters are in the main line in series, so they carry the same total current. (½ + ½)

Q B3-10 · ★ · 1 paper

SA · 3 marks

Two resistors with resistances 5 Ω and 10 Ω are to be connected to a battery of emf 6 V. How will you connect the resistances to obtain (a) maximum current? (b) Calculate the strength of the total current in the circuit in the two cases.

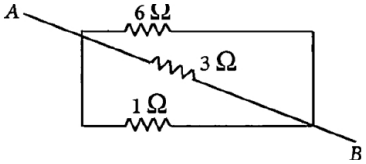
Source: Vedantu Sample Paper Set 2 (2026-27) Q31

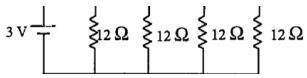
✔ **Answer** (a) In parallel (least resistance). (1)
(b) Parallel: R = 10/3 Ω, I = 6 × 3/10 = 1.8 A (1); Series: R = 15 Ω, I = 6/15 = 0.4 A (1)

Q B3-11 · ★ · 1 paper

Case · 4 marks

If two or more resistances are connected so that the same potential difference gets applied to each, they are in parallel; the current gets additional paths and overall resistance decreases.
(i) Three resistances 2 Ω, 6 Ω and 8 Ω are connected in parallel. What will be the equivalent resistance? (1)
(ii) A wire of resistance 12 Ω is cut into three equal pieces and then their ends are twisted together. What is the equivalent resistance? (1)
(iii) Three resistances (6 Ω, 3 Ω, 1 Ω) are connected as shown. Calculate the equivalent resistance between A and B. (2)
OR
(iii) Four 12 Ω resistors are connected in parallel across 3 V. Find the current in each resistance. (2)





OR

Find the current in each resistance. (2)

Figure from the question paper

Source: Practice Paper 2025-26 (C) Q38

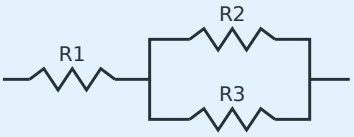
✔ **Answer** (i) 1/Rp = 1/2 + 1/6 + 1/8 = (12 + 4 + 3)/24 = 19/24; Rp = 24/19 = 1.26 Ω (1)
(ii) Each piece 4 Ω; three in parallel: 4/3 Ω (1)
(iii) All three are in parallel: 1/Rp = 1/6 + 1/3 + 1/1 = 9/6; Rp = 2/3 Ω (2)
OR (iii) Each resistor gets 3 V: I = 3/12 = 0.25 A (2)

⚠ **Note:** The source key worked part (i) with 4 Ω instead of 6 Ω (got 8/7 Ω). Correct answer with 2, 6, 8 Ω is 24/19 Ω.

B4 · Mixed networks and circuit-based cases

34 questions · 19 ideas · 34 papers
Prepared by Abhishek Das, TGT (Science)

Picture it
Solve a network step by step: replace each parallel group by Rp, add series parts, find the total current I = V/R, then work back to the pd and current in each part.



R = R1 + (R2 × R3)/(R2 + R3)

Q B4-1 · R in series with a parallel pair · ★★★ · Board ×2 · 10 papers · 5 questions

SA · 3 marks

(a) Calculate the total resistance of the given circuit and find the total current flowing in it (R1 = 1 Ω in series; R2 = 10 Ω in parallel with R3 = 6 Ω + R4 = 4 Ω; 12 V).
OR
(b) How would you join three resistors each of resistance 6 Ω, so that the equivalent resistance of the combination is (i) 9 Ω, and (ii) 4 Ω?

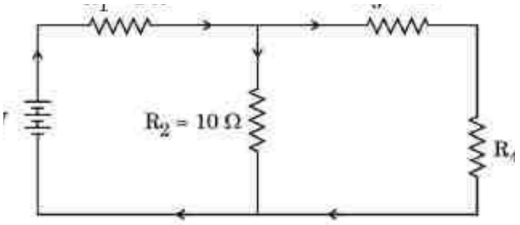


Figure from the question paper

Source: CBSE 31/7/1 Exam-2 (E7FDG) (2026) Q33 · CBSE 31/7/2 Exam-2 (E7FDG) (2026) Q33 · CBSE 31/7/3 Exam-2 (E7FDG) (2026) Q34 · KVS Lucknow Pre-Board (2025-26 (2)) Q34

✔ **Answer** (a) R3 + R4 = 10 Ω; 10 ∥ 10 = 5 Ω; total = 1 + 5 = 6 Ω (1½); I = 12/6 = 2 A (½)
OR (b)(i) Two 6 Ω in parallel (3 Ω) + 6 Ω in series = 9 Ω (1) (ii) Two 6 Ω in series (12 Ω) in parallel with 6 Ω: 12 × 6/18 = 4 Ω (1)

⚠ **Note:** Part (b) is NCERT Exercise 9.

Q B4-1 · R in series with a parallel pair · ★★★ · Board ×2 · 10 papers · 5 questions

More questions on this idea (4) – same method, other papers

B4-1.1 · **VSA · 2 marks** · CBSE Sample Question Paper (3-section) (2025-26) Q34 · CBSE Sample Question Paper (2025-26) Q34 · KVS Lucknow Pre-Board (2025-26) Q34

Study the circuit (two 24 Ω resistors in parallel, in series with 12 Ω, 6 V battery, ammeters A1 and A2) and find out: (i) Current in 12 Ω resistor, (ii) Difference in the readings of A1 and A2 if any.

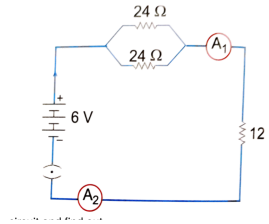


Figure from the question paper

✔ (i) 24 ∥ 24 = 12 Ω; total = 12 + 12 = 24 Ω; I = 6/24 = 0.25 A (1½)
(ii) Same readings of A1 and A2 (both in the main line). (½)

B4-1.2 · **SA · 3 marks** · CBSE 31/3/1 (DAA1B/3) (2024) Q33

(a) State Ohm's law. Write formula for the equivalent resistance Rp of the parallel combination of three resistors R1, R2 and R3.
(b) Find the resistance of the following network of resistors (R in series with R ∥ R between X and Y).

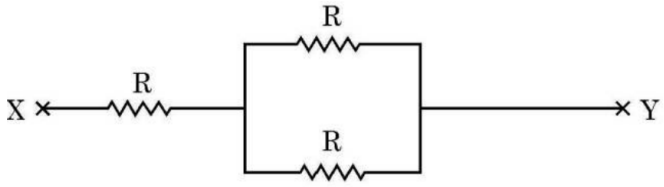


Figure from the question paper

✔ (a) V ∝ I at constant temperature (1); 1/Rp = 1/R1 + 1/R2 + 1/R3 (1)
(b) R + R/2 = 3R/2 (1)

B4-1.3 · **LA · 5 marks** · CBSE Sample Question Paper (3-section) (2025-26) Q34 · CBSE Sample Question Paper (2025-26) Q34 · CBSE Sample Question Paper 2025-26 (ALLEN copy) Q34 · Bangalore Sahodaya Pre-Board 1 Set 1 (2024-25) Q35 · Bangalore Sahodaya Pre-Board 1 (2025-26) Q39 · KVS Lucknow Pre-Board (2025-26 (2)) Q39 · Practice Paper 2025-26 (I) Q36 · Practice Paper 2024-25 (4) Q33

Find out the following in the electric circuit given in the figure (4 Ω between A and B; two 8 Ω resistors in parallel between C and D; 8 V battery; ammeters A1 and A2):
(i) Effective resistance of two 8 Ω resistors in the combination.
(ii) Current flowing through 4 Ω resistor.
(iii) Potential difference across 4 Ω resistance.
(iv) Power dissipated in 4 Ω resistor.
(v) Difference in ammeter readings, if any.

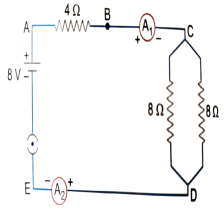


Figure from the question paper

Also asked as: SQP 2025-26 (2 marks): (i) 4 Ω (ii) 1 A. Practice Paper 2024-25 (4) Q33: pd across 4 Ω = 4 V; power = 4 W.
✔ (i) 1/Rp = 1/8 + 1/8; Rp = 4 Ω (1)
(ii) R = 4 + 4 = 8 Ω; I = 8/8 = 1 A (1)
(iii) V = IR = 1 × 4 = 4 V (1)
(iv) P = I²R = 1 × 4 = 4 W (1)
(v) No difference; A1 and A2 are in series in the same line, same current. (1)
⚠ NCERT Exercise 18 type circuit. CBSE SQP 2025-26 asks only (i) and (ii) for 2 marks.

Q B4-1 · R in series with a parallel pair · ★★★ · Board ×2 · 10 papers · 5 questions

B4-1.4 · LA · 15 marks · CBSE Competency-Based Education item bank (Science10 items) Q1

The circuit in Fig. 1.1 has resistors in series and parallel (two 6 Ω in parallel, in series with 2 Ω; 6 V battery; meters X and Y).

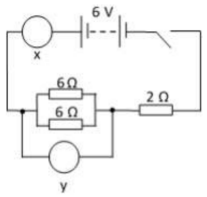


Figure from the question paper

(a) State two factors that affect the resistance of a resistor. (2)
(b) X and Y are meters. Identify X and Y and the electrical property that each meter measures. (2)
(c) Calculate the equivalent resistance in the circuit. (4)
(d) Using your answer to (c), calculate the current in the circuit. State the unit. (3)
(e) Explain the impact of connecting resistors in series and in parallel on the resistance of a simple circuit. (4)

✔ (a) Length; area of cross-section (also material, temperature). (2)
(b) X – ammeter, measures current; Y – voltmeter, measures potential difference. (2)
(c) 1/R = 1/6 + 1/6, R = 3 Ω; total = 3 + 2 = 5 Ω (4)
(d) I = V/R = 6/5 = 1.2 A (3)
(e) Series: voltage is shared, total resistance increases, current decreases. Parallel: same voltage, total resistance decreases, current increases; more paths for electrons; can be switched independently. (4)

Q B4-2 · Parallel arms with resistors in series · ★★★ · Board ×1 · 6 papers · 4 questions

SA · 3 marks

In the given circuit (10 Ω and 50 Ω in series, this combination in parallel with 30 Ω; 6 V battery and ammeter) determine the value of: (i) total resistance of the circuit (ii) current flowing through the ammeter.

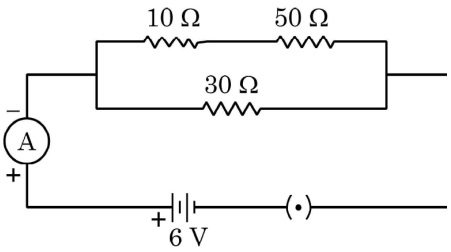


Figure from the question paper

Source: CBSE 31/2/2 Term-II (QQCRR/2) (2022) Q10

✔ **Answer** (i) 10 + 50 = 60 Ω; 60 Ω in parallel with 30 Ω: R = 60 × 30/90 = 20 Ω (2)
(ii) I = V/R = 6/20 = 0.3 A (1)

⚠ **Note:** This page is a scanned image in the file; the text was read by OCR.

More questions on this idea (3) – same method, other papers

B4-2.1 · VSA · 2 marks · Practice Paper 2024-25 (10) Q25 · Practice Paper 2024-25 (11) Q25 · Practice Paper 2024-25 (12) Q25

Study the circuit and find the (i) total resistance in arm CE (6 Ω + 6 Ω) (ii) current in arm AB (9 Ω + 8 Ω), with 5 V battery.
OR
Draw a schematic labelled diagram of a closed circuit which connects all the given components in series across a 12 V battery: (i) 20 W lamp (ii) an ammeter (iii) a switch (iv) 10 Ω/100 W resistor.

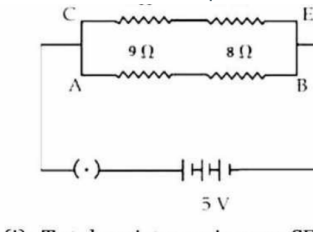


Figure from the question paper

✔ (i) RCE = 6 + 6 = 12 Ω (1)
(ii) RAB = 9 + 8 = 17 Ω; I = 5/17 = 0.29 A (1)
OR Series diagram: battery – switch – ammeter – lamp – resistor. (2)
⚠ Values 9 Ω and 8 Ω are read from the printed figure; check with the paper.

Q B4-2 · Parallel arms with resistors in series · ★★★ · Board ×1 · 6 papers · 4 questions

B4-2.2 · **SA · 3 marks** · Practice Paper 2024-25 (3) Q32

For the circuit shown (arm AB: 6 Ω and 3 Ω in series; arm CD: 12 Ω and 3 Ω in series; both arms in parallel across 4 V), what is the value of (i) current through 6 Ω resistor? (ii) potential difference across 12 Ω resistor?

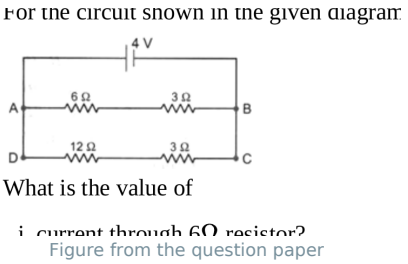


Figure from the question paper

✔ (i) Arm AB = 9 Ω; I1 = 4/9 = 0.44 A (1½)
(ii) Arm CD = 15 Ω; I2 = 4/15 = 0.27 A; V = 0.27 × 12 = 3.2 V (1½)

B4-2.3 · **Case · 4 marks** · Practice Paper 2025-26 (D) Q38

Study the electric circuit in which the resistors are arranged in three arms A (5 Ω, 15 Ω, 20 Ω), B (5 Ω, 10 Ω, 15 Ω) and C (10 Ω, 20 Ω, 30 Ω) with a 6 V battery.
(i) Find the equivalent resistance of arm B. (1)
(ii) Calculate the equivalent resistance of the parallel combination of arms B and C. (1)
(iii) Determine the current that flows through the ammeter. (2)
OR
Determine the current that flows in the ammeter when the arm B is withdrawn from the circuit. (2)

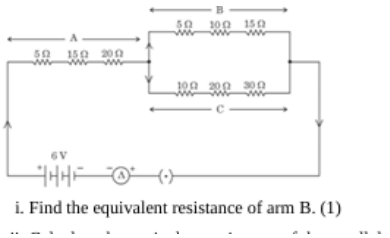


Figure from the question paper (screenshot)

✔ (i) RB = 5 + 10 + 15 = 30 Ω (1)
(ii) RC = 60 Ω; 30 ∥ 60 = 20 Ω (1)
(iii) RA = 40 Ω; total = 40 + 20 = 60 Ω; I = 6/60 = 0.1 A (2)
OR R = 40 + 60 = 100 Ω; I = 6/100 = 0.06 A (2)

Q B4-3 · Arrange given resistors to get a required value · ★★ · Board ×4 · 5 papers · 5 questions

SA · 3 marks

Show the arrangement of three resistors of 2 Ω, 3 Ω and 6 Ω which are connected in such a way that the total/equivalent resistance of the combination is (a) 1 Ω, and (b) 4 Ω. Justify your answer in each case.

Source: CBSE 31/S/1 Supplementary (EFGH/S) Q32 · CBSE 31/S/2 Supplementary (EFGH/S) Q32

✔ **Answer** (a) All three in parallel: 1/R = 1/2 + 1/3 + 1/6 = 1, R = 1 Ω (1½)
(b) 3 Ω ∥ 6 Ω = 2 Ω, in series with 2 Ω: 2 + 2 = 4 Ω (1½)

⚠ **Note:** NCERT Exercise 8.

More questions on this idea (4) – same method, other papers

B4-3.1 · **MCQ · 1 mark** · CBSE Competency Focused Practice Questions (CFPQ) Vol 2 Q15

Priya has three resistors each of resistance 2 Ω. Which of the following resistances will she NOT be able to get by combining these resistors in different combinations?
A. 0.67 Ω B. 0.75 Ω C. 3 Ω D. 6 Ω
✔ B. 0.75 Ω [possible: 6 Ω (series), 0.67 Ω (parallel), 3 Ω (2 + 2∥2), 1.33 Ω ((2+2)∥2)]

B4-3.2 · **VSA · 2 marks** · CBSE 31/6/2 (Z1XYW/6) (2023) Q24

Three resistors of 6 Ω, 4 Ω and 4 Ω are connected together so that the total resistance is 8 Ω. Draw a diagram to show this arrangement and give reason to justify your answer.
✔ The two 4 Ω resistors in parallel (= 2 Ω), in series with 6 Ω. (1)
Rp = 4 × 4/8 = 2 Ω; total = 6 + 2 = 8 Ω (1)

B4-3.3 · **SA · 3 marks** · CBSE 31/2/1 (GHF2E) (2025) Q32 · CBSE 31/2/3 (GHF2E) (2025) Q32

Three resistors of 2 Ω, 3 Ω and 6 Ω are connected in (i) series, and (ii) parallel. Draw the arrangements of the resistors and find the equivalent resistance of each arrangement.
✔ (i) Rs = 2 + 3 + 6 = 11 Ω (1½)
(ii) 1/Rp = 1/2 + 1/3 + 1/6 = 1; Rp = 1 Ω (1½) (with diagrams)

B4-3.4 · **SA · 3 marks** · CBSE 31/5/1 (2026) Q37 · CBSE 31/5/2 (2026) Q35 · CBSE 31/5/3 (2026) Q37

(a) Why does an electric bulb become dim when an electric heater in a parallel circuit is switched ON?
(b) How to connect three resistors each of resistance 8 Ω, so that the equivalent resistance of the combination is 12 Ω? Draw diagram of the combination and justify your answer.
✔ (a) The heater draws a large current, so a larger current flows in the supply wires and more voltage is lost in them; the voltage across the bulb falls slightly and it glows dim. (1)
(b) Two 8 Ω in parallel (= 4 Ω) in series with the third 8 Ω: 8 + 4 = 12 Ω. (2)

Q B4-4 · Series chain with a parallel pair · ★★ · Board ×2 · 5 papers · 3 questions

Case · 4 marks

Study the following circuit (4 Ω, 6 Ω and 16 Ω in series between A and B; two 8 Ω in parallel between B and C; 6 V battery and key). Answer:

(a) Find the value of total resistance between the points A and B. (1)

(b) Find the resistance between the points B and C. (1)

(c)(i) Calculate the current drawn from the battery, when the key is closed. (2)

OR

(c)(ii) The 16 Ω resistor or the parallel combination of two 8 Ω resistors – which one will have more potential difference across its two ends? Justify. (2)

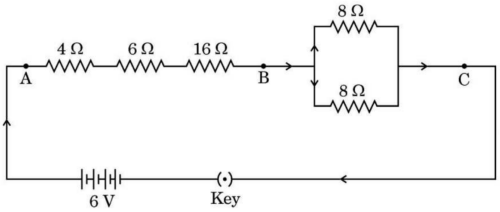


Figure from the question paper

Source: CBSE 31/4/1 (DACBA/4) (2024) Q39 · KVS Lucknow Pre-Board 2 (2024-25) Q39

✔ **Answer** (a) RAB = 4 + 6 + 16 = 26 Ω (1)
(b) RBC = 8 × 8/16 = 4 Ω (1)
(c)(i) R = 30 Ω; I = 6/30 = 0.2 A (2)
OR (c)(ii) V(16 Ω) = 0.2 × 16 = 3.2 V; V(parallel) = 0.2 × 4 = 0.8 V; the 16 Ω resistor has more pd (same current, more resistance). (2)

More questions on this idea (2) – same method, other papers

B4-4.1 · SA · 3 marks · CBSE 31/1/1 Term-II (QQARR/1) (2022) Q11

Calculate the equivalent resistance of the following network (R1 = 5 Ω from A to C; R2 = 10 Ω and R3 = 10 Ω in parallel between C and D; R4 = 5 Ω from D to B). Also draw a circuit with R1, R2, R3 in parallel connected to a battery, ammeter, voltmeter and key, showing the direction of current.

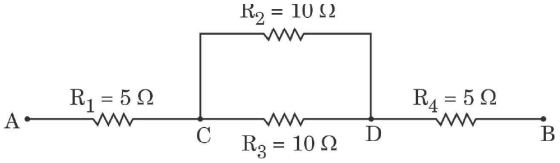


Figure from the question paper

✔ Network: 10 ∥ 10 = 5 Ω; R = 5 + 5 + 5 = 15 Ω (2)
Diagram of three resistors in parallel with ammeter in series, voltmeter across them, current arrows from + terminal. (1)

B4-4.2 · LA · 5 marks · KVS Ahmedabad Region paper (Set A) (2025-26) Q39 · KVS Ahmedabad Region paper (Set B) (2025-26) Q39

Four resistors (R1 = 15 Ω; R2 = 30 Ω in parallel with R3 = 15 Ω; R4 = 15 Ω), a voltmeter across R4 and a 20 V battery are connected as shown.

(a) What is the net resistance in the circuit? (b) How much potential difference will the voltmeter connected across R4 measure? (c) What is the power dissipated by the resistor R1?

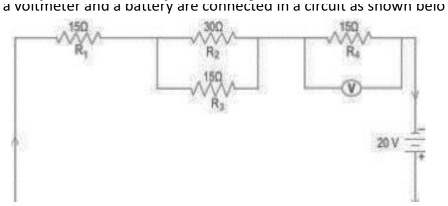


Figure from the question paper

✔ (a) 30 ∥ 15 = 10 Ω; R = 15 + 10 + 15 = 40 Ω (2)
(b) I = 20/40 = 0.5 A; V4 = 0.5 × 15 = 7.5 V (2)
(c) P = I²R = 0.25 × 15 = 3.75 W (1)
⚠ Values read from the printed figure (15, 30, 15, 15 Ω; 20 V).

Q B4-5 · Part of a device circuit (SQP 2024-25) · ★★ · Board ×1 · 4 papers · 2 questions

LA · 5 marks

The given electric circuit is a part of an electrical device (12 V; R1 in series; a 4.0 Ω resistor carrying 1.5 A in parallel with R2; then a 2.0 Ω resistor; total current 2.0 A). Calculate:
(I) Potential difference across the ends of resistor R2. (II) Value of resistor R2. (III) Value of resistor R1.
(ii) Write the factors on which resistance of a conductor depends and derive the formula for resistance.
OR
(i) How much current will an electric iron draw from a 220 V source if the resistance of its heating element when hot is 55 Ω? Calculate the power consumed. (ii) In a house, 3 bulbs of 100 W each are lit for 5 hours daily and an electric heater of 1.0 kW is used for half an hour daily. Calculate the total energy consumed in a month of 30 days and its cost at Rs 3.60 per kWh. (iii) Why are alloys commonly used to make elements of electrical heating devices?

A)

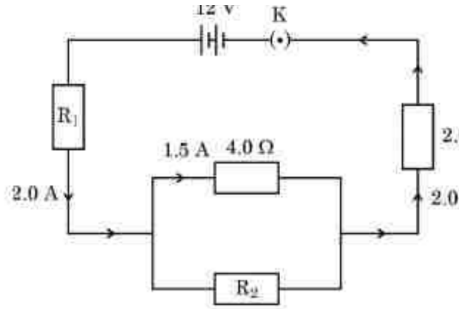


Figure from the question paper

Also asked as: CBSE SQP 2024-25 Q36 (A) uses the same circuit.

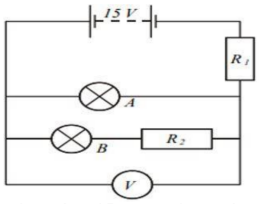
Source: CBSE 31/4/1 (2026) Q39 · CBSE Sample Question Paper (2024-25) Q36

✔ **Answer** (I) pd across R2 = pd across 4 Ω = 1.5 × 4 = 6 V (1)
(II) Current in R2 = 2.0 – 1.5 = 0.5 A; R2 = 6/0.5 = 12 Ω (1)
(III) pd across 2 Ω = 2 × 2 = 4 V; pd across R1 = 12 – 6 – 4 = 2 V; R1 = 2/2 = 1 Ω (1)
(ii) R ∝ l, R ∝ 1/A, so R = ρl/A. (2)
OR (i) I = 220/55 = 4 A; P = VI = 880 W (2)
(ii) Bulbs: 0.3 kW × 5 h = 1.5 kWh; heater 1 kW × 0.5 h = 0.5 kWh; per day 2 kWh; 30 days = 60 kWh; cost = 60 × 3.60 = Rs 216 (2)
(iii) High resistivity and they do not oxidise (burn) readily at high temperature. (1)

More questions on this idea (1) – same method, other papers

B4-5.1 · **LA · 5 marks** · CBSE Sample Question Paper (2024-25) Q36 · KVS Ahmedabad Region paper (Set A) (2025-26) Q39 · KVS Ahmedabad Region paper (Set B) (2025-26) Q39

As shown in the figure, A and B are two lamps. Lamp A is rated 12 V, 24 W. Lamp B is rated at 6.0 V; when lamp B operates at its rated voltage, the current in it is 3.0 A. The values of R1 and R2 are chosen so that both lamps operate at their rated voltages (battery 15 V).
(i) Calculate the current in lamp A. (ii) State and give reason for the reading of the voltmeter. (iii) Calculate the resistance of R2. (iv) Find the value of the resistance R1.



shown in the figure above A and B are two lamps. Lamp A

Figure from the question paper

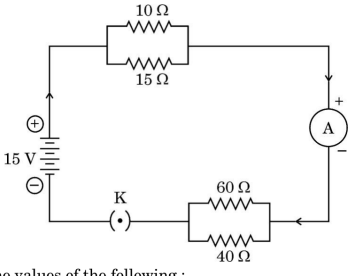
✔ (i) I = P/V = 24/12 = 2 A (1)
(ii) 12 V – lamp A and the arm with lamp B are in parallel, so the pd across both arms is 12 V. (1)
(iii) pd across R2 = 12 – 6 = 6 V; current = 3 A; R2 = 6/3 = 2 Ω (1½)
(iv) Current through R1 = 3 + 2 = 5 A; pd = 15 – 12 = 3 V; R1 = 3/5 = 0.6 Ω (1½)

Q B4-6 · Two parallel groups in series · ★ · Board ×1 · 2 papers · 2 questions

SA · 3 marks

Consider the following electric circuit (10 Ω and 15 Ω in parallel, in series with 60 Ω and 40 Ω in parallel, 15 V battery). Calculate:
(a) the total resistance of the circuit (b) the total current drawn from the source (c) potential difference across the parallel combination of 10 Ω and 15 Ω resistors.

ısider the following electric circuit :



culate the values of the following :

Figure from the question paper

Source: CBSE 31/1/1 (1GEFH) (2025) Q32 · CBSE 31/1/2 (1GEFH) (2025) Q28 · CBSE 31/1/3 (1GEFH) (2025) Q28

Q B4-6 · Two parallel groups in series · ★ · Board ×1 · 2 papers · 2 questions

✔ **Answer** (a) 10 ∥ 15 = 150/25 = 6 Ω; 60 ∥ 40 = 2400/100 = 24 Ω; R = 6 + 24 = 30 Ω (1)
(b) I = 15/30 = 0.5 A (1)
(c) V = 0.5 × 6 = 3 V (1)

More questions on this idea (1) – same method, other papers

B4-6.1 · SA · 3 marks · Practice Paper 2024-25 (8) Q33

In the figure, R1 = 10 Ω, R2 = 40 Ω, R3 = 30 Ω, R4 = 20 Ω, R5 = 60 Ω, and a 12 V battery is connected to the arrangement (R1 ∥ R2 in series with R3 ∥ R4 ∥ R5). Calculate (a) the total resistance in the circuit, and (b) the total current flowing in the circuit.

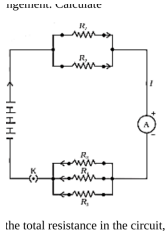


Figure from the question paper

✔ (a) 1/R' = 1/10 + 1/40 = 5/40, R' = 8 Ω; 1/R'' = 1/30 + 1/20 + 1/60 = 6/60, R'' = 10 Ω; R = 18 Ω (2)
(b) I = 12/18 = 0.67 A (1)
⚠ NCERT Example 11.9.

Q B4-7 · ★ · 2 papers

VSA · 2 marks

Answer the questions based on the electric circuit shown. All the four bulbs are identical. (a) How does the voltage reading on voltmeter 1 compare with the reading on voltmeter 2? (b) Identify the bulb(s) through which a current equal to the reading on the ammeter flows.

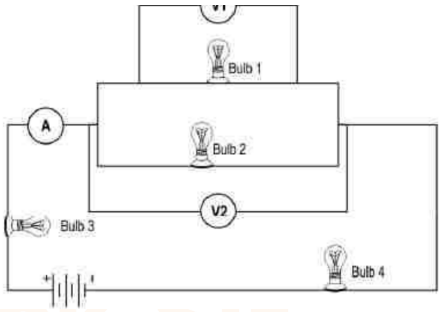


Figure from the question paper

Source: CBSE Competency item bank (chapter-wise, with answer key) Q7 · Bangalore Sahodaya Pre-Board 1 Set 1 (2024-25) Q22

✔ **Answer** (a) Same – both voltmeters are connected across the same parallel pair of bulbs. (1)
(b) Bulb 3 and bulb 4 (they are in the main line with the ammeter). (½ + ½)

Q B4-8 · ★ · 2 papers

LA · 5 marks

A letter 'A' consists of a uniform wire of resistance 1 ohm per cm. The sides of the letter are each 20 cm long and the cross-piece in the middle is 10 cm long while the apex angle is 60°. Find the resistance of the letter between the two ends of the legs.
OR
(a) Define power and state its SI unit. (b) A torch bulb is rated 5 V and 500 mA. Calculate its (i) power (ii) resistance (iii) energy consumed when it is lighted for 2½ hours.

Also asked as: Torch bulb 5.0 V, 500 mA lighted for four hours: 2.5 W, 10 Ω, 10 Wh = 36000 J. [Bangalore Sahodaya PB-1 2025-26 Q36]

Source: Practice Paper 2025-26 (B) Q39 · Bangalore Sahodaya Pre-Board 1 (2025-26) Q36

✔ **Answer** Cross-piece joins the mid-points (10 cm, 10 Ω); upper parts 10 Ω + 10 Ω = 20 Ω in parallel with 10 Ω: r = 20/3 Ω. Lower parts of legs 10 Ω each in series: R = 10 + 20/3 + 10 = 80/3 = 26.67 Ω (5)
OR (a) Rate of consumption of electric energy; watt. (1) (b)(i) P = VI = 5 × 0.5 = 2.5 W (ii) R = V/I = 10 Ω (iii) E = 2.5 W × 2.5 h = 6.25 Wh = 22500 J (4)

Q B4-9 · ★ · Board ×1 · 1 paper

MCQ · 1 mark

In the given circuit the total resistance between X and Y is:

(A) 12 Ω (B) 4 Ω
(C) 6 Ω (D) 1 Ω

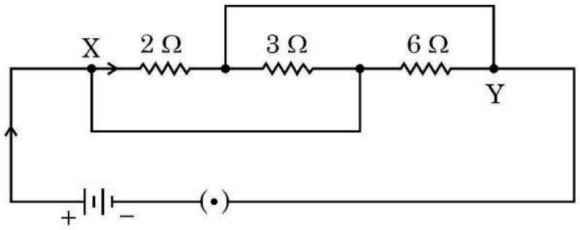


Figure from the question paper

Source: CBSE 31/3/3 (DAA1B/3) (2024) Q14

✔ **Answer** (D) 1 Ω [the wires join X to the 3 Ω–6 Ω junction and Y to the 2 Ω–3 Ω junction, so all three resistors are in parallel between X and Y: 1/R = 1/2 + 1/3 + 1/6 = 1]

Q B4-10 · ★ · Board ×1 · 1 paper

MCQ · 1 mark

Consider the following combinations of resistors (I: 2 Ω ‖ 2 Ω; II: 3 Ω ‖ 3 Ω ‖ 3 Ω; III: (2 Ω + 4 Ω) ‖ (3 Ω + 3 Ω); IV: 0.5 Ω ‖ 0.5 Ω). The combinations having equivalent resistance 1 Ω is/are:

(A) I and IV (B) Only IV
(C) I and II (D) I, II and III

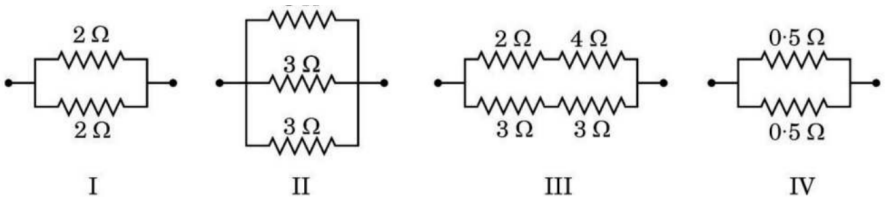


Figure from the question paper

Source: CBSE 31/4/1 (DACBA/4) (2024) Q13

✔ **Answer** (C) I and II [I = 1 Ω; II = 1 Ω; III = 6 ‖ 6 = 3 Ω; IV = 0.25 Ω]

Q B4-11 · ★ · Board ×1 · 1 paper

MCQ · 1 mark

Four identical resistors of 12 Ω each are connected in series to form a square ABCD as shown. The resistance of the network between the two points 1 and 2 (A and B) is:

(A) 48 Ω (B) 36 Ω
(C) 9 Ω (D) 6 Ω

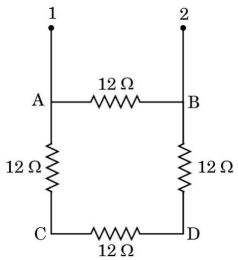


Figure from the question paper

Source: CBSE 31/2/1 (GHF2E) (2025) Q15 · CBSE 31/2/2 (GHF2E) (2025) Q11 · CBSE 31/2/3 (GHF2E) (2025) Q12

✔ **Answer** (C) 9 Ω [between adjacent corners: 12 Ω in parallel with (12 + 12 + 12) = 36 Ω; 12 × 36/48 = 9 Ω]

Q B4-12 · ★ · Board ×1 · 1 paper

LA · 5 marks

(A) (i) V–I graph for a nichrome wire is shown. Prove that the graph follows Ohm's law and calculate the resistance of the nichrome wire.
(ii) For the network (triangle: 3 Ω and 5 Ω on the left side, 7 Ω and 5 Ω on the right side, 10 Ω joining the mid-points, 5 V battery across the base), (I) calculate the equivalent resistance, (II) find the total current drawn from the battery.
OR
(B) (i) Define the SI unit of power. Express electric power in terms of V and I. (ii) In a house, 3 bulbs of 100 W each are lit for 5 hours daily and an electric heater of 1.0 kW is used for half an hour daily. Calculate the energy consumed in 30 days and its cost at Rs 3.60 per kWh. (iii) Convert the commercial unit of electric energy into joule.

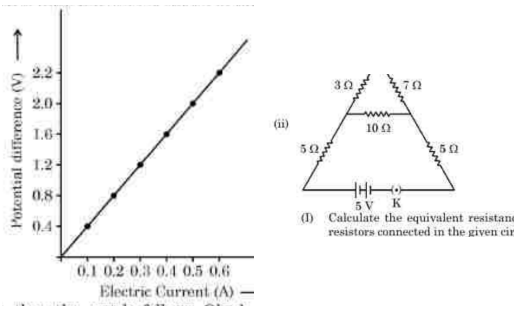


Figure from the question paper

Source: CBSE 31/4/2 (2026) Q39

✔ **Answer** (A)(i) The graph is a straight line through the origin, so V ∝ I (Ohm's law). R = V/I = 0.4/0.1 = 4 Ω (2)
(ii)(I) Between the mid-points: 10 Ω ∥ (3 + 7) Ω = 5 Ω; total = 5 + 5 + 5 = 15 Ω (2) (II) I = 5/15 = 0.33 A (1)
OR (B)(i) 1 W = power when 1 J is used in 1 s (1 V × 1 A); P = VI (1)
(ii) 2 kWh per day × 30 = 60 kWh; cost = Rs 216 (2) (iii) 1 kWh = 3.6×10^6 J (2)

Q B4-13 · ★ · Board ×1 · 1 paper

Case · 4 marks

Consider the following electrical circuit diagram in which nine identical resistors of 3 Ω each are connected as shown. If the reading of the ammeter A1 is 1 ampere, answer:
(a) What is the relationship between the readings of A1 and A3? Give reasons. (1)
(b) What is the relationship between the readings of A2 and A3? (1)
(c) Determine the reading of the voltmeter V1. (2)
OR
(c) Find the total resistance of the circuit. (2)

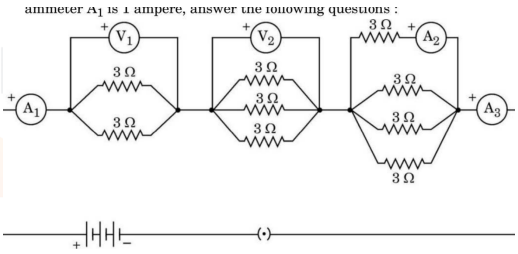


Figure from the question paper

Source: CBSE 31/2/1 (Z1XYW/2) (2023) Q39 · CBSE 31/2/2 (Z1XYW/2) (2023) Q39 · CBSE 31/2/3 (Z1XYW/2) (2023) Q39

✔ **Answer** (a) A1 = A3 = 1 A; both are in the main line in series, same current. (1)
(b) A2 is in one of the four equal branches of the last group: A2 = A3/4 = 0.25 A. (1)
(c) V1 is across two 3 Ω in parallel = 1.5 Ω; V1 = 1 × 1.5 = 1.5 V (2)
OR (c) Groups: 3/2 = 1.5 Ω, 3/3 = 1 Ω, 3/4 = 0.75 Ω; total = 1.5 + 1 + 0.75 = 3.25 Ω (2)

Q B4-14 · ★ · 1 paper

MCQ · 1 mark

The equivalent resistance between the points AB and CD respectively are (each resistor 5 Ω, as shown):
(a) 13.13 Ω and 3.3 Ω (b) 15 Ω and 25 Ω
(c) 3.3 Ω and 13.13 Ω (d) 25 Ω and 15 Ω

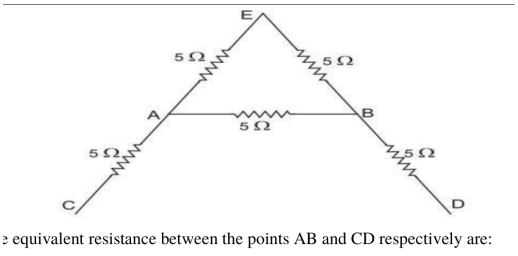


Figure from the question paper

Source: Bangalore Sahodaya Pre-Board 1 Set 2 (2024-25) Q14

✔ **Answer** (c) 3.3 Ω and 13.3 Ω
[A–B: 5 Ω ∥ (5 + 5) = 10/3 = 3.33 Ω; C–D: 5 + 3.33 + 5 = 13.33 Ω]

⚠ **Note:** Option (c) is printed as 13.13 Ω; the correct value is 13.33 Ω.

Q B4-15 · ★ · 1 paper

MCQ · 1 mark

The variable resistor R is connected in a circuit as shown. The resistance of R is increased. What will happen to the voltmeter readings V1 and V2?

A. V1 increases; V2 increases
B. V1 increases; V2 decreases
C. V1 decreases; V2 increases
D. V1 decreases; V2 decreases

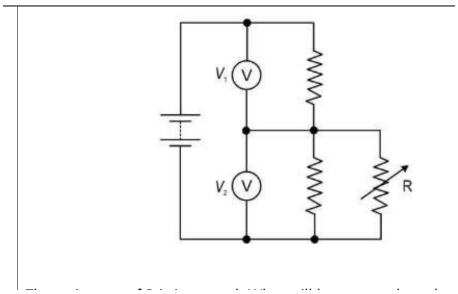


Figure from the question paper

Source: CBSE Competency Focused Practice Questions (CFPQ) Vol 2 Q17

✔ **Answer** C. V1 decreases; V2 increases [larger R takes a larger share of the battery voltage]

Q B4-16 · ★ · 1 paper

LA · 5 marks

(A) (i) List two disadvantages of using a series circuit in homes.
(ii) Calculate the effective resistance between A and B in the circuit given (A–B joined by: 6 Ω + 4 Ω on one side, 3 Ω + 3 Ω on the other, and 15 Ω directly).
(iii) Why do we need a 5 A fuse for an electric iron that consumes 1 kW power at 220 V?

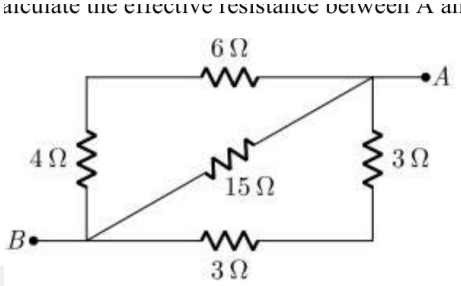


Figure from the question paper

Source: Bangalore Sahodaya Pre-Board 1 (2025-26) Q39

✔ **Answer** (i) If one appliance fails the whole circuit breaks; all appliances cannot get the full 220 V / cannot be switched independently. (2)
(ii) Three paths in parallel: 10 Ω, 6 Ω and 15 Ω: 1/R = 1/10 + 1/6 + 1/15 = (3 + 5 + 2)/30 = 1/3; R = 3 Ω (2)
(iii) I = P/V = 1000/220 = 4.5 A; the fuse rating should be a little more than 4.5 A, so 5 A. (1)

Q B4-17 · ★ · 1 paper

LA · 10 marks

The circuit shows resistors connected in series and parallel combinations (R1 = 20 Ω and R2 = 40 Ω in series, both in parallel with R3 = 30 Ω; R4 = 40 Ω in parallel with R5 = 120 Ω; current 0.25 A).
(a) State two resistors that are connected in series. (1)
(b) State one combination of resistors in parallel. (1)
(c) Calculate the equivalent resistance RT of the combination R1, R2 and R3. (3)
(d) The total resistance of the circuit is 50 Ω and the current is 0.25 A. (i) Calculate the potential difference of the cell. State the unit. (3) (ii) Determine the pd across the combination R4 and R5. (2)

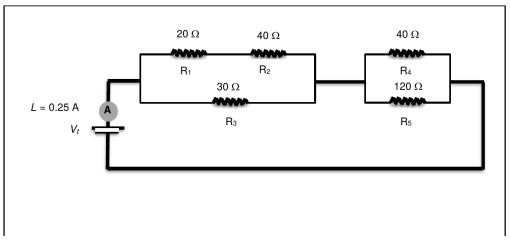


Figure from the question paper

Source: CBSE Competency-Based Education item bank (Science10 items) Q1

✔ **Answer** (a) R1 and R2 (1)
(b) R4 and R5 (1)
(c) R1 + R2 = 60 Ω; 1/RT = 1/60 + 1/30 = 3/60; RT = 20 Ω (3)
(d)(i) V = IR = 0.25 × 50 = 12.5 V (3) (ii) R4 ∥ R5 = 30 Ω; V = 0.25 × 30 = 7.5 V (2)

Q B4-18 · ★ · 1 paper

LA · 12 marks

(a) In an investigation, the current and the pd across a resistor were measured: I (A): 0.5, 1, 2, 3, 4; V (V): 1.6, 3.4, 6.8, 10.2, 13.2. (i) Plot a graph of V on the y-axis against I on the x-axis. (4) (ii) Calculate the resistance of the resistor at 13.2 V. (3)
(b) Calculate the equivalent resistance of the arrangement of resistors shown in Fig. 1 (8 Ω in series with two 8 Ω in parallel). (3)
(c) A wire of length l and area A has a resistance of 16 Ω. Determine the resistance of a wire of the same material with length 0.5 l and area 2A. (2)

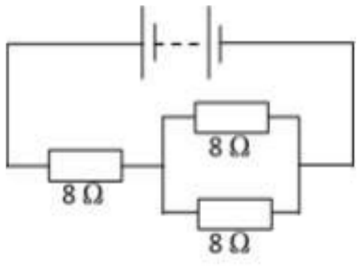


Figure from the question paper

Source: CBSE Competency-Based Education item bank (Science10 items) Q1

✔ **Answer** (a)(i) Labelled axes, scale, points plotted, line of best fit. (4)
(ii) R = V/I = 13.2/4 = 3.3 Ω (3)
(b) 8 ‖ 8 = 4 Ω; 8 + 4 = 12 Ω (3)
(c) R = 16 × 0.5/2 = 4 Ω (2)

⚠ **Note:** The item-bank mark scheme gives 3.6 Ω for (a)(ii); the correct value is 13.2/4 = 3.3 Ω.

Q B4-19 · ★ · 1 paper

LA · 5 marks

A. The given circuit consists of a variable resistor connected in series with two 200 Ω resistors (12 V battery; voltmeter across one 200 Ω resistor). The variable resistor can be adjusted to any value between 0 – 400 Ω.
a) If the maximum possible current in the circuit is 0.03 A, calculate the minimum possible current.
b) What is the smallest and largest possible reading in the voltmeter?
c) What is the purpose of the variable resistor in the circuit?
(OR)
B. In a household, if 5 A, 10 A and 13 A fuses are available, state which is most appropriate for the following appliances which are both connected to a 250 V supply. a) Electric toaster having a power rating of 1 kW b) Electric stove having a power rating of 2 kW. Why are household appliances connected in parallel?

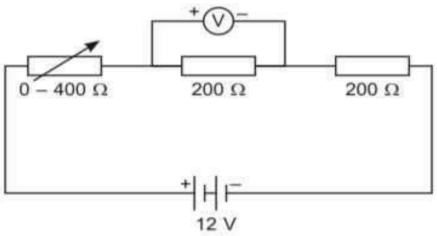


Figure from the question paper

Source: Bangalore Sahodaya Pre-Board 1 Set 2 (2024-25) Q36

✔ **Answer** A. a) Maximum current when variable resistor = 0: R = 400 Ω (12/400 = 0.03 A). Minimum when it is 400 Ω: R = 800 Ω, I = 12/800 = 0.015 A (2)
b) Voltmeter across 200 Ω: smallest = 0.015 × 200 = 3 V; largest = 0.03 × 200 = 6 V (2)
c) To change (regulate) the current in the circuit. (1)
OR B. a) I = 1000/250 = 4 A → 5 A fuse (1½) b) I = 2000/250 = 8 A → 10 A fuse (1½)
In parallel each appliance gets the full voltage and can be switched on or off independently. (2)

⚠ **Note:** The last part of option B (advantages of AC over DC) is from Ch 12 and is left out.

Theme C · Heating Effect, Electric Power and Energy

NCERT 11.7 - 11.8 · Prepared by Abhishek Das, TGT (Science)

C1 · Heating effect of current and Joule's law

17 questions · 9 ideas · 21 papers
Prepared by Abhishek Das, TGT (Science)

Picture it
$H = I^2 R t = VIt = V^2 t/R$ (Joule's law of heating). Uses: electric iron, toaster, heater, bulb, fuse. Heating elements use alloys (nichrome): high resistivity, do not oxidise (burn) at high temperature. Bulb filament: tungsten (melting point 3380 C).



nichrome: high ρ, high m.p.

$H = I^2Rt$
$= VIt = V^2t/R$

Q C1-1 · Heating effect; derive $H = I^2Rt$ · ★★★ · Board ×3 · 7 papers · 4 questions

SA · 3 marks
(a) What is the heating effect of electric current?
(b) Write an expression for the amount of heat produced in a resistor when an electric current is passed through it stating the meanings of the symbols used.
(c) Name two appliances based on the heating effect of electric current.

Source: Vedantu Sample Paper Set 2 (2026-27) Q32 · Vedantu Sample Paper Set 4 (2026-27) Q32 · Practice Paper 2024-25 (1) Q33 · CBSE 31/2/3 Term-II (QQCRR/2) (2022) Q10

✔ **Answer** (a) When current flows through a resistor, part of the electrical energy is changed into heat; this is the heating effect of electric current. (1)
(b) $H = I^2Rt$; H = heat (J), I = current (A), R = resistance (Ω), t = time (s). (1)
(c) Electric iron, electric heater (also toaster, geyser, bulb). (1)

More questions on this idea (3) – same method, other papers

C1-1.1 · **MCQ · 1 mark** · KVS Lucknow 1st Pre-Board (2022-23) Q8
Joule's law of heating states that heat produced in a resistor is
(a) directly proportional to the square of current for a given resistance.
(b) directly proportional to resistance for a given current.
(c) directly proportional to the time for which the current flows through the resistor.
(d) All the above.
✔ (d) All the above. [$H = I^2Rt$]

C1-1.2 · **LA · 5 marks** · CBSE 31(B) (VI) Series ZWYX Q36
(a) Derive an expression for the amount of heat produced when a current flows through a resistor for a given time.
(b) 200 joules of heat energy is produced each second in a resistor of 8 Ω. Find: (i) the current flowing through the resistor, and (ii) the potential difference across the ends of the resistor.
✔ (a) Work done in moving charge Q through pd V: W = VQ. Power P = W/t = VI, so energy in time t = VIt. This appears as heat: H = VIt; using V = IR, $H = I^2Rt$. (3)
(b)(i) P = H/t = 200 W; $I^2 = P/R = 200/8 = 25$; I = 5 A (1)
(ii) V = IR = 5 × 8 = 40 V (1)

C1-1.3 · **LA · 5 marks** · CBSE old papers (RSH/1, LRH/1) (pre-2020) Q18
Derive the expression for the heat produced due to a current 'I' flowing for a time interval 't' through a resistor 'R' having a potential difference 'V' across its ends. With which name is the relation known? How much heat will an instrument of 12 W produce in one minute if it is connected to a battery of 12 V?
✔ Derivation: $H = VIt = I^2Rt$ (3)
Joule's law of heating. (1)
H = P × t = 12 × 60 = 720 J (1)

Q C1-2 · Heat from charge and potential difference, H = VQ · ★★ · Board ×1 · 4 papers · 2 questions

SA · 3 marks

(a) Write the mathematical expression for Joule's law of heating.
(b) Calculate the amount of heat generated while transferring 72000 coulomb of charge in two hours through a potential difference of 220 V.

Source: CBSE 31/S/3 Supplementary (EFGH/S) Q31

✔ **Answer** (a) $H = I^2Rt$ (1)
(b) $H = VIt = VQ = 220 \times 72000 = 1.584 \times 10^7$ J (2)

More questions on this idea (1) – same method, other papers

C1-2.1 · VSA · 2 marks · Practice Paper 2025-26 (D) Q34 · Practice Paper 2025-26 (E) Q34 · Practice Paper 2025-26 (J) Q34

(a) Write the mathematical expression for Joule's law of heating. (b) Compute the heat generated while transferring 96000 coulomb of charge in two hours through a potential difference of 40 V.
OR
In the given circuit (3 Ω in series with two 6 Ω in parallel, 6 V), find: (a) total resistance (b) current through ammeter A (c) potential difference across 3 Ω and 6 Ω resistors.

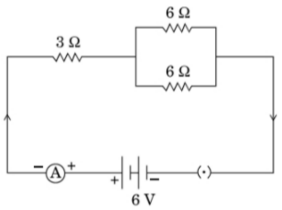


Figure from the question paper

✔ (a) $H = I^2Rt$ (½) (b) $H = VQ = 40 \times 96000 = 3.84 \times 10^6$ J (1½)
OR (a) 3 + (6 ∥ 6 = 3) = 6 Ω (b) I = 6/6 = 1 A (c) V(3 Ω) = 3 V; V(6 Ω) = 0.5 × 6 = 3 V (2)

Q C1-3 · Percentage change in heat · ★★ · Board ×3 · 3 papers · 3 questions

MCQ · 1 mark

In a resistive circuit if the current is increased to two times, the percentage change in the amount of heat dissipated in the circuit would be:

(a) 400% (b) 300%
(c) 200% (d) 100%

Source: CBSE 31/2/1 (Z1XYW/2) (2023) Q15 · CBSE 31/2/2 (Z1XYW/2) (2023) Q9 · CBSE 31/2/3 (Z1XYW/2) (2023) Q16

✔ **Answer** (b) 300% [$H \propto I^2$: heat becomes 4 times, so the increase is (4 – 1) × 100% = 300%]

More questions on this idea (2) – same method, other papers

C1-3.1 · MCQ · 1 mark · CBSE 31(B)/S (VI) Series CDBA/S Q16

The resistance of a resistor is increased four times its initial value. If other parameters (current and time) remain unchanged, the percentage change in the amount of heat produced in the resistor would be:
(A) 100% (B) 200% (C) 300% (D) 400%
✔ (C) 300% [$H = I^2Rt \propto R$: heat becomes 4 times, an increase of 300%]

C1-3.2 · MCQ · 1 mark · CBSE 31/4/1 (Z1XYW/4) (2023) Q15 · CBSE 31/4/2 (Z1XYW/4) (2023) Q14 · CBSE 31/4/3 (Z1XYW/4) (2023) Q16

The resistance of a resistor is reduced to half of its initial value. If other parameters of the electrical circuit remain unaltered, the amount of heat produced in the resistor will become:
(a) four times (b) two times (c) half (d) one fourth
✔ (b) two times [the source voltage is unchanged, so $H = V^2t/R$; halving R doubles the heat]
⚠ Read 'other parameters' as the same voltage and time. If the current were kept the same, $H = I^2Rt$ would become half.

Q C1-4 · H = I²Rt calculations · ★ · Board ×1 · 2 papers · 2 questions

MCQ · 1 mark

An electric iron of resistance 20 Ω draws a current of 5 A. The heat developed in the iron in 30 seconds is:

(A) 15000 J (B) 6000 J
(C) 1500 J (D) 3000 J

Source: CBSE 31/4/1 (DACBA/4) (2024) Q14

✔ **Answer** (A) 15000 J [H = I²Rt = 25 × 20 × 30 = 15000 J]

More questions on this idea (1) – same method, other papers

C1-4.1 · VSA · 2 marks · Practice Paper 2025-26 (A) Q34

A potential difference of 220 V is applied across a resistance of 440 Ω in an electric iron. (i) Find the current. (ii) Heat energy produced in 30 s.

OR

Calculate the cost of seeing 2 movies on colour T.V. daily for the month of September. Given wattage of colour T.V. = 60 W, duration of each movie is 2 hours 30 min and 1 kWh costs Rs 4.

✔ (i) I = V/R = 220/440 = 0.5 A (1)

(ii) H = VIt = 220 × 0.5 × 30 = 3300 J (1)

OR Time per day = 5 h; E = 0.06 kW × 5 h × 30 = 9 kWh; cost = 9 × 4 = Rs 36 (2)

Q C1-5 · Heating element and fuse: properties · ★ · 2 papers · 2 questions

Case · 4 marks

Read the following text carefully and answer the questions that follow:

When electric current flows in a purely resistive circuit electrical energy gets fully converted into heat energy. The amount of heat produced (H) is directly proportional to (i) the square of current I² (ii) the resistance (R) of the conductor and (iii) the time (t) for which current flows, H = I²Rt. Electrical devices such as an electric fuse, electric heater, electric iron etc. are all based on this effect.

a. List two properties of heating elements. (1)

b. List two properties of electric fuse. (1)

c. Name the principle on which an electric fuse works. Explain how a fuse wire is capable of saving electrical appliances from getting damaged due to accidently produced high currents. (2)

OR

c. The power of an electric heater is 1100 W. If the potential difference between the two terminals of the heater is 220 V, find the current flowing in the circuit. What will happen to an electric fuse of rating 5 A connected in this circuit? (2)

Source: Practice Paper 2025-26 (H) Q38

✔ **Answer** a. High resistivity; high melting point (does not oxidise at high temperature). (1)

b. Low melting point; made of a suitable alloy (e.g. of tin and lead); thin wire. (1)

c. Heating effect of electric current (Joule heating). (1) When an unduly high current flows, the fuse wire heats up, melts and breaks the circuit, so the appliance is protected. (1)

OR c. I = P/V = 1100/220 = 5 A. (1) The current is equal to the fuse rating, so the fuse will not melt; it is working at its limit, and any slight rise in current will melt it. (1)

More questions on this idea (1) – same method, other papers

C1-5.1 · Case · 4 marks · KVS Lucknow Pre-Board II (2023-24) Q37

The heating effect of current is obtained by transformation of electrical energy into heat energy. The heat produced in a conductor, when a current flows through it, is found to depend directly on (a) strength of current (b) resistance of the conductor (c) time for which the current flows.

(i) What are the properties of heating element? (a) High resistance, high melting point (b) High resistance, low melting point (c) Low resistance, high melting point (d) Low resistance, low melting point

(ii) What are the properties of electric fuse? (a) Low resistance, low melting point (b) High resistance, high melting point (c) High resistance, low melting point (d) Low resistance, high melting point

(iii) When the current is doubled in a heating device and time is halved, the heat energy produced is (a) doubled (b) halved (c) four times (d) one fourth times

✔ (i) (a) High resistance, high melting point (1)

(ii) (c) High resistance, low melting point (1)

(iii) (a) doubled [H ∝ I²t: 4 × ½ = 2] (2)

⚠ Part (iv) of this case (new radius of a fuse wire) is beyond the NCERT text and is left out.

Q C1-6 · ★ · Board ×1 · 1 paper

Case · 4 marks

Read the following passage and answer the questions that follow:
Swati, a class 10 student, observes that when she passes close to the refrigerator in her kitchen, she feels the heat, although the things kept inside the refrigerator are cool.
(a) Describe the cause of heating in the above-mentioned case. (1)
(b) A current I flows through a resistor of resistance R when the potential difference across it is V. Applying Ohm's law, write the formula for amount of heat produced by the resistor in time t. (1)
(c)(i) Write any two practical applications of heating effect of electric current. (2)
OR
(c)(ii) Define the commercial unit of electric energy and express it in Joules (J). (2)

Source: CBSE 31/2/1 (LMNK2) (2026) Q38 · CBSE 31/2/2 (LMNK2) (2026) Q38 · CBSE 31/2/3 (LMNK2) (2026) Q38

✔ **Answer** (a) Heating effect of electric current – current in the coils/wires of the refrigerator (compressor) produces heat. (1)
(b) $H = I^2Rt = VIt = V^2t/R$ (1)
(c)(i) Electric iron, toaster, heater, electric bulb, electric fuse (any two). (2)
OR (c)(ii) 1 kWh is the energy used in one hour at the rate of 1000 J/s (1 kW). (1) 1 kWh = 1000 W × 3600 s = 3.6×10^6 J (1)

Q C1-7 · ★ · 1 paper

MCQ · 1 mark

Which of the following is the most likely temperature of the filament of an electric light bulb when it is working on the normal 220 V supply line?

a) 2500 °C
b) 1500 °C
c) 500 °C
d) 4500 °C

Source: Practice Paper 2024-25 (4) Q14

✔ **Answer** a) 2500 °C [tungsten melts at 3380 °C; the filament works at about 2500 °C]

⚠ **Note:** NCERT Exemplar item.

Q C1-8 · ★ · 1 paper

VSA · 2 marks

An incandescent bulb works on the heating effect of electric current. The graph shows the variation in the current through a bulb immediately after it is switched on. The current decreases from 1 A at time t = 0 to 0.5 A at t = t1. The voltage of the power supply is 200 V and remains constant throughout.
(a) Based on the graph, state how the resistance of the bulb filament changes as the temperature increases from t = 0 to t = t1.
(b) What is the power consumed by the bulb when it is glowing at its full brightness?

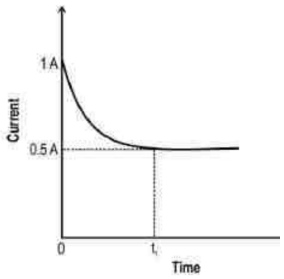


Figure from the question paper

Source: CBSE Competency item bank (chapter-wise, with answer key) Q14

✔ **Answer** (a) The resistance increases (current falls at constant voltage; R = V/I rises from 200 Ω to 400 Ω). (1)
(b) P = VI = 200 × 0.5 = 100 W (1)

Q C1-9 · ★ · 1 paper

VSA · 2 marks

You are given three identical 10 ohm resistors and a 12 V cell. Draw the circuit diagram to show how the resistors can be connected with the 12 V cell so that the total heat produced in the circuit is the MINIMUM.

Source: CBSE Competency item bank (chapter-wise, with answer key) Q12

✔ **Answer** Connect all three resistors in series with the cell (diagram). (1)
For a fixed voltage, $H = V^2t/R$; series gives the largest resistance (30 Ω), so the least heat. (1)

C2 · Electric power

27 questions · 11 ideas · 24 papers
Prepared by Abhishek Das, TGT (Science)

Picture it
P = VI = I^2 R = V^2/R. SI unit watt: 1 W = 1 J/s = 1 V x 1 A. A bulb rated 100 W, 220 V has R = V^2/P = 484 ohm. In parallel at the same voltage, the bulb with higher wattage glows brighter.



P = VI
= I^2R = V^2/R
1 W = 1 J/s

Q C2-1 · From the rating: I = P/V and R = V²/P · ★★★ · Board ×3 · 9 papers · 8 questions

VSA · 2 marks
(a) Consider two lamps A and B of rating 50 W; 220 V and 25 W; 220 V respectively. Find the ratio of the resistances of the two lamps (i.e. RA : RB).
OR
(b) Heat produced per second due to a current in a resistor of 4 Ω is 400 joules. Calculate the potential difference across the resistor.

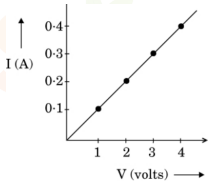
Source: CBSE 31/1/3 (1GEFH) (2025) Q22

✔ **Answer** (a) R = V²/P; RA/RB = PB/PA = 25/50; RA : RB = 1 : 2 (2)
OR (b) P = 400 W; P = V²/R; V² = 400 × 4 = 1600; V = 40 V (2)

More questions on this idea (7) – same method, other papers

C2-1.1 · MCQ · 1 mark · CBSE 31/2/1 (GHF2E) (2025) Q14 · CBSE 31/2/3 (GHF2E) (2025) Q11
An electric bulb is connected to a power supply of 220 V. If the current drawn by the bulb from the supply is 500 mA, the power of the bulb is:
(A) 11 W (B) 110 W (C) 220 W (D) 1100 W
✔ (B) 110 W [P = VI = 220 × 0.5]

C2-1.2 · VSA · 2 marks · Practice Paper 2025-26 (C) Q34 · Practice Paper 2025-26 (F) Q34
An electric heater rated 1100 W operates at 220 V. Calculate (i) its resistance, and (ii) the current drawn by it.
OR
In the experiment to study the dependence of current (I) on the potential difference (V) across a resistor, a student obtained a graph as shown. (i) What does the graph depict about the dependence of current on the potential difference? (ii) Find the current that flows through the resistor when the potential difference across it is 2.5 V.



at is a Solenoid? Draw the pattern o
ern the region where the magnetic f
Figure from the question paper

✔ (i) R = V²/P = 220 × 220/1100 = 44 Ω (1)
(ii) I = P/V = 1100/220 = 5 A (1)
OR (i) I is directly proportional to V (straight line through origin) – Ohm's law. (1) (ii) From the graph, I = 0.25 A at 2.5 V. (1)

C2-1.3 · VSA · 2 marks · Vedantu Sample Paper Set 2 (2026-27) Q25
You have two electric lamps having ratings 40 W, 220 V and 60 W, 220 V. Which of the two has a higher resistance? Give a reason for your answer. If these two lamps are connected to a source of 220 V, which will glow brighter?
✔ R = V²/P: 40 W lamp R = 1210 Ω; 60 W lamp R = 806.7 Ω. The 40 W lamp has higher resistance (R ∝ 1/P at the same V). (1)
At 220 V (parallel), each works at its rating, so the 60 W lamp glows brighter. (1)

C2-1.4 · SA · 3 marks · KVS Raipur Second Pre-Board (2025-26) Q29
(a) State Joule's law of heating.
(b) An electric lamp is marked 100 W, 220 V. It is used for 5 hours daily. Calculate: (i) its resistance while glowing (ii) energy consumed in kWh per day.
✔ (a) Heat produced in a resistor is directly proportional to the square of current, the resistance and the time: H = I^2Rt. (1)
(b)(i) R = V²/P = 220 × 220/100 = 484 Ω (1) (ii) E = 0.1 kW × 5 h = 0.5 kWh (1)

Q C2-1 · From the rating: I = P/V and R = V²/P · ★★★ · Board ×3 · 9 papers · 8 questions

C2-1.5 · **SA · 6 marks** · CBSE Competency-Based Education item bank (Science10 items) Q1

An electrical appliance has a resistance of 11 Ω.
1(a)(i) The appliance is connected to a supply voltage of 220 V. Calculate the current in the appliance. State the unit. (3 marks)
1(a)(ii) Using your answer in (a), calculate the power dissipated by the appliance. State the unit. (3 marks)
1(b) Electrical appliances in the home are connected in parallel. Give three advantages of connecting appliances in parallel. (3 marks)

✔ (a)(i) I = V/R = 220/11 = 20 A (3)
(ii) P = VI = 220 × 20 = 4400 W (or I^2R = 400 × 11) (3)
(b) Each appliance gets the full 220 V; each can be switched on/off independently; if one fails the others keep working; total resistance is less (any three). (3)
⚠ The item-bank mark scheme gives 11 A and 2420 W, which is wrong: 220 ÷ 11 = 20 A, so P = 4400 W. Part (c) on nuclear power is from another chapter and is left out.

C2-1.6 · **LA · 5 marks** · CBSE 31/1/1 (Z1XYW/1) (2023) Q36 · CBSE 31/1/2 (Z1XYW/1) (2023) Q34 · CBSE 31/1/3 (Z1XYW/1) (2023) Q35

An electric iron consumes energy at a rate of 880 W when heating is at the maximum rate and 330 W when the heating is at the minimum. If the source voltage is 220 V, calculate the current and resistance in each case.
(b) What is heating effect of electric current?
(c) Find an expression for the amount of heat produced when a current passes through a resistor for some time.

✔ (a) Maximum: I = P/V = 880/220 = 4 A; R = V/I = 55 Ω (1)
Minimum: I = 330/220 = 1.5 A; R = 220/1.5 = 146.7 Ω (1)
(b) Part of the electrical energy is changed into heat when current flows in a resistor. (1)
(c) H = VIt; V = IR, so H = I^2Rt (2)
⚠ NCERT Example 11.10.

C2-1.7 · **LA · 5 marks** · Bangalore Sahodaya Pre-Board 1 Set 1 (2024-25) Q35

[A] (a) State Joule's law of heating.
(b) A bulb is rated 40 W, 220 V. Find the current drawn by it, when it is connected to a 220 V supply. Also find its resistance. If the given bulb is replaced by a bulb of rating 25 W, 220 V, will there be any change in the value of current and resistance? Justify your answer and determine the change.

✔ (a) Heat produced in a resistor is directly proportional to the square of the current, the resistance and the time: H = I^2Rt. (1)
(b) 40 W bulb: I = P/V = 40/220 = 0.18 A (1); R = V^2/P = 220 × 220/40 = 1210 Ω (1)
25 W bulb: I = 25/220 = 0.11 A; R = 220 × 220/25 = 1936 Ω (1)
Yes – the current decreases by about 0.07 A and the resistance increases by 726 Ω (a bulb of lower power at the same voltage has more resistance). (1)
⚠ Option [B] of this question is the 4 Ω + 8 Ω ∥ 8 Ω circuit (B4-1.3).

Q C2-2 · Power in series vs parallel · ★★ · Board ×3 · 5 papers · 5 questions

VSA · 2 marks

(a) Consider the following circuits (i) 5 Ω with 12 V; (ii) 5 Ω and 5 Ω in series with 12 V; (iii) 5 Ω and 5 Ω in parallel with 12 V. In which circuit will the power dissipated in the circuit be (I) minimum (II) maximum? Justify your answer.
OR
(b) Two lamps, rated 100 W; 220 V and 60 W; 220 V are connected in parallel to electric main supply of 220 V. Find the current drawn by the two lamps from the supply.

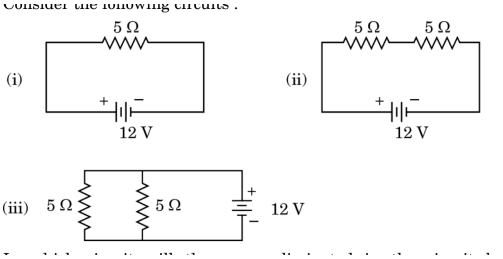


Figure from the question paper

Source: CBSE 31/1/2 (1GEFH) (2025) Q22

✔ **Answer** (a) P = V^2/R with V = 12 V. (i) R = 5 Ω, P = 28.8 W; (ii) R = 10 Ω, P = 14.4 W; (iii) R = 2.5 Ω, P = 57.6 W.
(I) Minimum in (ii) – largest resistance. (1) (II) Maximum in (iii) – least resistance. (1)
OR (b) P = 160 W; I = P/V = 160/220 = 0.727 A (2)

Q C2-2 · Power in series vs parallel · ★★ · Board ×3 · 5 papers · 5 questions

More questions on this idea (4) – same method, other papers

C2-2.1 · VSA · 2 marks · CBSE Sample Question Paper (2024-25) Q25

A. The electric circuit in a clothes dryer contains two heaters X and Y in parallel. The figure shows the circuit connected to a 230 V power supply. When both switches are closed, the current in X is 3.5 A. (i) Calculate the power developed in heater X. (ii) If the resistance of X is double that of Y, calculate the current in heater Y.

OR

B. The figure shows two resistors X and Y (R and 2R) connected in series to a battery. The power dissipated for this combination is P1. When these resistors are connected in parallel to the same battery then the power dissipated is given by P2. Find out the ratio P1/P2.

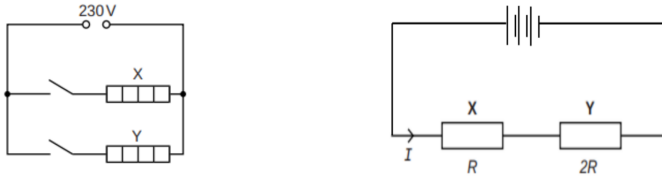


Figure from the question paper

Also asked as: For visually impaired students (same paper): (A) lowest resistance from 3, 6, 9 and 12 Ω = 36/25 = 1.44 Ω (all in parallel). (B) For a 1000 W, 220 V heater (I = 4.5 A) use fuse B of 5 A, not A of 2 A.

✔ A. (i) P = VI = 230 × 3.5 = 805 W (1) (ii) Same voltage; RY = RX/2, so IY = 2 × 3.5 = 7 A (1)

OR B. Series: R1 = 3R, P1 = V²/3R; parallel: R2 = 2R/3, P2 = 3V²/2R. P1/P2 = (1/3) ÷ (3/2) = 2/9, i.e. 2 : 9 (2)

C2-2.2 · VSA · 2 marks · KVS Raipur Second Pre-Board (2025-26) Q21

Two identical resistors, each of resistance 50 Ω are connected (i) in series (ii) in parallel, in turn, to a battery of 10 V. Calculate the ratio of power consumed in the combination of resistors in the two cases.

OR

What is the function of fuse in an electric circuit? Which material is generally used in fuse wire?

✔ Rs = 100 Ω, Ps = V²/Rs = 100/100 = 1 W; Rp = 25 Ω, Pp = 100/25 = 4 W (1½)

Ps : Pp = 1 : 4 (½)

OR A fuse protects circuits and appliances by melting and stopping an unduly high current. (1) It is made of an alloy of low melting point, e.g. of tin and lead (also aluminium, copper, iron, lead). (1)

C2-2.3 · LA · 5 marks · CBSE 31/7/2 Exam-2 (E7FDG) (2026) Q39

(a) (i) Write the definition of the SI unit of power.

(ii) Two resistors R1 = 1 Ω and R2 = 2 Ω are connected in an electric circuit with a battery of 12 V. Calculate the power consumed, when R1 and R2 are connected in (I) parallel combination, and (II) series combination.

(iii) Calculate the minimum number of identical electric bulbs of rating 4 V, 6 W that can work safely with their optimum brightness, when connected in series with a 240 V mains supply.

OR

(b) (i) State Ohm's law. V–I graph for Ohm's law is always a straight line. Justify.

(ii) V–I graphs for two wires of identical dimensions but made of different materials A and B are shown in the figure. Out of A and B, which one is a better choice for making a heating element? Justify your answer.

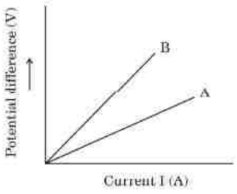


Figure from the question paper

✔ (a)(i) 1 watt is the power when 1 joule of energy is consumed in 1 second (1 W = 1 J/s = 1 V × 1 A). (1)

(ii)(I) Parallel: P = V²/R1 + V²/R2 = 144 + 72 = 216 W (1½) (II) Series: R = 3 Ω; P = 144/3 = 48 W (1)

(iii) Each bulb needs 4 V: n = 240/4 = 60 bulbs (1½)

OR (b)(i) V ∝ I at constant temperature, V = IR; since R is constant, the graph of V against I is a straight line through the origin. (2)

(ii) B. With V on the y-axis, slope = V/I = R; B has the greater slope, so greater resistance and (same dimensions) higher resistivity. A heating element needs high resistivity, so B is the better choice. (3)

C2-2.4 · LA · 5 marks · CBSE 31(B) (VI) Series E7FDG (2026) Q39

(a) (i) What is meant by the resistance of a conductor? Derive an expression for the equivalent resistance of a circuit in which two resistors R1 and R2 are connected in parallel.

(ii) Calculate the power consumed if two resistors, R1 = 2 Ω and R2 = 4 Ω, are connected in (I) series, and (II) parallel, with a battery of 8 V.

OR

(b) (i) Name the device which (I) helps to change the electric current in a circuit and (II) breaks the circuit during short-circuiting. (ii) List the factors on which the resistance of a conductor depends. (iii) Find the length of a wire of resistance 21 Ω if its diameter is 0.02 cm and resistivity 66 × 10^{-8} Ω m. (π = 22/7)

✔ (a)(i) Resistance is the property of a conductor to resist the flow of charge. Derivation 1/Rp = 1/R1 + 1/R2. (2)

(ii)(I) Series: R = 6 Ω; P = V²/R = 64/6 = 10.67 W (1½) (II) Parallel: Rp = 4/3 Ω; P = 64 × 3/4 = 48 W (1½)

OR (b)(i)(I) Rheostat (II) Fuse (1) (ii) Length, area of cross-section, material, temperature (1)

(iii) r = 10^{-4} m; A = (22/7) × 10^{-8} m²; l = RA/ρ = 21 × (22/7) × 10^{-8}/(66 × 10^{-8} = 1 m (3)

Q C2-3 · Domestic circuit cases with LED bulbs · ★ · Board ×2 · 2 papers · 2 questions

Case · 4 marks

In a domestic circuit five LED bulbs are arranged as shown. The source voltage is 220 V and the power rating of each bulb is marked in the circuit diagram (A: 22 W, 220 V; B, C, D, E: 11 W; 55 V each, in series). Based on the circuit diagram, answer the following questions:

(a) State what happens when (i) key K1 is closed. (ii) key K2 is closed. (1)

(b) Find the current drawn by the bulb B when it glows. (1)

(c) Calculate (i) the resistance of bulb B, and (ii) total resistance of the combination of four bulbs B, C, D and E. (2)

OR

(c) What would happen to the glow of all the bulbs in the circuit when keys K1 and K2 both are closed and the bulb C suddenly gets fused? Give reason to justify your answer. (2)

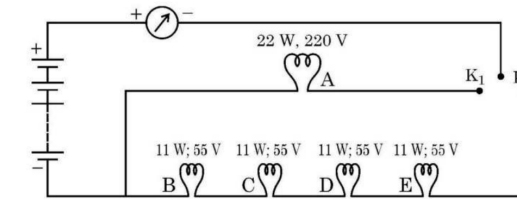


Figure from the question paper

Source: CBSE 31/3/1 (DAA1B/3) (2024) Q39 · CBSE 31/3/2 (DAA1B/3) (2024) Q39 · CBSE 31/3/3 (DAA1B/3) (2024) Q39

✔ **Answer** (a)(i) Only bulb A glows (it gets 220 V). (ii) Bulbs B, C, D and E glow – the 220 V is shared, 55 V each. (½ + ½)

(b) I = P/V = 11/55 = 0.2 A (1)

(c)(i) R = V²/P = 55 × 55/11 = 275 Ω (1) (ii) Series: 4 × 275 = 1100 Ω (1)

OR (c) B, C, D and E are in series, so when C fuses the circuit of that arm breaks and B, D, E stop glowing; A is in a separate parallel arm, so it keeps glowing with the same brightness. (2)

More questions on this idea (1) – same method, other papers

C2-3.1 · **Case · 4 marks** · CBSE 31/S/1 Supplementary (EFGH/S) Q39 · CBSE 31/S/2 Supplementary (EFGH/S) Q37 · CBSE 31/S/3 Supplementary (EFGH/S) Q38

In a domestic circuit, six LED bulbs and a ceiling fan are arranged as per the circuit shown in the figure. The source voltage is 220 volts and the power rating of each device is marked in the circuit diagram. Two fuses F1 and F2 are also provided in the circuit. Based on the circuit diagram, answer the following questions:

(a) State what happens when (i) only key K1 is closed, (ii) and key K2 is also closed. (1)

(b) Find the current drawn by the bulb L. (1)

(c)(i) Calculate the resistance of the bulb A. Find the total resistance offered by the circuit to the flow of current when only key K2 is closed. (2)

OR

(c)(ii) What would happen to the glow of the bulbs in the circuit when K1 and K2 both are closed and the fuse F1 melts suddenly? Give reason to justify your answer. (2)

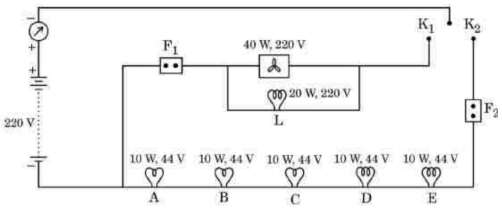


Figure from the question paper

✔ (a)(i) Only K1 closed: the fan runs and bulb L glows (both get 220 V). (ii) K2 also closed: bulbs A, B, C, D and E also glow, 44 V each. (½ + ½)

(b) L is rated 20 W, 220 V: I = P/V = 20/220 = 0.09 A (1)

(c)(i) RA = V²/P = 44 × 44/10 = 193.6 Ω (1); A to E in series: 5 × 193.6 = 968 Ω (1)

OR (c)(ii) F1 is in the arm of the fan and bulb L, so the fan stops and L goes off; bulbs A to E are in the other parallel arm (with F2), so they keep glowing as before. (2)

Q C2-4 · Power when current or voltage is changed · ★ · Board ×1 · 2 papers · 2 questions

MCQ · 1 mark

If the current I through a resistor is increased by 100% (at constant temperature), the increase in power dissipated will be

(a) 100% (b) 200%
(c) 300% (d) 400%

Source: CBSE 31/1/3 (Z1XYW/1) (2023) Q16

✔ **Answer** (c) 300% [P = I²R; I doubles, P becomes 4 times – an increase of 300%]

More questions on this idea (1) – same method, other papers

C2-4.1 · MCQ · 1 mark · Practice Paper 2024-25 (8) Q14

If the potential difference between the ends of a wire of fixed resistance is doubled, by how much does the electric power increase?

a) $4V^2/R$ b) $3V^2/R$ c) $6V^2/R$ d) $2V^2/R$

✔ b) $3V^2/R$ [new power = $(2V)^2/R = 4V^2/R$; increase = $4V^2/R - V^2/R = 3V^2/R$]

⚠ The practice-paper key gives (a). $4V^2/R$ is the NEW power; the INCREASE is $3V^2/R$.

Q C2-5 · Two lamps 100 W and 60 W in parallel · ★ · Board ×1 · 2 papers · 2 questions

SA · 3 marks

(a) (i) Define Electric Power and write its SI unit. (ii) Two bulbs rated 100 W; 220 V and 60 W; 220 V are connected in parallel to an electric mains of 220 V. Find the current drawn by the bulbs from the mains.

OR

(b) (i) State Joule's law of heating. Express it mathematically when an appliance of resistance R is connected to a source of voltage V and the current I flows through the appliance for a time t. (ii) A 5 Ω resistor is connected across a battery of 6 volts. Calculate the energy that dissipates as heat in 10 s.

Source: CBSE 31/1/1 Term-II (QQARR/1) (2022) Q12 · CBSE 31/1/2 Term-II (QQARR/1) (2022) Q9 · CBSE 31/1/3 Term-II (QQARR/1) (2022) Q13

✔ **Answer** (a)(i) Electric power is the rate at which electric energy is consumed (P = W/t); SI unit watt (W). (1)
(ii) $I1 = 100/220 = 0.455$ A; $I2 = 60/220 = 0.273$ A; $I = 0.727$ A (2)
OR (b)(i) Heat produced is proportional to I^2, R and t: $H = I^2Rt = VIt = V^2t/R$. (1)
(ii) $H = V^2t/R = 36 \times 10/5 = 72$ J (2)

More questions on this idea (1) – same method, other papers

C2-5.1 · SA · 3 marks · Practice Paper 2024-25 (8) Q32

Two electric lamps rated 100 W, 220 V and 60 W, 220 V are connected in parallel to electric mains supply. Calculate the current drawn from the mains if the supply voltage is 220 V.

b. A lamp consumes 50 W and is lighted 2 h daily in month of April. How many units of electric energy is consumed?

✔ a. $I = (100 + 60)/220 = 0.73$ A (1½)

b. $E = 50$ W × 2 h × 30 = 3000 Wh = 3 kWh = 3 units (1½)

Q C2-6 · Rated bulb used at a lower voltage · ★ · 2 papers · 2 questions

Case · 4 marks

Every electrical appliance like an electric bulb, radio or fan has a label or engraved plate on it which tells us the voltage (to be applied) and the electrical power consumed by it. The power rating of an electrical appliance tells us the rate at which electrical energy is consumed by the appliance. For example, a power rating of 100 watts on the bulb means that it will consume electrical energy at the rate of 100 joules per second. If we know the power P and voltage V of an appliance, we can find the current I drawn by it: P = V × I.

a) What is the S.I. unit of power? (1) Or Write the commercial unit of power.

b) An electric bulb is rated 220 V and 100 W. When operated on 110 V how much power will be consumed? (2)

c) What will be the current drawn by an electric bulb of 40 W when it is connected to a source of 220 V? (1)

Source: KVS Delhi Region Pre-Board-II (2024-25) Q39

✔ **Answer** a) Watt (W). (1) Or: kilowatt (kW); note that kWh is the commercial unit of ENERGY, not of power.
b) $R = V^2/P = 220^2/100 = 484$ Ω; $P' = 110^2/484 = 25$ W (2)
c) $I = P/V = 40/220 = 0.18$ A (1)

Q C2-6 · Rated bulb used at a lower voltage · ★ · 2 papers · 2 questions

More questions on this idea (1) – same method, other papers

C2-6.1 · MCQ · 1 mark · Practice Paper 2024-25 (5) Q14

An electric bulb is rated 220 V and 100 W. When it is operated on 110 V, the power consumed will be-

a) 100 W b) 50 W c) 25 W d) 75 W

✔ c) 25 W [$R = V^2/P = 484\ \Omega$; $P' = 110^2/484 = 25$ W]

Q C2-7 · Brightness of lamps in parallel · ★ · 2 papers · 2 questions

Case · 4 marks

Rahul constructed a circuit that operates four lamps A, B, C and D connected with a battery of 30 V in the school exhibition (currents 5 A in A, 3 A in B, 4 A in C, 3 A in D, as shown). Based on the demonstrated circuit, answer:

i) What kind of combination are the lamps arranged in (series or parallel)? (1)

ii) Explain with reference to your above answer, what are the advantages (any two) of this combination of lamps. (1)

iii) Explain with proper calculations which lamp glows the brightest. (2)

OR

iii) Calculate the total energy consumed in the above circuit in 60 s. (2)

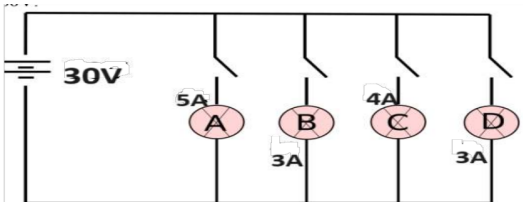


Figure from the question paper

Source: Bangalore Sahodaya Pre-Board Set 1 (2023-24) Q39

✔ **Answer** i) Parallel. (1)

ii) If one lamp is faulty, the others keep working; each lamp gets the full voltage of the battery. (1)

iii) $P = VI$; all lamps have the same voltage, lamp A has the largest current: $P_A = 30 \times 5 = 150$ W – lamp A glows the brightest. (2)

OR iii) Total current $= 5 + 3 + 4 + 3 = 15$ A; $E = VIt = 30 \times 15 \times 60 = 27000$ J (2)

More questions on this idea (1) – same method, other papers

C2-7.1 · MCQ · 1 mark · NCERT Exemplar Sample Question Paper-II Q13

In an electrical circuit three incandescent bulbs A, B and C of rating 40 W, 60 W and 100 W are connected in parallel to an electric source. Which of the following is likely to happen regarding their brightness?

(a) Brightness of all the bulbs will be the same

(b) Brightness of bulb A will be the maximum

(c) Brightness of bulb B will be more than that of A

(d) Brightness of bulb C will be less than that of B

✔ (c) Brightness of bulb B will be more than that of A. [In parallel each bulb gets the same voltage; the bulb of higher wattage glows brighter: C > B > A]

⚠ NCERT Exemplar item.

Q C2-8 · ★ · Board ×1 · 1 paper

LA · 5 marks

(a) (i) If Rs and Rp respectively are the total resistances of the series and parallel combinations of three resistors of resistances R1, R2 and R3, write the relationships among (I) Rs, R1, R2, R3 and (II) Rp, R1, R2, R3.

(ii) An electric oven operates on the mains voltage of 220 V. This oven consumes 2.2 kWh of electrical energy in one hour. Calculate: (I) power rating of the oven, (II) current drawn by the oven, and (III) resistance of the oven when in operation.

OR

(b) (i) Define the term electric power. Express it in terms of potential difference (V) and resistance (R).

(ii) The resistance of a metal wire of length 6 m is 120 Ω. If the area of cross-section of the wire is 4×10^{-7} m², calculate the electrical resistivity of the material of the wire. How would the resistivity be affected if this wire is gradually stretched so that its length is doubled? Justify your answer.

Source: CBSE 31(B)/S (VI) Series EFGH/S Q36

Q C2-8 · ★ · Board ×1 · 1 paper

✔ **Answer** (a)(i) Rs = R1 + R2 + R3; 1/Rp = 1/R1 + 1/R2 + 1/R3 (1)
(ii)(I) P = E/t = 2.2 kWh/1 h = 2.2 kW = 2200 W (1) (II) I = P/V = 2200/220 = 10 A (1½) (III) R = V/I = 220/10 = 22 Ω (1½)
OR (b)(i) Rate of consumption of electric energy; P = V²/R. (1)
(ii) ρ = RA/l = 120 × 4 × 10^{-7}/6 = 8 × 10^{-6} Ω m (2). No change – resistivity depends only on the material (and temperature), not on length. (2)

Q C2-9 · ★ · 1 paper

VSA · 2 marks

An electric motor takes 5 A from a 220 V line. Determine the power of the motor and the energy consumed in 2 hrs.
OR
Calculate the equivalent resistance in the following network when value of R1, R2, R3 & R4 are 4 Ohm, 6 Ohm, 8 Ohm & 2 Ohm respectively which are connected to 20 V battery.

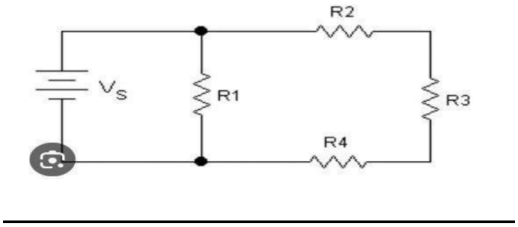


Figure from the question paper

Source: KVS Lucknow Pre-Board I (2023-24) Q22

✔ **Answer** P = VI = 220 × 5 = 1100 W (1); E = 1.1 kW × 2 h = 2.2 kWh (= 7.92 × 10^{6} J) (1)
OR R2, R3, R4 are in series = 6 + 8 + 2 = 16 Ω; this is in parallel with R1 = 4 Ω: R = 4 × 16/20 = 3.2 Ω (2)

⚠ **Note:** NCERT Exercise 15 (first part).

Q C2-10 · ★ · 1 paper

SA · 3 marks

Three 2 Ω resistors, A, B, and C are connected as shown in the figure (A in series with B and C in parallel). Each of them dissipates energy and can withstand a maximum power of 18 W without melting.
(a) Find the maximum current that can flow through the resistor A.
(b) Find the maximum current that can flow through resistors B and C.

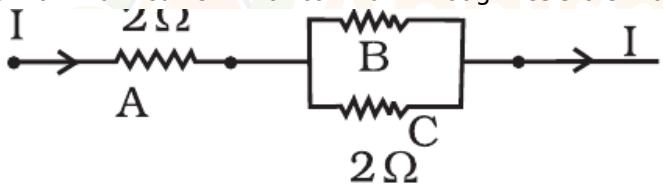


Figure from the question paper

Source: Vedantu Sample Paper Set 1 (2026-27) Q31

✔ **Answer** (a) P = I²R; 18 = I² × 2; I = 3 A (1½)
(b) The current in A divides equally between B and C: 3/2 = 1.5 A each (1½)

Q C2-11 · ★ · 1 paper

LA · 5 marks

(A) The arrangement of resistors shown in the figure (100 Ω in series with two 25 Ω resistors in parallel; voltmeter V2 across the parallel pair, V1 across the battery) is connected to a battery. The power dissipation in the 100 Ω resistor is 81 W. Calculate (i) the current in the circuit (ii) the reading in the voltmeter V2 (iii) the reading in the voltmeter V1.

OR

(B) An electric heater consists of three similar heating elements A, B and C, connected as shown in the figure. Each heating element is rated as 1.2 kW, 240 V and has constant resistance. S1, S2 and S3 are respective switches. The circuit is connected to a 240 V supply. (i) Calculate the resistance of one heating element. (ii) Calculate the current in each resistor when only S1 and S3 are closed. (iii) Calculate the power dissipated across A when S1, S2 and S3 are closed.

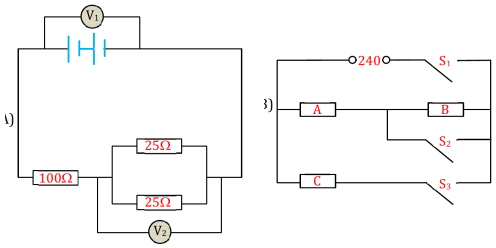


Figure from the question paper

Source: CBSE Sample Question Paper (3-section) (2025-26) Q39 · CBSE Sample Question Paper (2025-26) Q39 · CBSE Sample Question Paper 2025-26 (ALLEN copy) Q39

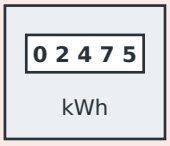
✔ **Answer** (A)(i) $P = I^2R$; $81 = I^2 \times 100$; $I = 0.9$ A (1)
(ii) $25 \parallel 25 = 12.5\ \Omega$; $V2 = 0.9 \times 12.5 = 11.25$ V (2)
(iii) V1 = I × total R = $0.9 \times 112.5 = 101.25$ V (2)
OR (B)(i) $R = V^2/P = 240 \times 240/1200 = 48\ \Omega$ (1)
(ii) S1, S3 closed: A and B in series (96 Ω) across 240 V: I = 2.5 A in A and B; C alone across 240 V: I = 5 A (2)
(iii) S2 closed shorts B, so A gets the full 240 V: P = 1.2 kW (2)

⚠ **Note:** CBSE Sample Paper 2025-26.

C3 · Electrical energy, kWh and electricity bill

14 questions · 4 ideas · 19 papers
Prepared by Abhishek Das, TGT (Science)

Picture it
Energy E = P x t. Commercial unit: 1 kWh = 1 unit = 3.6 x 10^6 J. Bill = (kW x hours per day x days) x rate per unit.



E = P × t
1 kWh = 1 unit
= 3.6 × 10^6 J

Q C3-1 · **Energy in kWh and electricity bill** · ★★★ · Board ×3 · 11 papers · 7 questions

LA · 5 marks

(a) A smart home uses energy monitoring system to track electricity usage of appliances. In a month of 30 days, the following devices are used: 1. An electric heater of 1500 W used for 4 hours daily. 2. A microwave oven rated at 1.5 kW used for 3 hours daily.
(i) Define electric power and write its SI unit. (ii) Calculate the total energy consumed in joules and kWh in a whole month. (iii) Find out the total cost of electricity for running both appliances for a month of 30 days if the cost of 1 unit is Rs 7.

OR

(b) (i) What is meant by electrical resistivity of a material? (ii) A series electric circuit comprising a resistor made of a metallic wire has an ammeter which reads 300 mA. If the length of the wire is made three times, what will be the new reading in the ammeter? (iii) Calculate the resistance of a 500 m long aluminium wire of cross-sectional area 1×10^{-3} m² and resistivity $2.65 \times 10^{-8}\ \Omega$ m.

Source: CBSE 31/7/1 Exam-2 (E7FDG) (2026) Q39

Q C3-1 · Energy in kWh and electricity bill · ★★★ · Board ×3 · 11 papers · 7 questions

✔ **Answer** (a)(i) Rate of consumption of electric energy; watt (W). (1)
(ii) Heater: 1.5 × 4 = 6 kWh/day; oven: 1.5 × 3 = 4.5 kWh/day; total 10.5 kWh/day × 30 = 315 kWh (1½) = 315 × 3.6 × 10^6 = 1.134 × 10^9 J (1)
(iii) Cost = 315 × 7 = Rs 2205 (1½)
OR (b)(i) Resistivity is the resistance of a conductor of unit length and unit area of cross-section (ρ = RA/l). (1)
(ii) R becomes 3 times, so I = 300/3 = 100 mA (2)
(iii) R = ρl/A = 2.65 × 10^{-8} × 500/(1 × 10^{-3} = 1.325 × 10^{-2} Ω ≈ 0.013 Ω (2)

⚠ **Note:** Area is read as 1 × 10^{-3} m² from the printed paper.

More questions on this idea (6) – same method, other papers

C3-1.1 · **SA · 3 marks** · Vedantu Sample Paper Set 3 (2026-27) Q33 · Vedantu Sample Paper Set 5 (2026-27) Q27 · Vedantu Sample Paper Set 4 (2026-27) Q33 · Practice Paper 2024-25 (7) Q33
A household uses the following electric appliances:
i. The refrigerator of rating 400 W for 10 h each day and two electric fans of rating 80 W each for 6 h daily.
ii. Six electric tubes of rating 18 W each for 6 h daily.
Calculate the electricity bill for the household for the month of June, if the cost of electrical energy is Rs 3 per unit.
✔ Refrigerator: 0.4 kW × 10 h = 4 kWh; fans: 2 × 0.08 × 6 = 0.96 kWh; tubes: 6 × 0.018 × 6 = 0.648 kWh (1½)
Per day = 5.608 kWh; June (30 days) = 168.24 kWh (1)
Bill = 168.24 × 3 = Rs 504.72 (½)

C3-1.2 · **SA · 3 marks** · Practice Paper 2024-25 (4) Q32 · KVS Lucknow First Pre-Board (2024-25) Q30
Calculate the total cost of running the following electrical devices in the month of September, if the rate of 1 unit of electricity is Rs 6.00.
i. Electric heater of 1000 W for 5 hours daily.
ii. Electric refrigerator of 400 W for 10 hours daily.
Also asked as: Same appliances for the month of October (31 days): 155 + 124 = 279 units; cost Rs 1674. [KVS Lucknow 2024-25 Q30]
✔ Heater: 1 kW × 5 h × 30 = 150 kWh (1); refrigerator: 0.4 kW × 10 h × 30 = 120 kWh (1)
Total = 270 units; cost = 270 × 6 = Rs 1620 (1)

C3-1.3 · **LA · 5 marks** · CBSE 31(B) (VI) Series LMNK2 (2026) Q39
(a) (i) In a house, 5 fans, rated 100 W; 220 V each are used for 4 hours daily and an electric heater rated 1000 W; 220 V is used for 5 hours daily. Calculate the cost of electrical energy consumed by the fans and the electric heater in a month of 30 days if the cost of 1 unit of electrical energy is Rs 5.
(ii) You have two fuse wires X and Y with electric current rating 5 A and 10 A respectively. Which of the two would you use with a heater rated 2000 W; 220 V? Justify your answer.
OR
(b) (i) State the relationship of the resistance (R) of a wire with its area of cross-section (A) and its length (l). With the help of this relation, define resistivity of the material of the wire.
(ii) In an electric circuit, 2 A electric current flows through a 40 Ω resistor for 50 seconds. (I) Calculate the heat produced in the wire. (II) If another 40 Ω resistor is connected in parallel to the given 40 Ω resistor, calculate the heat produced in the circuit in 50 seconds.
✔ (a)(i) Fans: 5 × 0.1 × 4 = 2 kWh; heater: 1 × 5 = 5 kWh; per day 7 kWh; 30 days = 210 units (2); cost = 210 × 5 = Rs 1050 (1)
(ii) I = P/V = 2000/220 = 9.09 A; use Y (10 A) – X (5 A) would melt. (2)
OR (b)(i) R = ρl/A; ρ is the resistance of a wire of unit length and unit area of cross-section. (2)
(ii)(I) H = I^2Rt = 4 × 40 × 50 = 8000 J (1½)
(II) Source pd = IR = 80 V; with two 40 Ω in parallel R = 20 Ω; H = V^2t/R = 6400 × 50/20 = 16000 J (1½)
⚠ (b)(ii)(II) is worked with the same source (80 V). If the current is taken as still 2 A, H = 2^2 × 20 × 50 = 4000 J; accept either with the reason stated.

C3-1.4 · **LA · 5 marks** · CBSE 31/5/3 (Z1XYW/5) (2023) Q35
(a) Define electric power and state its SI unit. The commercial unit of electrical energy is known as 'unit'. Write the relation between this 'unit' and joule.
(b) In a house, 2 bulbs of 50 W each are used for 6 hours daily and an electric geyser of 1 kW is used for 1 hour daily. Calculate the total energy consumed in a month of 30 days and its cost at the rate of Rs 8.00 per kWh.
✔ (a) Electric power is the rate at which electric energy is consumed; SI unit watt. (1) 1 unit = 1 kWh = 3.6 × 10^6 J (1)
(b) Bulbs: 2 × 0.05 × 6 = 0.6 kWh; geyser 1 kWh; per day 1.6 kWh (1)
30 days = 48 kWh (1); cost = 48 × 8 = Rs 384 (1)

Q C3-1 · Energy in kWh and electricity bill · ★★★ · Board ×3 · 11 papers · 7 questions

C3-1.5 · LA · 5 marks · CBSE Sample Question Paper (2024-25) Q36

For visually impaired students:

A. (i) State the law and write the formula connecting the electric current flowing through a conductor and voltage applied across it. (ii) In a household five fans each of 100 W are used for 4 hours and an electric press of 500 W for 2 hours every day. Calculate the cost of using the fans and electric press for 60 days if the cost of 1 unit of electrical energy is Rs 6.5.

OR

B. (i) State Joule's law of heating and write its mathematical expression. (ii) Two resistors of resistances 2 Ω and 4 Ω are connected in a) series b) parallel with a battery of given potential difference. Compute the ratio of total quantity of heat produced in the combination in the two cases if the total voltage and time are kept the same for both.

✔ A.(i) Ohm's law: $V \propto I$ at constant temperature; $V = IR$. (1)

(ii) Fans: 5 × 0.1 kW × 4 h = 2 kWh; press: 0.5 × 2 = 1 kWh; per day 3 kWh (2); 60 days = 180 kWh; cost = 180 × 6.5 = Rs 1170 (2)

OR B.(i) $H = I^2Rt$ (1)

(ii) Rs = 6 Ω, Rp = 4/3 Ω; $H = V^2t/R$, so Hs : Hp = Rp : Rs = (4/3) : 6 = 2 : 9 (4)

⚠ CBSE SQP 2024-25 Q36 (for visually impaired students). The SQP marking scheme counted only one fan (0.4 kWh) and got Rs 546; with five fans the cost is Rs 1170.

C3-1.6 · LA · 12 marks · CBSE Competency-Based Education item bank (Science10 items) Q1

Fig. 1 shows the filament in a lamp. The filament is made from a very thin piece of metal. When there is a current in the filament it glows brightly and becomes very hot.

1(a) Explain how the current causes the filament to become hot. (4 marks)

1(b) Lamps in the home are connected in parallel. Give two reasons why lamps are connected in parallel. (2 marks)

1(c) The cost of electricity is Rs 4 per kilowatt-hour. Calculate the cost of using a 100 W lamp for 8 hours. (3 marks)

✔ (a) The filament has high resistance; electrons moving through it collide with the metal atoms and give them energy; the electrical energy changes into heat ($H = I^2Rt$); the thin tungsten wire gets very hot and glows. (4)

(b) Each lamp gets the full mains voltage; each can be switched on/off separately; if one fails the others still work (any two). (2)

(c) E = 0.1 kW × 8 h = 0.8 kWh; cost = 0.8 × 4 = Rs 3.20 (3)

⚠ Part (d) on HFC in refrigerators is from another chapter and is left out.

Q C3-2 · kWh and joule · ★★ · Board ×2 · 4 papers · 3 questions

SA · 3 marks

a. What is the meaning of electric power of an electrical device? Write its SI unit.

b. An electric kettle of 2 kW is used for 2 h. Calculate the energy consumed in (i) kilowatt hour and (ii) joules.

Source: Practice Paper 2024-25 (5) Q33 · CBSE 31/2/2 Term-II (QQCRR/2) (2022) Q9 · CBSE 31/2/3 Term-II (QQCRR/2) (2022) Q13

✔ **Answer** a. The rate at which it consumes electrical energy; SI unit watt (W). (1)

b.(i) E = P × t = 2 kW × 2 h = 4 kWh (1)

(ii) $4 \times 3.6 \times 10^6 = 1.44 \times 10^7$ J (1)

⚠ **Note:** The practice-paper key wrote 4 kWh = 11,400,000 J; the correct value is 14,400,000 J (1.44×10^7 J).

More questions on this idea (2) – same method, other papers

C3-2.1 · A–R · 1 mark · CBSE 31/S/1 Supplementary (EFGH/S) Q19 · CBSE 31/S/2 Supplementary (EFGH/S) Q18 · CBSE 31/S/3 Supplementary (EFGH/S) Q18

Assertion (A): The commercial unit of electric energy is kilowatt hour (kWh).

Reason (R): 1 kWh = 3.6×10^6 joule (J).

✔ (B) Both A and R are true, but R is not the correct explanation of A.

C3-2.2 · SA · 3 marks · Practice Paper 2024-25 (9) Q32

Derive the relation between kilowatt hour and joule.

✔ 1 kWh is the energy used in 1 hour at the rate of 1 kW. (1)

1 kWh = 1 kW × 1 h = 1000 W × 3600 s (1)

= 3.6×10^6 W s = 3.6×10^6 J (1)

Q C3-3 · Current, energy and cost for an appliance · ★★ · Board ×1 · 4 papers · 3 questions

SA · 3 marks

For a heater, rated 4 kW and 220 V, calculate the following: (a) The current (b) Energy consumed in 2 hours (c) If 1 kWh is priced at Rs 4.50, then the cost of energy consumed

Also asked as: A 4 kW heater is connected to a 220 V source. Calculate (a) current 18.18 A (b) resistance $R = V^2/P = 12.1\ \Omega$ (c) energy in 2 h = 8 kWh. [Practice Paper 2024-25 (13) Q36 OR]

Source: CBSE 31/1/3 Term-II (QQARR/1) (2022) Q10 · Practice Paper 2024-25 (13) Q36

✔ **Answer** (a) $I = P/V = 4000/220 = 18.18$ A (1)
(b) $E = 4\ \text{kW} \times 2\ \text{h} = 8$ kWh (1)
(c) Cost = $8 \times 4.50 = $ Rs 36 (1)

More questions on this idea (2) – same method, other papers

C3-3.1 · **SA · 3 marks** · Practice Paper 2024-25 (9) Q33

i. A wire of resistance 2 Ω has been connected to a source of 50 V at its two ends. What is the current flowing through the wire?
ii. An electric kettle rated at 220 V, 2.2 kW works for 3 h. Calculate the energy consumed and the current drawn.
✔ i. $I = V/R = 50/2 = 25$ A (1)
ii. $E = 2.2\ \text{kW} \times 3\ \text{h} = 6.6$ kWh ($= 2.376 \times 10^7$ J) (1); $I = P/V = 2200/220 = 10$ A (1)

C3-3.2 · **SA · 3 marks** · Practice Paper 2024-25 (3) Q33

An electric geyser rated at 1500 W, 250 V is connected to a 250 V line mains. Solve: i. the electric current drawn by it, and the energy consumed by it in 50 h. ii. cost of energy consumed if each unit costs Rs 6.
✔ i. $I = P/V = 1500/250 = 6$ A (1); $E = 1.5\ \text{kW} \times 50\ \text{h} = 75$ kWh (1)
ii. Cost = $75 \times 6 = $ Rs 450 (1)

Q C3-4 · ★ · 1 paper

Case · 4 marks

Read the following text carefully and answer the questions that follow:
The electrical energy consumed by an electrical appliance is given by the product of its power rating and the time for which it is used. The SI unit of electrical energy is joule. Joule represents a very small quantity of energy, so for commercial purposes we use a bigger unit called kilowatt-hour. 1 kilowatt-hour is equal to 3.6×10^6 joules.
i. The energy dissipated by the heater is E. When the time of operating the heater is doubled, what would be the energy dissipated? (1)
ii. The power of a lamp is 60 W. What will be the energy consumed in 1 minute? (1)
iii. The electrical refrigerator rated 400 W operates 8 hours a day. The cost of electrical energy is Rs 5 per kWh. Find the cost of running the refrigerator for one day. (2)
OR
Calculate the energy transformed by a 5 A current flowing through a resistor of 2 Ω for 30 minutes. (2)

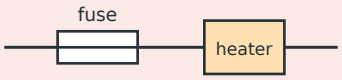
Source: Practice Paper 2025-26 (J) Q38

✔ **Answer** i. $2E$ ($E = Pt$) (1)
ii. $E = 60 \times 60 = 3600$ J (1)
iii. $E = 0.4\ \text{kW} \times 8\ \text{h} = 3.2$ kWh; cost $= 3.2 \times 5 = $ Rs 16 (2)
OR $E = I^2Rt = 25 \times 2 \times 1800 = 90000$ J (2)

C4 · Power rating, current drawn and fuse rating

13 questions · 6 ideas · 13 papers
Prepared by Abhishek Das, TGT (Science)

Picture it
Current drawn I = P/V. Fuse rating must be a little MORE than this current (e.g. 1 kW at 220 V draws 4.5 A, use a 5 A fuse). A fuse is a wire of low melting point joined in series; it melts and breaks the circuit when current is too large.



I = P / V → fuse a little above I
1 kW at 220 V → 4.5 A → 5 A fuse

Q C4-1 · Fuse rating from I = P/V · ★★★ · Board ×8 · 8 papers · 7 questions

SA · 3 marks
Explain in brief the function of an electric fuse in a domestic circuit. An electric heater of current rating 3 kW; 220 V is to be operated in an electric circuit of rating 5 A. What is likely to happen when the heater is switched 'ON'? Justify your answer with necessary calculation.

Also asked as: (VI papers) An electric heater of rating 2 kW; 220 V in a room with fuse/circuit rating 5 A: I = 9.09 A > 5 A, so the fuse melts. [31(B)/S EFGH/S Q32; VI paper E7FDG Q37(b), which also asks how 220 V reaches every point – appliances are in parallel]

Source: CBSE 31/3/1 (DAA1B/3) (2024) Q32 · CBSE 31/3/2 (DAA1B/3) (2024) Q31 · CBSE 31/3/3 (DAA1B/3) (2024) Q31 · CBSE 31(B)/S (VI) Series EFGH/S Q32 · CBSE 31(B) (VI) Series E7FDG (2026) Q37

✔ **Answer** Fuse: a wire of low melting point in series with the circuit; it melts and breaks the circuit when the current becomes too large, protecting the appliances. (1)
I = P/V = 3000/220 = 13.6 A (1)
This is much more than 5 A, so the fuse will melt and the circuit will break. (1)

More questions on this idea (6) – same method, other papers

C4-1.1 · **MCQ · 1 mark** · CBSE 31/5/1 (Z1XYW/5) (2023) Q15 · CBSE 31/5/2 (Z1XYW/5) (2023) Q14 · CBSE 31/5/3 (Z1XYW/5) (2023) Q16
An electric kettle consumes 1 kW of electric power when operated at 220 V. The minimum rating of the fuse wire to be used for it is
(a) 1 A (b) 2 A (c) 4 A (d) 5 A
✔ (d) 5 A [I = 1000/220 = 4.5 A; the fuse must be rated a little more than this]

C4-1.2 · **MCQ · 1 mark** · CBSE 31/1/2 (Z1XYW/1) (2023) Q14
An electric iron of 1500 W, 200 V and a flash light of 500 W, 200 V are used in homes. The rating of fuse to be used should be
(a) 5 A (b) 10 A (c) 15 A (d) 20 A
✔ (b) 10 A [total I = (1500 + 500)/200 = 10 A]

C4-1.3 · **VSA · 2 marks** · CBSE 31/5/3 (2026) Q39
For an electric heater rated as 220 V, 2200 W, what should be the minimum rating of fuse used with it?
✔ I = P/V = 2200/220 = 10 A (1); the fuse should be rated a little more than 10 A (e.g. 10–15 A) (1).
⚠ Other parts of this question (overload, short-circuit) are from Ch 12.

C4-1.4 · **VSA · 2 marks** · CBSE 31/2/1 (GHF2E) (2025) Q26
An electric kettle is rated 750 W; 220 V. Can this kettle be used in a circuit which has a fuse of current rating 3 A? Give reason for your answer.
✔ I = P/V = 750/220 = 3.41 A (1)
No – the current is more than 3 A, so the fuse will melt. (1)

C4-1.5 · **VSA · 2 marks** · CBSE 31/2/2 (GHF2E) (2025) Q26
An electric fuse is rated 8 A. Can it be used with an electrical appliance of rating 5 kW, 200 V? Justify your answer.
✔ I = P/V = 5000/200 = 25 A (1)
No – 25 A is much more than 8 A; the fuse will melt as soon as the appliance is switched on. (1)

C4-1.6 · **SA · 3 marks** · CBSE 31/4/1 (2026) Q33 · CBSE 31/4/2 (2026) Q33 · CBSE 31/4/3 (2026) Q33
A fuse in electric circuit is rated 4 A. Can it be used with an electric heater of rating 2 kW, 200 V? Explain your answer.
✔ I = P/V = 2000/200 = 10 A (1½)
No. 10 A is more than 4 A; the fuse wire will heat up, melt and break the circuit, so the heater cannot be used with it. (1½)

Q C4-2 · Fuse wire: function and properties · ★ · 2 papers · 2 questions

VSA · 2 marks

How does use of a fuse wire protect electrical appliances?

Source: KVS Lucknow Pre-Board II (2023-24) Q25

✔ **Answer** A fuse is placed in series with the appliance. If an unduly high current flows (overloading or short circuit), the fuse wire heats up and melts (heating effect), the circuit breaks and the appliance is saved. (2)

More questions on this idea (1) – same method, other papers

C4-2.1 · MCQ · 1 mark · Practice Paper 2024-25 (13) Q13

Which of the following is not a suitable characteristic of wire used in making an electric fuse?
a) Thin and short b) Low melting point c) Higher resistance d) Thick and short
✔ d) Thick and short

Q C4-3 · ★ · 1 paper

MCQ · 1 mark

Observe the circuit shown. All the three switches are open. Identify the switch/switches that on being closed will cause the fuse to blow.

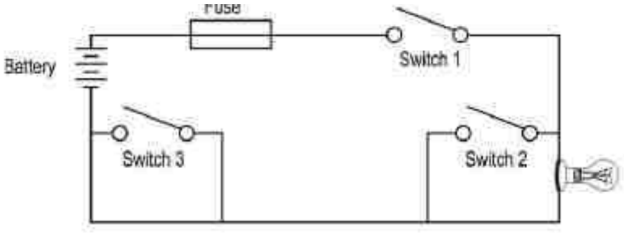


Figure from the question paper

Source: CBSE Competency item bank (chapter-wise, with answer key) Q13

✔ **Answer** Switch 1 and switch 2 (both closed). Switch 2 joins the two ends of the bulb directly (short circuit), so with switch 1 closed a very large current flows through the fuse. Switch 3 only joins two points of the same wire.

Q C4-4 · ★ · 1 paper

SA · 4 marks

For visually impaired students:
(A) (i) Explain why in household circuits only the fuse is connected in series with all the rest of the appliances but all appliances are connected in parallel to each other.
(ii) In a household circuit, an electric heater of power 1500 W and a fan of power 500 W are connected in parallel to a 220 V supply. A fuse rated for 10 A is connected to protect it from excessive current. (a) Calculate the total current drawn by the heater and the fan. (b) Determine whether the 10 A fuse is appropriate for this circuit or if it will blow.
OR
(B) Two resistors, R1 = 6 Ω and R2 = 12 Ω, are connected in parallel to a 24 V battery. The circuit operates for 5 minutes. (i) Calculate the total heat generated in both resistors. (ii) If each resistor has a power rating of 100 W, determine whether it is safe to use these resistors in the circuit.

Source: CBSE Sample Question Paper (3-section) (2025-26) Q39 · CBSE Sample Question Paper (2025-26) Q39 · CBSE Sample Question Paper 2025-26 (ALLEN copy) Q39

✔ **Answer** (A)(i) The fuse must carry the total current so it is in series; appliances are in parallel so each gets 220 V and works independently. (2)
(ii)(a) I = 2000/220 = 9.09 A (1½) (b) 9.09 A < 10 A – the fuse is appropriate; it will not blow. (1½)
OR (B)(i) P1 = 24²/6 = 96 W; P2 = 24²/12 = 48 W; H = 144 × 300 = 43200 J (3)
(ii) Both are below 100 W (96 W and 48 W), so it is safe. (2)

⚠ **Note:** CBSE Sample Paper 2025-26 Q39 (VI students).

Q C4-5 · ★ · 1 paper

SA · 3 marks

i. Several electric bulbs designed to be used on a 220 V electric supply line are rated 10 W. How many lamps can be connected in parallel with each other across the two wires of 220 V line if the maximum allowable current is 5 A?
ii. Calculate the cost of seeing 2 movies on colour T.V. daily for the month of September. Given wattage of colour T.V. = 60 W, duration of each movie is 2 hours 30 min and 1 kWh costs Rs 4.

Source: Practice Paper 2024-25 (6) Q33

✔ **Answer** i. Maximum power = VI = 220 × 5 = 1100 W; number of lamps = 1100/10 = 110 (2)
ii. 5 h daily × 30 days × 0.06 kW = 9 kWh; cost = 9 × 4 = Rs 36 (1)

⚠ **Note:** Part i is NCERT Exercise 12 type.

Q C4-6 · ★ · 1 paper

Case · 4 marks

Suresh bought a packet of 100 LEDs to make his own lights for decoration in his house. The label on the packet read: LED 2835, 0.2 W, 30 Lumens, 3 V. To understand how he should connect the LEDs, he referred to the circuit diagram shown (LED 1 to LED 16). Answer four of the five questions.
Q1 Which of the following describes how the LEDs are connected in the circuit diagram? (1) all in series (2) all in parallel (3) 8 each in a series combination, and the two combinations in parallel (4) 8 each in a parallel combination, and the two combinations in series
Q2 If the LED marked 'LED 2' stops working, which other LEDs also stop working? (When an LED stops working, current cannot flow across it.) (1) only LED 3 to LED 8 (2) only LED 3 to LED 8 and LED 1 (3) all the other LEDs in the circuit (4) none of the other LEDs
Q3 Suresh decided to connect all the LEDs in his lights in a series combination. How many LEDs will he need to connect to a 240 V mains supply so that the LEDs work at their power rating? (1) 16 (2) 80 (3) 240 (4) 1200
Q4 What will happen if he connects 100 LEDs, all in a parallel combination, to the 240 V mains supply? (1) Each LED will work as expected since the available voltage is more than 3 V. (2) Each LED will have a potential difference of 240 V and therefore they will get damaged. (3) Each LED will glow but the ones closer to the main supply will glow brighter. (4) Each LED will have a potential difference of 2.4 V across it and will glow dimmer.
Q5 How much current is each LED expected to draw when used according to the ratings given in the label? (1) 0.067 A (2) 0.6 A (3) 10 A (4) 15 A

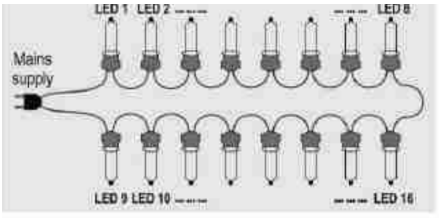


Figure from the question paper

Source: CBSE Competency item bank (chapter-wise, with answer key) Q1

✔ **Answer** Q1 (1) all in series – the wire runs from the plug through LED 1 to LED 8, down to LED 16 and back through LED 9 to the plug: one single path.
Q2 (3) all the other LEDs – the only path is broken.
Q3 (2) 80 [240 V ÷ 3 V]
Q4 (2) each LED gets the full mains voltage and gets damaged.
Q5 (1) 0.067 A [I = P/V = 0.2/3]

⚠ **Note:** Option labels and the last two options of Q5 are partly unreadable in the scan; the answers are worked from the diagram and the rating.

Summary table

Sub-theme × question type (number of unique questions)

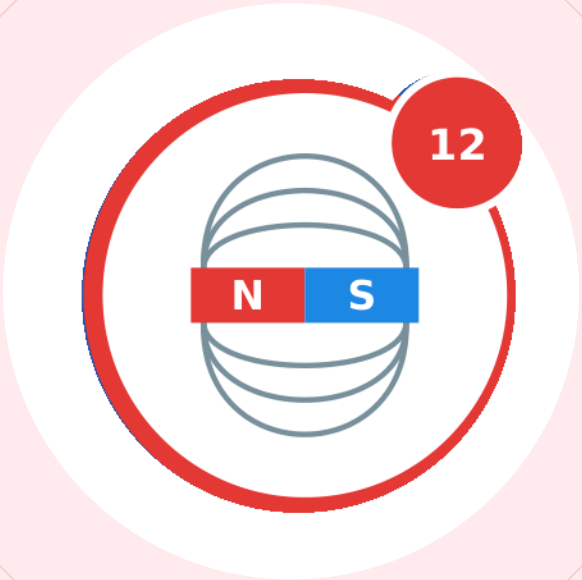
Sub-theme	MCQ	A-R	VSA	SA	LA	Case	Total	Stars ★★★/★★
A1 Electric current and charge	1		2		1	1	5	0 / 2
A2 Potential difference and volt	1		1	2		1	5	0 / 0
A3 Circuit diagram, symbols, ammeter and voltmeter	10		7	1		1	19	1 / 2
A4 Ohm's law and V-I graph	4	1	5	3	4	4	21	0 / 4
B1 Factors on which resistance depends; resistivity	14	2	8	11	6	3	44	3 / 6
B2 Resistors in series	8		1	5	1	1	16	1 / 2
B3 Resistors in parallel	3		6	5	4	4	22	1 / 2
B4 Mixed networks and circuit-based cases	6		4	10	11	3	34	2 / 3
C1 Heating effect of current and Joule's law	6		4	2	2	3	17	1 / 2
C2 Electric power	5		7	5	6	4	27	1 / 1
C3 Electrical energy, kWh and electricity bill		1		7	5	1	14	1 / 2
C4 Power rating, current drawn and fuse rating	4		4	4		1	13	1 / 0
Total	**62**	**4**	**49**	**55**	**40**	**27**	**237**	

Top 10 · last-minute revision

#	Q no.	Idea / question	Papers	Board
1	**B3-1**	Parallel circuit: Rp, branch currents and total current	13	3
2	**B2-1**	Series circuit: total R, current and pd across each	13	2
3	**C3-1**	Energy in kWh and electricity bill	11	3
4	**B4-1**	R in series with a parallel pair	10	2
5	**C2-1**	From the rating: $I = P/V$ and $R = V^2/P$	9	3
6	**C4-1**	Fuse rating from $I = P/V$	8	8
7	**B1-1**	Compare wires: R increases with length, decreases with area	7	5
8	**C1-1**	Heating effect; derive $H = I^2Rt$	7	3
9	**B1-2**	Find the length of a wire	6	2
10	**B4-2**	Parallel arms with resistors in series	6	1

Formulas to remember: $I = Q/t$ · $V = W/Q$ · $V = IR$ · $R = \rho l/A$ · $R_s = R1 + R2 + R3$ · $1/R_p = 1/R1 + 1/R2 + 1/R3$ · $H = I^2Rt$ · $P = VI = I^2R = V^2/R$ · $E = Pt$ · 1 kWh = 3.6×10^6 J

CHAPTER



Magnetic Effects of Electric Current

Unit IV: Effects of Current · Section C · Physics

36	122	93
papers with this chapter	times the questions came	questions in this chapter

WHAT IS INSIDE

- Magnetic Field and Field Lines
- Magnetic Field due to a Current
- Force on a Conductor and Domestic Circuits

Starts with its own cover, concept map and Must-do top 20 · 47 pages

Science with Abhishek Sir

PYQ HUNT · Class 10 Science (086)

Chapter 12
Magnetic Effects of Electric Current

Chapterwise question bank from past board papers, pre-boards and sample papers — with answers

Prepared by Abhishek Das, TGT (Science) · Science with Abhishek Sir · 2026-27 syllabus

84	36	122	93
papers in the PYQ HUNT collection	papers with this chapter	question appearances found	unique questions after clubbing (2 NEW)

What I went through	Papers with Ch 12	Question appearances
CBSE board papers (incl. VI)	19	71
KVS pre-boards and tests	11	34
Sample papers, CBSE competency and other banks	6	17
Total	**36**	**122**

How to read a question box	
Header colour	**MCQ** · **Assertion–Reason** · **Very Short (2)** · **Short (3)** · **Long (5)** · **Case-based (4)**
Border colour	**Green** = field & field lines · **Blue** = field due to a current · **Orange** = force & domestic circuits
Stars	★★★ asked in 6+ papers · ★★ 3–5 papers · ★ 1–2 papers
Board ×n	number of CBSE board papers (sets of one exam counted once)
Grey strip / Green box	where the question came from (file code) / answer in marking-scheme points with marks
Red note	something to be careful about (figure needed, key checked, text damaged)

Concept map — what is asked, and how often

Magnetic Field and Field Lines

Compass, magnetic field and field lines
17 questions · 17 papers · Board 8
Most asked (Q11): Draw a diagram showing the magnetic field lines around a bar magnet. Write any two characterist...

Magnetic Field due to a Current

Straight current-carrying conductor and right-hand thumb rule
15 questions · 20 papers · Board 11
Most asked (Q23): In a straight conductor, the current is flowing vertically downwards. State the pattern of the ...

Current through a circular loop
8 questions · 10 papers · Board 6
Most asked (Q34): Assertion (A) : The strength of the magnetic field produced at the centre of a current carrying...

Solenoid and electromagnet
16 questions · 20 papers · Board 11
Most asked (Q46): What is a solenoid? When does a solenoid behave as a magnet? Draw the pattern of the magnetic f...

Force on a Conductor and Domestic Circuits

Force on a current-carrying conductor (Fleming's left-hand rule)
17 questions · 16 papers · Board 11
Most asked (Q57): A positron enters a uniform magnetic field at right angles to it as shown. The direction of for...

Domestic electric circuits
20 questions · 18 papers · Board 14
Most asked (Q83): (a) How is the type of current used in household supply different from the current given by a b...

Out of the 2026-27 syllabus and **not** in this bank: electric motor, electromagnetic induction, galvanometer and induced current, electric generator, Fleming's right-hand rule, commutator.

Theme map (NCERT order)

Theme	Sub-theme	Q numbers	MCQ	A–R	VSA	SA	LA	Case
Magnetic Field and Field Lines	Compass, magnetic field and field lines	Q1–Q17	3	7	5	1	–	1
Magnetic Field due to a Current	Straight current-carrying conductor and right-hand thumb rule	Q18–Q32	5	–	6	2	2	–
Magnetic Field due to a Current	Current through a circular loop	Q33–Q40	1	1	2	2	2	–
Magnetic Field due to a Current	Solenoid and electromagnet	Q41–Q56	3	1	1	8	1	2
Force on a Conductor and Domestic Circuits	Force on a current-carrying conductor (Fleming's left-hand rule)	Q57–Q73	5	3	2	3	2	2
Force on a Conductor and Domestic Circuits	Domestic electric circuits	Q74–Q93	5	1	3	9	1	1

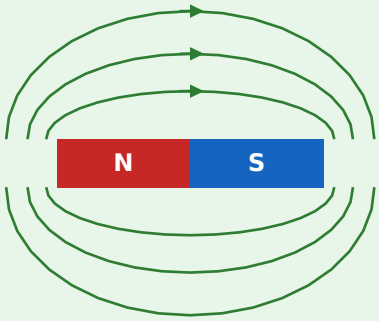
Must-do top 20 (most asked first)

#	Q	Question (short)	Type	Board	Papers
1	Q83	(a) How is the type of current used in household supply different from...	Short Answer	3	3
2	Q46	What is a solenoid? When does a solenoid behave as a magnet? Draw the ...	Short Answer	2	4
3	Q34	Assertion (A) : The strength of the magnetic field produced at the cen...	Assertion–Reason	2	3
4	Q67	(i) State the rule used to find the force acting on a current carrying...	Short Answer	2	2
5	Q84	Explain in brief the function of an electric fuse in a domestic circui...	Short Answer	2	2
6	Q85	State the role of fuse and earthing in domestic electric circuit. Sugg...	Short Answer	2	2
7	Q23	In a straight conductor, the current is flowing vertically downwards. ...	Very Short Answer	2	2
8	Q41	The magnetic field inside a long straight current carrying solenoid	MCQ	2	2
9	Q57	A positron enters a uniform magnetic field at right angles to it as sh...	MCQ	2	2
10	Q18	Which of the following correctly describes the magnetic field near a l...	MCQ	1	5
11	Q31	(a) The given figure shows the current passing through the straight co...	Long Answer	1	2
12	Q72	A student was asked to perform an experiment to study the force on a c...	Case-based	1	2
13	Q47	(i) Draw the pattern of magnetic field lines of (1) a current carrying...	Short Answer	1	2
14	Q68	i. The conductor gets displaced towards left when a current is passed ...	Short Answer	1	2
15	Q86	List three advantages of parallel circuits in domestic wiring.	Short Answer	1	2
16	Q11	Draw a diagram showing the magnetic field lines around a bar magnet. W...	Very Short Answer	1	2
17	Q24	State the rule to determine the direction of a (a) magnetic field prod...	Very Short Answer	1	2
18	Q19	A constant current flows in a horizontal wire in the plane of the pape...	MCQ	1	2
19	Q32	(A) (i) Draw a diagram showing the magnetic field lines around a bar m...	Long Answer	1	1
20	Q39	(a) (i) State the rule which gives the direction of force acting on a ...	Long Answer	1	1

A1 · Compass, magnetic field and field lines

Magnetic Field and Field Lines · 17 questions · 17 papers · Prepared by Abhishek Das, TGT (Science)

Picture it



Outside the magnet: N → S

Lines never cross each other

Closer lines = stronger field (near poles)

Compass N-pole shows the direction

MCQ

Q1 · MCQ · 1 mark ★

1 paper

The magnetic field lines always begin from

(a) N-pole and move towards S-pole outside the magnet.
(b) S-pole and move towards N-pole outside the magnet.
(c) start from the middle and end at N-pole.
(d) start from the middle and end at S-pole.

Source: KVS Lucknow First Pre-board 2024-25, Q11 [FM]

✓ Answer
(a) N-pole and move towards S-pole outside the magnet. [1]

Q2 · MCQ · 1 mark ★

1 paper

Which of these statements is true for the lines of a magnetic field? Circle 'Yes' or 'No'.
(i) Lines of a magnetic field can sometimes cross each other.
(ii) Lines of a magnetic field emerge from the north pole and meet at the south pole.
(iii) Lines of a magnetic field can sometimes change direction.

Source: CBSE–SAS Competency Based Test Items 2021, Ch 13 Q2 [F5]

✓ Answer
(i) No (ii) Yes (iii) No. [1]
Field lines never cross; outside the magnet they go from north pole to south pole.

Q3 · MCQ · 1 mark ★

1 paper

A student places some iron filings around a magnet. The iron filings arrange themselves as shown in the image. The student labelled four different regions around the magnet. Where would the magnetic field be the strongest?

(a) P
(b) Q
(c) R
(d) S

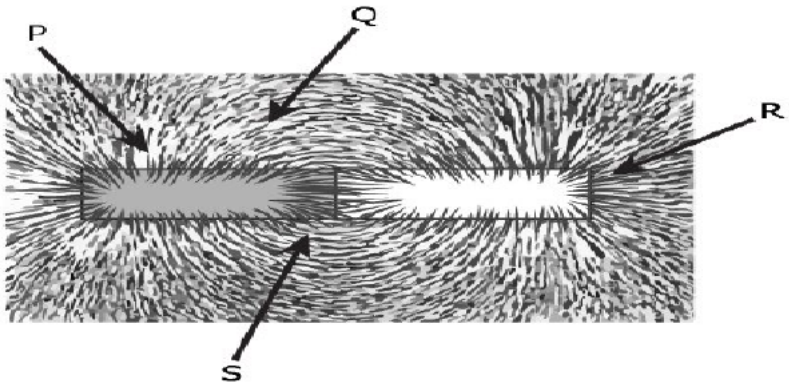


Figure from the question paper

Source: KVS Lucknow 1st Pre-board, Q14 [FM, PDF p.54]

✔ Answer
(c) R [1] — R is at the end (pole) of the magnet, where the filings are most crowded, so the field is strongest there.

⚠ **Note:** Key read from the figure in the paper: field is strongest where field lines (filings) are closest — at the poles.

Assertion-Reason

Q4 · Assertion-Reason · 1 mark ★ 2 papers

Assertion : A compass needle is placed near a current carrying wire. The deflection of the compass needle decreases when the magnitude of the current in the wire is increased.
Reason : The strength of a magnetic field at a point near the conductor increases on increasing the current.

Source: KVS Lucknow First Pre-board 2024-25, Q18 [FM] · KVS Delhi Pre-board-II 2024-25, Q20 [FM]

✔ Answer
(D) A is false but R is true. [1] More current → stronger field → deflection increases.

Q5 · Assertion-Reason · 1 mark ★ Board ×1 1 paper

Assertion (A) : Magnetic field lines never intersect each other.
Reason (R) : If two field lines intersect each other at a point then it would mean that at the point of intersection the resultant field has two directions, which is not possible.

Source: CBSE (VI) Series CDBA/S, 31(B)/S, Q17 [F1]

✔ Answer
(A) Both A and R are true and R is the correct explanation of A. [1]

Q6 · Assertion-Reason · 1 mark ★ Board ×1 1 paper

Assertion (A) : Magnetic field lines do not intersect each other.
Reason (R) : Magnetic field lines are imaginary lines, the tangent to which at any point gives the direction of the field at that point.

continued on next page ▸

▸ continued

Source: CBSE 2023 (Z1XYW/2) 31/2/1 Q20, 31/2/2 Q18, 31/2/3 Q17 [F1]

✓ Answer
(A) Both A and R are true and R is the correct explanation of A. [1]
If two lines crossed, there would be two tangents — two directions of the field at one point — which is not possible.

⚠ **Note:** Proof-check: R gives the meaning of the direction of a field line; NCERT uses exactly this to explain why lines cannot cross. So (A). Some keys mark (B) — confirm with the official marking scheme.

Q7 · Assertion–Reason · 1 mark ★ Board ×1 1 paper

Assertion (A) : The needle of a magnetic compass kept in strong external magnetic field, always aligns itself in north-south direction on the earth.
Reason (R) : Behaviour of the needle of a compass is same as that of a freely suspended bar magnet.

Source: CBSE 2026, 31/5/1 Q32 [F4]

✓ Answer
(D) A is false but R is true. [1]
In a strong external field the needle lines up along that field, not along north-south.

Q8 · Assertion–Reason · 1 mark ★ Board ×1 1 paper

Assertion (A): Two magnetic field lines around a current carrying straight wire do not intersect each other.
Reason (R): The magnitude of the magnetic field produced at a given point increases as the current through the wire increases.

Source: CBSE 2023 (Z1XYW/5) 31/5/1 Q20 [F1, PDF p.464]

✓ Answer
(b) Both A and R are true, but R is not the correct explanation of A. [1]
Lines do not cross because the field has only one direction at a point; R is a true fact about strength, not about crossing.

Q9 · Assertion–Reason · 1 mark ★ Board ×1 1 paper

Assertion (A) : No two magnetic field lines are found to cross each other.
Reason (R) : The compass needle cannot point towards two directions at the point of intersection of two magnetic field lines.

Source: CBSE 2025 (1GEFH) 31/1/1 Q19, 31/1/2 Q19, 31/1/3 Q18 [F9-OCR(full), PDF p.194, 235, 278]

✓ Answer
(a) Both A and R are true and R is the correct explanation of A. [1]

Q10 · Assertion–Reason · 1 mark ★ 1 paper

Assertion (A): Two bar magnets attract when they are brought near to each other with the same pole.
Reason (R): Unlike poles will attract each other.

Source: KVS Lucknow 1st Pre-board 2022-23, Q20 [FM]

✓ Answer
(D) A is false but R is true. [1] Like poles repel; unlike poles attract.

Very Short Answer

Q11 · Very Short Answer · 2 marks ★ Board ×1 2 papers

Draw a diagram showing the magnetic field lines around a bar magnet. Write any two characteristics of magnetic field lines.

Also asked as: 'Draw magnetic field lines around a bar magnet.'

Source: CBSE 2026, 31/5/1 Q39(A)(i) [F4] · KVS Lucknow 1st Pre-board, Q32 [FM]

✓ Answer
Diagram: closed curves coming out of N-pole and entering S-pole outside the magnet, crowded near the poles, with arrows N → S outside. [1]
Two characteristics [½ + ½]: field lines never cross each other; they are closer where the field is stronger (near the poles).

Q12 · Very Short Answer · 2 marks ★ Board ×1 1 paper

In the given figure, AB and CD are two magnetic field lines intersecting each other at point O. If a compass is placed at point O, what will happen? State your conclusions.

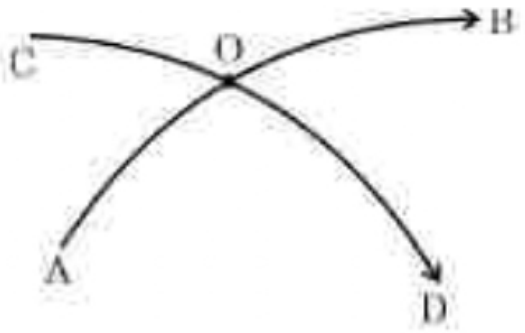


Figure from the question paper

Source: CBSE 2026, 31/8/1 Q35(C) (also 31/8/2) [F4, PDF p.115]

✓ Answer
The compass needle would have to point along two directions at the same point, which is not possible. [1]
Conclusion: magnetic field lines never intersect; the field has only one direction at a point — so the figure cannot be correct. [1]

Q13 · Very Short Answer · 2 marks ★

Board ×1 1 paper

(a) Name the poles P, Q, R and S of the magnets in the following figures 'a' and 'b'.
(b) State the inference drawn about the direction of the magnetic field lines on the basis of these diagrams.
OR
When is the force experienced by a current-carrying straight conductor placed in a uniform magnetic field (i) Maximum ; (ii) Minimum ?

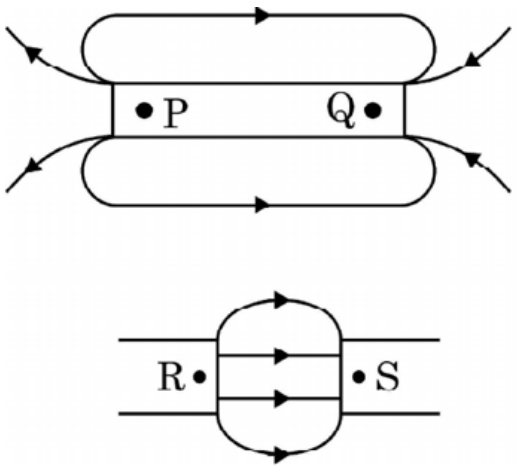


Figure from the question paper

Source: CBSE 2022 Term-II (QQCRR/2) 31/2/1 Q6 (also 31/2/2, 31/2/3) [F9-OCR(full), PDF p.299, 367, 439]

✓ Answer
(a) Figure 'a': P — north pole, Q — south pole. Figure 'b': R — north pole, S — south pole. [½ + ½]
(b) Outside a magnet, field lines go from the north pole to the south pole. [1]
OR (i) Maximum when the conductor (current) is perpendicular to the magnetic field. [1] (ii) Minimum (zero) when the conductor is parallel to the magnetic field. [1]

⚠ **Note:** Poles read from the arrows in the figure: lines leave P and R, and enter Q and S.

Q14 · Very Short Answer · 2 marks ★

1 paper

The figure shows two magnets X and Y kept near each other. Their poles are not marked, but the magnetic field lines are shown in the figure. If magnet X is moved towards magnet Y as indicated by the arrow, will the two magnets attract or repel each other? Justify your answer by describing how you interpret the field lines.

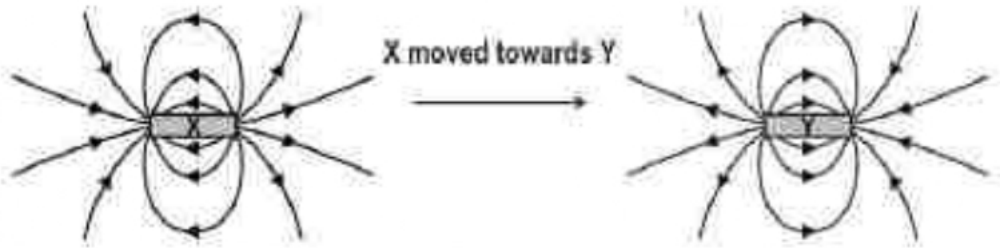


Figure from the question paper

continued on next page ▸

▸ continued

Source: CBSE Competency Items, Magnetic Effects Q13 [F4, PDF p.794]

✓ Answer
They will repel each other. [1] The field lines start from (go out of) the right end of X and also from the left end of Y, so both these facing ends are north poles; like poles repel. [1]

Q15 · Very Short Answer · 1 mark ★ 1 paper

Quadrupole magnets consist of groups of four magnets and are used in particle accelerators. The image below shows four bar magnets configured to produce a quadrupole. The magnetic field lines between the magnets is marked. What are the poles of the magnets at P, Q, R and S?



Figure from the question paper

Source: CBSE Competency Items, Magnetic Effects Q12 [F4, PDF p.794]

✓ Answer
P and R — south poles; Q and S — north poles. [½ + ½]
(The field lines start from Q and S and end on P and R.)

Short Answer

Q16 · Short Answer · 3 marks ★★ 5 papers

(a) What are magnetic field lines?
(b) How is the direction of magnetic field at a point determined?
(c) List any two properties of magnetic field lines.

Also asked as: 'What do you understand by magnetic field lines? Write their properties.' / 'Write any two characteristics of magnetic field lines.' / 'Write four properties of magnetic field lines.'

Source: KVS Lucknow Pre-board-II 2023-24, Q32 [FM] · KVS Lucknow (Set-1) Pre-board, Q28 [FM] · KVS Lucknow Pre-board-I 2023-24, Q33(i) [FM] · KVS Lucknow 1st Pre-board, Q32 OR [FM] · KVS Lucknow 1st Pre-board 2022-23, Q35 OR [FM]

✔ Answer
(a) The curves along which a north pole of a compass (or iron filings) lines up around a magnet; they show the magnetic field. [1]
(b) Place a small compass at the point; the direction in which its north pole points gives the direction of the field (the tangent to the field line at that point). [1]
(c) Any two [½ + ½]:
• Outside the magnet they go from north pole to south pole; inside, from south pole to north pole — they are closed curves.
• No two field lines cross each other.
• Where lines are closer, the field is stronger.

Case-based

Q17 · Case-based · 4 marks ★ Board ×1 1 paper

A student fixes a sheet of white paper on a drawing board using some adhesive materials. She places a bar magnet in the centre of it and sprinkles some iron filings uniformly around the bar magnet using a salt-sprinkler. On tapping the board gently, she observes that the iron filings have arranged themselves in a particular pattern.
(a) Draw a diagram to show this pattern of iron filings. 1
(b) Draw the magnetic field lines of a bar magnet showing the poles of the bar magnet as well as the direction of the magnetic field lines. 1
(c) (i) How is the direction of magnetic field at a point determined using the field lines ? Why do two magnetic field lines not cross each other ? 2
OR (ii) How are the magnetic field lines of a bar magnet drawn using a small compass needle ? Draw one magnetic field line each on both sides of the magnet. 2

Also asked as: 31/1/3 Q15(b): 'What makes iron filings arrange in a definite pattern ?' → each filing becomes a tiny magnet in the field of the bar magnet and lines up along the field lines.

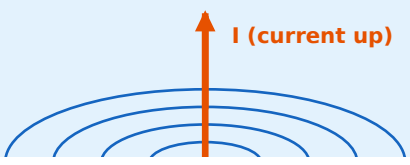
Source: CBSE 2022 Term-II (QQARR/1) 31/1/1 Q15, 31/1/2 Q15, 31/1/3 Q15 [F9-OCR(full), PDF p.180, 223, 260]

✔ Answer
(a) Iron filings crowded near the two ends (poles) and arranged in curved lines from one end to the other. [1]
(b) Closed curves from N-pole to S-pole outside the magnet, with arrows N → S. [1]
(c)(i) The direction of the field at a point is along the tangent to the field line at that point (the way the north pole of a compass points). [1] Two lines do not cross, because at the crossing point the compass needle would have to point in two directions, which is not possible. [1]
OR (ii) Place a small compass near the N-pole; mark the positions of the two ends of the needle; move the compass so that its south end is at the last north-end mark; repeat until the S-pole is reached; join the points by a smooth curve — this is one field line. Repeat on the other side. [1 + 1 for the drawing]

B1 · Straight current-carrying conductor and right-hand thumb rule

Magnetic Field due to a Current · 15 questions · 20 papers · Prepared by Abhishek Das, TGT (Science)

Picture it

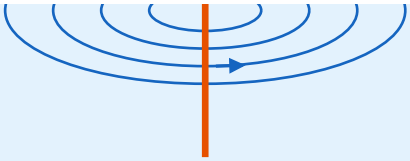


Right-hand thumb rule

Thumb → current; curled fingers → field

continued on next page ▸

▸ continued



Field lines: concentric circles

Field ↑ with current, ↓ with distance

MCQ

Q18 · MCQ · 1 mark ★★ Board ×1 5 papers

Which of the following correctly describes the magnetic field near a long straight wire?

(a) The field consists of concentric circles centred on the wire.

(b) The field consists of straight lines parallel to the wire.

(c) The field consists of radial lines originating from the wire.

(d) The field consists of straight lines perpendicular to the wire.

Also asked as: 'The magnetic field lines due to a straight wire carrying a current are — straight / circular / parabolic / elliptical' and 'Magnetic field lines around a straight conductor form a pattern of — concentric circles ...' / ZWYX (VI) Q16: 'A student has a long straight thick copper wire. If he passes a current in this wire he would get a magnetic field whose pattern must be : (a) radial lines... (b) concentric circles centred around the wire...' → (b).

Source: KVS Lucknow 1st Pre-board 2022-23, Q11 [FM] · KVS Lucknow Pre-board-2 2024-25, Q13 [FM] · KVS Lucknow 1st Pre-board, Q16 [FM] · British Council item Science10, Q1(a) [F5] · CBSE (VI) Series ZWYX, 31(B) Q16 [F9-OCR(full), PDF p.102]

✓ Answer

(a) The field consists of concentric circles centred on the wire. [1]

Q19 · MCQ · 1 mark ★ Board ×1 2 papers

A constant current flows in a horizontal wire in the plane of the paper from east to west as shown in the figure. The direction of the magnetic field will be north to south at a point :

(a) directly above the wire.

(b) directly below the wire.

(c) located in the plane of the paper on the north side of the wire.

(d) located in the plane of the paper on the south side of the wire.

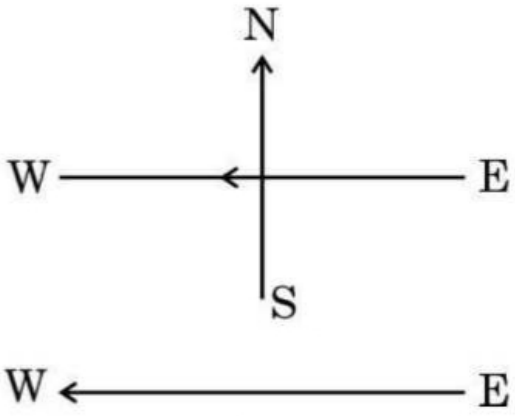


Figure from the question paper

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Source: CBSE 2023 (Z1XYW/5) 31/5/1 Q14 (also 31/5/2, 31/5/3) [F1, PDF p.462] · KVS Lucknow (Set-1) Pre-board, Q11 [FM]

✔ Answer
(b) directly below the wire. [1]
Right-hand thumb rule: thumb towards west; below the wire the fingers point from north to south (above the wire they point south to north).

⚠ **Note:** Checked with the figure in the paper.

Q20 · MCQ · 1 mark ★ Board ×1 1 paper

The direction of magnetic field produced around a current carrying straight conductor is determined by using :

(A) Fleming's left hand rule
(B) Left hand thumb rule
(C) Right hand thumb rule
(D) Fleming's right hand rule

Source: CBSE (VI) Series CDBA/S, 31(B)/S, Q11 [F1]

✔ Answer
(C) Right hand thumb rule. [1]

Q21 · MCQ · 1 mark ★ Board ×1 1 paper

The resultant magnetic field at point 'P' situated midway between two parallel wires (placed horizontally) each carrying a steady current I is

(a) in the same direction as the current in the wires.
(b) in the vertically upward direction.
(c) zero
(d) in the vertically downward direction.

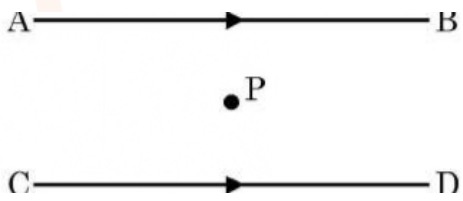


Figure from the question paper

Source: CBSE 2023 (Z1XYW/1) 31/1/1 Q16, 31/1/2 Q13, 31/1/3 Q15 [F1, PDF p.94]

✔ Answer
(c) zero [1]
Both currents flow the same way (A→B and C→D). At P, midway, the field due to AB and the field due to CD are equal and opposite, so they cancel.

⚠ **Note:** Checked with the figure: both currents are in the same direction.

Q22 · MCQ · 1 mark ★ 1 paper

Reema placed a magnetic needle in an electric circuit. She noticed a deflection of the needle when the circuit is turned ON. Reema placed a second battery in the circuit and turned the circuit ON. What change in the needle will she observe now?

A. The needle will keep spinning.
B. The deflection of the needle will increase.
C. The deflection of the needle will decrease.
D. There will be no change in the deflection of the needle.

Source: CBSE–SAS Competency Based Test Items 2021, Ch 13 Q3 [F5]

✓ Answer
B. The deflection of the needle will increase. [1] More current → stronger magnetic field.

Very Short Answer

Q23 · Very Short Answer · 2 marks ★ Board ×2 2 papers

In a straight conductor, the current is flowing vertically downwards. State the pattern of the magnetic field lines around the conductor. Name the rule which helps us to determine the direction of the magnetic field lines in this case.

Also asked as: 11-31(B) Q22: 'Write the shape of the magnetic field produced by a current carrying straight conductor. State the rule to find the direction of this field.'

Source: CBSE (VI) Series EFGH/S, 31(B)/S, Q26 [F1] · CBSE (VI) Series CDBA 11-31(B) Q22 [F9-OCR(full), PDF p.133]

✓ Answer
Pattern: concentric circles centred on the wire, in a plane perpendicular to it; seen from above, clockwise. [1]
Rule: right-hand thumb rule. [1]

Q24 · Very Short Answer · 2 marks ★ Board ×1 2 papers

State the rule to determine the direction of a (a) magnetic field produced around a straight conductor carrying current and (b) force experienced by a current carrying straight conductor placed in a magnetic field which is perpendicular to it.

Source: CBSE 2023, 31/6/2 Q23 [F9-OCR(1-64), PDF p.17] · Sample Paper (F6), Q37(i)(a),(b) [F6]

✓ Answer
(a) Right-hand thumb rule: hold the current-carrying straight conductor in your right hand so that the thumb points towards the direction of current; then the fingers wrap around the conductor in the direction of the field lines. [1]
(b) Fleming's left-hand rule: stretch the thumb, forefinger and middle finger of the left hand so that they are mutually perpendicular. If the first finger points in the direction of magnetic field and the second finger in the direction of current, then the thumb points in the direction of motion or force acting on the conductor. [1]

⚠ **Note:** Part (c) of the F6 sample-paper version (rule for induced current) is out of syllabus and is left out.

Q25 · Very Short Answer · 2 marks ★ Board ×1 1 paper

Draw a labelled diagram to show the pattern of magnetic field lines produced due to a current carrying straight conductor. Mark on it the direction of current in the conductor and the direction of magnetic field lines.

Source: CBSE 2024 (DAA1B/3) 31/3/1 Q25(a), 31/3/2 Q23(a), 31/3/3 Q24(a) [F1]

✓ Answer
Diagram: vertical wire through a cardboard; concentric circles round the wire, closer near the wire. [1]
Current arrow along the wire and arrows on circles by the right-hand thumb rule (current upwards → anticlockwise seen from above). [1]

Q26 · Very Short Answer · 2 marks ★ Board ×1 1 paper

Draw magnetic field lines produced around a straight current carrying conductor passing through a cardboard. How will the strength of the magnetic field change when the point where magnetic field is to be determined is moved away from the conductor?

Source: CBSE 2023, 31/6/3 Q26 [F9-OCR(1-64), PDF p.51]

✓ Answer
Diagram: concentric circles on the cardboard around the wire with direction by the right-hand thumb rule. [1]
The magnetic field becomes weaker as we move away from the conductor (field is inversely related to distance). [1]

Q27 · Very Short Answer · 2 marks ★ 1 paper

A straight wire of diameter 0.5 mm carrying a current of 1A is replaced by another wire of 1 mm diameter. How is the strength of the magnetic field far away from it related to it's earlier value.

Source: KVS Lucknow (Set-1) Pre-board, Q21 [FM]

✓ Answer
The strength of the magnetic field stays the same. [1]
The field due to a straight wire depends on the current and the distance from the wire, not on the thickness of the wire; the current is still 1 A. [1]

⚠ **Note:** Assumes the same current (1 A) flows in the new wire, as the question implies.

Q28 · Very Short Answer · 2 marks ★ 1 paper

An electrical current is in the direction P to Q as shown in the diagram. The magnetic field strength is measured at R and S.
(i) State and explain where the field strength is largest.
(ii) The current in the wire is reversed. Explain how this affects the magnetic field at R.

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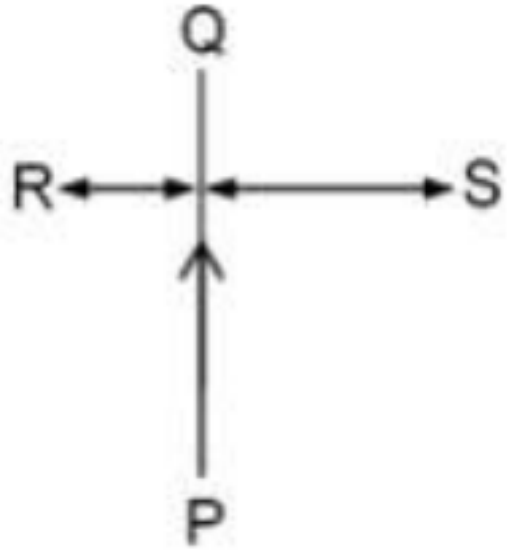


Figure from the question paper

Source: British Council item Science10, Q1(b) [F5, PDF p.60]

✔ Answer
(i) At R — the field lines are closer together there (R is nearer the wire). [1]
(ii) The field at R has the same strength but its direction is reversed. [1]

Short Answer

Q29 · Short Answer · 3 marks ★ Board ×1 1 paper

(a) List two factors on which the magnitude of magnetic field produced by a current carrying straight conductor depends.
(b) State the rule which determines the direction of magnetic field in the above case.
(c) Draw the pattern of magnetic field lines produced in this case.

Source: CBSE 2023, 31/2/3 Q32 [F1]

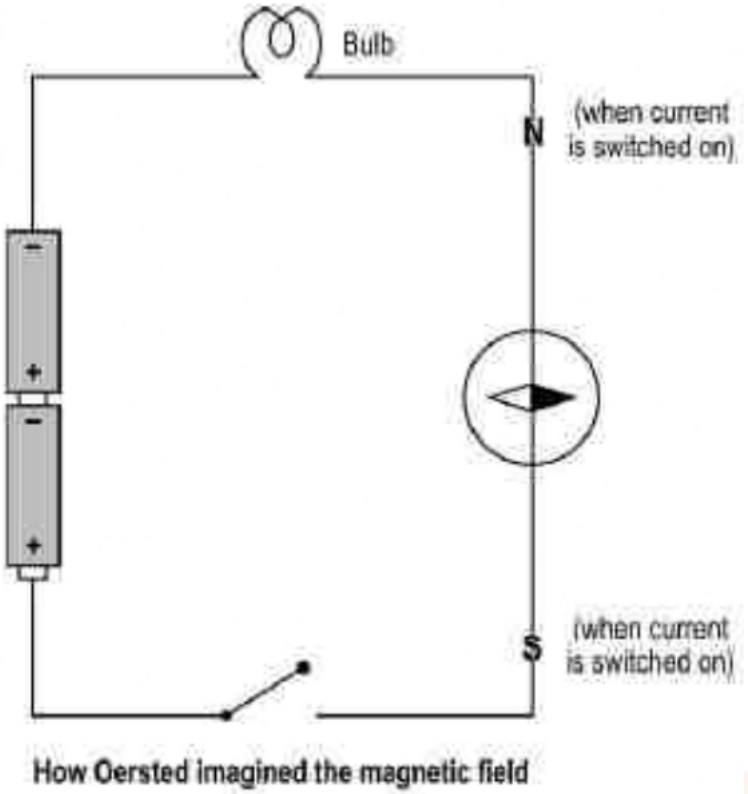
✔ Answer
(a) Field increases with the current through the conductor; it decreases as the distance from the conductor increases. [½ + ½]
(b) Right-hand thumb rule (statement as above). [1]
(c) Concentric circles around the wire with arrows; circles closer near the wire. [1]

Q30 · Short Answer · 3 marks ★ 1 paper

In 1820, Hans Christian Oersted discovered that a magnetic needle is deflected by a current-carrying wire. Before his discovery, Oersted had imagined the magnetic field to be a straight line along the direction of the wire with the north pole at one end and the south pole at the other. The figure shows how Oersted would have arranged his wire and magnetic needle in his early experiments.
(a) Draw a diagram to show the observation that Oersted would have expected when switching on the current, if his hypothesis had been correct.
(b) Based on our current knowledge of the magnetic field around a wire, explain why his experiment failed.

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How Oersted imagined the magnetic field

Figure from the question paper

Source: CBSE Competency Items, Magnetic Effects Q7 [F4, PDF p.791]

✔ Answer

(a) Diagram with the magnetic needle turned so that it lies along (parallel to) the wire. [1]
(b) The magnetic field due to the current is in circles around the wire, i.e. perpendicular to the wire. [1]
His needle was already placed perpendicular to the wire, along this field, so it did not get deflected. [1]

Long Answer

Q31 · Long Answer · 5 marks ★ Board ×1 2 papers

(a) The given figure shows the current passing through the straight conductor XY.
(i) Copy the diagram and draw the magnetic field lines when current flows from conductor X to Y.
(ii) Name and state the rule used in determining the direction of the magnetic field lines in the situation given above.
(iii) State Fleming's left hand rule. Using this rule, determine the direction of force applied on an electron entering a uniform magnetic field as shown in the figure.
OR
(b) (i) Define the term solenoid. Draw the pattern of the magnetic field lines in and around a current carrying straight solenoid. Mark on the pattern the (i) direction of current, (ii) direction of field lines near the ends of the solenoid, and (iii) region where the magnetic field is uniform.
(ii) How would you make an electromagnet using a current carrying solenoid?

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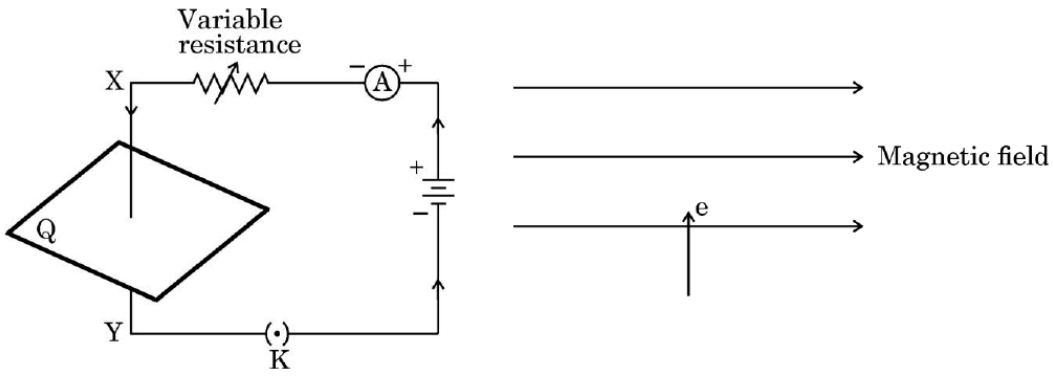


Figure from the question paper

Also asked as: KVS Ahmedabad 2025-26 Q37 (3 marks): only parts (i) and (ii) — draw the field lines from X to Y and name/state the rule.

Source: CBSE 2025 (GHF2E) 31/2/1 Q36, 31/2/2 Q35, 31/2/3 Q34 [F2, PDF p.358 & 360] · KVS Ahmedabad Pre-board I 2025-26, Set A & B Q37 [F9-OCR(full), PDF p.511, 523]

✓ Answer

(a)(i) Concentric circles round XY with arrows by the right-hand thumb rule (thumb from X to Y). [1]
(ii) Right-hand thumb rule + statement. [1]
(iii) Fleming's left-hand rule + statement. [1] The electron moves upwards, so the current is downwards; field to the right → **force out of the page**. [2]
(b)(i) A coil of many circular turns of insulated copper wire wrapped closely in the shape of a cylinder is called a solenoid. [1] Diagram: parallel straight lines inside, lines like a bar magnet outside; current arrows on turns; lines leave the N-end and enter the S-end; uniform region = inside the solenoid. [2]
(ii) Place a soft iron rod inside the solenoid and pass current; the strong field inside magnetises the soft iron — this is an electromagnet. [2]

⚠ **Note:** Direction of force on the electron worked out from the figure on PDF p.360.

Q32 · Long Answer · 5 marks ★

Board ×1 1 paper

(A) (i) Draw a diagram showing the magnetic field lines around a bar magnet. Write any two characteristics of magnetic field lines.
(ii) Write the statement of Right hand thumb rule.
(iii) The concentric circles representing the magnetic field around a current carrying straight wire become larger and larger as we move away from the wire. How does magnetic field change on these concentric circles?
OR
(B) (i) Draw a diagram, showing the magnetic field lines in and around the current carrying solenoid. Write any two salient features of these lines.
(ii) What is an electromagnet and how is it made?

Source: CBSE 2026, 31/5/1 Q39 [F4]

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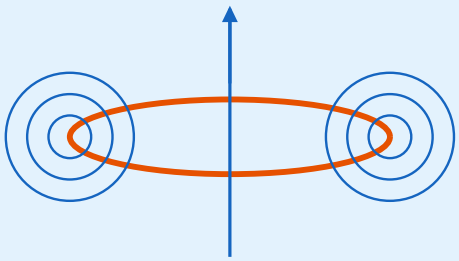
✔ Answer

(A)(i) Bar-magnet diagram + two characteristics (never cross; closer where field is stronger). [2]
(ii) Right-hand thumb rule statement. [1]
(iii) The magnetic field gets weaker (decreases) on the larger circles, i.e. as we move away from the wire. [2]
(B)(i) Solenoid diagram [1]; features: inside the lines are parallel straight lines (uniform field); outside the pattern is like a bar magnet, one end N and other S. [2]
(ii) A soft iron core placed inside a current-carrying solenoid becomes a strong magnet called an electromagnet. Made by winding insulated copper wire on a soft iron rod and passing current. [2]

B2 · Current through a circular loop

Magnetic Field due to a Current · 8 questions · 10 papers · Prepared by Abhishek Das, TGT (Science)

Picture it



Circular loop

Near the wire: circles; at centre: straight lines

All parts of the loop add up inside

n turns → field n times one turn

MCQ

Q33 · MCQ · 1 mark ★ Board ×1 1 paper

The correct pattern of magnetic field lines of the field produced by a current carrying circular loop is :

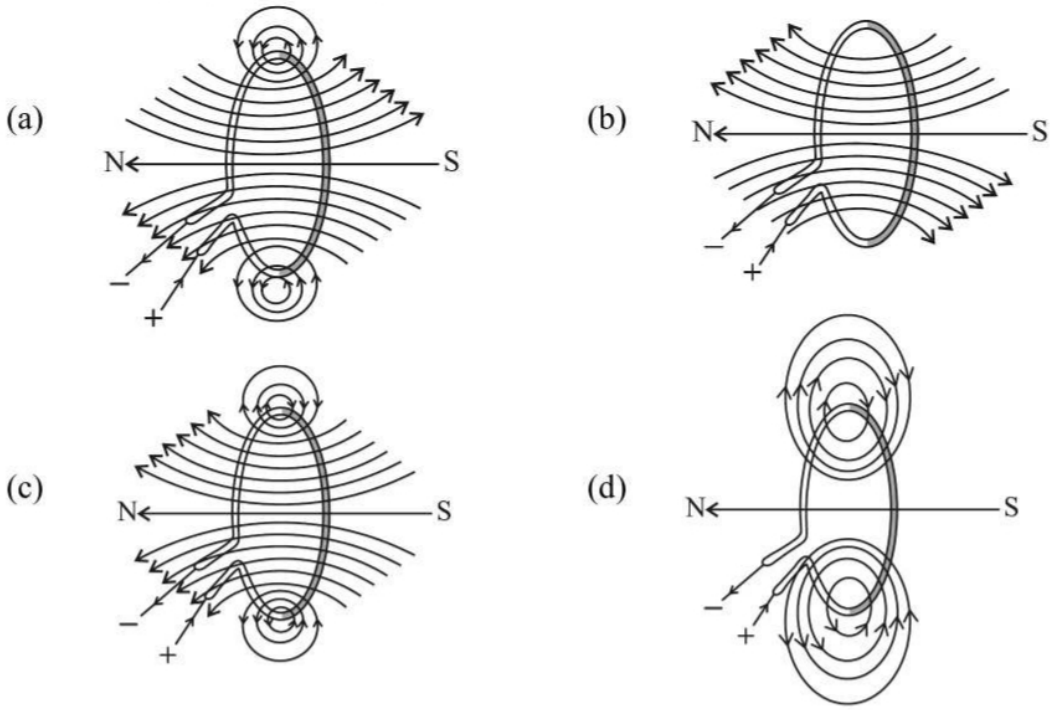


Figure from the question paper

Source: CBSE 2023 (Z1XYW/4), 31/4/1 Q14 [F1, PDF p.361]

✔ Answer

(c) [1]

Near the wire the lines are small concentric circles, and all the lines passing through the loop point the same way (towards N). In (a) the upper lines point the opposite way; (b) has no circles near the wire; (d) has no lines through the loop except the axis.

⚠ **Note:** Key worked out from the field directions in the figure; please confirm with the 2023 marking scheme.

Assertion-Reason

Q34 · Assertion-Reason · 1 mark ★★ Board ×2 3 papers

Assertion (A) : The strength of the magnetic field produced at the centre of a current carrying circular coil increases on increasing the number of turns in it.

Reason (R) : The current in each circular turn has the same direction and the magnetic field due to each turn then just adds up.

Source: CBSE 2023 (Z1XYW/1) 31/1/1 Q20, 31/1/2 Q17, 31/1/3 Q19 [F1] · KVS Lucknow Pre-board-I 2023-24, Q19 [FM] · CBSE (VI) Series CDBA 11-31(B) Q17 [F9-OCR(full), PDF p.131]

✔ Answer

(a) Both A and R are true and R is the correct explanation of A. [1]

Very Short Answer

Q35 · Very Short Answer · 2 marks ★ Board ×1 1 paper

Consider a circular loop of thick copper wire lying horizontally on a table. Let the current pass through the loop anticlockwise. Draw the magnetic field lines to show the direction and the pattern of the magnetic field inside and outside the loop.

Source: CBSE 2023, 31/2/2 Q25 [F1]

✓ Answer
Seen from above: current anticlockwise → by the right-hand thumb rule the field inside the loop is upwards (out of the table), and outside the loop it is downwards (into the table). [1]
Diagram: dots (⊙) inside the loop, crosses (⊗) outside; or side view with circular lines round each side and straight lines at the centre. [1]

Q36 · Very Short Answer · 2 marks ★ Board ×1 1 paper

Out of the two current carrying circular coils, coil 'A' has 10 turns while coil B has 15 turns. Which of the two coils will produce a stronger magnetic field at its centre if same current is flowing through both the coils? Explain with reason.

Source: CBSE 2026, 31/8/1 Q35(B) (also 31/8/2) [F4, PDF p.115]

✓ Answer
Coil B (15 turns). [1] The field due to each turn adds up, so the field at the centre is larger when the number of turns is larger. [1]

Short Answer

Q37 · Short Answer · 3 marks ★ 1 paper

How will the magnetic field produced at a point due to current carrying circular coil change if:
A) The current flowing through the coil is increased
B) The direction of current through the coil is reversed.
C) The number of turns in the coil increased

Source: KVS Lucknow Pre-board-2 2024-25, Q33 [FM]

✓ Answer
A) The magnetic field increases (field ∝ current). [1]
B) The direction of the magnetic field is reversed; strength stays the same. [1]
C) The magnetic field increases, because the fields due to each turn add up (field ∝ number of turns). [1]

Q38 · Short Answer · 3 marks ★ 1 paper

a. Draw the pattern of magnetic field lines produced by a current carrying circular loop showing the direction of current in the loop and the direction of the magnetic field lines.
b. State the rule which can be applied to know the direction of magnetic field lines in the above case.

Source: Sample Paper (F6), Q37 [F6]

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✔ Answer

a. Side view of the loop: concentric circles round each point where the wire cuts the paper, larger away from the wire; at the centre the lines are nearly straight; arrows by the right-hand thumb rule. [2]

b. Right-hand thumb rule. [1]

Long Answer

Q39 · Long Answer · 5 marks ★ Board ×1 1 paper

(a) (i) State the rule which gives the direction of force acting on a current-carrying conductor placed in a magnetic field.

(ii) What is a fuse ? Why is it called a safety device ?

(iii) Why are electrical appliances with metallic bodies connected to the mains through a three-pin plug, whereas an electric bulb is connected with a two-pin plug ?

(iv) What will be the direction of force experienced by the conductor AB due to the magnetic field, when current flows in the direction shown ? Name the law you applied to find the direction.

OR

(b) (i) Draw the pattern of magnetic field lines through and around a current-carrying circular loop.

(ii) State the rule to find out the direction of the magnetic field inside and around the circular loop.

(iii) Give reasons : (I) Why should a burnt-out fuse be replaced by another fuse of identical rating only, in an electric circuit ? (II) Why is soft iron-core used in making an electromagnet ?

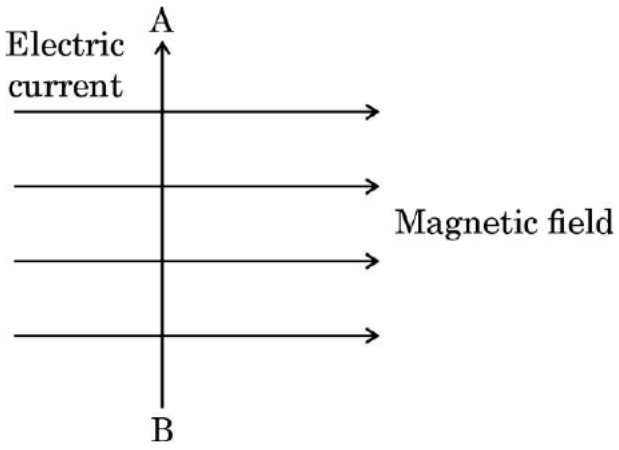


Figure from the question paper

Source: CBSE 2026, 31/2/1 Q39 [F2, PDF p.337]

✔ Answer

(a)(i) Fleming's left-hand rule (statement). [1]
(ii) A fuse is a wire of low melting point connected in series with the live wire; when too much current flows it melts and breaks the circuit, so it protects the circuit and appliances — hence a safety device. [1]
(iii) Metallic bodies are connected to the earth wire through the third pin; any leakage of current goes to the earth and the user does not get a severe shock. A bulb has no metal body that can be touched, so two pins (live, neutral) are enough. [2]
(iv) Current flows from B to A (upwards) and the field is to the right, so the force on AB is **into the page** — Fleming's left-hand rule. [1]
(b)(i) Loop diagram. [2] (ii) Right-hand thumb rule. [1] (iii)(I) A fuse of higher rating will not melt at the safe limit and will not protect the circuit; lower rating will melt even in normal use. [1] (II) Soft iron gets magnetised strongly while current flows and loses its magnetism when current stops. [1]

⚠ **Note:** (a)(iv) from the figure: current from B to A (upwards), field to the right → force into the page (Fleming's left-hand rule).

Q40 · Long Answer · 5 marks ★ 1 paper

Explain with the help of a labelled diagram the distribution of a magnetic field due to a current through a circular loop. Why is it that if a current carrying loop has n turns the field produced at any point is n times as large as that produced by a single turn?

Source: NCERT Exemplar Sample Paper-II, Q35 [F5]

✔ Answer

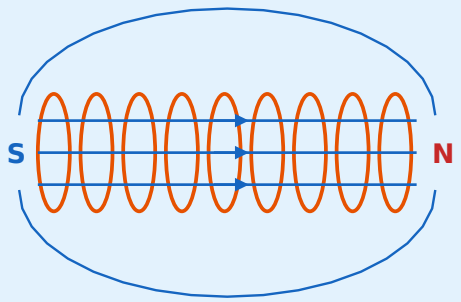
Diagram of loop through cardboard with field lines [1½]. Every point of the wire acts like a straight wire: the field lines are concentric circles near the wire, the circles become larger away from it, and at the centre of the loop the arcs appear as straight lines. All parts of the loop give field in the same direction inside the loop. [1]
With n turns, the current in each turn has the same direction, so the field due to each turn just adds up; the field becomes n times that of one turn. [2½]

⚠ **Note:** The OR part (electromagnetic induction) is out of syllabus and left out.

B3 · Solenoid and electromagnet

Magnetic Field due to a Current · 16 questions · 20 papers · Prepared by Abhishek Das, TGT (Science)

Picture it



Solenoid = coil like a cylinder

Inside: parallel lines → uniform field

Outside: like a bar magnet

Soft iron core inside → electromagnet

MCQ

Q41 · MCQ · 1 mark ★ Board ×2 2 papers

The magnetic field inside a long straight current carrying solenoid

(a) is zero.
(b) decreases as we move towards its end.
(c) increases as we move towards its end.
(d) is same at all points.

Also asked as: CDBA/S: '...The strength of the magnetic field inside the solenoid is : (A) zero everywhere (B) uniform everywhere (C) maximum at the ends... (D) minimum at the ends...' → (B) uniform everywhere.

Source: CBSE 2023, 31/6/2 Q3 and 31/6/3 Q13 [F9-OCR(1-64), PDF p.5, p.45] · CBSE (VI) Series CDBA/S, 31(B)/S, Q13 [F1]

✔ Answer
(d) is same at all points. [1]

Q42 · MCQ · 1 mark ★ Board ×1 1 paper

For a current in a long straight solenoid, N and S poles are created at the two ends. Among the following statements, the incorrect statement is :

(a) The magnetic field lines inside the solenoid are in the form of straight lines, which indicates that the magnetic field is uniform at all points inside the solenoid.
(b) The strong magnetic field produced inside the solenoid can magnetize the soft iron placed inside it.
(c) The pattern of the magnetic field associated with a current carrying solenoid is different from the pattern of the magnetic field around a bar magnet.
(d) The N and S poles exchange positions when the direction of current through the solenoid is reversed.

Source: CBSE 2023 (Z1XYW/5) 31/5/1 Q16 (also 31/5/2, 31/5/3) [F1, PDF p.464]

✔ Answer
(c) [1] — the pattern around a solenoid is similar to that of a bar magnet, so statement (c) is incorrect.

Q43 · MCQ · 1 mark ★ 1 paper

A soft iron bar is placed inside a current carrying solenoid. How will this affect the strength and direction of the magnetic field around the solenoid?

A. it will change direction and decrease in strength
B. it will change direction and increase in strength
C. it will increase in strength only
D. it will decrease in strength only

Source: British Council item Science10YP2 Q1 [F5]

✔ Answer
C. it will increase in strength only. [1]

Assertion-Reason

Q44 · Assertion-Reason · 1 mark ★ — 1 paper

Assertion: On freely suspending a current – carrying solenoid, it comes to rest in Geographical N-S direction.
Reason : One end of current carrying straight solenoid behaves as a North pole and the other end as a South pole, just like a bar magnet.

Source: KVS Lucknow 1st Pre-board, Q20 [FM]

✓ Answer
(a) Both A and R are true and R is the correct explanation of A. [1]

Very Short Answer

Q45 · Very Short Answer · 2 marks ★ — Board ×1 1 paper

Name the device used to magnetise a piece of magnetic material. Draw a labelled diagram to show the arrangement used for the magnetisation of a cylinder made of soft iron.

Source: CBSE 2024 (DAA1B/3) 31/3/1 Q25(b), 31/3/2 Q23(b), 31/3/3 Q24(b) [F1]

✓ Answer
Solenoid (current-carrying coil). [1]
Diagram: soft iron cylinder inside a solenoid connected to a battery and key, labelled. [1]

Short Answer

Q46 · Short Answer · 3 marks ★★ — Board ×2 4 papers

What is a solenoid? When does a solenoid behave as a magnet? Draw the pattern of the magnetic field produced inside it showing the directions of the magnetic field lines.

Also asked as: 'How does a solenoid behave as a magnet? Draw the pattern of the magnetic field produced by it showing the directions of the magnetic field lines.' / 'Draw magnetic lines of force around current carrying solenoid showing the direction of poles developed.' / 2022 T-II 31/1 Q6(b): '(i) What is a solenoid ? (ii) Draw the pattern of magnetic field lines of the magnetic field produced by a solenoid through which a steady current flows.'

Source: CBSE 2023, 31/6/2 Q27 and 31/6/3 Q27 [F9-OCR(1-64), PDF p.19, p.53] · KVS Lucknow Pre-board 2025-26 (Set), Q35 [FM] · KVS Lucknow Pre-board-I 2023-24, Q33(ii) [FM] · CBSE 2022 Term-II (QQARR/1) 31/1/1 Q6(b), 31/1/2 Q2(b), 31/1/3 Q5(b) [F9-OCR(full), PDF p.170, 211, 256]

✓ Answer
A coil of many circular turns of insulated copper wire wrapped closely in the shape of a cylinder. [1]
It behaves like a bar magnet when an electric current flows through it (one end N, other end S). [1]
Diagram: parallel straight lines inside going from S-end to N-end, with arrows. [1]

Q47 · Short Answer · 3 marks ★ — Board ×1 2 papers

(i) Draw the pattern of magnetic field lines of (1) a current carrying solenoid (2) a bar magnet
(ii) List two distinguishing features between the two fields.

Source: CBSE 2023 (Z1XYW/1) 31/1/1 Q32(b), 31/1/2 Q28(b), 31/1/3 Q31(b) [F1] · KVS Lucknow 1st Pre-board 2022-23, Q35 [FM]

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✔ Answer
(i) Two diagrams. [1 + 1]
(ii) [½ + ½] • Inside a solenoid the field lines are parallel straight lines (uniform field); inside a bar magnet they are not shown/uniform in the same way. • The field of a solenoid is there only while current flows and can be made stronger or reversed by changing the current; a bar magnet's field is permanent.

⚠ **Note:** CBSE's own key for (ii) accepts any two correct points; the patterns outside are similar — that is a likeness, not a difference.

Q48 · Short Answer · 3 marks ★ Board ×1 1 paper

What is a solenoid ? Draw a diagram to show the pattern of magnetic field around a current carrying solenoid. Name the region of uniform magnetic field.

Source: CBSE 2023, 31/2/2 Q32 [F1]

✔ Answer
A coil of many circular turns of insulated copper wire wrapped closely in the shape of a cylinder. [1]
Diagram with parallel lines inside and bar-magnet-like lines outside, with arrows. [1]
Uniform field: inside the solenoid. [1]

Q49 · Short Answer · 3 marks ★ Board ×1 1 paper

(A) For the current carrying solenoid as shown, draw magnetic field lines and give reason to explain that out of the three points A, B and C, at which point the field strength is maximum and at which point it is minimum ?

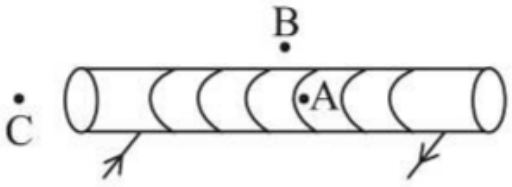


Figure from the question paper

Source: CBSE 2023 (Z1XYW/4), 31/4/1 Q32(B) [F1, PDF p.369]

✔ Answer
Diagram: parallel straight lines inside the solenoid; outside, lines like a bar magnet. [1]
Maximum at A — A is inside the solenoid, where the field lines are closest and parallel (strong, uniform field). [1]
Minimum at B — B is just outside the middle of the solenoid, where the field lines are far apart (field very weak). C is near an end, where the field is weaker than inside but stronger than at B. [1]

⚠ **Note:** Read from the figure: A inside, B outside above the middle, C at the left end.

Q50 · Short Answer · 3 marks ★ Board ×1 1 paper

What is a solenoid ? How does a current carrying solenoid behave when suspended freely and why ? Give its one main use.

Source: CBSE (VI) Series ZWYX, 31(B) Q32 [F9-OCR(full), PDF p.112]

✓ Answer
A coil of many circular turns of insulated copper wire wrapped closely in the shape of a cylinder is called a solenoid. [1]
When suspended freely it comes to rest in the north–south direction, because a current-carrying solenoid behaves like a bar magnet with one end N and the other end S. [1]
Use: to make an electromagnet (by placing a soft iron core inside it). [1]

Q51 · Short Answer · 3 marks ★ 1 paper

Observe the figure given below and answer the following questions:
(a) Write the special name given to the coil AB which has many circular turns of insulated copper wire.
(b) State the nature of magnetic field inside AB when a current is passed through it.
(c) List two factors on which the strength of the magnetic field produced by AB depends.

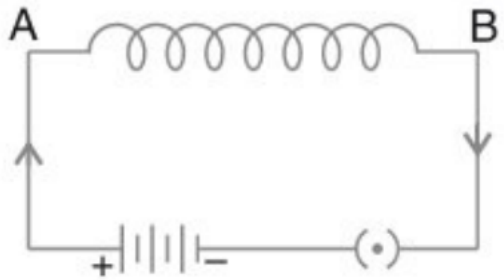


Figure from the question paper

Source: KVS Lucknow Pre-board-II 2023-24, Q32 OR [FM, PDF p.38]

✓ Answer
(a) Solenoid. [1]
(b) Uniform — the same at all points inside. [1]
(c) Number of turns; current through the coil. [½ + ½]

Q52 · Short Answer · 3 marks ★ 1 paper

A student is studying the magnetic field produced by a current-carrying solenoid. He makes the following statement.
Statement: The magnetic field produced by a solenoid is uniform inside the solenoid and has definite direction, whereas the magnetic field outside is weaker and irregular.
(i) Explain whether the student's statement is correct or not.
(ii) Draw a diagram to show the magnetic field lines inside and outside the solenoid.

Source: KVS Lucknow Pre-board 2025-26, Q36 [FM]

✓ Answer
(i) Partly correct. Inside, the field is uniform with a definite direction (parallel straight lines) — correct. Outside, the field is weaker, but it is not irregular: it has a definite pattern like that of a bar magnet. [2]
(ii) Solenoid diagram. [1]

Q53 · Short Answer · 3 marks ★ 1 paper

a) What is an electromagnet? List any two uses.
(b) Draw a labeled diagram to show how an electromagnet is made.
(c) List two ways of increasing the strength of an electromagnet if the material of the electromagnet is fixed.

Source: KVS Delhi Pre-board-II 2024-25, Q32 [FM]

✔ Answer
(a) A soft iron core placed inside a current-carrying solenoid becomes a strong magnet called an electromagnet. Uses: electric bell, cranes for lifting iron scrap (any two). [1]
(b) Diagram: insulated copper wire wound on a soft iron rod, connected to battery and key. [1]
(c) Increase the current; increase the number of turns. [1]

Long Answer

Q54 · Long Answer · 5 marks ★ Board ×1 1 paper

(a) (i) State the rules to determine the following : (I) Direction of magnetic field produced around a current-carrying straight conductor. (II) Direction of force experienced by a current-carrying straight conductor placed in a magnetic field which is perpendicular to it.
(ii) (I) Draw the magnetic field lines due to a current-carrying solenoid. (II) Three points A, B and C are marked in the above given diagram of the current-carrying solenoid. Out of the three points A, B and C, at which point is the magnetic field strength maximum and at which point is it minimum ?
OR
(b) (i) (I) In the given circuit diagram, a battery B, a key K, a resistance R and a thick copper wire XY are connected in series and a compass is placed near the wire. What is the purpose of this arrangement ?
(II) What conclusion do you draw from it ?
(ii) Give reasons : (I) There is either a convergence or a divergence of magnetic field lines near the ends of a current-carrying straight solenoid. (II) The current-carrying solenoid, when suspended freely, aligns along a particular direction. (III) The burnt-out fuse should be replaced by another fuse of identical rating.

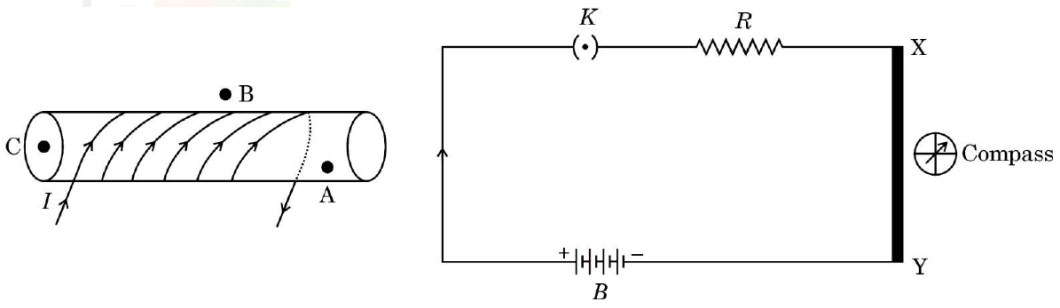


Figure from the question paper

Source: CBSE 2026, 31/2/2 Q39 [F2, PDF p.407]

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✔ Answer

(a)(i) Right-hand thumb rule [1]; Fleming's left-hand rule [1].
(ii)(I) Solenoid diagram [1]; (II) maximum at A (inside the solenoid, lines close and parallel), minimum at B (outside, lines far apart) [2].
(b)(i)(I) To show that a current-carrying wire produces a magnetic field around it (compass needle deflects). [1] (II) Electricity and magnetism are linked — a current produces a magnetic field. [1]
(ii)(I) The ends behave like the poles of a bar magnet; lines leave from N-end (diverge) and enter at S-end (converge). [1] (II) It behaves like a bar magnet, so it comes to rest in the north-south direction. [1] (III) A fuse of identical rating melts exactly at the safe limit; a higher-rated fuse will not protect the appliance. [1]

⚠ **Note:** (a)(ii)(II) from the figure: maximum at A (inside the solenoid), minimum at B (outside, above the middle).

Case-based

Q55 · Case-based · 4 marks ★ Board ×1 1 paper

Bhoumik was playing with a magnetic compass near a current carrying spring-like device. He observed that the compass needle shows deflection whenever he goes close to the device. After observing it, he started running around the device. Now, he observed that the compass needle is continuously changing its direction and tries to orient itself along the north-south direction of the earth.
(i) What is the similarity in the behaviour of a freely suspended bar magnet and a magnetic compass ? 1
(ii) How can the magnitude and direction of the magnetic field of a solenoid be changed ? 1
(iii) (a) Compare the magnetic field due to a current-carrying solenoid and a current-carrying straight wire made by stretching a solenoid. 2
OR (iii) (b) When a moving electron enters in a magnetic field, what will happen to its motion ? State the law required to explain your observation of moving electron in a magnetic field. 2

Source: CBSE 2026 (VI) Series E7FDG, 31(B) Q38 [F9-OCR(full), PDF p.89]

✔ Answer

(i) Both come to rest in the north–south direction (both behave as magnets). [1]
(ii) Magnitude — by changing the current (or the number of turns); direction — by reversing the direction of current. [½ + ½]
(iii)(a) Solenoid: field inside is strong and uniform (parallel lines) and the pattern outside is like a bar magnet. Straight wire: field lines are concentric circles round the wire and the field is weaker, decreasing with distance. [1 + 1]
OR (b) The electron experiences a force and its path bends (gets deflected), unless it moves along the field. [1] Fleming's left-hand rule (statement). [1]

Q56 · Case-based · 4 marks ★ 1 paper

A coil of insulated copper wire wound in the form of a cylinder is a solenoid. The magnetic field produced by a current-carrying solenoid is similar to the magnetic field produced by a bar magnet. The field lines inside the solenoid are in the form of parallel straight lines. The strong magnetic field produced inside a current-carrying solenoid can be used to magnetize a piece of a magnetic material like soft iron when placed inside the solenoid. The strength of the magnetic field produced by a current-carrying solenoid is directly proportional to the number of turns and strength of the current in the solenoid.
i. What would be the strength of the magnetic field inside a long current-carrying straight solenoid? (1)
ii. Which end is north and which end is south pole when current flows through a solenoid? (1)
iii. A long solenoid carrying a current produces a magnetic field B along its axis. If the current is double and the number of turns per cm is halved, then what will be the new value of the magnetic field? (2)
OR
A soft iron bar is enclosed by a coil of insulated copper wire as shown in the figure. When the plug of the key is closed, then where would the face B of the iron bar be marked? (2)

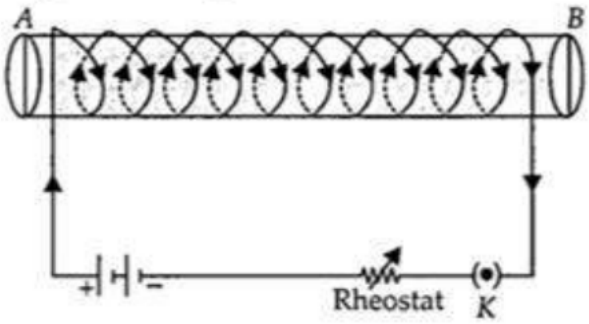


Figure from the question paper

Source: Sample Paper (Vedantu; also in F4 and F6) [F5, PDF p.365]

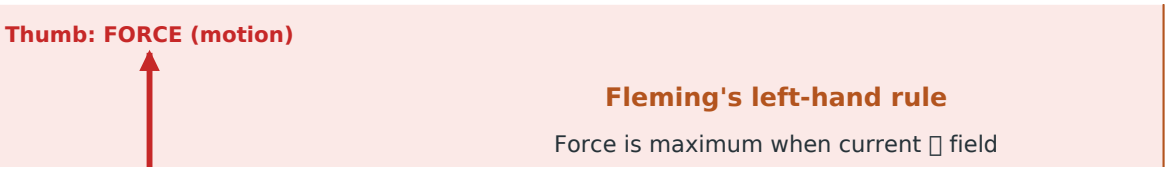
✔ Answer
i. The same at all points (uniform). [1]
ii. The end at which the current flows anticlockwise (seen from that end) is the north pole; the end where it flows clockwise is the south pole. [1]
iii. Field ∝ (current × turns per unit length) = 2I × n/2 = In → field stays B (unchanged). [2]
OR: Face B will be a **south pole**. [2] (Right-hand grip rule: fingers along the current in the turns, thumb points to end A, which is the N-pole; so B is S — same as the NCERT Exemplar key.)

⚠ **Note:** OR part answered from the NCERT Exemplar key for this figure.

C1 · Force on a current-carrying conductor (Fleming's left-hand rule)

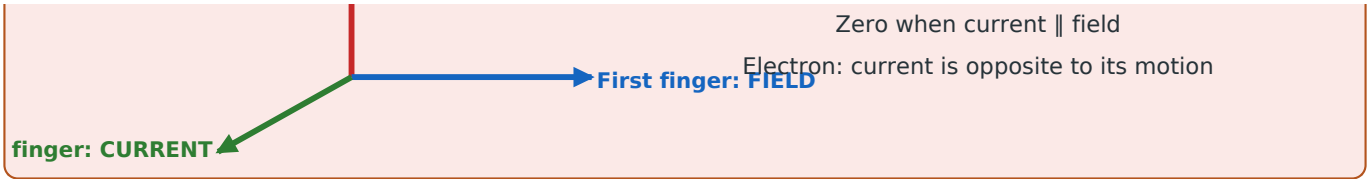
Force on a Conductor and Domestic Circuits · 17 questions · 16 papers · Prepared by Abhishek Das, TGT (Science)

Picture it



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MCQ

Q57 · MCQ · 1 mark ★

Board ×2 2 papers

A positron enters a uniform magnetic field at right angles to it as shown. The direction of force experienced by the positron will be :

(a) to the right
(b) to the left
(c) into the page
(d) out of the page

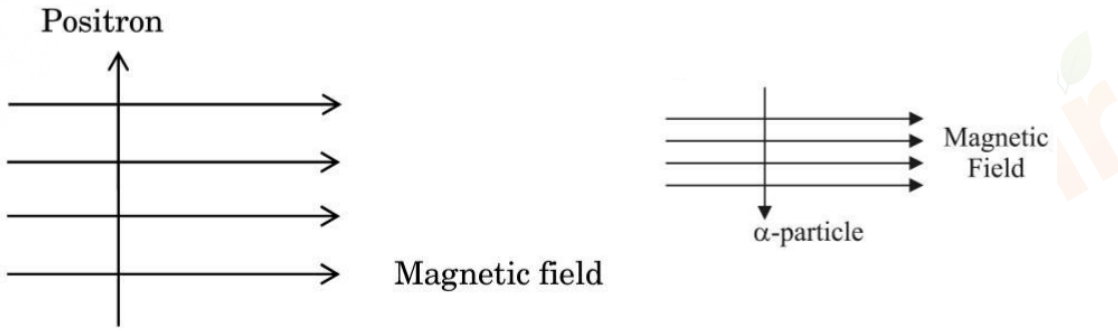


Figure from the question paper

Also asked as: 31/4/1: 'An alpha particle enters a uniform magnetic field as shown…' (same options: towards right / left / into the page / out of the page).

Source: CBSE 2023 (Z1XYW/2) 31/2/1 Q16, 31/2/2 Q7, 31/2/3 Q15 [F1, PDF p.188] · CBSE 2023 (Z1XYW/4) 31/4/1 Q16 (alpha particle) [F1, PDF p.363]

✓ Answer

Positron (31/2): **(c) into the page**. [1]
A positron is positive, so the current is along its motion (upwards). Left hand: first finger → field (to the right), middle finger → current (up) → thumb points into the page.
Alpha particle (31/4/1): **(d) out of the page**. [1] It moves downwards, so the current is downwards; field to the right → force out of the page.

⚠ **Note:** Keys fixed from the figures. The two papers have different answers because the particle moves up in one and down in the other.

Q58 · MCQ · 1 mark ★

Board ×1 1 paper

An electron projected towards east is deflected towards south by a uniform magnetic field. The direction of the magnetic field is :

(a) upwards
(b) downwards
(c) towards north
(d) towards west

Source: CBSE (VI) Series ZWYX, 31(B) Q15 [F9-OCR(full), PDF p.100]

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✔ **Answer**
(b) downwards [1]
Current is opposite to the electron's motion → towards west. Left hand: middle finger west, thumb south → first finger points downwards.

Q59 · MCQ · 1 mark ★ 1 paper

A magnetic field directed in north direction acts on an electron moving in east direction (drawn on paper). The magnetic force on the electron will act

(a) vertically outside the paper.
(b) towards east.
(c) vertically inside the paper.
(d) towards north

Source: KVS Lucknow First Pre-board 2024-25, Q13 [FM]

✔ **Answer**
(c) vertically inside the paper. [1]
Current is opposite to electron motion → towards west. Left hand: first finger north, middle finger west → thumb into the paper.

Q60 · MCQ · 1 mark ★ 1 paper

A positively-charged particle (alpha particle) projected towards west is deflected towards north by a magnetic field. The direction of magnetic field is:

(a) towards south
(b) towards east
(c) downward
(d) upward

Source: KVS Lucknow Pre-board-II 2023-24, Q14 [FM]

✔ **Answer**
(d) upward [1]
Fleming's left-hand rule: current west, force north → field upward.

⚠ **Note:** Same as NCERT in-text question; NCERT answer — upward.

Q61 · MCQ · 1 mark ★ 1 paper

A magnetic field exerts maximum force on:

(a) an electric charge moving perpendicular to its direction
(b) an electric charge moving parallel to its direction
(c) a stationary electric charge
(d) all of the above

Source: KVS Lucknow Pre-board-II 2023-24, Q16 [FM]

✔ **Answer**
(a) an electric charge moving perpendicular to its direction. [1]

Assertion-Reason

Q62 · Assertion-Reason · 1 mark ★

Board ×1 1 paper

Assertion (A) : A current carrying straight conductor experiences a force when placed perpendicular to the direction of magnetic field.
Reason (R) : The net charge on a current carrying conductor is always zero.

Source: CBSE 2023 (Z1XYW/4), 31/4/1 Q20 [F1]

✓ Answer
(b) Both (A) and (R) are true but (R) is not the correct explanation of (A). [1]
The force is due to moving charges (current) in the field, not due to net charge.

Q63 · Assertion-Reason · 1 mark ★

Board ×1 1 paper

Assertion (A) : Magnetic fields interact with moving charges and not with charges at rest.
Reason (R) : Charges produce magnetic field only when they move.

Source: CBSE (VI) Series ZWYX, 31(B) Q20 [F9-OCR(full), PDF p.104]

✓ Answer
(b) Both A and R are true, but R is not the correct explanation of A. [1]
R is about producing a field; A is about the force a field exerts on a charge.

⚠ **Note:** Some keys give (a). Kept (b): producing a field and being acted on by a field are two different ideas. Confirm with the marking scheme.

Q64 · Assertion-Reason · 1 mark ★

Board ×1 1 paper

Assertion (A) : Direction of force exerted on a current-carrying conductor placed in a magnetic field remains same if the directions of both magnetic field and current flowing through the conductor are reversed.
Reason (R) : The direction of force exerted on a current-carrying conductor placed in an external magnetic field can be determined by using magnetic compass.

Source: CBSE 2026, 31/2/1, 31/2/2, 31/2/3 (A–R in Section C) [F9-OCR(full), PDF p.331, 401, 471]

✓ Answer
(c) A is true, but R is false. [1]
Reversing both reverses the force twice, so it stays the same. The direction of force is found by Fleming's left-hand rule, not by a compass.

Very Short Answer

Q65 · Very Short Answer · 2 marks ★

Board ×1 1 paper

A vertical wire is carrying a current in the upward direction. It is placed in a magnetic field, pointing towards the East direction. Find out the direction of force on the wire.

Source: CBSE 2026, 31/8/1 Q35(A) (also 31/8/2) [F4, PDF p.115]

✓ Answer
Fleming's left-hand rule: first finger East, middle finger upward → thumb points North. [1]
Force on the wire is towards the north. [1]

Q66 · Very Short Answer · 2 marks ★ Board ×1 1 paper

(i) Name and state the rule to determine the direction of force experienced by a current carrying straight conductor placed in a uniform magnetic field which is perpendicular to it.
(ii) An alpha particle while passing through a magnetic field gets projected towards north. In which direction will an electron project when it passes through the same magnetic field ?

Source: CBSE 2022 Term-II (QQARR/1) 31/1/1 Q6(a), 31/1/2 Q2(a), 31/1/3 Q5(a) [F9-OCR(full), PDF p.170, 211, 256]

✓ Answer
(i) Fleming's left-hand rule (statement). [1]
(ii) Towards south. [1] An electron has negative charge, opposite to the alpha particle, so (moving the same way in the same field) it is pushed in the opposite direction.

Short Answer

Q67 · Short Answer · 3 marks ★ Board ×2 2 papers

(i) State the rule used to find the force acting on a current carrying conductor placed in a magnetic field.
(ii) Given below are three diagrams showing entry of an electron in a magnetic field. Identify the case in which the force will be (1) maximum and (2) minimum respectively. Give reason for your answer.

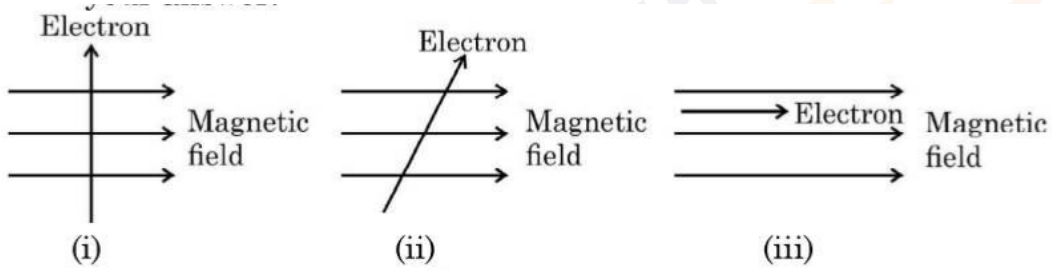


Figure from the question paper

Also asked as: 2026 31/5/3: 'Observe the given diagrams... Comment on the magnitude of force on electron in both the cases and give reason.'

Source: CBSE 2023 (Z1XYW/1) 31/1/1 Q32(a), 31/1/2 Q28(a), 31/1/3 Q31(a) [F1, PDF p.104] · CBSE 2026, 31/5/3 Q39(A)(iii) [F4, PDF p.552]

✓ Answer
(i) Fleming's left-hand rule (statement). [1]
(ii) (1) Maximum in case (i) — the electron moves at right angles to the magnetic field. [1]
(2) Minimum (zero) in case (iii) — the electron moves along (parallel to) the magnetic field. [1]

Q68 · Short Answer · 3 marks ★ Board ×1 2 papers

i. The conductor gets displaced towards left when a current is passed through it. What will happen to the displacement of the conductor if the 1. current through it is increased? 2. horse-shoe magnet is replaced by another stronger horse-shoe magnet? 3. direction of current through it is reversed?
ii. Name and state the rule for determining the direction of force on a current carrying conductor in a magnetic field.

Also asked as: 11-31(B) Q27(b): conductor displaced to the right; what happens if (1) polarity of magnet reversed (2) current reversed (3) current increased? → (1) left (2) left (3) more displacement.

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Source: Sample Paper (F6), Q35 [F6] · CBSE (VI) Series CDBA 11-31(B) Q27(b) [F9-OCR(full), PDF p.139]

✔ Answer

i. 1. Displacement increases. 2. Displacement increases. 3. Displacement is towards the right (reversed). [½ × 3]

ii. Fleming's left-hand rule + statement. [1½]

Q69 · Short Answer · 3 marks ★ 1 paper

The image below shows the cross-section of a wire placed between the poles of a magnet. The wire carries an electric current out of the plane of the page. Both the current carrying wire and the magnet generate a magnetic field. The resulting shape of the magnetic field is as shown.

(a) Draw arrows on the magnetic field lines to mark the direction of the magnetic field.

(b) In the image above, the left side of point X indicates a stronger magnetic field compared to the right side. What feature in the image indicates this?

(c) What is the direction of the force acting on the current carrying wire?

(d) Name and state the rule you used to determine the direction of force in (c).

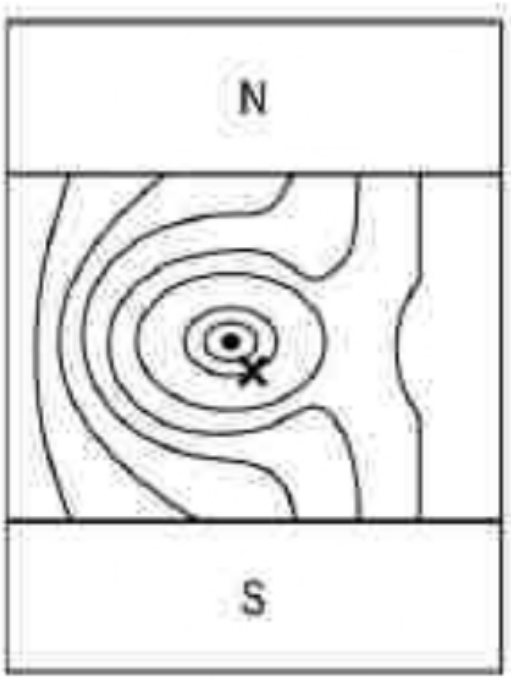


Figure from the question paper

Source: CBSE Competency Items, Magnetic Effects Q16 [F4, PDF p.796]

✔ Answer

(a) Arrows on the lines from the N-pole towards the S-pole (downwards); round the wire, anticlockwise. [½]

(b) The field lines are crowded (closer together) on the left of X. [½]

(c) Towards the right — from the side of stronger field to the side of weaker field. [1]

(d) Fleming's left-hand rule + statement. [1] (Field downwards, current out of the page → thumb points to the right.)

⚠ **Note:** The answer key in the competency book says 'towards the left'. Both Fleming's rule and the crowding of lines give 'towards the right', so the key has been corrected here.

Long Answer

Q70 · Long Answer · 5 marks ★ Board ×1 1 paper

(A) (i) State the rule which gives the direction of force acting on a current carrying conductor placed in a uniform magnetic field.
(ii) Name any two devices which work on the basis of an interaction between magnetic field and current carrying conductor.
(iii) Observe the given diagrams. Comment on the magnitude of force on electron in both the cases and give reason for your answer.
OR
(B) (i) List three possible reasons of short-circuiting in an electric circuit.
(ii) In case of overload, will the fuse protect to given electric circuit from damage? Justify your answer.
[figure: fuse in the neutral wire]
(iii) For an electric heater rated as 220 V, 2200 W, what should be the minimum rating of fuse used with it?

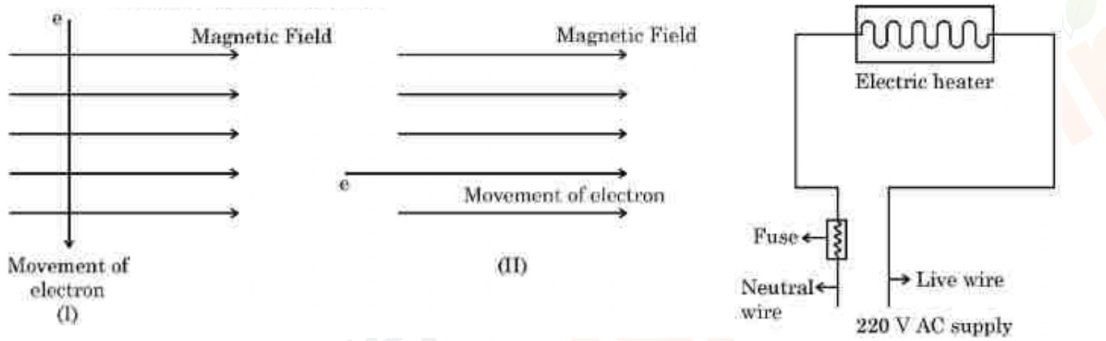


Figure from the question paper

Source: CBSE 2026, 31/5/3 Q39 [F4, PDF p.552–553]

✓ Answer

(A)(i) Fleming's left-hand rule. [2] (ii) Electric motor, loudspeaker (any two). [1] (iii) Force is maximum when electron moves perpendicular to the field and zero when it moves along the field. [2]
(B)(i) Damaged insulation of wires; live and neutral wires coming in direct contact; fault in an appliance (any three). [1½]
(ii) No — the fuse is in the neutral wire; it must be in the live wire to cut off the supply before the appliance is damaged. [1½]
(iii) I = P/V = 2200/220 = 10 A → fuse a little above 10 A. [2]

⚠ **Note:** Figure confirms the fuse is in the neutral wire — so it will not protect the heater.

Q71 · Long Answer · 5 marks ★ Board ×1 1 paper

(a) (i) The magnetic field lines due to two bar magnets X and Y are shown in the given diagram. If the magnet X is displaced towards magnet Y, will there be repulsion or attraction between them ? Justify.
(ii) A metallic conductor is suspended perpendicular to the magnetic field of a horseshoe magnet. The conductor gets displaced towards the left when a current is passed through it. What will be the effect on displacement of conductor if the : (I) current through the conductor is increased ? (II) horseshoe magnet is replaced by another stronger horseshoe magnet ? (III) direction of current through the conductor is reversed ?
OR
(b) (i) Draw a schematic diagram of a domestic electric circuit which includes the following devices : (I) a fuse (II) a power meter (III) one light point (IV) a power plug
(ii) Why is it necessary to connect an earth wire to the electrical appliances having metallic covers ?

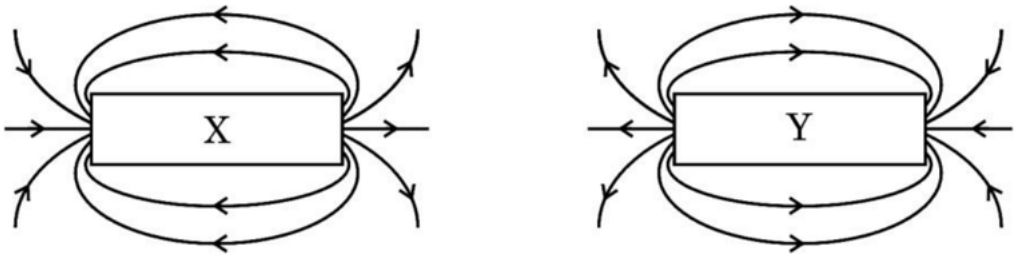


Figure from the question paper

Source: CBSE 2026, 31/2/3 Q39 [F9-OCR(full), PDF p.475–477]

✔ Answer
(a)(i) Repulsion. [1] Field lines leave the right end of X and the left end of Y, so both facing ends are north poles; like poles repel. [1]
(ii) (I) displacement increases (II) displacement increases (III) conductor is displaced towards the right. [1 × 3]
OR (b)(i) Diagram: mains (live, neutral, earth) → electricity (power) meter → fuse in the live wire → distribution; light point with its switch in the live wire; power plug (3-pin) with earth; appliances in parallel. [3]
(ii) The earth wire gives a low-resistance path to the earth; if current leaks to the metal cover it flows to the earth, so the user does not get a severe shock. [2]

⚠ **Note:** (a)(i) read from the figure. The device list in (b) is taken from the OCR text of p.477, which is partly damaged.

Case-based

Q72 · Case-based · 4 marks ★ Board ×1 2 papers

A student was asked to perform an experiment to study the force on a current carrying conductor in a magnetic field. He took a small aluminum rod AB, a strong horse shoe magnet, some connecting wires, a battery and a switch and connected them as shown. He observed that on passing current, the rod gets displaced. On reversing the direction of current, the direction of displacement also gets reversed. On the basis of your understanding of this phenomenon, answer the following questions :
(a) Why does the rod get displaced on passing current through it ?
(b) State the rule that determines the direction of the force on the conductor AB.
(c) (i) If the U shaped magnet is held vertically and the aluminum rod is suspended horizontally with its end B towards due north, then on passing current through the rod from B to A as shown, in which direction will the rod be displaced ? (ii) Name any two devices that use current carrying conductors and magnetic field.
OR
Draw the pattern of magnetic field lines produced around a current carrying straight conductor held vertically on a horizontal cardboard. Indicate the direction of the field lines as well as the direction of current flowing through the conductor.

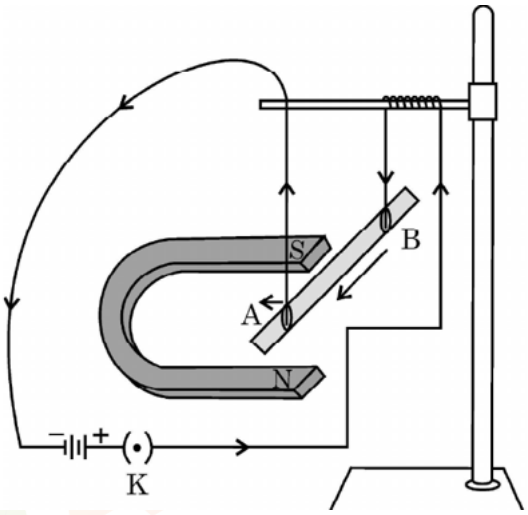


Figure from the question paper

Source: CBSE 2022 Term-II (QQCRR/2) 31/2/1 Q15 (also 31/2/2 Q4, 31/2/3 Q4) [F9-OCR(full), PDF p.305, 373–375, 443–445] · Sample Paper (F8), case on rod AB [F8]

✓ Answer
(a) A current-carrying conductor placed in a magnetic field experiences a force (the field due to the current and the magnet's field interact). [1]
(b) Fleming's left-hand rule + statement. [1]
(c)(i) Towards the **west**. [1] In the figure the N-pole is below and the S-pole above, so the field is upwards; the current B → A is towards the south; Fleming's left-hand rule gives a force towards the west. (ii) Electric motor, loudspeaker (any two). [1]
OR Concentric circles on the cardboard round the wire; current arrow along the wire; arrows on the circles by the right-hand thumb rule. [2]

⚠ **Note:** (c)(i) worked out from the figure (S-pole on top, N-pole below → field upwards). The F8 sample-paper key says 'upwards', which is not possible when the field itself is vertical — corrected.

Q73 · Case-based · 4 marks ★ Board ×1 1 paper

H.C. Oersted demonstrated that every current-carrying wire produces magnetic field around it. The pattern of the magnetic field depends upon the geometrical structure the current carrying wire is folded into. When a current-carrying wire is kept in a magnetic field, it experiences a force. Magnitude of this force is maximum when direction of magnetic field is at right angles to the current-carrying wire. Some rules to determine the direction of magnetic field and force were given by scientists Maxwell and Fleming.
(a) What is the direction of magnetic field inside and outside a solenoid ? 1
(b) Same electric current is flowing through three identical wires A, B and C. If wires A, B and C are making respectively angles 30°, 60° and 270° with the magnetic field, which of the wires will experience maximum force and why ? 1
(c) (i) Name and state the law which is required to find out the direction of force acting on a current carrying wire, kept in a magnetic field. 2
OR (c) (ii) Name and state the law which is required to find out the direction of magnetic field around the current carrying straight conductor. 2

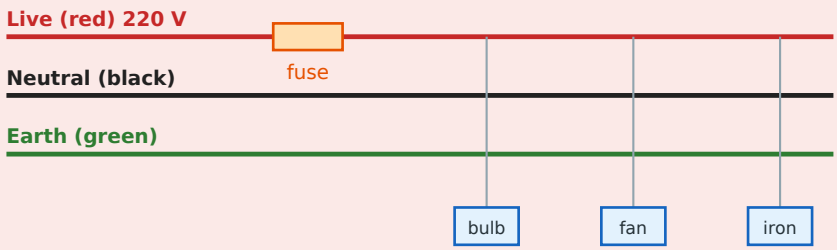
Source: CBSE 2026 (VI) Series LMNK2, 31(B) Q38 [F1]

✔ Answer
(a) Inside: from S-end to N-end; outside: from N-end to S-end. [1]
(b) Wire C (270°) — it is at right angles to the field, so the force is maximum. [1]
(c)(i) Fleming's left-hand rule + statement. [2] OR (ii) Right-hand thumb rule + statement. [2]

C2 · Domestic electric circuits

Force on a Conductor and Domestic Circuits · 20 questions · 18 papers · Prepared by Abhishek Das, TGT (Science)

Picture it



Appliances in parallel
Fuse/MCB in the live wire
Earth wire on metal bodies
Short-circuit: live touches neutral

MCQ

Q74 · MCQ · 1 mark ★ Board ×1 1 paper

In domestic electric circuits the wiring with 15 A current rating is for the electric devices which have

(a) higher power ratings such as geyser.
(b) lower power ratings such as fan.
(c) metallic bodies and low power ratings.
(d) non-metallic bodies and low power ratings.

continued on next page ▸

▸ continued

Source: CBSE 2023 (Z1XYW/1) 31/1/1 Q15, 31/1/2 Q15, 31/1/3 Q13 [F1]

✔ Answer
(a) higher power ratings such as geyser. [1]

Q75 · MCQ · 1 mark ★ Board ×1 1 paper

An electric iron of 1500 W, 200 V and a flash light of 500 W, 200 V are used in homes. The rating of fuse to be used should be

(a) 5 A (b) 10 A
(c) 15 A (d) 20 A

Source: CBSE 2023, 31/1/2 Q14 [F1, PDF p.128]

✔ Answer
(b) 10 A [1] — total power 2000 W; I = P/V = 2000/200 = 10 A.

Q76 · MCQ · 1 mark ★ Board ×1 1 paper

An electric kettle consumes 1 kW of electric power when operated at 220 V. The minimum rating of the fuse wire to be used for it is

(a) 1 A (b) 2 A
(c) 4 A (d) 5 A

Source: CBSE 2023 (Z1XYW/5) 31/5/1 Q15 [F1, PDF p.462]

✔ Answer
(d) 5 A [1]
I = P/V = 1000 W / 220 V ≈ 4.5 A, so the fuse should be a little above this — 5 A.

Q77 · MCQ · 1 mark ★ 1 paper

Appliances that have metal body are generally connected to the earthing wire. What is the reason to earth these wires:

A) To prevent excess of current
B) To prevent the leakage of current
C) To provide extra current to the appliance
D) To provide high resistance to the appliance

Source: KVS Lucknow Pre-board-2 2024-25, Q14 [FM]

✔ Answer
B) To prevent the leakage of current [1] — any leaked current goes to the earth, so the user does not get a severe shock.

Q78 · MCQ · 1 mark NEW

In domestic wiring, the insulation colour of the earth wire is

(a) red (b) black
(c) green (d) blue

Source: NEW — written from the NCERT text to cover this sub-theme

✓ Answer
(c) green [1]. Live wire — red; neutral wire — black; earth wire — green.

Assertion-Reason

Q79 · Assertion-Reason · 1 mark ★ 1 paper

Assertion A: Alternating current is used in household supply.
Reason R: AC electric power can be transmitted over long distances without much loss of energy.

Source: KVS Lucknow Pre-board-2 2024-25, Q18 [FM]

✓ Answer
A) Both A and R are true and R is the correct explanation of A. [1]

Very Short Answer

Q80 · Very Short Answer · 2 marks ★ Board ×1 1 paper

An electric kettle is rated 750 W; 220 V. Can this kettle be used in a circuit which has a fuse of current rating 3 A ? Give reason for your answer.

Also asked as: 31/2/2 Q26: 'An electric fuse is rated 8 A. Can it be used with an electrical appliance of rating 5 kW, 200 V ? Justify.' → No; I = 5000/200 = 25 A > 8 A. / 31/2/3 Q26: 'How and why is an electric fuse used in an electric circuit ? Briefly describe its function.'

Source: CBSE 2025 (GHF2E) 31/2/1 Q26 [F9-OCR(full), PDF p.352]

✓ Answer
No. [1] Current drawn I = P/V = 750/220 ≈ 3.4 A, which is more than 3 A, so the fuse will melt (blow). [1]

Q81 · Very Short Answer · 2 marks ★ 1 paper

How does use of a fuse wire protect electrical appliances?

Source: KVS Lucknow Pre-board-II 2023-24, Q25 [FM]

✓ Answer
The fuse is connected in series with the appliance in the live wire. [1] When the current exceeds the safe limit, the fuse wire heats up, melts and breaks the circuit, so no large current reaches the appliance. [1]

Q82 · Very Short Answer · 2 marks NEW

What is the function of an earth wire? Why is it necessary to earth metallic electric appliances?

Source: NEW — written from the NCERT text to cover this sub-theme

✔ Answer
The earth wire provides a low-resistance conducting path to the earth for current. [1] If current leaks to the metallic body, it flows to the earth; the potential of the body stays equal to that of the earth and the user does not get a severe electric shock. [1]

Short Answer

Q83 · Short Answer · 3 marks ★★ Board ×3 3 papers

(a) How is the type of current used in household supply different from the current given by a battery of dry cells ?
(b) Which one of the two currents mentioned above in (a) is considered to be more advantageous for the long distance transmission of electric power and why ?
(c) How does the electric fuse prevent the electric circuit and the appliances from a possible damage due to short circuiting ?

Also asked as: 31/4/1: '(i) Why is an alternating current (A.C.) considered to be advantageous over direct current (D.C.) for the long distance transmission... (ii) How is the type of current used in household supply different... (iii) How does an electric fuse prevent... short circuiting or overloading.'

Source: CBSE (VI) Series CDBA/S, 31(B)/S, Q33 [F1] · CBSE 2023 (Z1XYW/4), 31/4/1 Q32(A) [F1] · CBSE (VI) Series CDBA 11-31(B) Q27(a) [F9-OCR(full), PDF p.137]

✔ Answer
(a) Household supply is alternating current (AC) — it changes direction periodically (in India every 1/100 s; frequency 50 Hz). A dry cell gives direct current (DC), which flows in one direction only. [1]
(b) AC — it can be transmitted over long distances without much loss of energy. [1]
(c) On short-circuiting the current rises sharply; the fuse wire heats up, melts and breaks the circuit, stopping the flow of current. [1]

Q84 · Short Answer · 3 marks ★ Board ×2 2 papers

Explain in brief the function of an electric fuse in a domestic circuit. An electric heater of current rating 3 kW; 220 V is to be operated in an electric circuit of rating 5 A. What is likely to happen when the heater is switched 'ON' ? Justify your answer with necessary calculation.

Also asked as: EFGH/S: 'An electric heater of rating 2 kW; 220 V is to be operated in a room having fuse rating of 5 A...' → I = 2000/220 ≈ 9.1 A > 5 A → fuse blows.

Source: CBSE 2024 (DAA1B/3) 31/3/1 Q32, 31/3/2 Q31, 31/3/3 Q31 [F1] · CBSE (VI) Series EFGH/S, 31(B)/S, Q32 [F1]

✔ Answer
Fuse: a safety device connected in series in the live wire; when current exceeds the safe limit it melts and breaks the circuit, protecting the circuit and appliances. [1]
I = P/V = 3000 W / 220 V ≈ 13.6 A. [1]
This is more than 5 A, so the fuse will melt (blow) and the circuit will be cut off; the heater will not work. [1]

Q85 · Short Answer · 3 marks ★ Board ×2 2 papers

State the role of fuse and earthing in domestic electric circuit. Suggest any two precautions to be taken to avoid electrical accidents.

Also asked as: 31/8/2: 'Write any two precautions to be taken to avoid electrical accidents. State how these precautions prevent possible damage to the electric circuit.'

Source: CBSE 2026 (VI) Series LMNK2, 31(B) Q37 [F1] · CBSE 2026, 31/8/2 Q35(A) [F4]

✔ Answer
Fuse: protects the circuit and appliances from overloading and short-circuiting by melting and breaking the circuit. [1]
Earthing: the metallic body is connected to the earth wire; leaked current goes to the earth and the user does not get a severe shock. [1]
Precautions (any two): use a fuse of correct rating in the live wire; earth metal-body appliances; do not connect too many appliances to one socket; replace damaged insulation. [½ + ½]

Q86 · Short Answer · 3 marks ★ Board ×1 2 papers

List three advantages of parallel circuits in domestic wiring.

Source: CBSE 2024, 31/3/2 Q33 [F1] · KVS Lucknow Pre-board-2 2024-25, Q32 [FM]

✔ Answer
• Each appliance gets the full supply voltage (220 V). [1]
• If one appliance stops working or is switched off, the others keep working. [1]
• Each appliance can draw the current it needs, as the total resistance is less; each can have its own switch. [1]

⚠ **Note:** Also relevant to Ch 11 (series and parallel).

Q87 · Short Answer · 3 marks ★ Board ×1 1 paper

Explain the meaning of overloading of an electrical circuit. List two possible causes due to which overloading may occur in household circuits. Write one preventive measure that should be taken to avoid overloading of domestic circuits.

Source: CBSE 2023, 31/2/1 Q32 [F1]

✔ Answer
Overloading: when too much current is drawn from the supply, more than the safe limit of the circuit. [1]
Causes: an increase in the supply voltage; connecting too many appliances to a single socket. [1]
Preventive measure: use an electric fuse (or MCB) of proper rating / do not connect too many appliances to one socket. [1]

Q88 · Short Answer · 3 marks ★ Board ×1 1 paper

(a) At every electricity point in the different rooms of a house, there is a potential difference of 220 V. How is this possible ? Write any one benefit of it.
(b) An electric heater rated 2 kW; 220 V is used in a room having electric circuit of current rating of 5 A. What will happen when you switch on the circuit ? Justify your answer with reason.

Source: CBSE 2026 (VI) Series E7FDG, 31(B) Q37 [F9-OCR(full), PDF p.89]

continued on next page ▸

▸ continued

✔ Answer

(a) All the points (appliances) are connected in parallel across the live and neutral wires. [1] Benefit: each appliance gets the full 220 V and can be switched on/off independently. [½]

(b) I = P/V = 2000/220 ≈ 9.1 A, more than 5 A. [1] The circuit gets overloaded and the fuse melts (blows), cutting off the supply. [½]

Q89 · Short Answer · 3 marks ★ — 1 paper

Anannya responded to the question: Why do electrical appliances with metallic bodies are connected to the mains through a three pin plug, whereas an electric bulb can be connected with a two pin plug? She wrote: Three pin connections reduce heating of connecting wires.

(i) Is her answer correct or incorrect? Justify.

(ii) What is the function of a fuse in a domestic circuit?

Source: KVS Lucknow First Pre-board 2024-25, Q27 [FM]

✔ Answer

(i) Incorrect. [½] The third pin connects the metallic body to the earth wire; if current leaks to the body it flows to the earth, so the user does not get a severe shock. A bulb has no exposed metal body, so a two-pin plug is enough. [1½]

(ii) The fuse melts and breaks the circuit when too much current flows (overloading/short-circuit), protecting the circuit and appliances. [1]

Q90 · Short Answer · 3 marks ★ — 1 paper

Observe Madhu's and Rahul's circuits shown below.

(a) In which circuit will the bulb glow when the switch is closed? Explain why.

(b) Both Madhu and Rahul open the switches in their circuits to change the bulbs. For whom will changing the bulb be safe and for whom will it be dangerous? Explain why.

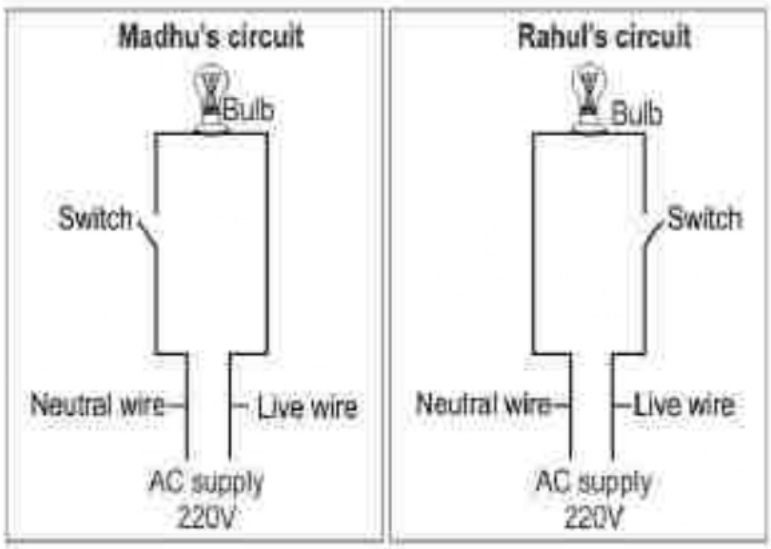


Figure from the question paper

Source: CBSE Competency Items, Magnetic Effects Q8 [F4, PDF p.792]

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▸ continued

✔ Answer
(a) The bulb will glow in both circuits — both are complete (closed) circuits. [½ + ½]
(b) Dangerous for Madhu, safe for Rahul. [1] Madhu's switch is in the neutral wire, so the bulb stays connected to the live wire even with the switch open and can give a shock; Rahul's switch is in the live wire, so the bulb is cut off from the live wire when the switch is open. [1]

Q91 · Short Answer · 3 marks ★ 1 paper

(a) In the circuit below, in case of an overload, will the fuse protect the electric oven from damage? Justify your answer.
(b) If the oven has a rating of 13 A, what should be the minimum rating of the fuse?

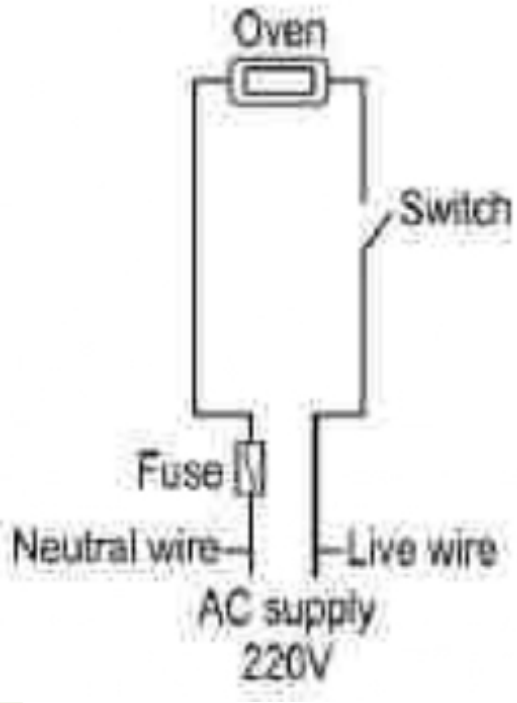


Figure from the question paper

Source: CBSE Competency Items, Magnetic Effects Q9 [F4, PDF p.792]

✔ Answer
(a) No. [1] The fuse is in the neutral wire; it will blow only after the large current has passed through the oven and damaged it. [1]
(b) A little above 13 A (e.g. 14 A or 15 A). [1]

Long Answer

Q92 · Long Answer · 5 marks ★ Board ×1 1 paper

(A) (i) List any two features of the electric current used in the houses of India.
(ii) Write any two differences between direct current and an alternating current.
(iii) How will you identify live wire and neutral wire in a domestic electric circuit?
OR
(B) (i) Why is fuse an important component in our electric circuits?
(ii) Distinguish between overloading and short-circuiting of a circuit.
(iii) Giving reason explain what type of materials are used in fuse wires.

Source: CBSE 2026, 31/5/2 Q39 [F4]

✔ Answer
(A)(i) It is AC; potential difference 220 V; frequency 50 Hz (any two). [1]
(ii) DC flows in one direction only; AC changes direction periodically. DC — from cells/batteries; AC — from power stations/mains. [2]
(iii) Live wire has red insulation, neutral wire has black insulation (live wire is at 220 V). [2]
(B)(i) It protects the circuit and appliances from damage due to overloading and short-circuiting by melting and breaking the circuit. [1]
(ii) Overloading: too much current drawn because many appliances are connected or voltage rises. Short-circuiting: live and neutral wires come in direct contact, resistance becomes very small and current rises sharply. [2]
(iii) Material with low melting point (and suitable resistivity), e.g. alloy of tin and lead, so that it melts quickly when large current flows. [2]

Case-based

Q93 · Case-based · 4 marks ★ Board ×1 1 paper

In our homes, we receive the supply of electric power through a main supply also called mains, either supported through overhead electric poles or by underground cables. In our country the potential difference between the two wires (live wire and neutral wire) of this supply is 220 V.
(a) Write the colours of the insulation covers of the line wires through which supply comes to our homes. 1
(b) What should be the current rating of the electric circuit (220 V) so that an electric iron of 1 kW power rating can be operated ? 1
(c) (i) What is the function of an earth wire? State the importance of the earth wire in domestic appliances like an electric iron. 2
OR (c) (ii) List two precautions to be taken to avoid electrical accidents. State how these precautions protect the circuit/appliance from possible damage. 2

Source: CBSE 2025 (GHF2E) 31/1/3 Q37 [F2, F2/F3/F9] · CBSE 2025 (1GEFH) 31/1/1 Q37, 31/1/2 Q37 [F9-OCR(full), PDF p.208, 247–249, 290–292]

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✔ Answer

(a) Live wire — red; neutral wire — black. [½ + ½]

(b) I = P/V = 1000/220 ≈ 4.5 A → a 5 A circuit (5 A rating). [1]

(c)(i) The earth wire (green) is connected to a metal plate deep in the earth; it gives a low-resistance path to leaked current. For an iron with metal body, leaked current goes to the earth and the user does not get a severe shock. [2]

OR (ii) Fuse of proper rating in the live wire (melts and cuts off supply on overloading/short-circuit); earthing of metal bodies (leakage goes to earth). [2]

⚠ **Note:** (c) is translated from the Hindi text on the same page; English sub-part (c) was on the next page — confirm wording.

Summary — sub-theme × question type

Sub-theme	MCQ	Assertion-Reason	Very Short Answer	Short Answer	Long Answer	Case-based	Total
A1 Compass, magnetic field and field lines	3	7	5	1	0	1	17
B1 Straight current-carrying conductor and right-hand thumb rule	5	0	6	2	2	0	15
B2 Current through a circular loop	1	1	2	2	2	0	8
B3 Solenoid and electromagnet	3	1	1	8	1	2	16
C1 Force on a current-carrying conductor (Fleming's left-hand rule)	5	3	2	3	2	2	17
C2 Domestic electric circuits	5	1	3	9	1	1	20
Total	**22**	**13**	**19**	**25**	**8**	**6**	**93**

Top 10 — revise these first

#	Q	Question (short)	Board	Papers
1	Q83	(a) How is the type of current used in household supply different from the current given by a battery of dry c...	3	3
2	Q46	What is a solenoid? When does a solenoid behave as a magnet? Draw the pattern of the magnetic field produced i...	2	4
3	Q34	Assertion (A) : The strength of the magnetic field produced at the centre of a current carrying circular coil ...	2	3
4	Q67	(i) State the rule used to find the force acting on a current carrying conductor placed in a magnetic field. (...	2	2
5	Q84	Explain in brief the function of an electric fuse in a domestic circuit. An electric heater of current rating ...	2	2
6	Q85	State the role of fuse and earthing in domestic electric circuit. Suggest any two precautions to be taken to a...	2	2
7	Q23	In a straight conductor, the current is flowing vertically downwards. State the pattern of the magnetic field ...	2	2
8	Q41	The magnetic field inside a long straight current carrying solenoid	2	2
9	Q57	A positron enters a uniform magnetic field at right angles to it as shown. The direction of force experienced ...	2	2
10	Q18	Which of the following correctly describes the magnetic field near a long straight wire?	1	5

File codes in the Source strips: F1, F2 (= F3, F9 copies), F4, F5, F6, F8 = PYQ HUNT project files; FM = X SCIENCE-merged (KVS papers); F9-OCR(1-64) = OCR of F9 pages 1–64.

★ Top Questions of the Book

The questions asked the most in past papers — do these first

Each list is the **Top 10** of that chapter. "Page" = page of this book with the question and its answer.

Chapter 9 · Light – Reflection and Refraction

			Papers	Board	Page
1	Q142	Sun's rays meet 25 cm behind a convex lens – where to place an object for a vir...	3	3	46
2	Q149	Which lens diverges a parallel beam? Draw the ray diagram	3	3	48
3	Q108	Write the two laws of refraction of light	3	2	36
4	Q6	Define principal focus of a concave mirror; find R from f	2	2	6
5	Q15	Convergent beam on a convex mirror – find its focal length	2	2	9
6	Q67	Concave mirror: object at 30 cm, real image – find f (mirror formula)	2	2	24
7	Q68	Concave mirror f = 50 cm, real image, m = 1 – distance of object and image	2	2	24
8	Q78	Image of a 3 cm object on a screen with a concave mirror – v, m and h′	2	2	26
9	Q93	Case: sun's image on cardboard by a concave mirror (principal focus)	2	2	31
10	Q116	From a ray diagram compare speed of light and optical density of A and B	2	2	38

Chapter 10 · The Human Eye and the Colourful World

			Papers	Board	Page
1	Q44	State reasons for myopia; ray diagrams of the defect and its correction	8	5	102
2	Q108	Explain rainbow formation; draw the labelled ray diagram	8	4	133
3	Q53	Cannot read nearer than 50 cm – name the defect, draw a ray diagram	6	5	106
4	Q94	Name the phenomenon by which a prism splits white light; give its reason	6	4	125
5	Q137	Path of a light beam is seen in a smoke-filled room – name and explain	6	4	144
6	Q104	Phenomena of light involved in the formation of a rainbow	5	2	131
7	Q40	Identify the defect of vision in the diagram; two causes; correcting lens	5	1	100
8	Q33	Power of accommodation; image distance when the object moves away	4	4	97
9	Q45	Cannot see beyond 5 m – name the defect, draw a ray diagram	4	3	102
10	Q106	When and where does a rainbow appear? Draw a labelled diagram	4	3	132

Chapter 11 · Electricity

			Papers	Board	Page
1	B3-1	Parallel circuit: Rp, branch currents and total current	13	3	176
2	B2-1	Series circuit: total R, current and pd across each	13	2	173
3	C3-1	Energy in kWh and electricity bill	11	3	203
4	B4-1	R in series with a parallel pair	10	2	181
5	C2-1	From the rating: $I = P/V$ and $R = V^2/P$	9	3	196
6	C4-1	Fuse rating from $I = P/V$	8	8	207
7	B1-1	Compare wires: R increases with length, decreases with area	7	5	164
8	C1-1	Heating effect; derive $H = I^2Rt$	7	3	192
9	B1-2	Find the length of a wire	6	2	165
10	B4-2	Parallel arms with resistors in series	6	1	183

★ Top Questions of the Book

The questions asked the most in past papers — do these first

		Chapter 12 · Magnetic Effects of Electric Current	Papers	Board	Page
1	Q83	AC and DC; why AC for long distances; how a fuse protects	3	3	252
2	Q46	What is a solenoid? When does it behave as a magnet? Draw its field	4	2	235
3	Q34	A–R: more turns in a coil give a stronger field at its centre	3	2	230
4	Q67	Fleming's left-hand rule; electron entering a field – max and min force	2	2	244
5	Q84	Function of a fuse; 3 kW, 220 V heater on a 5 A circuit	2	2	252
6	Q85	Role of fuse and earthing; two safety precautions	2	2	253
7	Q23	Field pattern around a vertical wire; rule for its direction	2	2	224
8	Q41	Magnetic field inside a long straight solenoid (MCQ)	2	2	234
9	Q57	Force on a positron entering a magnetic field (MCQ)	2	2	241
10	Q18	Magnetic field near a long straight wire (MCQ)	5	1	222

FORMULAS AND RULES TO REMEMBER

Ch 9 · Light

- Mirror: $1/v + 1/u = 1/f$, $f = R/2$
- Mirror: $m = h'/h = -v/u$
- Lens: $1/v - 1/u = 1/f$
- Lens: $m = h'/h = v/u$
- $n = c/v$; $n_{21} = n_2/n_1 = v_1/v_2$
- $P = 1/f$ (f in metre), unit dioptre (D)

Ch 10 · Human Eye

- Least distance of distinct vision = 25 cm
- Myopia → concave lens; hypermetropia → convex lens
- Power of correcting lens: $P = 1/f$
- VIBGYOR: violet bends most, red least
- Blue sky, red danger signals → scattering

Ch 11 · Electricity

- $I = Q/t$; $V = W/Q$; $V = IR$
- $R = \rho l/A$
- Series: $R_s = R_1 + R_2 + R_3$
- Parallel: $1/R_p = 1/R_1 + 1/R_2 + 1/R_3$
- $H = I^2Rt$; $P = VI = I^2R = V^2/R$
- 1 kWh = 3.6×10^6 J

Ch 12 · Magnetic Effects

- Field round a wire → right-hand thumb rule
- Force on a conductor → Fleming’s left-hand rule
- Outside a magnet field lines go N → S
- Live red · neutral black · earth green
- Mains in India: AC, 220 V, 50 Hz
- Fuse rating a little above $I = P/V$

✓ Revision Checklist

Tick each box when it is done. Come back to the empty boxes before the exam.

Ch 9 · Light – Reflection and Refraction · page 1	Read NCERT	Did the questions	Revised ★ ones
Laws of reflection and terms of spherical mirrors	☐	☐	☐
Image formation by spherical mirrors (ray diagrams)	☐	☐	☐
Uses of spherical mirrors	☐	☐	☐
Sign convention, mirror formula and magnification	☐	☐	☐
Laws of refraction and the glass slab	☐	☐	☐
Refractive index and speed of light	☐	☐	☐
Image formation by lenses (ray diagrams)	☐	☐	☐
Lens formula and magnification	☐	☐	☐
Power of a lens	☐	☐	☐
Lab skills: focal length, glass slab	☐	☐	☐

Ch 10 · The Human Eye and the Colourful World · page 82	Read NCERT	Did the questions	Revised ★ ones
A. Parts of the human eye	☐	☐	☐
B. Power of accommodation	☐	☐	☐
C. Myopia (near-sightedness)	☐	☐	☐
D. Hypermetropia (far-sightedness)	☐	☐	☐
E. Presbyopia, bifocal lens and cataract	☐	☐	☐
F. Lens power and the defect (numericals)	☐	☐	☐
A. Refraction of light through a prism	☐	☐	☐
B. Dispersion of white light and recombination	☐	☐	☐
C. Rainbow	☐	☐	☐
A. Atmospheric refraction – twinkling of stars	☐	☐	☐
B. Scattering of light – Tyndall effect, blue sky, red signals	☐	☐	☐

Ch 11 · Electricity · page 147	Read NCERT	Did the questions	Revised ★ ones
A1 Electric current and charge	☐	☐	☐
A2 Potential difference and volt	☐	☐	☐
A3 Circuit diagram, symbols, ammeter and voltmeter	☐	☐	☐
A4 Ohm's law and V-I graph	☐	☐	☐
B1 Factors on which resistance depends; resistivity	☐	☐	☐
B2 Resistors in series	☐	☐	☐
B3 Resistors in parallel	☐	☐	☐
B4 Mixed networks and circuit-based cases	☐	☐	☐
C1 Heating effect of current and Joule's law	☐	☐	☐
C2 Electric power	☐	☐	☐
C3 Electrical energy, kWh and electricity bill	☐	☐	☐
C4 Power rating, current drawn and fuse rating	☐	☐	☐

Ch 12 · Magnetic Effects of Electric Current · page 211	Read NCERT	Did the questions	Revised ★ ones
A1 Compass, magnetic field and field lines	☐	☐	☐
B1 Straight current-carrying conductor and right-hand thumb rule	☐	☐	☐
B2 Current through a circular loop	☐	☐	☐
B3 Solenoid and electromagnet	☐	☐	☐
C1 Force on a current-carrying conductor (Fleming's left-hand rule)	☐	☐	☐
C2 Domestic electric circuits	☐	☐	☐

✎ My Notes

Formulas, tricks, mistakes I made — write them here

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