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Your JEE Guide

CBSE Class X · Science (086)

Sample Question Paper 4 · Session 2026-27

Time allowed: 3 hours **Maximum marks: 80**

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This is an original practice paper written to the official CBSE 2026-27 design; it is not issued by CBSE.

General instructions:

1. This question paper consists of 39 questions in 3 sections. Section A is Biology, Section B is Chemistry and Section C is Physics.
2. All questions are compulsory. However, an internal choice is provided in some questions. A student is expected to attempt only one of the alternatives in such questions.

Section A — Biology

1.	Bile from the liver is poured into the: (A) stomach (B) small intestine (C) oesophagus (D) large intestine	1
2.	During vigorous exercise, a lack of oxygen in muscle cells leads to the formation of: (A) glucose (B) ethanol and carbon dioxide (C) lactic acid (D) carbon dioxide and water	1
3.	The part of a neuron that first picks up information from the surroundings is the: (A) dendrite (B) synapse (C) nerve ending (D) axon	1
4.	Which plant hormone inhibits growth and causes the wilting of leaves? (A) cytokinin (B) auxin (C) gibberellin (D) abscisic acid	1
5.	Spore formation is the usual mode of asexual reproduction in: (A) Hydra (B) Planaria (C) Rhizopus (D) Amoeba	1
6.	Which of the following is a pair of contrasting traits studied by Mendel? (A) round and wrinkled seeds (B) violet flowers and yellow seeds (C) axial flowers and green pods (D) tall plants and green pods	1
7.	The trophic level with the maximum available energy is that of the: (A) top carnivores (B) producers (C) herbivores (D) carnivores	1

8.	**Assertion (A):** Aerobic respiration releases much more energy than anaerobic respiration. **Reason (R):** In aerobic respiration, glucose is broken down completely into carbon dioxide and water. (A) Both Assertion (A) and Reason (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.	1
9.	**Assertion (A):** Sexual reproduction produces more variation than asexual reproduction. **Reason (R):** In asexual reproduction, offspring are produced by a single parent. (A) Both Assertion (A) and Reason (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.	1
10.	Name the end products of the digestion of (i) carbohydrates, (ii) proteins, (iii) fats. Where are they absorbed?	2
11.	Draw a neuron and label the dendrite, cell body, axon and nerve endings. **OR** What is a tropic movement? Name the type of tropism shown by (i) roots growing downwards, (ii) shoots growing upwards.	2
12.	Why are we advised to use cloth or jute bags instead of plastic bags?	2
13.	Name the components of blood. Give one function each of plasma, red blood cells and platelets.	3
14.	A tall pea plant crossed with a dwarf pea plant gave 50% tall and 50% dwarf plants. Work out the genotypes of the parents, showing a Punnett square. **OR** Name the parts of a bisexual flower and state the function of each.	3
15.	**Case study.** When the kidneys fail, an artificial kidney can be used to filter the blood. Blood from an artery is passed through long tubes with semi-permeable lining, kept in a tank of dialysing fluid that has the same osmotic pressure as blood but no nitrogenous wastes. The cleaned blood is returned to a vein. (i) What happens to the body if both kidneys stop working? *[1]* (ii) On what principle does the artificial kidney work? *[1]* (iii) How does the working of an artificial kidney differ from that of a natural kidney? *[2]* **OR** (iii) How do plants get rid of their excretory products? *[2]*	4

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16.	Describe, with one example each, how organisms reproduce by (a) budding, (b) fragmentation, (c) spore formation. (d) Why do asexually produced offspring show very little variation? **OR** (a) Name the hormone secreted by each of these glands and state one function of each: thyroid, pituitary, pancreas, testes (or ovaries). (b) Why is iodised salt advised? (c) What happens if growth hormone is deficient in childhood?	5

Section B — Chemistry

17.	Which of the following is a redox reaction? (A) $NaOH + HCl \rightarrow NaCl + H_2O$ (B) $CaCO_3 \rightarrow CaO + CO_2$ (C) $AgNO_3 + NaCl \rightarrow AgCl + NaNO_3$ (D) $CuO + H_2 \rightarrow Cu + H_2O$	1
18.	Lime water turns milky when carbon dioxide is passed through it because of the formation of: (A) $CaCO_3$ (B) $Ca(OH)_2$ (C) $CaCl_2$ (D) CaO	1
19.	A solution turns colourless phenolphthalein pink. The solution is: (A) neutral (B) strongly acidic (C) acidic (D) basic	1
20.	Plaster of Paris is made by heating: (A) bleaching powder (B) gypsum (C) limestone (D) washing soda	1
21.	Which metal melts when kept on the palm? (A) tungsten (B) copper (C) gallium (D) iron	1
22.	Which of the following is a saturated hydrocarbon? (A) C_3H_6 (B) C_2H_4 (C) C_3H_8 (D) C_2H_2	1
23.	Which of these hydrocarbons burns with a yellow, sooty flame? (A) C_2H_2 (ethyne) (B) C_2H_6 (ethane) (C) CH_4 (methane) (D) C_3H_8 (propane)	1
24.	**Assertion (A):** Zinc oxide is an amphoteric oxide. **Reason (R):** Zinc oxide reacts with both acids and bases to give a salt and water. (A) Both Assertion (A) and Reason (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.	1

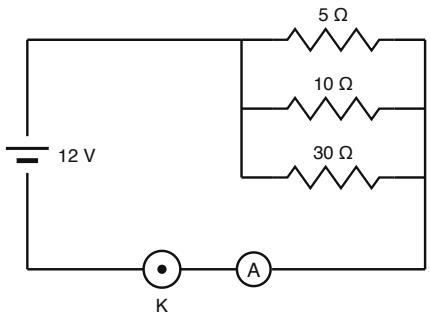
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25.	Balance the following equations: (i) $Fe + H_2O$ (steam) $\rightarrow Fe_3O_4 + H_2$; (ii) $BaCl_2 + Al_2(SO_4)_3 \rightarrow BaSO_4 + AlCl_3$.	2
26.	(i) Is the solution of ammonium chloride acidic, basic or neutral? Why? (ii) Which salt is used to remove the permanent hardness of water? (iii) Why does baking powder make cakes soft and spongy?	3
27.	Write the electronic configurations of sodium (atomic number 11) and oxygen (atomic number 8). Show the formation of sodium oxide by the transfer of electrons. What type of bond is formed? **OR** (i) What is anodising, and why is it done? (ii) Why are tarnished copper vessels cleaned with lemon or tamarind juice?	3
28.	**Case study.** Some substances change their smell in acidic or basic media; they are called olfactory indicators. A student added finely chopped onion and some vanilla essence separately to dilute hydrochloric acid and dilute sodium hydroxide solution, and noted the smell. (i) What is an olfactory indicator? *[1]* (ii) What happens to the smell of onion in sodium hydroxide solution? *[1]* (iii) What would the student notice with vanilla essence in the acid and in the base? *[2]* **OR** (iii) Name two natural indicators, and give the colour of turmeric in a basic solution. *[2]*	4
29.	(a) How is mercury obtained from its ore, cinnabar (HgS)? Write the equations. (b) Describe the electrolytic refining of copper with a labelled diagram. **OR** Give four differences between ionic and covalent compounds, with one example of each.	5

Section C — Physics

30.	The magnification produced by a plane mirror is: (A) infinite (B) +1 (C) –1 (D) 0	1
31.	The resistance of a metallic conductor at a given temperature does not depend on: (A) its length (B) its area of cross-section (C) its material (D) the current through it	1

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32.	**Assertion (A):** The Sun is visible to us about 2 minutes before the actual sunrise. **Reason (R):** Atmospheric refraction bends sunlight from the Sun just below the horizon towards us. (A) Both Assertion (A) and Reason (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.	1
33.	Draw the pattern of magnetic field lines produced by a current-carrying circular loop. How does the field at its centre change if the number of turns is increased? **OR** What is a solenoid? How can it be used to make an electromagnet?	2
34.	An object is placed at the centre of curvature of a concave mirror of focal length 10 cm. Find the position of the image and describe it.	2
35.	The speed of light in a medium is 2.25×10^8 m/s. Find the refractive index of the medium (speed of light in air 3×10^8 m/s). State the two laws of refraction.	3
36.	What is a spectrum? Draw a labelled diagram showing the dispersion of white light by a glass prism. Which colour bends the most?	3
37.	Three resistors of 5 Ω, 10 Ω and 30 Ω are connected in parallel to a 12 V battery, as shown. Find the current through each resistor, the total current and the total resistance.  **OR** An electric bulb is rated 100 W, 220 V. Find its resistance and the current it draws. How much energy does it use in 10 hours?	3

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38.	**Case study.** The eye lens can change its focal length to see objects at different distances; this is called accommodation. For a young adult with normal vision, the near point is about 25 cm and the far point is at infinity. With age, the power of accommodation usually decreases. (i) What is meant by the power of accommodation of the eye? *[1]* (ii) What is the least distance of distinct vision for a normal eye? *[1]* (iii) The near point of a person's eye is 1 m. What is the power of the lens needed to read at 25 cm? *[2]* **OR** (iii) What is presbyopia? Why does it arise? *[2]*	4
39.	(a) Draw ray diagrams to show the image formed by a concave mirror when the object is (i) beyond C, (ii) between F and P. (b) A concave mirror forms a real image three times the size of an object placed 10 cm in front of it. Where is the image, and what is the focal length of the mirror? **OR** (a) Show that the power used in a resistor can be written as $P = I^2R = V^2/R$. (b) What is the commercial unit of electrical energy? (c) A house uses five 60 W bulbs for 6 hours a day and a 1.5 kW heater for 1 hour a day. Find the cost of electricity for 30 days at ₹5 per unit.	5

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Answers and Marking Scheme

Marks for each step are shown in brackets. Any correct alternative method gets full credit.

Section A — Biology

1. **(B)** small intestine. *Working:* Bile enters the first part of the small intestine and emulsifies fats.

2. **(C)** lactic acid. *Working:* Pyruvate is converted to lactic acid; its build-up causes cramps.

3. **(A)** dendrite. *Working:* Information is acquired at the dendrite tip of a nerve cell.

4. **(D)** abscisic acid. *Working:* Abscisic acid is the growth inhibitor.

5. **(C)** Rhizopus. *Working:* Bread mould produces spores in sporangia.

6. **(A)** round and wrinkled seeds. *Working:* A contrasting pair is two forms of the same character.

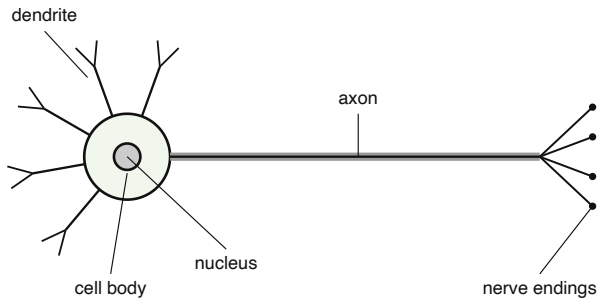
7. **(B)** producers. *Working:* Energy decreases at each successive level.

8. **(A)** Both Assertion (A) and Reason (R) are true and R is the correct explanation of A. *Working:* Complete breakdown of glucose releases far more energy, so R explains A.

9. **(B)** Both A and R are true but R is not the correct explanation of A. *Working:* Both are true, but the explanation is that sexual reproduction combines DNA from two parents; R does not state this.

10. (i) Glucose (½); (ii) amino acids (½); (iii) fatty acids and glycerol (½). They are absorbed through the villi of the small intestine (½).

11. Labelled diagram (2):



OR A directional growth movement of a plant part in response to a stimulus (1). (i) Positive geotropism (½); (ii) negative geotropism (½).

12. Cloth and jute are biodegradable and are broken down by decomposers (1). Plastic is non-biodegradable; it stays in the environment for a long time, chokes drains and harms animals that swallow it (1).

13. Plasma, red blood cells, white blood cells and platelets (½ + ½ for listing). Plasma carries food, CO_2 and nitrogenous wastes in dissolved form (½ + ½). RBCs carry oxygen using haemoglobin (½). Platelets help blood clot at the site of an injury (½).

14. Dwarf is recessive, so the dwarf parent is tt (1). If the tall parent were TT, all offspring would be tall; the 1 : 1 ratio means it is Tt (1). Tt × tt gives Tt (tall) : tt (dwarf) = 1 : 1 (1):

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	T	t
t	Tt	tt
t	Tt	tt

Tt (tall) × tt (dwarf)

OR Sepals protect the flower in the bud (½). Petals are often coloured and attract pollinators (½). Stamens are the male parts; their anthers produce pollen grains (1). The pistil is the female part: the stigma receives pollen, the style leads to the ovary, and the ovary contains ovules with the egg cells (1).

15. (i) Nitrogenous wastes such as urea build up in the blood, which can be fatal.
(ii) Dialysis: wastes diffuse from the blood into the dialysing fluid through the semi-permeable tubes.
(iii) A natural kidney filters the blood and then reabsorbs useful substances and water; the artificial kidney only removes wastes and has no reabsorption. **OR** Any two: wastes stored in leaves that later fall off; stored in vacuoles; stored as resins and gums in old xylem; some released into the soil around them.

16. (a) Budding in Hydra: an outgrowth (bud) forms by repeated cell division at one spot, grows into a tiny individual and detaches from the parent when mature (1½). (b) Fragmentation in Spirogyra: the filament breaks into small pieces, each of which grows into a new individual (1). (c) Spore formation in Rhizopus: sporangia produce many spores, which are released and grow into new plants on a moist surface (1½). (d) The offspring come from a single parent and receive copies of its DNA, so they are almost identical to it (1).

OR (a)

Gland	Hormone	Function
Thyroid	Thyroxine	Regulates carbohydrate, protein and fat metabolism
Pituitary	Growth hormone	Regulates growth and development
Pancreas	Insulin	Regulates the blood sugar level
Testes / ovaries	Testosterone / oestrogen	Changes at puberty; development of reproductive organs

(3). (b) Iodine is needed by the thyroid to make thyroxine; its deficiency causes goitre (1). (c) Dwarfism (1).

Section B — Chemistry

17. **(D)** $CuO + H_2 \rightarrow Cu + H_2O$. *Working:* CuO loses oxygen (reduced) while H_2 gains oxygen (oxidised).

18. **(A)** $CaCO_3$. *Working:* $Ca(OH)_2 + CO_2 \rightarrow CaCO_3$ (insoluble) + H_2O.

19. **(D)** basic. *Working:* Phenolphthalein is pink in basic solutions.

20. **(B)** gypsum. *Working:* $CaSO_4 \cdot 2H_2O$ at 373 K gives $CaSO_4 \cdot \frac{1}{2}H_2O$.

21. **(C)** gallium. *Working:* Gallium has a melting point of about 30 °C.

22. **(C)** C_3H_8. *Working:* Alkanes, C_nH_{2n+2}, have only single bonds.

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23. **(A)** C_2H_2 (ethyne). *Working:* Unsaturated hydrocarbons give a yellow flame with black smoke; saturated ones give a clean blue flame.

24. **(A)** Both Assertion (A) and Reason (R) are true and R is the correct explanation of A. *Working:* Reacting with both acids and bases is what makes an oxide amphoteric.

25. (i) $3Fe + 4H_2O \rightarrow Fe_3O_4 + 4H_2$ (1). (ii) $3BaCl_2 + Al_2(SO_4)_3 \rightarrow 3BaSO_4 + 2AlCl_3$ (1).

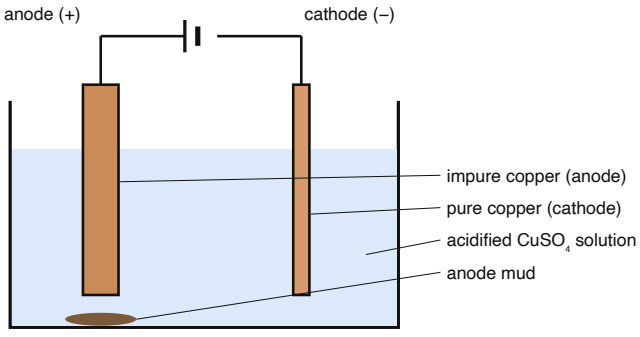
26. (i) Acidic (pH < 7): it is the salt of a strong acid (HCl) and a weak base (NH_4OH) (1). (ii) Washing soda, $Na_2CO_3 \cdot 10H_2O$ (1). (iii) On heating, the sodium hydrogencarbonate in it reacts with the mild acid (tartaric acid) to give carbon dioxide, which makes the cake rise (1).

27. Na: 2, 8, 1; O: 2, 6 (1). Each of two Na atoms gives one electron to the O atom: $2Na \rightarrow 2Na^+ + 2e^-$ and $O + 2e^- \rightarrow O^{2-}$, giving $(Na^+)_2O^{2-}$ (1). The bond is ionic (electrovalent), formed by the transfer of electrons (1).

OR (i) Forming a thick oxide layer on aluminium by making it the anode in the electrolysis of dilute sulphuric acid (1); the layer protects it from corrosion and can be dyed (½). (ii) Copper gains a green coat of basic copper carbonate in moist air (½); this coat is basic, and the acids in lemon or tamarind react with it and remove it (1).

28. (i) A substance whose smell changes in an acidic or basic medium.
(ii) The smell of onion disappears.
(iii) The smell of vanilla remains in the acid but cannot be detected in the base. **OR** Any two: litmus (from lichen), turmeric, red cabbage leaves, coloured petals such as Hydrangea or Petunia. Turmeric turns reddish-brown in a base.

29. (a) Cinnabar is heated in air; it first forms mercuric oxide: $2HgS + 3O_2 \rightarrow 2HgO + 2SO_2$ (1). On further heating the oxide is reduced to mercury: $2HgO \rightarrow 2Hg + O_2$ (1). (b) Impure copper is the anode and a thin strip of pure copper the cathode; the electrolyte is acidified copper sulphate solution (1). On passing current, copper from the anode dissolves and pure copper is deposited on the cathode; soluble impurities go into the solution and insoluble ones collect below the anode as anode mud (1). Diagram (1):



OR Ionic compounds are mostly hard solids; covalent compounds are often liquids or gases (1). Ionic: high melting and boiling points; covalent: generally low (1). Ionic: usually soluble in water and insoluble in kerosene or petrol; covalent: often the opposite (1). Ionic: conduct electricity when molten or in solution; covalent: generally do not (1). Examples: NaCl (ionic), CH_4 (covalent) (1).

Section C — Physics

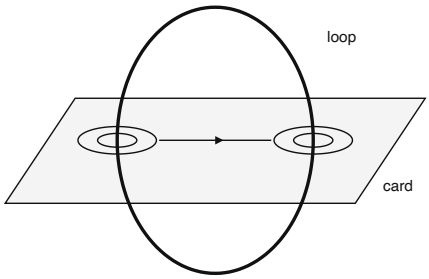
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30. **(B)** +1. *Working:* The image is erect and the same size as the object.

31. **(D)** the current through it. *Working:* $R = \rho\frac{l}{A}$: it depends on the material, length and area, not on the current.

32. **(A)** Both Assertion (A) and Reason (R) are true and R is the correct explanation of A. *Working:* Atmospheric refraction raises the apparent position of the Sun, so it appears before it actually crosses the horizon.

33. Diagram: concentric circles near the wire becoming larger, and nearly straight lines at the centre (1). The field at the centre increases in proportion to the number of turns, as the fields of the turns add up (1).

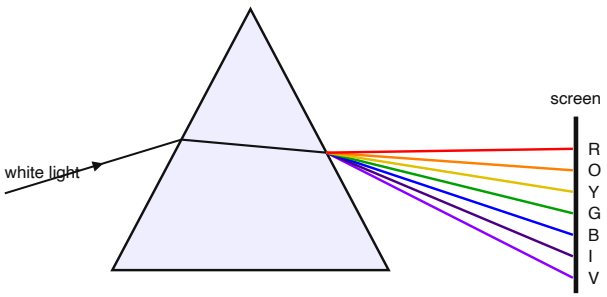


OR A coil of many circular turns of insulated copper wire wrapped closely in the shape of a cylinder (1). Placing a soft iron core inside the solenoid and passing current through it makes a strong electromagnet (1).

34. u = –20 cm: $\frac{1}{v} = -\frac{1}{10} + \frac{1}{20} = -\frac{1}{20}$, v = –20 cm, i.e. at C (1). The image is real, inverted and the same size as the object (1).

35. n = 3×10^8 / $2.25 \times 10^8 \approx 1.33$ (1). (i) The incident ray, the refracted ray and the normal at the point of incidence all lie in the same plane (1). (ii) For a given pair of media and a given colour of light, sin i / sin r is constant (Snell's law) (1).

36. The band of coloured components of a light beam (1). Diagram (1):



Violet bends the most and red the least (1).

37. I_1 = 12/5 = 2.4 A, I_2 = 12/10 = 1.2 A, I_3 = 12/30 = 0.4 A (1½). Total I = 4 A (½). R = 12/4 = 3 Ω (1).

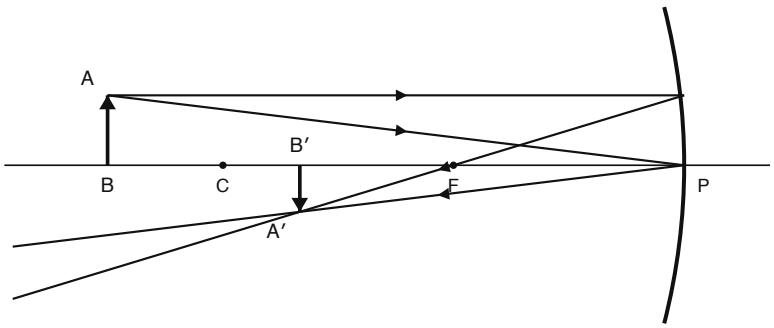
OR R = V^2/P = $220^2/100$ = 484 Ω (1). I = P/V = 100/220 ≈ 0.45 A (1). Energy = 0.1 kW × 10 h = 1 kWh (1).

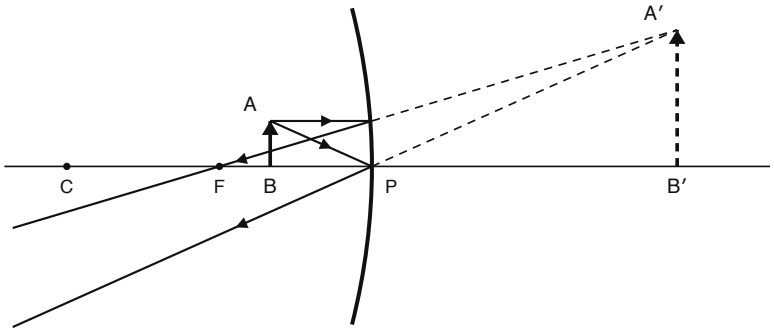
38. (i) The ability of the eye lens to adjust its focal length.
(ii) About 25 cm.

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(iii) u = –25 cm, v = –100 cm: $\frac{1}{f} = \frac{1}{v} - \frac{1}{u} = -\frac{1}{100} + \frac{1}{25} = \frac{3}{100}$, f ≈ 33.3 cm, so P ≈ +3 D (convex lens). **OR** Difficulty in seeing nearby objects in old age, because the ciliary muscles weaken and the eye lens becomes less flexible.

39. (a) (i) Image between F and C: real, inverted, diminished (1½). (ii) Image behind the mirror: virtual, erect, enlarged (1½). (b) m = –3 = –v/u, so v = 3u = –30 cm: 30 cm in front of the mirror (1). $\frac{1}{f} = \frac{1}{v} + \frac{1}{u} = -\frac{1}{30} - \frac{1}{10} = -\frac{4}{30}$, f = –7.5 cm (1).





OR (a) P = VI; with V = IR, P = I²R; with I = V/R, P = V²/R (2). (b) The kilowatt hour (kWh) (1). (c) Bulbs: 5 × 0.06 × 6 = 1.8 kWh; heater: 1.5 kWh; total 3.3 kWh a day, or 99 kWh in 30 days (1). Cost = 99 × 5 = ₹495 (1).

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