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# CBSE Class X · Science (086)

Sample Question Paper 1 · Session 2026-27

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

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**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.** | The correct sequence of events in sexual reproduction in a flowering plant is:<br>(A) pollination → fertilisation → embryo → seedling<br>(B) embryo → pollination → fertilisation → seedling<br>(C) pollination → embryo → fertilisation → seedling<br>(D) fertilisation → pollination → seedling → embryo | 1 |
| **2.** | In plants, xylem mainly transports:<br>(A) food made in the leaves<br>(B) hormones only<br>(C) water and minerals<br>(D) oxygen | 1 |
| **3.** | The structural and functional unit of the human kidney is the:<br>(A) villus<br>(B) alveolus<br>(C) neuron<br>(D) nephron | 1 |
| **4.** | The plant hormone that promotes cell division is:<br>(A) gibberellin<br>(B) cytokinin<br>(C) auxin<br>(D) abscisic acid | 1 |
| **5.** | When a pure tall pea plant (TT) is crossed with a pure dwarf plant (tt) and the F1 plants are self-pollinated, the ratio of tall to dwarf plants in F2 is:<br>(A) 9 : 3 : 3 : 1<br>(B) 3 : 1<br>(C) 1 : 1<br>(D) 1 : 2 : 1 | 1 |
| **6.** | Which of the following groups contains only decomposers?<br>(A) fungi and frog<br>(B) grass and goat<br>(C) algae and bacteria<br>(D) bacteria and fungi | 1 |

| | | |
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| **7.** | Complete digestion of carbohydrates, proteins and fats takes place in the:<br>(A) stomach (B) large intestine<br>(C) small intestine (D) mouth | 1 |
| **8.** | **Assertion (A):** The wall of the left ventricle is thicker than the wall of the right ventricle.<br>**Reason (R):** The left ventricle pumps blood to all parts of the body.<br>(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.<br>(C) A is true but R is false. (D) A is false but R is true. | 1 |
| **9.** | **Assertion (A):** Human beings have 23 pairs of chromosomes.<br>**Reason (R):** The sex of a child is decided by the chromosome it inherits from the mother.<br>(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.<br>(C) A is true but R is false. (D) A is false but R is true. | 1 |
| **10.** | Why is diffusion not enough to meet the oxygen needs of large multicellular organisms such as humans? | 2 |
| **11.** | What is a reflex arc? Show its parts in the correct order.<br>**OR**<br>State one function each of the cerebellum and the medulla in the human brain. | 2 |
| **12.** | Give two differences between self-pollination and cross-pollination. | 2 |
| **13.** | Draw labelled diagrams of an open and a closed stoma. State two functions of stomata. | 3 |
| **14.** | How do Mendel's experiments with pea plants show that some traits are dominant and others recessive?<br>**OR**<br>Explain how the sex of a child is determined in human beings. | 3 |

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| | | |
|---|---|---|
| **15.** | **Case study.** In a grassland, the food chain below is found. At each step, only about 10% of the energy in one trophic level is passed on to the next.<br><br><br>(i) Which organism in this chain is the producer? *[1]*<br>(ii) If the grass traps 20 000 J of energy, how much energy reaches the frog? *[1]*<br>(iii) Why do food chains usually have only three or four trophic levels? *[2]*<br>**OR**<br>(iii) What is biological magnification? Which organism in this chain would have the highest concentration of a pesticide? *[2]* | 4 |
| **16.** | Describe double circulation of blood in human beings. Why is it necessary?<br>**OR**<br>Describe the digestion of food in the human alimentary canal from the mouth to the small intestine. | 5 |

## Section B — Chemistry

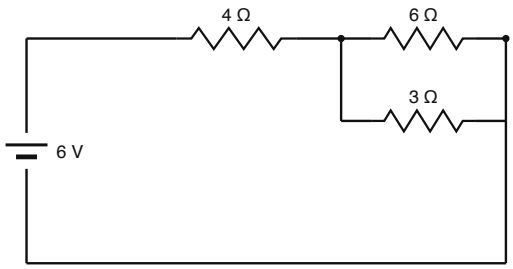
| | | |
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| **17.** | Which of the following is a combination reaction?<br>(A) $CaO + H_2O \rightarrow Ca(OH)_2$ (B) $NaOH + HCl \rightarrow NaCl + H_2O$<br>(C) $Zn + CuSO_4 \rightarrow ZnSO_4 + Cu$ (D) $CaCO_3 \rightarrow CaO + CO_2$ | 1 |
| **18.** | A solution turns red litmus blue. Its pH is likely to be:<br>(A) 1 (B) 10<br>(C) 4 (D) 7 | 1 |
| **19.** | The chemical formula of bleaching powder is:<br>(A) $NaHCO_3$ (B) $CaCO_3$<br>(C) $CaSO_4 \cdot ½H_2O$ (D) $CaOCl_2$ | 1 |
| **20.** | Which metal is stored under kerosene?<br>(A) sodium (B) magnesium<br>(C) iron (D) aluminium | 1 |
| **21.** | Which of the following oxides is amphoteric?<br>(A) MgO (B) $Na_2O$<br>(C) $Al_2O_3$ (D) $CO_2$ | 1 |
| **22.** | The functional group present in ethanoic acid is:<br>(A) –OH (B) –CHO<br>(C) –COOH (D) >C=O | 1 |

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| **23.** | The number of covalent bonds in a molecule of propane, $C_3H_8$, is:<br>(A) 8 (B) 10<br>(C) 11 (D) 3 | 1 |
| **24.** | **Assertion (A):** Rusting of iron is an oxidation reaction.<br>**Reason (R):** During rusting, iron combines with oxygen in the presence of moisture.<br>(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.<br>(C) A is true but R is false. (D) A is false but R is true. | 1 |
| **25.** | Why should a magnesium ribbon be cleaned before it is burnt in air? Write the balanced equation for its burning. | 2 |
| **26.** | What happens when (i) dilute hydrochloric acid is added to zinc granules, (ii) baking soda is heated, (iii) carbon dioxide is passed through lime water? Write a balanced equation for each. | 3 |
| **27.** | Show the formation of NaCl and $MgCl_2$ by the transfer of electrons. (Atomic numbers: Na 11, Mg 12, Cl 17.)<br>**OR**<br>Give reasons: (i) ionic compounds have high melting points; (ii) they conduct electricity in the molten state but not as solids. | 3 |
| **28.** | **Case study.** Ethanol and ethanoic acid are two important carbon compounds. Ethanol is the active ingredient of all alcoholic drinks and a good solvent; ethanoic acid in dilute form is vinegar. When heated together with a little concentrated sulphuric acid, they give a sweet-smelling substance.<br>(i) Draw the structural formula of ethanol. *[1]*<br>(ii) What is formed when ethanol reacts with sodium? *[1]*<br>(iii) Write the equation for the reaction that gives the sweet-smelling substance. Name it and give one use. *[2]*<br>**OR**<br>(iii) What is saponification? Write the equation for the saponification of ethyl ethanoate. *[2]* | 4 |
| **29.** | (a) Explain how zinc is obtained from its sulphide ore, with equations. (b) What is the thermit reaction? Write its equation and give one use.<br>**OR**<br>(a) What is the chlor-alkali process? Write its equation and name its three products. (b) How is plaster of Paris made from gypsum? Write the equation and give one use. | 5 |

## Section C — Physics

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| | | |
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| **30.** | The SI unit of resistivity is:<br>(A) Ω/m (B) Ω<br>(C) Ω m² (D) Ω m | 1 |
| **31.** | The power of a convex lens of focal length 20 cm is:<br>(A) +5 D (B) +20 D<br>(C) +0.05 D (D) –5 D | 1 |
| **32.** | **Assertion (A):** A concave lens always forms a virtual, erect and diminished image of a real object.<br>**Reason (R):** Rays refracted through a concave lens diverge.<br>(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.<br>(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 around a straight conductor carrying current upwards through a horizontal card. How is the direction of the field related to the current?<br>**OR**<br>State two properties of magnetic field lines. | 2 |
| **34.** | A wire of resistance 20 Ω is cut into four equal parts, and the parts are connected in parallel. Find the equivalent resistance. | 2 |
| **35.** | An object is placed 30 cm in front of a convex lens of focal length 20 cm. Find the position, nature and magnification of the image, and draw the ray diagram. | 3 |
| **36.** | Explain why (i) the clear sky looks blue, and (ii) the Sun looks reddish at sunrise and sunset. | 3 |
| **37.** | In the circuit shown, find (i) the equivalent resistance, (ii) the current drawn from the cell, (iii) the current through the 3 Ω resistor.<br><br><br>**OR**<br>An electric iron rated 1000 W is used for 2 hours a day for 30 days. Find the energy used and its cost at ₹6 per kWh. What current does it draw from a 220 V supply? | 3 |

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| | | |
|---|---|---|
| **38.** | **Case study.** Dentists use concave mirrors to see enlarged images of teeth. A concave mirror forms images of different kinds depending on where the object is placed.<br>(i) Where should a tooth be placed in front of a concave mirror to see an enlarged, erect image? *[1]*<br>(ii) What is the focal length of a concave mirror of radius of curvature 30 cm? *[1]*<br>(iii) A tooth is 10 cm from a concave mirror of focal length 15 cm. Find the position of the image and the magnification. *[2]*<br>**OR**<br>(iii) Why are convex mirrors, not concave ones, used as rear-view mirrors in vehicles? *[2]* | 4 |
| **39.** | (a) Draw the magnetic field lines of a current-carrying solenoid and state two features of the field. (b) When is the force on a current-carrying conductor placed in a magnetic field the greatest? State the rule that gives its direction. (c) What is the frequency of the AC supply in India? Give one advantage of AC over DC.<br>**OR**<br>State Ohm’s law. Draw the circuit used to verify it, describe how the readings are taken, and state the shape of the V–I graph. | 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.** **(A)** pollination → fertilisation → embryo → seedling. *Working:* Pollen reaches the stigma, the male gamete fuses with the egg, the zygote grows into an embryo, and the seed germinates into a seedling.

**2.** **(C)** water and minerals. *Working:* Xylem carries water and dissolved minerals from the roots; phloem carries food.

**3.** **(D)** nephron. *Working:* Each kidney has a very large number of nephrons, the filtering units.

**4.** **(B)** cytokinin. *Working:* Cytokinins promote cell division, for example in fruits and seeds.

**5.** **(B)** 3 : 1. *Working:* F1 is Tt; Tt × Tt gives TT : Tt : tt = 1 : 2 : 1, i.e. 3 tall : 1 dwarf.

**6.** **(D)** bacteria and fungi. *Working:* Bacteria and fungi break down dead remains; algae and grass are producers.

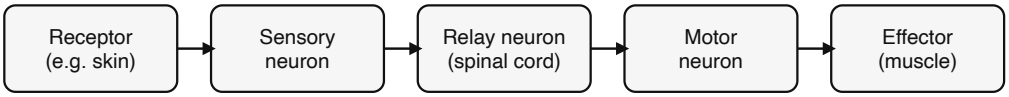
**7.** **(C)** small intestine. *Working:* Enzymes from the pancreas and the intestinal juice complete digestion in the small intestine.

**8.** **(A)** Both Assertion (A) and Reason (R) are true and R is the correct explanation of A. *Working:* The left ventricle must push blood through the whole body at high pressure, which needs a thicker, more muscular wall.

**9.** **(C)** A is true but R is false. *Working:* A is true. R is false: every egg carries an X chromosome, so the sex is decided by whether the sperm carries an X or a Y chromosome.

**10.** Most cells of a large body are far from the surface and not in direct contact with air (1). Diffusion over such distances is too slow to supply oxygen at the rate their high energy needs demand, so a transport system is needed (1).

**11.** A reflex arc is the pathway along which nerve impulses travel in a reflex action (1). Its parts are shown below (1).

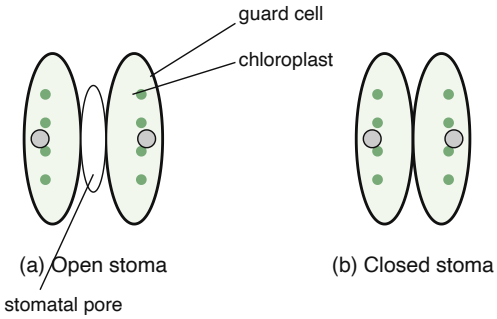



**OR** Cerebellum: maintains posture and balance and makes voluntary actions precise (1). Medulla: controls involuntary actions such as blood pressure, salivation and vomiting (1).

**12.** Self-pollination: pollen reaches the stigma of the same flower or another flower on the same plant; cross-pollination: pollen reaches a flower on a different plant (1). Self-pollination needs no outside agent in many cases and gives little variation; cross-pollination needs agents such as wind, water or animals and produces more variation (1).

**13.** Diagrams with guard cells and stomatal pore labelled (1½). Functions: exchange of gases ($CO_2$ in, $O_2$ out) for photosynthesis and respiration (½ + ½); loss of water vapour in transpiration (½).

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**14.** Mendel crossed pure tall (TT) and pure dwarf (tt) plants: all F1 plants were tall, so the dwarf trait did not show (1). On self-pollinating F1 (Tt), the F2 generation had tall and dwarf plants in the ratio 3 : 1, so the dwarf trait reappeared (1). The trait expressed in F1 (tallness) is dominant; the one that stays hidden but reappears (dwarfness) is recessive (1).

| | T | t |
|---|---|---|
| T | TT | Tt |
| t | Tt | tt |

F1 (Tt) self-pollinated: 3 tall : 1 dwarf

**OR** Women have two X chromosomes (XX) and men have one X and one Y (XY) (1). Every egg carries an X; half the sperms carry X and half carry Y (1). An X sperm fertilising the egg gives a girl (XX); a Y sperm gives a boy (XY). So the sex is decided by the father's sperm (1).

| | X | Y |
|---|---|---|
| X | XX (girl) | XY (boy) |
| X | XX (girl) | XY (boy) |

Sperm along the top, eggs down the side

**15.** (i) Grass.
(ii) Grasshopper 2000 J, frog 200 J.
(iii) About 90% of the energy is lost at each level (mostly as heat in respiration), so after a few levels too little energy is left to support another level. **OR** The build-up of non-biodegradable chemicals at higher trophic levels; the eagle, at the top of the chain.

**16.** Deoxygenated blood from the body enters the right atrium, passes to the right ventricle and is pumped to the lungs (1). Oxygenated blood returns from the lungs to the left atrium, passes to the left ventricle and is pumped to the whole body through the aorta (1½). Blood thus passes through the heart twice in each cycle: double circulation (1). It keeps oxygenated and deoxygenated blood separate (½), giving an efficient oxygen supply for the high energy needs of mammals and birds, which maintain a constant body temperature (1).

**OR** Mouth: salivary amylase breaks starch into sugar (1). Stomach: HCl gives an acidic medium and kills germs; pepsin begins protein digestion; mucus protects the lining (1½). Small intestine: bile from the liver emulsifies fats; pancreatic juice (trypsin, lipase, amylase) digests proteins, fats and starch (1½); the intestinal juice completes digestion to amino acids, glucose, and fatty acids and glycerol, which villi absorb (1).

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## Section B — Chemistry

**17.** **(A)** $CaO + H_2O \rightarrow Ca(OH)_2$. *Working:* Two substances combine to form a single product.

**18.** **(B)** 10. *Working:* Turning red litmus blue means the solution is basic, so pH > 7.

**19.** **(D)** $CaOCl_2$. *Working:* Bleaching powder is $CaOCl_2$; the others are limestone, plaster of Paris and baking soda.

**20.** **(A)** sodium. *Working:* Sodium reacts vigorously with air and moisture and can catch fire.

**21.** **(C)** $Al_2O_3$. *Working:* Aluminium oxide reacts with both acids and bases.

**22.** **(C)** –COOH. *Working:* Ethanoic acid, $CH_3COOH$, is a carboxylic acid.

**23.** **(B)** 10. *Working:* 2 C–C bonds and 8 C–H bonds.

**24.** **(A)** Both Assertion (A) and Reason (R) are true and R is the correct explanation of A. *Working:* Gain of oxygen is oxidation, so R explains A.

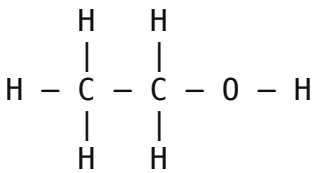
**25.** The ribbon is covered by a layer of magnesium oxide (and carbonate) that stops it burning easily; rubbing with sandpaper removes it (1). $2Mg + O_2 \rightarrow 2MgO$ (1).

**26.** (i) Hydrogen gas is evolved: $Zn + 2HCl \rightarrow ZnCl_2 + H_2$ (1). (ii) Sodium carbonate, water and carbon dioxide form: $2NaHCO_3 \rightarrow Na_2CO_3 + H_2O + CO_2$ (1). (iii) Lime water turns milky: $Ca(OH)_2 + CO_2 \rightarrow CaCO_3 + H_2O$ (1).

**27.** Na (2, 8, 1) loses one electron to become $Na^+$; Cl (2, 8, 7) gains it to become $Cl^-$: $Na\cdot + \cdot Cl \rightarrow Na^+ [:Cl:]^-$ (1½). Mg (2, 8, 2) loses two electrons, one to each of two chlorine atoms: $Mg^{2+} + 2Cl^-$, i.e. $MgCl_2$ (1½).

**OR** (i) Strong electrostatic forces between oppositely charged ions need a lot of energy to overcome (1). (ii) In the solid the ions are held in fixed positions and cannot move (1); on melting, the ions are free to move and carry the current (1).

**28.** (i)



(ii) Sodium ethoxide and hydrogen gas: $2CH_3CH_2OH + 2Na \rightarrow 2CH_3CH_2ONa + H_2$.
(iii) $CH_3COOH + CH_3CH_2OH \rightarrow CH_3COOCH_2CH_3 + H_2O$ (acid catalyst). The product is an ester (ethyl ethanoate), used in perfumes and as a flavouring. **OR** Hydrolysis of an ester by an alkali to give the alcohol and the sodium salt of the acid: $CH_3COOC_2H_5 + NaOH \rightarrow CH_3COONa + C_2H_5OH$.

**29.** (a) The sulphide ore is roasted (heated strongly in air) to the oxide: $2ZnS + 3O_2 \rightarrow 2ZnO + 2SO_2$ (1). The oxide is reduced with carbon: $ZnO + C \rightarrow Zn + CO$ (1). Roasting is done because metals are easier to obtain from oxides than from sulphides (1). (b) The reaction of iron(III) oxide with aluminium, which gives so much heat that the iron is molten: $Fe_2O_3 + 2Al \rightarrow 2Fe + Al_2O_3 +$ heat (1). It is used to join railway tracks and cracked machine parts (1).

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**OR** (a) Electrolysis of brine (aqueous NaCl) (1): 2NaCl + 2$H_2O$ → 2NaOH + $Cl_2$ + $H_2$ (1); products: sodium hydroxide, chlorine and hydrogen (1). (b) Gypsum is heated at 373 K: $CaSO_4 \cdot 2H_2O$ → $CaSO_4 \cdot ½H_2O$ + 1½$H_2O$ (1). Used for plaster casts to support fractured bones (or making toys and decoration) (1).

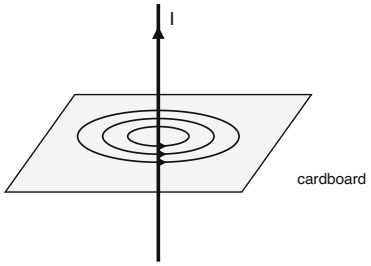
## Section C — Physics

**30.** **(D)** Ω m. *Working:* $\rho = \frac{RA}{l}$ has units Ω × m² / m = Ω m.

**31.** **(A)** +5 D. *Working:* $P = \frac{1}{f\ (\text{in m})} = \frac{1}{0.2} = +5$ D.

**32.** **(A)** Both Assertion (A) and Reason (R) are true and R is the correct explanation of A. *Working:* Because the refracted rays diverge, they only appear to meet on the object side, giving a virtual, erect, diminished image for every object position.

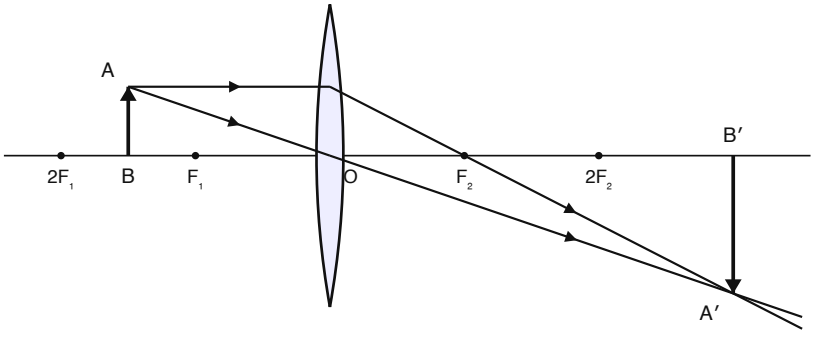
**33.** Concentric circles centred on the wire, anticlockwise when seen from above for an upward current (1). By the right-hand thumb rule: if the thumb points along the current, the curled fingers give the direction of the field (1).




**OR** Any two: they never intersect; they are closer together where the field is stronger; outside a magnet they go from the north pole to the south pole and form closed loops (1 + 1).

**34.** Each part has resistance 20/4 = 5 Ω (1). Four 5 Ω resistors in parallel: $\frac{1}{R} = \frac{4}{5}$, R = 1.25 Ω (1).

**35.** $\frac{1}{v} = \frac{1}{f} + \frac{1}{u} = \frac{1}{20} - \frac{1}{30} = \frac{1}{60}$, so v = +60 cm, on the other side of the lens (1). $m = \frac{v}{u} = \frac{60}{-30} = -2$: the image is real, inverted and twice the size (1). Ray diagram (1):



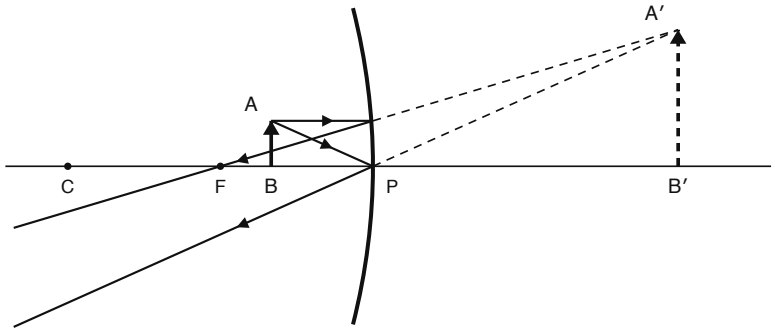

**36.** (i) Fine particles in the air scatter shorter (blue) wavelengths of sunlight much more than longer (red) ones, and this scattered blue light reaches our eyes from all over the sky (1½). (ii) Near the horizon, sunlight travels a much longer path through the atmosphere; most of the blue light is scattered away, so the light reaching us is mainly red (1½).

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**37.** (i) 6 Ω and 3 Ω in parallel: $\frac{6\times3}{9} = 2$ Ω; with 4 Ω in series, R = 6 Ω (1). (ii) I = 6/6 = 1 A (1). (iii) The p.d. across the parallel pair is 1 × 2 = 2 V, so the current in 3 Ω is 2/3 ≈ 0.67 A (1).

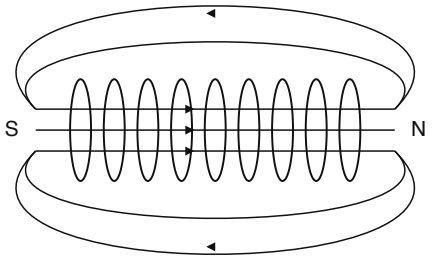
**OR** Energy = 1 kW × 2 h × 30 = 60 kWh (1). Cost = 60 × 6 = ₹360 (1). I = P/V = 1000/220 ≈ 4.55 A (1).

**38.** (i) Between the pole P and the principal focus F.
(ii) f = R/2 = 15 cm.
(iii) $\frac{1}{v} = \frac{1}{f} - \frac{1}{u} = -\frac{1}{15} + \frac{1}{10} = \frac{1}{30}$, so v = +30 cm (behind the mirror, virtual). $m = -\frac{v}{u} = 3$: erect and three times larger.

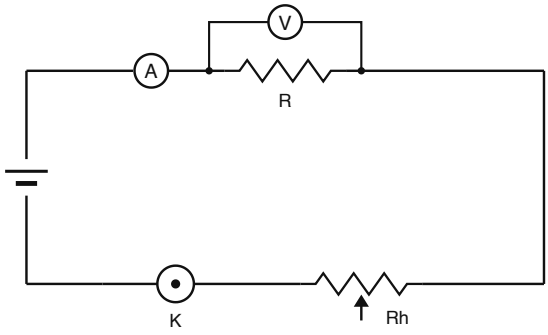



**OR** A convex mirror always gives an erect, diminished image and has a much wider field of view.

**39.** (a) Figure (1). Inside, the lines are parallel straight lines, so the field is uniform; outside, the pattern is like that of a bar magnet, with one end acting as N and the other as S (1). (b) When the current is perpendicular to the field (½). Fleming's left-hand rule: stretch the thumb, forefinger and middle finger of the left hand mutually perpendicular; if the forefinger points along the field and the middle finger along the current, the thumb gives the direction of the force (1½). (c) 50 Hz; AC can be sent over long distances with less loss of energy (1).




**OR** At constant temperature, the current through a conductor is proportional to the potential difference across it: V = IR (1). Circuit (2):




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Change the current with the rheostat and record the ammeter and voltmeter readings each time; V/I stays the same (1). The V–I graph is a straight line through the origin (1).

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