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# CBSE Class X · Science (086)

Sample Question Paper 5 · 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 enzyme in pancreatic juice that digests proteins is:<br>(A) lipase (B) amylase<br>(C) trypsin (D) pepsin | 1 |
| **2.** | In leaves, the exchange of gases takes place mainly through the:<br>(A) stomata (B) phloem<br>(C) xylem vessels (D) root cap | 1 |
| **3.** | The opening and closing of a stomatal pore is controlled by the:<br>(A) xylem cells (B) root hairs<br>(C) phloem cells (D) guard cells | 1 |
| **4.** | Which of these is a part of the hindbrain?<br>(A) pituitary gland (B) cerebellum<br>(C) hypothalamus (D) cerebrum | 1 |
| **5.** | The number of chromosomes in a human sperm cell is:<br>(A) 44 (B) 22<br>(C) 46 (D) 23 | 1 |
| **6.** | After fertilisation, the seed develops from the:<br>(A) style (B) anther<br>(C) ovule (D) ovary | 1 |
| **7.** | Which of the following is an artificial (human-made) ecosystem?<br>(A) crop field (B) lake<br>(C) forest (D) pond | 1 |

| | | |
|---|---|---|
| **8.** | **Assertion (A):** Leaves of most plants look green.<br>**Reason (R):** Chlorophyll absorbs green light.<br>(A) Both Assertion (A) and Reason (R) are true and R is the correct explanation of A.<br>(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.<br>(D) A is false but R is true. | 1 |
| **9.** | **Assertion (A):** A child gets half of its genetic material from the father and half from the mother.<br>**Reason (R):** Germ cells (gametes) contain only one set of chromosomes, half the number in body cells.<br>(A) Both Assertion (A) and Reason (R) are true and R is the correct explanation of A.<br>(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.<br>(D) A is false but R is true. | 1 |
| **10.** | How do guard cells open and close the stomatal pore? | 2 |
| **11.** | What is lymph? State two of its functions.<br>**OR**<br>Why is the rate of breathing much faster in aquatic organisms than in terrestrial ones? | 2 |
| **12.** | What will happen if all the herbivores in an ecosystem are killed? | 2 |
| **13.** | Describe an experiment, with a labelled diagram, to show that carbon dioxide is released during respiration. | 3 |
| **14.** | In humans, the gene for brown eyes (B) is dominant over that for blue eyes (b). A man heterozygous for brown eyes marries a blue-eyed woman. What is the chance that their child will have blue eyes? Show a Punnett square.<br>**OR**<br>What are hormones? Explain how the timing and amount of a hormone released is regulated, taking insulin as an example. | 3 |
| **15.** | **Case study.** After pollination, a pollen grain on the stigma grows a tube that passes through the style and reaches the ovule in the ovary. A male germ cell travels down this tube and fuses with the female germ cell.<br>(i) What is pollination? *[1]*<br>(ii) What is formed in the ovule after fertilisation, and what does it develop into? *[1]*<br>(iii) What happens to the ovary, the ovules and the petals after fertilisation? *[2]*<br>**OR**<br>(iii) Give two differences between pollination and fertilisation. *[2]* | 4 |

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| | | |
|---|---|---|
| **16.** | (a) Show, with a flow chart, how glucose is broken down in different organisms and conditions. (b) In which part of the cell does each stage take place? (c) Which pathway gives the most energy, and how is that energy stored in the cell?<br>**OR**<br>(a) What is biological magnification? (b) Why is the concentration of a pesticide highest in the top trophic level? (c) Give three ways in which you can help reduce the problem of garbage at home. | 5 |

## Section B — Chemistry

| | | |
|---|---|---|
| **17.** | Which of the following decomposition reactions takes place in the presence of light?<br>(A) $2Pb(NO_3)_2 \rightarrow 2PbO + 4NO_2 + O_2$ (B) $2AgBr \rightarrow 2Ag + Br_2$<br>(C) $2H_2O \rightarrow 2H_2 + O_2$ (D) $CaCO_3 \rightarrow CaO + CO_2$ | 1 |
| **18.** | The acid naturally present in tomato is:<br>(A) tartaric acid (B) oxalic acid<br>(C) lactic acid (D) citric acid | 1 |
| **19.** | The aqueous solution of a salt of a strong base and a weak acid has a pH:<br>(A) less than 7 (B) of 0<br>(C) exactly 7 (D) more than 7 | 1 |
| **20.** | Which of these metals is soft enough to be cut with a knife?<br>(A) iron (B) copper<br>(C) sodium (D) aluminium | 1 |
| **21.** | Which of the following is the most reactive metal?<br>(A) potassium (B) zinc<br>(C) lead (D) iron | 1 |
| **22.** | Which of the following is an alcohol?<br>(A) $C_2H_5COOH$ (propanoic acid) (B) $C_2H_5CHO$ (propanal)<br>(C) $CH_3COCH_3$ (propanone) (D) $C_3H_7OH$ (propanol) | 1 |
| **23.** | Butanone is a four-carbon compound whose functional group is:<br>(A) a carboxylic acid (B) a ketone<br>(C) an aldehyde (D) an alcohol | 1 |

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| **24.** | **Assertion (A):** When a copper wire is placed in silver nitrate solution, the solution slowly turns blue.<br>**Reason (R):** Copper is more reactive than silver and displaces it from its salt solution.<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.** | What is corrosion? Name the coating formed when (i) copper corrodes in moist air, (ii) silver articles tarnish. | 2 |
| **26.** | Write balanced equations for the reactions of (i) zinc granules with sodium hydroxide solution, (ii) calcium carbonate with dilute hydrochloric acid, (iii) sodium hydroxide with hydrochloric acid. Name the type of reaction in (iii). | 3 |
| **27.** | Distinguish between roasting and calcination, with one equation each. Why are these processes carried out?<br>**OR**<br>Describe how (i) sodium, (ii) magnesium and (iii) iron react with water, giving equations. | 3 |
| **28.** | **Case study.** Carbon atoms share electrons to form single, double or triple covalent bonds. Methane ($CH_4$) has only single bonds, ethene ($C_2H_4$) has a double bond between its two carbon atoms, and ethyne ($C_2H_2$) has a triple bond.<br>(i) How many pairs of electrons are shared in a molecule of ethene? *[1]*<br>(ii) Draw the structural formula of ethyne. *[1]*<br>(iii) Draw the electron-dot structure of methane. *[2]*<br>**OR**<br>(iii) Why are most carbon compounds poor conductors of electricity? *[2]* | 4 |
| **29.** | (a) Why should a chemical equation be balanced? (b) Balance: (i) $N_2 + H_2 \rightarrow NH_3$; (ii) $Pb(NO_3)_2 \rightarrow PbO + NO_2 + O_2$. (c) Why are respiration and the decomposition of vegetable matter into compost called exothermic? Give one more example of an exothermic reaction.<br>**OR**<br>(a) What is meant by a family of salts? Give an example. (b) State whether solutions of NaCl, $Na_2CO_3$ and $NH_4Cl$ are acidic, basic or neutral. (c) What happens when blue copper sulphate crystals are heated, and when water is then added to the residue? | 5 |

## Section C — Physics

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| **30.** | An object is placed at the principal focus of a concave mirror. Its image is formed:<br>(A) behind the mirror (B) at the focus<br>(C) at infinity (D) at the centre of curvature | 1 |
| **31.** | Which device is always connected in parallel with the part of a circuit it measures?<br>(A) voltmeter (B) fuse<br>(C) ammeter (D) switch | 1 |
| **32.** | **Assertion (A):** The equivalent resistance of resistors in parallel is less than the smallest of them.<br>**Reason (R):** For resistors in parallel, the reciprocals of the resistances add up.<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 a ray diagram to show the image formed by a convex mirror of an object placed in front of it. State the nature of the image.<br>**OR**<br>Why are concave mirrors used in torches and vehicle headlights? | 2 |
| **34.** | A 9 V battery is connected in series with resistors of 0.2 Ω, 0.3 Ω, 0.4 Ω, 0.5 Ω and 12 Ω. How much current flows through the 12 Ω resistor? | 2 |
| **35.** | An object 2 cm tall is placed 25 cm from a convex lens of focal length 10 cm. Find the position, size and nature of the image, and draw the ray diagram. | 3 |
| **36.** | Why do stars twinkle but planets do not? | 3 |
| **37.** | (i) 100 J of heat is produced each second in a 4 Ω resistor. Find the potential difference across it. (ii) Give two reasons why appliances in a house are not connected in series.<br>**OR**<br>(i) What is 1 ampere? (ii) How many electrons pass a point in a wire each second when the current is 1 A? (charge on an electron = $1.6 \times 10^{-19}$ C) (iii) Define 1 volt. | 3 |
| **38.** | **Case study.** An optician prescribes a corrective lens of power –2.5 D for a person.<br>(i) Is the lens converging or diverging? *[1]*<br>(ii) Find its focal length. *[1]*<br>(iii) Which defect of vision does the person have, and why does this lens correct it? *[2]*<br>**OR**<br>(iii) A lens of power +3.5 D is placed in contact with a lens of power –2.5 D. Find the power and focal length of the combination. *[2]* | 4 |

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| **39.** | (a) State the right-hand thumb rule. (b) How does the magnetic field of a straight current-carrying conductor change with (i) the distance from it, (ii) the current? (c) Draw the field lines of a current-carrying solenoid and compare its field with that of a bar magnet. (d) Give one use of an electromagnet.<br>**OR**<br>Explain: (a) why the sky looks dark to astronauts in space; (b) what the Tyndall effect is, with an example; (c) why clouds look white; (d) how a rainbow is formed. | 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.** **(C)** trypsin. *Working:* Trypsin digests proteins; pepsin acts in the stomach, not in pancreatic juice.

**2.** **(A)** stomata. *Working:* Stomata are the tiny pores on the leaf surface.

**3.** **(D)** guard cells. *Working:* Guard cells swell or shrink as they gain or lose water.

**4.** **(B)** cerebellum. *Working:* The hindbrain consists of the pons, medulla and cerebellum.

**5.** **(D)** 23. *Working:* Gametes carry half the 46 chromosomes of body cells.

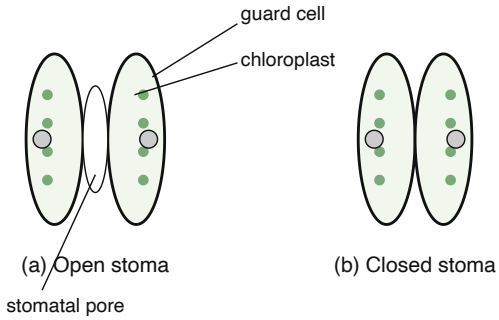
**6.** **(C)** ovule. *Working:* The ovule becomes the seed and the ovary the fruit.

**7.** **(A)** crop field. *Working:* Crop fields, gardens and aquariums are made by humans.

**8.** **(C)** A is true but R is false. *Working:* A is true. R is false: chlorophyll absorbs mainly red and blue light and reflects green light, which is why leaves look green.

**9.** **(A)** Both Assertion (A) and Reason (R) are true and R is the correct explanation of A. *Working:* Each gamete carries half the chromosomes; their fusion gives the child one set from each parent.

**10.** When the guard cells take in water they swell and the pore opens (1). When they lose water they shrink and the pore closes (1).



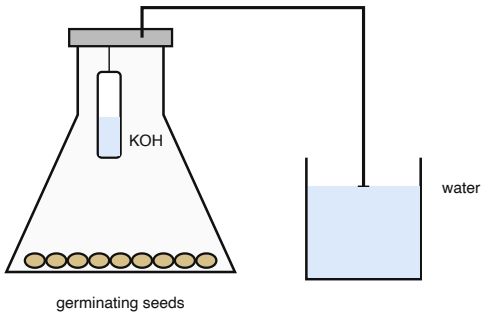

**11.** A fluid that escapes from the blood capillaries into the spaces between cells; it has less protein than plasma and no red blood cells (1). It carries digested and absorbed fat from the intestine, and drains excess fluid from the tissues back into the blood (½ + ½).

**OR** The amount of oxygen dissolved in water is much lower than the amount in air (1). So aquatic organisms must breathe faster to obtain enough oxygen (1).

**12.** The producers (plants) will increase unchecked at first, with no animals feeding on them (1). The carnivores that feed on herbivores will starve and may die out, upsetting the balance of the ecosystem (1).

**13.** Germinating seeds are kept in a conical flask with a small test tube of potassium hydroxide hanging inside, and the flask is sealed with a delivery tube dipping into water (1). Diagram (1):

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After some time, water rises in the delivery tube: the KOH absorbs the $CO_2$ released by the seeds, lowering the pressure in the flask (1).

**14.** Man Bb, woman bb (1). Punnett square (1):

| | B | b |
|---|---|---|
| b | Bb | bb |
| b | Bb | bb |

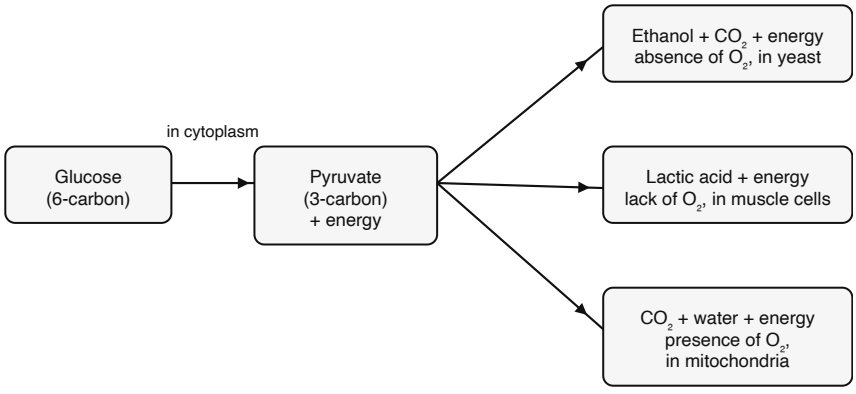
Bb (brown) × bb (blue)

Half the children are expected to be bb, so the chance of a blue-eyed child is 50% (1).

**OR** Hormones are chemical messengers secreted by endocrine glands directly into the blood (1). Their release is controlled by feedback mechanisms (1). When the blood sugar level rises, the pancreas detects it and secretes more insulin; as the sugar level falls, insulin secretion is reduced (1).

**15.** (i) The transfer of pollen grains from the anther to the stigma.
(ii) A zygote, which develops into an embryo.
(iii) The ovary grows and ripens into a fruit, the ovules develop into seeds, and the petals and sepals usually shrivel and fall off. **OR** Pollination is the transfer of pollen to the stigma; fertilisation is the fusion of male and female germ cells. Pollination happens on the stigma and needs agents such as insects or wind; fertilisation happens inside the ovule.

**16.** (a) Flow chart (2):




(b) Glucose to pyruvate in the cytoplasm; the aerobic breakdown of pyruvate in the mitochondria (1). (c) The aerobic pathway (½). The energy is used to make ATP, the energy currency of the cell, which is broken down when energy is needed (1½).

**OR** (a) The increase in concentration of harmful non-biodegradable chemicals at successive trophic levels (1). (b) These chemicals are not broken down or excreted; each organism eats many

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from the level below, so the chemical builds up most at the top (2). (c) Any three: separate biodegradable and non-biodegradable waste; use cloth bags instead of plastic; compost kitchen waste; reuse containers and repair rather than throw away (2).

## Section B — Chemistry

**17.** **(B)** $2AgBr \rightarrow 2Ag + Br_2$. *Working:* Silver bromide decomposes in sunlight; the others need heat or electricity.

**18.** **(B)** oxalic acid. *Working:* Tomato contains oxalic acid; citric acid is found in lemons.

**19.** **(D)** more than 7. *Working:* Such a salt (for example sodium carbonate) gives a basic solution.

**20.** **(C)** sodium. *Working:* Sodium and potassium are soft metals.

**21.** **(A)** potassium. *Working:* Potassium is at the top of the activity series.

**22.** **(D)** $C_3H_7OH$ (propanol). *Working:* The –OH group makes it an alcohol.

**23.** **(B)** a ketone. *Working:* The ending "-one" shows a ketone group.

**24.** **(A)** Both Assertion (A) and Reason (R) are true and R is the correct explanation of A. *Working:* $Cu + 2AgNO_3 \rightarrow Cu(NO_3)_2 + 2Ag$; copper nitrate gives the blue colour.

**25.** The slow eating away of a metal by the action of air, moisture or chemicals on its surface (1). (i) Green basic copper carbonate (½). (ii) Black silver sulphide (½).

**26.** (i) $Zn + 2NaOH \rightarrow Na_2ZnO_2 + H_2$ (1). (ii) $CaCO_3 + 2HCl \rightarrow CaCl_2 + H_2O + CO_2$ (1). (iii) $NaOH + HCl \rightarrow NaCl + H_2O$; neutralisation (1).

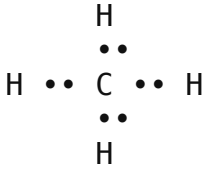
**27.** Roasting: a sulphide ore is heated strongly in excess air: $2ZnS + 3O_2 \rightarrow 2ZnO + 2SO_2$ (1). Calcination: a carbonate ore is heated strongly in limited air: $ZnCO_3 \rightarrow ZnO + CO_2$ (1). Both convert the ore into an oxide, which is easier to reduce to the metal (1).

**OR** (i) Sodium reacts violently with cold water: $2Na + 2H_2O \rightarrow 2NaOH + H_2$ + heat (1). (ii) Magnesium reacts with hot water, forming the hydroxide and hydrogen; it floats as bubbles stick to it: $Mg + 2H_2O \rightarrow Mg(OH)_2 + H_2$ (1). (iii) Iron reacts only with steam: $3Fe + 4H_2O \rightarrow Fe_3O_4 + 4H_2$ (1).

**28.** (i) Six: one pair in each of the four C–H bonds and two pairs in the C=C double bond.
(ii)

$$H - C \equiv C - H$$

(iii) Carbon shares one pair of electrons with each of the four hydrogen atoms:




**OR** They are covalent: their bonds involve shared electrons, so they do not form ions that could carry a current.

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**29.** (a) Mass is neither created nor destroyed in a reaction (law of conservation of mass), so the number of atoms of each element must be the same on both sides (1). (b) (i) $N_2 + 3H_2 \rightarrow 2NH_3$ (1). (ii) $2Pb(NO_3)_2 \rightarrow 2PbO + 4NO_2 + O_2$ (1). (c) Both release energy as heat (1). Another example: burning of natural gas, $CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$ + heat (1).

**OR** (a) Salts with the same positive or the same negative radical, e.g. NaCl and $Na_2SO_4$ (sodium salts), or NaCl and KCl (chlorides) (1). (b) NaCl neutral, $Na_2CO_3$ basic, $NH_4Cl$ acidic (1½). (c) The crystals lose their water of crystallisation and turn white: $CuSO_4 \cdot 5H_2O \rightarrow CuSO_4 + 5H_2O$ (1½). Adding water turns the white powder blue again (1).

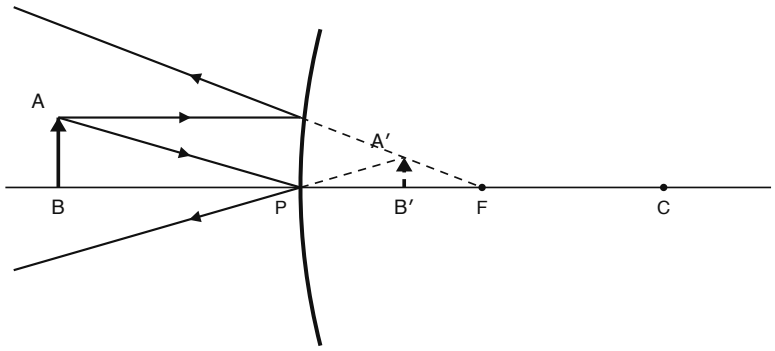
## Section C — Physics

**30.** **(C)** at infinity. *Working:* Reflected rays are parallel and meet at infinity.

**31.** **(A)** voltmeter. *Working:* A voltmeter measures the potential difference between two points.

**32.** **(A)** Both Assertion (A) and Reason (R) are true and R is the correct explanation of A. *Working:* Adding reciprocals makes 1/R larger than any single $1/R_i$, so R is smaller than each resistor.

**33.** Ray diagram (1). The image is behind the mirror between P and F: virtual, erect and diminished (1).

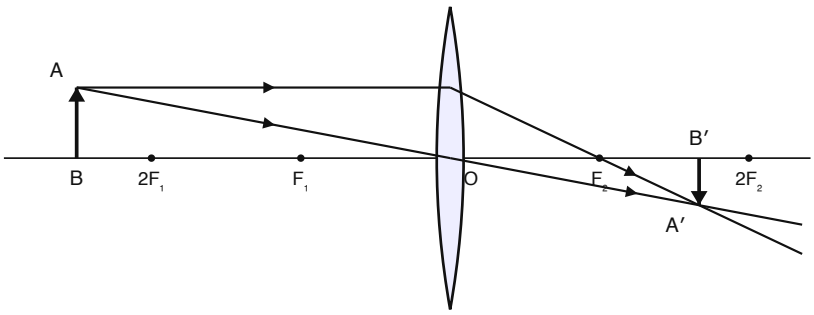



**OR** The bulb is placed at the principal focus (1); the reflected rays form a strong parallel beam of light (1).

**34.** Total R = 13.4 Ω (1). The same current flows through every resistor in series: I = 9/13.4 ≈ 0.67 A (1).

**35.** $\frac{1}{v} = \frac{1}{10} - \frac{1}{25} = \frac{3}{50}$, v ≈ +16.7 cm (1). m = v/u ≈ –0.67, so the image is about 1.33 cm tall: real, inverted and diminished (1). Ray diagram (1):

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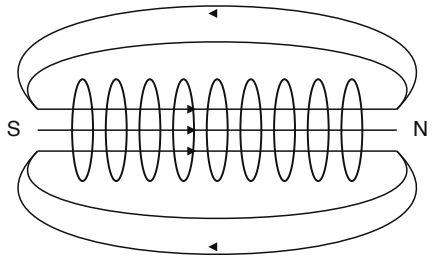

**36.** Stars are very far away and act as point sources; starlight is refracted by layers of air of changing refractive index, so the amount of light entering the eye keeps changing and the star seems to twinkle (1½). Planets are much closer and act as extended sources; the changes from different points average out, so they do not twinkle (1½).

**37.** (i) $P = 100\ W = V^2/R$, so $V^2 = 400$ and $V = 20\ V$ (1). (ii) In series, one faulty appliance would break the circuit for all of them, and each would not get the full supply voltage or its proper current (1 + 1).

**OR** (i) The current when 1 coulomb of charge flows past a point in 1 second (1). (ii) $n = 1/(1.6 \times 10^{-19}) = 6.25 \times 10^{18}$ electrons (1). (iii) The potential difference between two points when 1 joule of work is done to move 1 coulomb of charge between them (1).

**38.** (i) Diverging (concave), since the power is negative.
(ii) $f = 1/P = 1/(-2.5)\ m = -0.4\ m = -40\ cm$.
(iii) Myopia. The concave lens spreads out the rays from distant objects so that the eye lens can focus them on the retina instead of in front of it. **OR** $P = +3.5 - 2.5 = +1\ D$, so $f = 1\ m$ (converging).

**39.** (a) If you hold the conductor in the right hand with the thumb along the current, the curled fingers show the direction of the field lines (1). (b) (i) The field gets weaker with distance; (ii) it gets stronger as the current increases (1). (c) Diagram (1):




The field lines are like those of a bar magnet, with one end of the solenoid acting as N and the other as S; inside, the field is uniform (1). (d) Any one: electric bells, cranes for lifting scrap iron, relays (1).

**OR** (a) There is no atmosphere in space to scatter sunlight (1). (b) Scattering of light by colloidal particles, which makes the path of the beam visible, e.g. sunlight through a dense canopy or into a smoke-filled room (1½). (c) The water droplets in clouds are large and scatter all colours almost equally, so the scattered light looks white (1). (d) Sunlight is refracted and dispersed on entering

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raindrops, reflected inside them, and refracted again as it leaves; we see a rainbow with the Sun behind us (1½).

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