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# CBSE Class X · Science (086)

Sample Question Paper 7 · 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 first event in photosynthesis is the:<br>(A) splitting of water molecules<br>(B) absorption of light energy by chlorophyll<br>(C) reduction of carbon dioxide to carbohydrates<br>(D) release of oxygen | 1 |
| **2.** | Which organism takes in food by forming finger-like projections (pseudopodia) around it?<br>(A) Cuscuta<br>(B) yeast<br>(C) Amoeba<br>(D) Paramecium | 1 |
| **3.** | Valves in the heart ensure that:<br>(A) the heart beats regularly<br>(B) oxygen mixes with blood<br>(C) blood flows faster<br>(D) blood does not flow backwards | 1 |
| **4.** | The plant hormone that helps in the growth of the stem is:<br>(A) gibberellin<br>(B) insulin<br>(C) thyroxine<br>(D) abscisic acid | 1 |
| **5.** | Which of the following is a method of vegetative propagation?<br>(A) binary fission<br>(B) spore formation<br>(C) grafting<br>(D) pollination | 1 |
| **6.** | A pure violet-flowered pea plant (VV) is crossed with a white-flowered one (vv). The F1 plants will have:<br>(A) violet flowers<br>(B) half violet and half white flowers<br>(C) pink flowers<br>(D) white flowers | 1 |

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| **7.** | Green plants capture about what percentage of the sunlight that falls on their leaves?<br>(A) 100% (B) 1%<br>(C) 50% (D) 10% | 1 |
| **8.** | **Assertion (A):** Chemical communication in animals is faster than nervous communication.<br>**Reason (R):** Hormones are carried by the blood to their target cells.<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):** Spirogyra can reproduce by fragmentation.<br>**Reason (R):** Spirogyra has a simple body without specialised tissues, so each fragment can grow into a new individual.<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.** | Give two differences between autotrophic and heterotrophic nutrition. | 2 |
| **11.** | Why is it necessary to keep oxygenated and deoxygenated blood separate in mammals and birds?<br>**OR**<br>How is the amount of urine produced in the body regulated? | 2 |
| **12.** | What will happen to an ecosystem if all its decomposers are removed? | 2 |
| **13.** | Compare binary fission and multiple fission, giving one example of each. How does binary fission in Leishmania differ from that in Amoeba? | 3 |
| **14.** | What are genes? Explain, with the example of plant height, how genes control traits.<br>**OR**<br>List three changes seen in boys and three in girls at puberty. | 3 |
| **15.** | **Case study.** A person injured in an accident suffered damage to the spinal cord. Doctors found that some reflex actions and messages between the brain and parts of the body were affected.<br>(i) How is the spinal cord protected in the body? *[1]*<br>(ii) Name two functions of the spinal cord. *[1]*<br>(iii) Trace the path of a reflex action when a finger touches a hot object. *[2]*<br>**OR**<br>(iii) Why have reflex arcs evolved in animals? *[2]* | 4 |

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| **16.** | (a) Name the organs of the human excretory system and state the function of each. (b) What happens in the glomerulus? (c) Name the main nitrogenous waste removed in urine.<br>**OR**<br>(a) How do plants respond to stimuli without nerves or muscles? (b) How does a tendril coil around a support? (c) Why does a shoot bend towards light while a root bends away from it? (d) Name the hormone responsible for this bending. | 5 |

## Section B — Chemistry

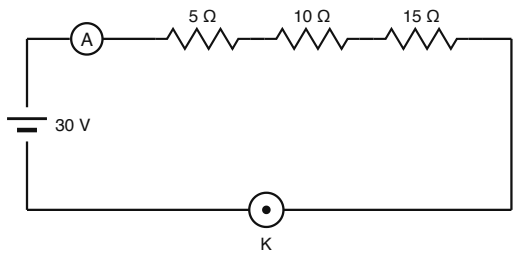
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| **17.** | What happens when dilute hydrochloric acid is added to iron filings?<br>(A) Iron salt and water are produced. (B) No reaction takes place.<br>(C) Chlorine gas and iron hydroxide are produced. (D) Hydrogen gas and iron chloride are produced. | 1 |
| **18.** | Which of the following is a neutralisation reaction?<br>(A) $Zn + CuSO_4 \rightarrow ZnSO_4 + Cu$ (B) $CaCO_3 \rightarrow CaO + CO_2$<br>(C) $KOH + HNO_3 \rightarrow KNO_3 + H_2O$ (D) $2Mg + O_2 \rightarrow 2MgO$ | 1 |
| **19.** | The pH of pure water at 25 °C is:<br>(A) 1 (B) 7<br>(C) 14 (D) 0 | 1 |
| **20.** | Which of the following non-metals is lustrous?<br>(A) sulphur (B) phosphorus<br>(C) charcoal (D) iodine | 1 |
| **21.** | An alloy of copper and zinc is called:<br>(A) brass (B) bronze<br>(C) solder (D) steel | 1 |
| **22.** | The formula of propanone is:<br>(A) $CH_3CH_2CH_2OH$ (B) $CH_3CH_2CHO$<br>(C) $CH_3COCH_3$ (D) $CH_3CH_2COOH$ | 1 |
| **23.** | The molecular formula of cyclohexane is:<br>(A) $C_6H_{12}$ (B) $C_6H_{10}$<br>(C) $C_6H_{14}$ (D) $C_6H_6$ | 1 |

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| **24.** | **Assertion (A):** The blue colour of copper sulphate solution fades when an iron nail is kept in it.<br>**Reason (R):** Iron displaces copper from copper sulphate solution.<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 |
| **25.** | What is an amphoteric oxide? Give one example, with equations to show its amphoteric nature. | 2 |
| **26.** | Explain: (i) why bags of chips are flushed with nitrogen gas; (ii) why silver chloride is kept in dark-coloured bottles; (iii) why a white precipitate forms when barium chloride solution is mixed with sodium sulphate solution. | 3 |
| **27.** | How is bleaching powder made? Give two of its uses. Write the equation for the preparation of baking soda.<br>**OR**<br>How is washing soda obtained from sodium carbonate? Give two uses of washing soda and one difference between washing soda and baking soda. | 3 |
| **28.** | **Case study.** The element carbon occurs in different forms called allotropes. In diamond, each carbon atom is bonded to four other carbon atoms, forming a rigid three-dimensional structure. In graphite, each carbon atom is bonded to three others in the same plane, giving hexagonal layers. Fullerenes are another class, the first identified being C-60.<br>(i) Why is diamond the hardest known substance? *[1]*<br>(ii) Why can graphite conduct electricity? *[1]*<br>(iii) What is the shape of C-60, and after whom is it named? *[2]*<br>**OR**<br>(iii) Give two reasons why carbon forms such a large number of compounds. *[2]* | 4 |
| **29.** | (a) Draw a soap molecule and show how soap molecules arrange themselves around oily dirt in water. (b) Explain how this removes dirt. (c) How can you test whether a sample of water is hard? (d) Why are detergents used in shampoos?<br>**OR**<br>(a) What are minerals and ores? (b) Why are some metals found in the free state? Give an example. (c) Write equations for the reduction of (i) zinc oxide with carbon and (ii) manganese dioxide with aluminium. | 5 |

## Section C — Physics

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| **30.** | A concave mirror forms a real, inverted and highly diminished image. The object is at:<br>(A) between P and F (B) infinity<br>(C) the centre of curvature (D) between F and C | 1 |
| **31.** | Nichrome is used in the heating elements of electric heaters because it has:<br>(A) a low melting point (B) low resistivity<br>(C) high conductivity (D) high resistivity | 1 |
| **32.** | **Assertion (A):** A voltmeter has a very high resistance.<br>**Reason (R):** It is connected in parallel and must draw very little current from the circuit.<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.** | Write the mirror formula and define linear magnification. What does a negative value of magnification show?<br>**OR**<br>A concave lens forms an image 10 cm from the lens of an object placed 15 cm from it. Find its focal length. | 2 |
| **34.** | Find the heat produced when a current of 1 A flows through a 100 Ω resistor for 1 hour. | 2 |
| **35.** | An object 4 cm high is placed 30 cm in front of a convex mirror whose radius of curvature is 30 cm. Find the position, nature and size of the image. | 3 |
| **36.** | (i) What are the near point and the far point of a normal human eye? (ii) A myopic person's far point is 80 cm. What is the power of the lens needed to correct the defect? | 3 |
| **37.** | In the circuit shown, find the current and the potential difference across each resistor.<br><br><br>**OR**<br>Wire A has length l and area of cross-section a. Wire B, of the same material, has length 2l and area a/2. (i) Compare their resistances. (ii) If they are connected in series, compare the heat produced in them in the same time. | 3 |

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| **38.** | **Case study.** A 60 W filament bulb and a 9 W LED bulb give about the same amount of light. A family uses one such bulb for 5 hours a day on a 220 V supply.<br>(i) Find the energy used by each bulb in 5 hours. *[1]*<br>(ii) Find the current drawn by the 60 W bulb. *[1]*<br>(iii) How much money is saved in 30 days by using the LED bulb if electricity costs ₹6 per kWh? *[2]*<br>**OR**<br>(iii) Why does a filament bulb use much more energy for the same light? *[2]* | 4 |
| **39.** | (a) Define the power of a lens and give its SI unit. (b) Draw a ray diagram for the image formed by a concave lens. (c) A concave lens of focal length 15 cm forms an image 10 cm from the lens. How far is the object from the lens? Find the magnification.<br>**OR**<br>(a) State Fleming's left-hand rule. (b) An alpha particle (positively charged) moving towards the west is deflected towards the north by a magnetic field. What is the direction of the field? (c) What happens to the force on a current-carrying conductor if (i) the current is reversed, (ii) the conductor is parallel to the field? | 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)** absorption of light energy by chlorophyll. *Working:* Light is absorbed first; it is then used to split water and finally to reduce $CO_2$.

**2.** **(C)** Amoeba. *Working:* Amoeba engulfs food in a food vacuole using pseudopodia.

**3.** **(D)** blood does not flow backwards. *Working:* Valves let blood flow in one direction only when the chambers contract.

**4.** **(A)** gibberellin. *Working:* Gibberellins promote stem growth; insulin and thyroxine are animal hormones.

**5.** **(C)** grafting. *Working:* Grafting joins parts of two plants to grow a new plant.

**6.** **(A)** violet flowers. *Working:* F1 is Vv; violet is dominant.

**7.** **(B)** 1%. *Working:* Only about 1% of the sunlight falling on leaves is converted into food energy.

**8.** **(D)** A is false but R is true. *Working:* A is false: hormonal communication is slower than nervous impulses. R is true.

**9.** **(A)** Both Assertion (A) and Reason (R) are true and R is the correct explanation of A. *Working:* Because its cells are not specialised, any piece can grow into a whole filament.

**10.** Autotrophs make their own food from simple inorganic substances; heterotrophs depend on food made by other organisms (1). Autotrophs need chlorophyll and sunlight; heterotrophs do not (1).

**11.** Separation gives a highly efficient supply of oxygen to the body (1). Mammals and birds need a lot of energy, partly to keep their body temperature constant (1).

**OR** It depends on how much excess water there is in the body (1) and how much dissolved waste has to be removed; more water is reabsorbed when the body needs it (1).

**12.** Dead plants and animals and their wastes would pile up and not be broken down (1). Nutrients would not return to the soil, so plants would not get the raw materials they need (1).

**13.** Binary fission: one cell divides into two, e.g. Amoeba (1). Multiple fission: one cell divides into many daughter cells at once, e.g. Plasmodium (1). In Leishmania, which has a whip-like structure at one end, the division takes place in a definite plane; in Amoeba it can occur in any plane (1).

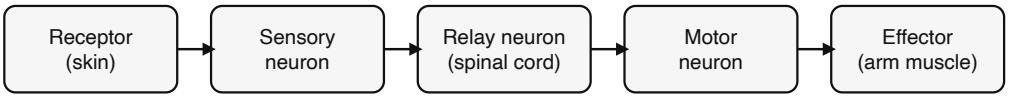
**14.** A gene is a section of DNA that provides the information for making one protein (1). Plant height depends on the amount of a growth hormone, which is made with the help of an enzyme (1). If the gene for that enzyme makes an efficient enzyme, much hormone is made and the plant is tall; if the gene is altered and the enzyme is less efficient, the plant is short (1).

**OR** Common: thick hair in the armpits and genital area, skin becoming oily (pimples). Boys: thick facial hair, voice cracking, occasional enlargement of the penis (1½). Girls: breast size increases,

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menstruation begins (1½). (Any three for each.)

**15.** (i) It is enclosed in the vertebral column (backbone).
(ii) It carries messages between the brain and the body, and it controls reflex actions.
(iii) Heat receptors in the skin → sensory neuron → relay neuron in the spinal cord → motor neuron → muscles of the arm, which pull the hand away.




**OR** They give a very quick response to danger without waiting for the brain to think, protecting the body from harm.

**16.** (a) Kidneys: filter wastes from the blood and form urine (1); ureters: carry urine to the bladder (½); urinary bladder: stores urine until it is passed out; its emptying is under nervous control (1); urethra: carries urine out of the body (½). (b) Blood is filtered under pressure; water, salts, glucose and urea pass into Bowman's capsule (1). (c) Urea (1).

**OR** (a) Plant cells use electrical-chemical signals and change shape by changing the amount of water in them; for growth movements they use hormones (1½). (b) The part of the tendril not touching the support grows faster than the part in contact, so it coils around the support (1). (c) Shoots are positively phototropic and roots negatively phototropic (1½). (d) Auxin (1).

## Section B — Chemistry

**17.** **(D)** Hydrogen gas and iron chloride are produced. *Working:* $Fe + 2HCl \rightarrow FeCl_2 + H_2$.

**18.** **(C)** $KOH + HNO_3 \rightarrow KNO_3 + H_2O$. *Working:* A base reacts with an acid to give salt and water.

**19.** **(B)** 7. *Working:* Pure water is neutral.

**20.** **(D)** iodine. *Working:* Iodine is a non-metal with a shiny lustre.

**21.** **(A)** brass. *Working:* Bronze is copper and tin; solder is lead and tin.

**22.** **(C)** $CH_3COCH_3$. *Working:* Propanone has a ketone group on the middle carbon.

**23.** **(A)** $C_6H_{12}$. *Working:* Six carbon atoms in a ring, each with two hydrogen atoms.

**24.** **(A)** Both Assertion (A) and Reason (R) are true and R is the correct explanation of A. *Working:* $Fe + CuSO_4 \rightarrow FeSO_4$ (pale green) + Cu, so the blue colour fades.

**25.** An oxide that reacts with both acids and bases to give salt and water (1). $Al_2O_3 + 6HCl \rightarrow 2AlCl_3 + 3H_2O$ and $Al_2O_3 + 2NaOH \rightarrow 2NaAlO_2 + H_2O$ (½ + ½).

**26.** (i) Nitrogen keeps out oxygen and so prevents the oil in the chips from being oxidised (rancidity) (1). (ii) It decomposes in light: $2AgCl \rightarrow 2Ag + Cl_2$ (1). (iii) Insoluble barium sulphate forms: $BaCl_2 + Na_2SO_4 \rightarrow BaSO_4 + 2NaCl$ (double displacement) (1).

**27.** Chlorine is passed over dry slaked lime: $Ca(OH)_2 + Cl_2 \rightarrow CaOCl_2 + H_2O$ (1). Uses: bleaching cotton and linen or wood pulp; disinfecting drinking water; as an oxidising agent (½ + ½). $NaCl + H_2O + CO_2 + NH_3 \rightarrow NH_4Cl + NaHCO_3$ (1).

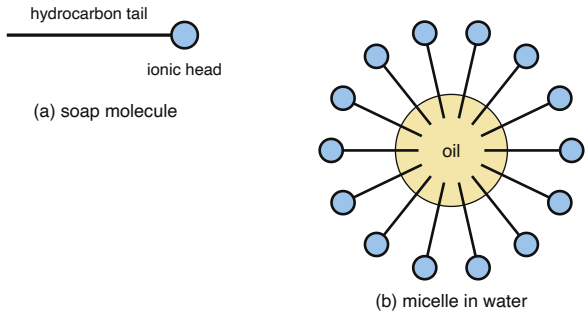
**OR** Anhydrous sodium carbonate is recrystallised from water: $Na_2CO_3 + 10H_2O \rightarrow Na_2CO_3{\cdot}10H_2O$ (1). Uses: cleaning, removing permanent hardness of water, manufacture of glass, soap and paper

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(½ + ½). Washing soda is sodium carbonate decahydrate (strongly basic); baking soda is sodium hydrogencarbonate, a mild base used in cooking and antacids (1).

**28.** (i) Each carbon atom is bonded to four others in a rigid three-dimensional network.
(ii) Each carbon uses only three electrons for bonding; the fourth is free to move, so graphite conducts.
(iii) Its atoms are arranged in the shape of a football. It is named Buckminsterfullerene after the architect Buckminster Fuller, whose domes it resembles. **OR** Catenation (carbon atoms bond to each other to form long chains, branches and rings) and tetravalency (it can bond with four other atoms, including other elements).

**29.** (a) Diagram (2):




(b) The hydrocarbon tails dissolve in the oil and the ionic heads stay in the water, forming a micelle with the dirt at the centre; the micelles are washed away with water (1). (c) Shake it with a little soap solution: hard water gives scum and very little lather (1). (d) Detergents work well even in hard water and do not form scum (1).

**OR** (a) Minerals are naturally occurring compounds of elements in the earth's crust; minerals from which a metal can be extracted profitably are ores (1). (b) Metals low in the activity series, such as gold and platinum, are so unreactive that they occur free (1). (c) (i) $ZnO + C \rightarrow Zn + CO$ (1½). (ii) $3MnO_2 + 4Al \rightarrow 3Mn + 2Al_2O_3$ + heat (1½).

## Section C — Physics

**30.** **(B)** infinity. *Working:* Rays from a very distant object are nearly parallel and focus at F as a point-sized image.

**31.** **(D)** high resistivity. *Working:* Its high resistivity produces much heat, and it does not oxidise readily at high temperature.

**32.** **(A)** Both Assertion (A) and Reason (R) are true and R is the correct explanation of A. *Working:* High resistance keeps the current through the voltmeter negligible, so it does not change the circuit.

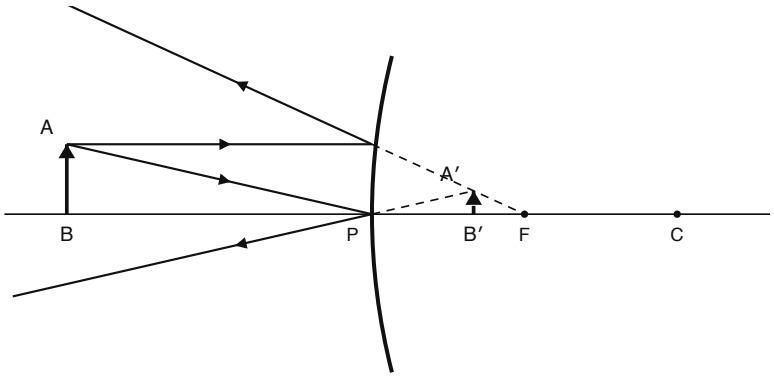
**33.** $\frac{1}{v} + \frac{1}{u} = \frac{1}{f}$ (½). Magnification m = height of image / height of object = –v/u (1). A negative value shows a real, inverted image (½).

**OR** u = –15 cm, v = –10 cm: $\frac{1}{f} = \frac{1}{v} - \frac{1}{u} = -\frac{1}{10} + \frac{1}{15}$ (1) $= -\frac{1}{30}$, so f = –30 cm (1).

**34.** $H = I^2Rt$ (1) = $1 \times 100 \times 3600 = 3.6 \times 10^5$ J (1).

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**35.** f = +15 cm. $\frac{1}{v} = \frac{1}{f} - \frac{1}{u} = \frac{1}{15} + \frac{1}{30} = \frac{1}{10}$, v = +10 cm, behind the mirror (1). m = –v/u = 1/3 (1). Image height ≈ 1.33 cm: virtual, erect and diminished (1).



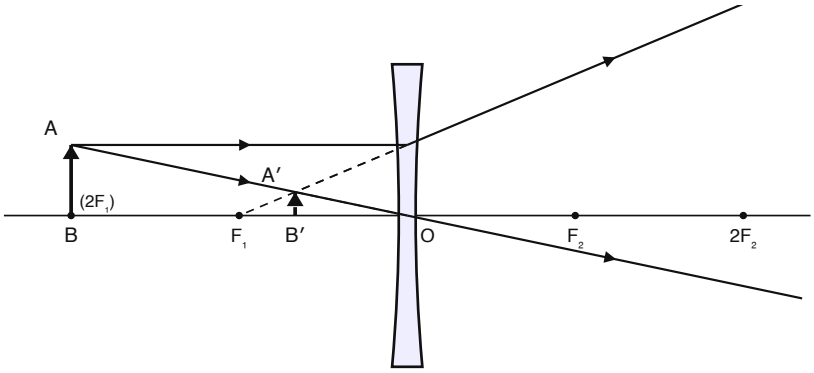

**36.** (i) Near point: about 25 cm; far point: infinity (1). (ii) The lens must form the image of a distant object at 80 cm: f = –80 cm (1). P = 1/f = 1/(–0.8) = –1.25 D, a concave lens (1).

**37.** R = 5 + 10 + 15 = 30 Ω, so I = 30/30 = 1 A (1). $V_1$ = 5 V, $V_2$ = 10 V, $V_3$ = 15 V (2).

**OR** (i) R ∝ l/a: $R_B = \rho\frac{2l}{a/2} = 4R_A$ (1½). (ii) The current is the same in series, so H ∝ R: $H_A : H_B = 1 : 4$ (1½).

**38.** (i) Filament: 0.06 kW × 5 h = 0.3 kWh; LED: 0.009 × 5 = 0.045 kWh.
(ii) I = 60/220 ≈ 0.27 A.
(iii) Saving per day = 0.3 – 0.045 = 0.255 kWh; in 30 days 7.65 kWh; ₹45.90. **OR** Most of the electrical energy in a filament bulb is converted into heat rather than light.

**39.** (a) The reciprocal of its focal length in metres, P = 1/f; unit: dioptre (D) (1). (b) Diagram (2):




(c) $\frac{1}{u} = \frac{1}{v} - \frac{1}{f} = -\frac{1}{10} + \frac{1}{15} = -\frac{1}{30}$, u = –30 cm (1). m = v/u = (–10)/(–30) = 1/3: virtual, erect, diminished (1).

**OR** (a) Stretch the thumb, forefinger and middle finger of the left hand mutually perpendicular; with the forefinger along the field and the middle finger along the current, the thumb gives the force (2). (b) The current is towards the west and the force towards the north, so by the rule the field is vertically upwards (1). (c) (i) The force reverses (1). (ii) No force acts (1).

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