MTA
Master Testing Agency
Practice papers, exam-standard · www.mastertestingagency.com

CBSE Class 10 Science Board Paper 2026 (31/2/1) with Solutions

PREVIOUS YEAR PAPER · CLASS X · SCIENCE (086) · BOARD EXAM 2026 · Q.P. CODE 31/2/1

TIME ALLOWED	MAXIMUM MARKS	QUESTIONS	NAME / ROLL NO.
3 hours	80	39 (A 16 · B 13 · C 10)	

GENERAL INSTRUCTIONS

Read the following instructions very carefully and strictly follow them:

1. This question paper contains 39 questions. All questions are compulsory.
2. The question paper is divided into three sections — A, B and C. Section A : Biology (30 marks); Section B : Chemistry (25 marks); Section C : Physics (25 marks).
3. The question paper has MCQs, VSAs, SAs, LAs and CBQs. Marks are given against each question.
4. There are case based questions (CBQs) with three sub-questions and are of 4 marks each.
5. Divide your answer sheet into three sections as per the question paper – Section A (Biology), Section B (Chemistry) and Section C (Physics). It is compulsory to answer each question in its respective section. Do not mix answers of one section into the other section.
6. Instructions are given with each section and question, wherever necessary.
7. There is no overall choice in the question paper. However, an internal choice has been provided in few questions. Only one of the choices in such questions must be attempted.
8. This is the official 2026 board paper (Q.P. Code 31/2/1). The step marks shown in the solutions are our marking scheme in the CBSE style; CBSE's own marking scheme may award steps differently.
9. The answer key and the marking scheme are at the end of this booklet. Attempt the paper in 3 hours before you look at them.

Questions: CBSE board examination 2026, Q.P. Code 31/2/1, as published by CBSE at cbse.gov.in; figures redrawn. Answers, step marks and worked solutions © Master Testing Agency. Free for personal practice; not for resale. Master Testing Agency is an independent test-prep publisher, not affiliated with, endorsed by or connected to the Central Board of Secondary Education (CBSE) or any other exam-conducting body.

Chapters: Full syllabus · **Topics:** Life Processes · Control and Coordination · How do Organisms Reproduce? · Heredity · Our Environment · Chemical Reactions and Equations · Acids, Bases and Salts · Metals and Non-metals · Carbon and its Compounds · Light – Reflection and Refraction · The Human Eye and the Colourful World · Electricity · Magnetic Effects of Electric Current

SECTION A

Biology (30 marks).

1. The genotype of green stemmed tomato plant is denoted by ‘GG’ and that of purple stemmed tomato plant as ‘gg’. Hybrid of a cross between these two were self-pollinated to obtain F_2 progeny. What will be the ratio of GG, Gg and gg in this F_2 progeny ? 1

(A) 2 : 1 : 1
(B) 3 : 1 : 0
(C) 1 : 1 : 2
(D) 1 : 2 : 1

2. Identify the type of tropic movement that is responsible for the movement of the pollen tube towards an ovule from the following options. 1

(A) Hydrotropism
(B) Geotropism
(C) Chemotropism
(D) Phototropism

3. *Spirogyra*, despite being a multi-cellular organism, still shows a simple reproductive method. Select the correct option with regard to reproduction in *Spirogyra* : 1

(A) Asexual reproduction by division of cells into two cells
(B) Sexual reproduction by division of cells into many cells
(C) Asexual reproduction by breaking up of *Spirogyra* filaments into smaller parts
(D) Sexual reproduction by the formation of gametes after meiosis of cells of filaments followed by fusion of male and female gametes

4. The carbohydrates, which are not used immediately in plants, are stored in the form of ‘a’, which serves as an internal energy reserve. What does ‘a’ stand for ? 1

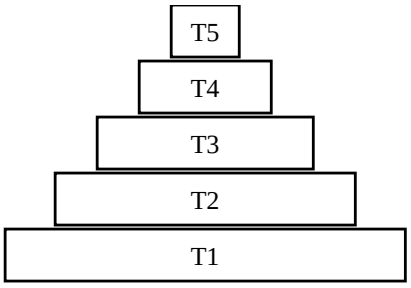
(A) Starch
(B) Sugar
(C) Fat
(D) Protein

5. The following events occur during the process of photosynthesis. Choose the option that indicates the correct events. 1

(i) Oxidation of carbon dioxide to carbohydrates
(ii) Conversion of light energy into chemical energy
(iii) Absorption of light energy by chlorophyll
(iv) Conversion of hydrogen and oxygen into water

(A) (i) and (ii)
(B) (ii) and (iii)
(C) (iii) and (iv)
(D) (i) and (iv)

6. In the given figure, identify the trophic level having maximum concentration of harmful chemicals. 1



(A) T1 (B) T5

(C) T4 (D) T3

7. Which of the following limits the number of trophic levels in a food chain ? 1

(A) Availability of water (B) Deficient food supply

(C) Decrease in energy at higher levels (D) Pollution in air

8. **Assertion (A) :** Blood plasma transports carbon dioxide in dissolved form, while oxygen is transported by respiratory pigments. 1

Reason (R) : Carbon dioxide is more soluble in water than in oxygen.

(A) Both, Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A).

(B) Both, Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of the Assertion (A).

(C) Assertion (A) is true, but Reason (R) is false.

(D) Assertion (A) is false, but Reason (R) is true.

9. **Assertion (A) :** There are generally a greater number of individuals at the lower trophic levels of an ecosystem. 1

Reason (R) : The greatest number is of the producers.

(A) Both, Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A).

(B) Both, Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of the Assertion (A).

(C) Assertion (A) is true, but Reason (R) is false.

(D) Assertion (A) is false, but Reason (R) is true.

10. (a) "The timing and the amount of hormone secreted by a gland are regulated in the human body." Justify this statement with the help of an example. 2

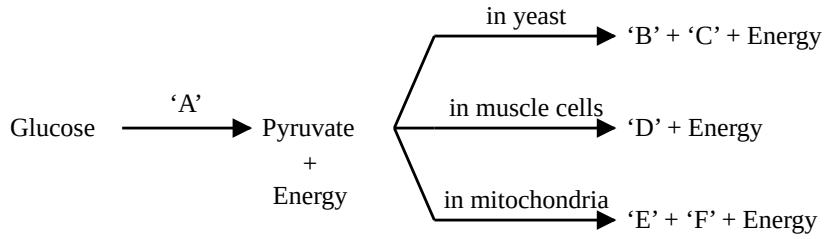
OR

(b) Electrical impulse is an excellent means to transmit information in the animal body, but there are some limitations to the use of electrical impulses. State any two limitations.

11. "Variation is useful for the survival of species over time." Explain this statement with the help of an example. 2

12. Suggest one best way to dispose of the following wastes : 2
(i) Kitchen waste (ii) Metallic waste (iii) Plastic bottles (iv) Sanitary waste

13. Complete the pathways given below, showing the breakdown of glucose. 3



Identify 'A', 'B', 'C', 'D', 'E' and 'F'.

14. (a) Giving two examples, justify the statement that the sex of the offspring in all animals is not always genetically determined. 3
(b) Differentiate between the sex chromosomes of male and female human beings.

15. A middle-aged person is facing some cognitive changes in himself. His early symptoms included mild forgetfulness. For example, forgetting where he left his mobile or failing to find words to complete his sentences. He was facing problems in driving a car, climbing up and down the stairs, inserting a plug into an outlet. He slowly developed a sad mood and anxiety.

(a) What are voluntary actions ? [1]

(b) Which part of the brain is responsible for precision of voluntary actions ? [1]

(c) Explain the role of the medulla. [2]

OR

(c) How do the animal muscles move ? [2]

16. (a) (i) Name an organ that helps in the formation of male germ cells in humans and also mention the condition that favours the formation of male germ cells. 5
(ii) In male reproductive system, write the pathway followed to deliver male germ cells to the site of fertilisation.
(iii) Mention the main physical feature of the male germ cell that helps it move towards the female germ cell.

OR

(b) Radha has three children. She does not want to have more children. Radha visits a nearby hospital, to know the methods to prevent pregnancy.
(i) Mention the name of any two ways other than the surgical methods, following which Radha can avoid unwanted pregnancies.
(ii) Name the surgical methods to prevent pregnancy.
(iii) Give one example each of sexually transmitted diseases caused by bacteria and virus.

SECTION B

Chemistry (25 marks).

17. Which of the following are combination reactions ? 1

(i) $2KClO_3 \rightarrow 2KCl + 3O_2$

(ii) $MgO + H_2O \rightarrow Mg(OH)_2$

(iii) $4Al + 3O_2 \rightarrow 2Al_2O_3$

(iv) $Zn + FeSO_4 \rightarrow ZnSO_4 + Fe$

(A) (i) and (iii)
(B) (iii) and (iv)
(C) (ii) and (iv)
(D) (ii) and (iii)

18. A metal carbonate reacts with a solution X which forms a salt, water and a gas Y. What are X and Y ? 1

(A) X – Sodium hydroxide, Y – Carbon dioxide
(B) X – Sodium hydroxide, Y – Hydrogen
(C) X – Hydrochloric acid, Y – Carbon dioxide
(D) X – Hydrochloric acid, Y – Hydrogen

19. When ferrous sulphate crystals are heated in a test tube, we observe that : 1

(A) A colourless gas with no smell is evolved.
(B) A brown gas is evolved.
(C) The green colour of the salt fades and a gas with the smell of burning sulphur is evolved.
(D) The green colour of the salt fades and no gas is evolved.

20. When Mg metal is treated with hot water, it starts floating on the surface of the water. The reason for its different behaviour is : 1

(A) Mg is a lighter element than water.
(B) Mg reacts with water to produce H_2 gas which helps in floating.
(C) Mg reacts with water to produce N_2 gas which helps in floating.
(D) Mg reacts with water to form CO_2 gas which helps in floating.

21. The pH of the gastric juices released during digestion is : 1

(A) Less than 7
(B) More than 7
(C) Equal to 7
(D) Equal to 0

22. Baking powder is a mixture of : 1

(A) Sodium carbonate + Acetic acid
(B) Sodium carbonate + Tartaric acid
(C) Sodium hydrogen carbonate + Tartaric acid
(D) Sodium hydrogen carbonate + Acetic acid

23. A student notices that her silver jewellery turned dull and had a grey-black coating over it after wearing for a few months. What results in the change in colour of the silver metal ? 1

(A) The polish over the jewellery was removed after wearing for a few months.
(B) The jewellery comes in contact with air, moisture and acids and corrodes.
(C) Dust particles over the jewellery change its colour.
(D) Its colour changes due to rusting.

24. **Assertion (A) :** Carbon compounds can form chains, branched and ring structures. 1
Reason (R) : Carbon exhibits the property of catenation.

(A) Both, Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A).

(B) Both, Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of the Assertion (A).

(C) Assertion (A) is true, but Reason (R) is false.

(D) Assertion (A) is false, but Reason (R) is true.

25. One student was comparing the reactivity of different metals for his science project. He added iron filings in four test tubes A, B, C and D containing aqueous solutions of $ZnSO_4$, $CuSO_4$, $FeSO_4$ and $Al_2(SO_4)_3$. 2

(i) In which of the test tubes will he observe the reaction to be the most vigorous and why ?

(ii) Write a balanced equation for the reaction involved.

26. (a) (i) Write one example each of one metal that is so soft that it can be cut with a knife, and one non-metal that is a good conductor of electricity. 3

(ii) Using the electronic configuration, explain how Mg atom combines with oxygen to form magnesium oxide by transfer of electrons. [Atomic number : Mg = 12, O = 8]

OR

(b) Give reasons :

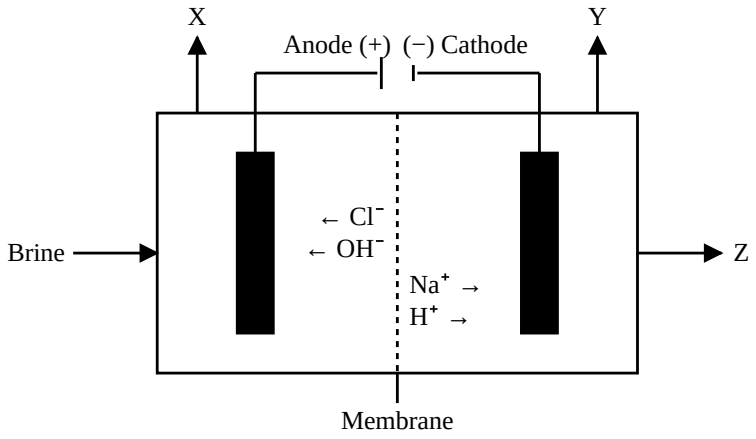
(i) Metal sulphides and carbonates should be converted to their metal oxides in the process of extraction of metals.

(ii) Aluminium oxide is considered as an amphoteric oxide.

(iii) Metals like Na, K, Ca and Mg are never found in their free state in nature.

27. (The figure shows a china dish containing copper powder placed on a wire gauze over a tripod stand and heated with a burner.) Seema took a small amount of copper powder in a china dish and heated it. What changes will she observe on heating ? When H_2 gas is passed over this heated substance, what visible changes will be seen in it ? Give the chemical equations of the reactions involved, along with the names and colours of the products in each case. 3

28. In the given diagram, when electricity is passed through an aqueous solution of a common salt, a substance 'Z' is produced, along with the evolution of gases 'X' and 'Y'. When a burning matchstick is brought near the gas 'Y', it burns with a pop sound, whereas 'X' is used for disinfecting drinking water. When 'X' is passed through slaked lime, an insoluble substance 'A' is produced.



(a) Write the names of the gases 'X' and 'Y'. [1]

(b) Write the balanced chemical equation for the formation of substance 'Z'. [1]

(c) What happens : (I) If a drop of red litmus solution is added to the aqueous solution of substance 'Z' ? (II) If CO_2 gas is passed through ammoniacal solution of aqueous NaCl ? [2]

OR

(c) Identify the substance 'A' and write the balanced chemical equation of the reaction which takes place in its preparation. [2]

29. (a) A carbon compound 'P' of molecular formula C_2H_6O is found to be neutral when tested with red and blue litmus. A gas that burns with a pop sound is produced when sodium metal reacts with compound 'P'. 5

(i) Identify the compound 'P'.

(ii) The carbon compound 'P' is heated with conc. H_2SO_4 at 443 K to produce compound 'Q'. (I) Write the chemical equation for the reaction. (II) What is the role of conc. H_2SO_4 in this reaction ?

(iii) What is likely to be observed on heating compound 'P' with ethanoic acid with an acid as a catalyst ? Write the chemical equation for the reaction.

OR

(b) (i) Write the structural formula of benzene.

(ii) State the reason why carbon can neither form C^{4+} cation nor C^{4-} anion.

(iii) What type of bond is formed between carbon and hydrogen ?

(iv) How is ethanol converted to ethanoic acid ?

(v) Complete the following chemical equation : $CH_3COOC_2H_5 + NaOH \rightarrow$

SECTION C

Physics (25 marks).

30. From the following options choose the one which gives negative magnification greater than one : 1

(A) Concave mirror; Nature of image – real

(B) Concave mirror; Nature of image – virtual

(C) Convex mirror; Nature of image – real

(D) Convex mirror; Nature of image – virtual

31. 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 ? 1

(A) Red, Green, Yellow, Violet, Blue
(B) Red, Yellow, Green, Blue, Violet
(C) Violet, Blue, Green, Yellow, Red
(D) Violet, Red, Green, Yellow, Blue

32. **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. 1

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.

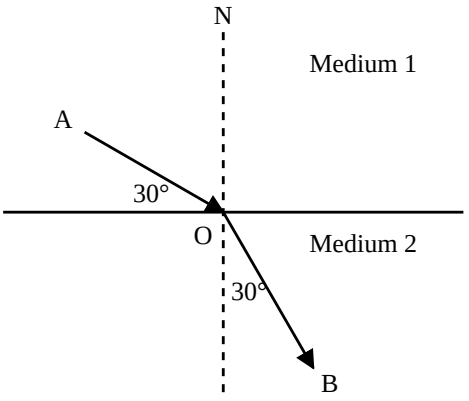
(A) Both, Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A).

(B) Both, Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of the Assertion (A).

(C) Assertion (A) is true, but Reason (R) is false.

(D) Assertion (A) is false, but Reason (R) is true.

33. With the help of the given ray diagram, calculate the refractive index of Medium 2 with respect to Medium 1. 2



(Given that $\sqrt{3} = 1{\cdot}732$)

34. (a) How does the focal length of eye lens change as the distance of the object from the eyes is altered ? Explain. 2

OR

(b) Why is the concave lens used as a corrective lens for a myopic eye ?

35. (a) Write the expression for the magnification produced by a lens in terms of object distance and image distance. 3

(b) A 4 cm tall object is placed perpendicular to the principal axis of a convex lens of focal length 20 cm. Calculate the size of the image formed, if the distance of the object from the lens is 10 cm.

36. What is scattering of light ? How is scattering of light different from reflection of light ? Explain. 3

37. 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 in the table : 3

I (Amperes) : 0·4, 0·8, 1·2, 1·6, 2·0

V (Volts) : 1·2, 2·4, 3·6, 4·8, 6·0

Plot a graph between V and I and calculate the resistance of that resistor.

38. 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) Write any two practical applications of heating effect of electric current. [2]

OR

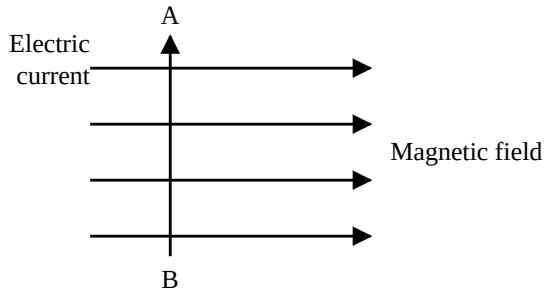
(c) Define the commercial unit of electric energy and express it in Joules (J). [2]

39. (a) (i) State the rule which gives the direction of force acting on a current-carrying conductor placed in a magnetic field. 5

(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 ?

END OF THE QUESTION PAPER

ANSWER KEY — SECTION A

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q17	Q18	Q19	Q20	Q21	Q22	Q23	Q24	Q30	Q31	Q32
(D)	(C)	(C)	(A)	(B)	(B)	(C)	(A)	(B)	(D)	(C)	(C)	(B)	(A)	(C)	(B)	(A)	(A)	(B)	(C)

MARKING SCHEME AND WORKED SOLUTIONS

Marks for each step are shown in brackets, as in the CBSE marking scheme. Any correct alternative method earns full marks.

Q1. Answer (D). F_1 is Gg. Gg × Gg gives GG : Gg : gg = 1 : 2 : 1.

Q2. Answer (C). The pollen tube grows towards the ovule in response to chemicals: chemotropism.

Q3. Answer (C). Spirogyra reproduces by fragmentation: the filament breaks into smaller pieces, each of which grows into a new individual.

Q4. Answer (A). Plants store carbohydrates as starch (animals store them as glycogen).

Q5. Answer (B). Chlorophyll absorbs light, light energy becomes chemical energy, water is split, and CO_2 is reduced (not oxidised) to carbohydrate. So (ii) and (iii).

Q6. Answer (B). Harmful chemicals that are not degraded build up at each step of the food chain (biological magnification), so the highest level, T5, has the most.

Q7. Answer (C). Only about 10% of the energy passes to the next level, so very little is left after a few levels: food chains rarely have more than 3–4 steps.

Q8. Answer (A). Haemoglobin carries oxygen, while carbon dioxide is carried mostly dissolved in the blood, because it is more soluble in water than oxygen is (NCERT). R (read as 'than oxygen is') explains A. Answer (A).

Q9. Answer (B). Both are true and come from the same NCERT sentence. That the producers are the most numerous is an instance of A, not its cause; the reason is the loss of energy at each level. Answer (B).

Q10. (2 marks) Answer: (a) feedback, e.g. insulin and blood sugar; (b) only connected cells, reset time.
(a) Feedback mechanisms control hormone secretion. [1] Example: when blood sugar rises, cells of the pancreas detect it and secrete more insulin; as the sugar level falls, insulin secretion is reduced. [1]
OR (b) Impulses reach only those cells that are connected by nervous tissue, not every cell. [1] After a cell has generated and sent an impulse it takes some time to reset before it can send another, so cells cannot continually create and send impulses. [1]

Q11. (2 marks) Answer: variants survive changed conditions, e.g. heat-resistant bacteria.
Variations allow some individuals to survive when the environment changes, so the species does not die out. [1] Example: if the water temperature rises sharply, most bacteria in a population die, but the few variants able to withstand heat survive and multiply. [1]

Q12. (2 marks) Answer: composting; recycling; recycling; incineration.
(i) Composting (it is biodegradable). (ii) Recycling. (iii) Recycling (or reuse). (iv) Incineration. [½ each]

Q13. (3 marks) Answer: A glycolysis (cytoplasm); B ethanol, C CO_2; D lactic acid; E CO_2, F H_2O.
A: glycolysis in the cytoplasm (glucose, 6-carbon → pyruvate, 3-carbon). [½]
In yeast (absence of oxygen): B ethanol, C carbon dioxide. [1]
In muscle cells (lack of oxygen): D lactic acid. [½]
In mitochondria (presence of oxygen): E carbon dioxide, F water. [1]

Q14. (3 marks) Answer: temperature (reptiles), sex change (snails); XX vs XY.
(a) In some animals the temperature at which the fertilised eggs are kept decides the sex of the offspring (some reptiles, e.g. turtles and lizards). [1] Some animals, such as snails, can change sex, so sex is not genetically fixed. [1]
(b) Women have a perfect pair of sex chromosomes, XX; men have a mismatched pair, XY, in which Y is shorter. [1]

Q15. (4 marks) Answer: conscious actions; cerebellum; involuntary actions; proteins change shape.
(a) Actions done consciously, by our will and after thinking, controlled by the brain (fore-brain), e.g. writing, talking, walking. [1]
(b) The cerebellum. [1]
(c) The medulla, in the hind-brain, controls involuntary actions [1] such as blood pressure, salivation and vomiting. [1]
OR (c) Muscle cells contain special proteins that change their shape and arrangement in response to nervous electrical impulses. [1] The new arrangement gives the muscle cells a shorter form: the muscle contracts. [1]

Q16. (5 marks) Answer: (a) testes, lower temperature; vas deferens → urethra; tail; (b) condom, pills, Copper-T; vasectomy, tubectomy; gonorrhoea, AIDS.
(a) (i) The testes. Sperm formation needs a temperature lower than normal body temperature, so the testes lie outside the abdominal cavity in the scrotum. [2]
(ii) Testes → vas deferens → (joins the tube from the urinary bladder) urethra → out through the penis; secretions of the seminal vesicles and prostate gland are added on the way. [2]
(iii) A long tail that helps the sperm swim towards the egg. [1]
OR (b) (i) Any two: barrier methods such as condoms; oral pills that change the hormonal balance; loop or Copper-T placed in the uterus. [2]
(ii) Vasectomy (the vas deferens is blocked, in males) and tubectomy (the fallopian tube is blocked, in females). [2]
(iii) Bacterial: gonorrhoea or syphilis; viral: HIV–AIDS or warts. [1]

Q17. Answer (D). (ii) and (iii) form a single product from two reactants. (i) is decomposition and (iv) is displacement.

Q18. Answer (C). Metal carbonate + acid → salt + water + carbon dioxide, e.g. $Na_2CO_3 + 2HCl \rightarrow 2NaCl + H_2O + CO_2$.

Q19. Answer (C). The green crystals lose water and then decompose: $2FeSO_4 \rightarrow Fe_2O_3 + SO_2 + SO_3$; the oxides of sulphur smell of burning sulphur.

Q20. Answer (B). $Mg + 2H_2O \rightarrow Mg(OH)_2 + H_2$; bubbles of hydrogen stick to the surface of the metal and make it float.

Q21. Answer (A). Gastric juice contains hydrochloric acid, so its pH is less than 7 (about 1–2).

Q22. Answer (C). Baking powder is baking soda (sodium hydrogen carbonate) with a mild edible acid such as tartaric acid.

Q23. Answer (B). Silver corrodes: it reacts with sulphur compounds in the air to form a black coating of silver sulphide. Rusting applies only to iron.

Q24. Answer (A). Catenation, the ability of carbon to link with other carbon atoms, is what gives straight chains, branched chains and rings. R explains A. Answer (A).

Q25. (2 marks) Answer: B ($CuSO_4$); $Fe + CuSO_4 \rightarrow FeSO_4 + Cu$.
(i) Test tube B ($CuSO_4$). Iron is more reactive than copper and displaces it; zinc and aluminium are more reactive than iron, and $FeSO_4$ contains iron itself, so A, C and D show no reaction. [1]
(ii) $Fe + CuSO_4 \rightarrow FeSO_4 + Cu$ (the blue solution turns pale green and brown copper deposits). [1]

Q26. (3 marks) Answer: (a) Na, graphite; $Mg \rightarrow Mg^{2+} + 2e^-$, $O + 2e^- \rightarrow O^{2-}$; (b) oxides easier to reduce; reacts with acids and bases; very reactive.
(a) (i) Sodium (or potassium); graphite. [1]
(ii) Mg (2, 8, 2) loses its two valence electrons to become Mg^{2+} (2, 8); O (2, 6) gains these two electrons to become O^{2-} (2, 8). [1] The oppositely charged ions are held by electrostatic attraction: the ionic compound $Mg^{2+}O^{2-}$, magnesium oxide. [1]
OR (b) (i) It is easier to obtain a metal from its oxide (by reduction) than from its sulphide or carbonate. [1]
(ii) It reacts with both acids and bases to give salt and water, e.g. $Al_2O_3 + 6HCl \rightarrow 2AlCl_3 + 3H_2O$ and $Al_2O_3 + 2NaOH \rightarrow 2NaAlO_2 + H_2O$. [1]
(iii) They are highly reactive, so they always occur combined (as compounds). [1]

Q27. (3 marks) Answer: brown → black CuO; black → brown Cu with H_2.
On heating, the surface of the brown copper powder becomes coated with black copper(II) oxide: $2Cu + O_2 \rightarrow 2CuO$ (copper oxide, black). [1½]
When hydrogen is passed over the heated black substance, it turns brown again as copper is formed: $CuO + H_2 \rightarrow Cu + H_2O$ (copper, reddish-brown; water). [1½]

Q28. (4 marks) Answer: X Cl_2, Y H_2; Z NaOH; litmus turns blue; $NaHCO_3$; A bleaching powder.
(a) X: chlorine (at the anode); Y: hydrogen (at the cathode). [1]
(b) $2NaCl(aq) + 2H_2O(l) \rightarrow 2NaOH(aq) + Cl_2(g) + H_2(g)$; Z is sodium hydroxide. [1]
(c) (I) Red litmus turns blue: NaOH is a base. [1] (II) Sodium hydrogen carbonate (baking soda) is formed: $NaCl + H_2O + CO_2 + NH_3 \rightarrow NH_4Cl + NaHCO_3$. [1]
OR (c) A is bleaching powder, $CaOCl_2$ [1]: $Ca(OH)_2 + Cl_2 \rightarrow CaOCl_2 + H_2O$. [1]

Q29. (5 marks) Answer: (a) ethanol; ethene, dehydrating agent; ester; (b) covalent bond; oxidation; $CH_3COONa + C_2H_5OH$.
(a) (i) P is ethanol, C_2H_5OH (neutral; with sodium it gives hydrogen: $2C_2H_5OH + 2Na \rightarrow 2C_2H_5ONa + H_2$). [1]
(ii) (I) $CH_3CH_2OH \xrightarrow{\text{conc. } H_2SO_4,\ 443\ K} CH_2{=}CH_2 + H_2O$; Q is ethene. [1] (II) Conc. H_2SO_4 is a dehydrating agent: it removes water from ethanol. [1]
(iii) A sweet-smelling ester (ethyl ethanoate) is formed: $CH_3COOH + C_2H_5OH \rightleftharpoons CH_3COOC_2H_5 + H_2O$ (esterification). [2]
OR (b) (i) C_6H_6: a hexagonal ring of six carbon atoms with alternate single and double bonds, each carbon bonded to one hydrogen. [1]
(ii) Losing four electrons (C^{4+}) needs a very large amount of energy, and a nucleus of six protons cannot hold ten electrons (C^{4-}). [1]
(iii) A covalent (single) bond. [1]
(iv) By oxidation with alkaline potassium permanganate or acidified potassium dichromate: $CH_3CH_2OH \rightarrow CH_3COOH$. [1]
(v) $CH_3COOC_2H_5 + NaOH \rightarrow CH_3COONa + C_2H_5OH$ (saponification). [1]

Q30. Answer (A). A negative magnification means a real, inverted image, which only a concave mirror can form; with the object between F and C, the image is enlarged ($|m| > 1$). A convex mirror always gives a virtual, erect, diminished image.

Q31. Answer (B). Red bends the least and appears at the top, violet bends the most and appears at the bottom (VIBGYOR read from the bottom): Red, Yellow, Green, Blue, Violet.

Q32. Answer (C). Reversing either the current or the field reverses the force; reversing both leaves it unchanged: A is true. The direction is found with Fleming's left-hand rule, not a compass: R is false. Answer (C).

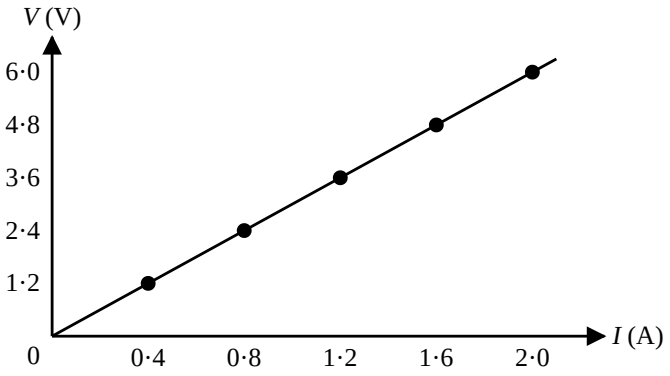
Q33. (2 marks) Answer: $\sqrt{3} = 1.732$.
The incident ray makes 30° with the surface, so the angle of incidence $i = 90° - 30° = 60°$; the refracted ray makes 30° with the normal, so $r = 30°$. [1]
$n_{21} = \sin i / \sin r = \sin 60° / \sin 30° = (\sqrt{3}/2)/(1/2) = \sqrt{3} = 1.732$. [1]

Q34. (2 marks) Answer: (a) thin lens for far, thick for near (accommodation); (b) diverges rays onto the retina.
(a) The ciliary muscles change the curvature of the eye lens (accommodation). [1] For a distant object they relax, the lens becomes thin and its focal length increases; for a near object they contract, the lens becomes thick and its focal length decreases, so the image always forms on the retina. [1]
OR (b) In a myopic eye the image of a distant object forms in front of the retina (eyeball too long or lens too strongly curved). [1] A concave lens of suitable power diverges the rays so that they appear to come from the far point, and the image is brought back onto the retina. [1]

Q35. (3 marks) Answer: m = v/u; 8 cm (virtual, erect).
(a) m = v/u (= h′/h). [1]
(b) 1/v − 1/u = 1/f: 1/v = 1/20 + 1/(−10) = −1/20, so v = −20 cm. [1] m = v/u = (−20)/(−10) = 2, h′ = 2 × 4 = 8 cm: an 8 cm tall, virtual, erect image on the same side as the object. [1]

Q36. (3 marks) Answer: scattering in all directions by tiny particles vs reflection in one direction from a surface.
Scattering: when light falls on very small particles (molecules, fine dust, colloidal particles), it is sent out in all directions; the colour scattered depends on the particle size (e.g. the blue sky). [1½]
Reflection: light falling on a smooth surface bounces back in one definite direction obeying the laws of reflection (angle of incidence = angle of reflection), while in scattering there is no single direction and the effect depends on the size of the particles relative to the wavelength. [1½]

Q37. (3 marks) Answer: straight line through the origin; R = 3 Ω.
The points lie on a straight line through the origin:



[2]
R = V/I = slope = 6.0/2.0 = 3 Ω (the same for every pair: 1.2/0.4 = 3). [1]

Q38. (4 marks) Answer: heating effect of current; H = I²Rt; iron, heater; 1 kWh = 3.6 × 10^6 J.
(a) The heat taken out from inside the refrigerator is given off by the coils at the back, and the current in the compressor motor and wires produces heat by the heating effect of electric current (Joule heating), which warms the air near it. [1]
(b) H = VIt; with V = IR, H = I²Rt (= V²t/R). [1]
(c) Any two: electric iron, toaster, electric heater, filament of an electric bulb, electric fuse. [2]
OR (c) The kilowatt hour (kW h): the energy used in one hour at a rate of 1 kW. [1] 1 kW h = 1000 W × 3600 s = 3.6 × 10^6 J. [1]

Q39. (5 marks) Answer: (a) Fleming's left-hand rule; force into the page; (b) right-hand thumb rule; same rating; soft iron magnetises and demagnetises easily.

(a) (i) 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. [1]

(ii) A fuse is a wire of low melting point connected in series with the circuit. [½] If the current becomes too large (overload or short circuit) it melts and breaks the circuit, protecting the appliances and wiring. [½]

(iii) The third pin connects the metal body to the earth wire; if current leaks to the body it flows to earth and the user does not get a shock. A bulb has no metal body that can be touched, so it needs no earthing. [1]

(iv) Current from B to A (up the page), field to the right: the force on AB is perpendicular to the plane of the paper, directed into the page. [1½] Law: Fleming's left-hand rule. [½]

OR (b) (i) Field lines: concentric circles around each point of the wire near it, becoming larger away from the wire; at the centre of the loop the lines are nearly straight and parallel, all in the same direction. [2]

(ii) Right-hand thumb rule: hold the wire in the right hand with the thumb along the current; the curled fingers give the direction of the field lines. [1]

(iii) (I) A fuse of the same rating melts at the safe limit for that circuit; one of higher rating would let too much current pass without melting and would not protect the circuit. [1] (II) Soft iron is strongly magnetised when current flows and loses its magnetism as soon as the current is switched off, so the electromagnet can be turned on and off. [1]

Questions: CBSE board examination 2026, Q.P. Code 31/2/1, as published by CBSE at cbse.gov.in; figures redrawn. Answers, step marks and worked solutions © Master Testing Agency. Free for personal practice; not for resale. Every answer was worked out by hand against the NCERT Class 10 Science textbook; the numerical answers and the direction in the magnetic-force question were checked by computer.