CBSE Class 10 Science: Sample Paper 2

Based on NCERT · the board's 2024 to 2026 pattern | Time: 3 hours · **Maximum marks: 80**

1. All questions are compulsory. Internal choice is given in some questions; attempt one of the alternatives.
2. Section A has 20 objective questions of 1 mark each: multiple-choice and assertion-reason.
3. Section B has very short answer questions of 2 marks; Section C short answer questions of 3 marks; Section D long answer questions of 5 marks; Section E case-based questions of 4 marks.
4. Wherever necessary, draw neat, labelled diagrams. Calculators are not allowed.
5. For the assertion-reason questions, choose: (a) Both A and R are true, and R is the correct explanation of A. (b) Both A and R are true, but R is not the correct explanation of A. (c) A is true, but R is false. (d) A is false, but R is true.

Section A (20 × 1 mark)

1. A cow has a much longer small intestine than a tiger because [1]

(a) the cellulose in grass needs a longer time to digest
(b) a cow eats less often than a tiger
(c) meat contains more water than grass
(d) a tiger absorbs its food in the stomach

2. When 30 C of charge flows through the load of an inverter battery, 360 J of electrical energy is converted. The potential difference across the load is [1]

(a) 0.083 V
(b) 390 V
(c) 10800 V
(d) 12 V

3. Candle wax, a mixture of carbon compounds, melts at about 330 K, while common salt melts only above 1000 K. The low melting point of wax is best explained by [1]

(a) weak bonds between the atoms inside each wax molecule
(b) weak forces between separate wax molecules, though the bonds within each molecule are strong
(c) the presence of ions in wax
(d) the absence of carbon-hydrogen bonds in wax

4. Assertion (A): Four bacteria formed when one bacterium divides twice are very similar, but not exactly identical. Reason (R): Small inaccuracies in DNA copying create very minor differences at each division. [1]

(a) Both A and R are true, and R is the correct explanation of A.
(b) Both A and R are true, but R is not the correct explanation of A.
(c) A is true, but R is false.
(d) A is false, but R is true.

5. A nursery cannot raise one of these plants from seed, because it has lost the capacity to produce seeds. Which one? [1]

(a) Mustard
(b) Papaya
(c) Watermelon
(d) Jasmine

6. Which of these reactions releases heat but gives out no light? [1]

(a) Respiration in the cells of the body
(b) Burning of a magnesium ribbon
(c) Burning of natural gas on a stove
(d) Photosynthesis in a leaf

7. Assertion (A): Gold is often found in nature in the free state. Reason (R): Gold is the most ductile metal. [1]

(a) Both A and R are true, and R is the correct explanation of A.
(b) Both A and R are true, but R is not the correct explanation of A.
(c) A is true, but R is false.
(d) A is false, but R is true.

8. A section of cellular DNA that provides the information for making one protein is called [1]

(a) a chromosome
(b) a gene
(c) a germ-cell
(d) a nucleus

9. Assertion (A): Light travels faster in water than in crown glass. Reason (R): Crown glass has a higher refractive index than water. [1]

(a) Both A and R are true, and R is the correct explanation of A.
(b) Both A and R are true, but R is not the correct explanation of A.
(c) A is true, but R is false.
(d) A is false, but R is true.

10. When a neem tree makes food, the energy change that takes place in its leaves is [1]

(a) chemical energy to light energy
(b) light energy to chemical energy
(c) heat energy to light energy
(d) chemical energy to heat energy

11. In which of the following will the offspring show the greatest variation among themselves? [1]

(a) sugarcane plants raised from stem pieces of one plant
(b) bacteria formed by repeated division of one bacterium
(c) kids born to a pair of goats
(d) hydra buds formed on one parent

12. A long straight wire carries a steady current. Point P is 2 cm from the wire on one side, and point Q is 2 cm from it on the exactly opposite side, both in the same plane perpendicular to the wire. The magnetic fields at P and Q are [1]

(a) equal in size and in the same direction
(b) both zero
(c) unequal, the one at P being larger
(d) equal in size and opposite in direction

13. Which of these can a young adult with normal vision not see distinctly? [1]

(a) the Moon
(b) a page held 30 cm from the eye
(c) a bus 40 m away
(d) a coin held 10 cm from the eye

14. A small bulb is placed 35 cm in front of a concave mirror of focal length 10 cm. The image of the bulb is formed [1]

(a) beyond C; enlarged, real and inverted
(b) between F and C; diminished, real and inverted
(c) at C; same size, real and inverted
(d) behind the mirror; enlarged, virtual and erect

15. A sealed glass ampoule in a school store holds a dark red-brown liquid. The label says the element is a non-metal. The element is [1]

(a) mercury
(b) iodine
(c) bromine
(d) sulphur

16. Assertion (A): The metal body of a table fan is connected to the earth wire. Reason (R): The earth wire in house wiring has green insulation. [1]

(a) Both A and R are true, and R is the correct explanation of A.
(b) Both A and R are true, but R is not the correct explanation of A.
(c) A is true, but R is false.
(d) A is false, but R is true.

17. Sana places a small plotting compass at a point near a magnet lying on her desk. The north pole of the needle points towards the east edge of the desk. The magnetic field at that point is directed towards the [1]

(a) north
(b) west
(c) east
(d) south

18. A student sorting elements finds a solid that shines like a metal, yet it is classed as a non-metal. The element is [1]

(a) bromine
(b) sulphur
(c) iodine
(d) oxygen

19. Two drops of phenolphthalein are added to four colourless liquids. The liquid that turns pink is [1]

(a) dilute hydrochloric acid
(b) sodium hydroxide solution
(c) vinegar
(d) lemon juice

20. A toxin stops the axon endings of a neuron from releasing their chemicals, but leaves the neuron otherwise unharmed. The most direct result is that [1]

(a) the dendrites of the poisoned neuron cannot pick up information
(b) no impulse is started in the dendrite of the next neuron
(c) the impulse travels backwards from the axon to the dendrite
(d) the cell body of the poisoned neuron stops working

Section B (6 × 2 marks)

21. A motorcyclist wears a helmet to protect his head. Name the two natural protections the body gives the brain and the one it gives the spinal cord. [2]

22. Balance the following equations. (a) $Fe + Cl_2 \rightarrow FeCl_3$ (b) $Al + HCl \rightarrow AlCl_3 + H_2$ [2]

Or *Balance the following equations. (a)* $P + O_2 \rightarrow P_2O_5$ *(b)* $KClO_3 \rightarrow KCl + O_2$

23. Ethanol is heated to 443 K with excess concentrated sulphuric acid, and a gas X is given off. Name X, write the equation for its formation, and state the role of the acid. [2]

24. A wire inside the plug of a room heater works loose and touches the other wire, and the fuse of that circuit blows at once. Explain what happened to the current and why the fuse wire melted. [2]

25. State the role of (a) the fine hairs and mucus lining the nostrils, and (b) the residual volume of air the lungs always retain. [2]

26. Name the part of the eye that carries the light-sensitive cells, and state how the signals they produce lead to vision. [2]

Section C (7 × 3 marks)

27. In a soda-acid fire extinguisher, sodium hydrogencarbonate solution reacts with dilute sulphuric acid. (a) Write the balanced equation for the reaction. (b) Name the gas released and give a test for it. (c) How does this gas put out the fire? [3]

28. Prakash winds two circular coils of the same radius: coil X has 25 turns and coil Y has 100 turns. The same current flows in both. (a) Compare the magnetic fields at their centres. (b) Why do the turns of a coil not cancel each other's field? (c) Describe how the field lines appear near the centre of either coil. [3]

29. For each observation, name the tropic movement and say whether the plant part grows towards or away from the stimulus. (i) A pot of balsam seedlings falls on its side; in a few days the stem tips curve upwards. (ii) The roots of mustard seedlings in a glass jar lit from one side bend away from the lit side. (iii) A pollen tube grows down the style of a flower to the ovule. [3]

30. Classify each as exothermic or endothermic, giving a reason: (a) natural gas burning on a kitchen stove (b) barium hydroxide stirred with ammonium chloride, after which the beaker feels cold (c) limestone decomposing in a kiln. [3]

31. A ray of light in air falls on one face of a rectangular glass slab at an angle of incidence of 40°. Describe how the ray bends at each face of the slab, give the angle at which it finally emerges into air, and name the shift between the incident and the emergent rays. [3]

32. In a species with a complex body, the two germ-cells are very unlike each other. (i) Describe the two kinds. (ii) Which is called the male gamete and which the female? (iii) In very simple organisms, how do the two germ-cells compare with each other? [3]

33. In a lake, the phytoplankton fix 30 000 kJ of energy. The chain is phytoplankton → zooplankton → small fish → kingfisher. (a) Using the average rule for transfer, find the energy available to the kingfisher. (b) Use this to explain why kingfishers are few in number. [3]

Section D (3 × 5 marks)

34. Arjun pulls apart a mustard flower in the laboratory, layer by layer. (a) Which of the parts he removes are not reproductive, and what does each of them do? (b) Name the male reproductive part and what it produces. (c) Name the three parts of the female reproductive part, from base to tip, and what the base contains. (d) After fertilisation, what does the zygote, the ovule and the ovary each become? [5]

Or *Meena tags a mustard flower and visits it every few days. Its petals and sepals fall, and the centre swells into a long pod with seeds. (a) Before they fell, what work did the sepals and the petals do? (b) Which part of the flower made the pollen? (c) Name the three parts of the central structure and say which one swelled into the pod. (d) What fused inside it to start each seed, and what does the seed contain?*

35. (a) What does the pH scale measure, and over what range does it generally run? (b) Solution P has a pH of 3 and solution Q a pH of 11. Which one turns phenolphthalein pink, and which has the higher hydrogen ion concentration? Give reasons. (c) Explain why tooth decay starts when the pH in the mouth falls below a certain value, name that value, and state how it can be prevented. [5]

Or *(a) What does the 'p' in pH stand for, and what does pH measure? (b) Solution R has a pH of 1 and solution S a pH of 6. Which is more acidic, and what colour does R give with blue litmus? Give reasons. (c) What is tooth enamel made of? Explain why eating sugary food without brushing can damage it, and why toothpaste helps.*

36. (a) Starting from P = VI, use Ohm's law to show that electric power can also be written as $P = I^2R$ and $P = V^2/R$. (2) (b) A family replaces a 2 kW storage geyser, used for 45 minutes a day, with a 3 kW instant water heater used for 12 minutes a day. Find the units each would consume in 30 days and the money saved in that time at ₹7 per unit. (2) (c) Which fuse, of 5 A, 10 A or 15 A, should protect the 3 kW heater on a 230 V supply? (1) [5]

Or *(a) Show, using Ohm's law, that $P = VI$ can be written as $P = I^2R$ and as $P = V^2/R$. (2) (b) A tailoring shop runs a 1100 W iron for 2 hours a day and two sewing-machine motors of 100 W each for 6 hours a day. Find its bill for 25 working days at ₹8 per unit. (2) (c) Which fuse, of 2 A, 5 A or 10 A, should protect the iron alone on a 230 V supply? (1)*

Section E (3 × 4 marks)

37. Read the passage and answer the questions that follow. [4]

Meera runs a small jewellery and repair shop in Thrissur. She explains to a customer that the chains she sells are 22 carat, not pure 24-carat gold. Her brother repairs radios at the back of the shop. He joins wires with solder, and he never uses brass strips to carry current in a circuit, though brass is cheaper than copper. Both of them work with alloys every day, made by melting a primary metal and dissolving other elements in it in definite proportions.

(a) A 22-carat chain has a mass of 36 g. The mass of pure gold in it is [1]

(a) 22 g (b) 33 g
(c) 34 g (d) 30 g

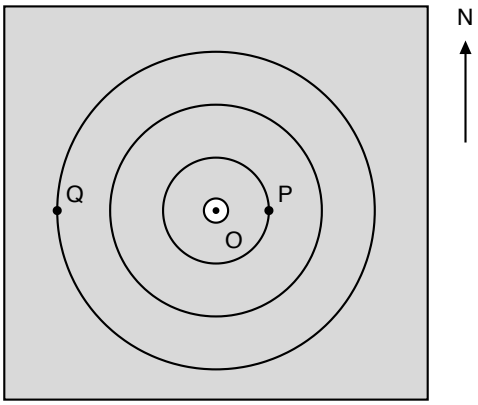
(b) Which metals are mixed with gold to make it 22 carat, and why is this done? [1]

(c) Name the metals in solder and state the property that makes it suitable for joining wires. Why is brass not used to carry current? [2]

Or *An alloy is a homogeneous mixture. Name the metals in bronze, and state how its melting point and its electrical conductivity compare with those of pure copper.*

38. Read the passage and answer the questions that follow. [4]

In a workshop, a long straight cable rises vertically out of a hole O in a horizontal wooden shelf, and a steady current flows up the cable. Anil maps the field on the shelf with a plotting compass and draws three of its field lines, shown from above in the figure. He then places one small compass at P, close to the cable, and another at Q, three times as far away on the opposite side. The arrow marked N shows north.



(a) The north pole of the compass at P points towards the [1]

(a) north (b) south
(c) east (d) cable at O

(b) Compared with the field at P, the field of the cable at Q is [1]

(a) smaller (b) larger
(c) the same (d) zero

(c) Anil reverses the current and also doubles it. State the effect on the compass at P, with reasons. [2]

Or *State the rule Anil should use to find the direction of the field lines, and use it to say whether, seen from above, they run clockwise or anticlockwise.*

39. Read the passage and answer the questions that follow. [4]

Harpreet crossed pure-breeding tall pea plants with round seeds and pure-breeding short plants with wrinkled seeds. All the F1 plants were tall with round seeds. She self-pollinated the F1 plants and grew the seeds into F2 plants. She recorded the height of every F2 plant and the shape of the seeds it grew from, as shown in the table.

F2 class	Number of plants
Tall, round seeds	452
Tall, wrinkled seeds	148
Short, round seeds	152
Short, wrinkled seeds	48
Total	800

(a) How many F2 plants show a combination of traits not found in either original parent? [1]

(a) 48 (b) 300
(c) 452 (d) 500

(b) The factor pairs of the F1 plants are [1]

(a) TT RR (b) Tt Rr
(c) tt rr (d) TT rr

(c) What do the classes in your answer to the first part prove about plant height and seed shape? Why could they not appear if each parent passed on one whole gene set? [2]

Or *Work out the number of plants expected in each class from a 9 : 3 : 3 : 1 ratio, and say whether Harpreet's counts fit it.*