Future Topper

Half-Yearly Examination Practice Paper 1

Class IX Science (086)

Time allowed: 3 hours Maximum marks: 80

Syllabus covered: Exploration (NCERT Class IX Science), the chapters usually set for the half-yearly exam: Cell: The Building Block of Life; Tissues in Action; Earth as a System; Exploring Mixtures and their Separation; Describing Motion Around Us; How Forces Affect Motion. Check your school's half-yearly list before you start.

General instructions

1. This paper has 39 questions in three sections. All questions are compulsory.
2. Section A (Biology and Earth Science): questions 1 to 16, 32 marks.
3. Section B (Chemistry): questions 17 to 27, 25 marks.
4. Section C (Physics): questions 28 to 39, 23 marks.
5. Each section has multiple-choice and assertion-reason questions of 1 mark, followed by questions of 2 to 5 marks. Marks are shown against each question.
6. Internal choice is given in some questions. Attempt only one of the choices.
7. Draw neat, labelled diagrams wherever needed.

Section A: Biology and Earth Science

32 marks

1. Which cell organelle is known as the powerhouse of the cell? **1**

(a) Ribosome (b) Mitochondrion
(c) Golgi apparatus (d) Lysosome

2. Which of these is present in a plant cell but absent in an animal cell? **1**

(a) Nucleus (b) Plasma membrane
(c) Cell wall (d) Mitochondria

3. A prokaryotic cell does not have **1**

(a) a membrane-bound nucleus (b) a plasma membrane
(c) ribosomes (d) cytoplasm

4. A plant cell kept in a strong salt solution loses water, and its contents shrink away from the cell wall. This is called **1**

(a) endocytosis (b) turgidity
(c) imbibition (d) plasmolysis

5. The tissue that increases the length of the root and the stem is the **1**

(a) lateral meristem (b) apical meristem
(c) parenchyma (d) xylem

6. The tissue that joins one bone to another bone is **1**

(a) tendon (b) cartilage
(c) ligament (d) areolar tissue

7. Which gas in the upper atmosphere absorbs most of the harmful ultraviolet radiation from the Sun? **1**

(a) Ozone (b) Carbon dioxide
(c) Nitrogen (d) Water vapour

8. **Assertion (A):** Red blood cells placed in pure water swell and may burst. **1**
Reason (R): Water moves by osmosis across a selectively permeable membrane from a region of higher water concentration to a region of lower water concentration.

(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.

9. **Assertion (A):** Cardiac muscle is a voluntary muscle. **1**
Reason (R): Cardiac muscle cells are cylindrical, branched and uninucleate.

(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.

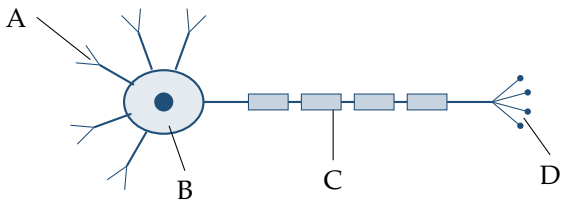
10. Give two differences between prokaryotic and eukaryotic cells, with one example of each. **2**

11. Why is the plasma membrane called a selectively permeable membrane? Name one substance that crosses it by diffusion. **2**

OR

Why are lysosomes sometimes called the "suicide bags" of the cell?

12. The figure shows a nerve cell (neuron). Name the parts labelled A, B, C and D. Write the function of part A and part C. **3**



13. Name the type of joint found (i) at the shoulder, (ii) at the knee, and (iii) between the skull and the first vertebra that lets you turn your head. Suggest one habit that keeps bones and joints healthy. **3**

14. Read the passage and answer the questions. **4**
Carbon moves constantly between the air, living things, the oceans and rocks. Plants take in carbon dioxide to make food. Animals and plants release it when they respire, and burning wood, coal and petrol releases more. For a long time these flows stayed roughly in balance. Over the last two centuries, burning fossil fuels and cutting forests have raised the amount of carbon dioxide in the air.

(a) Name two processes that add carbon dioxide to the air. (1)

(b) Name the process that removes carbon dioxide from the air. (1)

(c) Explain how cutting forests and burning fossil fuels together upset this balance, and why it warms the Earth. (2)

15. Read the passage and answer the questions. **4**

On a sunny day at the beach, the sand becomes too hot to walk on while the sea water stays cool. Land and water receive the same sunlight, but they heat up and cool down at different rates. This difference sets the air moving between land and sea.

(a) Which heats up faster during the day, land or sea? (1)

(b) In which direction does the breeze blow near the coast during the day? (1)

(c) Explain how a land breeze forms at night. (2)

OR

(d) Why do coastal towns have milder summers and winters than towns far inland? (2)

16. Describe the three kinds of simple permanent tissue in plants. For each, give its structure and one function. Name the two complex permanent tissues. **5**

OR

Write the structure and one function of each of these cell organelles: nucleus, endoplasmic reticulum, plastids, vacuole and Golgi apparatus.

Section B: Chemistry

25 marks

17. Which of these is a homogeneous mixture? **1**

(a) Muddy water (b) Salt solution
(c) Oil and water (d) Chalk powder in water

18. Which of these shows the Tyndall effect? **1**

(a) Sugar solution (b) Copper sulphate solution
(c) Milk (d) Salt solution

19. Cream is separated from milk by **1**

(a) centrifugation (b) sublimation
(c) crystallisation (d) chromatography

20. **Assertion (A):** Milk is a colloid. **1**
Reason (R): Colloids are heterogeneous mixtures.

(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.

21. 20 g of common salt is dissolved in 180 g of water. Find the concentration of the solution in mass by mass percentage. **2**

22. Name the method you would use to separate each of the following: **2**
(i) camphor from common salt (ii) the different dyes in black ink
(iii) acetone from water (iv) fine mud particles from water in a water treatment plant

23. Compare a true solution, a colloid and a suspension on three points: size of particles, whether they show the Tyndall effect, and whether the particles settle on standing. **3**

24. Why is crystallisation a better method than simple evaporation for getting pure copper sulphate crystals from an impure sample? Give three reasons. **3**

25. Describe how distillation is used to separate a mixture of acetone and water. Why does it work for this pair of liquids? **3**

OR

Describe how paper chromatography can show that black ink is a mixture of dyes.

26. A student added a pinch each of three substances to separate beakers of water and stirred. She then shone a torch through each beaker from the side. **4**

Beaker	Appearance after stirring	Path of light
A (common salt)	Clear, nothing settles	Not visible
B (starch)	Slightly cloudy, nothing settles	Clearly visible
C (chalk powder)	Cloudy, particles settle after some time	Visible while stirred

(a) Which beaker contains a true solution? (1)

(b) Which beaker contains a colloid? (1)

(c) Why is the path of light visible in B but not in A? How can the chalk be removed from C? (2)

OR

(d) Why is the mixture in C called a suspension? Give two of its properties. (2)

27. (i) 50 mL of alcohol is mixed with water to make 200 mL of solution. Find its concentration in volume by volume percentage. (1) **4**

(ii) 15 g of sugar is dissolved to make 250 mL of solution. Find its concentration in mass by volume percentage. (1)

(iii) How much salt and how much water are needed to make 500 g of a 4% (mass by mass) salt solution? (2)

OR

Classify each of the following as an element, a compound or a mixture, and give a reason for any two: oxygen gas, air, water, brass, sodium chloride, iron, soda water, sugar.

Section C: Physics

23 marks

28. The SI unit of acceleration is **1**

(a) m/s (b) m s

(c) s/m^2 (d) m/s^2

29. The slope of a velocity-time graph gives **1**

(a) acceleration (b) distance

(c) displacement (d) speed

30. An athlete runs once around a circular track of radius r and returns to the starting point. Her displacement is **1**

(a) $2\pi r$ (b) zero

(c) $2r$ (d) πr

31. A car starts from rest and accelerates uniformly at 2 m/s^2. Its velocity after 5 s is **1**

(a) 2.5 m/s (b) 7 m/s

(c) 10 m/s (d) 20 m/s

32. A force gives a 5 kg mass an acceleration of 2 m/s^2. The force is **1**

(a) 2.5 N (b) 7 N

(c) 3 N (d) 10 N

33. When a moving bus stops suddenly, the passengers lean forward. This is because of **1**

(a) friction (b) inertia of motion

(c) gravity (d) inertia of rest

34. **Assertion (A):** A body moving with constant speed along a circle is accelerating. **1**
Reason (R): Its direction of motion changes all the time, so its velocity changes.

(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.

35. Distinguish between distance and displacement. Give an example in which an object covers some distance but its displacement is zero. **2**

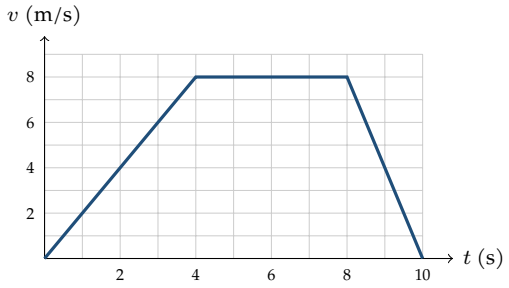
36. A cyclist rides 2 km east in 10 minutes and then 1 km west in 5 minutes. Find her (i) average speed and (ii) average velocity, in km/h. **3**

OR

State Newton's third law of motion. Explain it with two examples from daily life.

37. An object starts with velocity u and moves with uniform acceleration a. It reaches velocity v after time t. Using a velocity-time graph, derive $v = u + at$. **3**

38. The velocity-time graph of a car is shown. **4**



(a) Find the acceleration during the first 4 s. (1)

(b) Describe the motion between 4 s and 8 s. (1)

(c) Find the distance covered in the first 8 s. (2)

OR

(d) Find the acceleration between 8 s and 10 s, and the distance covered in that time. (2)

39. A car of mass 1500 kg moving at 20 m/s is brought to rest uniformly in 5 s by its brakes. Find (i) its acceleration, (ii) the braking force, and (iii) the distance it travels before stopping. **4**

OR

(i) What are balanced and unbalanced forces? Give one example of each.
(ii) A ball rolling on the ground slowly comes to a stop. Use Newton's first law of motion to explain why.

***** End of question paper *****

Solutions

Answers give the points an examiner looks for. Any correct answer in the student's own words should get full credit.

Section A

1. The mitochondrion releases energy from food by cellular respiration and stores it as ATP. **Answer: (b)**

2. **Answer: (c) Cell wall**

3. Its genetic material lies in the cytoplasm (the nucleoid region), with no nuclear membrane around it. **Answer: (a)**

4. **Answer: (d) plasmolysis**

5. Apical meristem is found at the growing tips of roots and stems. **Answer: (b)**

6. A tendon joins muscle to bone; a ligament joins bone to bone. **Answer: (c)**

7. **Answer: (a) Ozone**

8. Pure water has a higher water concentration than the cell, so water enters by osmosis and the cell swells. R explains A. **Answer: (a)**

9. Cardiac muscle works without our control, so it is involuntary and A is false. The description in R is correct. **Answer: (d)**

10. Prokaryotic cells have no nuclear membrane, while eukaryotic cells have a well-defined nucleus. Prokaryotic cells lack membrane-bound organelles such as mitochondria, while eukaryotic cells have them. Examples: bacteria (prokaryotic); onion peel cell or human cheek cell (eukaryotic).

11. It lets some substances pass in and out but stops others, so it controls what enters and leaves the cell. Oxygen or carbon dioxide crosses it by diffusion.
OR: Lysosomes contain powerful digestive enzymes. If a cell is damaged, the lysosomes may burst and their enzymes digest the cell itself.

12. A: dendrites. B: cell body (cyton), with the nucleus. C: axon. D: nerve endings.
Dendrites receive messages from other neurons and carry them towards the cell body. The axon carries the message away from the cell body to the next neuron or to a muscle.

13. (i) Ball and socket joint. (ii) Hinge joint. (iii) Pivot joint.
Any one habit: regular exercise, a diet with enough calcium and vitamin D, sitting and standing with correct posture, or lifting heavy loads with a straight back.

14. (a) Respiration and burning (combustion) of fuels.
(b) Photosynthesis.
(c) Burning fossil fuels puts extra carbon dioxide into the air, and cutting forests leaves fewer plants to take it out, so the amount in the air keeps rising. Carbon dioxide traps heat that the Earth gives off (the greenhouse effect), so more of it warms the Earth.

15. (a) Land.
(b) From the sea towards the land (sea breeze).
(c) At night the land cools faster than the sea. The air over the sea is now warmer, so it rises, and cooler air from the land moves out to take its place. This flow from land to sea is the land breeze.
OR (d): The sea heats up and cools down slowly, so it keeps the nearby air from getting very hot in summer or very cold in winter. Sea and land breezes carry this moderating effect onto the land.

16. Parenchyma: living cells with thin walls and spaces between them. Stores food; when it has chloroplasts (chlorenchyma) it makes food, and in water plants air spaces help them float.
Collenchyma: living, elongated cells thickened at the corners, with very little space between them. Gives flexibility and support, for example in leaf stalks.
Sclerenchyma: dead cells with thick walls hardened by lignin and no spaces between them. Makes parts hard and stiff, for example the husk of a coconut.
Complex permanent tissues: xylem and phloem.

OR: Nucleus: surrounded by a double membrane with pores, contains chromosomes; controls the cell's activities and carries hereditary information. **Endoplasmic reticulum:** a network of membrane tubes; rough ER (with ribosomes) helps make proteins, smooth ER helps make fats, and both carry materials around the cell. **Plastids:** have their own membranes; chloroplasts trap sunlight for photosynthesis, and leucoplasts store starch and oils. **Vacuole:** a sac filled with cell sap, large in plant cells; stores water and substances and keeps the cell firm. **Golgi apparatus:** stacks of flattened sacs; packages and sends out materials made in the cell, and helps form lysosomes.

Section B

17. Answer: (b) Salt solution

18. Milk is a colloid, and its particles scatter light. **Answer: (c)**

19. Answer: (a) centrifugation

20. Both statements are true, but saying colloids are heterogeneous does not explain why milk is a colloid. That depends on the size of its particles. **Answer: (b)**

21. Mass of solution $= 20 + 180 = 200$ g. Concentration $= \frac{20}{200} \times 100 = 10\%$.

22. (i) Sublimation. (ii) Paper chromatography. (iii) Distillation. (iv) Loading with alum (coagulation), followed by settling.

23. Particle size: solution, less than about 1 nm; colloid, roughly 1 to 100 nm; suspension, larger than about 100 nm.
Tyndall effect: not shown by a solution; shown by a colloid and a suspension.
Settling: particles of a solution and a colloid do not settle; particles of a suspension settle on standing.

24. Evaporating to dryness can char or decompose some substances. Soluble impurities stay dissolved in the solution during crystallisation, while evaporation leaves them mixed with the solid. Crystallisation gives well-formed crystals of the pure substance.

25. Put the mixture in a distillation flask fitted with a thermometer and connected to a condenser. Heat gently. Acetone (boiling point about 56°C) boils off first; its vapour cools in the condenser and is collected. Water (100°C) stays in the flask. It works because the boiling points of the two liquids differ widely.
OR: Put a small drop of black ink on a strip of filter paper, about 3 cm from one end. Dip that end in water so the drop stays above the water. As water rises up the paper, it carries the dyes with it. Different dyes move at different speeds, so they separate into bands of different colours, showing that the ink is a mixture.

26. (a) Beaker A. (b) Beaker B.
(c) Starch particles are large enough to scatter light, while dissolved salt particles are too small to do so. The chalk can be removed by filtration (or by letting it settle and pouring off the water).
OR (d): Its particles are large, can be seen, and settle down when left undisturbed. Properties: it is heterogeneous; it scatters light; its particles can be separated by filtration; it is unstable.

27. (i) $\frac{50}{200} \times 100 = 25\%$.
(ii) $\frac{15}{250} \times 100 = 6\%$.
(iii) Salt $= 4\%$ of 500 g $= 20$ g. Water $= 500 - 20 = 480$ g.
OR: Elements: oxygen gas, iron. Compounds: water, sodium chloride, sugar. Mixtures: air, brass, soda water.
Sample reasons: water is a compound because hydrogen and oxygen combine in a fixed ratio and can be separated only by a chemical reaction. Air is a mixture because its gases are not combined in a fixed ratio and keep their own properties.

Section C

28. **Answer: (d) m/s^2**

29. **Answer: (a) acceleration**

30. She ends where she started, so her displacement is zero. **Answer: (b)**

31. $v = u + at = 0 + 2 \times 5 = 10$ m/s. **Answer: (c)**

32. $F = ma = 5 \times 2 = 10$ N. **Answer: (d)**

33. The lower body stops with the bus, but the upper body tends to keep moving forward. **Answer: (b)**

34. **Answer: (a)**

35. Distance is the total length of the path travelled; it is a scalar and is never negative. Displacement is the shortest straight-line distance from the starting point to the final point, in a stated direction; it is a vector and can be zero. Example: a child who walks round a park and comes back to the gate covers a distance, but her displacement is zero.

36. (i) Total distance $= 3$ km. Total time $= 15$ min $= 0.25$ h. Average speed $= \frac{3}{0.25} = 12$ km/h.
(ii) Displacement $= 2 - 1 = 1$ km east. Average velocity $= \frac{1}{0.25} = 4$ km/h towards the east.
OR: When one object exerts a force on another, the second object exerts an equal and opposite force on the first. Examples: when a gun is fired, the bullet goes forward and the gun recoils backward; when we walk, our foot pushes the ground backward and the ground pushes us forward. (A rocket and a boat moving away when a person jumps ashore are also correct.)

37. On a velocity-time graph, the velocity rises in a straight line from u at time 0 (point A) to v at time t (point B). Draw BC perpendicular to the time axis, and AD parallel to the time axis meeting BC at D.
Acceleration = slope $= \frac{BD}{AD} = \frac{v-u}{t}$, so $a = \frac{v-u}{t}$, which gives $v = u + at$.

38. (a) $a = \frac{8-0}{4} = 2$ m/s^2.
(b) The velocity stays 8 m/s, so the car moves with uniform velocity (zero acceleration).
(c) Distance = area under the graph $= \frac{1}{2} \times 4 \times 8 + 4 \times 8 = 16 + 32 = 48$ m.
OR (d): $a = \frac{0-8}{2} = -4$ m/s^2 (a retardation of 4 m/s^2). Distance $= \frac{1}{2} \times 2 \times 8 = 8$ m.

39. (i) $a = \frac{0-20}{5} = -4$ m/s^2.
(ii) $F = ma = 1500 \times (-4) = -6000$ N, that is, 6000 N opposite to the motion.
(iii) $s = ut + \frac{1}{2}at^2 = 20 \times 5 + \frac{1}{2}(-4)(25) = 100 - 50 = 50$ m.
OR: (i) Forces are balanced when they cancel out, so the motion does not change; for example, a book resting on a table. Forces are unbalanced when there is a net force, so the object speeds up, slows down or changes direction; for example, kicking a football.
(ii) Newton's first law says an object keeps moving with the same velocity unless an unbalanced force acts on it. Friction from the ground acts on the ball, opposite to its motion. This unbalanced force slows it down until it stops.