

CLASS 9 SCIENCE

CHAPTER 2

CELL: THE BUILDING BLOCK OF LIFE

NCERT QUESTIONS & ANSWERS

Chapter: Cell: The Building Block of Life

Coverage: cell study and microscopy, cell structure, cell membrane and osmosis, prokaryotic and eukaryotic cells, cell organelles, plant and animal cells, mitosis, meiosis and uncontrolled cell division.

Note: This version contains **no internal source/citation codes**. Questions and answers are presented cleanly for student use.

CHAPTER-END QUESTIONS & ANSWERS

Revise • Reflect • Refine

1. Differentiate between the following pairs using the given basis: (a) Cell membrane and cell wall — permeability; (b) RER and SER — structure; (c) Chloroplast and chromoplast — pigments.

Answer:

(a) Cell membrane is selectively permeable and regulates movement of substances. Cell wall is a rigid supporting layer outside the membrane in plant cells and is not selectively permeable in the same manner.

(b) RER has ribosomes attached to its surface, whereas SER does not have attached ribosomes.

(c) Chloroplasts contain chlorophyll and carry out photosynthesis. Chromoplasts contain other coloured pigments and give colour to plant parts.

2. Two similar animal cells are placed in pure water and concentrated salt solution. One swells and the other shrinks. Which explanation is correct?

Answer: The correct explanation is: **water moves through the cell membrane**. In pure water, water enters the cell and it swells. In concentrated salt solution, water moves out of the cell and the cell shrinks. This movement of water through a selectively permeable membrane is called **osmosis**.

3. Identify the labelled cell parts in the diagram and match them with their functions.

Answer: The major functions are: **nucleus**—controls cell activities; **mitochondria**—cellular respiration and energy release; **vacuole**—storage and support in plant cells; **cell membrane**—controls movement of substances; **cell wall**—provides rigidity; **Golgi apparatus**—modifies, sorts and packages materials; **chloroplast**—photosynthesis.

4. Which pair correctly represents structures present in plant cells and absent in animal cells?

Answer: Leucoplast and cell wall. Leucoplasts are plastids found in plant cells, while the cell wall is a characteristic supporting structure of plant cells and is absent in animal cells.

Exam Tip: Understand the reason behind the answer. Questions from this chapter commonly test organelle functions, osmosis, cell types and cell division.

5. A student says plastids occur only in green parts of plants. Is this correct? Explain.

Answer: No. Plastids occur in plant cells, but different plastids have different functions. Chloroplasts are abundant in green parts and carry out photosynthesis, while leucoplasts occur in non-green parts and are mainly associated with storage. Chromoplasts contain coloured pigments.

6. Compare mitochondria and chloroplasts.

Answer: Both are membrane-bound organelles involved in energy-related processes. Mitochondria are the main sites of cellular respiration and release usable energy. Chloroplasts contain chlorophyll and carry out photosynthesis, converting light energy into chemical energy stored in food. Mitochondria occur in plant and animal cells; chloroplasts occur in photosynthetic plant cells.

7. Which pair of organelles contains DNA?

Answer: Mitochondria and nucleus. The nucleus contains the main genetic material of a eukaryotic cell, while mitochondria also possess their own DNA.

8. A carrot is kept in plain water and another in concentrated salt solution. Answer: (i) What is being tested? (ii) How can the experiment be improved? (iii) Why does the texture change?

Answer: (i) The experiment tests the effect of solution concentration on water movement through plant cells by osmosis. **(ii)** Use equal-sized carrot pieces, measured solution volumes, fixed time and temperature, repeated trials and a control. Record mass or length before and after. **(iii)** In plain water, water enters cells and increases turgidity, making the carrot firm. In concentrated salt solution, water leaves cells, reducing turgidity and making the carrot soft or rubbery.

Exam Tip: Understand the reason behind the answer. Questions from this chapter commonly test organelle functions, osmosis, cell types and cell division.

9. Indicate whether chromosome, nucleus, mitochondria, Golgi complex and chromoplasts occur in bacterial and animal cells.

Answer:

Bacterial cell: chromosome—Yes; nucleus—No; mitochondria—No; Golgi complex—No; chromoplasts—No.

Animal cell: chromosome—Yes; nucleus—Yes; mitochondria—Yes; Golgi complex—Yes; chromoplasts—No.

Bacteria are prokaryotic and lack a well-defined nucleus and membrane-bound organelles. Animal cells are eukaryotic.

10. In the potato-cup experiment, why does water collect in cups containing sugar or salt? Why is the empty cup needed? Why does the boiled-potato cup behave differently?

Answer: Sugar or salt creates a concentrated solution inside the potato cup. Water moves through the living cell membranes towards the more concentrated solution by osmosis. The empty cup is the **control** for comparison. Boiling damages cell membranes, so the normal selectively permeable membrane system needed for osmosis is disrupted.

11. Identify the incorrectly matched organelle and function: ribosome—protein synthesis; SER—lipid and cellulose synthesis; lysosome—digestion of foreign agents.

Answer: The incorrectly matched pair is **lysosome—digestion of foreign agents** in the chapter's answer key. Lysosomes contain digestive enzymes and are associated with intracellular digestion and breakdown of unwanted materials.

12. What would happen if all mitochondria were removed from a eukaryotic cell?

Answer: Cellular respiration would be severely affected. The cell would be unable to efficiently generate the energy needed for its activities, so essential processes would gradually fail and the cell would not remain functional.

Exam Tip: Understand the reason behind the answer. Questions from this chapter commonly test organelle functions, osmosis, cell types and cell division.

13. Which phenomenon prevents tumour formation in the human body? Can plants also develop tumours?

Answer: Normal control of cell division and controlled removal of cells helps prevent uncontrolled cell accumulation. Cancer involves uncontrolled cell division and can produce tumours. Plants can also develop abnormal growths because plant cells are capable of division.

14. Explain the route followed by proteins and lipids from their synthesis to the cell membrane.

Answer: Proteins destined for membranes are synthesised on ribosomes associated with the rough endoplasmic reticulum. Lipids are mainly synthesised in the smooth endoplasmic reticulum. Materials move from the ER to the Golgi apparatus, where they are modified, sorted and packaged. Vesicles then transport them to the cell membrane.

15. What would happen if gametes were formed by mitotic division instead of meiotic division?

Answer: Mitosis maintains chromosome number, whereas meiosis reduces it by half. If gametes were produced by mitosis, they would contain the full chromosome number. Fusion of two such gametes would double the chromosome number in the next generation. Meiosis prevents this by producing haploid gametes.

16. A farmer preserves excess amla and lemon using salt, sugar or jaggery. Identify the scientific concept, explain why it prevents spoilage, and suggest a preserved food.

Answer: The concept is **osmosis**. High concentrations of salt or sugar create conditions in which water moves out of microbial cells, making their growth difficult. Examples of preserved foods include lemon pickle, amla preserve or fruit preparations made with sugar/jaggery. The practice also reduces food waste and can support food security and small-scale entrepreneurship.

QUICK REVISION — CHAPTER 2

Last-minute revision checklist

Cell basics: Cell as the structural and functional unit of life • unicellular and multicellular organisms • tissues, organs and organ systems • microscopy and resolution.

Organelles: Cell membrane • cell wall • cytoplasm • nucleus • ER • ribosomes • mitochondria • Golgi apparatus • lysosomes • vacuoles • chloroplasts • chromoplasts • leucoplasts.

Transport: Diffusion • osmosis • selectively permeable membrane • hypotonic/hypertonic conditions • turgidity • plasmolysis • potato and carrot experiments.

Cell division: Mitosis produces two genetically similar daughter cells. Meiosis produces four cells with half the chromosome number and is important in gamete formation. Uncontrolled cell division can result in tumour formation.

Diagrams to practise: Plant cell • animal cell • prokaryotic cell • osmosis setup • potato-cup experiment • mitosis • meiosis • ER–Golgi–cell membrane pathway.