Cell: The Building Block of Life

Standard difficulty · 20 questions · 40 marks · Time: 37 minutes

Name: _____ Date: _____ Score: ____ / 40

Show your working for Sections B and C. Answers are on the last page — try every question first!

Section A — Choose the correct answer — 8 × 1 = 8 marks

1. Which part of the cell controls what enters and leaves the cell?
   (a) The lysosome **(b)** The rough endoplasmic reticulum
   (c) The leucoplast **(d)** The cell membrane

2. An animal cell whose contents have 3% salt is placed in a solution with 13% salt. What happens to the cell?
   (a) It swells as water enters **(b)** It stays the same size
   (c) It shrinks as water leaves **(d)** It takes in salt and doubles in size

3. Cells were first seen and named by:
   (a) Purkinje, in 1839 **(b)** Robert Brown, in 1831
   (c) Virchow, in 1855 **(d)** Robert Hooke, in 1665

4. Which of these is found in both plant and animal cells?
   (a) Chloroplasts **(b)** A cell wall
   (c) Ribosomes **(d)** A large central vacuole

5. Under a microscope with a 10× eyepiece and a 40× objective, a cell's image is 10 mm across. What is the actual size of the cell?
   (a) 4,000,000 µm **(b)** 25 µm **(c)** 200 µm **(d)** 250 µm

6. A body cell of a horse has 64 chromosomes. After mitosis, each daughter cell has:
   (a) 64 chromosomes **(b)** 66 chromosomes
   (c) 32 chromosomes **(d)** 128 chromosomes

7. A cube-shaped cell has sides of 3 µm. Its surface area to volume ratio is:
   (a) 0.33 : 1 **(b)** 0.5 : 1 **(c)** 2 : 1 **(d)** 54 : 1

8. Assertion (A): A cell whose image is 8 mm wide under 400× magnification is actually 20 µm wide.
   Reason (R): Actual size = size of the image ÷ magnification.
   (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 B — Short answer — 8 × 2 = 16 marks

9. Name the cell part that carries ribosomes and transports proteins within the cell.

10. An animal cell with 8% sugar in its sap is placed in a 20% sugar solution. Which way does water move? Is the outside solution hypotonic or hypertonic? What happens to the cell?

11. A student uses a 20× eyepiece with a 100× objective. (a) What is the total magnification? (b) If the image of a cell is 12 mm across, how big is the cell, in micrometres?

12. Why is the plasma membrane called a selectively permeable membrane?

13. A cell of maize (20 chromosomes) divides by mitosis every 4 hours. Starting with one cell, how many cells are there after 24 hours? How many chromosomes does each have?

14. What happens when grapes are kept in a thick sugar syrup? Explain.

15. Give two differences between the chloroplast and the mitochondrion.

16. Compare the surface area to volume ratio of cube-shaped cells with sides 5 µm and 10 µm. Which is better at exchanging materials with its surroundings?

Section C — Word problems — 4 × 4 = 16 marks

17. Compare a plant cell and an animal cell.

18. For cube-shaped cells with sides 1 µm, 5 µm, 10 µm: (a) find the surface area, volume and surface area to volume ratio of each; (b) what happens to the ratio as the cell grows? (c) Why does this explain why cells are small and large organisms have many cells?

19. Three potato pieces, each of mass 55 g, are left for an hour in distilled water, in a solution as concentrated as the potato cell sap, and in strong salt solution. Their masses become 63.25 g, 55 g and 52.25 g. (a) Find the percentage change in mass for each. (b) Explain each result. (c) Name the process.

20. A body cell of a horse has 64 chromosomes. (a) How many chromosomes are there in each cell after mitosis? (b) In each gamete after meiosis? (c) In the zygote? (d) Starting with one cell, after 6 rounds of mitosis, how many cells and how many chromosomes in all are there?

Want another sheet on this chapter? In the Ambiful Worksheets app every sheet is new, with its answer key, and your child never gets the same question twice.
Scan the code to get the free app, or open **worksheets.ambiful.com/get**

Answer key

Cell: The Building Block of Life · AW-9S-CEL-2026-V1 · For parents — fold back or tear off before handing the sheet to your child.

Q	Answer	Working
1	**(d) The cell membrane**	—
2	**(c) It shrinks as water leaves**	the outside solution is hypertonic (more concentrated)
3	**(d) Robert Hooke, in 1665**	he saw them in a thin slice of cork
4	**(c) Ribosomes**	—
5	**(b) 25 µm**	magnification 10 × 40 = 400; 10 mm = 10000 µm; ÷ 400
6	**(a) 64 chromosomes**	mitosis keeps the number the same
7	**(c) 2 : 1**	area 6 × 3^2 = 54 µm^2; volume 3^3 = 27 µm^3; 54 ÷ 27
8	**(a) Both A and R are true, and R is the correct explanation of A.**	A is true: 8000 µm ÷ 400 = 20 µm. R is true and explains A.
9	**The rough endoplasmic reticulum**	—
10	**Water moves out of the cell; the solution is hypertonic; the cell shrinks.**	water moves from the dilute to the concentrated side
11	**(a) 2000×; (b) 6 µm**	20 × 100; 12 × 1000 ÷ 2000
12	**It allows some substances, such as water, oxygen and carbon dioxide, to enter or leave the cell, but stops others.**	—
13	**64 cells; 20 chromosomes each**	6 divisions: 2^6; mitosis keeps the chromosome number
14	**They shrink: water leaves them into the more concentrated syrup.**	—
15	**The chloroplast is found only in plant cells and makes food by photosynthesis; the mitochondrion is in almost all cells and releases energy from food.**	—
16	**1.2 : 1 and 0.6 : 1; the 5 µm cell, which has more surface for its volume**	ratio = 6 ÷ side for a cube
17	**Plant cells have a cell wall of cellulose, plastids (including chloroplasts) and a large central vacuole; they are usually larger and more regular in shape. Animal cells have no cell wall or plastids, and have small vacuoles. Both have a cell membrane, nucleus, cytoplasm, mitochondria, ribosomes, ER and Golgi apparatus.**	—
18	**(a) 1 µm: 6 µm^2, 1 µm^3, 6 : 1; 5 µm: 150 µm^2, 125 µm^3, 1.2 : 1; 10 µm: 600 µm^2,**	area = 6s^2, volume = s^3

Q	Answer	Working
	1000 µm^3, 0.6 : 1. (b) The ratio falls as the cell gets bigger. (c) A small cell has enough surface for materials to enter and leave quickly; a big cell would not, so organisms grow by adding more cells.	
19	**(a) +15%, 0%, −5%. (b) In distilled water (hypotonic) water entered; in the solution as concentrated as the sap (isotonic) there was no net movement; in strong salt (hypertonic) water left. (c) Osmosis.**	change ÷ original mass × 100
20	**(a) 64. (b) 32. (c) 64. (d) 64 cells; 4,096 chromosomes in all.**	2^6 cells × 64