

Transport in cells: practice questions

9 questions • 29 marks • mark scheme at the back

For AQA GCSE Biology 8461 and Combined Science: Trilogy 8464. **Triple only** is not in Combined Science. **Higher tier** is only on the Higher paper.

Name

Total / 29

1 Which statement defines osmosis? [1 mark]

- A. ☐ The movement of particles from a low to a high concentration using energy
- B. ☐ The spreading out of particles of a gas
- C. ☐ The diffusion of water from a dilute solution to a concentrated solution through a partially permeable membrane
- D. ☐ The movement of any particles from a high to a low concentration

2 Oxygen enters a cell by diffusion. Explain how each of these changes would affect the rate of diffusion: (a) increasing the temperature, (b) increasing the concentration of oxygen outside the cell, (c) increasing the surface area of the membrane. [3 marks]

3 A cube has sides of 5 cm. Calculate its surface area to volume ratio. Give your answer in the form X : 1. [3 marks]

Answer =

- 4** A single-celled organism does not need a transport system or special exchange surfaces. **[4 marks]**
A large multicellular organism does. Explain why.

- 5** Explain how the gills of a fish are adapted for exchanging materials. **[3 marks]**

- 6** A potato cylinder has a mass of 5.0 g. After 30 minutes in a sugar solution its mass is 5.6 g. (a) Calculate the percentage change in mass. (b) Calculate the mean rate of water uptake in g per minute. **[4 marks]**

Answer =

- | Percentage change in mass of potato cylinders | |
|--|-------------------------------|
| Concentration of sugar solution (mol/dm ³) | Percentage change in mass (%) |
| 0.0 | +18 |
| 0.2 | +9 |
| 0.4 | +1 |
| 0.6 | -7 |
| 0.8 | -14 |

[illegible]

- =====

- [illegible]

Mark scheme

One mark for each point unless a maximum is given. Words in brackets are not needed for the mark.

1. [1]

C C (1)

2. [3]

- (a) rate increases because particles have more energy / move faster (1)
- (b) rate increases because the concentration gradient is steeper / difference in concentration is bigger (1)
- (c) rate increases because more particles can pass through at once (1)

3. [3]

- surface area = $6 \times 5 \times 5 = 150 \text{ cm}^2$ (1)
- volume = $5 \times 5 \times 5 = 125 \text{ cm}^3$ (1)
- $150 \div 125 = 1.2$, so 1.2 : 1 (1)
- Correct answer gains all 3 marks.

4. [4]

- single-celled organism has a large surface area to volume ratio (1)
- so enough substances can diffuse in and out across the surface to meet its needs (1)
- multicellular organism has a small surface area to volume ratio (1)
- so diffusion across the outside is not enough / diffusion distance too far for inner cells (1)
- so exchange surfaces and a transport system are needed to move molecules in and out of cells (1)
- Max 4.

5. [3]

- many gill filaments / lamellae give a large surface area (1)
- thin (membrane) gives a short diffusion path (1)
- good blood supply to maintain the concentration gradient (1)
- water flows over the gills / ventilated, keeping the concentration gradient (1)
- Max 3.

6. [4]

- (a) change in mass = $5.6 - 5.0 = 0.6 \text{ g}$ (1)
- (a) $0.6 \div 5.0 \times 100$ (1)
- (a) = 12% (increase) (1) allow +12%
- (b) $0.6 \div 30 = 0.02 \text{ g/min}$ (1)

7. [3]

- water moves into the cells by osmosis (1)
- from the dilute solution to the more concentrated solution (inside the cells) through the partially permeable membrane (1)
- estimate of 0.4 to 0.45 mol/dm³ (1)

8. [2]

- mitochondria release energy by respiration (1)
- needed for active transport of mineral ions (against a concentration gradient) (1)

9. [6]

Level 3 5-6	A clear description of all three processes, with accurate explanation of the differences in direction, what moves and energy. Examples and key terms are used correctly.
Level 2 3-4	Two or three processes described correctly, with some attempt to compare them, but with some gaps.
Level 1 1-2	Some correct statements about one or two processes, with little or no comparison.

Indicative content

- diffusion: net movement of particles (gas or in solution) from a higher to a lower concentration (down a gradient)
- examples of diffusion: oxygen and carbon dioxide in gas exchange, urea from cells into blood plasma
- osmosis: diffusion of water from a dilute solution to a concentrated solution through a partially permeable membrane
- active transport: moves substances from a more dilute to a more concentrated solution (against the concentration gradient)
- active transport requires energy from respiration, whereas diffusion and osmosis do not
- examples of active transport: mineral ions into root hairs, sugar from the gut into the blood
- osmosis only involves water