

Movement of substances into and out of cells: practice questions

7 questions • 22 marks • mark scheme at the back

For Pearson Edexcel International GCSE Biology 4BI1 and Science (Double Award) 4SD0. **Biology only** is not in the Double Award and is only examined on Paper 2.

Name

Total / 22

1 Which process needs energy from respiration? [1 mark]

- A. ☐ diffusion
- B. ☐ osmosis
- C. ☐ active transport
- D. ☐ diffusion and osmosis

2 Describe what is meant by osmosis. [3 marks]

3 Root hair cells take up mineral ions from the soil by active transport. Give two differences [3 marks] between active transport and diffusion, and state one reason why root hair cells need active transport.

- 4** A cell is modelled as a cube with sides of 4 cm. (a) Calculate the surface area of the cube. **[4 marks]**
(b) Calculate the volume of the cube. (c) Calculate the surface area : volume ratio. (d) A smaller cube with sides of 2 cm has a ratio of 3 : 1. State how the surface area : volume ratio changes as the cube gets larger.

Answer =

- 5** Explain how two factors, other than surface area to volume ratio, affect the rate at which oxygen diffuses into a cell. **[4 marks]**

- 6** A student fills a piece of Visking tubing with a mixture of starch and glucose solution and places it in a beaker of water. After 30 minutes the water in the beaker contains glucose but no starch. Explain these results. **[4 marks]**

- 7** A potato cylinder has a mass of 4.00 g. It is placed in a sugar solution for one hour. Its mass is then 4.40 g. Calculate the percentage change in mass and explain what this shows about the solution. **[3 marks]**

Answer =

.....

.....

.....

.....

.....

.....

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]

- (diffusion / movement) of water (1)
- from a dilute solution to a more concentrated solution (1) allow from a high to a low water concentration
- through a partially permeable membrane (1)

3. [3]

- active transport moves substances against the concentration gradient / from low to high concentration, diffusion moves them down the gradient (1)
- active transport needs energy from respiration, diffusion does not (1)
- mineral ions are at a higher concentration inside the cell than in the soil, so diffusion alone could not take them in (1)

4. [4]

- (a) $6 \times 4 \times 4 = 96 \text{ cm}^2$ (1)
- (b) $4 \times 4 \times 4 = 64 \text{ cm}^3$ (1)
- (c) $96 : 64 = 1.5 : 1$ (1) allow 3 : 2
- (d) it gets smaller / decreases (1)

5. [4]

- steeper / bigger concentration gradient (1)
- faster diffusion because more particles move down the gradient than back (1)
- higher temperature (1)
- faster diffusion because particles have more kinetic energy / move faster (1)
- allow shorter distance (1) for faster diffusion because particles travel a shorter way (1)
- Max 4

6. [4]

- Visking tubing is partially permeable / has tiny pores (1)
- glucose molecules are small (1)
- so they pass through the pores / diffuse out down a concentration gradient (1)
- starch molecules are too large to pass through the pores (1)

7. [3]

- $(4.40 - 4.00) \div 4.00 \times 100$ (1)
- = +10% / 10% increase (1)
- the solution is more dilute than the potato cell contents, so water moved into the potato by osmosis (1)