

Exercise walk-through

Active transport ■ 3.3

eXercise

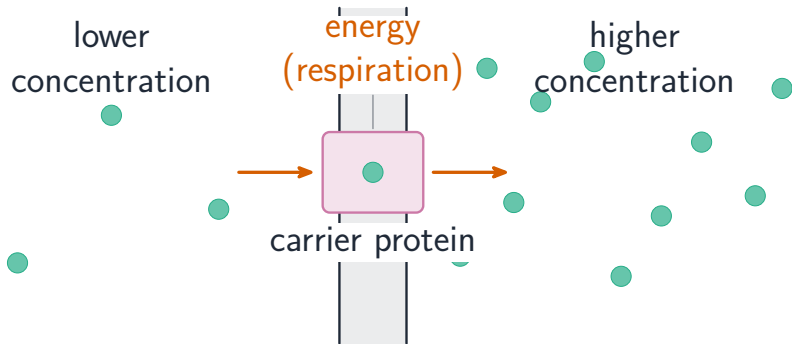
You must be able to

- define active transport (movement against the gradient, using energy)
- explain why it needs energy from respiration
- give an example (root hairs taking up mineral ions)

Method — Active transport

Process	Direction	Energy?
diffusion	high $\rightarrow$ low	no
osmosis	high $\rightarrow$ low water potential	no
active transport	low $\rightarrow$ high (against)	yes

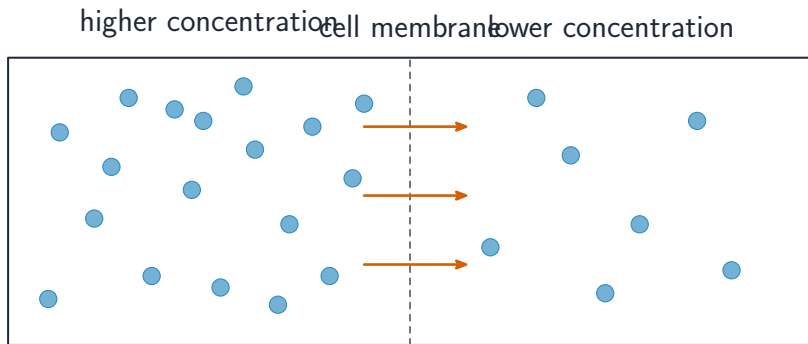
Method — Active transport



particles moved against the gradient, using energy

A carrier protein moving a particle against the gradient, using energy

Method — Active transport



net movement of particles down the concentration gradient

Active transport contrasts with passive diffusion

Practice 2.1 ■ 2 marks

Define active transport.

Solution 2.1

Method: Active transport

Worked steps

the movement of particles through a membrane from a lower to a higher concentration (against the gradient) **M1**, using energy from respiration **A1**.

Practice 2.2 ■ 1 mark

State the source of energy for active transport.

Solution 2.2

Method: Active transport

Worked steps

respiration **B1**.

Exam-style 3.1 ■ 1 mark

Which process moves particles **against** the concentration gradient?

- A diffusion
- B osmosis
- C active transport
- D evaporation

Solution 3.1

Method: Active transport

- A diffusion
- B osmosis
- C active transport 
- D evaporation

Worked steps

C. Active transport moves particles against the gradient.

Exam-style 3.2 ■ 1 mark

Root hair cells take up mineral ions from the soil.

- (a) Name the process used when the ions are more concentrated inside the cell.
- (b) Explain why this process needs energy.

Solution 3.2

Method: Active transport

Worked steps

(a) active transport **B1**.

(b) the ions move against the concentration gradient (uphill) **M1**, which requires energy **A1**.

Exam-style 3.3 ■ 2 marks

Explain the role of carrier proteins in active transport.

Solution 3.3

Method: Active transport

Worked steps

carrier proteins in the membrane pick up the ions/molecules **M1** and carry them across the membrane using energy **A1**.