A2 · The resting neuron · Practice key

This is the worked key. Every practice question is worked step by step.

Worked examples

Read these first. There is one for each kind of question in this lesson.

Example 1 · Decide which way an ion diffuses

A sodium channel opens in a resting neuron. Which way do sodium ions move?

1. Find where the ion is crowded: there are more sodium ions outside the cell.
2. Diffusion goes from more to less.

Answer: Sodium ions move into the cell.

Example 2 · Tell diffusion from active transport

The pump moves potassium ions into the cell. Is this diffusion or active transport?

1. There are already more potassium ions inside.
2. Moving an ion to the side with more needs energy.

Answer: Active transport.

Practice

Questions 1 to 4 are easy. Questions 5 to 8 are medium. Questions 9 and 10 are harder.

EASY

1. State the resting potential of a neuron, with its unit.

1. It is −70 mV.
2. The unit is the millivolt.

EASY

2. State which ion is found mostly outside a resting neuron.

1. Sodium ions are mostly outside.
2. Potassium ions are mostly inside.

EASY

3. Name the structure that ions must pass through to cross the cell membrane.

1. Ions cannot pass straight through the membrane.
2. They pass through ion channels.

EASY

4. State what diffusion is.

1. It is movement from where there is more to where there is less.
2. It uses no energy from the cell.

MEDIUM

5. Explain what the minus sign in −70 mV tells you.

1. It says which side is negative.
2. The inside of the neuron is negative compared with the outside.

MEDIUM

6. Explain why more potassium ions leave a resting neuron than sodium ions enter.

1. The resting membrane has many more potassium channels than sodium channels.
2. More open paths means more ions cross.

MEDIUM

7. State the two things the sodium-potassium pump moves, and the direction of each.

1. It moves sodium ions out of the cell.
2. It moves potassium ions into the cell.

MEDIUM

8. Explain why the sodium-potassium pump needs energy.

1. It moves each ion to the side that already has more.
2. That is against diffusion, so it takes energy.

HARDER

9. A poison blocks every potassium channel in a resting neuron. Predict the effect on the resting potential. Explain.

1. Potassium ions can no longer diffuse out.
2. Positive charge stops leaving the cell.
3. The inside becomes less negative, so the resting potential is lost.

HARDER

10. A cell has run out of energy. Predict what happens to its sodium ions and potassium ions over time. Explain.

1. The pump stops, because it needs energy.
2. Ions keep leaking through the channels.
3. In time the two sides hold the same ions.