

Solutions

Each answer shows the steps, then the **result**.

2.1

- Passive

2.2

- Channel proteins and carrier proteins

2.3

- Glucose is large and polar, so it cannot cross the hydrophobic bilayer without a protein

3.1 B

- a protein but no ATP

3.2

(a)

- No ATP — glucose moves down its gradient, which is spontaneous

(b)

- A channel forms a pore for the molecule to pass through; a carrier binds the molecule and changes shape to move it

3.3

- The molecule still moves **down** its concentration gradient, so no energy is spent; the protein only provides a passageway across the membrane