Revision Guide: Transport in Cells

Subject: GCSE Biology / Combined Science (AQA Foundation)

1. The "Big Three" Comparison

Feature	Diffusion	Osmosis	Active Transport
Definition	Movement of particles from **high to low** concentration.	Movement of **water** from high to low water concentration.	Movement of particles from **low to high** concentration.
Energy Needed?	No (Passive)	No (Passive)	**Yes (Active)**
Direction	Down the concentration gradient.	Down the concentration gradient.	**Against** the concentration gradient.
Membrane?	Not always.	Yes, a **partially permeable** one.	Yes, a cell membrane with carrier proteins.

2. Key Vocabulary

- **Solute:** The solid that dissolves (e.g., sugar/salt).
- **Solvent:** The liquid the solid dissolves into (usually water).
- **Solution:** The mixture of solute and solvent.
- **Concentration Gradient:** The difference in concentration between two areas.
- **Partially Permeable:** A membrane with very small holes that only lets small molecules (like water) pass through.

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3. Factors Affecting the Rate

How fast substances move into or out of a cell depends on:

1. **Concentration Gradient:** The bigger the difference, the faster the rate.
2. **Temperature:** Higher temperatures give particles more **kinetic energy**, so they move faster.

3. **Surface Area:** A larger surface area (e.g., folded membranes) means more particles can pass at once.

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4. Biological Examples (The "Where and Why")

- **Diffusion:** Oxygen moves from the **alveoli** (lungs) into the blood. Carbon dioxide moves from the blood into the lungs to be exhaled.
- **Osmosis:** Water moves from the soil into **root hair cells**.
- **Active Transport: Nitrate ions** (minerals) move from the soil into root hair cells. **Glucose** moves from the small intestine into the blood.

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5. Revision Checklist: Facts to Know

- [ ] Diffusion is the movement of particles from **high to low** concentration.
- [ ] Osmosis is the movement of **water** molecules only.
- [ ] Active transport requires **energy** from respiration.
- [ ] Diffusion and osmosis are **passive** (they don't need extra energy).
- [ ] A **partially permeable membrane** lets small molecules through but not large ones.
- [ ] Villi in the small intestine increase **surface area** to speed up transport.
- [ ] Active transport moves substances **against** a concentration gradient.
- [ ] **Mitochondria** provide the energy needed for active transport.
- [ ] Root hair cells use **active transport** to take in minerals like nitrates.
- [ ] High temperatures increase the rate of diffusion because particles have more **kinetic energy**.
