*This is the **Higher Combined** version — includes Higher Tier content. Some Separate-only details are omitted.*

Aerobic respiration releases energy from glucose in the presence of oxygen. It is the main source of energy for most cellular processes.

- Word equation: glucose + oxygen → carbon dioxide + water (+ energy as ATP).
- Symbol equation: C■H■■O■ + 6O■ → 6CO■ + 6H■O
- Occurs in the MITOCHONDRIA. Cells with high energy demands have more mitochondria (e.g. muscle cells, sperm cells, liver cells).
- Energy released is used for: movement (muscle contraction), active transport, maintaining body temperature, biosynthesis (building molecules), nerve impulse transmission.
- Aerobic respiration releases LOTS of energy per glucose molecule (up to 38 ATP).
- ★ **HT** The process consists of two main stages: glycolysis (cytoplasm) and the Krebs cycle/oxidative phosphorylation (mitochondria).

Key Terms

Aerobic respiration	Respiration using oxygen — releases large amounts of energy as ATP, in mitochondria
ATP	Adenosine triphosphate — the universal energy currency of cells, produced by respiration
Mitochondrion	Organelle where aerobic respiration occurs — has large folded inner membrane (cristae) to maximise surface area

■ **Exam Tip:** Aerobic respiration and breathing are NOT the same. Breathing = physical movement of air. Respiration = chemical process releasing energy in cells. Also: aerobic respiration does NOT just happen in lungs — it occurs in ALL living cells.