

This is the **Higher Separate** version — includes all Higher Tier content (marked ★) and all Separate Science content.

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: $C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O$
 - 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.