Cell Respiration (8.1)

Redox reactions (8.1.1)

Remember: **OIL RIG**

Oxidation **I**s **L**oss, **R**eduction **I**s **G**ain *(of e^-)*

	Oxidation	Reduction
Electrons	Loss	Gain
Hydrogen	Loss	Gain
Oxygen	Gain	Loss

Outline glycolysis (8.1.2)

Phosphorylation: Two ATP are added to glucose to make a hexose biphosphate

Lysis: This is then split into 2 triose phosphates

Oxidation: Triose phosphates lose electrons to form NADH + H^+ (×2), one phosphate added (each)

ATP Formation: Triose phosphates lose phosphates to form pyruvate (4 ATP produced)

Explain aerobic respiration (8.1.4)

Link Reaction:

- Pyruvate transported from cytosol to mitochondrial matrix and converted into acetyl CoA
- Each pyruvate produces CO_2 and NADH + H^+

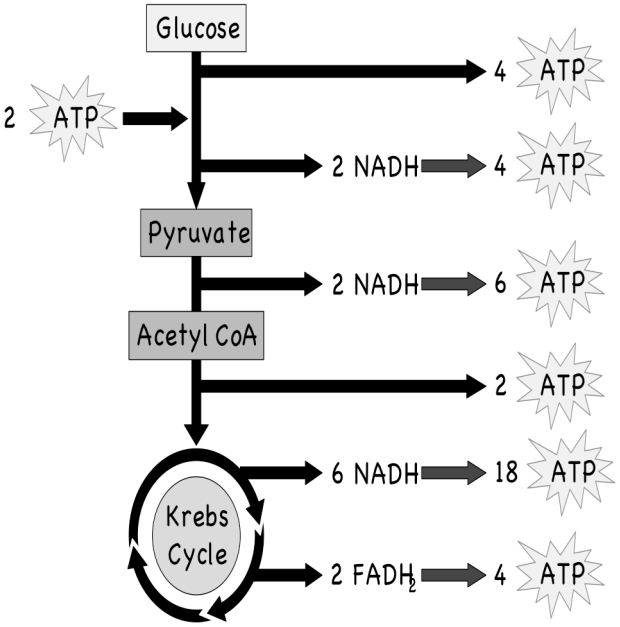
Krebs Cycle:

- Acetyl CoA (2C) is combined with a 4C compound to make a 6C intermediate, which is broken down in a series of reactions to reform the 4C compound
- This cycle produces ATP, 2 × CO_2, 3 × NADH + H^+ and $FADH_2$

Electron Transport Chain:

- Hydrogen carriers pass electrons to the ETC
- As electrons move through the chain they lose energy, which is used to make large quantities of ATP via *chemiosmosis*
- Oxygen is the final electron acceptor and is reduced to form water

Overview of Aerobic Respiration



Explain oxidative phosphorylation in terms of chemiosmosis (8.1.5)

- **Oxidative phosphorylation** involves using energy from *oxidised* hydrogen carriers (NADH + H^+ / $FADH_2$) to *phosphorylate* ADP and make chemical energy (ATP)
- As electrons move through an electron transport chain they lose energy which is used to pump hydrogen ions (H^+) from the matrix into the intermembrane space
- This generates a proton motive force which drives the hydrogen ions back into the matrix at special transmembrane pumps (*ATP synthetase*) - this is known as **chemiosmosis**
- ATP synthetase uses the energy released by the movement of H^+ ions to synthesise ATP from ADP + Pi

Relationship between mitochondrial structure and function (8.1.6)

- **Inner Membrane:** Folded into cristae, increasing SA:Vol ratio (∴ more ETC)
- **Intermembrane Space:** Small volume means that small changes in the number of H^+ ions will have a big effect on the proton motive force
- **Matrix:** Contains necessary enzymes and a suitable pH for the Krebs cycle to proceed
- **Outer Membrane:** Contains transport proteins for shuttling pyruvate from cytosol