CCEA GCE A2 BIOLOGY: UNIT 2

RESPIRATION

- Respiration
  - ATP
    - Components: adenine, ribose, phosphate
    - ATP/ADP cycle
    - Uses: synthesis, mechanical work, active transport
  - Glycolysis
    - Location: cytoplasm
    - Steps:
      - Glucose phosphorylated → fructose bisphosphate (uses 2 ATP)
      - Splits into 2 triose phosphates → pyruvate
      - Generates NADH and net 2 ATP
  - Aerobic respiration
    - Pyruvate enters mitochondria
    - Krebs cycle in matrix
    - Electron transport chain on cristae
  - Anaerobic respiration
    - Regenerates NAD after glycolysis
    - Animals: lactate
    - Plants/fungi: ethanol + CO_2
  - Krebs Cycle
    - Pyruvate → acetyl-CoA
    - Combines with C4 → C6 compound
    - Produces: NADH, $FADH_2$, ATP
    - Links metabolism of carbs, fats, proteins
  - Electron Transport Chain
    - Carriers: NADH, flavoprotein, coenzyme Q, cytochromes
    - O_2 = final electron acceptor
    - Produces most ATP
  - Comparison
    - Aerobic: high ATP yield, needs O_2
    - Anaerobic: less ATP, temporary energy supply
  - Respiratory Quotient (RQ)
    - RQ = CO_2 produced / O_2 consumed
    - Used to identify substrates, detect anaerobic conditions
  - Practical work
    - Respirometer: O_2, CO_2, RQ
    - Redox indicators: methylene blue