

*Learn these by heart before the exam.*

## Cells and movement

*Life processes (MRS GREN): Movement, Respiration, Sensitivity, Growth, Reproduction, Excretion, Nutrition.*

**Animal vs plant cell:** both have a nucleus, cytoplasm and membrane; plant cells also have a cell wall, chloroplasts and a large vacuole

**Diffusion:** net movement of particles from high to low concentration; how gases and small molecules cross membranes

**Osmosis:** diffusion of water across a partially permeable membrane, from high to low water potential

**Active transport:** movement from low to high concentration using energy from respiration (e.g. root hair cells taking up ions)

## Enzymes and nutrition

**Enzyme:** a biological catalyst that speeds up reactions; each has a specific substrate that fits its active site

*Enzymes work fastest at an optimum temperature and pH; high temperature or wrong pH denatures the active site.*

*Balanced diet: carbohydrates, proteins, lipids, vitamins, minerals, fibre and water.*

*Digestion enzymes: amylase → sugars, protease → amino acids, lipase → fatty acids + glycerol; bile emulsifies fats.*

**Photosynthesis:** carbon dioxide + water → (light, chlorophyll) → glucose + oxygen; limited by light, CO<sub>2</sub> and temperature

## Transport and respiration

*Plants: water and minerals up the xylem; sugars up and down the phloem (translocation).*

**Transpiration:** loss of water vapour from leaves; faster in heat, wind, light and low humidity

**Aerobic respiration:** glucose + oxygen → carbon dioxide + water + energy (much ATP)

**Anaerobic respiration:** without oxygen: in muscle → lactic acid; in yeast → alcohol + CO<sub>2</sub> (fermentation); little energy

*Blood: red cells carry oxygen, white cells fight disease, platelets clot, plasma transports. The heart is a double pump.*

## Coordination and homeostasis

**Homeostasis:** keeping a steady internal environment – temperature, water and blood glucose

*Reflex arc: receptor → sensory neurone → relay (spinal cord) → motor neurone → effector; fast and automatic.*

*Insulin lowers blood glucose; if it is not controlled the person has diabetes. Sweating and vasodilation cool the body.*

*Plant response: auxin makes shoots grow towards light (phototropism) and roots towards gravity.*

## Inheritance and ecology

**Mitosis vs meiosis:** mitosis makes identical cells for growth and repair; meiosis makes gametes with half the chromosomes and variation

*Genetics terms: dominant allele shows when present; recessive needs two copies. Monohybrid cross gives a 3:1 ratio.*

**Natural selection:** individuals vary; the best adapted survive, reproduce and pass on their genes – the population changes over time

*Food chain: producer → primary consumer → secondary consumer; energy is lost at each stage, so chains are short.*

*Carbon cycle: photosynthesis removes CO<sub>2</sub>; respiration, combustion and decay return it.*