IGCSE Biology

Revision Sheet · 考前速记

Learn these by heart before the exam. 考试前把这些内容背熟。

Cells and movement

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

Animal vs plant cell 动物与植物细胞: both have a nucleus, cytoplasm and membrane; plant cells also have a cell wall, chloroplasts and a large vacuole

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

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

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

Enzymes and nutrition

Enzyme 酶: 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 光合作用: carbon dioxide + water → (light, chlorophyll) → glucose + oxygen; limited by light, CO_2 and temperature

Transport and respiration

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

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

Aerobic respiration 有氧呼吸: glucose + oxygen → carbon dioxide + water + energy (much ATP)

Anaerobic respiration 无氧呼吸: without oxygen: in muscle → lactic acid; in yeast → alcohol + CO_2 (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 稳态: 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 有丝分裂与减数分裂: 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 自然选择: 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_2; respiration, combustion and decay return it.