

Topic 6: Plant Structures and Functions

Edexcel · GCSE Biology · Revision Notes
Specification reference: 6.1–6.7

Note: Sections marked ★ HIGHER TIER ONLY are for Higher tier students only. Foundation tier students should focus on the unmarked sections.

6.1–6.3 Photosynthesis

Photosynthesis produces glucose and oxygen from CO₂ and water using light energy. It occurs in chloroplasts.

Equation: $6\text{CO}_2 + 6\text{H}_2\text{O} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$

- Light intensity, CO₂ concentration and temperature are limiting factors.
- Glucose is used for: respiration, making starch, cellulose, proteins, fats, sucrose.

Leaf structure: palisade mesophyll (photosynthesis), spongy mesophyll (gas exchange), guard cells (control stomata), xylem (water in), phloem (sugars out).

Required Practical 5: Investigate the effect of light intensity on the rate of photosynthesis using pondweed.

6.4–6.5 Transpiration

Transpiration is the evaporation of water from leaves through stomata. It pulls water up the xylem from roots.

- Factors increasing transpiration rate: higher temperature, higher light intensity, lower humidity, higher wind speed.
- Stomata are opened by turgid guard cells (when water is plentiful) and closed when the plant is water-stressed.
- Translocation: dissolved sucrose moves through phloem from leaves (source) to other parts (sink).

Required Practical 6: Investigate factors affecting transpiration rate using a potometer.

6.6–6.7 Plant Hormones

Plants produce hormones that control growth and responses to stimuli.

- **Auxins** (e.g. IAA) — produced in shoot tips; control growth. In phototropism, light causes auxin to move to shaded side → cells there elongate → shoot bends towards light.
- **Gravitropism** — auxin accumulates on the lower side of roots → inhibits growth on that side → root grows downward.
- **Gibberellins** — promote seed germination and stem elongation.
- **Ethene** — promotes fruit ripening; used commercially to ripen bananas after transport.
- **Abscisic acid (ABA)** — promotes stomata closure in drought; promotes seed dormancy.

- Practical uses: auxins as rooting powder (cuttings), selective weedkillers (broadleaf weeds), ethene to ripen fruits.

Key Terms

Tropism: Growth response of a plant to a directional stimulus

Phototropism: Growth towards (positive) or away from (negative) light

Gravitropism: Growth response to gravity (roots: positive; shoots: negative)