Cerebrum Biology Academy

Plant Biology Diagrams

A Visual Reference Guide for NEET

Website: cerebrumbiologyacademy.com

Phone: +91 8826444334

Created: February 2026

Root Structure

- Root cap: Protective layer at the apex
- Meristematic zone: Cell division and growth
- Elongation zone: Cells increase in length
- Maturation zone: Root hairs and vascular tissues develop
- Epidermis: Outer protective layer with root hairs for absorption
- Vascular cylinder: Contains xylem and phloem for transport

■ NEET TIP

Root structure is crucial for water and mineral absorption. Remember the zones from apex to maturity: Cap → Meristematic → Elongation → Maturation

Stem Anatomy: Dicot vs Monocot

- Dicot stems: Vascular bundles arranged in rings with cambium
- Monocot stems: Vascular bundles scattered throughout the stem
- Dicots: Secondary growth possible (woody stems)
- Monocots: No secondary growth (herbaceous, hollow)
- Both have epidermis, cortex, and vascular bundle arrangement differences
- Starch storage: More in monocots, less in dicots

■ REMEMBER

Dicots = rings (like tree rings), Monocots = scattered. This helps identify plant type from cross-section!

Leaf Structure & Internal Anatomy

- Epidermis: Upper and lower layers with waxy cuticle for protection
- Mesophyll: Middle layer with palisade and spongy cells
- Palisade cells: Tightly packed, main site of photosynthesis
- Spongy mesophyll: Loosely arranged for gas exchange
- Stomata: Microscopic pores for CO2 uptake and transpiration
- Vascular bundles: Transport water and nutrients

■ NEET TIP

Palisade cells are the "photosynthesis factories" of the leaf. Understand their structure for better answering physiology questions.

Flower Parts & Reproductive Structure

- Calyx: Sepals (protective, typically green)
- Corolla: Petals (attractive, aids in pollination)
- Androecium: Stamens (anther + filament) - male reproductive organ
- Gynoecium: Pistil (stigma + style + ovary) - female reproductive organ
- Anther: Produces pollen grains (male gametes)
- Ovule: Inside ovary, contains egg (female gamete)

■ KEY CONCEPT

A complete flower has all 4 whorls. Know the structure for pollination and fertilization questions!

Photosynthesis: Light & Dark Reactions

- Light reactions (Thylakoid membrane): Convert light to ATP and NADPH
- PS II: Water splitting, oxygen release
- PS I: NADP+ reduction to NADPH
- Calvin cycle (Stroma): Uses ATP and NADPH to fix CO2 into glucose
- Light-dependent: Produces ATP and NADPH
- Light-independent: Produces glucose using ATP and NADPH

■ NEET TIP

Light reactions are energy-producing, dark reactions are energy-consuming. Both are equally important for NEET!

Plant Hormones & Their Functions

- Auxin: Promotes cell elongation, apical dominance, root formation
- Gibberellin: Promotes stem elongation, seed germination, flowering
- Cytokinin: Promotes cell division, delays senescence
- Ethylene: Ripening of fruits, leaf and flower abscission
- Abscisic Acid: Closes stomata, stress response, seed dormancy
- Interactions: Hormone ratios determine plant responses

■ REMEMBER

Each hormone has multiple functions. Focus on their antagonistic and synergistic interactions.

Plant Growth & Development

- Growth: Irreversible increase in size and biomass
- Development: Qualitative changes in structure and function
- Apical meristem: Produces primary growth (length)
- Lateral meristem: Produces secondary growth (thickness)
- Differentiation: Cells specialize into tissues
- Morphogenesis: Development of plant form and structure

■ CONCEPT

All growth is development, but not all development is growth. Understand this distinction clearly!

Transport in Plants: Xylem & Phloem

- Xylem: Transports water and minerals (passive, one-way)
- Xylem vessels: Dead, hollow cells, connected end-to-end
- Phloem: Transports organic nutrients (active, two-way)
- Phloem sieve tubes: Living, with companion cells for active transport
- Transpiration: Water loss through stomata, drives xylem transport
- Root pressure and capillarity: Also contribute to water movement

■ NEET TIP

Remember: Xylem = dead (no sap movement), Phloem = living (translocation). Key for transport questions!

Sexual Reproduction in Plants

- Pollination: Transfer of pollen from anther to stigma
- Agents: Wind, water, insects, animals (pollinator-flower coevolution)
- Fertilization: Fusion of male and female gametes
- Double fertilization: Unique to angiosperms (endosperm formation)
- Seed development: From ovule after fertilization
- Fruit development: From ovary wall maturation

■ KEY CONCEPT

Double fertilization produces both zygote and endosperm. This is unique to flowering plants!

Plant Taxonomy: Key Families for NEET

- Poaceae (Grasses): Wheat, rice, maize - monocot family
- Fabaceae (Legumes): Beans, peas - nitrogen-fixing bacteria
- Solanaceae: Tomato, potato, chili - dicot family
- Brassicaceae: Cabbage, mustard - cruciferous family
- Cucurbitaceae: Cucumber, pumpkin - climbing vines
- Asteraceae: Sunflower, chrysanthemum - largest family

■ REMEMBER

Know family characteristics, economic importance, and example plants. These appear frequently in NEET questions!