

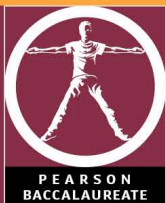
Biology

HIGHER LEVEL

Worksheet 9.1

Fifteen summary facts

- 1 Seeded vascular plants have three basic types of tissue:
 - dermal tissue, which protects and prevents water loss
 - ground tissue, which functions in storage, photosynthesis, support and secretion
 - vascular tissue, which allows conduction of water, minerals and nutrients.
- 2 The parts of a root include the epidermis, cortex, endodermis, xylem and phloem. These structures allow the root to carry out its main functions of absorbing mineral ions and water from the soil, anchoring the plant, and (in some cases) providing food storage.
- 3 The stem of a plant is involved in transport of materials and allows the attachment of leaves, the photosynthetic factories of the plant. The leaves contain a cuticle, upper epidermis, palisade mesophyll, spongy mesophyll, lower epidermis, and vascular bundles made up of xylem and phloem. Stomata are on the bottom surface of leaves and allow oxygen and carbon dioxide exchange.
- 4 Angiosperms (flowering plants) are divided into monocots and dicots. Monocots have parallel leaf venation, flower parts in threes or multiples of three, seeds with one cotyledon (seed leaf), fibrous root systems, vascular bundles throughout the stem, and pollen grains with one opening. Dicots have netlike venation in leaves, flower parts in fours or fives or multiples of four or five, seeds with two cotyledons, taproot root systems, vascular bundles arranged as a ring in the stem, and pollen grains with three openings.
- 5 Roots, stems and leaves may have modifications that allow them to carry out functions that help in the survival of different species. Some of these modifications include prop roots, pneumatophores, bulbs, rhizomes, stolons, tendrils, bracts and spines.
- 6 Plants show indeterminate growth because of their meristematic tissue. Apical meristems occur at the tips of roots and stems and cause primary growth. Lateral meristems include vascular cambium and cork cambium and allow growth in thickness of plants. Meristematic tissue allows tropisms in plants.
- 7 Water moves into the root hairs of roots because they have a higher solute concentration and a lower water concentration than the surrounding soil. Once in the root hairs, water follows this pathway: epidermis → cortex → vascular cylinder. A protein pump may carry out chemiosmosis to transport mineral ions and solutes into the root.
- 8 Transpiration is water loss from the aerial portions of plants. As water is lost by transpiration, more water is absorbed by the roots. Plants called xerophytes have special modifications that decrease transpiration. These modifications include small leaves, reduced stomata number, a thickened cuticle, and hair cells on the surface.



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- 9 Stomata open and close because of changes in the turgor pressure of the guard cells. Abscissic acid causes potassium ions to move out of guard cells resulting in stomatal closure.
- 10 The cohesion–tension theory explains the movement of water and minerals upwards in the xylem of plants. The movement depends on cohesion and adhesion maintaining a constant column of water in the xylem.
- 11 The movement of organic molecules in plants is called translocation. Phloem sap includes mostly water, sugars, amino acids, plant hormones and mRNA. Its movement is explained by the pressure–flow hypothesis. This hypothesis involves a point of loading of sugar called the source, bulk flow, and the removal of sugar at the sink. Sugar is transported into and away from the source and sink sites by active transport.
- 12 All plants show two different generations in their life cycle: the gametophyte (haploid) and the sporophyte (diploid) generations. These two generations alternate with one another – this is called ‘alternation of generations’.
- 13 Pollination must occur before fertilization in flowering plants. Vectors of pollen include the wind, insects, birds, water and animals other than insects. There are two types of pollination, cross-pollination and self-pollination.
- 14 Fertilization in plants occurs when sperm from the growing pollen tube combines with the egg of the carpel’s ovule to form a zygote. Once the zygote is formed, it develops with the surrounding tissue into the seed. If the surrounding ovary of the seed continues to develop, it becomes a fruit. The fruit encloses and helps to protect the seed.
- 15 Seeds require water, oxygen, and an appropriate temperature to germinate. Once germination begins, gibberellic acid is released triggering the production of amylase. Amylase causes the hydrolysis of starch into maltose and then into glucose. The glucose is then used for cellular respiration and continued growth of the seed.