Unit 10- Plants /Study Guide KEY

Answer Key

SECTION 20.1. ORIGINS OF PLANT LIFE

1. eukaryotic, photosynthetic, same types of chlorophyll, starch as storage product, cellulose in cell walls
2. Charophyceae
3. multicellular body, which allowed for the specialization of cells and tissues, a method of cell division producing channels for communication within cell walls, a method of reproduction involving sperm traveling to and fertilizing an egg
4. Plants will die if they dry out from exposure to air and sunlight; cuticles hold moisture in and stomata allow for gas exchange through the cuticle.
5. Plants must transport water up from roots and sugars down from leaves; a vascular system allows for the transportation of these materials.
6. Plants need to be able to support their weight while growing upright; lignin hardens the cell walls of some plant tissues, providing support.
7. Plants must be able to reproduce on land; pollen grains (from which sperm develop) can be carried by wind or animals to female flower parts, and seeds protect plant embryos from drying wind and sunlight.
8. Most plant roots provide habitats for fungi and bacteria, which in turn help the plants to obtain nutrients from the soil. Mutualisms have also evolved between plants and the organisms that pollinate them, such as the night-blooming orchid and the hawk moth.
9. Some plants have evolved thorns or spines to keep herbivores from eating them. Others have evolved defensive chemicals which taste bad to herbivores or make them sick.
   Plant: could show plant growing on land with Sun shining down. **Cuticle and Stomata:** could show surface with water bouncing off (cuticle), with opening in the center (stomata) showing arrows going in and out to represent gas exchange. **Vascular System:** could show simple plant with arrows running up from roots up to leaves and arrows running down from leaves to roots. **Seed:** could show tiny plant/embryo surrounded by a protective barrier that shields out Sun and wind

SECTION 20.2. CLASSIFICATION OF PLANTS

1. free-standing water through which sperm can travel to eggs
2. They must grow close to the ground and absorb water and nutrients directly.
3. *liverworts*—Hepatophyta; live in damp environments, come in two basic forms—thallose or leafy; *hornworts*—Anthocerophyta; found in tropical forests and along streams, main plant body is flat and lobed; *mosses*—Bryophyta; most common type of nonvascular plant, have no true leaves or roots, anchor themselves to surfaces with rhizoids
4. They are able to grow higher up off of the ground.
5. *club mosses*—Lycophyta; not true mosses, oldest living group of vascular plants; *ferns*—Pterophyta; grow from underground stems called rhizomes, have large leaves called fronds
6. They can reproduce without free-standing water; seeds nourish and protect plant embryos; and seeds allow plants to disperse to new areas.

7. gymnosperms: seeds are not enclosed in fruit; angiosperms: seeds are enclosed in fruit
8. *cycads*—Cycadophyta; gymnosperms that grow in tropical areas, look like palm trees with large cones; *gingko*—Ginkgophyta; gymnosperm, only one species (*Ginkgo biloba*), which is common in gardens and urban landscaping; *conifers*—Coniferophyta; most diverse gymnosperms, have needlelike leaves and cones; *flowering plants*—Anthophyta; includes all angiosperms, have flowers as reproductive structures, seeds are enclosed in fruit
9. fruit
10. pollination
11. cone
12. flower

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SECTION 20.3. DIVERSITY OF FLOWERING PLANTS

1. flowers
2. pollination by animals
3. fruit
4. seed dispersal
5. 1; parallel veins in leaves, flower parts in multiples of three, vascular tissue scattered in stem
6. 2; netlike veins in leaves, flower parts in multiples of four or five, vascular tissue arranged in rings in stem
7. Other characteristics affect the outward appearance of flowering plants as well as when they should be planted and harvested.
8. woody stems: stiff, often thick stems containing the dead cell walls of vascular tissues that contain lignin and cellulose; herbaceous stems: do not contain wood
9. **Annual:** mature from seed, flower, and die in one year; corn, lettuce, zinneas; **Biennial:** complete life cycle in two years, producing leaves, flowers and seeds in second year; carrots. **Perennial:** live more than two years; most woody plants (including trees), grasses, dandelions
10. an embryonic leaf inside a seed
11. Monocots have one cotyledon.
12. Dicots have two cotyledons.
13. dead cells of vascular tissue, which contain lots of lignin and cellulose in their cell walls

SECTION 21.1. PLANT CELLS AND TISSUES

1. Parenchyma cells store starch, oils, and water for the plant, help heal wounds and regenerate parts. Their cell walls are thin, stretchy, and flexible.
2. Collenchyma cells provide support while the plant grows. Their cell walls are variable width and flexible.
3. Sclerenchyma cells provide skeletal support for the plant. Their cell walls are thick and rigid.
4. dermal
5. ground
6. vascular
7. xylem
8. phloem
9. cuticle
10. outer bark
11. support and storage
12. water and minerals
13. sugars
14. dermal tissue
15. vascular tissue

16. ground tissue
17. collenchyma cell
18. phloem
19. sclerenchyma cell
20. parenchyma cell
21. xylem

SECTION 21.2. THE VASCULAR SYSTEM

1. Cohesion is the tendency of hydrogen bonds to form between water molecules. Sketch should show H bonds between water molecules.
2. Adhesion is the force made by hydrogen bonds formed between water molecules and other substances. Sketch should show H bonds forming between water molecules and wall of xylem or other container.
3. **Roots:** water and dissolved minerals in the soil are pulled into the roots
4. **Stems:** cohesion and adhesion create tension within xylem that helps move water upward
5. **Leaves:** Transpiration, the evaporation of water through leaf stomata, is the major force moving water through leaves.
6. leaves and roots
7. A part of the plant using or storing the sugar.
8. sugar source
9. pumping or loading sugar into the phloem at a high concentration, and unloading sugars into the sink
10. osmosis
11. pressure-flow model
12. cohesion-tension theory
13. transpiration

SECTION 21.3. ROOTS AND STEMS

1. **Vascular cylinder:** the center of the root, made of xylem and phloem
2. **Apical meristem:** areas of growth that lengthen the tips of roots
3. **Root cap:** small cone of cells that protects the growing part of the root as it pushes through soil
4. they increase the surface are of the roots, making absorption more efficient
5. fibrous roots
6. taproots
7. mineral (nutrient) ions
8. water
9. nitrogen
10. magnesium
11. Stems support flowers and leaves, house the vascular system, store food and water
12. baobab tree, cactus
13. Strawberry plants form new plants from their stems (called runners or stolons)
14. potatoes and ginger
15. Herbaceous stems produce little or no wood, are usually soft, can be monocots or dicots, are green and may conduct photosynthesis.
16. primary growth
17. secondary growth
18. a band of both light- and dark-colored wood
19. root cap
20. meristem
21. vascular cylinder
22. fibrous root
23. primary growth

24. root hair
25. taproot
26. secondary growth

SECTION 21.4. LEAVES

1. Blade should attach to petiole, which attaches to the stem. Axillary bud should be at the spot where the stem and petiole meet.
   Sequence Diagram: open → CO_2 → photosynthesis → transpiration → guard cells → CO_2
2. leaf type, vein pattern, and margin (edge)
3. A leaf has an axillary bud at the base of the petiole.
4. mesophyll
5. Paliside mesophyll is right beneath the dermal layer and collects sunlight. Spongy mesophyll has air spaces that connect with stomata, allowing gas exchange to occur.
6. Accept three of the following: having spines or needles rather than leaves (small surface area), thick cuticles or waxy epidermis, sunken areas around stomata.
7. Terms should be in the following order: cuticle, dermal tissue, mesophyll, dermal tissue, cuticle.
8. blade
9. guard cell
10. petiole
11. mesophyll

SECTION 22.1. PLANT LIFE CYCLES

1. life cycle that alternates between diploid and haploid phases
2. sporophyte: diploid, produces spores; gametophyte: haploid, produces gametes
3. during the gametophyte phase when gametes are produced
4. Diagram should resemble Figure 1.1, and include each of the terms provided in the word box as labels. May also want to divide the diagram into 2 hemispheres, showing diploid and haploid phases.
5. moss; sporophytes are stalks that grow up from gametophyte, spores produced in tiny cups at tip of stalks; gametophyte dominant
6. fern; sporophyte dominant, spores produced on the underside of leaves; gametophyte is the size of a fingernail
7. conifer; sporophyte is dominant, produces male and female spores; has microscopic male and female gametophytes, pollen grains are male gametophytes
8. sporophyte (diploid) and gametophyte (haploid)
9. Sporophytes produce spores.
10. Gametophytes produce gametes.

SECTION 22.2. REPRODUCTION IN FLOWERING PLANTS

1. Diagram should resemble Figure 2.1, with all floral structures clearly labeled. Functions: sepal—protects developing flower; petal—can attract pollinators; stamen—male reproductive structure; carpel—female reproductive structure.
2. A pollen grain must reach the stigma of the same plant species.
3. Animal pollinators transfer pollen in a reliable way, while they are searching for food from flower to flower; wind is much more random as it may or may not blow pollen in the right direction.
4. Cells in anthers divide by meiosis into four male spores, which each divide again by mitosis to form pollen grains (male gametophytes); results in many two-celled pollen grains

5. One cell in each ovule divides by meiosis to form female spores, one of these divides by mitosis three times to produce female gametophyte; results in seven-celled female gametophyte—one large central cell with two nuclei called polar nuclei, one cell develops into egg.
6. Two sperm from pollen grain travel down the pollen tube, one sperm fertilizes egg and the other unites with polar nuclei; results in fertilized egg and endosperm.
7. Ovule develops into seed and surrounding ovary develops into fruit; results in seed that may be dispersed with aid of fruit.
8. An ovary can contain many ovules, one egg can be produced in each ovule.
9. egg and polar nuclei

SECTION 22.3. SEED DISPERSAL AND GERMINATION

1. to help disperse seeds
2. to reduce competition for resources (space, sunlight, water, nutrients) with other plants
3. passed through their digestive system and deposited; brushed off of them after being stuck to their body
4. wind: wing- or parachute-like fruits; water: floating fruits
5. dormant
6. favorable
7. proper temperature, moisture, oxygen, and light levels
8. embryo takes up water
   → seed swells, seed coat cracks; water activates enzymes
   → enzymes break down endosperm into sugars; sugars are moved to embryo
   → embryo continues to grow, eventually breaking surface of soil
9. The embryonic root/radicle emerges first, followed by a young shoot called a plumule, and then cotyledons/leaves.
10. when it begins to photosynthesize
11. dormancy
12. Germination is when an embryo breaks out of its seed coat.

SECTION 4. ASEXUAL REPRODUCTION

1. production of offspring from a single parent
2. Well-adapted individuals can make many copies of themselves.
3. it gives rise to genetic diversity
4. asexually
5. regeneration
6. a new individual growing from stem, leaf, or root fragment that has fallen off parent plant
7. a new individual growing from stem, leaf, or root still attached to parent plant
8. horizontal above-ground stem; new plants can grow from certain points; strawberries
9. horizontal underground stem; new plants can grow from certain points; irises
10. underground stem modified for storage; new plants can sprout from “eyes”; potato
11. underground stem surrounded by modified leaves; can divide to produce new plants; tulips
12. When fragments of stems or leaves are placed in water or soil, they can develop into new individuals.
13. Vegetative structures from two different plants, each with their own desirable traits, can be joined together.
14. Regeneration is the process in which plants bring a new version of themselves into being.
15. Vegetative structures are structures not involved in sexual reproduction; vegetative reproduction is reproduction involving these structures (stems, leaves, and roots).

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SECTION 5. PLANT HORMONES AND RESPONSES

1. chemical messenger produced in one part of an organism that stimulates or suppresses the activity of cells in another part
2. normal changes in the environment; internal changes/part of life cycle
3. produce dramatic increases in size, such as rapid growth of young seedlings and rapid growth of some fruits and flower stalks
4. fruit ripening
5. stimulate cytokinesis/cell division, involved in growth of side branches
6. lengthening cells, involved in growth of primary stem
7. thigmotropism
8. rapid response
9. gravitropism
10. photoperiodism
11. phototropism
12. Phototropism is growth turning toward light, thigmotropism is growth turning in response to touch, gravitropism is growth turning in response to gravity.

stem "bending" toward one side. Cells should be drawn within stem. Cells on side of stem opposite the direction stem is bending should be long and have high auxin concentration. Cells on side of stem that stem is bending toward should be shorter with lower auxin concentration13.

Phototropism: Illustration should show a

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