Name _____ **Period _____**

AP Biology **Date _____**

REVIEW UNIT 8: PLANT FORM & FUNCTION — "TOP TEN"

A. Top "10" — If you learned anything from this unit, you should have learned:

1. Plant structure
   a. cells: parenchyma (least differentiated, most abundant; photosynthetic – leaf tissue); collenchyma (support – celery strings); sclerenchyma (reinforced, tough cell walls, no longer growing – wood, nutshells)
   b. tissue: dermal (protective outer coating); vascular (transport), ground (everything else)
   c. specialized cells
      - xylem: tracheids (long, thin) & vessel elements (short, wide) – conduct water & dead at functional maturity
      - phloem: sieve-tube elements & companion cells – conduct sugar & sieve-tube elements are alive at functional maturity, but lack nucleus, ribosomes & central vacuole, connected by plasmodesmata; companion cells provide molecular needs of sieve-tube elements
2. Growth
   a. structure: meristems (apical, lateral, vascular cambium, cork cambium) – embryonic stem cells that produce new cells
   b. cross section through angiosperm tree (from center outward): pith, primary xylem, secondary xylem, vascular cambium, secondary phloem, primary phloem, cortex, cork cambium, bark
3. Gas exchange
   a. structure: stomates in leaves
   b. function: diffusion (O_2 in & O_2 & H_2O out), transpiration, supports Calvin cycle
4. Energy production
   a. structure: leaf (mesophyll, palisades, chloroplasts, photosynthesis, phloem, xylem)
   b. function: production of sugars for energy storage and plant structure, bulk flow / translocation of sugars = osmotic gradient from source to sink
5. Mineral & Water Transport
   a. structure: roots, root hairs, xylem, stomates, transpiration (adhesion, cohesion, evaporation), endodermis & Casparian strip, NPK
   b. function: supports photosynthesis & synthesis
   c. symbiotic relationships (mutualism)
      - mycorrhizae (fungus) – live in soil & extend into plant roots; increases water & mineral absorption; fungus gets food
      - *Rhizobium* (N-fixing bacteria) – live in root nodules of legume family; converts N into soluble form for plant use; bacteria get food and shelter

6. Response
   a. hormones
      - auxin (stimulate cell elongation), gibberellins (fruit growth & stimulate cell elongation with auxins), ethylene (gas: fruit ripening, autumn leaf fall, death of annual plants, apoptosis), cytokinins (stimulate cell division, cytokinesis & differentiation; coordinated with auxins), abscisic acid (slows growth, seed dormancy)
      - signal transduction pathway: reception, transduction, response
   b. gravitropism (settling of starch grains), phototropism (elongation of cells on shaded side), photoperiod/flowering (changes in phytochromes: P_r converts to P_{fr} in light), thigmotropism (loss of K^+ & H_2O from cells)
      - short-day (long night plants: early fall or spring flowering), long-day (short night plants: late spring or summer flowering) & day-neutral plants (flowering at any time): length of darkness vs. critical period
7. Reproduction
   a. structure: flower, petals, stamen, pistil & ovules
      - pollen grain (microspores or male gametophyte): two sperm nuclei
      - ovules (megaspores or female gametophyte) : eight nuclei (1 egg, 2 polar nuclei, 5 others)
   b. function: double fertilization
      - one sperm nucleus fertilizes egg = 2n zygote
      - other sperm nucleus combines with 2 polar nuclei = 3n endopserm (food storage)
   c. alternation of generations
      - multicellular diploid (sporophyte) alternating with multicellular haploid (gametophyte)
      - diploid sporophyte makes haploid spores (meiosis)
      - haploid gametophyte makes haploid gametes (mitosis)
   d. Prevention of self-fertilization: self-incompatability
8. Evolution
   a. mosses (bryophytes)
      - no vascular system, swimming sperm, dominant gametophyte / parasitic sporophyte
   b. ferns (pteridophytes)
      - vascular, swimming sperm, dominant sporophyte / independent, reduced gametophyte
   c. conifers (gymnosperm)
      - pollen & naked seeds, dominant sporophyte (tree) / highly reduced gametophyte (pollen & ovule in cones)

d. flowering plants (angiosperm)
   - flowers, fruits & double fertilization, dominant sporophyte / highly reduced gametophyte (pollen & ovule in flowers)

B. Labs

1. Transpiration Lab

   Be sure to review the procedures and the conclusions, and understand:

   a. Factors that affect rate of transpiration
   b. How to set up a similar experiment
   c. Controls vs. Experimental