

**REVIEW 7: PLANT ANATOMY & PHYSIOLOGY UNIT****A. Top “10” — If you learned anything from this unit, you should have learned:**

1. Gas exchange
  - a. structure: stomates
  - b. function: diffusion, supports Calvin cycle
2. Energy production
  - a. structure: leaf (mesophyll, palisades, chloroplasts, photosynthesis, phloem)
  - b. function: bulk flow = osmotic gradient from source to sink
3. Mineral & Water Transport
  - a. structure: roots, root hairs, xylem, stomates, transpiration (adhesion, cohesion, evaporation), Casparian strip, NPK
  - b. function: supports photosynthesis & synthesis
4. Growth
  - a. structure: meristems (apical, lateral, vascular cambium, cork cambium)
5. Response
  - a. hormones
    - auxin (cell growth & division), gibberellins (fruit growth), ethylene (fruit ripening, autumn leaf fall), cytokinins (works with auxins), abscisic acid (seed dormancy)
  - b. gravitropism (settling of starch grains), phototropism (elongation of cells on shaded side), photoperiod (changes in phytochrome), thigmotropism (loss of  $K^+$  &  $H_2O$  from cells),
6. Reproduction
  - a. structure: flower, petals, stamen, pistil
7. Evolution
  - a. alternation of generations
    - multicellular diploid (sporophyte) alternating with multicellular haploid (gametophyte)
  - b. mosses (bryophytes)
    - no vascular system, swimming sperm
  - c. ferns (pteridophytes)
    - vascular, swimming sperm
  - d. conifers (gymnosperm)
    - pollen & seeds
  - e. flowering plants (angiosperm)
    - flowers & fruits

**B. Labs**

## 1. Transpiration Lab

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

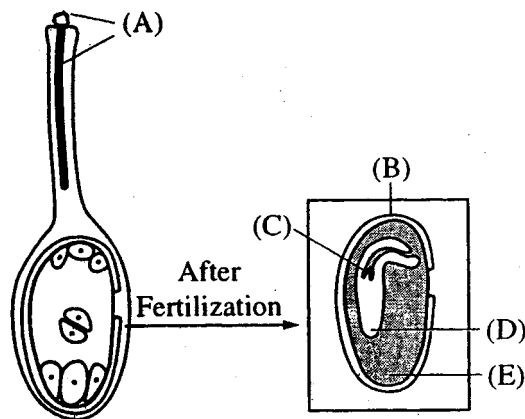
- a. Factors that affect rate of transpiration
- b. How to set up a similar experiment
- c. Controls vs. Experimental

**C. Sample Multiple Choice Questions**

1. Plant stems bend towards the light source as a result of increased (1999:30)
  - a. chlorophyll synthesis on the side of the stem near the light source
  - b. cell division on the side of the stem near the light source
  - c. cell division on the side of the stem away from the light source
  - d. cell elongation on the side of the stem near the light source
  - e. cell elongation on the side of the stem away from the light source
  
2. The gametophyte is the dominant generation in which of the following plants (1999:33)
  - a. Dicots
  - b. Monocots
  - c. Gymnosperm
  - d. Ferns
  - e. Mosses
  
3. The driving force for the movement of materials in the phloem of plants is (1999:35)
  - a. gravity
  - b. a difference in osmotic potential between the source and the sink
  - c. root pressure
  - d. transpiration of water through stomates
  - e. adhesion of water to vessel elements
  
4. In plants, the initiation of flowering in response to photoperiod is triggered by changes in (1999:36)
  - a. ethylene
  - b. auxin
  - c. gibberellic acid
  - d. phytochrome
  - e. cytokinin

5. The rate of flow of water through the xylem is regulated by (1999:48)
- passive transport by the pith
  - the force of transpirational pull
  - the number of companion cells in the phloem
  - active transport by the sieve-tube members
  - active transport by tracheid and vessel cells
6. On a sunny day, the closing of stomata in plant leaves results in (1999:52)
- a decrease in  $\text{CO}_2$  intake
  - a shift from  $\text{C}_3$  photosynthesis to  $\text{C}_4$  photosynthesis
  - an increase in transpiration
  - an increase in the concentration of  $\text{CO}_2$  in mesophyll cells
  - an increase in the rate of production of starch

(1999:69-73)



- Root meristem
- Male gametophyte
- Tripliod nutritive tissue (endosperm)
- Seed coat
- Apical meristem of the shoot

**D. Sample Free Response Questions**

1. 2005:3

Angiosperms (flowering plants) have wide distribution in the biosphere and the largest number of species in the plant kingdom.

- a. **Discuss** the function of FOUR structures for reproduction found in angiosperms and the adaptive (evolutionary) significance of each.
- b. Mosses (bryophytes) have not achieved the widespread terrestrial success of angiosperms. **Discuss** how the anatomy and reproductive strategies of mosses limit their distribution.
- c. **Explain** alternation of generations in either angiosperms or mosses.

2. 2003B:2

Hormones play important roles in regulating the lives of many living organisms.

- a. For TWO of the following physiological responses, **explain** how hormones cause the response in plants.
  - increase in height
  - adjustment to change in light
  - adjustment to lack of water
- b. For TWO of the following physiological responses, **explain** how hormones cause the response in animals.
  - increase in height
  - adjustment to change in light
  - adjustment to lack of water
- c. **Describe** TWO different mechanisms by which hormones cause their effects at the cellular level.

3. 2003:2

Regulatory (control) mechanisms in organisms are necessary for survival. Choose **THREE** of the following examples and explain how each is **regulated**.

- Flowering in plants
- Water balance in plants
- Water balance in terrestrial vertebrates
- Body temperature in terrestrial vertebrates