Bi 103 Final Review

Plant anatomy and nutrient transport

1. In the space below, draw a generalized plant. Label the major organs, and indicate the location of the three major categories of plant tissue (dermal, ground, vascular).

2. Fill in the blanks:

   a. Primary growth is cell division in the _____ _____.

   b. Primary growth results in an increase in _____ of roots and shoots.

   c. Secondary growth is cell division in the _____ _____.

   d. Secondary growth results in an increase in _____ of the plant.

3. Fill in the blanks with the following names of plant tissues: epidermis, parenchyma, collenchyma, sclerenchyma, xylem, phloem. (terms may be used more than once)

   a. Conducts water up the plant: _____

   b. Carries sap from source to sink: _____

   c. Provides rigid support: _____

   d. Provides flexible support: _____

   e. Soft tissue that often stores sugars and starches: _____

   f. Linen fabric is made from this: _____

   g. On the roots, this tissue grows root hairs: _____

   h. Vascular tissue that is living at maturity: _____

   i. Vascular tissue that is dead at maturity: _____

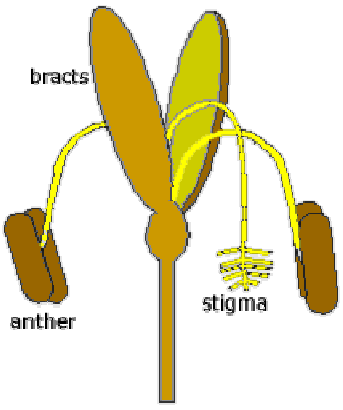
4. In the space below, sketch a generalized plant. Indicate on the diagram where these processes that move water from root to leaf occur: active transport of minerals; evaporation of water from stomata; capillary action; water moves in by osmosis.

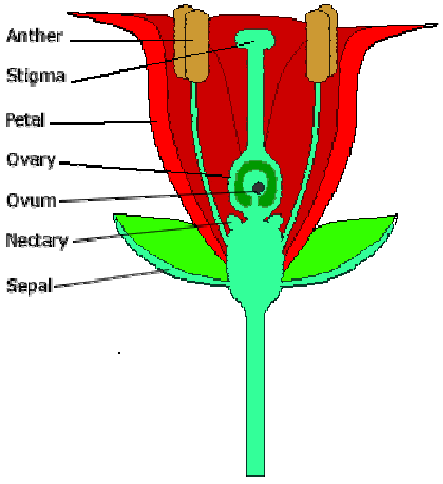
5. In the space below, sketch a generalized diagram of how sap (sugars and water) move from source to sink. Indicate on the diagram where the following processes occur: active transport of sugars (2 places); water moves in by osmosis (2 places), osmotic pressure moves sap by bulk flow; sugars are produced; sugars are stored.

Plant Reproduction and Development

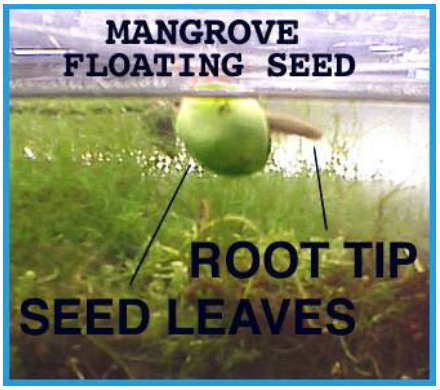
7. In the space below, sketch a generalized life cycle of a plant, showing the alternation of generations. Show the sporophyte and gametophyte phases. Show where gametes and spores are produced. Indicate where meiosis and mitosis take place.

8. The two pictures below are generalized diagrams of two kinds of flowers. One is wind-pollinated and the other is insect pollinated. Indicate which one is which, and explain how you can tell.





9. Look at the pictures of plant fruits and seeds. The forms of each give clues as to how they are dispersed. Under each picture, indicate how the fruit is dispersed and how you can tell.



Plant Responses to the Environment

10. Fill in the blanks with the plant hormones that produce the response described (auxins, gibberellins, cytokinins, ethylene gas, abscisic acids):

a. Allows the apical bud to grow while suppressing the lateral buds: _____

b. Stimulates seed germination: _____

c. Causes fruits to develop: _____, _____, and _____

d. Causes fruits to ripen _____

e. Causes cells to divide in meristems: _____

f. If its concentration is higher than auxins, allows lateral buds to grow: _____

g. Prevents buds from developing: _____

h. Causes flowers to wilt: _____

i. Promotes plant dormancy: _____

j. Causes internodes to lengthen: _____

k. Gardeners use this to make cuttings of plants grow roots: _____

l. Causes tropisms: _____

11. The herbicide 2,4-D contains synthetic auxins. Discuss and summarize what happens to plants when they are sprayed with an abundance of auxins, and why this will kill plants.

12. List several ways in which nastic movements (such as the movement of the sensitive plant) are different from tropisms.

Homeostasis and the Organization of the Animal Body

13. Draw a negative feedback loop that controls body temperature. Include any hormones involved.

14. Is it the heat or the humidity? Discuss and list the effects of both heat and humidity on our ability to maintain body temperature.

Nervous System

15. You're a famous brain surgeon and you've been called to an emergency room to examine a patient who received a head injury in an accident. What symptoms would tell you if any of these parts of the brain had been damaged?

a. Occipital lobe

b. Medulla

c. Cerebellum

d. Frontal lobe

16. In the space below, sketch a reflex arc.

17. Sketch and label a diagram of a neuron.

Endocrine System

18. In the space below, draw a negative feedback loop for blood glucose control. Include the two hormones involved.

19. Suppose you have a friend with Type I diabetes. You've been studying together for several hours, then go for a walk. Your friend suddenly feels dizzy and disoriented. Your friend carries a "diabetes emergency kit" that contains two items: glucose tablets and an insulin syringe. Which should you give to your friend, and why?

20. In the space below, draw a negative feedback loop for blood calcium control. Include the two hormones involved.

21. You're a researcher in a lab studying osteoporosis. You could study the roles of parathyroid hormone or calcitonin on osteoporosis. Which hormone would you research as a treatment, and why?

Urinary System

22. In the space below, sketch and label a nephron. Label the parts of the nephron where the following occur: filtration, active transport of sodium, osmosis of water, active transport of potassium and drugs.

23. Trace the path of a molecule of urea from the human liver to the external environment.

24. List some ways in which the urinary system maintains homeostasis in the body.

Musculo-Skeletal System

25. The following statements describe the process of skeletal muscle contraction – but they are not in order. Number the steps so that these are in the proper order.

____ Calcium is released into myofibrils.

____ Motor neurons send signals from the spine.

____ Binding sites on the thin filaments are exposed.

____ Myosin cross-bridges bind to actin filaments.

____ Neurotransmitter is released from the motor neuron.

____ Myosin heads move.

____ Action potential is passed to the muscle fiber.

26. Sketch a hinge joint. Show how it is moved by antagonistic muscles.

27. Compare and contrast these pairs of musculo-skeletal system structures:

osteoblasts and osteoclasts

bone and cartilage

spongy bone and compact bone

smooth and striated muscle

slow-twitch and fast-twitch muscle fibers

Circulatory System and Respiratory system

28. In the space below, sketch a 4-chambered heart and the major blood vessels leading into and out of it. Then sketch the path of blood from the body, to the lungs, from the lungs, and to the body.

29. Two long-distance runners decide to cheat a little to get an edge in an upcoming competition. What would each of these treatments do that would give them an advantage?

a. Taking erythropoietin

b. Training at high altitudes, then having some of their blood drawn and stored.

26. Sketch the arrangement of arteries, arterioles, capillaries, venules, and veins in body and lung tissue. Indicate how nutrients, wastes, and gases are moved.

30. When people smoke, they inhale carbon dioxide. How does this affect the body's ability to exchange gases?

Digestive System

31. What do we get from each of these major nutrients? Check each appropriate box.

	Energy	Amino acids	Structural material	Electrolytes	Metabolic roles	Anti-oxidants
Carbohydrates						
Lipids (fats, oils)						
Proteins						
Minerals						
Vitamins						

32. In which part of the human digestive system do each of these processes occur?

	Mouth	Stomach	Upper small intestine	Lower small intestine	Large intestine
Mechanical digestion					
Amylase breaks down starch					
Acid digestion of proteins					
Alkaline digestion					
Emulsification of lipids					
Most nutrients are absorbed					
Most water is absorbed					

33. The liver and pancreas aren't part of the digestive tract, but they play important roles in the digestive system. What do each of them do?

a. liver

b. pancreas

Immune System

34. The following statements describe the process of the immune reaction, but they are not in order. Number the blanks to put them in order.

____ T-helper cell begins the immune process.

____ Antibodies “tag” the antigen.

____ Macrophage finds a possible antigen.

____ T-helper cell calls a halt to the immune response.

____ Clonal selection of B-cells

____ T-cells differentiate into cytotoxic T-cells and memory T-cells.

____ Macrophage “shows” the antigen to the T-helper cell.

____ B-cells produce antibodies.

____ Cytotoxic T-cells attack the antigen.

____ Differentiation of B-cells into B-memory cells and Plasma cells.

35. Describe the roles of each of the following in non-specific defense of the body:

a. intact skin

b. mucus membranes

c. cilia in the respiratory tract

d. phagocytes

e. inflammation

36. Describe how humans develop allergies