

Name \_\_\_\_\_

Botany 2104. Final Exam. A01.

PRINT your name at the top of each page. Do not use red ink or red pencil. If an answer cannot be understood for ANY reason (penmanship, spelling, grammar, etc.), the answer is wrong.

The exam is 9 pages long. BEFORE STARTING, be sure you have all 9 pages.

MULTIPLE CHOICE. There are 3-5 answer choices per question. READ ALL CHOICES BEFORE ANSWERING. Print your answer in the space in front of the question. (2 points each; 74 points total)

\_\_\_\_\_ 1. When lipase acts

- A. a covalent bond is formed  
B. a hydrolysis reaction occurs  
C. a condensation reaction occurs  
D. A and C  
E. B and C

\_\_\_\_\_ 2. Starch is a polymer of

- A. glucose  
B. sucrose  
C. fructose  
D. cellulose

Use the following answer choices for questions 3-7.

- A. glycolysis  
B. Krebs cycle  
C. electron transport chain (ETC)  
D. A and B

\_\_\_\_\_ 3.  $O_2$  (oxygen) is reduced to  $H_2O$  (water)

\_\_\_\_\_ 4. pyruvic acid  $\rightarrow \rightarrow \rightarrow$  3  $CO_2$

\_\_\_\_\_ 5. a proton ( $H^+$ ) gradient forms and ATP is produced

\_\_\_\_\_ 6. glucose  $\rightarrow \rightarrow \rightarrow$  pyruvic acid

\_\_\_\_\_ 7. electrons are removed from NADH and  $FADH_2$

\_\_\_\_\_ 8. The carbohydrate produced during the Calvin Cycle is

- A. starch  
B. glucose  
C. PGA  
D. triose phosphate (PGald)  
(PGA = phosphoglyceric acid; PGald = phosphoglyceraldehyde)

\_\_\_\_\_ 9. During photosynthesis, oxygen ( $O_2$ ) is released from

- A. carbon dioxide ( $CO_2$ ) during the light reactions  
B. carbon dioxide ( $CO_2$ ) during the Calvin cycle  
C. water ( $H_2O$ ) during the light reactions  
D. water ( $H_2O$ ) during the Calvin cycle

\_\_\_\_\_ 10. Ploidy refers to

- A. homologous chromosomes  
B. the number of individual chromosomes in a nucleus  
C. the number of sets of chromosomes in a nucleus

\_\_\_\_\_ 11. The phenomenon of double fertilization involves the fusion between

- A. the egg and two sperm  
B. the egg and one sperm and the polar nuclei (central cell) and the other sperm  
C. the egg and one sperm and the synergids and the other sperm  
D. the egg and one sperm and the antipodals and the other sperm

- \_\_\_\_\_ 12. A spore  
A. is a gamete    B. becomes a gametophyte by mitosis    C. becomes a gametophyte by meiosis  
D. becomes a sporophyte by mitosis    E. becomes a sporophyte by meiosis
- \_\_\_\_\_ 13. A gametophyte produces  
A. spores by mitosis    B. spores by meiosis    C. gametes by mitosis  
D. gametes by meiosis
- \_\_\_\_\_ 14. A sporophyte produces  
A. spores by mitosis    B. spores by meiosis    C. gametes by mitosis  
D. gametes by meiosis
- \_\_\_\_\_ 15. The Calvin cycle of photosynthesis  
A. occurs in the thylakoids and results in the production of ATP and NADPH  
B. occurs in the stroma and results in the production of ATP and NADPH  
C. occurs in the thylakoids and results in the production of carbohydrate (sugar)  
D. occurs in the stroma and results in the production of carbohydrate (sugar)
- \_\_\_\_\_ 16. The light reactions of photosynthesis  
A. occur in the thylakoids and result in the production of ATP and NADPH  
B. occur in the stroma and result in the production of ATP and NADPH  
C. occur in the thylakoids and result in the production of carbohydrate (sugar)  
D. occur in the stroma and result in the production of carbohydrate (sugar)
- \_\_\_\_\_ 17. The carbon in carbon dioxide (CO<sub>2</sub>) is  
A. oxidized    B. reduced    C. inorganic  
D. A and C    E. B and C
- \_\_\_\_\_ 18. Plants which engage in C<sub>4</sub> photosynthesis  
A. have Kranz anatomy    B. lack rubisco    C. lack the Calvin cycle  
D. A and B    E. A and C
- \_\_\_\_\_ 19. Which molecule provides the energy for the reduction of carbon dioxide during the Calvin cycle?  
A. NADPH    B. rubisco    C. light    D. ATP
- \_\_\_\_\_ 20. Which molecule directly provides electrons for the reduction of carbon dioxide during the Calvin cycle?  
A. NADPH    B. rubisco    C. RuBP    D. PGA    E. ATP
- \_\_\_\_\_ 21. If a secondary cell wall is produced, it is often strengthened by the addition of  
A. cellulose    B. cutin    C. calcium pectate (pectin)    D. lignin
- \_\_\_\_\_ 22. Plant cells that are usually dead at maturity include all of the following **except**  
A. companion cells    B. sclereids    C. vessel elements    D. tracheids
- \_\_\_\_\_ 23. The **tissue** that moves dissolved sucrose in a generally downward direction is  
A. xylem    B. phloem    C. tracheid    D. vessel    E. C and D

\_\_\_\_\_ 24. The structure that surrounds the cell and controls the movement of materials into and out of the cell is the

- A. cell wall            B. plasma membrane            C. middle lamella            D. plasmodesmata

\_\_\_\_\_ 25. A plastid specialized for the storage of starch is the

- A. amyloplast            B. chloroplast            C. chromoplast

\_\_\_\_\_ 26. The light colored, conducting xylem is called

- A. hardwood            B. summer wood            C. heartwood            D. sapwood

\_\_\_\_\_ 27. The tissue that divides the wood and the bark is the

- A. cork            B. periderm            C. vascular cambium            D. cork cambium            E. secondary phloem

\_\_\_\_\_ 28. Lateral roots are produced by the

- A. pericycle            B. root hairs            C. buds            D. xylem            E. endodermis

\_\_\_\_\_ 29. Wood is

- A. secondary phloem            B. secondary xylem            C. A and B            D. secondary xylem and bark

\_\_\_\_\_ 30. The dark, nonfunctional xylem at the center of a tree is called

- A. hardwood            B. late wood            C. heartwood            D. sapwood            E. early wood

\_\_\_\_\_ 31. Growth rings can be seen in cross sections of trees because of differences in the sizes of the cells of the

- A. sapwood and heartwood            B. early wood and late wood  
C. primary and secondary xylem            D. primary and secondary phloem

\_\_\_\_\_ 32. Bark is a nontechnical name for

- A. the cork            B. the periderm            C. all of the tissues outside the vascular cambium  
D. all of the tissues outside the cork cambium

\_\_\_\_\_ 33. A nail is pounded into the side of a tree, 5 feet above the ground. The tree grows 1 foot per year. How far above the ground will the wire be after 3 years?

- A. 5 feet            B. 6 feet            C. 7 feet            D. 8 feet            E. the tree will be dead by then

\_\_\_\_\_ 34. Loose collections of cells that allow gas exchange are called

- A. lenticels            B. stomata            C. bud scales            D. leaf scars

\_\_\_\_\_ 35. The initial cork cambium in stems originates from the cells of the

- A. pericycle            B. cortex            C. cork            D. procambium

\_\_\_\_\_ 36. The initial cork cambium in roots originates from the cells of the

- A. pericycle            B. cortex            C. cork            D. procambium

\_\_\_\_\_ 37. The roots of some plants are modified to parasitize other plants. These roots are called

- A. mycorrhizae            B. haustoria            C. adventitious            D. radicles

(4 points) Which molecule, A or B, has fewer calories per carbon atom? Defend your answer.



(9 points) List the three vegetative organs of the flowering plants. Give two functions for each organ.

Organ	Function 1	Function 2

(6 points) List two functions for each of the following classes of biologically important polymers.

polymer	function #1	function #2
carbohydrate		
lipid		
protein		

(3 points) Why is it important that cells oxidize glucose in steps rather than all at once during respiration?

(2 points) Why does the procambium persist in mature stems and roots of dicots but not monocots?

(10 points) In the table below, list the primary and secondary meristems and the tissues that they produce.

Primary Meristems	Primary Tissues	Secondary Meristems	Secondary Tissues

(6 points) Distinguish between monocots and dicots for each of the traits listed in the table below.

trait	monocots	dicots
leaf venation		
leaf mesophyll		
type of root system		

(4 points) MATCHING. Match the descriptions with a cell type. Not all of the cells will be used.

\_\_\_\_\_ 1. water and mineral conducting cell  
found in all vascular plants

\_\_\_\_\_ 2. general purpose cell which can perform  
photosynthesis, respiration, or storage, depending  
on its tissue location and organelle content

\_\_\_\_\_ 3. a flexible support cell with walls  
thickened at corners or along parallel sides

\_\_\_\_\_ 4. A long, narrow support cell with  
evenly thickened and lignified cell walls

(5 points) C4 plants attract a lot of attention because under certain environmental conditions they produce higher yields than C3 plants do because the C4 plants don't photorespire. Explain why C4 plants do not experience photorespiration.

(5 points) Describe the structure of an endodermis cell in a very young part of a root and explain how it contributes to root function. How does the structure and function of an endodermis cell change as the root ages?

STATION 1 (5 points) Identify the indicated structures in the sketches of a bean seed.

A. \_\_\_\_\_

D. \_\_\_\_\_

B. \_\_\_\_\_

E. \_\_\_\_\_

C. \_\_\_\_\_

STATION 2 (8 points) Identify the parts indicated in the sketch of a generalized flower.

A. \_\_\_\_\_ D. \_\_\_\_\_

B. \_\_\_\_\_ E. \_\_\_\_\_

C. \_\_\_\_\_

a. This flower is complete. If it were incomplete, how would it be different?

b. This flower is perfect. If it were imperfect, how would it be different?

STATION 3. (8 points) Identify the structures indicated in the sketch of an *Elodea* cell. Give one function for each indicated structure.

	structure	function
A		
B		
C		
D		

STATION 4. (3 points) Is this a macerate of a hardwood or a soft wood? Defend your answer.

STATION 5. (6 points) Identify the structures indicated in the cross section of the leaf.

A. \_\_\_\_\_ D. \_\_\_\_\_

B. \_\_\_\_\_ E. \_\_\_\_\_

C. \_\_\_\_\_ F. \_\_\_\_\_

STATION 6. (12 points) Do these pictures show a cross section of a dicot stem or a monocot stem? Defend your answer.

For A-D, identify the tissue. For E-I, identify the cell type.

A. \_\_\_\_\_

F. \_\_\_\_\_

B. \_\_\_\_\_

G. \_\_\_\_\_

C. \_\_\_\_\_

H. \_\_\_\_\_

D. \_\_\_\_\_

I. \_\_\_\_\_

E. \_\_\_\_\_

STATION 7. (5 points) Identify the structures indicated in the drawing of a woody stem.

a. \_\_\_\_\_

d. \_\_\_\_\_

b. \_\_\_\_\_

e. \_\_\_\_\_

c. \_\_\_\_\_

STATION 8. (7 points) Identify the structures indicated in the cross section of a root.

A. \_\_\_\_\_

E. \_\_\_\_\_

B. \_\_\_\_\_

F. \_\_\_\_\_

C. \_\_\_\_\_

G. \_\_\_\_\_

D. \_\_\_\_\_

STATION 9. (3 points) Does this slide show a cross section of a dicot root or a monocot root? Defend your answer.



STATION 10. (4 points) Identify the indicated microscope parts.

A. \_\_\_\_\_

C. \_\_\_\_\_

B. \_\_\_\_\_

D. \_\_\_\_\_

STATION 11. (4 points)

a. Identify the vein pattern in the *Coleus* leaves.

b. What is the arrangement of leaves at the nodes of *Coleus*?

STATION 12. (4 points) Does this plant have compound or simple leaves? (If compound, indicate which type.) What observation(s) support your answer?

BONUS!! (8 points)

List two anatomical features of xerophytic leaves. What is the function significance of each feature?

1.

2.

List two anatomical features of hydrophytic leaves. What is the function significance of each feature?

1.

2.

- A. collenchyma cell
- B. fiber
- C. parenchyma cell
- D. sclereid
- E. sieve tube element
- F. tracheid
- G. vessel element