

Part I – Multiple choice – **Circle** the **one** best choice in each. 1 pt. each.

1. An energy requiring (endergonic) process by which molecules are moved across a membrane is: A) active transport B) simple diffusion C) exocytosis D) facilitated diffusion E) more than one of the above
2. Using the choices in question 1, which process does **not** involve the movement of a substance across a membrane? _____
3. You are given an unknown organism to study, and you find that it has no nuclear membranes or mitochondria. Given that, which of the following do you think it would possess? A) ribosomes B) endoplasmic reticulum C) chloroplasts D) Golgi apparatus E) lysosomes F) none of the above
4. Which of the following structures would **not** be likely to be found in your muscle cells? A) endoplasmic reticulum B) nucleus C) chromoplast D) microtubule E) mitochondrion
5. DNA is found in: A) nuclei B) plastids C) mitochondria D) more than one of the above E) all of the above
6. In plants, most of the ATP used for their cell processes is produced in: A) the light reactions B) photophosphorylation C) glycolysis D) dark reactions E) aerobic respiration
7. The enzymes that catalyze the reactions of the Krebs's cycle are found in the: A) cytoplasm of the cell B) matrix of the mitochondria C) stroma of the chloroplasts D) inner membrane of the mitochondria E) outer membrane of the mitochondria
8. In a living animal, which of the following compounds has the greatest amount of usable energy per molecule? A) ATP B) NADH C) FADH D) CO₂ E) acetyl CoA
9. The primary role of oxygen in respiration is to: A) supply energy for ATP production B) oxidize the final compound in the electron transport chain C) break down glucose D) combine with carbon to form carbon dioxide E) transform pyruvate to lactic acid
10. A primary function of fermentation is to: A) synthesize glucose B) synthesize ethanol C) produce ATP D) breakdown glucose E) oxidize NADH

11. Energy to drive the C₃ dark reactions derives in part from: A) oxygen B) ATP C) pyruvate D) glyceraldehyde-3-phosphate (G3P) E) carbon dioxide
12. One carbon dioxide molecule reacts in each turn of the C₃ cycle. How many turns of the cycle are then required to ultimately produce one molecule of glucose? A) 1 B) 3 C) 6 D) 9 E) 12
13. Excited electrons from photosystem I are typically used to: A) produce ATP B) reduce chlorophyll in photosystem II C) reduce NADP D) reduce NAD E) split water
14. All of the following are necessary substrates for some reaction in photosynthesis except: A) O₂ B) ATP C) H₂O D) NADP E) CO₂
15. Structures that are used for rapid transport of materials between adjacent plant cells are: A) desmosomes B) permeases C) microtubules D) gap junctions E) plasmodesmata
16. The structures in question 16 are derived from: A) protein B) endoplasmic reticulum C) cellulose D) fibers E) none of the above
17. In a cell membrane, proteins are found: A) on the outer surface B) in the interior C) on the inner surface D) extending all the way through the membrane E) all of the above
18. A red blood cell is placed in a hypotonic solution. Which of the following diagrams below most clearly represents the direction of water movement across it membrane (Length of the arrow proportional to rate of water movement)
19. Which of the diagrams in question 18 best represents water movement when the cell is at an osmotic equilibrium? _____
20. When a molecule is reduced, it: A) gains electrons B) loses electrons C) gains energy D) both A and C E) both B and C
21. To extract energy and produce ATP from fatty acids, they are first converted to _____ before entering the Krebs's cycle. A) 2 carbon fragments B) glucose C) pyruvate D) glycerols E) none of the above, they enter directly as fatty acids

The major stages of aerobic respiration are listed below. Use their numbers to answer questions 22 through 26.

Stage I – glycolysis

Stage II – entry and movement through the Krebs' cycle

Stage III – oxidative phosphorylation (electron transport chain)

22. Carbon dioxide is produced in: A) stage I B) stage II C) stage III
D) stages II and III E) all 3 stages
23. ATP is produced in (use the choices in question 22): _____
24. Oxygen is reduced in: A) stages I and II B) stage II only C) stages II and III
D) stage III only E) all 3 stages
25. The stage(s) occurring in the cytoplasm is(are): A) stage I B) stage III
C) stages I and II D) stages I and III E) none of the stages occur there
26. Which stage(s) will occur in the absence of oxygen? A) stage I B) stage II
C) stage III D) stages I and II E) none of the above

In questions 27-31, use the following choices: A) greater than B) less than
C) equal to D) there is not enough information to specifically answer the question

We place a sodium chloride solution on the outside of a cell membrane that is permeable only to chloride ions. At equilibrium:

27. Sodium concentration outside the membrane will be _____ the concentration inside.
28. Chloride concentration outside the membrane will be _____ the concentration inside.
29. Positive charges outside will be _____ the inside.

We put a salt solution inside a cell membrane and distilled water outside. The membrane is permeable only to water. At equilibrium:

30. Water pressure inside the membrane is _____ the pressure outside.
31. Water concentration inside the membrane is _____ the water concentration outside.

Part II – Fill-in – Put an appropriate word or phrase in each blank space. 1 pt. each blank.

1. For each of the structures listed below, write the name of another structure that has almost identical appearance or construction.

Flagellum _____
Granum _____
Basal body _____

2. The process called _____ is used to maintain concentration differences across a membrane. This process requires a(n) _____ and _____ as an energy supply.

3. List one **specific** function for each of the cell structures below: (2 pts for each blank here)

- A. tight junction
- B. golgi aparatus
- C. ribosome
- D. nucleolus
- E. middle lamella
- F. amyloplast
- G. endoplasmic reticulum
- H. lysosome

Part III – True-false – Indicate validity of each statement by placing a “T” or “F” in the margin to the **left**. 1 pt. each.

1. All else being equal, a substance with a higher molecular weight will have a higher diffusion rate.
2. In plant cells the primary cell wall is always the part of the wall nearest the cell membrane.
3. Plant cells do not have mitochondria.
4. Photorespiration functions to produce ATP for C3 plants.

5. You are likely to have lysosomes in your cells.
6. Glycerol can be used as a substrate for ATP production in respiration.
7. Permeases are used only in active transport.

Part IV – Short answer – Write an appropriate answer in the space provided. Pts as indicated.

1. Define: (3 pts each)
 - A. endocytosis

 - B. osmotic pressure

 - C. equilibrium potential

 - D. procaryotic cell

 - E. simple diffusion

2. How do C₄ plants overcome the problem caused by photorespiration in Calvin cycle (C₃) plants? (12 pts)

3. What is the endosymbiotic hypothesis? What characteristics of plastids and mitochondria lend some support to this hypothesis? (12 pts)

THAT'S IT!