

Assessment

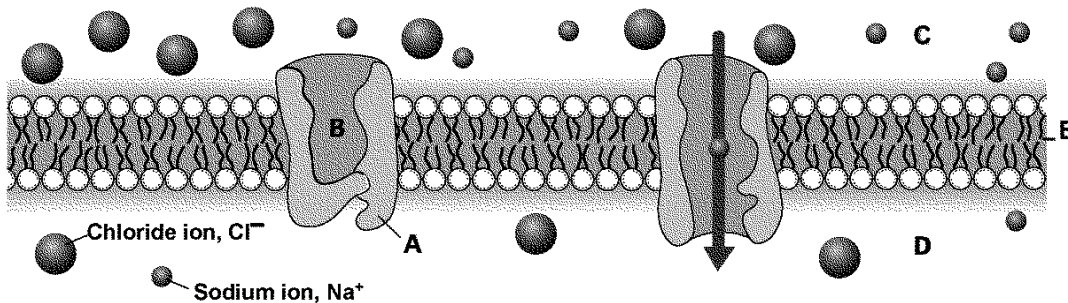
Mid- Term Exam

Cells and Their Environment

In the space provided, write the letter of the term or phrase that best completes each statement or best answers each question. (4 points each)

- _____ 1. Which of the following is an example of osmosis?
- movement of ions from an area of high concentration to an area of lower concentration
 - movement of ions from an area of low concentration to an area of higher concentration
 - movement of free water molecules from an area of high concentration to an area of lower concentration
 - movement of free water molecules from an area of low concentration to an area of higher concentration

Questions 2–5 refer to the figure below, which shows transport through the cell membrane.



- _____ 2. The interior of the pore, labeled *B*, enables substances to pass through the cell membrane without coming in contact with the
- solution outside the cell.
 - nonpolar interior of the lipid bilayer.
 - polar interior of the lipid bilayer.
 - All of the above
- _____ 3. The area that has the greatest concentration of ions in solution is labeled
- A*
 - B*
 - C*
 - D*
- _____ 4. What type of transport is illustrated by the figure above?
- osmosis
 - active transport
 - diffusion
 - facilitated diffusion

- _____ 5. Which type of substance is labeled *E*?
- a. a phospholipid
 - b. oxygen
 - c. an amino acid
 - d. a glycoprotein
- _____ 6. Which of these can pass unaided through a cell membrane?
- a. water
 - b. sugars
 - c. amino acids
 - d. steroid hormones
- _____ 7. Membrane proteins are held in place in the cell membrane because
- a. the lipid bilayer is polar throughout.
 - b. the amino acids have polar and nonpolar parts.
 - c. water repels the polar ends of phospholipids.
 - d. All of the above
- _____ 8. How do many animal cells avoid the swelling that osmosis can cause?
- a. by pumping solutes out of the cytoplasm
 - b. by using their contractile vacuoles to expel ions
 - c. by using their contractile vacuoles to expel water
 - d. by stiffening the cell membrane with membrane proteins
- _____ 9. During which of the following processes do vesicles sometimes fuse with lysosomes?
- a. facilitated diffusion
 - b. osmosis
 - c. exocytosis
 - d. endocytosis
- _____ 10. Signal molecules attach to specific cells because of the
- a. orientation of the cell membrane.
 - b. opening of channel proteins.
 - c. shape of the receptor binding site.
 - d. change in shape of the signal molecule.
- _____ 11. Which of these acts as a signal molecule in the cytoplasm of a cell?
- a. a receptor protein
 - b. a second messenger
 - c. a transport protein
 - d. an enzyme

Cell Structure

In the space provided, write the letter of the term or phrase that best completes each statement or best answers each question (4 points each)

- _____ 12. To maximize its surface area-to-volume ratio, a large cell may
- a. exchange materials with the environment.
 - b. take a spherical shape.
 - c. be large in one dimension but small in two.
 - d. become larger.

- _____ 13. What is one difference between prokaryotes and eukaryotes?
- Only eukaryotes are always unicellular.
 - Only prokaryotes have a nuclear membrane.
 - Organelles are found only in prokaryotes.
 - Only eukaryotes contain mitochondria.
- _____ 14. An example of a prokaryotic cell is a(n)
- animal cell.
 - plant cell.
 - bacterium.
 - a protist.
- _____ 15. A cell's digestive enzymes are stored in
- Golgi apparatus.
 - lysosomes.
 - ribosomes.
 - mitochondria.
- _____ 16. Which allow bacteria to adhere to one another?
- a capsule and cell wall
 - a cell wall and flagella
 - flagella and pili
 - pili and a capsule
- _____ 17. The interior of a cell is called the
- cytoplasm.
 - cytoskeleton.
 - flagellum.
 - cilium.
- _____ 18. How do vesicles help maintain homeostasis in a cell?
- aid cell movement
 - aid colonial cells
 - store and release substances as needed
 - make ribosomes
- _____ 19. Cells in multicellular organisms
- are independent.
 - are permanently associated.
 - have unused organelles.
 - do not coordinate activities.

- _____ 20. Which two structures are involved in energy production and use on the cellular level?
- a. chloroplasts and mitochondria
 - b. mitochondria and Golgi bodies
 - c. Golgi bodies and chloroplasts
 - d. microtubules and mitochondria
- _____ 21. Which of these observations helped lead to the cell theory?
- a. All cells have DNA.
 - b. Many different types of cells have organelles.
 - c. Cells are modified for different functions.
 - d. All parts of a plant are made of cells.

Study the following steps related to protein production and packaging in a eukaryotic cell. Determine the order in which the steps occur. Write the number of each step in the space provided. (2 point each)

- _____ 22. The ER membrane pinches off to encircle the protein.
- _____ 23. The vesicle with the protein enters one end of the Golgi apparatus.
- _____ 24. In the nucleus, DNA instructions are copied as RNA messages.
- _____ 25. Proteins cross the membrane of the rough ER and enter the ER.
- _____ 26. The finished protein leaves the other end of the Golgi apparatus in a new vesicle that buds from the organelle's surface.
- _____ 27. The finished protein travels through the cytoplasm to the cell membrane.
- _____ 28. The vesicle fuses with the cell membrane, releasing the protein out of the cell.
- _____ 29. The vesicle holding the protein travels through the endoplasmic reticulum and out into the cytoplasm.
- _____ 30. RNA messages travel to bound ribosomes, where proteins are made.
- _____ 31. The protein is modified by enzymes.
- _____ 32. The finished protein is repackaged, enclosed in a new vesicle.

Photosynthesis and Cellular Respiration

33. All cells store energy in molecules of (ATP, ATP synthase, or hydrogen ions) that they can make in one place and use in another.

34. (The Krebs cycle, The Calvin cycle, or Glycolysis) breaks down glucose to two pyruvates, two NADH molecules, and four ATP molecules.
35. When a chlorophyll molecule absorbs light, some of its electrons become (attached, excited, or ions).
36. The process of fermentation is (aerobic, anaerobic, or on-going).
37. Carbon dioxide fixation is a process that is part of (aerobic respiration, glycolysis, or photosynthesis).
38. Photosynthesis occurs in flat sacs in chloroplasts called (pigments, thylakoids, or carotenoids).

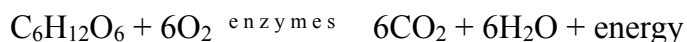
In the space provided, write the letter of the term or phrase that best completes each statement or best answers each question.

- ___ 39. Which substances assist with chemical reactions that release energy gradually in cells?
- | | |
|---------------------|---------------------|
| a. channel proteins | c. molecules of ADP |
| b. enzymes | d. nucleotides |
- ___ 40. Cellular respiration is the process by which cells harvest energy from
- | | |
|------------------|-------------------|
| a. ATP. | c. carbohydrates. |
| b. ATP synthase. | d. pigments. |
- ___ 41. What are two products from the first stages of photosynthesis that are used to produce energy-storing sugars in the final stages of the process?
- | | |
|-------------------|---------------------------|
| a. ATP and NADPH | c. NADPH and ATP synthase |
| b. NADH and NADPH | d. NADH and ATP synthase |
- ___ 42. Which of the following processes is aerobic?
- | | |
|-------------------|-----------------------------|
| a. photosynthesis | c. the Krebs cycle |
| b. glycolysis | d. lactic acid fermentation |
- ___ 43. When electrons of a chlorophyll molecule are excited to a higher energy level,
- | |
|--|
| a. they become ions. |
| b. they enter an electron transport chain. |
| c. they enter the Calvin cycle. |
| d. carotenoids are converted to chlorophyll. |
- ___ 44. What is the source of oxygen produced during photosynthesis?
- | | | | |
|-------------------|------------|-------------|----------|
| a. carbon dioxide | b. glucose | c. pyruvate | d. water |
|-------------------|------------|-------------|----------|

- _____ 45. The final electron acceptor for the electron transport chain following the Krebs cycle is
- a. hydrogen.
 - b. NADPH.
 - c. ATP.
 - d. oxygen.
- _____ 46. How do organisms store and use energy?
- a. by converting oxygen into organic compounds
 - b. by taking in electrons from electron transport chains
 - c. by making and breaking the chemical bonds in organic compounds
 - d. by transferring energy through the process of homeostasis
- _____ 47. For each molecule of glucose entering glycolysis, there is a net gain of
- a. six ATP molecules.
 - b. four ATP molecules.
 - c. three ATP molecules.
 - d. two ATP molecules.
- _____ 48. What is the main way that organisms contribute to the carbon cycle?
- a. through metabolic processes
 - b. through the diffusion of hydrogen ions
 - c. by reflecting light
 - d. by splitting water molecules
- _____ 49. Which is the ultimate source of energy for most organisms on Earth?
- a. oxygen
 - b. carbon dioxide
 - c. water
 - d. sunlight
- _____ 50. How is the energy a cell releases different from energy a fire releases?
- a. A cell releases more total energy all at once than a fire does.
 - b. A fire releases energy as heat but a cell does not.
 - c. A cell releases energy gradually compared with a fire.
 - d. Energy from a fire comes from chemical bonds unlike energy from a cell.
- _____ 51. The Calvin cycle is a common method of which of the following?
- a. electron transport
 - b. carbon fixation
 - c. aerobic respiration
 - d. anaerobic respiration
- _____ 52. Which of these are products of the Krebs cycle?
- a. ATP and glucose
 - b. ATP, NADH, and FADH₂
 - c. glucose and pyruvate
 - d. NADPH and pyruvate
- _____ 53. What captures light energy for photosynthesis?
- a. pigments in chloroplasts
 - b. thylakoids in mitochondria
 - c. electromagnetic radiation
 - d. hydrogen ions in ATP synthase
- _____ 54. Which of these are electron carriers in aerobic respiration?
- a. ATP and ATP synthase
 - b. NADH and FADH₂
 - c. glucose and pyruvate
 - d. FADH₂ and pyruvate

- _____ 55. What is the purpose of the ATP and NADPH produced in the light reactions of photosynthesis?
- to transfer light energy to excited electrons
 - to stop the electron transport chain
 - to act as carrier proteins in inner mitochondrial membranes
 - to transfer energy to compounds forming three-carbon sugars
- _____ 56. Which is necessary for the final stage of photosynthesis to occur?
- chlorophyll
 - oxygen
 - carbon dioxide
 - glucose
- _____ 57. When do your muscle cells use lactic acid fermentation?
- when these cells run out of oxygen
 - when the se cells run out of carbon dioxide
 - when these cells run out of ATP
 - when these cells need to use the electron transport chain
- _____ 58. Which yields the most molecules of ATP per glucose molecule?
- glycolysis
 - the Krebs cycle
 - alcoholic fermentation
 - the electron transport chain
- _____ 59. For which process does fermentation recycle essential materials?
- glycolysis
 - the Krebs cycle
 - aerobic respiration
 - protein synthesis

Question 60 refers to the chemical equation below.



- _____ 60. The equation summarizes the overall process of
- cellular respiration.
 - photosynthesis.
 - alcoholic fermentation.
 - the Calvin cycle.
- _____ 61. A person measuring motion needs to observe an object's
- position once
 - position at different times
 - size and direction once
 - size and direction at different times
- _____ 62. Rosa wants to determine how long it will take her to drive from her house to her grandmother's house 5 km away. The time can be calculated using her car's
- acceleration
 - motion
 - position
 - average speed

- _____ 63. Greg thinks the car he is in is stopped, and the car next to him is rolling backward. What else might be happening?
- Greg's car is rolling backward while the other car is stopped.
 - Both cars are rolling forward, but Greg's car is rolling forward faster.
 - The other car is rolling forward while Greg's car is stopped.
 - Both cars are rolling backward, but Greg's car is rolling backward faster.
- _____ 64. Michael jogged 200 m in 25 seconds and then 100 m in 25 seconds. He could find his average speed by dividing
- 200 m by 40 seconds
 - 300 m by 25 seconds
 - 300 m by 40 seconds
 - 100 m by 15 seconds
- _____ 65. Melanie is accelerating as she skates on the ice. However, the speed at which she is skating has not changed. A possible explanation for this is that Melanie
- is skating a wide circle
 - is skating in a straight line
 - has reached the top speed at which she can skate
 - has stopped skating and is now standing still
- _____ 66. Roger observed an airplane flying overhead. He measured its speed and noted that it moved from north to south. Roger determined the plane's
- | | |
|-----------------|-------------|
| a. acceleration | c. position |
| b. distance. | d. velocity |
- _____ 67. Chen rode his bicycle north with a speed of 20 m/s. Olivia rode her bicycle with the opposite velocity. She rode
- | | |
|--------------------|--------------------|
| a. south at 10 m/s | c. south at 20 m/s |
| b. east at 20 m/s | d. north at 10 m/s |
- _____ 68. On a roller coaster, the cars first climb a hill at decreasing speed. Then the cars speed up as they go down the hill, before coasting at a steady speed on a straight track. Finally, the cars slow down as the ride ends. The cars have zero acceleration while
- | | |
|------------------------|-----------------------------------|
| a. climbing the hill | c. coasting on the straight track |
| b. descending the hill | d. near the end of the track |

- _____ 69. The formula for calculating acceleration is
- a. $a = v_{\text{final}} + v_{\text{initial}}$
 - b. $a = v_{\text{final}} - v_{\text{initial}}$
 - c. $a = v_{\text{final}} + v_{\text{initial}} / t$
 - d. $a = v_{\text{final}} - v_{\text{initial}} / t$
- _____ 70. An object's distance- time graph shows that it moves 10 m during the first 10 s and moves an additional 5 m during the next 10 s. the object has
- a. positive acceleration
 - b. negative acceleration
 - c. no acceleration
 - d. no velocity
- _____ 71. Which has the greatest inertia?
- a. a baseball traveling at 95 mi/h
 - b. a car sitting at a traffic light
 - c. a jumbo jet airplane taxiing down a runway
 - d. a cart loaded with large books
- _____ 72. A bicyclist is riding in a straight line at a constant speed. Which best describes the forces acting on the bike?
- a. the forces are unbalanced
 - b. the forces are balanced
 - c. a positive net force is acting on the bike
 - d. a negative net force is acting on the bike
- _____ 73. The motion of an object can be changed by a(n)
- a. unbalanced force
 - b. balanced force
 - c. net force equal to zero
 - d. large velocity
- _____ 74. Newton's first law describe the tendency of objects to resist a change in motion. This resistance is also called
- a. inertia
 - b. velocity
 - c. acceleration
 - d. friction
- _____ 75. Imagine that each of the following balls is moving at the same velocity. Which ball has the most momentum
- a. golf ball
 - b. tennis ball
 - c. soccer ball
 - d. bowling ball

- ___ 76. The strength of a reaction force is
- greater than the strength of the action force
 - less than the strength of the action force
 - equal to the strength of the action force
 - unrelated to the strength of the action force.
- ___ 77. The action force of a golf club hitting a ball accelerates the ball in one direction. Predict the direction in which the reaction force accelerates the club.
- in the opposite direction
 - in the same direction
 - at right angles to the action force
 - upward away from the action force
- ___ 78. You are standing in a crowded city bus. As the bus begins to move forward, you have a tendency to fall backwards. Which of the following best explains this motion?
- When the bus is still, both you and the bus are at rest. As the bus moves forward, you stay at rest, resulting in a tendency to fall backward.
 - Your lesser mass causes you to be moved more easily. Thus, the force of the bus on you moves you backwards.
 - The motion is a result of action/reaction pairs. The forward motion of the bus causes an equal and opposite reaction of your body falling backward.
 - The motion is a result of balanced forces. The motion of the bus forward balances a backward force on you.
- ___ 79. How do you find the total momentum of two objects moving at the same speed in opposite directions?
- Add the momentum of the two objects.
 - Subtract the momentum of one object from the other object.
 - Multiply the momentum of the two objects.
 - Divide the momentum of the larger object by that of the smaller.
- ___ 80. The momentum of a skateboard is not conserved because
- friction acts on the wheels of the skateboard
 - centripetal force acts against the motion of the skateboard
 - inertia exceeds the motion of the skateboard
 - the skateboard tends to move sideways