

Biology 101 Exam 2: Question Pool

Multiple Choice

Identify the letter of the choice that best completes the statement or answers the question.

- _____ 1. The first person to reportedly see living, moving cells using a microscope was
- Robert Hooke.
 - Robert Brown.
 - Theodor Schwann.
 - Rudolf Virchow.
 - Anton van Leeuwenhoek.
- _____ 2. The first cell seen by Robert Hooke using a microscope was a
- cork cell.
 - blood cell.
 - sperm cell.
 - skin cell.
 - root tip cell.
- _____ 3. Ten years before Schleiden's pronouncement of the cell theory, who had discovered the presence of nuclei in plant cells?
- Robert Hooke
 - Robert Brown
 - Theodor Schwann
 - Rudolf Virchow
 - Anton van Leeuwenhoek
- _____ 4. The cell theory was proposed by
- Robert Hooke.
 - Robert Brown.
 - Theodor Schwann.
 - Rudolf Virchow.
 - Anton van Leeuwenhoek.
- _____ 5. One of the generalizations of the cell theory is that
- all cells have a nucleus.
 - all cells divide by meiosis.
 - all living organisms are made up of cells.
 - cells arise through spontaneous generation.
 - growth is solely the result of cell division.
- _____ 6. The idea that all living cells came from preexisting living cells was proposed by
- Robert Hooke.
 - Robert Brown.
 - Theodor Schwann.
 - Rudolf Virchow.
 - Anton van Leeuwenhoek.
- _____ 7. Which of these cell features is absent in a bacterial cell?
- plasma membrane
 - nucleoid
 - cytoplasm
 - nucleus
 - DNA

- _____ 8. If the volume of a cell increases, its surface area will
- decrease.
 - remain the same.
 - increase proportionately.
 - increase to a greater degree.
 - increase to a lesser degree.
- _____ 9. Volume increases by the _____ of the diameter, and surface area increases by the _____.
- square; doubling
 - square; cube
 - cube; square
 - cube; cube
 - none of these
- _____ 10. Cells are of small size because of considerations of
- weight.
 - complexity.
 - diffusion.
 - space.
 - division.
- _____ 11. Elephants are large animals because they
- have bigger cells.
 - possess expandable cells.
 - are made of a greater number of cells.
 - have bigger cells and are made of a greater number of cells.
 - have bigger cells that are expandable and of greater number.
- _____ 12. The maximum power of magnification of a light microscope is
- 500.
 - 1,000.
 - 2,000.
 - 4,000.
 - 10,000.
- _____ 13. The highest magnification generally used to study cells is provided by the
- transmission electron microscope.
 - compound light microscope.
 - phase contrast microscope.
 - scanning electron microscope.
 - binocular dissecting microscope.
- _____ 14. All cells except bacteria
- are eukaryotes.
 - possess a nucleus.
 - use organelles for compartmentalization.
 - possess a nucleus and use organelles for compartmentalization.
 - are eukaryotes, possess a nucleus, and use organelles for compartmentalization.
- _____ 15. If a cell did not have ribosomes, it would be unable to
- extract energy from glucose.
 - synthesize glucose.
 - store food in the form of fat.
 - form proteins.

- _____ 16. Which of the following organelles is correctly matched with its function?
- nucleus: protein synthesis
 - ER: heredity
 - Golgi bodies: packaging
 - mitochondria: digestion
 - chloroplasts: storage of lipids
- _____ 17. The organelle that pinches off portions of its membrane to form a vesicle used for storage or transport is the
- mitochondrion.
 - chloroplast.
 - nucleolus.
 - Golgi body.
- _____ 18. Which of the following is the primary advantage of the eukaryotic nuclear envelope?
- providing residence for ribosomes
 - allowing isolation of DNA from cytoplasmic machinery
 - providing pore entry places
 - enabling faster cell division
 - enabling larger cell size
- _____ 19. An organelle found in the nucleus is a
- plastid.
 - vacuole.
 - microvillus.
 - nucleolus.
 - basal body.
- _____ 20. Which of the following terms cannot be used to characterize eukaryotic chromosomes?
- DNA plus proteins
 - duplicated
 - condensed
 - bathed in cytoplasm
 - "colored bodies"
- _____ 21. Which of the following is NOT a part of the endomembrane system?
- nucleus
 - endoplasmic reticulum
 - lysosomes
 - Golgi bodies
 - vesicles
- _____ 22. The breakdown of a plasma or nuclear membrane would yield
- cellulose.
 - suberin and cutin.
 - phospholipids and proteins.
 - microtubules and microfilaments.
- _____ 23. Organelles composed of a system of canals, tubes, and sacs that transport molecules inside the cytoplasm are
- Golgi bodies.
 - ribosomes.
 - mitochondria.
 - lysosomes.
 - endoplasmic reticula.

- _____ 24. The endoplasmic reticulum
- serves as the internal transportation system of a cell.
 - is the inner membrane of the mitochondria.
 - is characterized by the presence of ribosomes throughout.
 - manufactures ATP.
- _____ 25. Which of the following are sometimes referred to as rough or smooth, depending on the structure?
- Golgi bodies
 - ribosomes
 - mitochondria
 - lysosomes
 - endoplasmic reticula
- _____ 26. Which of the following are the primary cellular assembly sites for the production of proteins?
- Golgi bodies
 - ribosomes
 - mitochondria
 - lysosomes
 - smooth endoplasmic reticula
- _____ 27. Which of the following are the primary structures for the packaging of cellular secretions for export from the cell?
- Golgi bodies
 - ribosomes
 - mitochondria
 - lysosomes
 - endoplasmic reticula
- _____ 28. Which of the following contain enzymes and are the main organelles of intracellular digestion?
- Golgi bodies
 - ribosomes
 - mitochondria
 - lysosomes
 - endoplasmic reticula
- _____ 29. Which of the following cell organelles is responsible for disposal of hydrogen peroxide?
- Golgi bodies
 - ribosomes
 - mitochondria
 - lysosomes
 - peroxisomes
- _____ 30. Which of the following are the primary cellular sites for the recapture of energy from carbohydrates?
- Golgi bodies
 - ribosomes
 - mitochondria
 - lysosomes
 - endoplasmic reticula
- _____ 31. Which of the following contain enzymes used in the breakdown of glucose and generation of ATP?
- Golgi bodies
 - ribosomes
 - mitochondria
 - lysosomes
 - endoplasmic reticula

- ___ 32. Energy stored in which of the following molecules is converted by mitochondria to a form usable by the cell?
- water
 - carbon compounds
 - NAD⁺
 - ATP
 - carbon dioxide
- ___ 33. If a biologist said that the human body might be getting its power from "bacteria," he would be referring to
- energy cells that utilize bacteria by producing energy.
 - bacteria in our intestinal tract that digest food to supply us with energy.
 - the mitochondria in our cells that may have originated as endosymbiotic bacteria.
 - the *E. coli* throughout the human body that produce ATP.
- ___ 34. Which of the following is thought to be the descendant of engulfed ancient bacteria?
- nuclei
 - Golgi bodies
 - ER
 - mitochondria
 - lysosomes
- ___ 35. Which of the following is NOT used as evidence that mitochondria and chloroplasts may have arisen according to the endosymbiotic relationship?
- They can live an independent existence when isolated from a cell.
 - They possess their own type of DNA different from that found in the nucleus.
 - They possess their own ribosomes.
 - They have their own membranes and are the same size as bacteria.
- ___ 36. In contrast to the membrane of the nucleus, the double membrane of a mitochondrion
- is riddled with holes.
 - is not permeable.
 - creates two compartments.
 - separates DNA from cytoplasm.
 - has two lipid bilayers.
- ___ 37. Starch is stored in
- plastids.
 - vacuoles.
 - lysosomes.
 - microvilli.
 - any of the above
- ___ 38. In which of the following is photosynthesis NOT possible?
- chloroplasts
 - amyloplasts
 - grana
 - mitochondria
 - both amyloplasts and mitochondria.
- ___ 39. Fluid-filled sacs that may store food, ions, or water in cells are called
- plastids.
 - vacuoles.
 - microvilli.
 - nucleoli.
 - Golgi bodies.

- ___ 40. Which of the following are found in both plant and animal cells?
- nucleus, Golgi body, chloroplasts
 - ribosomes, mitochondria, plasma membranes
 - centrioles, cell walls, nucleolus
 - vacuoles, nucleolus, starch grains
- ___ 41. Organelles that dramatically increase the surface area of a membrane are
- plastids.
 - vacuoles.
 - chloroplasts.
 - nucleoli.
 - microfilaments.
- ___ 42. Only plant cells possess
- a central vacuole.
 - plastids.
 - grana.
 - stroma.
 - all of these
- ___ 43. Structural features that contain the protein actin and help to control the shapes of cells are
- plastids.
 - vacuoles.
 - microvilli.
 - nucleoli.
 - microfilaments.
- ___ 44. Cell components used to move chromosomes are the
- cilia.
 - flagella.
 - microtubules.
 - microfilaments.
 - Golgi bodies.
- ___ 45. The organelle that is compared to a whip is a
- microfilament.
 - intermediate filament.
 - microvillus.
 - flagellum.
 - microtubule.
- ___ 46. A "9 + 2 array" refers to
- microtubules.
 - Golgi bodies.
 - ribosomes.
 - cilia.
 - both microtubules and cilia.
- ___ 47. Microfilaments are commonly found in
- cilia.
 - skeletal muscle cells.
 - flagella.
 - only cilia and flagella.
 - cilia, flagella, and skeletal muscle cells.

- _____ 48. The centrosome of a cell
- gives rise to the spindle microtubules.
 - is a type of microtubule organizing center.
 - is located near the nucleus.
 - gives rise to the spindle microtubules and is a type of microtubule organizing center.
 - gives rise to the spindle microtubules, is a type of microtubule organizing center, and is located near the nucleus.
- _____ 49. Cilia and flagella
- are found only in motile cells.
 - are found only in sex cells and unicellular organisms.
 - are fundamentally the same structurally.
 - may also function as receptor sites for certain hormones.
- _____ 50. Which of the following is NOT found as a part of all cells?
- cell membrane
 - cell wall
 - ribosomes
 - DNA
 - RNA
- _____ 51. The cell wall
- provides skeletal support for plants.
 - controls what enters and leaves a cell.
 - replaces the plasma membrane of animal cells in plant cells.
 - is found in all eukaryotes.
- _____ 52. Which of the following junctions permit(s) cytoplasmic interconnections between cells?
- gap junctions
 - plasmodesmata
 - adhering junctions
 - only gap junctions and plasmodesmata.
 - gap junctions, plasmodesmata, and adhering junctions.
- _____ 53. Plasmodesmata are related to
- gap junctions in animal cells.
 - tight junctions in bacteria.
 - wall junctions in plants.
 - adhering junctions.
 - both tight junctions in bacteria and adhering junctions.
- _____ 54. Which are examples of prokaryotes?
- protozoa
 - bacteria
 - algae
 - fungi
 - mosses
- _____ 55. Prokaryotic cells do NOT have
- ribosomes.
 - membrane-bound nuclei.
 - cytoplasm.
 - a plasma membrane.
 - ribosomes or membrane-bound nuclei.

- ___ 56. Prokaryotes
- have nucleoid regions.
 - are unicellular.
 - have cell walls.
 - are monerans.
 - all of these
- ___ 57. Which of the following are made of two subunits and are composed of RNA and protein?
- Golgi bodies
 - mitochondria
 - chloroplasts
 - ribosomes
 - endoplasmic reticula
- ___ 58. A mutant bacterial strain without ribosomes would be incapable of
- carbohydrate synthesis.
 - respiration.
 - DNA programming.
 - protein synthesis.
 - diffusion.
- ___ 59. Four of the five answers listed below are related by a common observation. Select the exception.
- Hooke
 - Galileo
 - Schwann
 - Schleiden
 - Virchow
- ___ 60. Four of the five statements listed below are portions of a well-known theory. Select the exception.
- Cells are the structural and functional components of living things.
 - Cells arise from preexisting cells.
 - All organisms are composed of cells.
 - Cells are the basic living unit of organization of living things.
 - All cells have a nucleus.
- ___ 61. Four of the five answers listed below are familiar organelles in the cytoplasm. Select the exception.
- nucleolus
 - mitochondrion
 - ribosome
 - Golgi body
 - chloroplast
- ___ 62. Four of the five answers listed below are parts of an electron microscope. Select the exception.
- projector lens
 - mirror
 - electron gun
 - condensing lens
 - fluorescent screen or photographic film
- ___ 63. Four of the five answers listed below are organelles found in eukaryotic cells. Select the exception.
- mitochondrion
 - Golgi body
 - nucleoid
 - lysosome
 - vacuole

- _____ 64. Four of the five answers listed below are composed of membranes. Select the exception.
- endoplasmic reticulum
 - granum
 - plasma membrane
 - chromosome
 - nuclear envelope
- _____ 65. Four of the five answers listed below are chloroplast features. Select the exception.
- stroma
 - granum
 - microbody
 - pigment
 - ATP
- _____ 66. Four of the five answers listed below are features of plasma membrane extensions. Select the exception.
- amyloplast
 - centriole
 - microtubule
 - basal body
 - 9 + 2 array
- _____ 67. Four of the five answers listed below are types of intercellular connections. Select the exception.
- tight junctions
 - gap junctions
 - plasmodesmata
 - adhering junctions
 - microvilli
- _____ 68. Four of the five answers listed below are bound by membranes. Select the exception.
- mitochondrion
 - ribosome
 - chromoplast
 - vacuole
 - lysosome
- _____ 69. The phospholipid molecules of most membranes have
- a hydrophobic head and a hydrophilic tail.
 - a hydrophobic head and a hydrophobic tail.
 - a hydrophobic head and two hydrophobic tails.
 - a hydrophilic head and two hydrophobic tails.
 - none of these
- _____ 70. If a cell membrane is pierced with a very fine needle, the cell will
- explode.
 - seal itself.
 - collapse.
 - absorb fluid from the outside and grow.
 - none of these
- _____ 71. Hydrophobic reactions of phospholipids can produce clusters of their fatty acid tails to form
- a lipid bilayer.
 - hydrolysis of the fatty acids.
 - a protein membrane.
 - a cytoskeleton.
 - a nonpolar membrane.

- _____ 72. Which of the following statements is true?
- When lipids and water are mixed, it is the water molecules that isolate themselves into droplets.
 - When lipids and water are mixed, the lipids dissolve and enter into a solution.
 - Lipids are classified as nonpolar substances and will not mix with water.
 - Polar substances are able to pass through a plasma membrane more readily than nonpolar substances.
 - All portions of a phospholipid molecule found in a membrane are classified as nonpolar.
- _____ 73. A hypothetical "microbullet" shot through a phospholipid bilayer would pass the components in which order?
- tail >>> tail >>> head >>> head
 - head >>> tail >>> head >>> tail
 - tail >>> head >>> head >>> tail
 - head >>> tail >>> tail >>> head
 - head >>> head >>> tail >>> tail
- _____ 74. If a plasma membrane were compared to a sandwich, _____ would be considered the filling.
- cholesterol
 - protein
 - hydrophilic heads
 - hydrophobic tails
 - carbohydrates
- _____ 75. Unsaturated tails of lipids
- are hydrophilic.
 - are unstable and tend to break apart.
 - have kinks in them and lessen the interaction between adjacent fat molecules.
 - will break whenever exposed to phosphate ions.
 - all of these
- _____ 76. Unsaturated tails tend to _____ at the sites of their double bonds.
- dissolve
 - kink or bend
 - separate
 - react with ions
 - none of these
- _____ 77. The relative impermeability of membranes to water-soluble molecules is a result of
- the nonpolar nature of water molecules.
 - the presence of large proteins that extend through both sides of membranes.
 - the presence of inorganic salt crystals scattered through some membranes.
 - the presence of cellulose and chemicals such as cutin, lignin, pectin, and suberin in the membranes.
 - the presence of phospholipids in the lipid bilayer.
- _____ 78. Which statement is NOT true?
- Membranes are often perforated by proteins that extend through both sides of the membrane.
 - Some membranes have proteins with channels or pores that allow for the passage of hydrophilic substances.
 - Hydrophilic substances have an easier time passing through membranes than do hydrophobic substances.
 - The current concept of a membrane can be best summarized by the fluid mosaic model.
 - The lipid bilayer serves as a hydrophobic barrier between two fluid regions.

- _____ 79. Which of the following statements is NOT true?
- A lipid bilayer is characteristic of all membranes.
 - Cellular organelles are associated with membranes.
 - In a plasma membrane, the hydrophilic portion is oriented to the outside of the cell.
 - Lipid molecules make the cell membrane relatively impermeable to water.
 - Even under extremely high magnification, an electron microscope cannot reveal the substructure of cell membranes.
- _____ 80. In an attempt to visualize the fluid mosaic model of a membrane, we could describe the _____ as floating in a sea of _____.
- lipid; protein
 - phospholipids; carbohydrate
 - proteins; lipid
 - fats; water
 - glycolipids; sterols
- _____ 81. A membrane is more "fluid" than solid because
- phospholipid tails prevent close packing.
 - proteins can shift positions.
 - water is the main component.
 - phospholipid tails prevent close packing and proteins can shift positions.
 - phospholipid tails prevent close packing, proteins can shift positions, and water is the main component.
- _____ 82. Which of the following statements is false?
- The plasma membrane is more like a fluid than a solid.
 - The cell membrane is symmetrical, so it is impossible to identify which is the extracellular surface.
 - The glycoproteins have their sugar side chains on the outside of the cell membrane.
 - The plasma membrane is in constant movement, with proteins shifting positions.
 - There are functional differences between the two sides of the plasma membranes.
- _____ 83. Cholesterol
- is not found in plant membranes.
 - makes a membrane more fluid (flexible) wherever it is found.
 - at high concentrations tends to make fatty-acid tails stick together.
 - renders membranes more fluid in cold temperature.
 - all of these
- _____ 84. Glycolipids differ from other membrane lipids in that they
- have hydrophilic heads.
 - have hydrophobic heads.
 - have molecules of a monosaccharide associated with them.
 - have saturated and partially unsaturated tails.
 - are stationary molecules found scattered throughout the membrane.
- _____ 85. Which statement is true of plasma membranes?
- They have molecules on their surfaces that identify them.
 - They are essentially impermeable.
 - They are basically static, nonchanging structures.
 - They are hydrophilic barriers between cells.
 - They function primarily through the activity of their carbohydrates.

- ___ 86. A transport protein is most analogous to a
- water pipe.
 - subway train.
 - light switch.
 - voice identification device.
 - television receiver.
- ___ 87. Most of the functions of plasma membranes are carried out by
- cholesterol.
 - proteins.
 - hydrophilic heads.
 - hydrophobic tails.
 - carbohydrates.
- ___ 88. A water-soluble hormone would most likely bind to which of the following membrane proteins?
- carrier
 - recognition
 - receptor
 - channel
 - transport
- ___ 89. Which of the following proteins is not necessarily associated with the plasma membrane?
- recognition protein
 - antibody protein
 - receptor protein
 - channel protein
 - adhesion protein
- ___ 90. Which of the following affects the rate of diffusion through a semipermeable membrane?
- steeper concentration gradients
 - higher temperatures
 - molecular size
- I only
 - II only
 - I and II
 - II and III
 - I, II, and III
- ___ 91. The rate of diffusion through a semipermeable membrane will be lowest when which of the following is (are) true?
- Concentration gradients are steep.
 - Temperatures are low.
 - Solutes are small molecules.
- I only
 - II only
 - I and III
 - II and III
 - I, II, and III

- ___ 92. A concentration gradient ceases to exist when
- all the molecules have moved from high concentration to low.
 - the membrane pores close.
 - the temperature drops.
 - there is no net movement.
 - bulk flow intervenes.
- ___ 93. In simple diffusion,
- the rate of movement of molecules is controlled by temperature and pressure.
 - the movement of individual molecules is random.
 - the movement of molecules of one substance is independent of the movement of any other substance.
 - the net movement is away from the region of highest concentration.
 - all of these
- ___ 94. Oxygen, carbon dioxide, glucose, and other small molecules cross the plasma membrane through the process(es) of
- osmosis.
 - diffusion.
 - endocytosis and exocytosis.
 - active transport.
 - facilitated diffusion.
- ___ 95. Which substance passes most readily into a cell?
- ions
 - large molecules
 - glucose
 - ethanol
 - polar molecules
- ___ 96. Movement of matter or energy in nature may be the result of
- concentration gradients.
 - differential pressures.
 - differences in electrical charges.
 - the existence of thermal differentials.
 - all of these
- ___ 97. Movement of a molecule against a concentration gradient is
- simple diffusion.
 - facilitated diffusion.
 - osmosis.
 - active transport.
 - bulk flow.
- ___ 98. The method of movement that requires the expenditure of ATP molecules is
- simple diffusion.
 - facilitated diffusion.
 - osmosis.
 - active transport.
 - bulk flow.

- ___ 99. Which of the following does NOT require the participation of a membrane protein?
- active transport
 - exocytosis
 - facilitated diffusion
 - simple diffusion
 - all of these require a protein
- ___ 100. The sodium-potassium pump is an example of
- simple diffusion.
 - facilitated diffusion.
 - osmosis.
 - active transport.
 - bulk flow.
- ___ 101. The carrier molecules used in active transport are
- calcium ions in the calcium pump.
 - proteins.
 - ATP molecules.
 - carbohydrates.
 - lipids.
- ___ 102. A single-celled freshwater organism, such as a protistan, is transferred to saltwater. Which of the following is likely to happen?
- The cell bursts.
 - Salt is pumped out of the cell.
 - The cell shrinks.
 - Enzymes flow out of the cell.
 - all of these
- ___ 103. Which statement is true?
- A cell placed in an isotonic solution will swell.
 - A cell placed in a hypotonic solution will swell.
 - A cell placed in a hypotonic solution will shrink.
 - A cell placed in a hypertonic solution will remain the same size.
 - A cell placed in a hypotonic solution will remain the same size.
- ___ 104. Distilled water refers to water that nearly is free of
- solutes.
 - ions.
 - gases.
 - suspended solids.
 - none of these
- ___ 105. Which statement is true?
- The movement of solvent occurs from a hypotonic solution to an isotonic solution.
 - The net movement from an isotonic to a hypotonic solution involves the movement of solute molecules only.
 - The concentration of the solute is greater in an isotonic solution than in a hypertonic solution.
 - The concentration of the solvent is greater in a hypertonic solution than in an isotonic solution.
 - Osmosis involves only hypertonic solutions.

- ___ 106. The net direction that an ion or molecule moves is
- dependent upon the size of the molecule.
 - unpredictable because movement is random.
 - controlled by the temperature of the medium.
 - controlled by the membranes in the vicinity.
 - the result of concentration differences.
- ___ 107. A red blood cell will lyse when placed in which of the following kinds of solution?
- hypotonic
 - hypertonic
 - isotonic
 - any of the above
 - none of these
- ___ 108. If a plant cell is placed in a hypotonic solution,
- the entire cell will not swell or shrink.
 - the entire cell will shrink.
 - the turgor pressure will increase.
 - the cell wall prevents the cell from exploding.
 - the turgor pressure will increase but the cell wall prevents the cell from exploding.
- ___ 109. Wilting of a plant occurs
- if the plant is placed in an isotonic solution.
 - if there is a rise in turgor pressure.
 - as a result of facilitated diffusion.
 - when a plant with flexible cell walls is placed in a hypertonic solution.
- ___ 110. Wilting is counteracted by
- turgor pressure.
 - osmotic pressure.
 - concentration gradients.
 - diffusion.
 - metabolic pressure within a cell.
- ___ 111. Which of the following is NOT a form of active transport?
- sodium-potassium pump
 - endocytosis
 - exocytosis
 - bulk flow
 - none of these
- ___ 112. Which statement is NOT true of bulk flow?
- It is faster than diffusion.
 - It explains massive movement on a microscopic scale, but movement over large distances in animals is more likely due to diffusion.
 - It involves the movement of the molecules of different substances together.
 - It accounts for the movement of sap in the vascular tissues of plants.
 - When present, materials of different substances move in the same direction in response to pressure gradients.
- ___ 113. Bulk flow differs from osmosis in that bulk flow
- involves molecules that are not all alike.
 - goes against pressure gradients.
 - is intracellular.
 - is the reverse of osmosis.
 - is used only by plants.

- ___ 114. Which of the following is NOT a form of passive transport?
- osmosis
 - facilitated diffusion
 - bulk flow
 - exocytosis
 - none of these
- ___ 115. White blood cells use _____ to get rid of foreign particles in the blood.
- simple diffusion
 - bulk flow
 - osmosis
 - phagocytosis
 - facilitated diffusion
- ___ 116. The action of a white blood cell engulfing a bacterium is
- pinocytosis.
 - phagocytosis.
 - exocytosis.
 - endocytosis.
 - phagocytosis and endocytosis.
- ___ 117. Exocytotic vesicles develop from the membranes of which of the following structures?
- mitochondria
 - Golgi bodies
 - lysosomes
 - vacuoles
 - phagocytes
- ___ 118. Four of the five answers listed below are characteristics of the plasma membrane. Select the exception.
- phospholipid
 - fluid mosaic
 - lipid bilayer
 - inert and impermeable
 - hydrophobic tails
- ___ 119. Four of the five answers listed below are factors affecting simple diffusion. Select the exception.
- temperature
 - pressure
 - characteristic of the membrane
 - size of the molecules
 - concentration gradient
- ___ 120. Four of the five answers listed below result when a cell is placed in a hypertonic solution. Select the exception.
- wilting
 - plasmolysis
 - turgidity
 - limpness
 - shriveling
- ___ 121. Four of the five answers listed below are related by energy requirements. Select the exception.
- water potential
 - osmosis
 - bulk flow
 - active transport
 - diffusion

- ___ 122. Four of the five answers listed below are related by energy requirements. Select the exception.
- active transport
 - endocytosis
 - facilitated diffusion
 - exocytosis
 - sodium-potassium pump
- ___ 123. Metabolism describes
- the cell's capacity to acquire energy.
 - cellular processes used to store substances.
 - reactions that break apart nutrients to release energy.
 - the elimination of waste products.
 - all of these
- ___ 124. Energy
- cannot be produced by fungi and heterotrophic organisms.
 - involves ATP in living organisms.
 - is the ability to do work.
 - usage is governed by the laws of thermodynamics.
 - all of these
- ___ 125. According to the first law of thermodynamics,
- although energy in the universe is constant, energy in an earthly system may increase.
 - the amount of energy in the universe is constant.
 - chemical reactions do not create or destroy energy.
 - energy can change from one form to another.
 - all of these
- ___ 126. The second law of thermodynamics holds that
- matter can be neither created nor destroyed.
 - energy can be neither created nor destroyed.
 - energy of one form is converted to a less concentrated form whenever energy is transformed or transferred.
 - entropy decreases with time.
 - none of these
- ___ 127. The second law of thermodynamics states that
- energy can be transformed into matter and, because of this, we can get something for nothing.
 - energy can be destroyed only during nuclear reactions, such as those that occur inside the sun.
 - if energy is gained by one region of the universe, another place in the universe also must gain energy in order to maintain the balance of nature.
 - energy tends to become increasingly more disorganized.
- ___ 128. Which of the following statements is false?
- The universe has a certain amount of energy.
 - One form of energy can be converted to other forms of energy.
 - Whenever energy conversions occur, some energy is lost.
 - Once energy is utilized, it disappears.
 - There are differences in the quality of energy.

- ___ 129. Essentially, the first law of thermodynamics says that
- one form of energy cannot be converted into another.
 - entropy is increasing in the universe.
 - energy can be neither created nor destroyed.
 - energy cannot be converted into matter or matter into energy.
 - all of these
- ___ 130. Which of the following is an application of the first law of thermodynamics?
- The level of entropy increases as time passes.
 - Living organisms represent an exception to the laws of energy.
 - Energy does not increase or decrease.
 - Fungi and plants do not make their own energy but derive it from somewhere else.
 - The amount of energy found in the compounds on one side of an equation is equal to that on the other side.
- ___ 131. Which statement is NOT true?
- Because living things maintain organization, entropy does not apply to living organisms.
 - The amount of energy in the web of life is greatest among the plants that capture solar energy.
 - A state of maximum entropy will never occur.
 - Entropy applies at the molecular level as well as at the organismal level.
 - Entropy is a measure of the degree of disorder of a system.
- ___ 132. The energy used by living organisms
- is declining through time.
 - is derived by breaking bonds that hold the atoms in organic molecules together.
 - involves ionic bonds more often than covalent bonds.
 - is available only from glucose when it undergoes respiration.
 - tends to accumulate in a food chain.
- ___ 133. Which of the following is NOT true?
- Cells lose some energy in the form of heat.
 - Energy flows in one direction.
 - The web of life refers to the flow of energy through an ecosystem.
 - The primary source for energy on earth is the sun.
 - The most common and important form of energy available for living organisms is heat.
- ___ 134. The most common form of low-quality energy released in energy conversions is
- metabolic.
 - heat.
 - entropy.
 - exergonic emission.
 - oxidation.
- ___ 135. Which reaction is NOT an exergonic reaction?
- protein synthesis
 - digestion
 - fire
 - respiration
 - movement

- ___ 136. Endergonic reactions
- have more energy in the reactants than in the products.
 - have more energy in the products than in the reactants.
 - are illustrated by the breakdown of glucose.
 - are the mechanisms used by animals to provide energy for biological reactions.
 - have more energy in the products than in the reactants and are illustrated by the breakdown of glucose.
- ___ 137. Which of the following statements about exergonic reactions is NOT true?
- They release energy.
 - Glucose metabolism is an example.
 - Their products have more energy than the reactants.
 - There is an energy loss.
 - Bonds are broken.
- ___ 138. ATP contains
- alanine.
 - arginine.
 - ribose.
 - tyrosine.
 - glucose.
- ___ 139. ATP contains
- adenine.
 - cytosine.
 - uracil.
 - thymine.
 - guanine.
- ___ 140. A "high-energy bond"
- absorbs a large amount of free energy when the phosphate group is attached during hydrolysis.
 - is formed when ATP is hydrolyzed to ADP and one phosphate group.
 - is usually found in each glucose molecule; that is why glucose is chosen as the starting point for glycolysis.
 - releases a large amount of usable energy when the phosphate group is split off during hydrolysis.
 - none of these
- ___ 141. A molecule that gives up an electron becomes
- ionized.
 - oxidized.
 - reduced.
- I only
 - II only
 - III only
 - I and II
 - I and III

- ___ 142. The removal of electrons from a compound is known as
- dehydration.
 - oxidation.
 - reduction.
 - phosphorylation.
 - a nonreversible chemical reaction.
- ___ 143. When NAD^+ combines with hydrogen, the NAD^+ is
- reduced.
 - oxidized.
 - phosphorylated.
 - denatured.
- ___ 144. The "balancing" of chemical equations is dictated by
- the laws of thermodynamics.
 - tradition.
 - chemistry teachers.
 - the law of conservation of mass.
 - none of these
- ___ 145. Which of the following statements is true?
- The products of a reaction can have less energy than the reactants.
 - The products of a reaction can have more energy than the reactants.
 - Reversible reactions tend to approach an equilibrium.
 - Most reactions are reversible.
 - all of these
- ___ 146. Chemical equilibrium for a particular reaction will not be achieved if
- more reactants are added.
 - products are removed.
 - additional enzyme is added.
 - more reactants are added and products are removed.
 - more reactants are added, products are removed, and additional enzyme is added.
- ___ 147. Which of the following statements is NOT true?
- At an equilibrium there are equal numbers of molecules on each side of a reaction.
 - Chemical equilibrium is controlled solely by the amount of the reactants available.
 - A chemical equilibrium is reached when the forward and reverse reactions occur at the same rate.
 - At an equilibrium there are equal numbers of molecules on each side of a reaction; and Chemical equilibrium is controlled solely by the amount of the reactants available.
 - At an equilibrium there are equal numbers of molecules on each side of a reaction; and Chemical equilibrium is controlled solely by the amount of the reactants available; and A chemical equilibrium is reached when the forward and reverse reactions occur at the same rate.
- ___ 148. Chemical reactions will reach an equilibrium under which of the following conditions?
- There is sufficient time.
 - The reactions are reversible.
 - Product remains after it is formed.
 - There are sufficient reactants.
 - all of these

- ___ 149. A chemical equilibrium
- means the concentration of reactants and products is the same.
 - means the rate of opposing reactions is equal.
 - means highly spontaneous reactions are less likely to occur than when the system is not at equilibrium.
 - means both reactions are typically proceeding against concentration gradients.
 - only occurs in endergonic reactions.
- ___ 150. A biosynthetic pathway can be characterized as
- endergonic.
 - exergonic.
 - degradative.
 - releasing energy.
 - producing ATP.
- ___ 151. An orderly sequence of reactions with specific enzymes acting at each step is the definition of
- energy carriers.
 - metabolic pathway.
 - induced-fit model.
 - intermediary compounds.
 - activation.
- ___ 152. Substances that enter a reaction are termed
- intermediates.
 - enzymes.
 - energy carriers.
 - reactants.
 - none of these
- ___ 153. Which of the following substances would be unlikely to function as a coenzyme?
- a water-soluble vitamin
 - an iron ion
 - glucose
 - NAD⁺
 - a magnesium ion
- ___ 154. NAD⁺ and FAD are
- coenzymes.
 - electron acceptors.
 - reduced forms.
 - coenzymes and electron acceptors.
 - coenzymes, electron acceptors, and reduced forms.
- ___ 155. ATP and NADP⁺ act as what type of agents between breakdown and synthesis pathways?
- linkage
 - feedback
 - catalytic
 - allosteric
 - enzymatic
- ___ 156. Which of the following is most closely associated with photosynthesis?
- FADH
 - FAD
 - NAD⁺
 - NADP⁺
 - NADH₂

- ___ 157. The molecule NADP⁺ is
- I. a coenzyme.
 - II. a prosthetic group.
 - III. a nucleotide.
- a. I only
 - b. I and II
 - c. I and III
 - d. III only
 - e. I, II, and III
- ___ 158. Which of the following may show enzymatic activity?
- I. lipids
 - II. proteins
 - III. RNA
- a. I only
 - b. II only
 - c. III only
 - d. I and II
 - e. II and III
- ___ 159. Which of the following is NOT true of enzyme behavior?
- a. Enzyme shape may change during catalysis.
 - b. The active site of an enzyme orients its substrate molecules, thereby promoting interaction of their reactive parts.
 - c. All enzymes have an active site where substrates are temporarily bound.
 - d. Each enzyme can catalyze a wide variety of different reactions.
- ___ 160. Enzymes
- a. are very specific.
 - b. act as catalysts.
 - c. are organic molecules.
 - d. have special shapes that control their activities.
 - e. all of these
- ___ 161. Enzymes
- a. control the speed of a reaction.
 - b. change shapes to facilitate certain reactions.
 - c. may place physical stress on the bonds of the substrate.
 - d. may require cofactors.
 - e. all of these
- ___ 162. Which of the following statements is false?
- a. Enzymes catalyze reversible reactions in either direction.
 - b. Enzymes are highly specific.
 - c. Most enzymes are protein molecules.
 - d. Enzymes allow some reactions to occur that would never occur without their help.
 - e. Although enzymes may be modified during their involvement with the substrate, they revert to their original characteristics when the reaction is over.

- ___ 163. For an enzyme to function, what kind of energy must be provided?
- combination
 - activation
 - thermal
 - electrical
 - solar
- ___ 164. Activation energy
- is less when enzymes are present.
 - allows greater interaction of substrate with the active site.
 - is needed to begin a reaction.
 - is less when enzymes are present and is needed to begin a reaction.
 - is less when enzymes are present, allows greater interaction of substrate with the active site, and is needed to begin a reaction.
- ___ 165. Enzymes
- may be secreted by glands.
 - are usually molecules of RNA.
 - are nonspecific with regard to substrate.
 - enable some reactions to occur that would never happen without the availability of enzymes.
 - will mediate a reversible reaction in one direction only.
- ___ 166. During enzyme-catalyzed reactions, *substrate* is a synonym for
- end products.
 - by-products.
 - enzymes.
 - reactants.
 - none of these
- ___ 167. The active site of an enzyme
- is where the coenzyme is located.
 - is a specific bulge or protuberance on an enzyme.
 - is a groove or crevice in the structure of the enzyme.
 - will react with only one substrate no matter how many molecules may resemble the shape of the substrate.
 - rigidly resists any alteration of its shape.
- ___ 168. The inadequacy of the lock-and-key model of enzyme-substrate interaction was that
- there were more keys than locks.
 - keys could change too easily.
 - locks were too numerous for available keys.
 - it was too inflexible.
 - Emil Fischer did not know that enzymes were proteins.
- ___ 169. Which of the following is NOT a true statement?
- When an enzyme and a substrate fit together, they are in the "transition state."
 - Most enzymes and substrates are exact fits, like a lock and key.
 - Activation energy must be supplied before the "transition state" is reached.
 - The idea for the lock-and-key theory was first proposed over 100 years ago.
 - Enzymes have an active site where the substrate fits.

- ____ 170. Enzymatic reactions can be controlled by
- the amount of substrates available.
 - the concentration of products.
 - temperature.
 - modification of reactive sites by substances that fit into the enzyme and, later, their reactive site.
 - all of these
- ____ 171. Inhibitors of enzyme-catalyzed reactions act by
- forming clusters of reactants that are unable to break free.
 - tying up ATP supplies.
 - binding to the enzyme's active site.
 - tying up ATP supplies, and binding to the enzyme's active site.
 - forming clusters of reactants that are unable to break free, tying up ATP supplies, and binding to the enzyme's active site.
- ____ 172. Enzymes may be controlled by
- hormones.
 - pH.
 - inhibitors.
 - the presence of cofactors.
 - all of these
- ____ 173. Enzymes may be controlled by
- temperature.
 - the presence of chemicals that fit into allosteric sites.
 - feedback inhibition.
 - current metabolic conditions in the cell.
 - all of these
- ____ 174. Which of the following statements is false?
- Enzymes are highly specific and act on chemicals called substrates.
 - Enzymes act as catalysts and speed up chemical reactions within cells.
 - Heavy metals such as cadmium and mercury function as coenzymes or activators of enzymes so they can function.
 - Most enzymes are proteins.
 - Enzymes can become denatured in high fevers.
- ____ 175. Allosteric inhibition is generally a result of
- excess substrates.
 - binding of regulatory molecules at another site.
 - a change in the temperature of the system.
 - a lack of coenzymes.
 - pH inhibition.
- ____ 176. An allosteric enzyme
- has an active site where substrate molecules bind and another site that binds with intermediate or end-product molecules.
 - is an important energy-carrying nucleotide.
 - carries out either oxidation reactions or reduction reactions but not both.
 - raises the activation energy of the chemical reaction it catalyzes.
 - all of these

- ___ 177. Four of the five answers listed below are related to the second law of thermodynamics. Select the exception.
- entropy
 - Energy can be neither created nor destroyed.
 - The amount of available energy in a closed system declines with time.
 - Energy is lost as it is transferred or transformed to another form.
 - Spontaneous flow of energy from high- to low-quality forms occurs.
- ___ 178. Four of the five answers listed below apply to conditions in which energy is released. Select the exception.
- endergonic reaction
 - respiration
 - entropy
 - second law of thermodynamics
 - exergonic reaction
- ___ 179. Four of the five answers listed below are related by their description of enzyme properties. Select the exception.
- cofactors
 - active sites
 - activation energy
 - substrate
 - catalyst
- ___ 180. Four of the five answers listed below are cofactors or coenzymes. Select the exception.
- mineral
 - water-soluble vitamin
 - metallic ions
 - NAD⁺
 - protein
- ___ 181. Four of the five answers listed below affect the rate of an enzymatic reaction. Select the exception.
- pH
 - temperature
 - concentration
 - built-up product
 - presence of hormones
- ___ 182. Four of the five answers listed below are metabolic processes. Select the exception.
- protein synthesis
 - growth
 - digestion
 - phosphorylation
 - oxidation-reduction
- ___ 183. Three of the four answers listed below are parts of a common molecule. Select the exception.
- phosphate group
 - adenine
 - deoxyribose
 - ribose

Matching

Choose the one most appropriate answer for each.

- a. contain enzymes for intracellular digestion
- b. are primary cellular organelles where proteins are assembled
- c. package cellular secretions for export
- d. extract energy stored in carbohydrates; synthesize ATP; produce water and carbon dioxide
- e. synthesize subunits that will be assembled into two-part ribosomes in the cytoplasm
- f. transcribe, translate hereditary instructions into specific proteins
- g. increase cell surface area; store substances
- h. encode hereditary information
- i. help distribute chromosomes to the new cells during cell division
- j. convert light energy to chemical energy stored in the chemical bonds of glucose or starch

- ___ 184. microtubules
 ___ 185. chloroplasts
 ___ 186. Golgi bodies
 ___ 187. DNA molecules
 ___ 188. RNA molecules
 ___ 189. central vacuoles
 ___ 190. lysosomes
 ___ 191. mitochondria
 ___ 192. nucleoli
 ___ 193. ribosomes

The following items are organelles found in animal cells. Answer the questions with reference to these organelles.

- a. ribosome
- b. mitochondrion
- c. lysosome
- d. Golgi body
- e. endoplasmic reticulum

- ___ 194. This organelle is the site of polypeptide assembly.
 ___ 195. The cellular digestion and disposal of biological molecules occurs inside this organelle.
 ___ 196. Aerobic respiration occurs in and on this organelle.
 ___ 197. RNA carries out the genetic code translation process in association with ribosomes on this organelle.
 ___ 198. The packaging of secretory proteins occurs in association with this structure.
 ___ 199. This organelle is involved in lipid production and protein transport.
 ___ 200. The hemoglobin of mammals and birds is synthesized on this tiny, two-part organelle.
 ___ 201. Sugar metabolism occurs in association with this organelle.
 ___ 202. DNA synthesis occurs in the nucleus. Its breakdown can occur in this organelle.

The following questions ask about membrane permeability. Answer them in reference to the following five processes:

- a. simple diffusion
- b. bulk flow
- c. osmosis
- d. active transport
- e. endocytosis

- ___ 203. This process is used by white blood cells to ingest bacteria.
- ___ 204. This process specifically moves water molecules across a differentially permeable membrane.
- ___ 205. This process explains the movement of any kind of molecule from areas of higher concentration to areas of lower concentration.
- ___ 206. This process is the tendency of molecules to move more rapidly because they move together.
- ___ 207. This process explains the movement of molecules against a concentration gradient.

Choose the one most appropriate answer for each.

- a. rate of forward reaction equals rate of reverse action
- b. transfer agent that carries hydrogen and electrons to sites where hydrogen-containing molecules are being assembled
- c. attaching a phosphate group by a high-energy bond
- d. an excess of end-product molecules alters the shape of the first enzyme in the pathway and shuts off that metabolic pathway
- e. part of an enzyme that binds to the substrate
- f. by binding a regulatory molecule, it changes the activity of a metabolic pathway
- g. lowers the activation energy of a reaction
- h. universal energy currency
- i. carriers in a series that help transport electrons
- j. a permanent loss of protein structure

- ___ 208. active site
- ___ 209. allosteric enzyme
- ___ 210. adenosine triphosphate
- ___ 211. NADP⁺
- ___ 212. catalyst
- ___ 213. cytochromes
- ___ 214. denaturation
- ___ 215. equilibrium
- ___ 216. feedback inhibition
- ___ 217. phosphorylation

Items a-c below are processes that occur during different stages of photosynthesis. Answer by selecting one of these three processes.

- a. oxidation
- b. reduction
- c. phosphorylation

- ___ 218. This process leads to the formation of ATP from ADP plus inorganic phosphate.
- ___ 219. When an electron is passed to an electron acceptor molecule, such as NADP⁺, this process occurs to the NADP⁺.

Name: _____

ID: A

- ___ 220. When a photon of light energy causes an electron to leave the chlorophyll molecule, this process is involved.
- ___ 221. When an electron transport molecule, such as ferredoxin, gives up an electron, this process occurs to the ferredoxin.