Human Physiology From Cells to Systems (Canadian) 5th edition Sherwood Test Bank

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Name:_____ Class:_____ Date:_____

Chapter 1 – The Foundation of Physiology

1. Which of these statements most accurately reflects the study of physiology?
   a. Stroke volume and heart rate determine cardiac output, which is a measure of the function of the heart.
   b. The brain is located superior to the spinal cord.
   c. The major organ of the respiratory system is the lung.
   d. The digestive tract includes the mouth, esophagus, stomach, and intestines.

ANSWER: a

2. Physiology is most closely related to which other scientific discipline?
   a. biology b. anatomy
   c. biochemistry d. chemistry

ANSWER: b

3. If someone asks the question, "Why does the stomach secrete digestive juices?" and the response is "Because it is stimulated by the nervous system," what type of explanation does the response represent?
   a. teleological b. phenomenological
   c. mechanistic d. anatomical

ANSWER: c

4. Who was the first Canadian to win the Nobel Prize in Physiology and Medicine in 1923 for discovering insulin?
   a. Ralph Steinman b. David H. Hubel
   c. Charles B. Huggins d. Frederick Banting

ANSWER: d

5. Which one of these sequences represents the hierarchy of biological organization?
   a. cell, organ, tissue, system, organism b. cell, tissue, organ, system, organism
   c. tissue, cell, system, organism, organ d. tissue, cell, organism, system, organ

ANSWER: b

6. Which progression represents the hierarchy of organization, from simplest to most complex?
   a. atom, cell, tissue, organ, system, organism
   b. tissue, cell, system, organism, organ, body
   c. system, atom, cell, organ, tissue, organism
   d. atom, molecule, compound, cell, body, organism

ANSWER: a

7. Through which process do cells become more specialized to carry out specific functions?
   a. division b. differentiation
   c. maturation d. meiosis

ANSWER: b

8. Which of the following is **NOT** a basic cell function that is common to all cells of the body?
   a. performing chemical reactions of metabolism
   b. sensing and responding to environmental conditions
   c. reproducing

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d. synthesizing proteins

ANSWER: c

9. What type of tissue has cells that are specialized to generate force?
   a. connective b. muscle
   c. bone d. nervous

ANSWER: b

10. What type of tissue has cells that are specialized for sending messages over long distances?
   a. connective b. muscle
   c. bone d. nervous

ANSWER: d

11. Epithelial tissue is organized into which of the two general types of structures?
   a. epithelial sheets and secretory glands b. cells and cell walls
   c. ducts and nuclei d. protective and absorptive

ANSWER: a

12. Which of these statements is characteristic of connective tissue?
   a. It has relatively few cells dispersed within an abundance of extracellular matrix.
   b. It has no blood vessels.
   c. It covers various parts of the body.
   d. It is usually found in the walls of hollow cavities.

ANSWER: a

13. Which of the following is a type of connective tissue?
   a. exocrine glands b. endocrine glands
   c. blood d. smooth muscle tissue

ANSWER: c

14. What are the secretions of endocrine glands called?
   a. paracrines b. autocrines
   c. lumens d. hormones

ANSWER: d

15. Which of the following are two examples of exocrine glands?
   a. sweat glands and glands that secrete digestive juices
   b. mammary glands and pancreas
   c. bladder and kidneys
   d. thyroid gland and sweat glands

ANSWER: a

16. Which of these statements describes endocrine glands?
   a. They consist of ducts.

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b. They secrete hormones internally into the blood capillaries.
c. They are derived from connective tissue.
d. They include the salivary glands.

ANSWER: b

17. Which of these statements *best* describes an organ?
a. a collection of cells that collectively carry out a body function
b. a group of separate body structures that perform similar function, but come together to carry out activities that are vital for survival
c. a structure made up of two or more different types of primary tissue that work together to perform a function for the body
d. a structure that the body could not survive without

ANSWER: c

18. Why do most cells depend on other cells of the body for survival?
a. because cells do not contain fluid
b. because all cells of the body are physically connected with one another
c. because body cells cannot perform all life-sustaining functions on their own
d. because most cells of the body do not directly interact with the external environment and therefore need other cells to provide nutrients and remove wastes

ANSWER: d

19. Which of these statements describes the internal environment?
a. It consists of intracellular fluid.
b. It is in direct contact with the body's cells and consists of the extracellular fluid.
c. It is inside the body but not in direct contact with the body's cells.
d. It is outside the body and keeps the fluid volume in unchanging composition.

ANSWER: b

20. What type of fluid resides within cells?
a. intracellular b. interstitial
c. extracellular d. plasma

ANSWER: a

21. What type of fluid is the fluid component of blood?
a. intracellular b. interstitial
c. extracellular d. plasma

ANSWER: d

22. What type of fluid is specifically refers to the fluid that is between neighbouring cells?
a. intracellular b. interstitial
c. extracellular d. plasma

ANSWER: b

23. Which of these statements describes extracellular fluid?

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a. It is the external environment of the body.
b. It is the fluid inside each cell.
c. It consists of plasma only.
d. It consists of plasma and interstitial fluid.

ANSWER: d

24. Which of these statements applies to homeostasis?
a. It is a fixed state.
b. It is only required for certain cells of the body to survive.
c. Changes occur, but deviations from a set point are minimized.
d. Only factors external to the body are capable of triggering responses designed to maintain homeostasis.

ANSWER: c

25. Which of these factors is **NOT** under homeostatic regulation?
a. sweat rate
b. body temperature
c. levels of waste products in the body
d. levels of oxygen and carbon dioxide in the blood

ANSWER: a

26. Which of these statements applies to the integumentary system?
a. It eliminates unwanted substances from the body to the external environment.
b. It consists of the heart, blood vessels, and lungs in the pulmonary cavity.
c. It is important for protection of the body and also participates in temperature regulation.
d. It is responsible for taking up required essential nutrients for the body.

ANSWER: c

27. In which body system would you find the source of all the different types of blood cells?
a. endocrine system
b. integumentary system
c. muscular system
d. skeletal system

ANSWER: d

28. Which of these statements describes negative feedback?
a. A change in a regulated variable triggers a response by the effector that opposes the change.
b. The input to a system increases the output, and the output limits its own production by inhibiting the input.
c. A control system's input and output continue to enhance each other in order to maintain homeostasis.
d. It is the main operating principle of most of the body's homeostatic control mechanisms.

ANSWER: b

29. What are the two systems concerned with the control of body functioning by extrinsic controls?
a. nervous and respiratory
b. nervous and endocrine
c. endocrine and respiratory
d. endocrine and lymphatic

ANSWER: b

30. In a negative-feedback loop, which component compares the level of a variable to its set point level?
a. receptor
b. control centre

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c. effector d. set point

ANSWER: b

31. What are the three actions that the body's control system must perform in order to maintain homeostasis?

a. control the external environment, record information, make appropriate adjustments

b. control the internal environment, record information, detect deviation

c. detect information, integrate internal environment, control changes

d. detect deviations, integrate information, make appropriate adjustments

ANSWER: d

32. The hormone insulin enhances the transport of glucose (sugar) from the blood into most of the body's cells. Its secretion is controlled by a negative-feedback system between the concentration of glucose in the blood and insulin-secreting cells. How does this negative-feedback system work?

a. A decrease in blood glucose concentration stimulates insulin secretion, which in turn further lowers the blood glucose concentration.

b. An increase in blood glucose concentration stimulates insulin secretion, which in turn lowers the blood glucose concentration.

c. A decrease in blood glucose concentration stimulates insulin secretion, which in turn increases the blood glucose concentration.

d. An increase in blood glucose concentration stimulates insulin secretion, which further increases the blood glucose concentration.

ANSWER: b

33. Childbirth occurs under which feedback control system?

a. negative feedback b. positive feedback

c. extrinsic control d. feedforward

ANSWER: b

34. Which of the following is an example of a positive-feedback system?

a. regulation of body temperature b. birth of a baby

c. regulation of room temperature d. regulation of blood pH

ANSWER: b

35. Platelets, which have negatively charged cell membranes, adhere to the positively charged surface of a torn blood vessel. As they do so, they release substances that attract more platelets to the damaged area and change the charge on their cell membranes to positive. More platelets adhere to the damaged area. The cycle repeats until the damaged area is sealed. What sort of feedback loop is formed, and why?

a. positive-feedback loop: the response reinforces the initial change

b. negative-feedback loop: the response opposes the initial stimulus

c. negative-feedback loop: having too many platelets in one area blocks blood flow

d. positive-feedback loop: the response prevents a person from haemorrhaging to death

ANSWER: a

36. Describing body processes in terms of the bodily need that they fulfill explains a physiological concept using a teleological perspective.

a. True

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b. False

ANSWER: True

37. A mechanistic explanation of why a person sweats is to cool off.
    a. True
    b. False

ANSWER: False

38. The cellular level is the smallest level of organization in the body.
    a. True
    b. False

ANSWER: False

39. Different cell types in the body are capable of performing unique functions because of cell differentiation.
    a. True
    b. False

ANSWER: True

40. Highly differentiated tissues, such as nervous tissue and cardiac muscle, are incapable of new cell production.
    a. True
    b. False

ANSWER: False

41. Organs are created when specialized cells that carry out similar functions come together.
    a. True
    b. False

ANSWER: False

42. Tissues are composed of two or more types of cells organized to perform a particular function or functions.
    a. True
    b. False

ANSWER: False

43. All substances that enter and leave the body must pass through a layer of epithelial cells to do so.
    a. True
    b. False

ANSWER: True

44. Endocrine glands secrete hormones into ducts that then drain into the capillaries.
    a. True
    b. False

ANSWER: False

45. An exocrine gland is an example of structure composed of connective tissue.
    a. True

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b. False

ANSWER: False

46. Blood is a type of connective tissue.
a. True
b. False

ANSWER: True

47. A lumen is a cavity within a hollow organ or tube.
a. True
b. False

ANSWER: True

48. The external environment is found outside cells but inside the body.
a. True
b. False

ANSWER: False

49. Intestine, heart, and skin do not consist of hormone-secreting cells.
a. True
b. False

ANSWER: False

50. Interstitial fluid is the fluid component of blood.
a. True
b. False

ANSWER: False

51. Homeostasis is both created by and required by cells.
a. True
b. False

ANSWER: True

52. Homeostasis is considered a fixed state because it is designed to keep variables at a predefined set point.
a. True
b. False

ANSWER: False

53. Not all activities performed by the muscular and nervous systems are directed toward maintaining homeostasis.
a. True
b. False

ANSWER: True

54. The plasma surrounds and bathes all the body's cells.
a. True

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b. False

ANSWER: False

55. Sweat rate is a variable that is under homeostatic control.
a. True
b. False

ANSWER: False

56. In addition to regulating fluid balance, the level of electrolytes in the extracellular fluid is controlled for other reasons.
a. True
b. False

ANSWER: True

57. The skeletal system is the site of synthesis for all the different types of blood cells.
a. True
b. False

ANSWER: True

58. The endocrine system functions with the circulatory system for the transport of hormones.
a. True
b. False

ANSWER: True

59. Some organs, such as the heart, skin, and intestine, belong to more than one body system.
a. True
b. False

ANSWER: True

60. The endocrine system can adjust kidney function to maintain electrolyte balance in the body.
a. True
b. False

ANSWER: True

61. Negative feedback operates to maintain a controlled factor in a relatively steady state, whereas positive feedback moves a controlled variable even further from a steady state.
a. True
b. False

ANSWER: True

62. With positive feedback, a control system's input and output continue to enhance each other.
a. True
b. False

ANSWER: True

63. Feedforward mechanisms bring about a response in reaction to a change in a regulated variable.

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a. True
b. False
ANSWER: False

64. Most homeostatic mechanisms operate on the principle of positive feedback.
a. True
b. False
ANSWER: False

65. In a negative-feedback system, the effector compares the level of a controlled variable to its set point.
a. True
b. False
ANSWER: False

66. If body temperature increases, skeletal muscle is the effector that will bring about the necessary actions to reduce it.
a. True
b. False
ANSWER: False

67. Homeostatic control systems are grouped into two classes: intrinsic and extrinsic controls.
a. True
b. False
ANSWER: True

68. **List and describe the levels of organization within the body.**
ANSWER: Answers will vary.

69. **Explain how the components of a negative-feedback system work to restore deviations in a controlled variable back to set point.**
ANSWER: Answers will vary.

70. **Compare and contrast regulation by negative-feedback, positive-feedback, and feedforward mechanisms.**
ANSWER: Answers will vary.

71. The smallest unit capable of carrying out the processes associated with life is the _____.
ANSWER: cell

72. When processes within the body are explained in terms of cause-and-effect sequences, this is a _____ viewpoint of physiology.
ANSWER: mechanistic

73. The _____ surrounds each cell and keeps its internal contents separate from contents that are external to it.
ANSWER: plasma membrane

74. _____ are individual living entities, examples of which are humans and bacteria.

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ANSWER: Organisms

75. _____ are composed of two or more types of primary tissue organized to perform a particular function or functions.
ANSWER: Organs

76. Cell _____ is the process in which cells mature and become more specialized.
ANSWER: differentiation

77. _____ glands secrete through ducts in the skin.
ANSWER: Exocrine

78. A _____ is a collection of organs that perform related functions and interact to accomplish a common activity that is essential for survival of the whole body.
ANSWER: body system

79. The internal environment consists of the _____, which is made up of _____, the fluid portion of the blood, and _____, which surrounds and bathes all cells.
ANSWER: extracellular fluid; plasma; interstitial fluid

80. The _____ is the liquid part of the blood.
ANSWER: plasma

81. The fluid that immediately surrounds each cell within a tissue is the _____ fluid.
ANSWER: interstitial fluid

82. _____ refers to maintenance of a relatively stable internal environment.
ANSWER: Homeostasis

83. The _____ system houses the tissue where the synthesis of all blood cells takes place.
ANSWER: skeletal

84. The two major control systems of the body are the _____ and the _____.
ANSWER: nervous system; endocrine system
endocrine system; nervous system

85. _____ are the blood vessels in which materials are mixed between the blood plasma and the interstitial fluid.
ANSWER: Capillaries

86. The _____ system is the transport system of the body.
ANSWER: circulatory

87. The _____ system eliminates waste products other than carbon dioxide, and plays a key role in regulating the volume, electrolyte composition, and acidity of the extracellular fluid.
ANSWER: urinary

88. The _____ system controls and coordinates bodily activities that require swift responses, especially

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to changes in the external environment.
ANSWER: nervous

89. In a negative-feedback loop, the _____ monitors any deviations in the levels of a controlled variable.
ANSWER: sensor

90. In a negative-feedback loop, the _____ compares the current level of the controlled variable to its set-point level.
ANSWER: integrator

91. The term _____ refers to the abnormal functioning of the body associated with disease.
ANSWER: pathophysiology

Match the terms, labelled a. through d., with their correct descriptions. (Options may be used more than once or not at all.)

a. nervous tissue

b. epithelial tissue

c. muscle tissue

d. connective tissue

REF: 1.2 Levels of Organization in the Body
CUSTOM ID: 01-90

92. This tissue type is composed of cells specialized for contraction.
ANSWER: c

93. This tissue type is made up of cells specialized in the exchange of materials between the cell and its environment.
ANSWER: b

94. This tissue type connects, supports, and anchors various body parts.
ANSWER: d

95. The heart is made of this type of tissue.
ANSWER: c

96. Bone is this tissue type.
ANSWER: d

97. Glands are a derivative of this tissue type.
ANSWER: b

98. The digestive tract is lined with this tissue.
ANSWER: b

99. The brain is made primarily of this tissue.
ANSWER: a

100. The blood is this tissue type.

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ANSWER: d

101. This tissue is distinguished by relatively few cells within an extracellular material.
ANSWER: d

CUSTOM ID: 01-91

102. body temperature
ANSWER: a

103. temperature-sensitive nerve cells
ANSWER: c

104. skeletal muscles and sweat glands
ANSWER: d

105. hypothalamus
ANSWER: b

CUSTOM ID: 01-92

106. increased blood flow into muscle tissue in response to a localized increase in carbon dioxide
ANSWER: a

107. the release of a hormone to lower blood calcium level when it gets too high
ANSWER: b

108. increased cardiac activity to elevate blood pressure when systemic pressure is low
ANSWER: b

109. rapid clotting of blood due to increasing levels of platelet activity at a site of vessel damage
ANSWER: c

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Chapter 2 – Cell Physiology

1. Which of the following statements reflects a correct component of cell theory?
   a. Pre-existing cells are required for new cells to be created.
   b. Molecules are the smallest structural and functional unit that can perform life functions.
   c. Functional activities of a cell are unrelated to structural characteristics of that cell.
   d. The cells of all organisms are fundamentally different in structure and function.

ANSWER: a

2. Which of these components is always present in most human cells?
   a. flagella b. cell wall
   c. cilia d. plasma membrane

ANSWER: d

3. What is the major role of peroxisomes?
   a. oxidation b. detoxification
   c. protein synthesis d. cellular digestion

ANSWER: b

4. Which of these is a characteristic of the Golgi complex?
   a. It receives newly synthesized proteins and modifies them.
   b. It is partially studded with ribosomes.
   c. It contains the enzymes for the TCA cycle.
   d. It contains hydrolytic enzymes.

ANSWER: a

5. Resisting mechanical stress is the function of which cell structure?
   a. lysosome b. vault
   c. microtubule d. intermediate filament

ANSWER: d

6. If cells were missing the endoplasmic reticulum, which of the following cellular functions would be affected?
   a. detoxification
   b. duplicating DNA
   c. synthesizing new cell membrane components
   d. synthesizing new proteins

ANSWER: c

7. Which of these cellular organelles is the site for protein synthesis?
   a. ribosome b. Golgi complex
   c. endoplasmic reticulum d. nucleus

ANSWER: a

8. Ribosomes may be found attached to which other cellular organelle?
   a. nucleus b. mitochondrion
   c. Golgi complex d. endoplasmic reticulum

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ANSWER: d

9. Which of these statements does NOT apply to ribosomes?
   a. They are composed of RNA.
   b. They assemble proteins.
   c. They may be bound to endoplasmic reticulum.
   d. They are covered by a membrane.

ANSWER: d

10. Which organelles contain hydrolytic enzymes?
   a. peroxisomes b. lysosomes
   c. vaults d. mitochondria

ANSWER: b

11. Which of the following is NOT an activity of the cytosol?
   a. duplication of chromosomes
   b. enzymatic regulation of intermediary metabolism
   c. storage of fat and glycogen
   d. synthesis of proteins for use in the cytosol

ANSWER: a

12. Which of these organelles is NOT membrane bound?
   a. lysosome b. ribosome
   c. mitochondrion d. peroxisome

ANSWER: b

13. Which these statements is an accurate description of metabolism?
   a. Catabolic and anabolic reactions are happening simultaneously in cells.
   b. Catabolic reactions are synthesis reactions.
   c. Anabolic reactions favour the breakdown of molecules.
   d. Catabolic reactions require ATP to occur.

ANSWER: a

14. Which of these statements does NOT refer to intermediary metabolism?
   a. It is the set of reactions that make energy to support cellular activities.
   b. Most of it occurs in plasma membrane.
   c. It uses simple sugars, amino acids, and fatty acids to make energy.
   d. The cytoplasm contains most of the enzymes that it requires.

ANSWER: b

15. What happens to the rate of oxidative phosphorylation if oxygen availability in cells is low?
   a. It increases.
   b. It decreases.
   c. It stays the same.

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d. It decreases initially and then increases if oxygen stays low.

ANSWER: b

16. What accounts for the most ATP production?
    a. citric acid cycle
    b. glycolysis
    c. substrate-level phosphorylation
    d. oxidative phosphorylation

ANSWER: d

17. Which of these statements refers to substrate-level phosphorylation?
    a. It is an important source of ATP for liver cells.
    b. It requires the enzyme creatine phosphorylase.
    c. It generates a large amount of ATP for every molecule of creatine phosphate.
    d. It is a fast method of generating ATP.

ANSWER: d

18. When a muscle cell first starts contracting, what happens to the levels of creatine phosphate and ATP?
    a. Creatine phosphate levels increase rapidly and ATP levels decrease rapidly.
    b. Creatine phosphate levels decrease rapidly and ATP levels increase rapidly.
    c. Creatine phosphate levels and ATP levels decrease rapidly.
    d. Creatine phosphate levels and ATP levels increase rapidly.

ANSWER: b

19. Which of the following pathways of energy production releases CO_2?
    a. glycolysis
    b. electron transport chain
    c. pyruvate decarboxylation
    d. chemiosmosis

ANSWER: c

20. If cellular levels of oxaloacetate are low, which energy-producing pathway is affected?
    a. glycolysis
    b. pyruvate decarboxylation
    c. citric acid cycle
    d. substrate level phosphorylation

ANSWER: c

21. Which of these compounds is the metabolic product that enters the TCA cycle?
    a. citrate
    b. pyruvic acid
    c. acetyl CoA
    d. $FADH_2$

ANSWER: c

22. If oxidation is uncoupled from phosphorylation, what would happen to the rate of ATP synthesis?
    a. It would increase.
    b. It would decrease.
    c. It would increase initially, then decrease.
    d. It would not change.

ANSWER: b

23. The chemiosmotic mechanism involves which of the following?
    a. ATP synthesis using a H^+ concentration gradient

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b. ATP synthesis using creatine kinase
c. ATP synthesis from anaerobic metabolism
d. NADH synthesis using a H^+ gradient

ANSWER: a

24. Which of these statements describes ATP synthase?
a. It is present in the outer mitochondrial membrane.
b. It is activated by the flow of H^+ from the mitochondrial matrix to the intermembrane space.
c. It synthesizes ADP from ATP.
d. It is an anabolic enzyme

ANSWER: d

25. At the end of glycolysis, how many molecules of pyruvic acid are generated?
a. 1 b. 2
c. 3 d. 4

ANSWER: b

26. Which of the following explains the variability in the number of ATP molecules produced from glucose?
a. The TCA cycle produces variable amounts of ATP.
b. ATP synthase may use ATP at times.
c. Glycolysis is not always 100 percent efficient.
d. Some transporters use ATP to move NADH into the mitochondria.

ANSWER: d

27. What is the purpose of pyruvate decarboxylation?
a. to produce ATP directly b. to produce creatine phosphate
c. to produce $FADH_2$ d. to produce acetyl CoA

ANSWER: d

28. Where are the enzymes for glycolysis located?
a. in the mitochondrial matrix b. in the endoplasmic reticulum
c. in the inner mitochondrial membrane d. in the cytosol

ANSWER: d

29. Which of these statements describes NADH and $FADH_2$?
a. They are energy carriers. b. They play a role in cellular respiration.
c. They are used in glycolysis. d. They are used in the citric acid cycle.

ANSWER: a

30. Which of these statements describes electron transport chains?
a. They are “circuits” for small amounts of electricity to pass through.
b. They are made of proteins.
c. They deliver energy to cytochrome to pump H^+ into the intermembrane space.

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d. They do not need oxygen to be available.

ANSWER: c

31. Why does anaerobic respiration take place when O_2 is unavailable?
    a. to continue ATP production
    b. to prevent cell death
    c. to make use of available glucose
    d. to prevent protein breakdown

ANSWER: a

32. Which of these statements applies to the citric acid cycle?
    a. It occurs in the mitochondrial cristae.
    b. Starting with citrate, 1 carbon molecule is removed with each step.
    c. H^+ are removed and transferred to hydrogen carriers.
    d. Acetyl CoA and oxaloacetate react to form citrate.

ANSWER: c

33. Which of the following is the definition of *anaerobic*?
    a. with oxygen
    b. with carbon dioxide
    c. without oxygen
    d. without carbon dioxide

ANSWER: c

34. Which of the following is **NOT** a function of the plasma membrane?
    a. to provide a physical barrier to hold in the contents of the cell
    b. to aid in maintaining different ionic concentrations outside versus inside the cell
    c. to allow the cell to store excess cholesterol
    d. to help cells respond to changes in their immediate environment

ANSWER: c

35. What component of the plasma membrane is responsible for its ability to keep intracellular fluid separate from extracellular fluid?
    a. cholesterol
    b. carrier proteins
    c. phospholipids
    d. glycolipids

ANSWER: c

36. The fluid mosaic model refers to which characteristic of the plasma membrane?
    a. its ability to regulate fluid movement through carrier proteins
    b. the ability of the numerous membrane proteins to move around in the phospholipid bilayer
    c. the presence of glycoproteins and glycolipids
    d. the multiple components of which it is composed

ANSWER: b

37. Which of these components in the plasma membrane provides a method of self-recognition for cells?
    a. carbohydrates
    b. cholesterol
    c. phospholipids
    d. receptor proteins

ANSWER: a

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38. Which of these plasma membrane components prevents the fatty acids in phospholipids from packing together?
a. carbohydrates b. cholesterol
c. phospholipids d. receptor proteins
ANSWER: b

39. Which of these plasma membrane components directly enhances membrane fluidity?
a. cholesterol b. glycolipids
c. carrier proteins d. channel proteins
ANSWER: a

40. Which structure, formed by membrane proteins, spans the lipid bilayer and forms water-filled passages that allow small ions to move in and out of cells?
a. transporter b. receptor
c. carrier d. channel
ANSWER: d

41. Which of the following does NOT refer to cell adhesion molecules?
a. They can participate in cell signalling.
b. They include cadherins and integrins.
c. They form loops and hooks that the cell uses to hold organelles in place.
d. They are structural links that anchor the cell to extracellular and intracellular scaffolding.
ANSWER: c

42. What would be a potential consequence if cells did NOT have integrins?
a. Cell transport would be affected negatively.
b. Small ions would not be able to permeate the plasma membrane.
c. Secretory vesicles could not empty their contents to the extracellular surroundings.
d. Cells could not form links with their extracellular surroundings.
ANSWER: d

43. Which of the following is **NOT** a function of membrane proteins?
a. to act as carriers for substances to cross the membrane
b. to act as receptor sites for binding of extracellular substances
c. to impart membrane fluidity
d. to serve as enzymes
ANSWER: c

44. If the phospholipids in the plasma membrane flipped their orientation, which direction would the fatty acid tails be facing?
a. toward the intracellular fluid
b. toward the extracellular fluid
c. toward the intracellular and extracellular fluid
d. toward the interior of the plasma membrane

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ANSWER: c

45. The plasma membrane would not be compatible with the extracellular and intracellular fluid without the presence of which of its components?
    a. fatty acids of the phospholipids b. phosphate groups of the phospholipids
    c. integral membrane proteins d. cholesterol

ANSWER: b

46. What is the primary determinant of a membrane's selective permeability?
    a. the structures of the membrane phospholipids
    b. the amount of cholesterol present
    c. the number and types of membrane proteins
    d. the charge of the membrane

ANSWER: c

47. What is the underlying cause of cystic fibrosis?
    a. the buildup of thick mucus in respiratory airways and the pancreas
    b. a genetic defect that affects membrane sodium transport
    c. a genetic defect that affects membrane chloride transport
    d. a genetic defect that affects membrane potassium transport

ANSWER: c

48. Which of these statements describes cadherins?
    a. They create a filamentous meshwork in the inner surface of the membrane.
    b. They act as membrane-bound enzymes.
    c. They are used for cell recognition purposes.
    d. They provide a mechanical link between the cells in a tissue.

ANSWER: d

49. Which of the following proteins of the extracellular matrix holds cells in place?
    a. collagen b. fibronectin
    c. elastin d. cadherin

ANSWER: b

50. Which of the following is a characteristic of elastin?
    a. It imparts strength to tissues.
    b. It provides tissues the ability to stretch and then recoil.
    c. It aids in communication between cells.
    d. It anchors cells in place within a tissue.

ANSWER: b

51. Which of the following proteins imparts tensile strength to the extracellular matrix?
    a. fibronectin b. elastin
    c. collagen d. keratin

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ANSWER: c

52. What is the function of the extracellular matrix?
    a. to allow movement of cells from one location to another
    b. to allow endocytosis and exocytosis to occur
    c. to regulate enzyme activity within cells
    d. to hold the cells that make up a tissue together

ANSWER: d

53. Which cell type in connective tissue secretes components of the extracellular matrix?
    a. epithelial cells b. myoblasts
    c. fibroblasts d. cardiac muscle cells

ANSWER: c

54. Which of these statements describes tight junctions?
    a. They provide cell-to-cell adhesion in epithelial sheets.
    b. They provide cell-to-cell adhesion in tissues that undergo significant mechanical stretch.
    c. They provide cell-to-cell adhesion in tissues requiring rapid transfer of substances between cells.
    d. They provide cell-to-cell adhesion in muscle cells.

ANSWER: a

55. Which of these statements refers to desmosomes?
    a. Plaques on the outer surface of two adjacent cells are attached to intracellular keratin filaments.
    b. They are composed of cytoplasmic plaques and glycoprotein filaments.
    c. They are composed of connexon units.
    d. Intercellular keratin filaments hold the nuclei of neighbouring cells together.

ANSWER: b

56. What is the name of the site where the lateral (side) edges of adjacent cells in an epithelial sheet are joined together?
    a. connexon b. plaque
    c. tight site d. kiss site

ANSWER: d

57. Gap junctions are also considered what type of cell-to-cell junction?
    a. adhering b. communicating
    c. sealing d. impermeable

ANSWER: b

58. Which of the following refers to membrane transport?
    a. Lipid soluble particles must be transported by assisted transport.
    b. Water soluble ions can permeate the plasma membrane unassisted if they are small enough.
    c. Non-polar molecules, such as O_2 and CO_2, need to be actively transported across the plasma membrane.
    d. Specific ion channels need to be present and open for certain ions to pass through the membrane.

ANSWER: d

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59. Forces that do not need energy to transport substances across the plasma membrane are known as what?
a. active forces b. passive forces
c. permeating forces d. transport forces
ANSWER: b

60. A concentration gradient refers to which of the following?
a. substances spreading out evenly because of their movement in a solution
b. movement of the same substance across a membrane
c. different numbers of the same substance on opposite sides of a membrane
d. opposing movement of substances across a membrane
ANSWER: c

61. Area A and Area B contain a solution of molecule X. Area A has a higher number of molecule X than Area B. Which of the following will result?
a. Molecule X will move from Area B to Area A until molecule X reaches steady state.
b. Molecule X will move from Area A to Area B until molecule X reaches steady state.
c. Molecule X will move from Area A to Area B until the number of molecules X in Area B is greater than in Area A.
d. Molecule X will move from Area B to Area A until the number of molecules X in Area A is greater than in Area B.
ANSWER: b

62. What causes diffusion of substances?
a. electrical attraction between molecules in an area where they are densely packed and an area where they are sparse
b. electrical attraction between the solvent and solutes in a solution
c. random collisions between molecules in an area where they are densely packed
d. energy-dependent pumping of a substance in an area where it is densely packed
ANSWER: c

63. If 20 molecules of X move from Area A to Area B, and 10 molecules of X move from Area B to Area A, what is the net diffusion of molecule X?
a. 5 b. 10
c. 20 d. 30
ANSWER: b

64. The term “net diffusion” refers to which of the following?
a. the sum of opposing movements of the same molecule between two areas
b. the fraction of opposing movements of the same molecule between two areas
c. the total of opposing movements of the same molecule between two areas
d. the difference in opposing movements of the same molecule between two areas
ANSWER: d

65. Which of the following statements describes net diffusion?

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a. It is the difference in opposing movements of different molecules between two areas.
b. It is the total of opposing movements of different molecules between two areas.
c. It is the total of opposing movements of the same molecule between two areas.
d. It is the difference in opposing movements of the same molecule between two areas.

ANSWER: c

66. What will happen when a membrane separates unequal solutions of a nonpenetrating solute?
a. The solute will move down its concentration gradient.
b. The volume of solution on the side of the membrane with lower concentration will increase.
c. The volume of solution on the side of the membrane with the higher concentration will increase.
d. The volume of solution of the side of the membrane with the higher concentration will decrease.

ANSWER: c

67. What is the pressure exerted by a stationary fluid?
a. hydrostatic pressure b. osmotic pressure
c. hydro-osmotic pressure d. solution pressure

ANSWER: a

68. What happens when a membrane separates a solution of nonpenetrating solute from pure water?
a. Water will move until hydrostatic pressure is equal to osmotic pressure.
b. Osmotic pressure will always be higher than hydrostatic pressure and water will continually move.
c. Hydrostatic pressure will always be higher than osmotic pressure and water will continually move.
d. Water will move until the concentration of the solution on both sides of the membrane is the same.

ANSWER: a

69. The tendency of water to move into a solution due to its concentration of nonpenetrating solutes is known as what?
a. diffusion pressure b. fluid pressure
c. hydrostatic pressure d. osmotic pressure

ANSWER: d

70. What will happen to a cell if the extracellular fluid is hypertonic?
a. Water will move into the cell and the cell will shrivel.
b. Water will move into the cell and the cell will swell.
c. Water will move out of the cell and the cell will swell.
d. Water will move out of the cell and the cell will shrivel.

ANSWER: d

71. Which of the following *decreases* the rate of diffusion of a substance through the plasma membrane?
a. increasing the concentration gradient
b. increasing the molecular size of the substance
c. increasing the permeability of the membrane
d. increasing the surface area of the membrane

ANSWER: b

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72. Which of the following does diffusion result from?
    a. ATP-driven processes
    b. ion gradients
    c. inherent kinetic energy of matter
    d. selective permeability

ANSWER: c

73. Which of these substances is *most* likely to diffuse passively across the plasma membrane by dissolving in the membrane?
    a. a cation
    b. an anion
    c. a nonpolar or nonionized molecule
    d. a polar molecule

ANSWER: c

74. Which of the following statements is an accurate description of assisted membrane transport?
    a. Carrier-mediated transport moves small water-soluble molecules across the membrane.
    b. Carrier-mediated transport moves large macromolecules across the membrane.
    c. Vesicular transport moves glucose across the membrane.
    d. Cells can use vesicular transport strictly to move molecules from the ECF to the ICF.

ANSWER: a

75. The term transport maximum refers to which aspect of carrier-mediated transport systems?
    a. specificity
    b. saturation
    c. competition
    d. solubility

ANSWER: b

76. Which of the following statements applies to assisted membrane transport?
    a. If a carrier can transport more than one substance, the rate of transport for those substances is not affected when both of those substances are present.
    b. When transport maximum is reached, 90 percent the carrier binding sites for a substance are occupied.
    c. Before transport maximum is reached, the rate of transport for a substance is determined by its concentration.
    d. Carrier proteins can only transport a single compound.

ANSWER: c

77. Insulin promotes the uptake of glucose into cells by which of these transport mechanisms?
    a. carrier-mediated transport
    b. endocytosis
    c. exocytosis
    d. osmosis

ANSWER: a

78. Which of these statements describes carrier-mediated transport?
    a. It always involves a specific membrane protein that serves as a carrier molecule.
    b. It always transports substances against a concentration gradient.
    c. It always requires energy expenditure.
    d. It always transports substances along a concentration gradient.

ANSWER: a

79. Structurally similar compounds being transported by the same carrier refers to which aspect of carrier-mediated transport?

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a. specificity b. competition
c. saturation d. maximum transport

ANSWER: b

80. Which of the following applies to facilitated diffusion?
a. A carrier transports a substance against its concentration gradient by expending energy.
b. A carrier transports a substance down its concentration gradient by expending energy.
c. A carrier transports a substance down its concentration gradient without expending energy.
d. A carrier transports a substance against its concentration gradient without expending energy.

ANSWER: c

81. Which of the following is an accurate description of active transport?
a. It uses ATP to pump substances down their concentration gradient.
b. Active transport carriers have ATP synthase activity.
c. Dephosphorylation of a carrier increases the binding affinity for a substance.
d. Carriers have a higher binding affinity for a substance of lower concentration when it is phosphorylated.

ANSWER: d

82. Which of these descriptions applies to the movement of molecules across the plasma membrane?
a. If two similar molecules can both combine with the same carrier, the presence of one of these molecules increases the rate of entry of the other.
b. In simple diffusion, the rate of transport is inversely proportional to the molecule's concentration.
c. When a carrier becomes saturated, the maximum rate of transport is reached.
d. Large molecules can cross it via nonselective, receptor-mediated endocytosis.

ANSWER: c

83. Carriers performing active transport are also known as what?
a. pumps b. channels
c. docking proteins d. binding proteins

ANSWER: a

84. For every two potassium ions that the sodium–potassium pump moves into the cell, how many sodium ions does it move out of the cell?
a. 4 b. 3
c. 2 d. 1

ANSWER: b

85. Which of the following statements refers to the Na^+–K^+ pump?
a. When open to the ECF, it has three high-affinity binding sites for Na^+ and two low-affinity binding sites for K^+.
b. Phosphorylation causes it to change conformation and open to the ICF.
c. When open to the ICF, it has three high-affinity binding sites for Na^+ and two low-affinity binding sites for K^+.

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d. It has three binding sites for K^+ and two binding sites for Na^+.

ANSWER: c

86. The Na^+–K^+ pump is important for all of the following EXCEPT which one?
a. maintaining appropriate cell volumes
b. exocytosis of secretory vesicles
c. secondary active transport
d. nerve and muscle cell excitability

ANSWER: b

87. With secondary active transport, the movement of
a. Na^+ into the cell by the cotransport carrier is downhill.
b. Na^+ into the cell by the cotransport carrier is uphill.
c. glucose by the cotransport carrier is uphill.
d. Cl^- into the cell by the cotransport carrier is downhill.

ANSWER: a

88. Which of the following is NOT relevant to vesicular transport?
a. carrier-mediated transport
b. use of ATP
c. pinocytosis
d. pseudopods

ANSWER: a

89. Phagocytosis is used commonly by which type of cell?
a. liver cells
b. muscle cells
c. white blood cells
d. intestinal cells

ANSWER: c

90. Which of these mechanisms is used by large polar molecules when they leave or enter the cell?
a. vesicular transport
b. osmosis
c. selective passive transport
d. channels

ANSWER: a

91. Which of the following is a form of vesicular transport?
a. carrier-mediated transport
b. protein-mediated transport
c. pinocytosis
d. Na^+–K^+ pump

ANSWER: c

92. Which of the following does NOT accurately describe vesicular transport?
a. Pinocytosis is a form of endocytosis.
b. The contents of endocytic vesicles are released into the ECF if the vesicle fuses with a lysosome.
c. In some cells, endocytic vesicles release their contents via exocytosis.
d. The endocytic vesicle is formed from a portion of the plasma membrane.

ANSWER: b

93. Which of these statements does NOT apply to endocytosis?

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a. provides a way to add specific components to the plasma membrane
b. phagocytosis of large multimolecular particles such as bacteria or cellular debris
c. a particle gaining entry to the interior of the cell without actually passing through the plasma membrane
d. can be triggered by the binding of a particle to a receptor site on the plasma membrane

ANSWER: a

94. Which of the following use(s) receptor-mediated endocytosis to be internalized by a cell?
a. glucose b. amino acids
c. vitamin B12 d. bacteria

ANSWER: c

95. What does the SNARE complex provide?
a. recognition of foreign proteins in the cell
b. binding of correct enzyme with correct substrate
c. means to deliver vesicles to an appropriate site
d. receptor-mediated endocytosis

ANSWER: c

96. Which of these is present on the plasma membrane and allows a secretory vesicle to dock?
a. sorting signal b. coat protein
c. v-SNARE d. t-SNARE

ANSWER: d

97. Some viruses gain access to cells by using which of these processes?
a. pinocytosis b. receptor-mediated endocytosis
c. exocytosis d. active transport

ANSWER: b

98. Chemical messengers secreted by cells that act locally are known as what?
a. paracrines b. autocrines
c. hormones d. neurohormones

ANSWER: a

99. Which of the following statements refers to neurohormones?
a. They are secreted into the bloodstream by endocrine cells.
b. They travel long distances to reach target cells.
c. They are secreted by neurons to influence neighbouring neurons.
d. They travel short distances to reach target cells.

ANSWER: b

100. What would happen if second messengers did not exist?
a. First messengers would not be produced.
b. Messages that rely on opening of chemically gated ion channels could not be sent.
c. Some extracellular messengers could not exert effects on target cells.

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d. Glycolysis could not occur.

ANSWER: c

101. Light microscopes are 1000 times more powerful than electron microscopes.
a. True
b. False

ANSWER: False

102. The cytosol contains the cell's genetic material.
a. True
b. False

ANSWER: False

103. Intermediary metabolic enzymes are found in the cytosol.
a. True
b. False

ANSWER: True

104. The endoplasmic reticulum packages and distributes new proteins.
a. True
b. False

ANSWER: False

105. Cell detoxification takes place in lysosomes.
a. True
b. False

ANSWER: False

106. Secretory vesicles travel along microfilaments to move from one location to another.
a. True
b. False

ANSWER: False

107. Synthesis, modification, and packaging of newly formed proteins is performed by the endoplasmic reticulum.
a. True
b. False

ANSWER: False

108. Ribosomes are composed of both RNA and proteins.
a. True
b. False

ANSWER: True

109. Mitochondria contain the enzymes for both the TCA cycle and oxidative phosphorylation.
a. True

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b. False

ANSWER: True

110. Vaults are cellular organelles with a role in transport.
a. True
b. False

ANSWER: True

111. Inclusions, such as fat droplets, store excess nutrients in the cell.
a. True
b. False

ANSWER: True

112. Intermediate filaments are hollow, tube-like structures that provide stability against mechanical stress.
a. True
b. False

ANSWER: False

113. Microfilaments are composed of tubulin molecules, and aid in contraction of cells.
a. True
b. False

ANSWER: False

114. Anabolic and catabolic processes occur simultaneously within cells.
a. True
b. False

ANSWER: True

115. Energy stored in the chemical bonds in food can be used directly for energy production.
a. True
b. False

ANSWER: False

116. The energy stored in the terminal phosphate bond of ATP is the immediate energy source for cells.
a. True
b. False

ANSWER: True

117. Creatine phosphate provides the phosphate molecule required for substrate level phosphorylation.
a. True
b. False

ANSWER: True

118. Phosphate released from hydrolysis of creatine phosphate is used indirectly to synthesize ATP.
a. True

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b. False

ANSWER: False

119. In a working muscle cell, the decrease in creatine phosphate levels is greater than the decrease in ATP levels.
a. True
b. False

ANSWER: True

120. The direct product of glycolysis is two molecules of acetyl CoA.
a. True
b. False

ANSWER: False

121. Glycolysis yields an amount of energy that is insufficient to supply all cellular energy needs.
a. True
b. False

ANSWER: True

122. To be metabolized, pyruvate must be transported from the mitochondrial matrix to the cytosol.
a. True
b. False

ANSWER: False

123. Pyruvate decarboxylation generates energy indirectly through production of NADH.
a. True
b. False

ANSWER: True

124. Pyruvate decarboxylation occurs in the mitochondrial matrix.
a. True
b. False

ANSWER: True

125. The TCA cycle produces CO_2, which leaves the cell and enters the bloodstream.
a. True
b. False

ANSWER: True

126. The electron carrier molecules of the electron transport chain are located in the outer mitochondrial matrix.
a. True
b. False

ANSWER: False

127. Oxidative phosphorylation refers to the use of oxygen to pump H^+ across the inner mitochondrial membrane.

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a. True
b. False
ANSWER: False

128. Production of ATP through chemiosmosis would not happen without the buildup of H^+ in the intermembrane space.
a. True
b. False
ANSWER: True

129. Anaerobic metabolism of glucose produces lactic acid.
a. True
b. False
ANSWER: True

130. Anaerobic metabolism of glucose produces lactic acid and more ATP than aerobic metabolism of glucose.
a. True
b. False
ANSWER: False

131. Enzymes of the TCA cycle are located in the cytosol of the cell.
a. True
b. False
ANSWER: False

132. Carbohydrates on the surface of the plasma membrane assist in appropriate cell growth.
a. True
b. False
ANSWER: True

133. Carrier proteins allow for movement of water soluble ions across the plasma membrane.
a. True
b. False
ANSWER: False

134. Water-soluble ions would not be able to passively move through the plasma membrane without channel proteins.
a. True
b. False
ANSWER: True

135. Secretory vesicles require membrane proteins in order to release their contents to the extracellular fluid.
a. True
b. False
ANSWER: True

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136. Cadherins link the outer surface of a cell to its external environment, and the inner membrane surface to the cytoskeleton.

a. True

b. False

ANSWER: False

137. Cholesterol imparts fluidity to the plasma membrane by preventing fatty acid tails in phospholipids from packing tightly together.

a. True

b. False

ANSWER: True

138. Cell adhesion molecules participate in cellular signalling.

a. True

b. False

ANSWER: True

139. The surface carbohydrates within the plasma membrane serve as cell adhesion molecules (CAMs), which cells use to grip one another and surrounding connective tissue fibres.

a. True

b. False

ANSWER: False

140. The hydrophilic interior of the lipid bilayer provides a barrier to the passage of water-soluble molecules.

a. True

b. False

ANSWER: False

141. Carbohydrates on the surface of the plasma membrane can be either glycolipids or glycoproteins.

a. True

b. False

ANSWER: False

142. The extracellular matrix includes a watery gel made of carbohydrates.

a. True

b. False

ANSWER: True

143. Cell behaviour of most cells will change if they are not in contact with the extracellular matrix.

a. True

b. False

ANSWER: True

144. The presence of tight junctions in epithelial sheets requires substances to move between cells.

a. True

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b. False

ANSWER: False

145. Gap junctions are abundant in tissues' epithelial sheets.
a. True
b. False

ANSWER: False

146. Fibronectin is a rubber-like protein important for stretch.
a. True
b. False

ANSWER: False

147. Tight junctions are also known as adhering junctions.
a. True
b. False

ANSWER: False

148. Connexons make up the structure of gap junctions.
a. True
b. False

ANSWER: True

149. Desmosome plaques are located on the intracellular surface of cells.
a. True
b. False

ANSWER: True

150. Skin is an example of tissue where there would be an abundance of desmosomes.
a. True
b. False

ANSWER: True

151. Tight junctions ensure selective transport of substances through the cells of epithelial sheets.
a. True
b. False

ANSWER: True

152. Gap junctions play an important role in transmission of impulses for heart contraction.
a. True
b. False

ANSWER: True

153. The plasma membrane is considered impermeable because it allows only certain substance to cross through it.
a. True

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b. False

ANSWER: False

154. The plasma membrane is an impermeable barrier to substances that are poorly soluble in water.

a. True

b. False

ANSWER: False

155. The two features of a substance that determine its permeability are its size and its solubility in lipid.

a. True

b. False

ANSWER: True

156. Particles with low lipid solubility that are too large for channels cannot cross the plasma membrane without assistance.

a. True

b. False

ANSWER: True

157. As temperature decreases, the rate of diffusion will increase.

a. True

b. False

ANSWER: False

158. If a particle is lipid soluble and can permeate the plasma membrane, no force is required for it to move across the membrane.

a. True

b. False

ANSWER: False

159. A concentration gradient is also known as an electrical gradient.

a. True

b. False

ANSWER: False

160. Osmosis is the diffusion of water down its own concentration gradient.

a. True

b. False

ANSWER: True

161. Hydrostatic pressure is a pulling pressure exerted by water.

a. True

b. False

ANSWER: False

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162. Osmosis is the major force that moves water in and out of cells.
a. True
b. False
ANSWER: True

163. If a cell is placed in a hypertonic solution, the cell will swell.
a. True
b. False
ANSWER: False

164. If a cell is placed in a hypotonic solution, the cell will swell.
a. True
b. False
ANSWER: True

165. The tonicity of extracellular fluid is determined by the concentration of penetrating solutes.
a. True
b. False
ANSWER: False

166. When equilibrium is achieved and no net diffusion is taking place, there is no movement of molecules.
a. True
b. False
ANSWER: False

167. Osmosis does not occur if the concentration gradients for water and solutes are absent in a system.
a. True
b. False
ANSWER: True

168. In carrier-mediated transport, the carriers for glucose can also act as carriers for amino acids.
a. True
b. False
ANSWER: False

169. Specificity of carrier-mediated transport involves a maximum number of binding sites on a carrier.
a. True
b. False
ANSWER: False

170. Activity of the Na^+–K^+ pump helps regulate cell volume.
a. True
b. False
ANSWER: True

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171. In kidney cells, the Na^+–K^+ pump directly provides the energy for glucose transport.
a. True
b. False
ANSWER: False

172. Most cells in the body can perform phagocytosis.
a. True
b. False
ANSWER: False

173. Endocytosis can be accomplished by phagocytosis and pinocytosis.
a. True
b. False
ANSWER: True

174. Phosphorylation of a carrier can alter the affinity of its binding sites, accompanied by a change in its conformation.
a. True
b. False
ANSWER: True

175. Pinocytosis refers to the process of a cell engulfing a large, multimolecular particle and bringing the particle into the contents of the cell.
a. True
b. False
ANSWER: False

176. In active transport, ATP energy is used in the phosphorylation–dephosphorylation cycle of the carrier.
a. True
b. False
ANSWER: True

177. In secondary active transport, energy is required directly by the carrier to move a substance uphill against a concentration gradient.
a. True
b. False
ANSWER: False

178. Signal transduction is a way for cells to send signals to their extracellular environment.
a. True
b. False
ANSWER: False

179. Signal transduction is a method for water-soluble messengers to effect change on the interior of a cell.
a. True
b. False

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ANSWER: True

180. In order for a second messenger to be activated, a first messenger needs to bind to a cell surface receptor.
a. True
b. False
ANSWER: True

181. Extracellular messengers can effect changes in target cells by opening ion channels or activating intracellular signalling pathways.
a. True
b. False
ANSWER: True

182. The only means by which an extracellular chemical messenger can bring about a desired intracellular response is to activate a second messenger system.
a. True
b. False
ANSWER: False

183. One extracellular messenger molecule can ultimately influence the activity of only one protein molecule within the cell.
a. True
b. False
ANSWER: False

184. Second messenger signalling pathways are very different, depending on the cell type.
a. True
b. False
ANSWER: False

185. Explain the steps involved in generating ATP via electron transport and oxidative phosphorylation.
ANSWER: Answers will vary.

186. Outline how ATP is generated from a molecule of glucose that undergoes aerobic metabolism.
ANSWER: Answers will vary.

187. Describe what ATP is used for in the cell.
ANSWER: Answers will vary.

188. Describe the different functions that are carried out by membrane proteins.
ANSWER: Answers will vary.

189. Explain how the Na^+–K^+ pump uses ATP and conformation changes to transport Na^+ and K^+ across the plasma membrane.
ANSWER: Answers will vary.

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Chapter 2 – Cell Physiology

190. Describe how secondary active transport mechanisms are used to transport glucose in intestinal cells.
ANSWER: Answers will vary.

191. Explain how secretory vesicles are packaged, docked to the plasma membrane, and their contents released.
ANSWER: Answers will vary.

192. The _____ serves as the cell's "bones and muscles."
ANSWER: cytoskeleton

193. Ribosomes may be found free in the cytosol or bound to the _____.
ANSWER: endoplasmic reticulum

194. _____ are the folds of the inner mitochondrial membrane that project into the matrix.
ANSWER: Cristae

195. Lysosomes contain _____ enzymes that aid in digesting cellular debris and foreign material.
ANSWER: hydrolytic

196. _____ contain oxidative enzymes that detoxify the cell.
ANSWER: Peroxisomes

197. Helical chains of actin molecules that aid in cell contractile responses are called _____.
ANSWER: microfilaments

198. The portions of the cytoskeleton that aid in transport of secretory vesicles within cells are _____.
ANSWER: microtubules

199. The major structural component of flagella and cilia are _____.
ANSWER: microtubules

200. The Golgi complex modifies, packages, and distributes newly synthesized _____.
ANSWER: proteins

201. Vaults assist in _____ between the nucleus and the cytoplasm.
ANSWER: transport

202. The set of intracellular chemical reactions that are vital for capturing energy for the cell is known as _____.
ANSWER: intermediary metabolism

203. _____ reactions are those that build materials for the cell.
ANSWER: Anabolic

204. _____ reactions are those that degrade larger molecules into small ones.
ANSWER: Catabolic

205. The name of the enzyme that catalyzes substrate level phosphorylation is _____.

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ANSWER: creatine kinase

206. In substrate level phosphorylation, P_i is generated from _____.
ANSWER: creatine phosphate/phosphocreatine

207. Breakdown of glucose via glycolysis yields _____ molecules of ATP and _____ molecules of NADH.
ANSWER: 2; 2
two; two

208. The carbon-based product of glycolysis is _____.
ANSWER: pyruvic acid

209. Pyruvate decarboxylation yields _____, which moves directly into the TCA cycle.
ANSWER: acetyl CoA

210. During pyruvate decarboxylation, carbon is removed and forms _____.
ANSWER: carbon dioxide

211. In the TCA cycle, _____ joins with acetyl CoA to form citrate.
ANSWER: oxaloacetate

212. In addition to ATP and CO_2, the TCA cycle also produces _____ and _____, which are used for energy production.
ANSWER: NADH; $FADH_2$
$FADH_2$; NADH

213. The electron carrier molecules of the electron transport chain are located in the _____ of the mitochondria.
ANSWER: inner mitochondrial membrane

214. _____ is activated by H^+ moving down its concentration gradient.
ANSWER: ATP synthase

215. _____ metabolism occurs in the presence of O_2.
ANSWER: Aerobic

216. In addition to glucose, ATP can also be generated from _____ and _____.
ANSWER: amino acids; fatty acids
fatty acids; amino acids

217. Water soluble ions can move through the plasma membrane via proteins that act as _____.
ANSWER: channels

218. The hydrophobic portion of phospholipids is composed of _____.
ANSWER: fatty acids

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Chapter 2 – Cell Physiology

219. Surface markers made of _____ assist in appropriate cell growth.
ANSWER: carbohydrates

220. Cadherins and integrins are types of _____.
ANSWER: cell adhesion molecules

221. Secretory vesicles depend on this type of membrane protein to release their contents: _____.
ANSWER: docking marker acceptors

222. Chemical messengers in the blood communicate with their target cells via _____ proteins.
ANSWER: receptor

223. The fluid mosaic model refers to the movement of _____ within the fluid phospholipids of the plasma membrane.
ANSWER: proteins

224. The extracellular matrix is a mixture of fibrous proteins in a _____.
ANSWER: watery gel

225. The watery gel of the ECM allows substances such as nutrients to move between cells via _____.
ANSWER: diffusion

226. The protein that provides stretch and recoil to the ECM of lung tissue is _____.
ANSWER: elastin

227. The structure within a desmosome to which intracellular keratin filaments are attached is called _____.
ANSWER: plaque

228. Gap junctions are also known as _____ junctions.
ANSWER: communicating

229. Desmosomes are also known as _____ junctions.
ANSWER: adhering junctions

230. _____ are the structures that make up the tunnels that form gap junctions.
ANSWER: Connexons

231. A/an _____ solution has the same osmolarity as normal body cells.
ANSWER: isotonic

232. If red blood cells are placed in a(n) _____ solution, water enters, causing them to swell.
ANSWER: hypotonic

233. If red blood cells are placed in a(n) _____ solution, water leaves the cells, causing them to shrink.
ANSWER: hypertonic

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234. Assisted membrane transport includes facilitated transport and _____ transport.
ANSWER: active

235. The Na^+–K^+ pump indirectly provides the energy for transport of _____ in intestinal cells.
ANSWER: glucose

236. _____ refers to the process of an intracellular vesicle fusing with the plasma membrane, then opening and emptying its contents to the exterior.
ANSWER: Exocytosis

237. _____ is a protein responsible for pinching off an endocytic vesicle.
ANSWER: Dynamin

238. Foreign material to be attacked by lysosomal enzymes is brought into the cell by the process of _____.
ANSWER: endocytosis

239. Lysosomes contain _____ enzymes that are capable of digesting and removing unwanted debris from the cell.
ANSWER: hydrolytic

240. _____ diffusion allows materials to pass through the membrane by a carrier protein, without the expenditure of energy.
ANSWER: Facilitated

241. In a(n) _____ transport, materials may be moved "uphill" and are concentrated in a cell.
ANSWER: active

242. The _____ refers to the maximum amount of a substance that can be transported across the plasma membrane via a carrier in a given time.
ANSWER: transport maximum
T_m

243. The three characteristics that determine the kind and amount of material that can be moved across a membrane by carrier-mediated transport are _____, _____, and _____.
ANSWER: competition; saturation; specificity (in any order)

244. In facilitated diffusion, particles move from a _____ concentration to a _____ concentration.
ANSWER: higher; lower

245. In active transport, a substance moves from an area of _____ concentration to an area of _____ concentration.
ANSWER: lower; higher

246. Endocytosis and exocytosis are both kinds of _____ transport.
ANSWER: vesicular

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247. _____ are local chemical messengers.
ANSWER: Paracrines

248. _____ are long-distance chemical messengers.
ANSWER: Hormones

249. Neurohormones are released into the bloodstream by _____.
ANSWER: neurosecretory neurons

Match the terms, labelled a. through f., to their correct descriptions. (Options may be used more than once or not at all.)
a. plasma membrane
b. nucleus
c. cytoplasm
d. cytosol
e. organelle
f. cytoskeleton

250. houses the cell's DNA
ANSWER: b

251. responsible for cell shape and movement
ANSWER: f

252. highly organized, membrane-bound, intracellular structure
ANSWER: e

253. selectively controls movement of molecules between the intracellular fluid and the extracellular fluid
ANSWER: a

254. consists of organelles and cytosol
ANSWER: c

255. site of intermediary metabolism
ANSWER: d

256. permits incompatible chemical reactions to occur simultaneously in the cell
ANSWER: e

257. separates contents of the cell from its surroundings
ANSWER: a

258. site of fat and glycogen storage
ANSWER: d

PTS: 1

Match the terms, labelled a. through c., with their characteristics. (Options may be used more than once or not at all.)

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a. glycolysis
b. citric acid cycle
c. oxidative phosphorylation

259. directly uses inspired oxygen
ANSWER: c

260. does not directly use inspired oxygen
ANSWER: a

261. takes place in the cytosol
ANSWER: a

262. takes place in the mitochondrial matrix
ANSWER: b

263. takes place on the inner mitochondrial membrane
ANSWER: c

264. low yield of ATP
ANSWER: a

265. high yield of ATP
ANSWER: c

PTS: 1

Matching

Match the terms, labelled a. through i., to their descriptions. (Options may be used more than once or not at all.)
a. endoplasmic reticulum (ER)
b. Golgi complex
c. lysosome
d. peroxisome
e. mitochondrion
f. vault
g. ribosome
h. microtubule
i. microfilament

266. contains powerful oxidative enzymes important in detoxifying various wastes
ANSWER: d

267. an important component of cilia and flagella
ANSWER: h

268. one continuous extensive organelle consisting of a network of tubules and flattened filament

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ANSWER: a

269. removes unwanted cellular debris and foreign material
ANSWER: c

270. the powerhouse of the cell
ANSWER: e

271. acts as a mechanical stiffener
ANSWER: i

272. synthesizes proteins for use in the cytosol
ANSWER: g

273. consists of stacks of flattened sacs
ANSWER: b

274. shaped like an octagonal barrel
ANSWER: f

PTS: 1

Matching

Match the terms, labelled a. through c., to their descriptions. (Options may be used more than once or not at all.)
a. microtubules
b. microfilaments
c. intermediate filaments

275. the largest of the cytoskeletal elements
ANSWER: a

276. present in parts of the cell subject to mechanical stress
ANSWER: c

277. consist of actin
ANSWER: b

278. form the mitotic spindle
ANSWER: a

279. essential for creating and maintaining an asymmetrical cell shape
ANSWER: a

280. composed of tubulin
ANSWER: a

281. play a key role in muscle contraction

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ANSWER: b

PTS: 1

Matching

Match the vesicles, labelled a. through c., with their characteristics. (Options may be used more than once or not at all.)
a. endocytic vesicles
b. receptor-mediated endocytic vesicles
c. secretory vesicles

282. originate from the Golgi complex
ANSWER: c

283. bring nonspecific contents into the cell
ANSWER: a

284. contain cholesterol as cargo
ANSWER: b

285. contents emptied to the exterior by exocytosis
ANSWER: c

286. enclosed in a clathrin framework
ANSWER: b

287. fuse with lysosomes
ANSWER: a

288. used to internalize specific substances.
ANSWER: b

289. can be used to restock the plasma membrane
ANSWER: c

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