

# Chapter 1--Introduction to Physiology and Homeostasis

Student: \_\_\_\_\_

1. Select the incorrect association.

- A. anatomy/body structure
- B. human body/multicellular
- C. oxygen/cell waste product
- D. physiology/body function
- E. unicellular/one-celled

2. Which of the following is a mechanistic rather than a teleological explanation of a physiological phenomenon?

- A. A person breathes to obtain oxygen.
- B. A person sweats to cool off.
- C. A person's stomach secretes digestive juices because it is stimulated by the nervous system.
- D. A person's heart beats to pump blood.
- E. A person's kidneys produce urine to eliminate wastes from the body.

3. When a blood capillary is cut, a clot forms under which influence?

- A. negative feedback
- B. positive feedback
- C. extrinsic control
- D. negative feedback and extrinsic control
- E. none of these

4. The term *smooth* refers to a type of \_\_\_\_ tissue.

- A. connective
- B. epithelial
- C. glandular
- D. muscle
- E. nervous

5. Which of the following factors of the internal environment are homeostatically maintained?

- A. concentration of nutrient molecules
- B. concentration of oxygen and carbon dioxide
- C. pH
- D. temperature
- E. all of these

6. The outer layer of the skin consists of \_\_\_\_\_ tissue.

- A. connective
- B. endocrine
- C. epithelial
- D. muscle
- E. nervous

7. The respiratory system

- A. obtains O<sub>2</sub> from and eliminates CO<sub>2</sub> to the internal environment
- B. includes the heart and lungs
- C. helps regulate the pH of the internal environment by removing acid-forming CO<sub>2</sub> from the blood
- D. all of the these
- E. obtains O<sub>2</sub> from and eliminates CO<sub>2</sub> to the internal environment and helps regulate the pH of the internal environment by removing acid-forming CO<sub>2</sub> from the blood

8. Select the incorrect statement about connective tissue.

- A. Bone is an example.
- B. Blood is an example.
- C. Elastin may be found in the extracellular material.
- D. It has tightly-packed cells.
- E. It is a primary tissue type.

9. Which of the following body systems is not directed entirely toward maintaining homeostasis?

- A. reproductive system
- B. endocrine system
- C. nervous system
- D. all of these
- E. reproductive and nervous systems

10. Which sequence represents the correct hierarchy of biological organization in a human?

- A. cell-organ-tissue-system-organism
- B. cell-tissue-organ-system-organism
- C. tissue-cell-system-organism-organ
- D. organ-tissue-cell-organism-system
- E. system-cell-organ-organism-tissue

11. The internal environment

- A. is not in direct contact with the body's cells
- B. consists of the intracellular fluid
- C. must be maintained at absolutely unchanging composition, temperature, and volume for survival of the body
- D. is in direct contact with the body's cells and consists of the extracellular fluid
- E. consists of the intracellular fluid and must be maintained at absolutely unchanging composition, temperature, and volume for survival of the body

12. Extracellular fluid

- A. is the internal environment of the body
- B. is outside the cells but inside the body
- C. consists of the plasma and interstitial fluid
- D. exhibits a dynamic steady state in regard to composition, temperature, and volume
- E. all of these

13. Nutrients and oxygen are distributed through the body mainly by the \_\_\_\_ system.

- A. circulatory
- B. digestive
- C. endocrine
- D. integumentary
- E. skeletal

14. Which of the following statements about negative feedback is incorrect?

- A. It exists when a change in a regulated variable triggers a response that opposes the change.
- B. It exists when the input to a system increases the output and the output inhibits the input.
- C. The control system's input and output continue to enhance each other.
- D. It is the method by which most of the body's control mechanisms operate.
- E. It helps maintain the body's dynamic, steady state.

15. Identify the characteristics associated with endocrine glands.

- A. lack ducts
- B. secrete chemicals directly into the blood
- C. derived from epithelial tissue
- D. include the parathyroids
- E. all of these

16. Which of the following is least related to connective tissue?

- A. thymus
- B. bone
- C. blood
- D. tendon
- E. elastin

17. Which of the following is not an example of negative feedback?

- A. A low grade on an exam causes a student to study harder for the next exam.
- B. A small stone rolls down a hill and starts an avalanche.
- C. A person goes to eat in the cafeteria when he/she gets hungry.
- D. You change a flat tire so you can continue on a journey in your car.
- E. A person's body shivers after the person falls into a cold river.

18. Evaporation of sweat cooling the body is an example of

- A. negative feedback
- B. positive feedback
- C. a feedforward mechanism
- D. an intrinsic (local) control mechanism
- E. autoregulation

19. The two systems concerned with the control of body functioning are:

- A. nervous and respiratory
- B. nervous and endocrine
- C. endocrine and respiratory
- D. endocrine and lymphatic
- E. circulatory and endocrine

20. Calcium is stored mainly in the \_\_\_\_ system.

- A. digestive
- B. endocrine
- C. integumentary
- D. muscular
- E. skeletal

21. If a letter in the alphabet is equated to a cell, then \_\_\_\_ would be most like an organ.

- A. two paragraphs
- B. a paragraph
- C. a word
- D. a sentence
- E. two sentences

22. Identify the correct statement(s) about stem cells.

- A. They are undifferentiated embryonic cells.
- B. They may reproduce many times.
- C. Their daughter cells may differentiate into a number of different specialized cell types.
- D. All of these.
- E. None of these.

23. Which of the following is a feedforward phenomenon?

- A. increasing the amount of insulin secreted before nutrients in food enter the blood
- B. shivering in response to having cold air around the body
- C. sweating after being in a sauna for 10 minutes
- D. eating a doughnut because you are hungry
- E. shivering in response to having cold air around the body and sweating after being in a sauna for 10 minutes

24. Cells eliminate carbon dioxide as a waste product.

True False

25. All cells that are not pluripotent can reproduce.

True False

26. Highly differentiated tissues such as nervous and cardiac muscle are incapable of reproduction because they are pluripotent.

True False

27. Enzymes are carbohydrates that speed up chemical reactions in the body.

True False

28. A mechanistic explanation of why a person breathes is to obtain oxygen.

True False

29. A teleological (non-mechanistic) explanation of why a person sweats is to cool off.

True False

30. Tissues are composed of two or more types of cells organized to perform a particular function or functions.

True False

31. Blood is a type of connective tissue that contains small fibers of elastin protein in the extracellular material called plasma.

True False

32. Glands are formed during embryonic development by pockets of epithelial tissue that dip inward from the surface.

True False

33. Endocrine glands secrete hormones through ducts into the blood.

True False

34. Insulin is a hormone that is secreted into the lumen of the intestine in response to the presence of food.

True False

35. The epidermis that covers the skin is a simple organ.

True False

36. The external environment is found outside cells but inside the body.

True False

37. Factors that are homeostatically regulated are maintained at a constant, fixed level unless disease is present.

True False

38. The lungs remove carbon dioxide from the blood plasma.

True False

39. To sustain life, the internal environment must be maintained in an absolutely unchanging state.

True False

40. Some activities performed by the muscular and nervous systems are not directed toward maintaining homeostasis.

True False

41. The plasma surrounds and bathes all of the body's cells.

True False

42. The concentration of salt in the extracellular fluid influences how water enters and leaves cells.

True False

43. Exocrine glands are the only structures in the body capable of secretion.

True False

44. Secretion in response to appropriate stimulation refers to the release of specific products that have, in large part, been synthesized by the cell.

True False

45. The endocrine system relies on the circulatory system for the transport of hormones.

True False

46. One organ can belong to more than one body system.

True False

47. The integumentary system contains specialized organs called sweat glands, which are important in regulating body temperature.

True False

48. Negative feedback operates to maintain a controlled factor in a relatively steady state.

True False

49. Positive feedback moves a controlled variable even further away from a steady state.

True False

50. With positive feedback, a control system's input and output continue to enhance each other.

True False

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

True False

52. Most homeostatic mechanisms operate on the principle of positive feedback.

True False

53. A single pluripotent cell without dividing can differentiate into more than one kind of mature body cell.

True False

**54. Complete each of the following statements.**

The smallest unit capable of carrying out the processes associated with life is the \_\_\_\_\_.

\_\_\_\_\_

**55. Complete each of the following statements.**

\_\_\_\_\_ cells are specialized to send electrical signals.

\_\_\_\_\_



**56. Complete each of the following statements.**

\_\_\_\_\_ muscle tissue composes the heart.

---

**57. Complete each of the following statements.**

\_\_\_\_\_ are composed of two or more types of primary tissue organized to perform a particular function or functions.

---

**58. Complete each of the following statements.**

\_\_\_\_\_ glands secrete through ducts, whereas \_\_\_\_\_ glands secrete directly into the blood.

---

**59. Complete each of the following statements.**

A(n) \_\_\_\_\_ 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.

---

**60. Complete each of the following statements.**

The internal environment consists of the \_\_\_\_\_, which is made up of \_\_\_\_\_; the fluid portion of the blood; and \_\_\_\_\_, which surrounds and bathes all cells.

---

**61. Complete each of the following statements.**

The \_\_\_\_\_ is the liquid part of the blood.

---

**62. Complete each of the following statements.**

The body cells are in direct contact with, and make life-sustaining exchanges with, the \_\_\_\_\_.

\_\_\_\_\_

**63. Complete each of the following statements.**

\_\_\_\_\_ refers to maintenance of a relatively stable internal environment.

\_\_\_\_\_

**64. Complete each of the following statements.**

\_\_\_\_\_ tissue is composed of cells specialized for contraction and force generation.

\_\_\_\_\_

**65. Complete each of the following statements.**

The \_\_\_\_\_ system consists of all hormone-secreting tissues.

\_\_\_\_\_

**66. Complete each of the following statements.**

The two major control systems of the body are the \_\_\_\_\_ and the \_\_\_\_\_.

\_\_\_\_\_

**67. Complete each of the following statements.**

\_\_\_\_\_ are the blood vessels where materials are exchanged between the blood and the interstitial fluid.

\_\_\_\_\_

**68. Complete each of the following statements.**

The spleen is part of the \_\_\_\_\_ system.

\_\_\_\_\_

**69. Complete each of the following statements.**

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.

---

**70. Complete each of the following statements.**

The \_\_\_\_\_ system controls and coordinates bodily activities that require swift responses, especially to changes in the external environment.

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\_\_\_\_\_ refers to the abnormal functioning of the body associated with disease.

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**72. Complete each of the following statements.**

"Reaction counteracts stress" would be a shorthand way of defining \_\_\_\_\_ feedback.

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**73. Complete each of the following statements.**

\_\_\_\_\_ cells are not specialized for a specific function but can divide to give rise to highly specialized cells.

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**74. Complete each of the following statements.**

\_\_\_\_\_ stem cells are partially differentiated, harvested from adults, and can become highly differentiated, specialized cell types.

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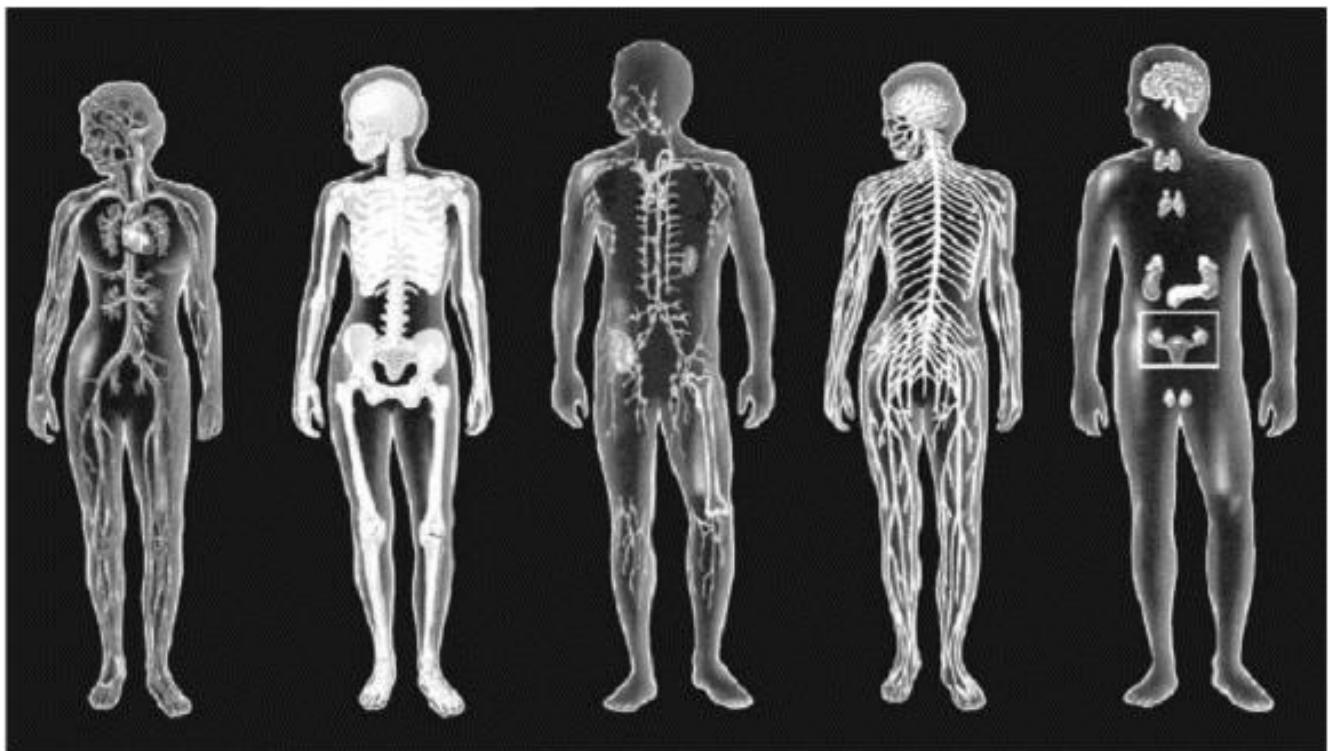
**75. Complete each of the following statements.**

\_\_\_\_\_ stem cells are undifferentiated cells that result from the early divisions of a fertilized egg and ultimately give rise to all specialized cells of the body.

\_\_\_\_\_

76. Temperature-sensitive nerve cells monitor the body temperature and provide information about its status to a temperature-control center in the hypothalamus, a part of the brain. The hypothalamus can bring about adjustments in body temperature by inducing shivering or sweating, among other things. Indicate the roles served by each component of this control system using the following answer code.

- |                                      |                     |       |
|--------------------------------------|---------------------|-------|
| 1. Temperature-sensitive nerve cells | controlled variable | _____ |
| 2. Body temperature                  | sensor              | _____ |
| 3. Hypothalamus                      | effector            | _____ |
| 4. Skeletal muscles and sweat glands | integrator          | _____ |

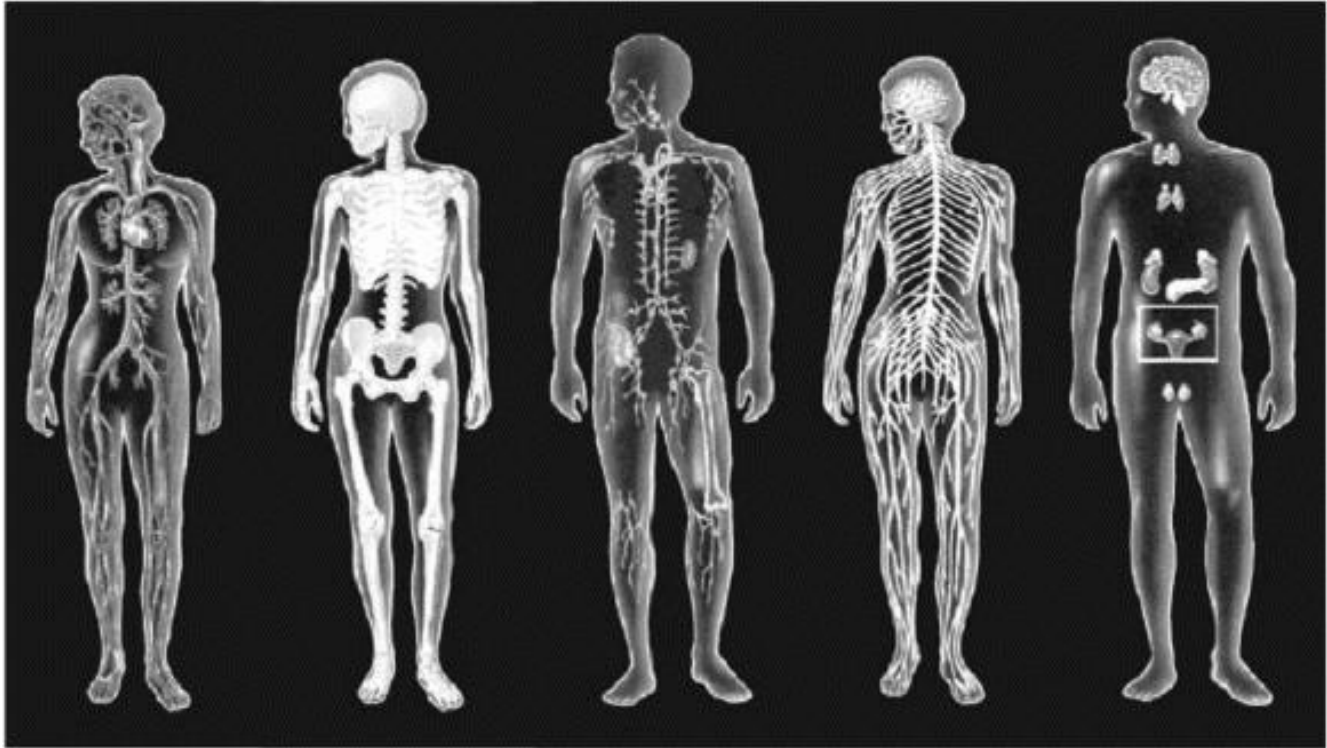


77.           1                               2                               3                               4                               5

**Use the figure above to answer the corresponding questions.**

Which number identifies the system that serves as the source of all blood cells?

- a. 1
- b. 2
- c. 3
- d. 4
- e. 5

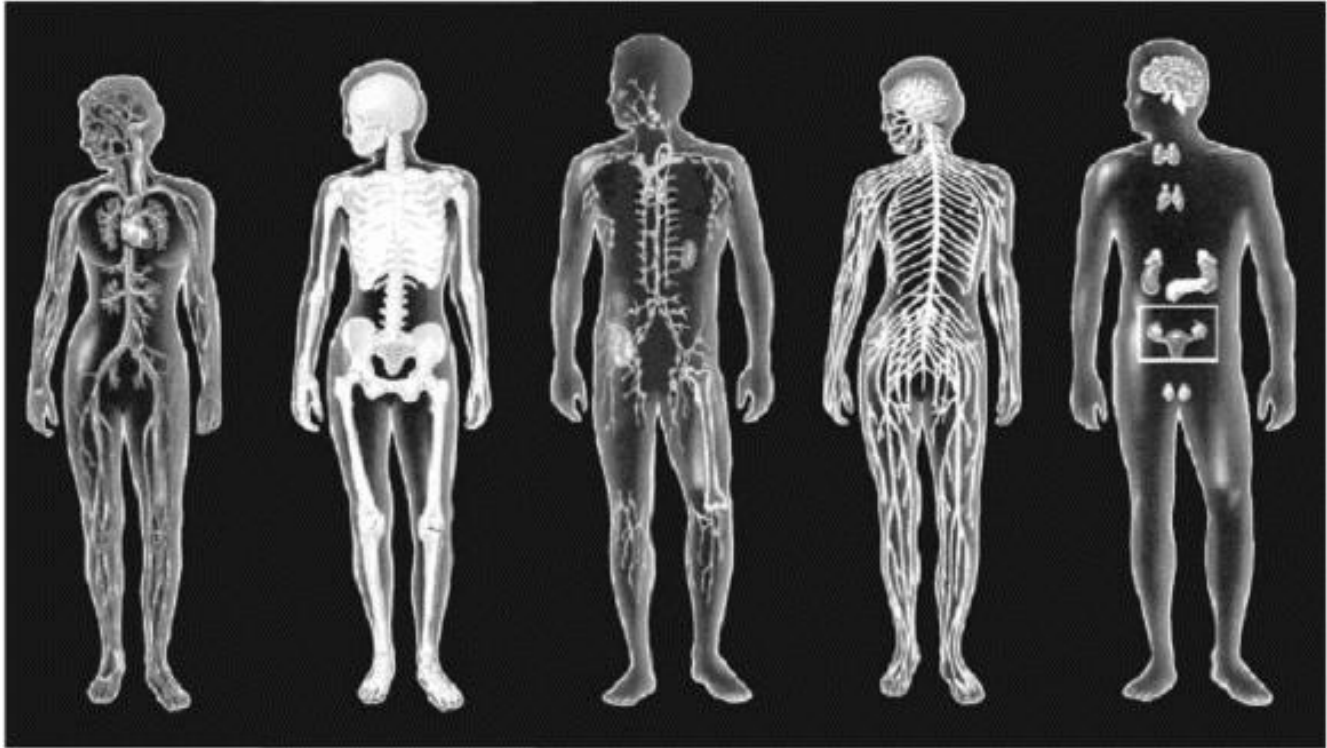


78.            1                            2                            3                            4                            5

Use the figure above to answer the corresponding questions.

Which number identifies the system that serves as a regulatory system in which the duration of activity is more important than the speed of activity?

- a. 1
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79.         **1**                         **2**                         **3**                         **4**                         **5**

**Use the figure above to answer the corresponding questions.**

Which number identifies the system that serves as the site of nutrient and waste exchange between cells and the interstitial fluid?

- a.         1
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- c.         3
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80. Beginning with the chemical level and ending with the system level, compare the different levels of organization in the human body with the following things found on a page in a book: sentence, letter, word, ink in a letter, paragraph, and all paragraphs on a page.

81. The pancreas is part of the endocrine system and secretes the hormone insulin, which allows most body cells to absorb glucose from the blood. A lack of insulin can result in hyperglycemia (high blood glucose), which can adversely affect one's health. Describe the roles of the digestive system, circulatory system, and endocrine systems in maintaining glucose homeostasis when a person eats a sugary meal.

82. Explain the long-term adaptations made by the heart in response to an exercise regimen of sufficient intensity and duration, and explain how this is beneficial to the heart and to the athlete.

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19. The two systems concerned with the control of body functioning are:

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- B. nervous and endocrine**
- C. endocrine and respiratory
- D. endocrine and lymphatic
- E. circulatory and endocrine

20. Calcium is stored mainly in the \_\_\_\_ system.

- A. digestive
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- D. muscular
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21. If a letter in the alphabet is equated to a cell, then \_\_\_\_ would be most like an organ.

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- B. a paragraph
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- D.** a sentence
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- A. They are undifferentiated embryonic cells.
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- C. Their daughter cells may differentiate into a number of different specialized cell types.
- D.** All of these.
- E. None of these.

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- D. eating a doughnut because you are hungry
- E. shivering in response to having cold air around the body and sweating after being in a sauna for 10 minutes

24. Cells eliminate carbon dioxide as a waste product.

**TRUE**

25. All cells that are not pluripotent can reproduce.

**FALSE**

26. Highly differentiated tissues such as nervous and cardiac muscle are incapable of reproduction because they are pluripotent.

**FALSE**

27. Enzymes are carbohydrates that speed up chemical reactions in the body.

**FALSE**

28. A mechanistic explanation of why a person breathes is to obtain oxygen.

**FALSE**

29. A teleological (non-mechanistic) explanation of why a person sweats is to cool off.

**TRUE**

30. Tissues are composed of two or more types of cells organized to perform a particular function or functions.

**FALSE**

31. Blood is a type of connective tissue that contains small fibers of elastin protein in the extracellular material called plasma.

**FALSE**

32. Glands are formed during embryonic development by pockets of epithelial tissue that dip inward from the surface.

**TRUE**

33. Endocrine glands secrete hormones through ducts into the blood.

**FALSE**

34. Insulin is a hormone that is secreted into the lumen of the intestine in response to the presence of food.

**FALSE**

35. The epidermis that covers the skin is a simple organ.

**FALSE**

36. The external environment is found outside cells but inside the body.

**FALSE**

37. Factors that are homeostatically regulated are maintained at a constant, fixed level unless disease is present.

**FALSE**

38. The lungs remove carbon dioxide from the blood plasma.

**TRUE**

39. To sustain life, the internal environment must be maintained in an absolutely unchanging state.

**FALSE**

40. Some activities performed by the muscular and nervous systems are not directed toward maintaining homeostasis.

**TRUE**

41. The plasma surrounds and bathes all of the body's cells.

**FALSE**

42. The concentration of salt in the extracellular fluid influences how water enters and leaves cells.

**TRUE**

43. Exocrine glands are the only structures in the body capable of secretion.

**FALSE**

44. Secretion in response to appropriate stimulation refers to the release of specific products that have, in large part, been synthesized by the cell.

**TRUE**

45. The endocrine system relies on the circulatory system for the transport of hormones.

**TRUE**

46. One organ can belong to more than one body system.

**TRUE**

47. The integumentary system contains specialized organs called sweat glands, which are important in regulating body temperature.

**TRUE**

48. Negative feedback operates to maintain a controlled factor in a relatively steady state.

**TRUE**

49. Positive feedback moves a controlled variable even further away from a steady state.

**TRUE**

50. With positive feedback, a control system's input and output continue to enhance each other.

**TRUE**

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

**FALSE**

52. Most homeostatic mechanisms operate on the principle of positive feedback.

**FALSE**

53. A single pluripotent cell without dividing can differentiate into more than one kind of mature body cell.

**FALSE**

54. **Complete each of the following statements.**

The smallest unit capable of carrying out the processes associated with life is the \_\_\_\_\_.

**cell**

55. **Complete each of the following statements.**

\_\_\_\_\_ cells are specialized to send electrical signals.

**Nerve**

56. Complete each of the following statements.

\_\_\_\_\_ muscle tissue composes the heart.

**Cardiac**

57. Complete each of the following statements.

\_\_\_\_\_ are composed of two or more types of primary tissue organized to perform a particular function or functions.

**Organs**

58. Complete each of the following statements.

\_\_\_\_\_ glands secrete through ducts, whereas \_\_\_\_\_ glands secrete directly into the blood.

**Exocrine, endocrine**

59. Complete each of the following statements.

A(n) \_\_\_\_\_ 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.

**system**

60. Complete each of the following statements.

The internal environment consists of the \_\_\_\_\_, which is made up of \_\_\_\_\_; the fluid portion of the blood; and \_\_\_\_\_, which surrounds and bathes all cells.

**extracellular fluid, plasma, interstitial fluid**

61. Complete each of the following statements.

The \_\_\_\_\_ is the liquid part of the blood.

**plasma**



62. Complete each of the following statements.

The body cells are in direct contact with, and make life-sustaining exchanges with, the \_\_\_\_\_.

**internal environment (extracellular fluid)**

63. Complete each of the following statements.

\_\_\_\_\_ refers to maintenance of a relatively stable internal environment.

**Homeostasis**

64. Complete each of the following statements.

\_\_\_\_\_ tissue is composed of cells specialized for contraction and force generation.

**Muscle**

65. Complete each of the following statements.

The \_\_\_\_\_ system consists of all hormone-secreting tissues.

**endocrine**

66. Complete each of the following statements.

The two major control systems of the body are the \_\_\_\_\_ and the \_\_\_\_\_.

**nervous system, endocrine system**

67. Complete each of the following statements.

\_\_\_\_\_ are the blood vessels where materials are exchanged between the blood and the interstitial fluid.

**Capillaries**

68. Complete each of the following statements.

The spleen is part of the \_\_\_\_\_ system.

**immune (lymphatic)**

69. Complete each of the following statements.

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.

**urinary**

70. Complete each of the following statements.

The \_\_\_\_\_ system controls and coordinates bodily activities that require swift responses, especially to changes in the external environment.

**nervous**

71. Complete each of the following statements.

\_\_\_\_\_ refers to the abnormal functioning of the body associated with disease.

**Pathophysiology**

72. Complete each of the following statements.

"Reaction counteracts stress" would be a shorthand way of defining \_\_\_\_\_ feedback.

**negative**

73. Complete each of the following statements.

\_\_\_\_\_ cells are not specialized for a specific function but can divide to give rise to highly specialized cells.

**Stem**

74. Complete each of the following statements.

\_\_\_\_\_ stem cells are partially differentiated, harvested from adults, and can become highly differentiated, specialized cell types.

**Tissue-specific**

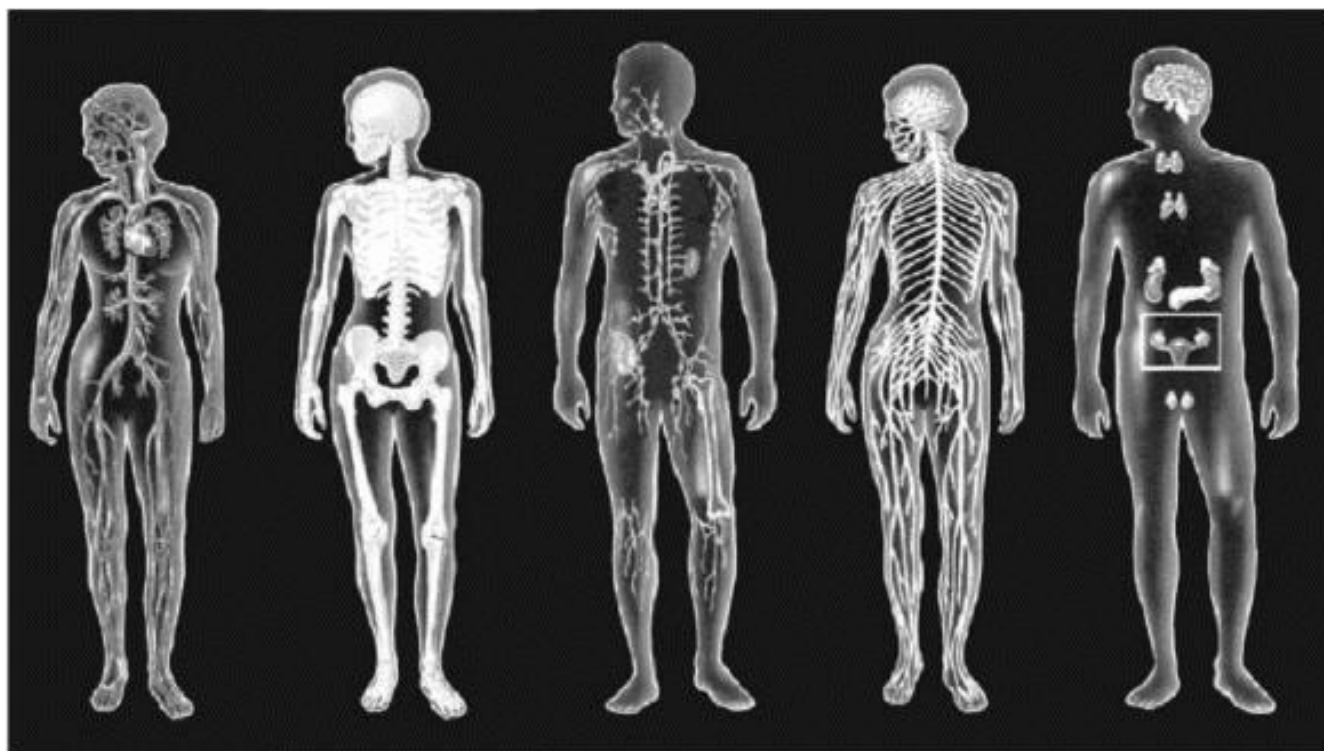
**75. Complete each of the following statements.**

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**Embryonic stem**

76. Temperature-sensitive nerve cells monitor the body temperature and provide information about its status to a temperature-control center in the hypothalamus, a part of the brain. The hypothalamus can bring about adjustments in body temperature by inducing shivering or sweating, among other things. Indicate the roles served by each component of this control system using the following answer code.

- |                                      |                     |          |
|--------------------------------------|---------------------|----------|
| 1. Temperature-sensitive nerve cells | controlled variable | <u>2</u> |
| 2. Body temperature                  | sensor              | <u>1</u> |
| 3. Hypothalamus                      | effector            | <u>4</u> |
| 4. Skeletal muscles and sweat glands | integrator          | <u>3</u> |



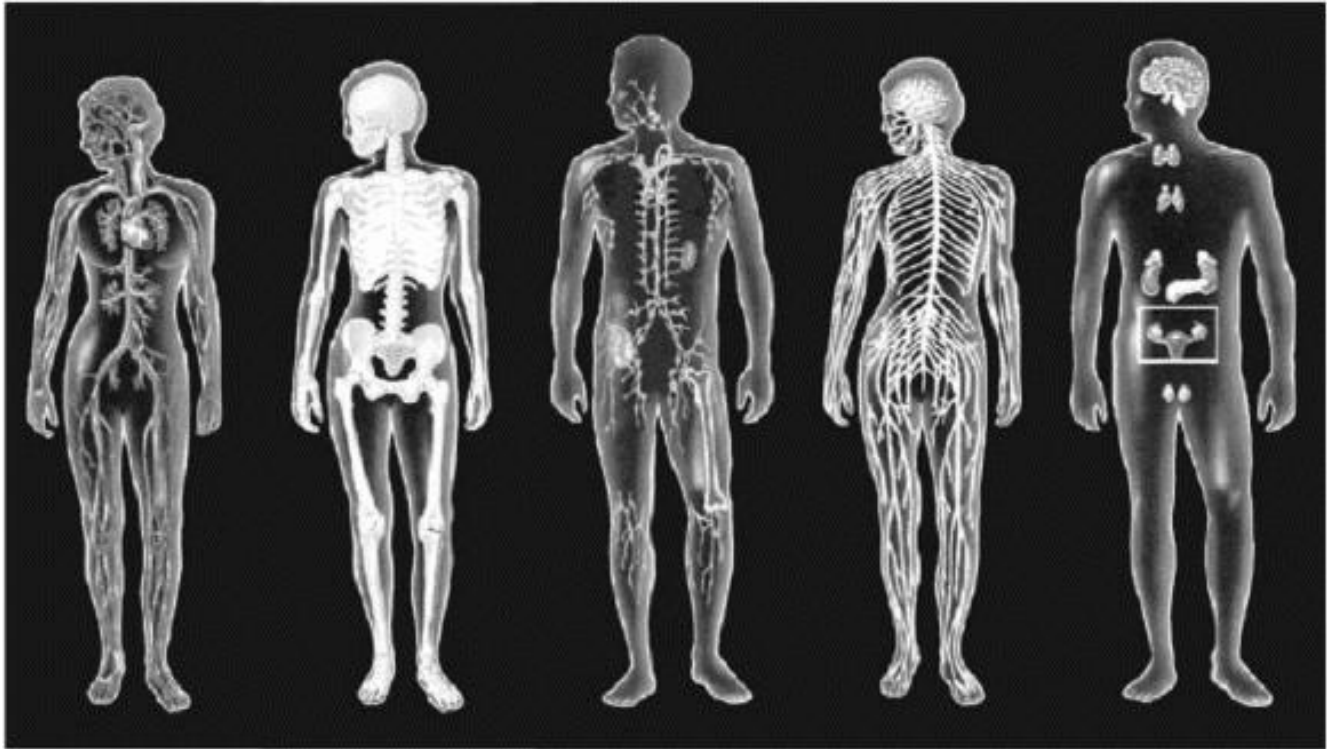
77.            **1**    **2**    **3**    **4**    **5**

**Use the figure above to answer the corresponding questions.**

Which number identifies the system that serves as the source of all blood cells?

- a. 1
- b. 2
- c. 3
- d. 4
- e. 5

b



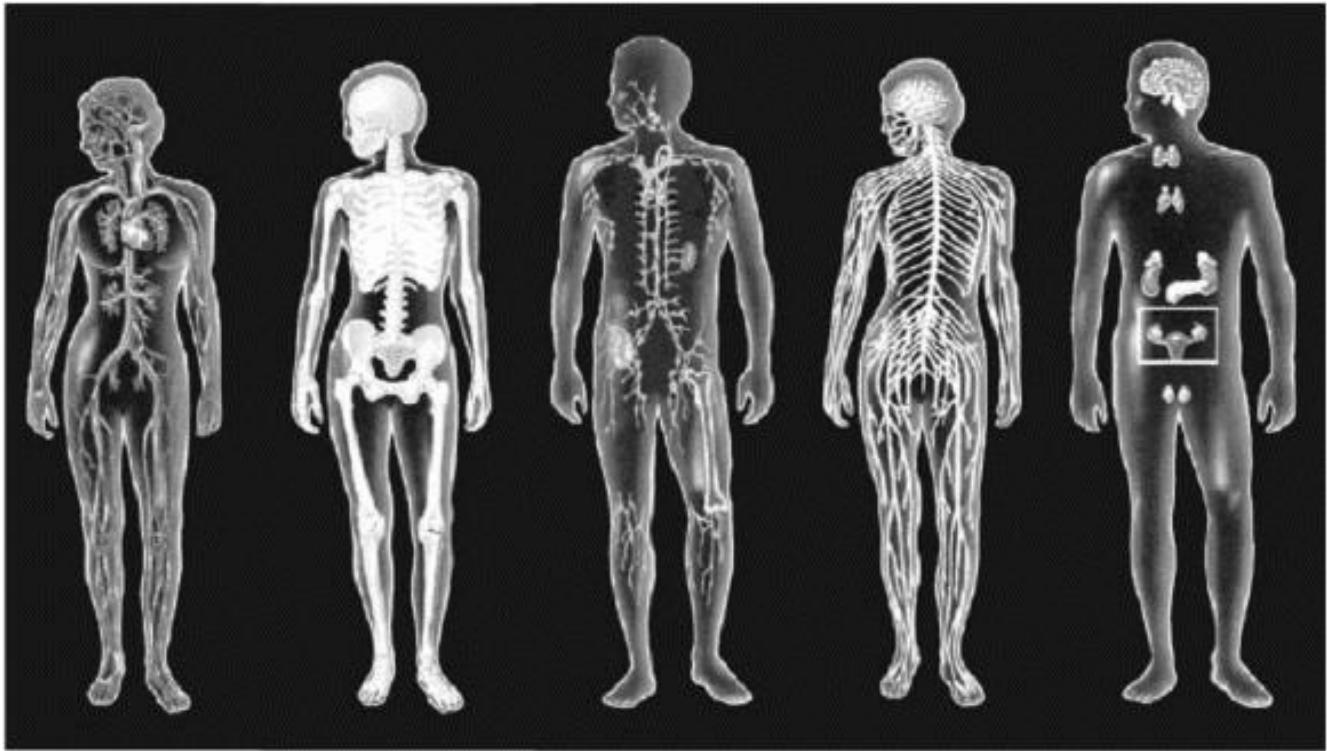
78.           1   2   3   4   5

Use the figure above to answer the corresponding questions.

Which number identifies the system that serves as a regulatory system in which the duration of activity is more important than the speed of activity?

- a.           1
- b.           2
- c.           3
- d.           4
- e.           5

e



79.           1                               2                               3                               4                               5

Use the figure above to answer the corresponding questions.

Which number identifies the system that serves as the site of nutrient and waste exchange between cells and the interstitial fluid?

- a.        1
- b.        2
- c.        3
- d.        4
- e.        5

a

80. Beginning with the chemical level and ending with the system level, compare the different levels of organization in the human body with the following things found on a page in a book: sentence, letter, word, ink in a letter, paragraph, and all paragraphs on a page.

*The ink would be like the chemical level and it forms the letters, which would be like cells. Two or more letters together make up a word, which is like a tissue. Two or more words make up a sentence, which is like an organ; and two or more sentences make up a paragraph, which is like a body system. All paragraphs on a page would be like all body systems together, which make up the human body.*

81. The pancreas is part of the endocrine system and secretes the hormone insulin, which allows most body cells to absorb glucose from the blood. A lack of insulin can result in hyperglycemia (high blood glucose), which can adversely affect one's health. Describe the roles of the digestive system, circulatory system, and endocrine systems in maintaining glucose homeostasis when a person eats a sugary meal.

*The digestive system breaks down the sugary meal and transports the sugars into the blood. The circulatory system transports the sugars throughout the body. If the level of glucose in the blood increases above optimum, the endocrine system releases insulin that causes body cells to absorb glucose, thus lowering the glucose to optimum levels in the blood.*

82. Explain the long-term adaptations made by the heart in response to an exercise regimen of sufficient intensity and duration, and explain how this is beneficial to the heart and to the athlete.

*The heart increases its strength and efficiency so that it pumps more blood per beat. This allows the muscles to receive more oxygen to meet the increased demand. Because of the increased pumping ability, the heart does not have to beat as rapidly to pump a given quantity of blood as it did before beginning the exercise regimen.*