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_2 from and eliminates CO_2 to the internal environment
B. includes the heart and lungs
C. helps regulate the pH of the internal environment by removing acid-forming CO_2 from the blood
D. all of the these
E. obtains O_2 from and eliminates CO_2 to the internal environment and helps regulate the pH of the internal environment by removing acid-forming CO_2 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 statments.**

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

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

_____ cells are specialized to send electrical signals.

_____

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

_____ muscle tissue composes the heart.

_____

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

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

_____

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

_____ glands secrete through ducts, whereas _____ glands secrete directly into the blood.

_____

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

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 statments.**

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 statments.**

The _____ is the liquid part of the blood.

_____

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

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

_____

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

_____ refers to maintenance of a relatively stable internal environment.

_____

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

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

_____

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

The _____ system consists of all hormone-secreting tissues.

_____

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

The two major control systems of the body are the _____ and the _____.

_____

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

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

_____

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

The spleen is part of the _____ system.

_____

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

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 statments.**

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

_____

71. **Complete each of the following statments.**

_____ refers to the abnormal functioning of the body associated with disease.

_____

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

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

_____

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

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

_____

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

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_____

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_____ 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.

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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.

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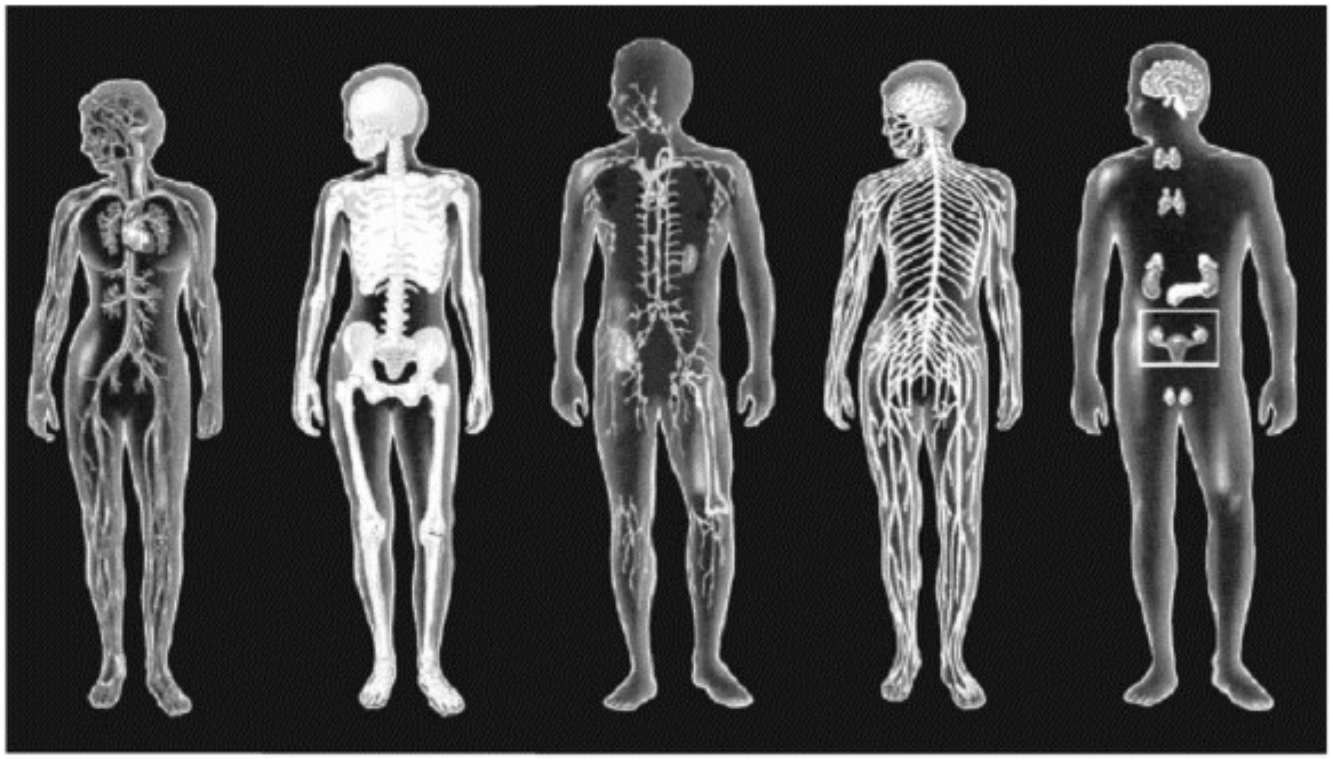
4. Skeletal muscles and sweat glands	integrator ____



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

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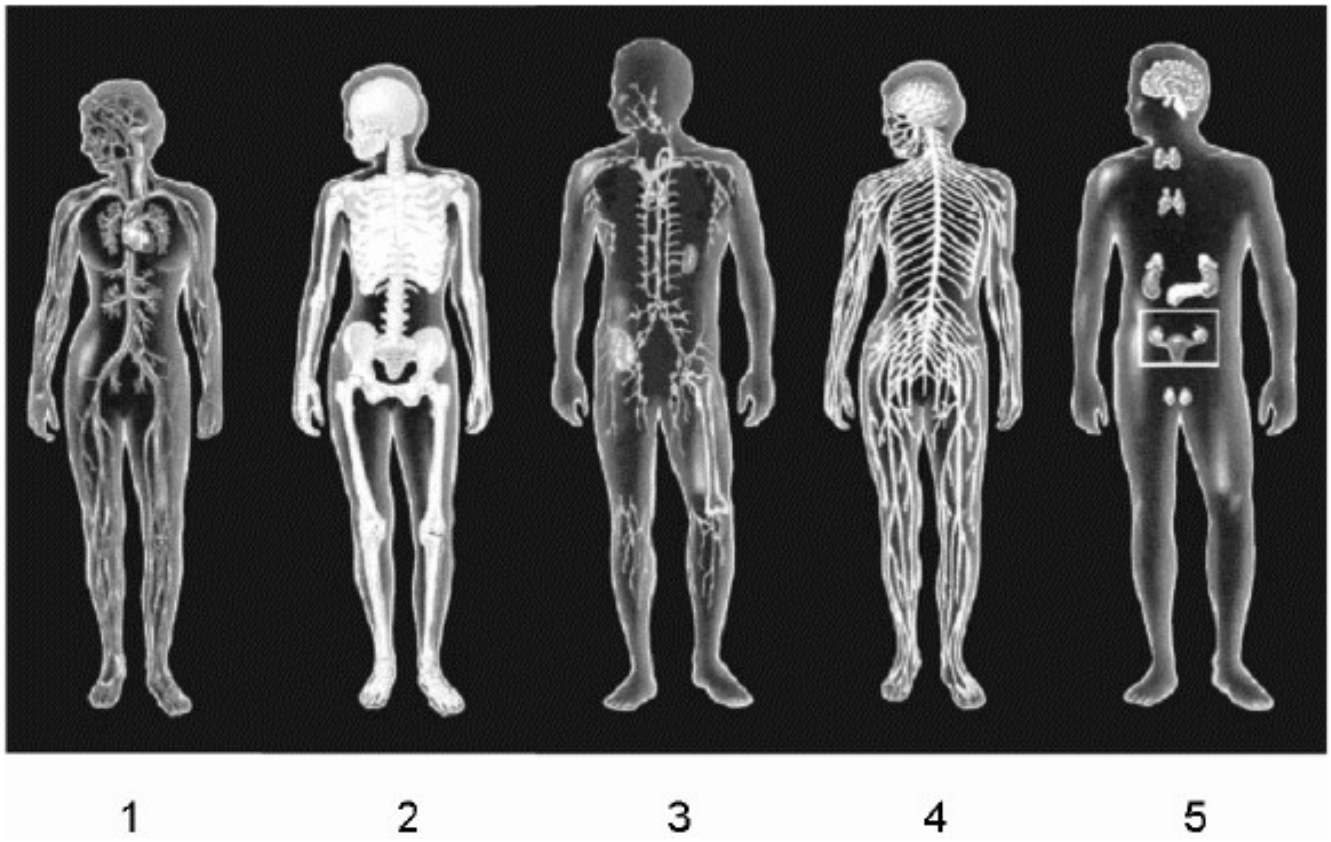

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Which number identifies the system that serves as a regulatory system in which the duration of activity is more important than the speed of activity?

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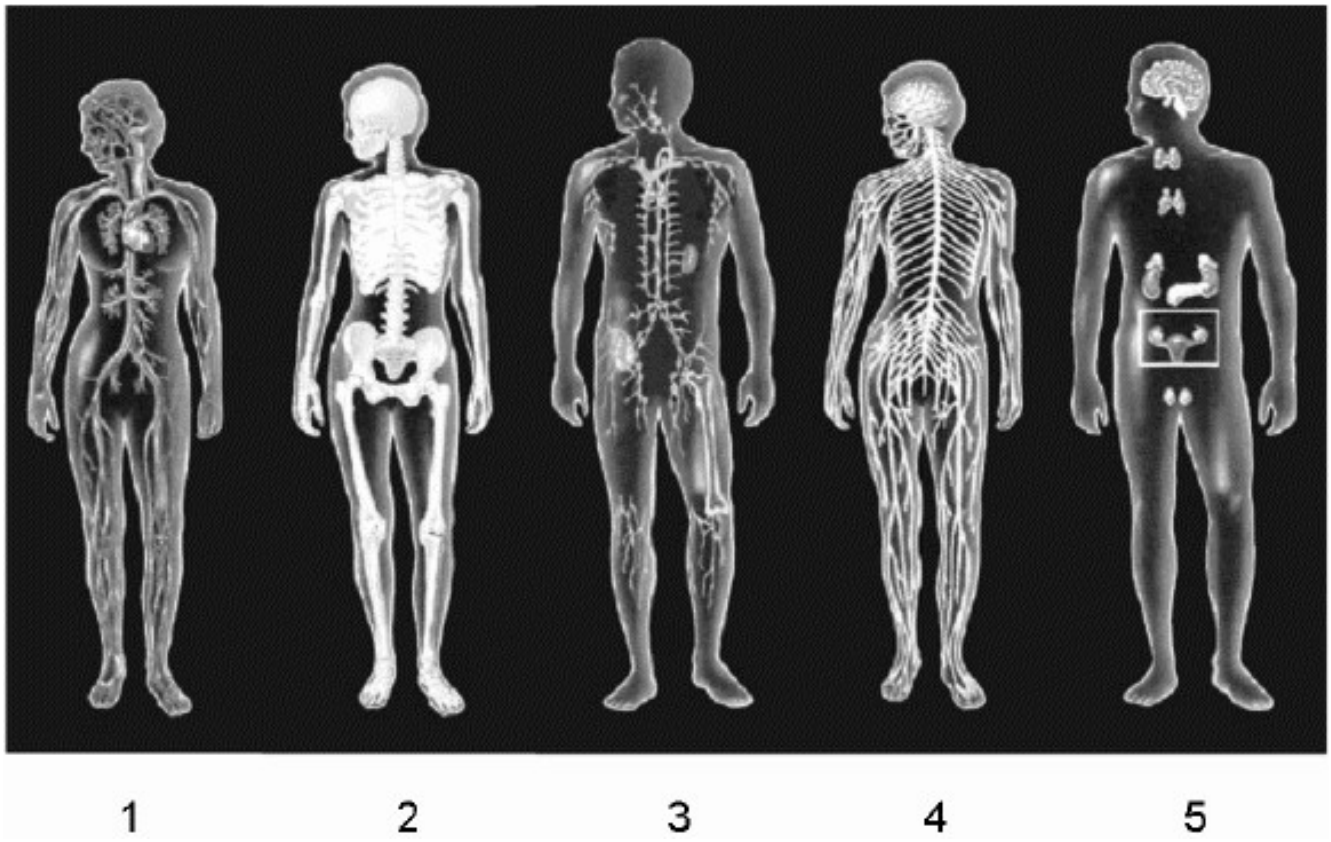

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Use the figure above to answer the corresponding questions.

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

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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.

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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

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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 statments.**

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

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

_____ cells are specialized to send electrical signals.
Nerve

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

_____ muscle tissue composes the heart.
Cardiac

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

_____ 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 statments.**

_____ glands secrete through ducts, whereas _____ glands secrete directly into the blood.
Exocrine, endocrine

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

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 statments.**

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 statments.**

The _____ is the liquid part of the blood.
plasma

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

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 statments.**

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

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

_____ tissue is composed of cells specialized for contraction and force generation.
Muscle

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

The _____ system consists of all hormone-secreting tissues.
endocrine

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

The two major control systems of the body are the _____ and the _____.
nervous system, endocrine system

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

_____ are the blood vessels where materials are exchanged between the blood and the interstitial fluid.
Capillaries

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

The spleen is part of the _____ system.
immune (lymphatic)

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

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 statments.**

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 statments.**

_____ refers to the abnormal functioning of the body associated with disease.
Pathophysiology

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

"Reaction counteracts stress" would be a shorthand way of defining _____ feedback.
negative

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

_____ 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 statments.**

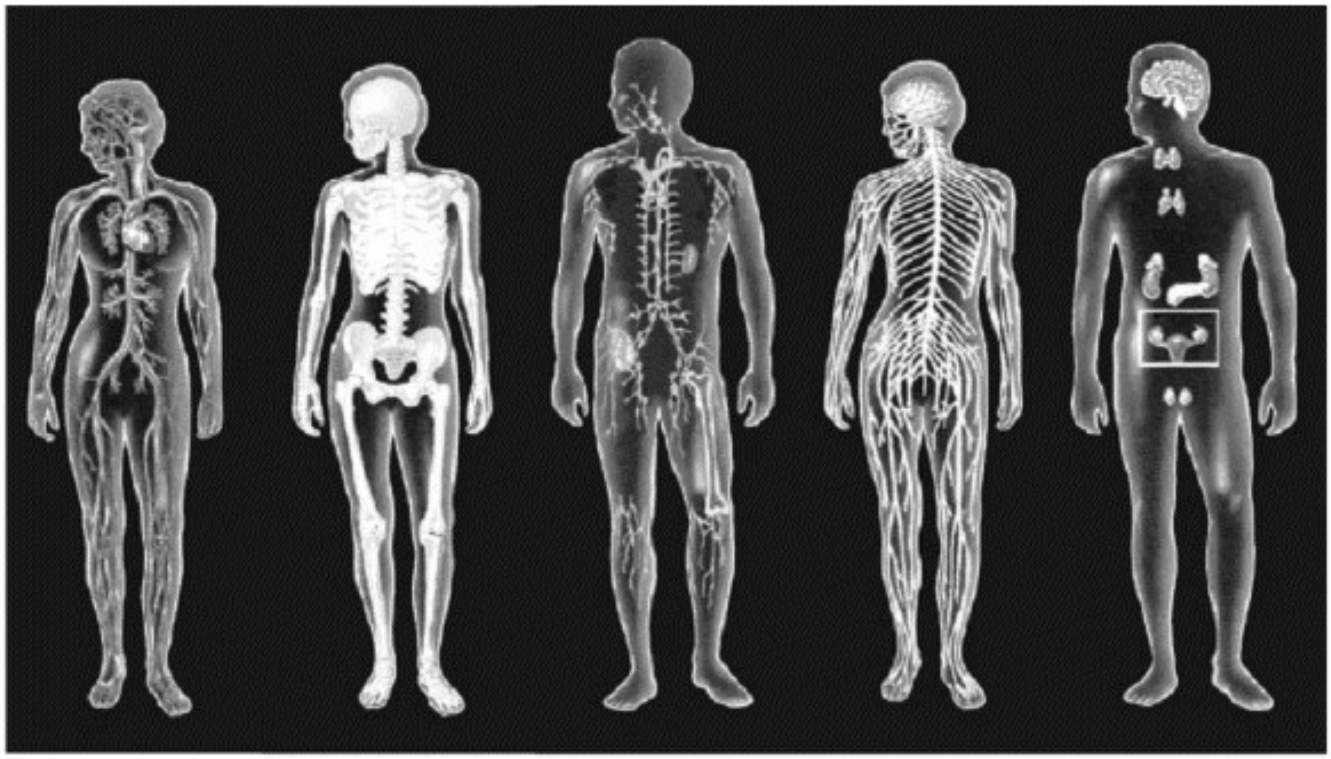
_____ stem cells are partially differentiated, harvested from adults, and can become highly differentiated, specialized cell types.
Tissue-specific

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

_____ 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.
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 **2**
2. Body temperature	sensor **1**
3. Hypothalamus	effector **4**
4. Skeletal muscles and sweat glands	integrator **3**



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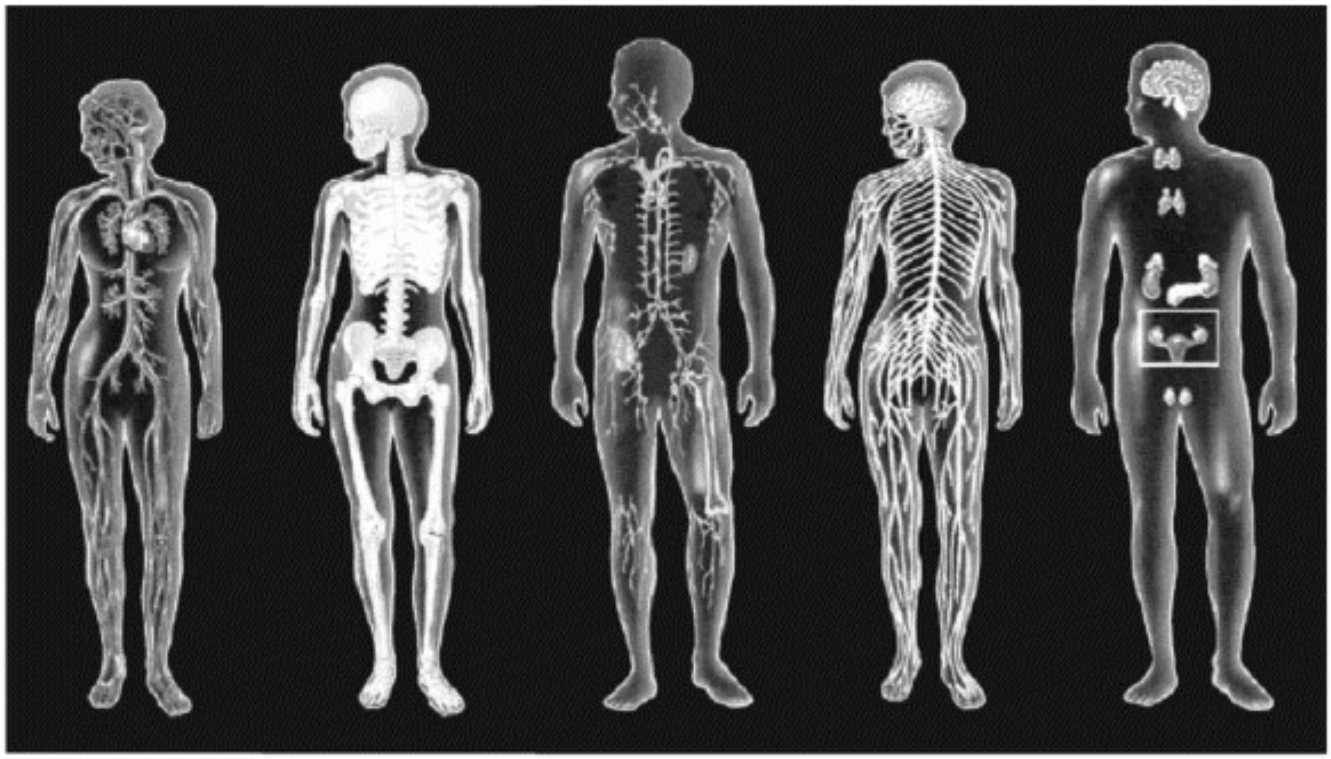
Which number identifies the system that serves as the source of all blood cells?

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

b



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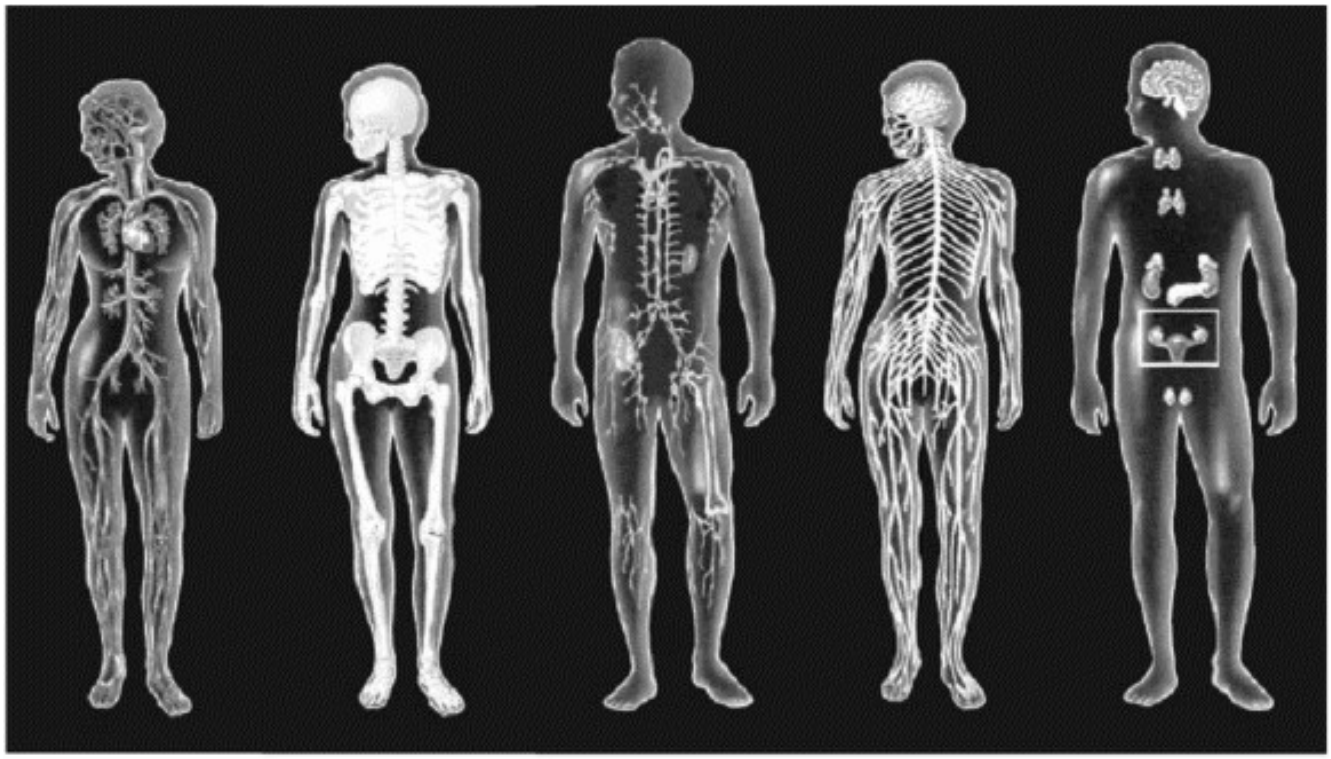

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c. 3
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a

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.