

Chapter 01

Homeostasis: A Framework for Human Physiology

Multiple Choice Questions

1. The four broad categories of cells include those specialized for each of the following functions except

- A. Movement
- B.** Synthesis of complex molecules
- C. Secretion
- D. Support
- E. Conduction of electrical impulses

Bloom's Level: 1. Remember
Section 1.02
Topic: Cells

2. Physiology is the study of

- A. How two organisms interact
- B.** How organisms function
- C. The spread of diseases
- D. The structure of the body

Bloom's Level: 1. Remember
Section 1.01
Topic: General

3. The study of disease states in the body is called

- A.** Pathophysiology
- B. Anatomy
- C. Homeostasis
- D. Biology
- E. Histology

Bloom's Level: 1. Remember
Section 1.01
Topic: General

4. Which is not a connective tissue cell?
- A. Bone cells
 - B. Skeletal muscle cells**
 - C. Blood cells
 - D. Fat cells
 - E. Both skeletal muscle cells and blood cells are correct

Bloom's Level: 2. Understand
Section 1.02
Topic: Cells

5. Epithelial cells
- A. Include fat-storing cells
 - B. Act as anchors for body structures
 - C. Form boundaries between body compartments**
 - D. Both include fat-storing cells and act as anchors for body structures are correct
 - E. Include all of the choices are correct

Bloom's Level: 1. Remember
Section 1.02
Topic: Cells

6. The cell type that is specialized to communicate with other cells and control their activities is
- A. Epithelial cells
 - B. Muscle cells
 - C. Connective tissue cells
 - D. Nerve cells**
 - E. All of the choices are correct

Bloom's Level: 1. Remember
Section 1.02
Topic: Cells

7. The developmental process that leads to specialized cell types is called
- A. Genomics
 - B. Differentiation**
 - C. Homeostasis
 - D. Positive feedback
 - E. Acclimatization

Bloom's Level: 1. Remember
Section 1.02
Topic: Cells

8. Which of the following statements is true with regard to the extracellular matrix?
- A. Its composition is uniform in all of the body's tissues
 - B. It is an inert framework upon which cells are anchored
 - C. It is composed of fibers and other proteins
 - D. It functions to allow communication between cells
 - E. Both it is composed of fibers and other proteins and it functions to allow communication between cells are correct**

Bloom's Level: 2. Understand
Section 1.02
Topic: Cells

9. The internal environment
- A. Refers to the intracellular fluid compartment of the body
 - B. Is regulated to remain relatively constant by the specialized activities of many of the body's cells
 - C. Is the medium for exchange of nutrients and wastes for the body's cells
 - D. Both refers to the intracellular fluid compartment of the body and is regulated to remain relatively constant by the specialized activities of many of the body's cells are correct
 - E. Both is regulated to remain relatively constant by the specialized activities of many of the body's cells and is the medium for exchange of nutrients and wastes for the body's cells are correct**

Bloom's Level: 1. Remember
Section 1.04
Topic: Cells

10. If a person begins to sweat upon entering a hot room but continued sweating is able to keep the body temperature constant, the person is
- A. In equilibrium
 - B. Not using energy to maintain a constant temperature
 - C. In steady state**
 - D. Using a positive feedback mechanism

Bloom's Level: 3. Apply
Section 1.05
Topic: General

11. Homeostasis refers to
- A. The unwavering control of a physiological set point
 - B. Maintaining a stable internal environment**
 - C. Maintaining a stable external environment
 - D. Both the unwavering control of a physiological set point and maintaining a stable internal environment are correct
 - E. Both the unwavering control of a physiological set point and maintaining a stable external environment are correct

Bloom's Level: 1. Remember
Section 1.04
Topic: General

12. The concept of homeostasis
- A. Includes the concept of an error signal
 - B. Refers to maintaining physiological functions in a stable condition
 - C. Refers only to the regulation of body temperature
 - D. Both includes the concept of an error signal and refers to maintaining physiological functions in a stable condition are correct**
 - E. Both refers to maintaining physiological functions in a stable condition and refers only to the regulation of body temperature are correct

Bloom's Level: 1. Remember
Section 1.04
Topic: General

13. Homeostasis

- A. Refers to rigid constancy of the internal environment
- B.** Refers to dynamic constancy of the internal environment
- C. Is maintained primarily by positive feedback
- D. Both refers to rigid constancy of the internal environment and is maintained primarily by positive feedback are correct
- E. Both refers to dynamic constancy of the internal environment and is maintained primarily by positive feedback are correct

Bloom's Level: 1. Remember
Section 1.04
Topic: General

14. The concept of homeostasis

- A. Refers to maintaining conditions of constancy of the internal environment
- B. Includes the concept of an error signal
- C. Includes the concept of feedforward regulation
- D.** Includes all of the choices
- E. Includes none of the choices

Bloom's Level: 1. Remember
Section 1.04
Topic: General

15. The steady state value for any variable that the body attempts to maintain is the

- A.** Set point
- B. Equilibrium potential
- C. Error signal
- D. Reflex arc
- E. Median value

Bloom's Level: 1. Remember
Section 1.05
Topic: General

16. A reflex is different than a homeostatic control mechanism because a reflex
- A. Is not initiated by a change in the environment
 - B. Arc does not require an integrating center to take place
 - C. Does not require an afferent pathway
 - D. Is a localized response involving short distance communication
 - E.** Will not always attempt to decrease the magnitude of the original stimulus

Bloom's Level: 4. Analyze
Section 1.06
Topic: General

17. Feedforward regulatory processes
- A. Work in anticipation of changes in regulated variables
 - B. Work in conjunction with negative feedback processes
 - C. Lead to instability of the regulated variable
 - D. Maximize fluctuations in the regulated variable
 - E.** Both work in anticipation of changes in regulated variables and work in conjunction with negative feedback processes are correct

Bloom's Level: 1. Remember
Section 1.05
Topic: General

18. Feedforward regulation differs from feedback regulation in that
- A. The former is stimulatory while the latter is inhibitory
 - B.** The former allows the CNS to anticipate the need for changes in physiological set points, whereas the latter does not
 - C. Only the latter is involved in homeostatic regulation
 - D. Both the former is stimulatory while the latter is inhibitory and the former allows the CNS to anticipate the need for changes in physiological set points, whereas the latter does not are correct
 - E. Both the former is stimulatory while the latter is inhibitory and only the latter is involved in homeostatic regulation are correct

Bloom's Level: 4. Analyze
Section 1.05
Topic: General

19. The concept of an error signal, when applied to homeostatic adjustments, refers to the fact that the

- A. New steady state is often not exactly the same as the set point that existed before the adjustment was necessary
- B. Pattern of afferent nerve impulses from receptors is sometimes not adequate for optimal adjustments
- C. Integrating centers in the CNS sometimes make errors in analyzing afferent signals from various receptors
- D. All of the choices are correct
- E. None of the choices are correct

Bloom's Level: 4. Analyze

Section 1.08

Topic: General

20. A positive feedback mechanism is an effective way to

- A. Maintain a constant internal environment
- B. Anticipate changes in the environment
- C. Adapt to a new environment
- D. Bring about a rapid change in the body
- E. Detect changes in the external environment

Bloom's Level: 2. Understand

Section 1.05

Topic: General

21. Shivering in response to a cold draft is an example of

- A. A homeostatic mechanism
- B. Negative feedback
- C. A physiological reflex
- D. A homeostatic mechanism and negative feedback
- E. All of the choices are correct

Bloom's Level: 3. Apply

Section 1.05

Topic: General

22. Homeostasis

- A. Depends upon control systems that use primarily positive feedback
- B. Involves adjusting to the external environment in a process called acclimatization
- C.** Depends upon the interaction of receptors, integrating centers and effectors
- D. Both depends upon control systems that use primarily positive feedback and involves adjusting to the external environment in a process called acclimatization are correct
- E. Is described by none of the choices

Bloom's Level: 2. Understand
Section 1.06
Topic: General

23. If the amount of sodium in the blood decreases, then a negative feedback control mechanism would be expected to

- A. Decrease the amount of sodium in the blood
- B.** Increase the amount of sodium in the blood
- C. Leave the amount of sodium unchanged
- D. Change the set point for sodium

Bloom's Level: 3. Apply
Section 1.08
Topic: General

24. The efferent pathway of a reflex arc

- A. Is so named because it carries information to the integrating center
- B. Can be neural
- C. Can be hormonal
- D. Both is so named because it carries information to the integrating center and can be neural are correct
- E.** Both can be neural and can be hormonal are correct

Bloom's Level: 1. Remember
Section 1.06
Topic: General

25. Which one of the following is the correct sequence for a regulatory reflex arc?
- A. Stimulus, effector, efferent pathway, integrating center, afferent pathway, receptor
 - B. Stimulus, receptor, efferent pathway, integrating center, afferent pathway, effector
 - C.** Stimulus, receptor, afferent pathway, integrating center, efferent pathway, effector
 - D. Stimulus, effector, afferent pathway, integrating center, efferent pathway, receptor
 - E. Effector, efferent pathway, integrating center, afferent pathway, receptor, stimulus

Bloom's Level: 1. Remember
Section 1.06
Topic: General

26. Which of the following are the most common effector cells in reflex arcs?
- A. Neurons
 - B. Muscle cells
 - C. Gland cells
 - D. Both neurons and muscle cells are correct
 - E.** Both muscle cells and gland cells are correct

Bloom's Level: 1. Remember
Section 1.06
Topic: General

27. The hormone insulin enhances the transport of glucose 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 the cells that secrete insulin. Which of the following statements is most likely to be correct?
- A. A decrease in blood glucose concentration will stimulate insulin secretion, which will in turn lower the blood glucose concentration still further
 - B.** An increase in blood glucose concentration will stimulate insulin secretion, which will in turn lower the blood glucose concentration
 - C. A decrease in blood glucose concentration will stimulate insulin secretion, which will in turn increase the blood glucose concentration
 - D. An increase in blood glucose concentration will stimulate insulin secretion, which will in turn increase the blood glucose concentration still further
 - E. None of the choices are correct

Bloom's Level: 5. Evaluate
Section 1.05
Topic: Endocrine System

28. Neural and hormonal control mechanisms differ in
- A. That only neural mechanisms mediate reflexes
 - B.** That mode of delivery of the chemical regulator
 - C. That chemical nature of the regulator used
 - D. Both that only neural mechanisms mediate reflexes and that mode of delivery of the chemical regulator are correct
 - E. Both that mode of delivery of the chemical regulator and that chemical nature of the regulator used are correct

Bloom's Level: 2. Understand
Section 1.06
Topic: General

29. Endocrine regulation
- A. Refers to chemical regulators that are conveyed from one organ to another via the blood stream
 - B. May be achieved by stimulating the secretion of autocrine/paracrine regulators
 - C. Differs from paracrine regulation in that endocrine regulators act on different cell types from those that secreted them, whereas paracrine regulators are secreted by the same cell they act on
 - D.** Both refers to chemical regulators that are conveyed from one organ to another via the blood stream and may be achieved by stimulating the secretion of autocrine/paracrine regulators are correct
 - E. All of the choices are correct

Bloom's Level: 1. Remember
Section 1.06
Topic: Endocrine System

30. Hormones
- A. Are chemical regulators that are conveyed from one organ to another via the blood stream
 - B. May be secreted by endocrine cells
 - C. May be secreted by nerve cells
 - D. Both are chemical regulators that are conveyed from one organ to another via the blood stream and may be secreted by endocrine cells are correct
 - E.** All of the choices are correct

Bloom's Level: 1. Remember
Section 1.07
Topic: Endocrine System

31. Some neurons in the vagus nerve terminate on sinoatrial (pacemaker) cells in the heart. These neurons secrete acetylcholine, which ultimately results in a decreased heart rate. This is an example of
- A. Endocrine control
 - B. Exocrine control
 - C. Hormonal control
 - D. Neural control**
 - E. None of the choices are correct

Bloom's Level: 3. Apply
Section 1.07
Topic: Nervous System

32. Heart rate is affected by the release of epinephrine by the adrenal medulla into the bloodstream. This is an example of
- A. Endocrine control**
 - B. Exocrine control
 - C. Paracrine control
 - D. Direct neural control
 - E. None of the choices are correct

Bloom's Level: 3. Apply
Section 1.07
Topic: General

33. Which of the following is/are functions of the human nervous system?
- A. Receiving, storing and processing information on the internal and external environments
 - B. Bringing about changes in physiology and/or behavior to ensure optimal functions of homeostatic mechanisms
 - C. Secretion of hormones
 - D. Both receiving, storing and processing information on the internal and external environments and bringing about changes in physiology and/or behavior to ensure optimal functions of homeostatic mechanisms are correct
 - E. All of the choices are correct**

Bloom's Level: 1. Remember
Section 1.02
Topic: Nervous System

34. Which of the following statements applies to autocrine regulation?
- A. Chemical regulators are released directly into blood vessels
 - B. Chemical regulators released by cells affect the functional status of different kinds of cells in the vicinity of the secretory cell
 - C. Chemical regulators affect the same cell that produced it**
 - D. Chemical regulators reach their site of action through a duct
 - E. Chemical regulators are continuously released in constant amounts by the cell

Bloom's Level: 1. Remember
Section 1.07
Topic: General

35. The tall slender body shape that helps to dissipate heat in people native to equatorial regions is an example of
- A. An adaptation**
 - B. Acclimatization
 - C. Set point resetting
 - D. Homeostasis
 - E. Phase-shift

Bloom's Level: 3. Apply
Section 1.08
Topic: Evolution

36. After spending several days at a high altitude, where oxygen pressure is low, a person will begin to produce more red blood cells, which enhances the ability of his/her blood to carry oxygen to the tissues. Which of the following control mechanisms best describes this response?
- A. Developmental acclimatization
 - B. Positive feedback
 - C. Physiological acclimatization**
 - D. Feedforward regulation
 - E. None of the choices are correct

Bloom's Level: 3. Apply
Section 1.08
Topic: General

37. When a person is exposed to an environmental stress for a prolonged period of time, the person's ability to adapt to that stress is enhanced. This is an example of

- A. Negative feedback
- B. Positive feedback
- C. Physiological acclimatization**
- D. Developmental acclimatization
- E. Both negative feedback and developmental acclimatization

Bloom's Level: 1. Remember
Section 1.08
Topic: General

38. When an adult athlete trains strenuously at high altitude (e.g., in the Rocky Mountains) for a period of months, he/she is likely to experience

- A. An increase in the concentration of oxygen-carrying cells in blood, which is an example of physiological acclimatization**
- B. Development of a large, barrel-shaped chest, which is an example of developmental acclimatization
- C. An increase in the concentration of oxygen-carrying cells in blood, which is an example of physiological acclimatization, first followed by development of a large, barrel-shaped chest, which is an example of developmental acclimatization
- D. First, development of a large, barrel-shaped chest, which is an example of developmental acclimatization, first followed by an increase in the concentration of oxygen-carrying cells in blood, which is an example of physiological acclimatization
- E. First, an increase in the concentration of oxygen-carrying cells in blood, which is an example of physiological acclimatization and development of a large, barrel-shaped chest, which is an example of developmental acclimatization together

Bloom's Level: 3. Apply
Section 1.08
Topic: General

39. Which of the following statements about biological rhythms is correct?

- A. Menstrual cycles are examples of circadian rhythms
- B. Circadian rhythms are driven by pacemakers entrained by light and dark cycles
- C. Jet lag is a result of desynchronization of the internal clock from external time cues
- D. Both menstrual cycles are examples of circadian rhythms and circadian rhythms are driven by pacemakers entrained by light and dark cycles are correct
- E.** Both circadian rhythms are driven by pacemakers entrained by light and dark cycles and jet lag is a result of desynchronization of the internal clock from external time cues are correct

Bloom's Level: 1. Remember
Section 1.08
Topic: General

40. Circadian rhythms

- A. Are entrained by light: dark cycles
- B. Allow homeostatic set points to be changed appropriately for the overall physiological circumstance (e.g., being awake or asleep)
- C. Are important for helping to avoid jet lag
- D.** Both are entrained by light: dark cycles and allow homeostatic set points to be changed appropriately for the overall physiological circumstance (e.g., being awake or asleep) are correct
- E. Both allow homeostatic set points to be changed appropriately for the overall physiological circumstance (e.g., being awake or asleep) and are important for helping to avoid jet lag are correct

Bloom's Level: 1. Remember
Section 1.08
Topic: General

41. The internal pacemaker that sets biological rhythms

- A.** Is located in the brain
- B. Is located in the heart
- C. Does not function in the absence of light or other environmental cues
- D. Both is located in the brain and does not function in the absence of light or other environmental cues are correct
- E. None of the choices are correct

Bloom's Level: 1. Remember
Section 1.08
Topic: General

42. A protein is found in blood that is produced by the pancreas and acts on the liver. That protein is probably

- A.** A hormone
- B. An autocrine
- C. A paracrine
- D. A neurotransmitter
- E. None of the choices are correct

Bloom's Level: 3. Apply
Section 1.07
Topic: General

43. The total body balance of a chemical substance depends upon

- A. The net gain of a substance
- B. The net loss of a substance
- C. The size of the chemical pool in the body
- D.** The net gain of a substance and the net loss of a substance
- E. All of the choices are correct

Bloom's Level: 1. Remember
Section 1.08
Topic: General

44. A burn patient ingests 100 grams of protein per day but is losing 110 grams of protein per day by various means. This patient is in

- A. Positive protein balance
- B.** Negative protein balance
- C. Stable balance
- D. A state that can't be determined

Bloom's Level: 3. Apply
Section 1.08
Topic: General

45. Increasing sodium intake by eating a bag of potato chips without increasing sodium excretion would result in a
- A.** Positive sodium balance
 - B. Negative sodium balance
 - C. Stable sodium balance
 - D. It can't be determined without knowing the size of the sodium pool

Bloom's Level: 2. Understand
Section 1.08
Topic: General

46. According to the balance concept of chemical homeostasis,
- A. Negative balance results when net gain of a substance exceeds net loss from the body
 - B. Negative balance results when net loss of a substance exceeds net gain to the body
 - C. Stable balance results when net gain of a substance equals net loss from the body
 - D. Both negative balance results when net gain of a substance exceeds net loss from the body and stable balance results when net gain of a substance equals net loss from the body are correct
 - E.** Both negative balance results when net loss of a substance exceeds net gain to the body and stable balance results when net gain of a substance equals net loss from the body are correct

Bloom's Level: 1. Remember
Section 1.08
Topic: General

True / False Questions

47. Differentiation is necessary before a cell can exchange material with its environment.
FALSE

Bloom's Level: 1. Remember
Section 1.02
Topic: Cells

48. The number of distinct cell types in the human body is about twenty.

FALSE

*Bloom's Level: 1. Remember
Section 1.02
Topic: Cells*

49. One function of epithelial cells is to form selective barriers regulating exchange of materials across them.

TRUE

*Bloom's Level: 1. Remember
Section 1.02
Topic: Cells*

50. Organs are generally composed of only one kind of tissue.

FALSE

*Bloom's Level: 1. Remember
Section 1.02
Topic: Histology*

51. An important function of organ systems is to regulate the external environment of the body.

FALSE

*Bloom's Level: 1. Remember
Section 1.02
Topic: General*

52. The respiratory system is primarily responsible for transporting blood to the body's tissues.

FALSE

*Bloom's Level: 1. Remember
Section 1.02
Topic: Respiratory System*

53. Homeostasis refers to the relative constancy of the external environment.

FALSE

Bloom's Level: 1. Remember

Section 1.04

Topic: General

54. The composition of the fluid bathing the cells of the body is essentially the same as that within the cells.

FALSE

Bloom's Level: 1. Remember

Section 1.03

Topic: Cells

55. The internal environment consists of interstitial fluid and blood plasma.

TRUE

Bloom's Level: 1. Remember

Section 1.04

Topic: General

56. Homeostatic control systems and acclimatization are examples of biological adaptations.

TRUE

Bloom's Level: 1. Remember

Section 1.08

Topic: General

57. A person who is acclimated to a hot environment will begin to react physiologically to a decreased environmental temperature faster than a person who is not.

FALSE

Bloom's Level: 1. Remember

Section 1.08

Topic: General

58. When loss of a substance from the body exceeds gain, the body is said to be in positive balance for that substance.

FALSE

Bloom's Level: 1. Remember

Section 1.08

Topic: General

Fill in the Blank Questions

59. The internal environment consists of the _____ fluid compartment of the body.

extracellular

Bloom's Level: 1. Remember

Section 1.04

Topic: General

60. Local homeostatic responses differ from reflex arcs in that the former lack _____.

afferent and efferent pathways

Bloom's Level: 2. Understand

Section 1.06

Topic: General

61. _____ is a chemical released by axon terminals into a synaptic cleft.

Neurotransmitter

Bloom's Level: 1. Remember

Section 1.07

Topic: Nervous System

62. _____ is a chemical released by axon terminals into the bloodstream.

Neurohormone

Bloom's Level: 1. Remember

Section 1.07

Topic: Endocrine System

63. _____ is the regulation of cellular activity by messengers from nearby cells.

Paracrine

Bloom's Level: 1. Remember

Section 1.07

Topic: Cells

64. _____ is the regulation of cellular activity by chemical mediators produced by that cell.

Autocrine

Bloom's Level: 1. Remember

Section 1.07

Topic: Cells