Test Bank
to accompany
The Mind's Machine, Third Edition
Watson • Breedlove

Chapter 2: Cells and Structures: The Anatomy of the Nervous System

TEST BANK QUESTIONS

Multiple Choice

1. Dendrites are
a. a type of glial cell.
b. the input zone of a nerve cell.
c. the conduction zone of a nerve cell.
d. small interneurons.
Answer: b
Textbook Reference: The Nervous System Contains Several Types of Cells
Learning Objective: 2.I.1 Name and describe the general function of the four main parts of a neuron.
Bloom's Level: 2. Understanding

2. The output zone of the neuron is the
a. axon terminal.
b. dendrites.
c. axon.
d. soma.
Answer: a
Textbook Reference: The Nervous System Contains Several Types of Cells
Learning Objective: 2.I.1 Name and describe the general function of the four main parts of a neuron.
Bloom's Level: 2. Understanding

3. Which pathway represents the most common sequence of information flow through a neuron?
a. Cell body → axon → axon hillock → axon terminal
b. Dendrite → cell body → axon → axon hillock
c. Dendrite → cell body → axon hillock → axon
d. Dendrite → axon terminal → cell body → axon
Answer: c
Textbook Reference: The Nervous System Contains Several Types of Cells
Learning Objective: 2.I.1 Name and describe the general function of the four main parts of a neuron.

Bloom's Level: 3. Applying

4. The gaps between segments of myelin are known as
a. synaptic clefts.
b. neural nodes.
c. nodes of Ranvier.
d. neuromuscular junctions.
Answer: c
Textbook Reference: The Nervous System Contains Several Types of Cells
Learning Objective: 2.I.1 Name and describe the general function of the four main parts of a neuron.
Bloom's Level: 1. Remembering

5. Which neuronal structure is responsible for integrating information arriving from other neurons, leading to an electrical impulse that stimulates neurotransmitter release?
a. Dendrites
b. Axon hillock
c. Dendritic spine
d. Axon terminal
Answer: b
Textbook Reference: The Nervous System Contains Several Types of Cells
Learning Objective: 2.I.1 Name and describe the general function of the four main parts of a neuron.
Bloom's Level: 2. Understanding

6. Which statement about neurons is true?
a. All neurons have the same four functional zones.
b. Multipolar neurons can have many dendrites and many axons.
c. Some interneurons lack a nucleus.
d. Unipolar neurons are especially common in the visual system.
Answer: a
Textbook Reference: The Nervous System Contains Several Types of Cells
Learning Objective: 2.I.1 Name and describe the general function of the four main parts of a neuron.
Bloom's Level: 3. Applying

7. Preventing the formation of which structure would *decrease* the surface area of the postsynaptic membrane?
a. Synaptic vesicles
b. Dendritic spines
c. Myelin sheath
d. Axon hillock
Answer: b
Textbook Reference: The Nervous System Contains Several Types of Cells
Learning Objective: 2.I.1 Name and describe the general function of the four main parts of a neuron.

Bloom's Level: 4. Analyzing

8. Neurons receive information from other neurons at the _____ zone through cellular extensions called _____.
a. integration; hillock
b. input; dendrites
c. conduction; axon
d. output; terminal
Answer: b
Textbook Reference: The Nervous System Contains Several Types of Cells
Learning Objective: 2.I.1 Name and describe the general function of the four main parts of a neuron.
Bloom's Level: 2. Understanding

9. Axon terminals typically form synapses on the cell body or dendrites of a _____ neuron.
a. postsynaptic
b. presynaptic
c. glial
d. Nissl
Answer: a
Textbook Reference: The Nervous System Contains Several Types of Cells
Bloom's Level: 4. Analyzing
Learning Objective: 2.I.1 Name and describe the general function of the four main parts of a neuron.

10. Axon terminals
a. are found within synaptic vesicles.
b. are protrusions occurring along the length of dendrites.
c. synapse onto other cells.
d. are specialized synapses occurring on muscles.
Answer: c
Textbook Reference: The Nervous System Contains Several Types of Cells
Learning Objective: 2.I.1 Name and describe the general function of the four main parts of a neuron.
Bloom's Level: 2. Understanding

11. In which part of the neuron are synaptic vesicles found?
a. Cell body
b. Dendritic spines
c. Axon hillock
d. Axon terminal
Answer: d
Textbook Reference: The Nervous System Contains Several Types of Cells
Learning Objective: 2.I.1 Name and describe the general function of the four main parts of a neuron.

Bloom's Level: 1. Remembering

12. The vast majority of neurons in the brain are classified as
a. bipolar neurons.
b. motoneurons.
c. sensory neurons.
d. interneurons.
Answer: d
Textbook Reference: The Nervous System Contains Several Types of Cells
Learning Objective: 2.I.2 Classify neurons according to both structure and function.
Bloom's Level: 1. Remembering

13. Which of the following is in the correct order of size, from largest to smallest?
a. A synaptic cleft; an axon terminal; the diameter of an ion channel; the thickness of the neuronal membrane
b. The thickness of the neuronal membrane; a synaptic cleft; an axon terminal; the diameter of an ion channel
c. The diameter of an ion channel; the thickness of the neuronal membrane; an axon terminal; a synaptic cleft
d. An axon terminal; a synaptic cleft; the thickness of the neuronal membrane; the diameter of an ion channel
Answer: d
Textbook Reference: The Nervous System Contains Several Types of Cells
Learning Objective: 2.I.3 Outline the basic structure of a synapse and the steps in neurotransmission.
Bloom's Level: 5. Evaluating

14. Synaptic vesicles
a. are found in the postsynaptic membrane.
b. capture and react to neurotransmitters such as dopamine and glutamate.
c. are released by dendrites in response to a neural impulse.
d. eventually fuse with the neural membrane.
Answer: d
Textbook Reference: The Nervous System Contains Several Types of Cells
Learning Objective: 2.I.3 Outline the basic structure of a synapse and the steps in neurotransmission.
Bloom's Level: 4. Analyzing

15. The major function of Schwann cells is
a. transmission of nutrients to neurons.
b. myelination of peripheral nerve fibers.
c. scavenging of cellular debris.
d. myelination of axons in the brain.
Answer: b
Textbook Reference: The Nervous System Contains Several Types of Cells
Learning Objective: 2.I.4 Describe the four principal types of glial cells.

Bloom's Level: 2. Understanding

16. Which glial cells interact with blood vessels?
a. Oligodendrocytes
b. Astrocytes
c. Microglial cells
d. Stellate cells
Answer: b
Textbook Reference: The Nervous System Contains Several Types of Cells
Learning Objective: 2.I.4 Describe the four principal types of glial cells.
Bloom's Level: 2. Understanding

17. Large nerve cell bodies are about _____ in diameter.
a. 10 μm
b. 10 mm
c. 100 nm
d. 1 cm
Answer: c
Textbook Reference: The Nervous System Contains Several Types of Cells
Learning Objective: Not aligned
Bloom's Level: 1. Remembering

18. Which type of stain is used to reveal the entire neuron with all its processes?
a. Nissl
b. Golgi
c. In situ hybridization
d. Anterograde labeling
Answer: b
Textbook Reference: The Nervous System Contains Several Types of Cells
Learning Objective: Not aligned
Bloom's Level: 1. Remembering

19. Which imaging technique uses a label that is taken up by axon terminals and then transported back to the cell body?
a. Retrograde labeling
b. In situ hybridization
c. Immunocytochemistry (ICC)
d. Nissl stain
Answer: a
Textbook Reference: The Nervous System Contains Several Types of Cells
Learning Objective: Not aligned
Bloom's Level: 1. Remembering

20. Horseradish peroxidase (HRP) is a molecule that can be taken up by axon terminals and then carried back to the cell body for visualization of the neuron. Dysfunction in which cellular process would prevent cell labeling by HRP?

a. Anterograde transport
b. Retrograde transport
c. Dendritic transport
d. In situ hybridization
Answer: b
Textbook Reference: The Nervous System Contains Several Types of Cells
Learning Objective: Not aligned
Bloom's Level: 4. Analyzing

21. A researcher interested in determining which brain regions are active when an animal subject performs a particular behavior will most likely make use of which procedure?
a. Nissl stains
b. Golgi stains
c. Anterograde labeling
d. Immunocytochemistry (ICC)
Answer: d
Textbook Reference: The Nervous System Contains Several Types of Cells
Learning Objective: Not aligned
Bloom's Level: 2. Understanding

22. Substances are conveyed from the cell body of the neuron to the distant reaches of the axon through the process of
a. retrograde transport.
b. neuroplasticity.
c. anterograde transport.
d. myelination.
Answer: c
Textbook Reference: The Nervous System Contains Several Types of Cells
Learning Objective: Not aligned
Bloom's Level: 2. Understanding

23. The human brain contains nearly
a. 80–90 billion circuits.
b. 80–90 billion neurons.
c. 80–90 billion synapses.
d. 80–90 million glial cells.
Answer: b
Textbook Reference: The Nervous System Contains Several Types of Cells
Learning Objective: Not aligned
Bloom's Level: 1. Remembering

24. The Spanish anatomist Santiago Ramón y Cajal showed that although neurons come very close together, they are not quite continuous with one another but rather are structurally and functionally independent. This observation became part of what is known as the
a. brain doctrine.

b. theory of the nervous system.
c. cortical doctrine.
d. neuron doctrine.
Answer: d
Textbook Reference: The Nervous System Contains Several Types of Cells
Learning Objective: Not aligned
Bloom's Level: 2. Understanding

25. The neuron doctrine
a. proposed that neurons are not functionally independent.
b. proposed the existence of synaptic contacts between neurons.
c. was refuted by the great neuroanatomist Ramón y Cajal.
d. is not supported by modern neuroimaging techniques.
Answer: b
Textbook Reference: The Nervous System Contains Several Types of Cells
Learning Objective: Not aligned
Bloom's Level: 3. Applying

26. The peripheral nervous system has _____ component(s).
a. one
b. two
c. three
d. four
Answer: b
Textbook Reference: The Nervous System Extends throughout the Body
Learning Objective: 2.II.1 Explain what a nerve is, and distinguish between somatic and autonomic nerves.
Bloom's Level: 1. Remembering

27. The somatic nervous system includes the
a. autonomic nervous system and the spinal nerves.
b. peripheral nervous system.
c. sensory pathways.
d. cranial nerves and the spinal nerves.
Answer: d
Textbook Reference: The Nervous System Extends throughout the Body
Learning Objective: 2.II.1 Explain what a nerve is, and distinguish between somatic and autonomic nerves.
Bloom's Level: 3. Applying

28. Which cranial nerve is *not* involved in the control of eye movements?
a. Oculomotor
b. Trigeminal
c. Trochlear
d. Abducens
Answer: b

Textbook Reference: The Nervous System Extends throughout the Body
Learning Objective: 2.II.2 Identify the cranial and spinal nerves by name and function.
Bloom's Level: 2. Understanding

29. What would be the consequence for a patient with damage to the eighth cranial nerve?
a. Blindness
b. An inability to speak
c. Impaired balance
d. In inability to chew
Answer: c
Textbook Reference: The Nervous System Extends throughout the Body
Learning Objective: 2.II.2 Identify the cranial and spinal nerves by name and function.
Bloom's Level: 3. Applying

30. Axons of the sympathetic nervous system exit the central nervous system from the
a. thoracic and lumbar regions spinal cord.
b. sympathetic chain.
c. cervical and sacral regions of the spinal cord.
d. cranial nerves.
Answer: a
Textbook Reference: The Nervous System Extends throughout the Body
Learning Objective: 2.II.2 Identify the cranial and spinal nerves by name and function.
Bloom's Level: 3. Applying

31. The efferent nerves of the autonomic nervous system (ANS) go to
a. the cortex.
b. the cerebellum.
c. voluntary muscles.
d. various organs of the body.
Answer: d
Textbook Reference: The Nervous System Extends throughout the Body
Learning Objective: 2.II.2 Identify the cranial and spinal nerves by name and function.
Bloom's Level: 4. Analyzing

32. Damage to efferent cranial nerves would result in _____ impairments; damage to afferent cranial nerves would result in _____ impairments.
a. sensory; motor
b. motor; sensory
c. sympathetic; parasympathetic
d. parasympathetic; sympathetic
Answer: b
Textbook Reference: The Nervous System Extends throughout the Body
Learning Objective: 2.II.2 Identify the cranial and spinal nerves by name and function.
Bloom's Level: 3. Applying

33. The major divisions of the spinal cord are cervical, thoracic, _____, and sacral.
a. cranial
b. ventral
c. trigeminal
d. lumbar
Answer: d
Textbook Reference: The Nervous System Extends throughout the Body
Learning Objective: 2.II.2 Identify the cranial and spinal nerves by name and function.
Bloom's Level: 1. Remembering

34. The reason that sympathetic and parasympathetic nervous systems have different effects on the organs is because
a. they are controlled by different brain regions.
b. they innervate different organ systems.
c. the sympathetic nerves travel a longer distance to reach their ganglia compared to parasympathetic nerves.
d. they release different neurotransmitters.
Answer: d
Textbook Reference: The Nervous System Extends throughout the Body
Learning Objective: 2.II.3 Describe the general functions of the two divisions of the autonomic nervous system.
Bloom's Level: 3. Applying

35. Which of the following is *not* a consequence of parasympathetic activation?
a. Increased salivation
b. Increased heart rate
c. Dilation of blood vessels in the skin
d. Increased digestion
Answer: b
Textbook Reference: The Nervous System Extends throughout the Body
Learning Objective: 2.II.3 Describe the general functions of the two divisions of the autonomic nervous system.
Bloom's Level: 2. Understanding

36. An individual finds themselves in a situation that requires a fight-or-flight response, leading to an accelerated heartrate. Which neurotransmitter is directly responsible for the increased cardiac muscle activity?
a. norepinephrine
b. acetylcholine
c. dopamine
d. glutamate
Answer: a
Textbook Reference: The Nervous System Extends throughout the Body
Learning Objective: 2.II.3 Describe the general functions of the two divisions of the autonomic nervous system.
Bloom's Level: 3. Applying

37. The _____ lobe is the most anterior portion of the cerebral cortex.
a. frontal
b. temporal
c. parietal
d. occipital
Answer: a
Textbook Reference: The Nervous System Extends throughout the Body
Learning Objective: 2.II.4 Name the main anatomical structures that make up the two cerebral hemispheres.
Bloom's Level: 1. Remembering

38. The ridges of tissue on the convoluted surface of the cortex are called
a. gyri.
b. sulci.
c. nuclei.
d. ganglia.
Answer: a
Textbook Reference: The Nervous System Extends throughout the Body
Learning Objective: 2.II.4 Name the main anatomical structures that make up the two cerebral hemispheres.
Bloom's Level: 1. Remembering

39. The central sulcus divides the _____ and _____ lobes.
a. frontal; parietal
b. parietal; occipital
c. frontal; temporal
d. temporal; occipital
Answer: a
Textbook Reference: The Nervous System Extends throughout the Body
Learning Objective: 2.II.4 Name the main anatomical structures that make up the two cerebral hemispheres.
Bloom's Level: 2. Understanding

40. Which region of the cortex is crucial for motor control?
a. Postcentral gyrus
b. Parietal lobe
c. Precentral gyrus
d. Prefrontal cortex
Answer: c
Textbook Reference: The Nervous System Extends throughout the Body
Learning Objective: 2.II.4 Name the main anatomical structures that make up the two cerebral hemispheres.
Bloom's Level: 1. Remembering

41. The _____ is the main source of communication between the left and the right hemispheres.
a. cortex
b. basal ganglia
c. cerebellum
d. corpus callosum
Answer: d
Textbook Reference: The Nervous System Extends throughout the Body
Learning Objective: 2.II.4 Name the main anatomical structures that make up the two cerebral hemispheres.
Bloom's Level: 3. Applying

42. Which statement about white and gray matter is true?
a. White matter is like insulation.
b. Gray matter is like a chimney.
c. White and gray matter are similar.
d. Gray matter is not found in the brain.
Answer: a
Textbook Reference: The Nervous System Extends throughout the Body
Learning Objective: 2.II.5 Explain the difference between gray matter and white matter, with examples.
Bloom's Level: 5. Evaluating

43. Which statement regarding the spinal cord is true?
a. The spinal cord does not have meningeal support.
b. Gray matter is in the center of the spinal cord, and white matter surrounds it.
c. Dorsal roots convey motor information, and ventral roots convey sensory information.
d. Sacral cross sections are larger than thoracic cross sections.
Answer: b
Learning Objective: 2.II.5 Explain the difference between gray matter and white matter, with examples.
Textbook Reference: The Nervous System Extends throughout the Body
Bloom's Level: 4. Analyzing

44. In the developing fetus, the telencephalon becomes the
a. cortex.
b. midbrain.
c. hypothalamus.
d. spinal cord.
Answer: a
Textbook Reference: The Nervous System Extends throughout the Body
Learning Objective: 2.II.6 Describe the fetal development of the brain.
Bloom's Level: 1. Remembering

45. The five main divisions of the human brain are visible about _____ days after conception.

a. 5
b. 20
c. 35
d. 50
Answer: d
Textbook Reference: The Nervous System Extends throughout the Body
Learning Objective: 2.II.6 Describe the fetal development of the brain.
Bloom's Level: 1. Remembering

46. The diencephalon become(s) the
a. medulla and pons.
b. midbrain and forebrain.
c. thalamus and hypothalamus.
d. cerebral hemispheres.
Answer: c
Textbook Reference: The Nervous System Extends throughout the Body
Learning Objective: 2.II.6 Describe the fetal development of the brain.
Bloom's Level: 1. Remembering

47. A cut in the _____ plane would sever all the tracts that connect the left and right cerebral hemispheres.
a. horizontal
b. axial
c. mid-sagittal
d. coronal
Answer: c
Textbook Reference: The Nervous System Extends throughout the Body
Learning Objective: Not aligned
Bloom's Level: 3. Applying

48. The plane that divides the body into left and right halves is called the _____ plane.
a. sagittal
b. frontal
c. coronal
d. horizontal
Answer: a
Textbook Reference: The Nervous System Extends throughout the Body
Learning Objective: Not aligned
Bloom's Level: 1. Remembering

49. In terms of its position on your body, your nose is _____ and _____.
a. superior; dorsal
b. caudal; anterior
c. medial; anterior
d. ventral; dorsal
Answer: c

Textbook Reference: The Nervous System Extends throughout the Body
Learning Objective: Not aligned
Bloom's Level: 3. Applying

50. In terms of its position on his body, the top of a dog's head is
a. proximal.
b. posterior.
c. caudal.
d. dorsal.
Answer: d
Textbook Reference: The Nervous System Extends throughout the Body
Learning Objective: Not aligned
Bloom's Level: 3. Applying

51. A group of axons traveling together within the brain is called a
a. tract.
b. nerve.
c. nucleus.
d. ganglion.
Answer: a
Textbook Reference: The Nervous System Extends throughout the Body
Learning Objective: Not aligned
Bloom's Level: 1. Remembering

52. In humans, the plane that passes through the ears and divides the top of the brain from the rest of the brain is called the _____ plane.
a. sagittal
b. coronal
c. horizontal
d. caudal
Answer: c
Textbook Reference: The Nervous System Extends throughout the Body
Learning Objective: Not aligned
Bloom's Level: 3. Applying

53. How many distinct layers are observed in the human cortex?
a. One
b. Three
c. Six
d. Twelve
Answer: c
Textbook Reference: The Brain Is Described in Terms of Both Structure and Function
Learning Objective: 2.III.1 Describe the cellular organization of the cortex.
Bloom's Level: 1. Remembering

54. Which statement about cortical columns is true?

a. They are found only in the basal ganglia.
b. They extend through the entire thickness of the cortex.
c. They are made up primarily of gray matter.
d. Within each column, most of the synaptic interconnections of neurons are horizontal.
Answer: b
Textbook Reference: The Brain Is Described in Terms of Both Structure and Function
Learning Objective: 2.III.1 Describe the cellular organization of the cortex.
Bloom's Level: 5. Evaluating

55. The most prominent type of neuron in the cerebral cortex, the _____ cell, is found mostly in layer III or layer _____.
a. pyramidal; I
b. glial; II
c. interneuron; IV
d. pyramidal; V
Answer: d
Textbook Reference: The Brain Is Described in Terms of Both Structure and Function
Learning Objective: 2.III.1 Describe the cellular organization of the cortex.
Bloom's Level: 2. Understanding

56. The basal ganglia consists primarily of the caudate nucleus, globus palludis, and
a. thalamus.
b. septal nuclei.
c. putamen.
d. fornix
Answer: c
Textbook Reference: The Brain Is Described in Terms of Both Structure and Function
Learning Objective: 2.III.2 Distinguish between the basal ganglia, and the limbic system, and state some of the behavioral functions of each.
Bloom's Level: 1. Remembering

57. Damage to the cingulate gyrus would most likely impair
a. attention.
b. pain perception.
c. motor control.
d. vision.
Answer: a
Textbook Reference: The Brain Is Described in Terms of Both Structure and Function
Learning Objective: 2.III.2 Distinguish between the basal ganglia, and the limbic system, and state some of the behavioral functions of each.
Bloom's Level: 3. Applying

58. The _____ is particularly implicated in odor perception.
a. hypothalamus
b. fornix
c. amygdala

d. cerebellum
Answer: c
Textbook Reference: The Brain Is Described in Terms of Both Structure and Function
Learning Objective: 2.III.2 Distinguish between the basal ganglia, and the limbic system, and state some of the behavioral functions of each.
Bloom's Level: 1. Remembering

59. Which structure is part of the midbrain?
a. Pons
b. Amygdala
c. Olfactory bulbs
d. Tegmentum
Answer: d
Textbook Reference: The Brain Is Described in Terms of Both Structure and Function
Learning Objective: 2.III.3 Name the major divisions of the brainstem and midbrain, and identify major functions performed by each.
Bloom's Level: 1. Remembering

60. The brainstem consists of the
a. spinal cord, cerebellum, and medulla.
b. spinal cord, cerebellum, and pons.
c. midbrain, cerebellum, and spinal cord.
d. midbrain, pons, and medulla.
Answer: d
Textbook Reference: The Brain Is Described in Terms of Both Structure and Function
Learning Objective: 2.III.3 Name the major divisions of the brainstem and midbrain, and identify major functions performed by each.
Bloom's Level: 1. Remembering

61. Which structure does *not* contain any cell bodies located in the reticular formation?
a. Telencephalon
b. Midbrain
c. Hindbrain
d. Medulla
Answer: a
Textbook Reference: The Brain Is Described in Terms of Both Structure and Function
Learning Objective: 2.III.3 Name the major divisions of the brainstem and midbrain, and identify major functions performed by each.
Bloom's Level: 3. Applying

62. Within the midbrain, auditory information is received by the _____ and visual information is received by the _____.
a. inferior colliculi; superior colliculi
b. caudate nucleus; putamen
c. tectum; tegmentum
d. periaqueductal gray; reticular formation

Answer: a
Textbook Reference: The Brain Is Described in Terms of Both Structure and Function
Learning Objective: 2.III.3 Name the major divisions of the brainstem and midbrain, and identify major functions performed by each.
Bloom's Level: 2. Understanding

63. Almost all incoming sensory information passes through the _____, which sends the information on to the overlying cortex.
a. hypothalamus
b. caudate nucleus
c. thalamus
d. hippocampus
Answer: c
Textbook Reference: The Brain Is Described in Terms of Both Structure and Function
Learning Objective: Not aligned
Bloom's Level: 1. Remembering

64. The ventricular system contains
a. the blood-brain barrier.
b. blood.
c. cerebrospinal fluid.
d. the meninges.
Answer: c
Textbook Reference: Specialized Support Systems Protect and Nourish the Brain
Learning Objective: 2.III.4 Name and describe the meninges and ventricular system, and their clinical significance.
Bloom's Level: 2. Understanding

65. The specialized vascular tissue that produces the cerebrospinal fluid is called the
a. tectum.
b. meninges.
c. corpus callosum.
d. choroid plexus.
Answer: d
Textbook Reference: Specialized Support Systems Protect and Nourish the Brain
Learning Objective: 2.III.4 Name and describe the meninges and ventricular system, and their clinical significance.
Bloom's Level: 2. Understanding

66. Which statement best describes the blood-brain barrier?
a. It is a part of the immune system that facilitates the release of antibodies to protect the brain from infectious agents.
b. It is a property of the walls of brain capillaries that prevents large molecules from entering the brain.
c. It is a property of the blood vessels of the brain that promotes the diffusion of nutrients into the tissue of the brain.

d. It is a property of neurons that prevents them from accidentally releasing their neurotransmitters into the blood circulation.
Answer: b
Textbook Reference: Specialized Support Systems Protect and Nourish the Brain
Learning Objective: 2.III.5 Give an outline of the vascular supply of the brain, and note the signs and symptoms of stroke.
Bloom's Level: 4. Analyzing

67. In its common usage, the term "stroke" refers to
a. brain damage caused by a reduction or blockage of blood flow to the brain.
b. brain damage caused by external toxic agents such as drugs.
c. brain damage due to head trauma.
d. any process that causes a sudden intellectual deterioration.
Answer: a
Textbook Reference: Specialized Support Systems Protect and Nourish the Brain
Learning Objective: 2.III.5 Give an outline of the vascular supply of the brain, and note the signs and symptoms of stroke.
Bloom's Level: 2. Understanding

68. Which of the following is/are used to make CT scan images?
a. X-rays
b. Magnetism
c. Radio-frequency emissions
d. Radioactive particle emissions
Answer: a
Textbook Reference: Brain-Imaging Techniques Reveal the Structure and Function of the Human Brain
Learning Objective: 2.III.6 Describe the major brain imaging technologies, highlighting their differing uses and limitations, and discuss the importance of the connectome.
Bloom's Level: 2. Understanding

69. The physiological activity of the brain can be visualized using
a. positron emission tomography (PET).
b. computerized axial tomography (CT).
c. magnetic resonance imaging (MRI).
d. electron microscopy.
Answer: a
Textbook Reference: Brain-Imaging Techniques Reveal the Structure and Function of the Human Brain
Learning Objective: 2.III.6 Describe the major brain imaging technologies, highlighting their differing uses and limitations, and discuss the importance of the connectome.
Bloom's Level: 3. Applying

70. Which imaging technique is *not* used for studies of brain activity?
a. fMRI scan
b. MRI scan

c. Magnetoencephalography
d. PET scan
Answer: b
Textbook Reference: Brain-Imaging Techniques Reveal the Structure and Function of the Human Brain
Learning Objective: 2.III.6 Describe the major brain imaging technologies, highlighting their differing uses and limitations, and discuss the importance of the connectome.
Bloom's Level: 2. Understanding

71. A brain tumor is best imaged by a(n) _____ scan.
a. fMRI
b. PET
c. CT scan
d. TMS
Answer: c
Textbook Reference: Brain-Imaging Techniques Reveal the Structure and Function of the Human Brain
Learning Objective: 2.III.6 Describe the major brain imaging technologies, highlighting their differing uses and limitations, and discuss the importance of the connectome.
Bloom's Level: 3. Applying

72. Subtractive analysis is useful for
a. detecting brain tumors.
b. highly accurate images of brain structure.
c. single trial experiments that connect behaviors to brain activity.
d. studies that average brain activity over multiple subjects to gather information about the neural basis of behavior.
Answer: d
Textbook Reference: Brain-Imaging Techniques Reveal the Structure and Function of the Human Brain
Learning Objective: 2.III.6 Describe the major brain imaging technologies, highlighting their differing uses and limitations, and discuss the importance of the connectome.
Bloom's Level: 3. Applying

73. MRI makes use of _____ waves and _____ fields to form images of the structure of the living brain.
a. sound; magnetic
b. light; electric
c. radio; magnetic
d. gamma; electric
Answer: c
Textbook Reference: Brain-Imaging Techniques Reveal the Structure and Function of the Human Brain
Learning Objective: 2.III.6 Describe the major brain imaging technologies, highlighting their differing uses and limitations, and discuss the importance of the connectome.
Bloom's Level: 3. Applying

Essay/Discussion

74. Draw and describe the main structural components and the four functional components of a typical neuron.
Answer: Answers and discussion will vary.
Textbook Reference: The Nervous System Contains Several Types of Cells
Learning Objective: 2.I.1 Name and describe the general function of the four main parts of a neuron.
Bloom's Level: 3. Applying

75. Give an account of the ways in which neurons may be categorized. What are the various categories, and what are some examples for each category?
Answer: Answers and discussion will vary.
Textbook Reference: The Nervous System Contains Several Types of Cells
Learning Objective: 2.I.2 Classify neurons according to both structure and function.
Bloom's Level: 2. Understanding

76. Draw and describe a typical synapse, then outline the sequence of events that occurs when a neural signal arrives.
Answer: Answers and discussion will vary.
Textbook Reference: The Nervous System Contains Several Types of Cells
Learning Objective: 2.I.3 Outline the basic structure of a synapse and the steps in neurotransmission.
Bloom's Level: 3. Applying

77. What are glial cells? Name the four types of glial cells and describe a function for each one.
Answer: Answers and discussion will vary.
Textbook Reference: The Nervous System Contains Several Types of Cells
Learning Objective: 2.I.4 Describe the four principal types of glial cells.
Bloom's Level: 1. Remembering

78. Give a full description of the physical and functional layout of the spinal cord, including the segmentation and sensory/motor roots.
Answer: Answers and discussion will vary.
Textbook Reference: The Nervous System Extends throughout the Body
Learning Objective: 2.II.2 Identify the cranial and spinal nerves by name and function.
Bloom's Level: 1. Remembering

79. Name the 12 pairs of cranial nerves, and briefly describe the functions performed by each one.
Answer: Answers and discussion will vary.
Textbook Reference: The Nervous System Extends throughout the Body
Learning Objective: 2.II.2 Identify the cranial and spinal nerves by name and function.
Bloom's Level: 1. Remembering

80. How does embryonic development provide a scheme for subdividing the various parts of the human brain?
Answer: Answers and discussion will vary.
Textbook Reference: The Nervous System Extends throughout the Body
Learning Objective: 2.II.6 Describe the fetal development of the brain.
Bloom's Level: 2. Understanding

81. Summarize the ways in which one brain region may be distinguished from another. In your answer, take several perspectives, including those of gross anatomy, cellular anatomy, and functional anatomy.
Answer: Answers and discussion will vary.
Textbook Reference: The Brain Is Described in Terms of Both Structure and Function
Learning Objective: 2.III.1 Describe the cellular organization of the cortex.
Bloom's Level: 3. Applying

82. Discuss the specialized support systems present in the nervous system that are designed to protect and nourish the brain.
Answer: Answers and discussion will vary.
Textbook Reference: Specialized Support Systems Protect and Nourish the Brain
Learning Objective: 2.III.4 Name and describe the meninges and ventricular system, and their clinical significance.
Bloom's Level: 3. Applying

83. Compare and contrast at least four different human brain imaging technologies through discussion of their technical bases and the types of information each provides.
Answer: Answers and discussion will vary.
Textbook Reference: Brain-Imaging Techniques Reveal the Structure and Function of the Human Brain
Learning Objective: 2.III.6 Describe the major brain imaging technologies, highlighting their differing uses and limitations, and discuss the importance of the connectome.
Bloom's Level: 4. Analyzing

Matching

84. Match each term with its correct description.
_____ a. Golgi stain
_____ b. Retrograde transport
_____ c. Nissl stain
_____ d. Radioactive glucose
_____ e. Immunocytochemistry
_____ f. Cranial nerves
_____ g. Thalamus
_____ h. Medulla
_____ i. Limbic system
_____ j. Hypothalamus

_____ k. Cerebral cortex
_____ l. Cerebellum
1. Labels intracellular proteins
2. Labels only cell bodies
3. Labels metabolically active neurons during a PET scan
4. Labels entire neuron, including all cell processes
5. Movement of material from axon terminal to cell body
6. Directs sensory information to appropriate cortical regions
7. Controls essential processes like respiration and heart rate
8. Important for motor coordination
9. Main communicator with hormonal systems of the body
10. Composed of six layers
11. Important for emotion
12. Sensory/motor systems of head, neck, and visceral organs
Answer: a. 4; b. 5; c. 2; d. 3; e. 1; f. 12; g. 6; h. 7; i. 11; j. 9; k. 10; l. 8
Textbook Reference: Brain-Imaging Techniques Reveal the Structure and Function of the Human Brain
Learning Objective: 2.III.6 Describe the major brain imaging technologies, highlighting their differing uses and limitations, and discuss the importance of the connectome.
Bloom's Level: 3. Applying

Short Answer

85. Outline the pathway of the neural signal beginning at the dendrites and ending at the synaptic cleft.
Answer: Dendrites → Cell body → Axon hillock → Axon → Axon terminals → Presynaptic membrane of axon terminals → Synaptic cleft
Textbook Reference: The Nervous System Contains Several Types of Cells
Learning Objective: 2.I.1 Name and describe the general function of the four main parts of a neuron.
Bloom's Level: 3. Applying

86. Draw and describe a myelinated axon of the peripheral nervous system. What purpose does myelin serve and what medical problem results when it is compromised?
Answer: The diagram should include the following components: axon hillock (optional), axon, Schwann cells, and nodes of Ranvier. A single Schwann cell wraps one myelin segment, and the neural signal travels faster down a myelinated axon as it jumps from node to node. Multiple sclerosis is the disease that is caused by degenerating myelin.
Textbook Reference: The Nervous System Contains Several Types of Cells
Learning Objective: 2.I.4 Describe the four principal types of glial cells.
Bloom's Level: 3. Applying

87. Name the four cranial nerves that have both afferent and efferent pathways. Then name two cranial nerves that just have afferent pathways, and two that just have efferent pathways.
Answer: Both afferent and efferent: Trigeminal, facial, glossopharyngeal, vagus.

Afferent (any two): Olfactory, optic, vestibulocochlear.
Efferent (any two): Oculomotor, trochlear, abducens, spinal accessory, hypoglossal.
Textbook Reference: The Nervous System Extends throughout the Body
Learning Objective: 2.II.2 Identify the cranial and spinal nerves by name and function.
Bloom's Level: 1. Remembering

88. What does the embryonic hindbrain develop into?
Answer: The embryonic hindbrain develops into the cerebellum, pons, and medulla.
Textbook Reference: The Nervous System Extends throughout the Body
Learning Objective: 2.II.6 Describe the fetal development of the brain.
Bloom's Level: 1. Remembering

89. What is the function of the basal ganglia, and what structures comprise this system?
Answer: The basal ganglia plays a critical role in the control of movement (see textbook Figure 2.14A). It is made up of the caudate nucleus, the putamen, and the globus pallidus.
Textbook Reference: The Brain Is Described in Terms of Both Structure and Function
Learning Objective: 2.III.2 Distinguish between the basal ganglia, and the limbic system, and state some of the behavioral functions of each.
Bloom's Level: 1. Remembering

90. What is the function of the limbic system, and what structures comprise this system?
Answer: The limbic system plays an important role in emotion and learning (see textbook Figure 2.14B). It system is made up of the amygdala, the hippocampus, the fornix, the cingulate gyrus, the mammillary bodies and the olfactory bulbs.
Textbook Reference: The Brain Is Described in Terms of Both Structure and Function
Learning Objective: 2.III.2 Distinguish between the basal ganglia, and the limbic system, and state some of the behavioral functions of each.
Bloom's Level: 1. Remembering

91. List at least four brain structures or brain systems implicated in movement.
Answer: Precentral gyrus, basal ganglia, substantia nigra, cerebellum, motoneurons, most cranial nerves with motor pathways, somatic nervous system, ventral root
Textbook Reference: The Brain Is Described in Terms of Both Structure and Function
Learning Objective: 2.III.2 Distinguish between the basal ganglia, and the limbic system, and state some of the behavioral functions of each.
Bloom's Level: 3. Applying

92. List the structures of the midbrain.
Answer: The tectum, which includes the inferior and superior colliculi, and the tegmentum, which includes the substantia nigra, the periaqueductal gray, and the some of the reticular formation.
Textbook Reference: The Brain Is Described in Terms of Both Structure and Function
Learning Objective: 2.III.3 Name the major divisions of the brainstem and midbrain, and identify major functions performed by each.
Bloom's Level: 1. Remembering

93. Use the following terms in a coherent and informative paragraph: Lateral ventricles, meninges, dura mater, pia mater, choroid plexus, and cerebrospinal fluid.
Answer: (Sample answer) The brain has a number of specialized support systems designed to protect and nourish it. One is the meninges, which is made up of three layers. The outer tough layer is called the dura mater, and the inner layer is called the pia mater. The middle layer is called the arachnoid layer. This middle layer is web-like and suspends the brain in a bath of cerebrospinal fluid (CSF). CSF is a watery liquid made in the choroid plexus. The choroid plexus lines the lateral ventricles.
Textbook Reference: Specialized Support Systems Protect and Nourish the Brain
Learning Objective: 2.III.4 Name and describe the meninges and ventricular system, and their clinical significance.
Bloom's Level: 3. Applying

94. Explain how PET scans differ from CT scans.
Answer: CT or CAT is an abbreviation for computerized axial tomography. These scans provide medium-resolution images of the living brain by sequential X-rays of the brain taken in an arc around the head. The many individual X-ray images are then mathematically combined to provide an anatomical map of the brain. They are useful for visualizing strokes, tumors, or cortical shrinkage. Positron emission tomography, or PET scans provide maps of brain activity during a behavioral task. Radioactively labeled substances such as glucose are injected into the bloodstream while a person engages in a cognitive task. As the most active brain regions selectively take up the radioactive glucose, PET provides a moment-to-moment color-coded map of brain activity.
Textbook Reference: Brain-Imaging Techniques Reveal the Structure and Function of the Human Brain
Learning Objective: 2.III.6 Describe the major brain imaging technologies, highlighting their differing uses and limitations, and discuss the importance of the connectome.
Bloom's Level: 3. Applying

ONLINE QUIZ QUESTIONS

Multiple Choice

1. The most common type of neuron in vertebrates is the _____ neuron.
a. unipolar
b. multipolar
c. bipolar
d. semipolar
Answer: b
Textbook Reference: The Nervous System Contains Several Types of Cells
Learning Objective: 2.I.2 Classify neurons according to both structure and function.
Bloom's Level: 1. Remembering

2. Which statement about glial cells is *false*?
a. They regulate the chemical content of the extracellular space of surrounding neurons.

b. They are found outside the nervous system.
c. Some types of glia are responsible for myelinating axons.
d. They are important for providing structural support for neurons.
Answer: b
Textbook Reference: The Nervous System Contains Several Types of Cells
Learning Objective: 2.I.4 Describe the four principal types of glial cells.
Bloom's Level: 4. Analyzing

3. Which type of cell is responsible for myelination within the central nervous system?
a. Schwann cells
b. Astrocytes
c. Microglial cells
d. Oligodendrocytes
Answer: d
Textbook Reference: The Nervous System Contains Several Types of Cells
Learning Objective: 2.I.4 Describe the four principal types of glial cells.
Bloom's Level: 2. Understanding

4. The neuron doctrine stipulates that neurons
a. depend on one another for their metabolic needs.
b. are continuous with one another through a system of tubes.
c. are not continuous with one another.
d. plus glial cells form functional units.
Answer: c
Textbook Reference: The Nervous System Contains Several Types of Cells
Learning Objective: Not aligned
Bloom's Level: 1. Remembering

5. Which neuroanatomical method provides an outline of an entire neuronal cell body, allowing measurement of cell body size and density?
a. Nissl stain
b. Immunocytochemistry
c. Golgi stain
d. In situ hybridization
Answer: a
Textbook Reference: The Nervous System Contains Several Types of Cells
Learning Objective: Not aligned
Bloom's Level: 2. Understanding

6. Moving from the base of the brain to the tailbone, what are the respective segments of the spinal cord to which spinal nerves attach?
a. Cervical, sacral, thoracic, coccygeal, lumbar
b. Lumbar, sacral, cervical, thoracic, coccygeal
c. Cervical, thoracic, lumbar, sacral, coccygeal
d. Lumbar, cervical, sacral, coccygeal, thoracic
Answer: c

Textbook Reference: The Nervous System Extends throughout the Body
Learning Objective: 2.II.2 Identify the cranial and spinal nerves by name and function.
Bloom's Level: 3. Applying

7. What kind of information is carried by the ventral roots of the spinal cord?
a. Motor information to muscles
b. Sensory information from muscles and skin
c. Both motor and sensory information
d. Pain information
Answer: a
Textbook Reference: The Nervous System Extends throughout the Body
Learning Objective: 2.II.2 Identify the cranial and spinal nerves by name and function.
Bloom's Level: 3. Applying

8. Which structure is ventral to the hypothalamus?
a. Thalamus
b. Basal ganglia
c. Corpus callosum
d. Pons
Answer: d
Textbook Reference: The Nervous System Extends throughout the Body
Learning Objective: 2.II.4 Name the main anatomical structures that make up the two cerebral hemispheres.
Bloom's Level: 3. Applying

9. The two cerebral hemispheres are connected by
a. the meninges.
b. tendons.
c. the corpus callosum.
d. the reticular formation.
Answer: c
Textbook Reference: The Nervous System Extends throughout the Body
Learning Objective: 2.II.4 Name the main anatomical structures that make up the two cerebral hemispheres.
Bloom's Level: 2. Understanding

10. The temporal lobe is separated from the frontal and parietal lobes by the
a. central sulcus.
b. Sylvian fissure.
c. precentral gyrus.
d. postcentral gyrus.
Answer: b
Textbook Reference: The Nervous System Extends throughout the Body
Learning Objective: 2.II.4 Name the main anatomical structures that make up the two cerebral hemispheres.
Bloom's Level: 1. Remembering

11. The pons is a structure within the
a. hindbrain.
b. midbrain.
c. telencephalon.
d. diencephalon.
Answer: a
Textbook Reference: The Nervous System Extends throughout the Body
Learning Objective: 2.II.6 Describe the fetal development of the brain.
Bloom's Level: 1. Remembering

12. The basal ganglia are particularly implicated in
a. emotion.
b. learning and memory.
c. movement.
d. sympathetic nervous system control.
Answer: c
Textbook Reference: The Brain Is Described in Terms of Both Structure and Function
Learning Objective: 2.III.2 Distinguish between the basal ganglia, and the limbic system, and state some of the behavioral functions of each.
Bloom's Level: 2. Understanding

13. Which of the following is *not* part of the limbic system?
a. Putamen
b. Hippocampus
c. Fornix
d. Mammillary bodies
Answer: a
Textbook Reference: The Brain Is Described in Terms of Both Structure and Function
Learning Objective: 2.III.2 Distinguish between the basal ganglia, and the limbic system, and state some of the behavioral functions of each.
Bloom's Level: 2. Understanding

14. The brain and spinal cord are wrapped in protective membranes known collectively as the
a. dura mater.
b. pia mater.
c. myelin.
d. meninges.
Answer: d
Textbook Reference: Specialized Support Systems Protect and Nourish the Brain
Learning Objective: 2.III.4 Name and describe the meninges and ventricular system, and their clinical significance.
Bloom's Level: 1. Remembering

15. A researcher wants to know which brain region(s) is/are active when a person is listening to music. What would be the imaging technique of choice for this type of research?
a. Magnetoencephalography
b. PET (positron emission tomography)
c. fMRI (functional magnetic resonance imaging)
d. MRI (magnetic resonance imaging)
Answer: c
Textbook Reference: Brain-Imaging Techniques Reveal the Structure and Function of the Human Brain
Learning Objective: 2.III.6 Describe the major brain imaging technologies, highlighting their differing uses and limitations, and discuss the importance of the connectome.
Bloom's Level: 3. Applying

Essay

16. What are the components of a synapse? Describe the sequence of events that occur when information is transmitted from one neuron to the next.
Answer: Answers will very.
Textbook Reference: The Nervous System Contains Several Types of Cells
Learning Objective: 2.I.3 Outline the basic structure of a synapse and the steps in neurotransmission.
Bloom's Level: 2. Understanding

17. List the names and functions of the different types of glial cells.
Answer: Answers will very.
Textbook Reference: The Nervous System Contains Several Types of Cells
Learning Objective: 2.I.4 Describe the four principal types of glial cells.
Bloom's Level: 1. Remembering

18. Identify the components and general layout of the central nervous and peripheral nervous systems.
Answer: Answers will very.
Textbook Reference: The Nervous System Extends throughout the Body
Learning Objective: 2.II.3 Describe the general functions of the two divisions of the autonomic nervous system.
Bloom's Level: 2. Understanding

19. Describe the components and general function of the basal ganglia and limbic system, midbrain, and hindbrain.
Answer: Answers will very.
Textbook Reference: The Brain Is Described in Terms of Both Structure and Function
Learning Objective: 2.III.2 Distinguish between the basal ganglia, and the limbic system, and state some of the behavioral functions of each.
Bloom's Level: 2. Understanding

20. Review the anatomy of the membranes, fluids, and ventricles that provide support and protection for the brain.
Answer: Answers will very.
Textbook Reference: Specialized Support Systems Protect and Nourish the Brain
Learning Objective: 2.III.4 Name and describe the meninges and ventricular system, and their clinical significance.
Bloom's Level: 2. Understanding

21. Review the invasive and noninvasive techniques that allow researchers to study the structure and function of the mammalian nervous system.
Answer: Answers will very.
Textbook Reference: Brain-Imaging Techniques Reveal the Structure and Function of the Human Brain
Learning Objective: 2.III.6 Describe the major brain imaging technologies, highlighting their differing uses and limitations, and discuss the importance of the connectome.
Bloom's Level: 2. Understanding