

## Chapter 5 a--The Central Nervous System

1. Which characteristic is relevant to the endocrine system but not to the nervous system?
  - A. Releases chemicals into synaptic clefts.
  - B. Chemical signals operate at short distances.
  - C. Speed of response is very rapid.
  - D. Signaling may target many diverse cells.
  - E. Anatomically a "wired" system.
  
2. The normal sequence of structures activated for signal transmission and response in the body is
  - A. effector @afferent neuron@interneuron@efferent neuron@receptor
  - B. effector@efferent neuron@interneuron@afferent neuron@receptor
  - C. receptor@afferent neuron@interneuron@efferent neuron@effector
  - D. receptor@efferent neuron@interneuron@afferent neuron@effector
  - E. receptor@interneuron@efferent neuron@afferent neuron@effector
  
3. Which of the following is (are) not part of the peripheral nervous system?
  - A. motor neurons
  - B. sympathetic nervous system
  - C. spinal cord
  - D. afferent division
  - E. autonomic nervous system
  
4. The most abundant type of neuron in the body is (are) the
  - A. motor neuron
  - B. efferent neuron
  - C. afferent neuron
  - D. interneuron
  - E. sympathetic and parasympathetic neurons
  
5. Afferent neurons
  - A. transmit information to effector organs.
  - B. have a motor function.
  - C. transmit messages to the spinal cord.
  - D. none of these answers.
  - E. all of these answers.

6. Efferent neurons
  - A. carry information to the CNS
  - B. have cell bodies that originate in the CNS
  - C. lie entirely within the CNS
  - D. transmit information from effectors
  - E. carry information to the CNS and transmit information from effectors
  
7. The sympathetic and parasympathetic divisions are part of the
  - A. central nervous system
  - B. somatic nervous system
  - C. autonomic nervous system
  - D. afferent division
  - E. autonomic nervous system and afferent division
  
8. The vast majority of cells in the nervous system are
  - A. fibroblasts
  - B. glial cells
  - C. neurons
  - D. plexus cells
  - E. sarcomeres
  
9. Astrocytes
  - A. induce formation of the blood-brain barrier
  - B. are important in the repair of brain injuries and in neural scar formation
  - C. take up excess  $K^+$  from the brain ECF
  - D. physically support neurons
  - E. all of these
  
10. Which of the following is not a function of astrocytes?
  - A. Hold the neurons together in proper spatial relationship.
  - B. Line the internal cavities of the brain and spinal cord.
  - C. Induce the formation of the blood-brain barrier.
  - D. Take up excess  $K^+$  to help maintain proper brain ECF ion concentration.
  - E. Form neural scar tissue.
  
11. Which of the following is least associated with ependymal cells?
  - A. myelin sheath
  - B. brain ventricle
  - C. CSF
  - D. choroid plexus
  - E. glial cell

12. Which type of glial cell lines the ventricles of the brain?
- A. astrocytes
  - B. neurons
  - C. oligodendrocytes
  - D. ependymal cells
  - E. microglia
13. The outer most meningeal layer is the
- A. arachnoid mater
  - B. dura mater
  - C. dural sinus
  - D. pia mater
  - E. venous sinus
14. Cerebrospinal fluid
- A. is formed by the choroid plexuses
  - B. is formed by the arachnoid villi
  - C. separates the blood and brain to form the blood-brain barrier
  - D. is formed by the choroid plexuses and separates the blood and brain to form the blood-brain barrier
  - E. is formed by the arachnoid villi and separates the blood and brain to form the blood-brain barrier
15. Which of the following statements about cerebrospinal fluid is incorrect?
- A. forms at the choroid plexuses and is reabsorbed across the arachnoid villi into the blood within the dural sinuses
  - B. serves as a shock-absorbing fluid to cushion the brain against jarring movements
  - C. comes into direct contact with neurons and glial cells
  - D. fills the subarachnoid space
  - E. influences the composition of the brain interstitial fluid more than the blood does
16. Which statement about CSF is correct?
- A. It is produced along the spinal cord.
  - B. It is produced by meningeal cells.
  - C. It enters the meningeal layer through the cerebral aqueduct.
  - D. It flows inferiorly along the dorsal subarachnoid space of the spinal cord.
  - E. It does not flow through the meningeal layers.
17. The blood-brain barrier
- A. limits the direct exchange of materials between the cerebrospinal fluid and brain
  - B. is formed in part by the tight junctions between the brain capillary cells
  - C. consists of the astrocyte processes that encircle the brain capillaries
  - D. all of these
  - E. limits the direct exchange of materials between the cerebrospinal fluid and brain and is formed in part by the tight junctions between the brain capillary cells

18. Which glial cells possess phagocytic abilities?
- A. astrocytes
  - B. ependymal cells
  - C. neurons
  - D. microglia
  - E. oligodendrocytes
19. In addition to producing cerebrospinal fluid, ependymal cells may
- A. contribute to the formation of the blood-brain barrier
  - B. act as immune cells
  - C. function as neural stem cells
  - D. conduct neural impulses
  - E. produce myelin
20. Which statement is incorrect?
- A. Afferent fibers enter the spinal cord through the ventral root.
  - B. The dorsal and ventral roots at each level of the spinal cord join to form a spinal nerve.
  - C. The spinal cord is not as long as the vertebral column.
  - D. The ventral horn contains cell bodies of the efferent motor neurons that supply skeletal muscles.
  - E. The white matter of the spinal cord is organized into ascending and descending tracts.
21. During cerebrovascular accidents, glutamate released by damage neurons binds to \_\_\_\_ receptors of neighboring, healthy neurons, thus, initiating apoptosis.
- A. acetylcholine
  - B. calcium
  - C. epinephrine
  - D. NMDA
  - E. serotonin
22. The arachnoid mater is
- A. the innermost meningeal layer
  - B. a delicate, richly vascularized meningeal layer that is "cobwebby" in appearance
  - C. a tough, non-elastic membrane that covers the central nervous system
  - D. involved with the formation of CSF
  - E. the innermost meningeal layer which has a delicate, richly vascularized "cobwebby" appearance
23. The brain
- A. consists of 90 percent interneurons and 10 percent glial cells
  - B. can perform anaerobic metabolism when oxygen supplies are low
  - C. normally uses only glucose as a fuel for energy production
  - D. all of these
  - E. consists of 90% interneurons and 10 percent glial cells), and normally uses only glucose as a fuel for energy production

24. A stroke is a
- A. cerebrovascular accident
  - B. glucose deficiency
  - C. loss of the myelin sheath
  - D. neurotransmitter deficiency
  - E. uncontrolled firing of neurons
25. The region of the brain that is the oldest in evolutionary development is the
- A. cerebellum
  - B. brain stem
  - C. hypothalamus
  - D. forebrain
  - E. basal nuclei
26. Consciousness is created in the
- A. cerebellum
  - B. cerebral cortex
  - C. pons
  - D. hypothalamus
  - E. medulla oblongata
27. Which of the following is not accomplished by the cerebral cortex?
- A. voluntary initiation of movement
  - B. control of breathing, circulation, and digestion
  - C. final sensory perception
  - D. language ability
  - E. personality traits
28. Damage to which area below would result in the inability to perform precise hand movements?
- A. Broca's area
  - B. somatosensory cortex
  - C. premotor cortex
  - D. postcentral gyrus
  - E. Wernicke's area
29. The primary motor cortex
- A. is located in the parietal lobes
  - B. in the left cerebral hemisphere controls the skeletal muscles on the right side of the body
  - C. is the only region of the brain involved with motor control
  - D. develops motor programs for specific voluntary tasks
  - E. All of these

30. Which of the following does not participate in control of skeletal muscle activity?
- A. limbic system
  - B. cerebellum
  - C. supplementary motor area
  - D. premotor cortex
  - E. posterior parietal cortex
31. Language ability is usually associated with the
- A. hypothalamus
  - B. right cerebral hemisphere
  - C. left cerebral hemisphere
  - D. limbic system
  - E. prefrontal association cortex
32. Which of the following does not apply to Wernicke's area?
- A. usually developed only in the left cerebral hemisphere
  - B. responsible for controlling the muscles necessary for speaking ability
  - C. concerned with language comprehension
  - D. plays a critical role in understanding both spoken and written messages
  - E. responsible for formulating coherent patterns of speech
33. The sense of body position is
- A. somatosensory
  - B. integrated in the frontal lobe
  - C. proprioception
  - D. integrated in the occipital lobe
  - E. none of these
34. The primary motor cortex is located
- A. posterior to the central sulcus
  - B. anterior to the central sulcus
  - C. in the temporal lobe
  - D. in the parietal lobe
  - E. posterior to the central sulcus and in the parietal lobe
35. Somesthetic sensation is
- A. initially processed by the frontal lobes of the cerebral cortex
  - B. the awareness of body position
  - C. equally sensitive for all regions of the body surface
  - D. processed by the pyramidal cells
  - E. none of these

36. The prefrontal association cortex
- A. is concerned primarily with motivation and emotion
  - B. integrates somatic, auditory, and visual sensations
  - C. plays an important role in personality traits
  - D. localizes the source of sensory input and perceives the level of intensity of the stimulus
  - E. when damaged results in aphasia
37. Damage to the back of the brain could most likely adversely affect a person's
- A. vision
  - B. ability to feel sensation in the skin
  - C. ability to hear
  - D. ability to smell
  - E. ability to voluntarily move the arms
38. The corpus callosum interconnects the
- A. brain stem and cerebellum
  - B. brain stem and diencephalon
  - C. hypothalamus and thalamus
  - D. two cerebral hemispheres
  - E. two hemispheres of the cerebellum
39. If a person suffers a severe blow to the side of the head slightly above the ear, it is closest to the \_\_\_\_\_ lobe of the cerebral cortex.
- A. frontal
  - B. occipital
  - C. parietal
  - D. prefrontal
  - E. temporal
40. The left cerebral hemisphere normally excels in all of the following, except
- A. musical ability
  - B. verbal tasks
  - C. math skills
  - D. logical and analytical tasks
  - E. language ability
41. Select the incorrect association.
- A. occipital lobe/saying your name
  - B. occipital lobe/seeing an apple
  - C. parietal lobe/feeling off balance
  - D. parietal lobe/feeling a bug on your arm
  - E. temporal lobe/listening to a concert

42. An electroencephalogram
- A. is primarily a record of action potential activity in the cerebral cortex
  - B. represents the momentary collective postsynaptic activity in the cerebral cortex
  - C. displays larger brain waves when the eyes are open than when the eyes are closed
  - D. is primarily a record of action potential activity in the cerebral cortex and displays larger brain waves when the eyes are open than when the eyes are closed
  - E. represents the momentary collective postsynaptic activity in the cerebral cortex and displays larger brain waves when the eyes are open than when the eyes are closed
43. Broca's area is located in the cerebral cortex
- A. near the base of the precentral gyrus
  - B. near the middle of the postcentral gyrus
  - C. in the parietal lobe
  - D. between the parietal and occipital lobe
  - E. posterior to Wernicke's area
44. Parkinson's disease is
- A. associated with an excess of dopamine.
  - B. characterized by an intention tremor
  - C. characterized by a resting tremor
  - D. all of these
  - E. associated with an excess of dopamine and characterized by a resting tremor
45. The thalamus
- A. performs preliminary processing of all sensory input on its way to the cortex
  - B. inhibits muscle tone throughout the body
  - C. controls thirst, urine output, and food intake
  - D. plays a role in emotional and behavioral patterns
  - E. selects and maintains purposeful motor activity while suppressing useless or unwanted patterns of movement
46. Which of the following functions is not associated with the hypothalamus?
- A. senses touch in the skin
  - B. controls thirst and urine output
  - C. regulates body temperature
  - D. controls food intake
  - E. involved in emotional and behavioral patterns



47. Which part of the brain controls thirst and urine output, food intake, and body temperature, among other things?
- A. cerebral cortex
  - B. hypothalamus
  - C. basal nuclei
  - D. thalamus
  - E. pons
48. The limbic system
- A. is a ring of forebrain structures surrounding the brain stem
  - B. plays a key role in emotion
  - C. contains regions designated as reward and punishment centers
  - D. all of these
  - E. plays a key role in emotion and contains regions designated as reward and punishment centers
49. Wernicke's area functions mainly for
- A. control of limb movements
  - B. hand-eye coordination
  - C. language comprehension
  - D. memory
  - E. vision
50. A deficiency of the neurotransmitter dopamine in the basal nuclei causes
- A. schizophrenia
  - B. epilepsy
  - C. Parkinson's disease
  - D. depression
  - E. aphasia
51. Procedural memories
- A. are associated with the temporal lobes and are closely associated limbic structures
  - B. are associated with the cerebellum
  - C. involve acquisition of motor skills gained via repetitive training
  - D. are associated with the temporal lobes, are closely associated limbic structures, and involve acquisition of motor skills gained via repetitive training
  - E. are associated with the cerebellum and involve acquisition of motor skills gained via repetitive training

52. Select the function not characteristic of the hypothalamus.
- A. body temperature control
  - B. coordination center with the autonomic nervous system
  - C. food intake control
  - D. production of posterior pituitary hormones
  - E. sensory inputs from skeletal muscles
53. Short-term memory
- A. has a larger storage capacity than long-term memory
  - B. takes longer to retrieve than long-term memory
  - C. involves transient modifications in the function of preexisting synapses, such as channel modification
  - D. takes longer to retrieve than long-term memory and involves transient modifications in the function of preexisting synapses, such as channel modification
  - E. all of these
54. \_\_\_\_ memories are memories of facts that often result after only one experience, whereas \_\_\_\_ memories involve motor skills gained via repetitive training.
- A. Declarative; procedural
  - B. Procedural; declarative
  - C. Short-term; long-term
  - D. Long-term; short-term
  - E. none of these
55. What part of the brain plays a vital role in short-term memory involving the integration of various related stimuli and is also crucial for consolidation into long-term memory?
- A. hippocampus
  - B. basal nuclei
  - C. cerebellum
  - D. cerebral cortex
  - E. hypothalamus
56. The neurotransmitter required for long-term potentiation is
- A. epinephrine
  - B. acetylcholine
  - C. glycine
  - D. glutamate
  - E. norepinephrine

57. Which is not a function of the basal nuclei?
- A. inhibition of muscle tone
  - B. coordination of impulses related to posture
  - C. suppression of unnecessary motor activity
  - D. autonomic control
  - E. all of these
58. Long-term potentiation
- A. refers to increased responsiveness to mild stimuli following a strong or noxious stimulus
  - B. refers to an increase in strength of existing synaptic connections in pathways involved in initial storage of declarative information following brief periods of stimulation
  - C. involves a retrograde chemical messenger from the postsynaptic neuron influencing the presynaptic neuron
  - D. refers to increased responsiveness to mild stimuli following a strong or noxious stimulus and involves a retrograde chemical messenger from the postsynaptic neuron influencing the presynaptic neuron
  - E. refers to an increase in strength of existing synaptic connections in pathways involved in initial storage of declarative information following brief periods of stimulation, and involves a retrograde chemical messenger from the postsynaptic neuron influencing the presynaptic neuron
59. Which structure below is in the cerebral cortex?
- A. basal nuclei
  - B. thalamus
  - C. Wernicke's area
  - D. cerebellum
  - E. medulla
60. Which is not a structural component of the limbic system?
- A. amygdala
  - B. thalamus
  - C. hypothalamus
  - D. medulla
  - E. hippocampus
61. Which is not a function of the limbic system?
- A. provides emotional responses
  - B. coordinates aspects of learning
  - C. provides pleasant sensation of "reward"
  - D. coordinates survival instincts
  - E. provides conscious perceptions

62. In Alzheimer patients, amyloid plaques may cause
- A. a breakdown the blood-brain barrier
  - B. glutamate toxicity to neurons
  - C. degeneration of the neuron cell bodies
  - D. a breakdown in the blood-brain barrier and glutamate toxicity to neurons
  - E. glutamate toxicity to neurons and degeneration of the neuron cell bodies
63. Most of the cranial nerves originate from the
- A. brain stem
  - B. cerebellum
  - C. cerebral cortex
  - D. hypothalamus
  - E. thalamus
64. The cerebellum
- A. primarily influences motor activity but does not have direct influence on motor neurons
  - B. is part of the brain stem
  - C. when diseased gives rise to resting tremors
  - D. contains the reticular activating system
  - E. is associated with declarative memories
65. The cerebellum does not
- A. play a role in balance and equilibrium
  - B. decrease muscle tone
  - C. compare the intentions of the higher motor centers with the performance of the muscles and correct any deviations from the intended movement
  - D. play a role in the planning and initiation of voluntary activity
  - E. play a role in eye movement
66. Select the characteristic that does not describe short-term memory.
- A. immediate storage
  - B. large capacity
  - C. permanently forgotten
  - D. rapid retrieval
  - E. transient modifications in functions
67. Which statement about the brain stem is incorrect?
- A. contains the medulla
  - B. passageway for most fibers passing between the peripheral nervous and higher brain centers
  - C. controls sociosexual behaviors conducive to mating
  - D. contains part of the reticular activating system
  - E. contains centers that control respiration, blood vessel and heart function, and digestive activities

68. The \_\_\_\_ nerves primarily innervate visceral organs.
- A. facial
  - B. trochlear
  - C. vagus
  - D. abducens
  - E. accessory
69. Which statement about paradoxical sleep is incorrect?
- A. Characterized by rapid eye movements.
  - B. Occurs before entering slow-wave sleep.
  - C. Characterized by dreaming.
  - D. The EEG pattern during paradoxical sleep is similar to that of an alert, awake person.
  - E. A specified amount of paradoxical sleep appears to be required.
70. Which of the following can activate the arousal system?
- A. motor activity
  - B. afferent sensory input
  - C. intense excitement
  - D. afferent sensory input and intense excitement
  - E. all of these
71. A neuromodulator implicated as a neural sleep factor is
- A. adenosine
  - B. ATP
  - C. caffeine
  - D. norepinephrine
  - E. enkephalin
72. Neurons that play a major role in the sleep-wake cycle are found in the
- A. hypothalamus
  - B. cerebellum
  - C. brain stem
  - D. hypothalamus and brain stem
  - E. cerebellum and brain stem
73. Identify the true statement(s).
- A. Slow-wave sleep occupies a greater percentage of sleeping time than paradoxical sleep.
  - B. It is harder to arouse someone from slow-wave sleep than from paradoxical sleep.
  - C. Slow-wave sleep is characterized by frequent shifts in body position.
  - D. All of these.
  - E. Slow-wave sleep occupies a greater percentage of sleeping time than paradoxical sleep and is characterized by frequent shifts in body position.

74. Ascending tracts
- A. relay messages from the spinal cord to efferent neuron cell bodies
  - B. carry impulses from nerves to the CNS
  - C. carry impulses from the CNS to nerves
  - D. are part of the peripheral nervous system
  - E. transmit signals derived from afferent neurons to the brain
75. Nerves
- A. contain both afferent and efferent axons
  - B. do not contain complete neurons
  - C. are present within the central nervous system
  - D. contain both afferent and efferent axons and are present within the central nervous system
  - E. all of these
76. The peripheral nervous system includes
- A. 24 cranial nerves
  - B. nerve fibers that conduct impulses between the deep parts of the brain and peripheral parts of the brain, such as the cerebral cortex
  - C. only 31 nerves
  - D. only small parts of interneurons
  - E. 24 cranial nerves and only small parts of interneurons
77. Information travels up the spinal cord to the brain via
- A. afferent pathways
  - B. efferent pathways
  - C. ascending tracts
  - D. descending tracts
  - E. the dorsal root ganglion
78. Which component of the reflex arc directly sends an impulse to an organ making a response?
- A. receptor
  - B. afferent pathway
  - C. integrating center
  - D. efferent pathway
  - E. effector
79. Which tract transmits conscious sensory impulse regarding pain and temperature?
- A. dorsal cerebellar
  - B. ventral spinothalamic
  - C. lateral spinothalamic
  - D. lateral corticospinal
  - E. rubrospinal

80. Which of the following is a monosynaptic reflex?
- A. stretch reflex
  - B. withdrawal reflex
  - C. brain stem reflexes
  - D. all of these
  - E. stretch reflex and withdrawal reflex
81. Nerves of the autonomic nervous system control skeletal muscle responses.
- True False
82. Efferent neurons are motor neurons.
- True False
83. If neuronal pathways present at birth are not used during sensitive developmental periods, they may be eliminated.
- True False
84. Interneurons lie entirely within the central nervous system.
- True False
85. Afferent neurons have a long peripheral axon and a short central axon.
- True False
86. The cell bodies of afferent and efferent neurons both originate in the CNS.
- True False
87. Efferent neurons are the most abundant type of neuron.
- True False
88. Astrocytes take up the neurotransmitter GABA and excess  $\text{Na}^+$  from the ECF around neurons.
- True False
89. Oligodendrocytes form myelin around the axons of the CNS.
- True False
90. Cells associated with the blood-brain barrier prevent an increase in the concentration of potassium ions in the ECF surrounding brain cells.
- True False

91. Hydrocephalus is caused by insufficient cerebrospinal fluid.  
True False
92. Ninety percent of the cells within the CNS are neurons, and most of these are interneurons.  
True False
93. Microglia are phagocytic cells that help move CSF within the ventricles of the brain.  
True False
94. Most brain tumors of neural origin consist of interneurons.  
True False
95. Since neurons are not usually replaced after they are destroyed or die, the brain lacks plasticity of functions.  
True False
96. The cerebral cortex has an outer core of white matter and an inner core of white matter.  
True False
97. The dura mater is the fragile meningeal layer that closely adheres to the surfaces of the brain and spinal cord.  
True False
98. Cerebrospinal fluid comes into direct contact with the neuronal and glial cells only at one location within the brain.  
True False
99. Transport across the brain capillary walls is anatomically prevented between the cells and is physiologically restricted through the cells.  
True False
100. Under resting conditions, the brain uses approximately 50% of the body's oxygen consumption and 20% of the body's glucose consumption.  
True False
101. The cells that form the walls of the brain capillaries have the inherent ability to form tight junctions.  
True False



102. The brain cannot produce ATP in the absence of glucose or oxygen.
- True False
103. Gray matter refers to regions of the central nervous system composed primarily of densely packed cell bodies, whereas white matter consists of bundles of myelinated nerve fibers.
- True False
104. An electroencephalogram is a record of action potential activity in the cerebral cortex.
- True False
105. The gray matter in the CNS consists of parts of neurons not covered with myelin.
- True False
106. The occipital lobe is in the posterior region of the brain and houses the auditory cortex.
- True False
107. The sensory homunculus is drawn for the frontal lobe and depicts different regions of the body in different sizes.
- True False
108. The two regions of gray matter within the cerebrum are the cerebral cortex and the basal nuclei.
- True False
109. Different parts of the body are not equally represented in the somatosensory cortex and in the primary motor cortex.
- True False
110. When pushing a needle toward the spinal cord, the *last* meningeal layer pierced before the needle hits the spinal cord is the choroid plexus.
- True False
111. Gray matter consists predominantly of neuron cell bodies and dendrites.
- True False
112. Sound sensation is initially received by the parietal lobes.
- True False

113. The amount of cortical space in the primary motor cortex devoted to a given body part is proportional to the size of the part.  
True False
114. The right hemisphere is usually dominant in right-handed persons.  
True False
115. Stimulation of the frontal lobe produces changes in personality and social behavior.  
True False
116. Complex thought is a function of the frontal lobe.  
True False
117. The right and left cerebral hemispheres perform identical functions except for controlling opposite sides of the body.  
True False
118. A flat EEG always signifies brain death.  
True False
119. The basal nuclei are part of the cerebrum and diencephalon.  
True False
120. Resting tremors may be associated with diseases that affect the thalamus.  
True False
121. Centers for the control of respiration and circulatory function are located in the hypothalamus.  
True False
122. The corpus callosum allows the cerebrum to communicate with the diencephalon.  
True False
123. Anterograde amnesia is the inability to recall recent past events.  
True False
124. Working memory involves comparing current sensory data with relevant stored knowledge and manipulating that information.  
True False

125. The recycling of newly acquired information through short-term memory increases the likelihood of long-term memory consolidation.
- True False
126. The spinocerebellum enhances muscle tone and coordinates skilled movements, while the cerebrocerebellum is important in maintaining balance and controlling eye movements.
- True False
127. A retrograde chemical messenger from the postsynaptic neuron can influence neurotransmitter release from the presynaptic neuron at a synapse during long-term potentiation.
- True False
128. Disorders of the cerebellum are characterized by a resting tremor.
- True False
129. The cerebellum and basal nuclei both help coordinate voluntary movements, but neither of these brain regions directly stimulate motor neurons.
- True False
130. Most cranial nerves arise from the diencephalon and stimulate effectors in the head and neck.
- True False
131. A person can have normal conscious experience as long as the cerebral cortex is functioning properly.
- True False
132. Sleep is accompanied by a reduction in neural activity.
- True False
133. Gray matter forms the outer layer of the brain and spinal cord, and white matter comprises most of the deeper regions.
- True False
134. Bundles of nerve fibers exist in the CNS and in the PNS.
- True False
135. Impulses travel in the spinal cord through horns, which contain tracts.
- True False

136. Afferent neurons carry impulses through columns of the spinal cord, while efferent neurons carry impulses from the columns to effectors.
- True False
137. Reciprocal innervation refers to the fact that some organs are innervated by both divisions of the autonomic nervous system.
- True False
138. Aphasia is a speech impediment due to weakness or lack of coordination of speech muscles.
- True False
139. Efferent neurons leave the spinal cord through the dorsal root.
- True False
140. A bundle of neuron cell bodies in the CNS is a ganglion, whereas a bundle of axons in the PNS is a nerve.
- True False
141. Information as to whether a finger was touching an ice cube or being hit by a hammer would be carried to the brain in different ascending tracts within the spinal cord.
- True False
142. The withdrawal reflex requires ascending pathways and is classified as polysynaptic.
- True False
143. The withdrawal reflex for the arm requires an EPSP be generated on motor neurons that innervate the triceps muscle, and requires an IPSP be generated on neurons that innervate the biceps muscle.
- True False
144. The limbic association cortex is involved with motivation and emotion.
- True False
145. Depression is a psychiatric disorder associated with defects in basal nuclei neurotransmitters.
- True False
146. The paired facial nerves are the longest cranial nerves and they innervate face muscles, salivary glands, and tear glands.
- True False

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

The CNS is comprised of the brain and \_\_\_\_\_.

\_\_\_\_\_

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

Skeletal muscles are stimulated by the \_\_\_\_\_ nervous system, which is within the \_\_\_\_\_ division of the peripheral nervous system.

\_\_\_\_\_

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

The \_\_\_\_\_ system coordinates rapid responses of the body, whereas the \_\_\_\_\_ system is responsible for regulating metabolic functions and activities that require duration rather than speed.

\_\_\_\_\_

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

The \_\_\_\_\_ nervous system stimulates only digestive organs, and this system is a subdivision of the \_\_\_\_\_ division of the PNS.

\_\_\_\_\_

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

The efferent division of the PNS is divided into the \_\_\_\_\_ nervous system, which innervates skeletal muscles, and the \_\_\_\_\_ nervous system, which innervates smooth muscle, cardiac muscle, and glands.

\_\_\_\_\_

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

The \_\_\_\_\_ nervous system conducts impulses to the CNS.

\_\_\_\_\_

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

The \_\_\_\_\_ is any organ in the PNS that is innervated by a motor neuron.

\_\_\_\_\_

154. Complete each of the following statements.

A(n) \_\_\_\_\_ is an environmental change that causes a sensory receptor to initiate an action potential.

\_\_\_\_\_

155. Complete each of the following statements.

About 90 percent of the cells in the CNS are \_\_\_\_\_ cells.

\_\_\_\_\_

156. Complete each of the following statements.

The four major types of glial cells in the CNS are \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_.

\_\_\_\_\_

157. Complete each of the following statements.

\_\_\_\_\_ are the glial cells that induce anatomical changes in blood vessels.

\_\_\_\_\_

158. Complete each of the following statements.

The \_\_\_\_\_ are protective and nourishing membranes that lie between the central nervous system and its bony covering.

\_\_\_\_\_

159. Complete each of the following statements.

The \_\_\_\_\_ is a special cushioning fluid that surrounds the brain and spinal cord.

\_\_\_\_\_

160. Complete each of the following statements.

The meninges from the outermost to the innermost layer are the \_\_\_\_\_, the \_\_\_\_\_, and the \_\_\_\_\_.

\_\_\_\_\_

161. Complete each of the following statements.

\_\_\_\_\_ are tumors of the meninges.

\_\_\_\_\_

162. Complete each of the following statements.

The \_\_\_\_\_ space contains CSF, which is reabsorbed back into the blood via fingerlike projections called \_\_\_\_\_.

\_\_\_\_\_

163. Complete each of the following statements.

The brain normally uses only \_\_\_\_\_ as a source of fuel for energy production, yet it does not store any of this nutrient.

\_\_\_\_\_

164. Complete each of the following statements.

The largest portion of the human brain is the \_\_\_\_\_, which contains gray matter in its \_\_\_\_\_ and \_\_\_\_\_.

\_\_\_\_\_

165. Complete each of the following statements.

Hydrocephalus results from an accumulation of \_\_\_\_\_, which is made by the \_\_\_\_\_ in the brain ventricles, and these structures contain ependymal cells.

\_\_\_\_\_

166. Complete each of the following statements.

\_\_\_\_\_ matter consists predominantly of densely packaged cell bodies and dendrites, whereas \_\_\_\_\_ matter consists of bundles of myelinated nerve fibers.

\_\_\_\_\_

167. Complete each of the following statements.

The \_\_\_\_\_ lobes of the cerebral cortex are responsible for initial processing of visual input, and the \_\_\_\_\_ lobes are responsible for initial processing auditory input.

\_\_\_\_\_

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

The \_\_\_\_\_ cortex, the site for initial cortical processing of somesthetic and proprioceptive input, is located in the \_\_\_\_\_ lobes.

\_\_\_\_\_

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

Most capillaries in the brain are joined cell connections called \_\_\_\_\_.

\_\_\_\_\_

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

\_\_\_\_\_ area is responsible for speaking ability, whereas \_\_\_\_\_ area is concerned with language comprehension.

\_\_\_\_\_

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

\_\_\_\_\_ refers to the ability of the brain to be functionally remolded in response to the demands placed on it.

\_\_\_\_\_

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

The \_\_\_\_\_ and \_\_\_\_\_ compose the diencephalon of the brain.

\_\_\_\_\_

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

The \_\_\_\_\_ lobes of the \_\_\_\_\_ hemisphere excel in performance of logical, analytical, sequential, and verbal tasks, whereas the same lobes of the \_\_\_\_\_ hemisphere excel in nonlanguage skills such as spatial perception and artistic and musical endeavors.

\_\_\_\_\_

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

The \_\_\_\_\_ of the brain maintains upright posture.

\_\_\_\_\_



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

The \_\_\_\_\_ consist of several masses of gray matter located deep within the cerebrum and play an important \_\_\_\_\_ role in motor control.

\_\_\_\_\_

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

The \_\_\_\_\_, which is part of the \_\_\_\_\_ that forms the walls of the third ventricle, serves as a relay station and synaptic integrating center for preliminary processing of all sensory input on its way to the cortex.

\_\_\_\_\_

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

The central sulcus separates the \_\_\_\_\_ and \_\_\_\_\_ lobes.

\_\_\_\_\_

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

Voluntary motor activity is mainly a function of the \_\_\_\_\_ gyrus, located in the \_\_\_\_\_ lobe.

\_\_\_\_\_

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

\_\_\_\_\_ refers to the ability to direct behavior toward specific goals, while \_\_\_\_\_ is the acquisition of knowledge as a consequence of experience.

\_\_\_\_\_

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

The initial storage of complex memory involving modifications that take place by increased use at a given preexisting synapses is called \_\_\_\_\_.

\_\_\_\_\_

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

\_\_\_\_\_ represent the subjective urges associated with specific bodily needs that motivate appropriate behavior to satisfy those needs.

\_\_\_\_\_

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

The motor cortex is activated by the \_\_\_\_\_ potential, a widespread pattern of neural discharge.

\_\_\_\_\_

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

The neural change responsible for retention or storage of knowledge is known as the \_\_\_\_\_.

\_\_\_\_\_

\_\_\_\_\_

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

By \_\_\_\_\_ competition, somatotopic mapping can be altered.

\_\_\_\_\_

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

The inability to recall recent past events following a traumatic event is known as \_\_\_\_\_, whereas the inability to store new memories for later retrieval is called \_\_\_\_\_.

\_\_\_\_\_

\_\_\_\_\_

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

In the condition \_\_\_\_\_, letters of words are formed in reverse image.

\_\_\_\_\_

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

\_\_\_\_\_ is a decreased responsiveness to an indifferent stimulus that is repeatedly presented, whereas \_\_\_\_\_ is increased responsiveness to mild stimuli following a strong noxious stimulus.

\_\_\_\_\_

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

The \_\_\_\_\_ association cortex is located at the interface of three lobes of the brain.

\_\_\_\_\_

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

\_\_\_\_\_ refers to the brain's learning to ignore indifferent stimuli so that it can attend to other, more important stimuli.

\_\_\_\_\_

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

The \_\_\_\_\_ association area is the part of the brain that "thinks."

\_\_\_\_\_

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

Somatic motor neurons have cell bodies in the \_\_\_\_\_ horns of the spinal cord, whereas sensory neuron cell bodies are located in the \_\_\_\_\_ ganglion.

\_\_\_\_\_

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

\_\_\_\_\_ refers to subjective awareness of surroundings and self.

\_\_\_\_\_

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

Parkinson's disease is associated with a deficiency of the neurotransmitter \_\_\_\_\_.

\_\_\_\_\_

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

The paired \_\_\_\_\_ nerves deliver sensory information from the face and much of the scalp.

\_\_\_\_\_

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

The \_\_\_\_\_ system promotes alertness and helps direct attention toward specific events.

\_\_\_\_\_

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

The \_\_\_\_\_ is a specific part of the \_\_\_\_\_ system, and it processes inputs that give rise to the sensation of fear.

\_\_\_\_\_

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

Stimulation of the nerve supply to one muscle and simultaneous inhibition of the nerves to its antagonistic muscle is known as \_\_\_\_\_.

\_\_\_\_\_

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

The \_\_\_\_\_ is part of the limbic system and plays a role in declarative memories, such as conjuring up a mental image of experiences in the past.

\_\_\_\_\_

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

Schizophrenia probably results from excess production of the neurotransmitter \_\_\_\_\_.

\_\_\_\_\_

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

An afferent neuron with its cell body located in the \_\_\_\_\_ ganglion near the vertebral column synapses with another neuron in the \_\_\_\_\_, which is part of the CNS.

\_\_\_\_\_

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

The \_\_\_\_\_ horns in the spinal cord contain autonomic nerve fibers that supply cardiac and smooth muscle and glands.

\_\_\_\_\_

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

The \_\_\_\_\_ horns of the spinal cord consist of cell bodies of \_\_\_\_\_ on which sensory input is received.

\_\_\_\_\_



## Chapter 5 a--The Central Nervous System **Key**

1. Which characteristic is relevant to the endocrine system but not to the nervous system?
  - A. Releases chemicals into synaptic clefts.
  - B. Chemical signals operate at short distances.
  - C. Speed of response is very rapid.
  - D.** Signaling may target many diverse cells.
  - E. Anatomically a "wired" system.
2. The normal sequence of structures activated for signal transmission and response in the body is
  - A. effector @afferent neuron@interneuron@efferent neuron@receptor
  - B. effector@efferent neuron@interneuron@afferent neuron@receptor
  - C.** receptor@afferent neuron@interneuron@efferent neuron@effector
  - D. receptor@efferent neuron@interneuron@afferent neuron@effector
  - E. receptor@interneuron@efferent neuron@afferent neuron@effector
3. Which of the following is (are) not part of the peripheral nervous system?
  - A. motor neurons
  - B. sympathetic nervous system
  - C.** spinal cord
  - D. afferent division
  - E. autonomic nervous system
4. The most abundant type of neuron in the body is (are) the
  - A. motor neuron
  - B. efferent neuron
  - C. afferent neuron
  - D.** interneuron
  - E. sympathetic and parasympathetic neurons
5. Afferent neurons
  - A. transmit information to effector organs.
  - B. have a motor function.
  - C.** transmit messages to the spinal cord.
  - D. none of these answers.
  - E. all of these answers.

6. Efferent neurons
- A. carry information to the CNS
  - B.** have cell bodies that originate in the CNS
  - C. lie entirely within the CNS
  - D. transmit information from effectors
  - E. carry information to the CNS and transmit information from effectors
7. The sympathetic and parasympathetic divisions are part of the
- A. central nervous system
  - B. somatic nervous system
  - C.** autonomic nervous system
  - D. afferent division
  - E. autonomic nervous system and afferent division
8. The vast majority of cells in the nervous system are
- A. fibroblasts
  - B.** glial cells
  - C. neurons
  - D. plexus cells
  - E. sarcomeres
9. Astrocytes
- A. induce formation of the blood-brain barrier
  - B. are important in the repair of brain injuries and in neural scar formation
  - C. take up excess  $K^+$  from the brain ECF
  - D. physically support neurons
  - E.** all of these
10. Which of the following is not a function of astrocytes?
- A. Hold the neurons together in proper spatial relationship.
  - B.** Line the internal cavities of the brain and spinal cord.
  - C. Induce the formation of the blood-brain barrier.
  - D. Take up excess  $K^+$  to help maintain proper brain ECF ion concentration.
  - E. Form neural scar tissue.
11. Which of the following is least associated with ependymal cells?
- A.** myelin sheath
  - B. brain ventricle
  - C. CSF
  - D. choroid plexus
  - E. glial cell

12. Which type of glial cell lines the ventricles of the brain?
- A. astrocytes
  - B. neurons
  - C. oligodendrocytes
  - D.** ependymal cells
  - E. microglia
13. The outer most meningeal layer is the
- A. arachnoid mater
  - B.** dura mater
  - C. dural sinus
  - D. pia mater
  - E. venous sinus
14. Cerebrospinal fluid
- A.** is formed by the choroid plexuses
  - B. is formed by the arachnoid villi
  - C. separates the blood and brain to form the blood-brain barrier
  - D. is formed by the choroid plexuses and separates the blood and brain to form the blood-brain barrier
  - E. is formed by the arachnoid villi and separates the blood and brain to form the blood-brain barrier
15. Which of the following statements about cerebrospinal fluid is incorrect?
- A. forms at the choroid plexuses and is reabsorbed across the arachnoid villi into the blood within the dural sinuses
  - B. serves as a shock-absorbing fluid to cushion the brain against jarring movements
  - C.** comes into direct contact with neurons and glial cells
  - D. fills the subarachnoid space
  - E. influences the composition of the brain interstitial fluid more than the blood does
16. Which statement about CSF is correct?
- A. It is produced along the spinal cord.
  - B. It is produced by meningeal cells.
  - C.** It enters the meningeal layer through the cerebral aqueduct.
  - D. It flows inferiorly along the dorsal subarachnoid space of the spinal cord.
  - E. It does not flow through the meningeal layers.



17. The blood-brain barrier
- A. limits the direct exchange of materials between the cerebrospinal fluid and brain
  - B.** is formed in part by the tight junctions between the brain capillary cells
  - C. consists of the astrocyte processes that encircle the brain capillaries
  - D. all of these
  - E. limits the direct exchange of materials between the cerebrospinal fluid and brain and is formed in part by the tight junctions between the brain capillary cells
18. Which glial cells possess phagocytic abilities?
- A. astrocytes
  - B. ependymal cells
  - C. neurons
  - D.** microglia
  - E. oligodendrocytes
19. In addition to producing cerebrospinal fluid, ependymal cells may
- A. contribute to the formation of the blood-brain barrier
  - B. act as immune cells
  - C.** function as neural stem cells
  - D. conduct neural impulses
  - E. produce myelin
20. Which statement is incorrect?
- A.** Afferent fibers enter the spinal cord through the ventral root.
  - B. The dorsal and ventral roots at each level of the spinal cord join to form a spinal nerve.
  - C. The spinal cord is not as long as the vertebral column.
  - D. The ventral horn contains cell bodies of the efferent motor neurons that supply skeletal muscles.
  - E. The white matter of the spinal cord is organized into ascending and descending tracts.
21. During cerebrovascular accidents, glutamate released by damage neurons binds to \_\_\_\_ receptors of neighboring, healthy neurons, thus, initiating apoptosis.
- A. acetylcholine
  - B. calcium
  - C. epinephrine
  - D.** NMDA
  - E. serotonin
22. The arachnoid mater is
- A. the innermost meningeal layer
  - B.** a delicate, richly vascularized meningeal layer that is "cobwebby" in appearance
  - C. a tough, non-elastic membrane that covers the central nervous system
  - D. involved with the formation of CSF
  - E. the innermost meningeal layer which has a delicate, richly vascularized "cobwebby" appearance

23. The brain
- A. consists of 90 percent interneurons and 10 percent glial cells
  - B. can perform anaerobic metabolism when oxygen supplies are low
  - C.** normally uses only glucose as a fuel for energy production
  - D. all of these
  - E. consists of 90% interneurons and 10 percent glial cells), and normally uses only glucose as a fuel for energy production
24. A stroke is a
- A.** cerebrovascular accident
  - B. glucose deficiency
  - C. loss of the myelin sheath
  - D. neurotransmitter deficiency
  - E. uncontrolled firing of neurons
25. The region of the brain that is the oldest in evolutionary development is the
- A. cerebellum
  - B.** brain stem
  - C. hypothalamus
  - D. forebrain
  - E. basal nuclei
26. Consciousness is created in the
- A. cerebellum
  - B.** cerebral cortex
  - C. pons
  - D. hypothalamus
  - E. medulla oblongata
27. Which of the following is not accomplished by the cerebral cortex?
- A. voluntary initiation of movement
  - B.** control of breathing, circulation, and digestion
  - C. final sensory perception
  - D. language ability
  - E. personality traits
28. Damage to which area below would result in the inability to perform precise hand movements?
- A. Broca's area
  - B. somatosensory cortex
  - C.** premotor cortex
  - D. postcentral gyrus
  - E. Wernicke's area

29. The primary motor cortex
- A. is located in the parietal lobes
  - B.** in the left cerebral hemisphere controls the skeletal muscles on the right side of the body
  - C. is the only region of the brain involved with motor control
  - D. develops motor programs for specific voluntary tasks
  - E. All of these
30. Which of the following does not participate in control of skeletal muscle activity?
- A.** limbic system
  - B. cerebellum
  - C. supplementary motor area
  - D. premotor cortex
  - E. posterior parietal cortex
31. Language ability is usually associated with the
- A. hypothalamus
  - B. right cerebral hemisphere
  - C.** left cerebral hemisphere
  - D. limbic system
  - E. prefrontal association cortex
32. Which of the following does not apply to Wernicke's area?
- A. usually developed only in the left cerebral hemisphere
  - B.** responsible for controlling the muscles necessary for speaking ability
  - C. concerned with language comprehension
  - D. plays a critical role in understanding both spoken and written messages
  - E. responsible for formulating coherent patterns of speech
33. The sense of body position is
- A. somatosensory
  - B. integrated in the frontal lobe
  - C.** proprioception
  - D. integrated in the occipital lobe
  - E. none of these
34. The primary motor cortex is located
- A. posterior to the central sulcus
  - B.** anterior to the central sulcus
  - C. in the temporal lobe
  - D. in the parietal lobe
  - E. posterior to the central sulcus and in the parietal lobe

35. Somesthetic sensation is
- A. initially processed by the frontal lobes of the cerebral cortex
  - B. the awareness of body position
  - C. equally sensitive for all regions of the body surface
  - D. processed by the pyramidal cells
  - E. none of these**
36. The prefrontal association cortex
- A. is concerned primarily with motivation and emotion
  - B. integrates somatic, auditory, and visual sensations
  - C. plays an important role in personality traits**
  - D. localizes the source of sensory input and perceives the level of intensity of the stimulus
  - E. when damaged results in aphasia
37. Damage to the back of the brain could most likely adversely affect a person's
- A. vision**
  - B. ability to feel sensation in the skin
  - C. ability to hear
  - D. ability to smell
  - E. ability to voluntarily move the arms
38. The corpus callosum interconnects the
- A. brain stem and cerebellum
  - B. brain stem and diencephalon
  - C. hypothalamus and thalamus
  - D. two cerebral hemispheres**
  - E. two hemispheres of the cerebellum
39. If a person suffers a severe blow to the side of the head slightly above the ear, it is closest to the \_\_\_\_\_ lobe of the cerebral cortex.
- A. frontal
  - B. occipital
  - C. parietal
  - D. prefrontal
  - E. temporal**
40. The left cerebral hemisphere normally excels in all of the following, except
- A. musical ability**
  - B. verbal tasks
  - C. math skills
  - D. logical and analytical tasks
  - E. language ability

41. Select the incorrect association.
- A. occipital lobe/saying your name
  - B. occipital lobe/seeing an apple
  - C. parietal lobe/feeling off balance
  - D. parietal lobe/feeling a bug on your arm
  - E. temporal lobe/listening to a concert
42. An electroencephalogram
- A. is primarily a record of action potential activity in the cerebral cortex
  - B. represents the momentary collective postsynaptic activity in the cerebral cortex
  - C. displays larger brain waves when the eyes are open than when the eyes are closed
  - D. is primarily a record of action potential activity in the cerebral cortex and displays larger brain waves when the eyes are open than when the eyes are closed
  - E. represents the momentary collective postsynaptic activity in the cerebral cortex and displays larger brain waves when the eyes are open than when the eyes are closed
43. Broca's area is located in the cerebral cortex
- A. near the base of the precentral gyrus
  - B. near the middle of the postcentral gyrus
  - C. in the parietal lobe
  - D. between the parietal and occipital lobe
  - E. posterior to Wernicke's area
44. Parkinson's disease is
- A. associated with an excess of dopamine.
  - B. characterized by an intention tremor
  - C. characterized by a resting tremor
  - D. all of these
  - E. associated with an excess of dopamine and characterized by a resting tremor
45. The thalamus
- A. performs preliminary processing of all sensory input on its way to the cortex
  - B. inhibits muscle tone throughout the body
  - C. controls thirst, urine output, and food intake
  - D. plays a role in emotional and behavioral patterns
  - E. selects and maintains purposeful motor activity while suppressing useless or unwanted patterns of movement

46. Which of the following functions is not associated with the hypothalamus?
- A. senses touch in the skin
  - B. controls thirst and urine output
  - C. regulates body temperature
  - D. controls food intake
  - E. involved in emotional and behavioral patterns
47. Which part of the brain controls thirst and urine output, food intake, and body temperature, among other things?
- A. cerebral cortex
  - B. hypothalamus
  - C. basal nuclei
  - D. thalamus
  - E. pons
48. The limbic system
- A. is a ring of forebrain structures surrounding the brain stem
  - B. plays a key role in emotion
  - C. contains regions designated as reward and punishment centers
  - D. all of these
  - E. plays a key role in emotion and contains regions designated as reward and punishment centers
49. Wernicke's area functions mainly for
- A. control of limb movements
  - B. hand-eye coordination
  - C. language comprehension
  - D. memory
  - E. vision
50. A deficiency of the neurotransmitter dopamine in the basal nuclei causes
- A. schizophrenia
  - B. epilepsy
  - C. Parkinson's disease
  - D. depression
  - E. aphasia

51. Procedural memories
- A. are associated with the temporal lobes and are closely associated limbic structures
  - B. are associated with the cerebellum
  - C. involve acquisition of motor skills gained via repetitive training
  - D. are associated with the temporal lobes, are closely associated limbic structures, and involve acquisition of motor skills gained via repetitive training
  - E. are associated with the cerebellum and involve acquisition of motor skills gained via repetitive training
52. Select the function not characteristic of the hypothalamus.
- A. body temperature control
  - B. coordination center with the autonomic nervous system
  - C. food intake control
  - D. production of posterior pituitary hormones
  - E. sensory inputs from skeletal muscles
53. Short-term memory
- A. has a larger storage capacity than long-term memory
  - B. takes longer to retrieve than long-term memory
  - C. involves transient modifications in the function of preexisting synapses, such as channel modification
  - D. takes longer to retrieve than long-term memory and involves transient modifications in the function of preexisting synapses, such as channel modification
  - E. all of these
54. \_\_\_\_\_ memories are memories of facts that often result after only one experience, whereas \_\_\_\_\_ memories involve motor skills gained via repetitive training.
- A. Declarative; procedural
  - B. Procedural; declarative
  - C. Short-term; long-term
  - D. Long-term; short-term
  - E. none of these
55. What part of the brain plays a vital role in short-term memory involving the integration of various related stimuli and is also crucial for consolidation into long-term memory?
- A. hippocampus
  - B. basal nuclei
  - C. cerebellum
  - D. cerebral cortex
  - E. hypothalamus

56. The neurotransmitter required for long-term potentiation is
- A. epinephrine
  - B. acetylcholine
  - C. glycine
  - D. glutamate**
  - E. norepinephrine
57. Which is not a function of the basal nuclei?
- A. inhibition of muscle tone
  - B. coordination of impulses related to posture
  - C. suppression of unnecessary motor activity
  - D. autonomic control**
  - E. all of these
58. Long-term potentiation
- A. refers to increased responsiveness to mild stimuli following a strong or noxious stimulus
  - B. refers to an increase in strength of existing synaptic connections in pathways involved in initial storage of declarative information following brief periods of stimulation
  - C. involves a retrograde chemical messenger from the postsynaptic neuron influencing the presynaptic neuron
  - D. refers to increased responsiveness to mild stimuli following a strong or noxious stimulus and involves a retrograde chemical messenger from the postsynaptic neuron influencing the presynaptic neuron
  - E. refers to an increase in strength of existing synaptic connections in pathways involved in initial storage of declarative information following brief periods of stimulation, and involves a retrograde chemical messenger from the postsynaptic neuron influencing the presynaptic neuron**
59. Which structure below is in the cerebral cortex?
- A. basal nuclei
  - B. thalamus
  - C. Wernicke's area**
  - D. cerebellum
  - E. medulla
60. Which is not a structural component of the limbic system?
- A. amygdala
  - B. thalamus
  - C. hypothalamus
  - D. medulla**
  - E. hippocampus



61. Which is not a function of the limbic system?
- A. provides emotional responses
  - B. coordinates aspects of learning
  - C. provides pleasant sensation of "reward"
  - D. coordinates survival instincts
  - E. provides conscious perceptions**
62. In Alzheimer patients, amyloid plaques may cause
- A. a breakdown the blood-brain barrier
  - B. glutamate toxicity to neurons
  - C. degeneration of the neuron cell bodies
  - D. a breakdown in the blood-brain barrier and glutamate toxicity to neurons
  - E. glutamate toxicity to neurons and degeneration of the neuron cell bodies**
63. Most of the cranial nerves originate from the
- A. brain stem**
  - B. cerebellum
  - C. cerebral cortex
  - D. hypothalamus
  - E. thalamus
64. The cerebellum
- A. primarily influences motor activity but does not have direct influence on motor neurons**
  - B. is part of the brain stem
  - C. when diseased gives rise to resting tremors
  - D. contains the reticular activating system
  - E. is associated with declarative memories
65. The cerebellum does not
- A. play a role in balance and equilibrium
  - B. decrease muscle tone**
  - C. compare the intentions of the higher motor centers with the performance of the muscles and correct any deviations from the intended movement
  - D. play a role in the planning and initiation of voluntary activity
  - E. play a role in eye movement
66. Select the characteristic that does not describe short-term memory.
- A. immediate storage
  - B. large capacity**
  - C. permanently forgotten
  - D. rapid retrieval
  - E. transient modifications in functions

67. Which statement about the brain stem is incorrect?
- A. contains the medulla
  - B. passageway for most fibers passing between the peripheral nervous and higher brain centers
  - C.** controls sociosexual behaviors conducive to mating
  - D. contains part of the reticular activating system
  - E. contains centers that control respiration, blood vessel and heart function, and digestive activities
68. The \_\_\_\_ nerves primarily innervate visceral organs.
- A. facial
  - B. trochlear
  - C.** vagus
  - D. abducens
  - E. accessory
69. Which statement about paradoxical sleep is incorrect?
- A. Characterized by rapid eye movements.
  - B.** Occurs before entering slow-wave sleep.
  - C. Characterized by dreaming.
  - D. The EEG pattern during paradoxical sleep is similar to that of an alert, awake person.
  - E. A specified amount of paradoxical sleep appears to be required.
70. Which of the following can activate the arousal system?
- A. motor activity
  - B. afferent sensory input
  - C. intense excitement
  - D. afferent sensory input and intense excitement
  - E.** all of these
71. A neuromodulator implicated as a neural sleep factor is
- A.** adenosine
  - B. ATP
  - C. caffeine
  - D. norepinephrine
  - E. enkephalin
72. Neurons that play a major role in the sleep-wake cycle are found in the
- A. hypothalamus
  - B. cerebellum
  - C. brain stem
  - D.** hypothalamus and brain stem
  - E. cerebellum and brain stem

73. Identify the true statement(s).
- A. Slow-wave sleep occupies a greater percentage of sleeping time than paradoxical sleep.
  - B. It is harder to arouse someone from slow-wave sleep than from paradoxical sleep.
  - C. Slow-wave sleep is characterized by frequent shifts in body position.
  - D. All of these.
  - E.** Slow-wave sleep occupies a greater percentage of sleeping time than paradoxical sleep and is characterized by frequent shifts in body position.
74. Ascending tracts
- A. relay messages from the spinal cord to efferent neuron cell bodies
  - B. carry impulses from nerves to the CNS
  - C. carry impulses from the CNS to nerves
  - D. are part of the peripheral nervous system
  - E.** transmit signals derived from afferent neurons to the brain
75. Nerves
- A. contain both afferent and efferent axons
  - B. do not contain complete neurons
  - C. are present within the central nervous system
  - D.** contain both afferent and efferent axons and are present within the central nervous system
  - E. all of these
76. The peripheral nervous system includes
- A.** 24 cranial nerves
  - B. nerve fibers that conduct impulses between the deep parts of the brain and peripheral parts of the brain, such as the cerebral cortex
  - C. only 31 nerves
  - D. only small parts of interneurons
  - E. 24 cranial nerves and only small parts of interneurons
77. Information travels up the spinal cord to the brain via
- A. afferent pathways
  - B. efferent pathways
  - C.** ascending tracts
  - D. descending tracts
  - E. the dorsal root ganglion
78. Which component of the reflex arc directly sends an impulse to an organ making a response?
- A. receptor
  - B. afferent pathway
  - C. integrating center
  - D.** efferent pathway
  - E. effector

79. Which tract transmits conscious sensory impulse regarding pain and temperature?
- A. dorsal cerebellar
  - B. ventral spinothalamic
  - C. lateral spinothalamic**
  - D. lateral corticospinal
  - E. rubrospinal
80. Which of the following is a monosynaptic reflex?
- A. stretch reflex**
  - B. withdrawal reflex
  - C. brain stem reflexes
  - D. all of these
  - E. stretch reflex and withdrawal reflex
81. Nerves of the autonomic nervous system control skeletal muscle responses.
- FALSE**
82. Efferent neurons are motor neurons.
- TRUE**
83. If neuronal pathways present at birth are not used during sensitive developmental periods, they may be eliminated.
- TRUE**
84. Interneurons lie entirely within the central nervous system.
- TRUE**
85. Afferent neurons have a long peripheral axon and a short central axon.
- TRUE**
86. The cell bodies of afferent and efferent neurons both originate in the CNS.
- FALSE**
87. Efferent neurons are the most abundant type of neuron.
- FALSE**
88. Astrocytes take up the neurotransmitter GABA and excess  $\text{Na}^+$  from the ECF around neurons.
- FALSE**

89. Oligodendrocytes form myelin around the axons of the CNS.

**TRUE**

90. Cells associated with the blood-brain barrier prevent an increase in the concentration of potassium ions in the ECF surrounding brain cells.

**TRUE**

91. Hydrocephalus is caused by insufficient cerebrospinal fluid.

**FALSE**

92. Ninety percent of the cells within the CNS are neurons, and most of these are interneurons.

**FALSE**

93. Microglia are phagocytic cells that help move CSF within the ventricles of the brain.

**FALSE**

94. Most brain tumors of neural origin consist of interneurons.

**FALSE**

95. Since neurons are not usually replaced after they are destroyed or die, the brain lacks plasticity of functions.

**FALSE**

96. The cerebral cortex has an outer core of white matter and an inner core of white matter.

**FALSE**

97. The dura mater is the fragile meningeal layer that closely adheres to the surfaces of the brain and spinal cord.

**FALSE**

98. Cerebrospinal fluid comes into direct contact with the neuronal and glial cells only at one location within the brain.

**FALSE**

99. Transport across the brain capillary walls is anatomically prevented between the cells and is physiologically restricted through the cells.

**TRUE**

100. Under resting conditions, the brain uses approximately 50% of the body's oxygen consumption and 20% of the body's glucose consumption.
- FALSE**
101. The cells that form the walls of the brain capillaries have the inherent ability to form tight junctions.
- FALSE**
102. The brain cannot produce ATP in the absence of glucose or oxygen.
- FALSE**
103. Gray matter refers to regions of the central nervous system composed primarily of densely packed cell bodies, whereas white matter consists of bundles of myelinated nerve fibers.
- TRUE**
104. An electroencephalogram is a record of action potential activity in the cerebral cortex.
- FALSE**
105. The gray matter in the CNS consists of parts of neurons not covered with myelin.
- TRUE**
106. The occipital lobe is in the posterior region of the brain and houses the auditory cortex.
- FALSE**
107. The sensory homunculus is drawn for the frontal lobe and depicts different regions of the body in different sizes.
- FALSE**
108. The two regions of gray matter within the cerebrum are the cerebral cortex and the basal nuclei.
- TRUE**
109. Different parts of the body are not equally represented in the somatosensory cortex and in the primary motor cortex.
- TRUE**
110. When pushing a needle toward the spinal cord, the *last* meningeal layer pierced before the needle hits the spinal cord is the choroid plexus.
- FALSE**

111. Gray matter consists predominantly of neuron cell bodies and dendrites.  
**TRUE**
112. Sound sensation is initially received by the parietal lobes.  
**FALSE**
113. The amount of cortical space in the primary motor cortex devoted to a given body part is proportional to the size of the part.  
**FALSE**
114. The right hemisphere is usually dominant in right-handed persons.  
**FALSE**
115. Stimulation of the frontal lobe produces changes in personality and social behavior.  
**FALSE**
116. Complex thought is a function of the frontal lobe.  
**TRUE**
117. The right and left cerebral hemispheres perform identical functions except for controlling opposite sides of the body.  
**FALSE**
118. A flat EEG always signifies brain death.  
**FALSE**
119. The basal nuclei are part of the cerebrum and diencephalon.  
**TRUE**
120. Resting tremors may be associated with diseases that affect the thalamus.  
**TRUE**
121. Centers for the control of respiration and circulatory function are located in the hypothalamus.  
**FALSE**
122. The corpus callosum allows the cerebrum to communicate with the diencephalon.  
**FALSE**

123. Anterograde amnesia is the inability to recall recent past events.

**FALSE**

124. Working memory involves comparing current sensory data with relevant stored knowledge and manipulating that information.

**TRUE**

125. The recycling of newly acquired information through short-term memory increases the likelihood of long-term memory consolidation.

**TRUE**

126. The spinocerebellum enhances muscle tone and coordinates skilled movements, while the cerebrocerebellum is important in maintaining balance and controlling eye movements.

**FALSE**

127. A retrograde chemical messenger from the postsynaptic neuron can influence neurotransmitter release from the presynaptic neuron at a synapse during long-term potentiation.

**TRUE**

128. Disorders of the cerebellum are characterized by a resting tremor.

**FALSE**

129. The cerebellum and basal nuclei both help coordinate voluntary movements, but neither of these brain regions directly stimulate motor neurons.

**TRUE**

130. Most cranial nerves arise from the diencephalon and stimulate effectors in the head and neck.

**FALSE**

131. A person can have normal conscious experience as long as the cerebral cortex is functioning properly.

**FALSE**

132. Sleep is accompanied by a reduction in neural activity.

**FALSE**

133. Gray matter forms the outer layer of the brain and spinal cord, and white matter comprises most of the deeper regions.

**FALSE**



134. Bundles of nerve fibers exist in the CNS and in the PNS.

**TRUE**

135. Impulses travel in the spinal cord through horns, which contain tracts.

**FALSE**

136. Afferent neurons carry impulses through columns of the spinal cord, while efferent neurons carry impulses from the columns to effectors.

**FALSE**

137. Reciprocal innervation refers to the fact that some organs are innervated by both divisions of the autonomic nervous system.

**FALSE**

138. Aphasia is a speech impediment due to weakness or lack of coordination of speech muscles.

**FALSE**

139. Efferent neurons leave the spinal cord through the dorsal root.

**FALSE**

140. A bundle of neuron cell bodies in the CNS is a ganglion, whereas a bundle of axons in the PNS is a nerve.

**FALSE**

141. Information as to whether a finger was touching an ice cube or being hit by a hammer would be carried to the brain in different ascending tracts within the spinal cord.

**TRUE**

142. The withdrawal reflex requires ascending pathways and is classified as polysynaptic.

**FALSE**

143. The withdrawal reflex for the arm requires an EPSP be generated on motor neurons that innervate the triceps muscle, and requires an IPSP be generated on neurons that innervate the biceps muscle.

**FALSE**

144. The limbic association cortex is involved with motivation and emotion.

**TRUE**

145. Depression is a psychiatric disorder associated with defects in basal nuclei neurotransmitters.

**FALSE**

146. The paired facial nerves are the longest cranial nerves and they innervate face muscles, salivary glands, and tear glands.

**FALSE**

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

The CNS is comprised of the brain and \_\_\_\_\_.

**spinal cord**

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

Skeletal muscles are stimulated by the \_\_\_\_\_ nervous system, which is within the \_\_\_\_\_ division of the peripheral nervous system.

**somatic, efferent**

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

The \_\_\_\_\_ system coordinates rapid responses of the body, whereas the \_\_\_\_\_ system is responsible for regulating metabolic functions and activities that require duration rather than speed.

**nervous, endocrine**

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

The \_\_\_\_\_ nervous system stimulates only digestive organs, and this system is a subdivision of the \_\_\_\_\_ division of the PNS.

**enteric, autonomic**

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

The efferent division of the PNS is divided into the \_\_\_\_\_ nervous system, which innervates skeletal muscles, and the \_\_\_\_\_ nervous system, which innervates smooth muscle, cardiac muscle, and glands.

**somatic, autonomic**

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

The \_\_\_\_\_ nervous system conducts impulses to the CNS.

**afferent**

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

The \_\_\_\_\_ is any organ in the PNS that is innervated by a motor neuron.

**effector**

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

A(n) \_\_\_\_\_ is an environmental change that causes a sensory receptor to initiate an action potential.

**stimulus**

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

About 90 percent of the cells in the CNS are \_\_\_\_\_ cells.

**glial**

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

The four major types of glial cells in the CNS are \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_.

**astrocytes, oligodendrocytes, ependymal cells, microglia**

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

\_\_\_\_\_ are the glial cells that induce anatomical changes in blood vessels.

**Astrocytes**

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

The \_\_\_\_\_ are protective and nourishing membranes that lie between the central nervous system and its bony covering.

**meninges**

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

The \_\_\_\_\_ is a special cushioning fluid that surrounds the brain and spinal cord.

**cerebrospinal fluid (CSF)**

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

The meninges from the outermost to the innermost layer are the \_\_\_\_\_, the \_\_\_\_\_, and the \_\_\_\_\_.

**dura mater, arachnoid mater, pia mater**

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

\_\_\_\_\_ are tumors of the meninges.

**Meningiomas**

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

The \_\_\_\_\_ space contains CSF, which is reabsorbed back into the blood via fingerlike projections called \_\_\_\_\_.

**subarachnoid, arachnoid villi**

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

The brain normally uses only \_\_\_\_\_ as a source of fuel for energy production, yet it does not store any of this nutrient.

**glucose**

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

The largest portion of the human brain is the \_\_\_\_\_, which contains gray matter in its \_\_\_\_\_ and \_\_\_\_\_.

**cerebrum, cortex, basal nuclei**

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

Hydrocephalus results from an accumulation of \_\_\_\_\_, which is made by the \_\_\_\_\_ in the brain ventricles, and these structures contain ependymal cells.

**CSF, choroid plexuses**

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

\_\_\_\_\_ matter consists predominantly of densely packaged cell bodies and dendrites, whereas \_\_\_\_\_ matter consists of bundles of myelinated nerve fibers.

**Gray, white**

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

The \_\_\_\_\_ lobes of the cerebral cortex are responsible for initial processing of visual input, and the \_\_\_\_\_ lobes are responsible for initial processing auditory input.

**occipital, temporal**

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

The \_\_\_\_\_ cortex, the site for initial cortical processing of somesthetic and proprioceptive input, is located in the \_\_\_\_\_ lobes.

**somatosensory, parietal**

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

Most capillaries in the brain are joined cell connections called \_\_\_\_\_.

**tight junctions**

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

\_\_\_\_\_ area is responsible for speaking ability, whereas \_\_\_\_\_ area is concerned with language comprehension.

**Broca's, Wernicke's**

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

\_\_\_\_\_ refers to the ability of the brain to be functionally remolded in response to the demands placed on it.

**Plasticity**

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

The \_\_\_\_\_ and \_\_\_\_\_ compose the diencephalon of the brain.

**thalamus, hypothalamus**

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

The \_\_\_\_\_ lobes of the \_\_\_\_\_ hemisphere excel in performance of logical, analytical, sequential, and verbal tasks, whereas the same lobes of the \_\_\_\_\_ hemisphere excel in nonlanguage skills such as spatial perception and artistic and musical endeavors.

**frontal, left, right**

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

The \_\_\_\_\_ of the brain maintains upright posture.

**cerebellum**

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

The \_\_\_\_\_ consist of several masses of gray matter located deep within the cerebrum and play an important \_\_\_\_\_ role in motor control.

**basal nuclei, inhibitory**

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

The \_\_\_\_\_, which is part of the \_\_\_\_\_ that forms the walls of the third ventricle, serves as a relay station and synaptic integrating center for preliminary processing of all sensory input on its way to the cortex.

**thalamus, diencephalon**

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

The central sulcus separates the \_\_\_\_\_ and \_\_\_\_\_ lobes.

**frontal, parietal**

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

Voluntary motor activity is mainly a function of the \_\_\_\_\_ gyrus, located in the \_\_\_\_\_ lobe.

**precentral, frontal**

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

\_\_\_\_\_ refers to the ability to direct behavior toward specific goals, while \_\_\_\_\_ is the acquisition of knowledge as a consequence of experience.

**Motivation, learning**

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

The initial storage of complex memory involving modifications that take place by increased use at a given preexisting synapses is called \_\_\_\_\_.

**long-term potentiation**

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

\_\_\_\_\_ represent the subjective urges associated with specific bodily needs that motivate appropriate behavior to satisfy those needs.

**Homeostatic drives**

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

The motor cortex is activated by the \_\_\_\_\_ potential, a widespread pattern of neural discharge.

**readiness**

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

The neural change responsible for retention or storage of knowledge is known as the \_\_\_\_\_.

**memory trace**

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

By \_\_\_\_\_ competition, somatotopic mapping can be altered.

**use-dependent**

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

The inability to recall recent past events following a traumatic event is known as \_\_\_\_\_, whereas the inability to store new memories for later retrieval is called \_\_\_\_\_.

**retrograde amnesia, anterograde amnesia**

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

In the condition \_\_\_\_\_, letters of words are formed in reverse image.

**dyslexia**

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

\_\_\_\_\_ is a decreased responsiveness to an indifferent stimulus that is repeatedly presented, whereas \_\_\_\_\_ is increased responsiveness to mild stimuli following a strong noxious stimulus.

**Habituation, sensitization**

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

The \_\_\_\_\_ association cortex is located at the interface of three lobes of the brain.

**parietal-temporal-occipital**

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

\_\_\_\_\_ refers to the brain's learning to ignore indifferent stimuli so that it can attend to other, more important stimuli.

**Habituation**

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

The \_\_\_\_\_ association area is the part of the brain that "thinks."

**prefrontal**

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

Somatic motor neurons have cell bodies in the \_\_\_\_\_ horns of the spinal cord, whereas sensory neuron cell bodies are located in the \_\_\_\_\_ ganglion.

**ventral, dorsal root**

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

\_\_\_\_\_ refers to subjective awareness of surroundings and self.

**Consciousness**

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

Parkinson's disease is associated with a deficiency of the neurotransmitter \_\_\_\_\_.

**dopamine**



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

The paired \_\_\_\_\_ nerves deliver sensory information from the face and much of the scalp.

**trigeminal**

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

The \_\_\_\_\_ system promotes alertness and helps direct attention toward specific events.

**reticular activating**

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

The \_\_\_\_\_ is a specific part of the \_\_\_\_\_ system, and it processes inputs that give rise to the sensation of fear.

**amygdala, limbic**

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

Stimulation of the nerve supply to one muscle and simultaneous inhibition of the nerves to its antagonistic muscle is known as \_\_\_\_\_.

**reciprocal innervation**

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

The \_\_\_\_\_ is part of the limbic system and plays a role in declarative memories, such as conjuring up a mental image of experiences in the past.

**hippocampus**

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

Schizophrenia probably results from excess production of the neurotransmitter \_\_\_\_\_.

**dopamine**

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

An afferent neuron with its cell body located in the \_\_\_\_\_ ganglion near the vertebral column synapses with another neuron in the \_\_\_\_\_, which is part of the CNS.

**dorsal root, spinal cord**

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

The \_\_\_\_\_ horns in the spinal cord contain autonomic nerve fibers that supply cardiac and smooth muscle and glands.

**lateral**

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

The \_\_\_\_\_ horns of the spinal cord consist of cell bodies of \_\_\_\_\_ on which sensory input is received.

**dorsal, interneurons**