Chapter 5
The Central Nervous System
TEST QUESTIONS

Multiple Choice

1. Which characteristic is relevant to the endocrine system, rather than the nervous system?
   (a) releases chemicals into synaptic clefts.
   (b) chemical signals operate at very short distances.
   (c) speed of response very rapid.
   (d) signaling may target many diverse cells.
   (e) anatomically a "wired" system.

ANSWER: d

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.

ANSWER: c

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

ANSWER: c

4. The most abundant type of neuron in the body is the
   (a) motor neuron.
   (b) efferent neuron.
   (c) afferent neuron.
   (d) interneuron.
   (e) sympathetic and parasympathetic neurons.

ANSWER: d

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.

ANSWER: c

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) two of these answers.
(e) all of these answers.

ANSWER: b

7. Which component of the nervous system is comprised of sympathetic and parasympathetic divisions?
(a) central nervous system.
(b) somatic nervous system.
(c) autonomic nervous system.
(d) afferent division.
(e) none of these answers.

ANSWER: c

8. The vast majority of cells in the nervous system are
(a) fibroblasts.
(b) glial cells.
(c) neurons.
(d) plexus cells
(e) sarcomeres.

ANSWER: b

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 answers.

ANSWER: e

10. Which of the following is not a function of astrocytes?
(a) holding the neurons together in proper spatial relationship
(b) lining the internal cavities of the brain and spinal cord
(c) inducing the formation of the blood-brain barrier
(d) take up excess K+ to help maintain proper brain ECF ion concentration.
(e) forming neural scar tissue

ANSWER: b

11. An imaging technology in which images are reconstructed from differences in X-ray absorption is
(a) computerized axial tomography.
(b) magnetic resonance imaging.
(c) positron emission tomography.
(d) radioactive tracing imaging.
(e) none of these answers.

ANSWER: a

12. Which type of glial cell lines the ventricles of the brain?
(a) astrocytes
(b) neurons
(c) oligodendrocytes
(d) ependymal cells
(e) microglia

ANSWER: d

13. The outer most meninge is the
    (a) arachnoid mater
    (b) dura mater
    (c) dural sinus
    (d) pia mater
    (e) venous sinus

ANSWER: b

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) both (a) and (c) above.
    (e) both (b) and (c) above.

ANSWER: a

15. Which of the following statements concerning cerebrospinal fluid is incorrect? Cerebrospinal fluid
    (a) is formed by 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 the neuronal and glial cells.
    (d) fills the subarachnoid space.
    (e) influences the composition of the brain interstitial fluid more than the blood does.

ANSWER: c

16. Which statement regarding CSF production and flow is correct?
    (a) CSF is produced along the spinal cord.
    (b) CSF is produced by meningeal cells.
    (c) CSF enter the meningeal layer through the cerebral aqueduct.
    (d) CSF flows inferiorly along the dorsal subarachnoid space of the spinal cord.
    (e) CSF does not flow through the meningeal layers.

ANSWER: c

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) both (a) and (b) above.
    (e) all of these answers.

ANSWER: b

18. Which glial cells possess phagocytic abilities?
    (a) astrocytes.
    (b) ependymal cells.
    (c) neurons.
    (d) microglia.
    (e) oligodendrocytes.

ANSWER: d

19. In addition to producing cerebral spinal 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.

ANSWER: c

20. Neural damage following a cerebrovascular accident is due to
    (a) reduced O_2 and glucose delivery to the region of the brain deprived of its blood supply.
    (b) toxic release from damaged brain cells of glutamate, which overexcites and subsequently destroys surrounding brain cells.
    (c) a loss of the blood-brain barrier in the affected area of the brain as a result of rupture or occlusion of a cerebral vessel.
    (d) both (a) and (b) above.
    (e) all of these answers.

ANSWER: d

21. During cerebrovascular accidents, glutamate released by damage neurons binds to _____ receptors of neighboring, healthy neurons, thus, initiating apotosis.
    (a) acetylcholine.
    (b) calcium.
    (c) epinephrine.
    (d) NMDA.
    (e) serotonin.

ANSWER: d

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, inelastic membrane that covers the central nervous system.
    (d) involved with the formation of cerebrospinal fluid.
    (e) more than one of these answers is correct.

ANSWER: b

23. The brain
    (a) consists of 90% interneurons and 10% glial cells.
    (b) can perform anaerobic metabolism when oxygen supplies are low.
    (c) normally uses only glucose as a fuel for energy production.
    (d) two of these answers.
    (e) all of these answers.

ANSWER: c

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.

ANSWER: a

25. The region of the brain that is smallest and oldest in evolutionary development is the

(a) cerebellum.
(b) brain stem.
(c) hypothalamus.
(d) forebrain.
(e) basal nuclei.

ANSWER: b

26. Consciousness is created in the
(a) cerebellum.
(b) cerebral cortex.
(c) frontal lobe.
(d) hypothalamus.
(e) medulla oblongata.

ANSWER: b

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.

ANSWER: b

28. Damage to which area below would result in the inability to perform accurate motor actions?
(a) Broca's area.
(b) somatosensory cortex.
(c) premotor cortex.
(d) postcentral gyrus.
(e) Wernicke's area.

ANSWER: c

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) more than one of the above.

ANSWER: b

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.

ANSWER: a

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.

ANSWER: c

32. Which of the following does not apply to Wernicke's area?
(a) is usually developed only in the left cerebral hemisphere.
(b) is responsible for controlling the muscles necessary for speaking ability.
(c) is concerned with language comprehension.
(d) plays a critical role in understanding both spoken and written messages.
(e) is responsible for formulating coherent patterns of speech.

ANSWER: b

33. The sense of body position is
(a) somatosensory.
(b) kinesthetic.
(c) proprioception.
(d) integrated in the occipital lobe.
(e) none of the above.

ANSWER: c

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) in the occipital lobe.

ANSWER: b

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 answers.

ANSWER: e

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.

ANSWER: c

37. Which condition rarely causes headaches?
(a) inflammation of the sinuses' mucous membranes.
(b) dilation of cerebral blood vessels.
(c) eye disorders.
(d) inflammation of the meninges.
(e) brain damage.

ANSWER: e

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.

ANSWER: d

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.

ANSWER: e

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.

ANSWER: a

41. Select the incorrect association.
    (a) occipital lobe/speech formation.
    (b) occipital lobe/visual input.
    (c) parietal lobe/proprioception.
    (d) parietal lobe/somesthetic sensations.
    (e) temporal lobe/sound input.

ANSWER: a

42. An electroencephalogram
    (a) is 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) both (a) and (c) above.
    (e) both (b) and (c) above.

ANSWER: d

43. Broca's area is located on the cerebral cortex of the _____ lobe.
    (a) frontal.
    (b) occipital.
    (c) parietal.
    (d) temporal.
    (e) insula.

ANSWER: a

44. Parkinson's disease is
    (a) associated with a deficiency of serotonin.
    (b) characterized by an intention tremor.
    (c) characterized by a resting tremor.
    (d) both (a) and (b) above.
    (e) both (a) and (c) above.

ANSWER: c

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.

ANSWER: a

46. Which of the following functions is not associated with the hypothalamus?
    (a) control of respiration and circulatory function.
    (b) control of thirst and urine output.
    (c) control of body temperature.
    (d) control of food intake.
    (e) extensive involvement with emotion and behavioral patterns.

ANSWER: a

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

ANSWER: b

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) two of these answers are correct.
    (e) all of these answers.

ANSWER: e

49. Wernicke's area functions mainly for
    (a) control of limb movements.
    (b) hand-eye coordination.
    (c) language comprehension.
    (d) memory.
    (e) vision.

ANSWER: c

50. A deficiency of the neurotransmitter dopamine in the basal nuclei causes
    (a) schizophrenia.
    (b) epilepsy.

(c) Parkinson's disease.
(d) depression.
(e) aphasia.

ANSWER: c

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) both (a) and (c) above.
(e) both (b) and (c) above.

ANSWER: e

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.

ANSWER: e

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) two of these answers.
(e) all of these answers.

ANSWER: c

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 answers.

ANSWER: a

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

ANSWER: a

56. The neurotransmitter required for log term potentiation is
(a) epinephrine.
(b) acetylcholine.
(c) glycine.

(d) glutamate.
(e) norepinephrine.

ANSWER: d

57. 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) both (a) and (c) above.
(e) both (b) and (c) above.

ANSWER: e

58. Which is not a function of the basal nuclei?
(a) inhibition of muscle tone.
(b) coordinate impulses related to posture.
(c) suppression of unnecessary motor activity.
(d) autonomic control activity.
(e) all of these answers.

ANSWER: d

59. Which structure below is not subcortical .
(a) basal nuclei.
(b) thalamus.
(c) Wernicke's area.
(d) cerebellum.
(e) medulla.

ANSWER: c

60. Which is not a structural component of the limbic system?
(a) amygdala.
(b) cingulate gyrus.
(c) mammillary body.
(d) medulla.
(e) hippocampus.

ANSWER: d

61. Which is not a function of the limbic system?
(a) provide emotional overtones.
(b) coordinate aspects of learning.
(c) provide 'reward' stimulation.
(d) coordinate survival instincts.
(e) provide conscious perceptions.

ANSWER: e

62. In Alzheimer patients, neural damage from amyloid plaques, may cause neuronal damage by
(a) breaking down the blood-brain barrier.
(b) inducing glutamate toxicity.
(c) increasing calcium influx.
(d) both (a) and (b) above.
(e) both (b) and (c) above.

ANSWER: e

63. Most of the cranial nerves originate from the
    (a) brain stem.
    (b) cerebellum.
    (c) cerebral cortex.
    (d) hypothalamus.
    (e) thalamus.

ANSWER: a

64. The cerebellum
    (a) is concerned primarily with motor activity yet does not have any direct influence on efferent motor neurons.
    (b) is part of the subcortical region of the brain.
    (c) when diseased gives rise to resting tremors.
    (d) contains the reticular activating system.
    (e) is associated with declarative memories.

ANSWER: a

65. The cerebellum
    (a) is important for the maintenance of balance.
    (b) compares the intentions of the higher motor centers with the performance of the muscles and corrects any deviations from the intended movement.
    (c) plays a role in the planning and initiation of voluntary activity.
    (d) controls eye movement.
    (e) inhibits muscle tone.

ANSWER: b

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.

ANSWER: b

67. Which of the following statements concerning the brain stem is incorrect?
    (a) the medulla is part of the brain stem.
    (b) the brain stem is a critical connecting link through which all fibers traversing between the periphery and higher brain centers must pass.
    (c) the brain stem controls sociosexual behaviors conducive to mating.
    (d) the brain stem contains the reticular activating system.
    (e) the brain stem contains centers that control respiration, blood vessel and heart function, and digestive activities.

ANSWER: c

68. Which cranial nerve primarily innervates visceral organs?
    (a) facial.
    (b) trochlear.
    (c) vagus.
    (d) abducens.
    (e) accessory.

ANSWER: c

69. Which of the following statements concerning paradoxical sleep is incorrect?
    (a) paradoxical sleep is characterized by rapid eye movements.
    (b) a person normally passes through paradoxical sleep before entering slow-wave sleep.
    (c) dreaming occurs only during paradoxical sleep.
    (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.

ANSWER: b

70. Which of the following can activate the arousal system?
    (a) motor activity.
    (b) afferent sensory input.
    (c) intense excitement.
    (d) two of these answers.
    (e) all of these answers.

ANSWER: e

71. A neuromodulator implicated as a neural sleep factor is
    (a) adenosine.
    (b) ATP.
    (c) caffeine.
    (d) norepinephrine.
    (e) enkephalin.

ANSWER: a

True/False

72. Nerves of the autonomic nervous system control skeletal muscle responses.

ANSWER: False

73. Efferent neurons are motor neurons.

ANSWER: True

74. If neuronal pathways present at birth are not used during sensitive developmental periods, they may be eliminated.

ANSWER: True

75. Interneurons lie entirely within the central nervous system.

ANSWER: True

76. Afferent neurons have a long peripheral axon and a short central axon.

ANSWER: True

77. The cell bodies of afferent and efferent neurons both originate in the CNS.

ANSWER: False

78. Efferent neurons are the most abundant type of neuron.

ANSWER: False

79. Astrocytes take up the neurotransmitter GABA.

ANSWER: True

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

ANSWER: False

81. The blood-brain-barrier prevents an increase in the concentration of potassium ions in the ECF surrounding brain cells.

ANSWER: True

82. Hydrocephalus is caused by insufficient cerebrospinal fluid.

ANSWER: False

83. Ninety percent of the cells within the CNS are neurons.

ANSWER: False

84. Microglia are phagocytic cells delivered by the blood to the central nervous system.

ANSWER: True

85. Most brain tumors of neural origin consist of glial cells.

ANSWER: True

86. The brain lacks plasticity of functions.

ANSWER: False

87. The cerebral cortex is an inner core of white matter.

ANSWER: False

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

ANSWER: False

89. The cerebrospinal fluid comes into direct contact with the neuronal and glial cells.

ANSWER: False

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

ANSWER: True

91. Cells forming the brain capillaries are joined by tight junctions that completely seal the capillary wall.

ANSWER: True

92. The cells that form the walls of the brain capillaries have the inherent ability to form tight junctions.

ANSWER: False

93. The brain cannot produce ATP in the absence of oxygen.

ANSWER: True

94. 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.

ANSWER: True

95. An electroencephalogram is a record of action potential activity in the cerebral cortex.

ANSWER: False

96. The gray matter in the CNS consists of parts of neurons not covered with myelin.

ANSWER: True

97. The occipital lobe is in the anterior region of the brain.

ANSWER: False

98. Different parts of the body are not represented by equal areas of the sensory homunculus of the parietal lobe.

ANSWER: True

99. The two regions of gray matter within the cerebrum are the cerebral cortex and the basal nuclei.

ANSWER: True

100. Different parts of the body are not equally represented in the somatosensory cortex and in the primary motor cortex.

ANSWER: True

101. White matter consists primarily of myelinated nerve fibers.

ANSWER: True

102. Gray matter consists predominantly of neuron cell bodies and dendrites.

ANSWER: True

103. Sound sensation is initially received by the parietal lobes.

ANSWER: False

104. The amount of cortical space in the primary motor cortex devoted to a given body part is proportional to the size of the part.

ANSWER: False

105. The right hemisphere is usually dominant in right-handed persons.

ANSWER: False

106. Stimulation of the frontal lobe produces changes in personality and social behavior.

ANSWER: False

107. Complex thought is a function of the frontal lobe.

ANSWER: True

108. The right and left cerebral hemispheres perform identical functions except for controlling opposite sides of the body.

ANSWER: False

109. A flat EEG always signifies brain death.

ANSWER: False

110. The basal nuclei are part of the cerebrum.

ANSWER: True

111. Resting tremors are associated with diseases of the basal nuclei.

ANSWER: True

112. Centers for the control of respiration and circulatory function are located in the hypothalamus.

ANSWER: False

113. The motor cortex on the frontal lobe is not the only brain region involved in motor control.

ANSWER: True

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

ANSWER: False

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

ANSWER: True

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

ANSWER: True

117. Somatotopic maps of the cerebral cortex are static through the life of the organism.

ANSWER: False

Fill-in-the-Blank

118. The CNS is comprised of the brain and _____.

ANSWER: spinal cord

119. The nervous system is organized into the _____, consisting of the brain and _____, and the _____, consisting of nerve fibers that carry information between the CNS and other parts of the body.

ANSWER: central nervous system, spinal cord, peripheral nervous system

120. 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.

ANSWER: nervous, endocrine

121. The _____ division of the peripheral nervous system carries information to the CNS. Instructions from the CNS are transmitted via the _____ division of the peripheral nervous system to the _____ organs.

ANSWER: afferent, efferent, effector

122. The efferent division of the peripheral nervous system is divided into the _____, which consists of _____ that supply the skeletal muscles, and the _____, which innervates smooth muscle, cardiac muscle, and glands.

ANSWER: somatic nervous system, motor neurons, autonomic nervous system

123. The two subdivisions of the autonomic nervous system are the _____ and the _____.

ANSWER: sympathetic nervous system, parasympathetic nervous system

124. An _____ organ is a muscle or gland carrying out a response.

ANSWER: effector

125. A sensory receptor generates action potentials if disturbed by an environmental change or _____.

ANSWER: stimulus

126. About 90% of the cells in the CNS are _____ cells.

ANSWER: glial

127. The four major types of glial cells are _____, _____, _____, and _____.

ANSWER: astrocytes, oligodendrocytes, ependymal cells, microglia

128. _____ are the glial cells that induce anatomical changes in blood vessels.

ANSWER: astrocytes

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

ANSWER: meninges

130. The _____ is a special cushioning fluid that surrounds the brain and spinal cord.

ANSWER: cerebrospinal fluid

131. The meninges from the outermost to the innermost layer are the _____, the _____, and the _____.

ANSWER: dura mater, arachnoid mater, pia mater

132. _____ are tumors of the meninges.

ANSWER: meningiomas

133. The _____ contains CSF which is reabsorbed in the arachnoid villi.

ANSWER: subarachnoid space

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

ANSWER: glucose

135. The largest portion of the human brain is the _____, which is divided into two halves.

ANSWER: cerebrum

136. Hydrocephalus results from the accumulation of _____ in regions of the brain.

ANSWER: CSF

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

ANSWER: gray, white

138. The _____ lobes of the cerebral cortex are responsible for initial processing of visual input.

ANSWER: occipital

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

ANSWER: somatosensory, parietal

140. Brain capillaries are joined by _____ junctions.

ANSWER: tight

141. _____ area is responsible for speaking ability, whereas _____ area is concerned with language comprehension.

ANSWER: Broca's, Wernicke's

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

ANSWER: plasticity

143. The _____ and _____ compose the diencephalon of the brain.

ANSWER: thalamus, hypothalamus

144. The _____ hemisphere excels in performance of logical, analytical, sequential and verbal tasks, whereas the _____ hemisphere excels in nonlanguage skills such as spatial perception and artistic and musical endeavors.

ANSWER: left, right

145. The _____ of the brain maintains upright posture.

ANSWER: cerebellum

146. The _____ consist of several masses of gray matter located deep within the cerebral white matter.

ANSWER: basal nuclei

147. The _____ serves as a relay station and synaptic integrating center for preliminary processing of all sensory input on its way to the cortex.

ANSWER: thalamus

148. The central sulcus separates the _____ and _____ lobes.

ANSWER: frontal, parietal

149. Voluntary motor activity is mainly a function of the _____ lobe.

ANSWER: frontal

150. _____ refers to the ability to direct behavior toward specific goals.

ANSWER: motivation

151. _____ is the acquisition of knowledge as a consequence of experience.

ANSWER: learning

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

ANSWER: homeostatic drives

Matching

153. Indicate which brain structure is associated with each function by writing the appropriate letter in the blank using the following answer code:
(a) cerebellum
(b) hypothalamus
(c) brain stem
(d) basal nuclei
(e) cerebral cortex

_____ Controls anterior pituitary hormone secretion.
_____ Initiates all voluntary movement.

_____ Inhibits muscle tone throughout the body.
_____ Damage to this structure is associated with a resting tremor.
_____ Controls thirst, urine output, food intake, and body temperature.
_____ Contains centers for respiration, heart and blood vessel function, and many digestive activities.
_____ Helps monitor and coordinate slow, sustained contractions, especially those related to balance and posture.
_____ Contains the autonomic nervous system coordinating center.
_____ Disorder of this structure characterized by an intention tremor.
_____ Plays a role in emotion and behavioral patterns.
_____ Is concerned with the coordination of motor activity initiated by higher brain centers; compares the "intentions" of the higher centers with the "performance" of the muscles, and corrects any "errors."
_____ Accomplishes final sensory perception.

ANSWER: b, e, d, d, b, c, d, b, a, b, a, e

154. Indicate whether the characteristics below pertain to the nervous system or endocrine system by writing the appropriate letter in the blanks using the following answer code:
(a) applies to the nervous system
(b) applies to the endocrine system
(c) applies to both the nervous system and the endocrine system

_____ Coordinates rapid activities of the body.
_____ Secretes hormones.
_____ Primarily controls metabolic activities and other activities that require duration rather than speed.
_____ Alters target cells by release of chemical messengers that interact with specific receptors of the target cells.
_____ Chemical messengers travel long distances.
_____ Chemical messengers travel short distances.
_____ Chemical messengers released only in response to an action potential.

ANSWER: a, b, b, c, b, a, a

155. Match the following lobes to its descriptions.
(a) occipital lobes
(b) temporal lobes
(c) parietal lobes
(d) frontal lobes

_____ Initially process sound input.
_____ Initially process visual input.
_____ Initially process somesthetic sensation and proprioception.
_____ Contain primary motor cortex.
_____ Contain the region responsible for personality traits.
_____ Contain the limbic association cortex.
_____ Located on the sides of the head.
_____ Located at the back of the head.
_____ Located in front of the central sulcus.
_____ Located to the rear of the central sulcus.

ANSWER: b, a, c, d, d, b, b, a, d, c

156. Indicate which nervous pathway is being described by writing the appropriate letter in the blanks using the following answer code:
(a) ascending tracts
(b) descending tracts
(c) afferent neurons
(d) efferent neurons

_____ Carry information from the periphery to the CNS.

_____ Carry information up the spinal cord to the brain.
_____ Carry information from the brain down the spinal cord.
_____ Carry information from the CNS to the effector organs.

ANSWER: c, a, b, d

157. Match the structure to its proper description.
(a) dorsal horn
(b) dorsal root
(c) dorsal root ganglion
(d) ventral horn
(e) ventral root
(f) lateral horn

_____ Afferent fibers enter the spinal cord through this structure.
_____ Efferent fibers leave the spinal cord through this structure.
_____ Contains cell bodies of interneurons upon which afferent neurons terminate.
_____ Contains cell bodies of afferent neurons.
_____ Contains cell bodies of the efferent motor neurons supplying skeletal muscles.
_____ The cell bodies of autonomic nerve fibers originate here.

ANSWER: b, e, a, c, d, f

158. Complete the sentences using the following answer code.
(a) astrocytes
(b) oligodendrocytes
(c) ependymal cells
(d) microglia

_____ are brain phagocytes.
_____ line the brain ventricles.
_____ form the insulative myelin sheaths around axons in the CNS.
_____ are the main brain "glue."

ANSWER: d, c, b, a

159. Match the following structures to their descriptions.
(a) gray matter of spinal cord.
(b) white matter of spinal cord
(c) dorsal root ganglion

_____ location of ascending and descending tracts
_____ location of cell bodies for efferent neurons
_____ location of cell bodies for afferent neurons
_____ location of short interneurons involved in integration of spinal reflexes
_____ outer portion of spinal cord
_____ inner portion of spinal cord

ANSWER: b, a, c, a, b, a

160. Match the following structures to their descriptions.

(a) arachnoid villi
(b) subarachnoid space
(c) choroid plexuses
(d) dural sinuses
(e) dura mater

_____ tough, inelastic outer meningeal layer
_____ venous blood draining from the brain empties here
_____ tissue across which CSF is reabsorbed into the blood
_____ site of formation of CSF
_____ location of CSF as it surrounds the brain

ANSWER: e, d, a, c, b

161. Match the following structures to their descriptions.
(a) temporal lobe
(b) Wernicke's area
(c) somatosensory cortex
(d) limbic association cortex
(e) corpus callosum
(f) primary motor cortex
(g) occipital lobe
(h) Broca's area
(i) supplementary motor area
(j) prefrontal association cortex

_____ a thick band of axons transversing between the two hemispheres
_____ initial cortical processing for vision
_____ initial cortical processing for hearing
_____ initial cortical processing for sensations arising from the surface of the body
_____ programs complex sequences of movement
_____ triggers voluntary movement by activating motor neurons
_____ responsible for speaking ability
_____ responsible for comprehension and formulation of coherent patterns of speech
_____ primarily concerned with motivation and emotion
_____ lesions in this area result in changes in personality and social behavior

ANSWER: e, g, a, c, i, f, h, b, d, j

162. Match the following structures to their descriptions.
(a) vestibulocerebellum
(b) spinocerebellum
(c) cerebrocerebellum

_____ Regulates muscle tone; compares intentions of higher centers with performance of muscles and corrects any errors, especially with rapid phasic movements.
_____ Plays a role in planning and initiation of voluntary activity; important for learning and remembering procedural motor tasks.
_____ Is important for balance and eye movement.

ANSWER: b, c, a

163. Indicate which characteristic applies to which type of memory using the following answer code:
(a) short-term memory
(b) long-term memory

_____ very large storage capacity
_____ limited storage capacity
_____ site for initial deposition of new information
_____ takes longer to retrieve information from this store
_____ involves transient modifications in function of preexisting synapses
_____ probably involves relatively permanent functional or structural changes between existing neurons

ANSWER: b, a, a, b, a, b

164. Match the following functions to their cranial nerves.
    (a) hearing, body balance
    (b) sense of smell
    (c) sensory, motor function to facial regions, teeth
    (d) controls many internal organs in the ventral body cavity
    (e) moves the eye
    (f) sense of vision

_____ oculomotor
_____ olfactory
_____ optic
_____ trigeminal
_____ vagus
_____ vestibulocochlear

ANSWER: e, b, f, c, d, a

165. Match spinal tract with correct characteristic.
    (a) ventral spinocerebellar
    (b) rubrospinal
    (c) lateral corticospinal
    (d) fasciculus cuneatus
    (e) lateral spinothalamic

_____ tract that terminates in the cerebellum
_____ tract for motor impulses providing muscle tone control
_____ tract for voluntary motor actions
_____ largest sensory tract
_____ sensory tract for pain and temperature

ANSWER: e, d, c, b, a

Essay Questions

1. Compare and contrast the nervous and endocrine systems.

2. Describe the organization of the nervous system.

3. Describe the structure and function of the cerebral cortex.

4. Describe the structural aspects of the limbic system and its functions.

5. Describe how memories are created.