Name:_____ Class:_____ Date:_____

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1. What brain structure is involved in the formation of myelin?
   a. Neurons
   b. Glia cells
   c. Dendrites
   d. Synapses

ANSWER: b

2. Reflexive activity, such as jerking your hand away from a hot stove, is governed by the ____.
   a. rescue system
   b. endocrine system
   c. nervous system
   d. parasympathetic system

ANSWER: c

3. The action of tying your shoes is most likely to involve the ____ system.
   a. endocrine
   b. exocrine
   c. nervous
   d. parasympathetic

ANSWER: c

4. The information-carrying cells of the nervous system are called ____.
   a. Neurons
   b. glia cells
   c. Hormones
   d. Glands

ANSWER: a

5. Glia cells are responsible for ____.
   a. forming myelin
   b. directing the activity of hormones
   c. providing very little benefit to the brain
   d. occasionally functioning as neurotransmitters

ANSWER: a

6. Which of the following statements is TRUE regarding neurons and glia cells in the adult human brain?
   a. Neurons are far more numerous than glia cells.
   b. Neurons are more concentrated in the brainstem than glia cells.
   c. Neurons and glia cells are similar in number.
   d. Neurons are far less numerous than glia cells.

ANSWER: c

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7. Myelin ____.
   a. is a type of neurotransmitter
   b. disrupts neurological activity
   c. is produced by the action potential
   d. speeds up neural signals

ANSWER: d

8. Symptoms of multiple sclerosis include ____.
   a. difficulty with movement
   b. digestive ailments
   c. high fever
   d. skin rash

ANSWER: a

9. Without glia cells, your brain would ____.
   a. experience no change in function
   b. be forced to communicate more often through the endocrine system
   c. repair itself more rapidly than normal in the case of an injury
   d. send information more slowly

ANSWER: d

10. Which disease is associated with myelin loss, causing neural impulses to travel around the brain without reaching its destination?
   a. Depression
   b. Multiple sclerosis
   c. Parkinson's disease
   d. Alzheimer's disease

ANSWER: b

11. Francisco has a disease that is destroying the myelin on his neurons. What effect will this disease most likely have on Francisco?
   a. His brain and spinal cord will completely cease to function.
   b. He will be paralyzed on one side of his body but not the other.
   c. His neural signals will slow down.
   d. His neural signals will speed up.

ANSWER: c

12. The part of the neuron that receives incoming signals from other neurons is called the ____.
   a. axon
   b. dendrite

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c. cell body
d. synaptic cleft

ANSWER: b

13. Dr. Adelman is biological psychologist who is most interested in studying the part of the neuron that receives input from other neurons. He is most likely to focus on which of the following?
a. Myelin
b. Axon bulbs
c. Dendrites
d. Glia

ANSWER: c

14. Within a single neuron, dendrites are ____ and axon bulbs ____.
a. active in communication; active in cell metabolism
b. myelinated; unmyelinated
c. on the head; at the tail
d. much smaller; much larger

ANSWER: c

15. A neuron's axon ____.
a. is nearly always less than two millimeters in length
b. is usually completely covered in myelin from end-to-end
c. can either by myelinated or unmyelinated
d. usually ends in one "bulb," which physically connects to the next neuron

ANSWER: c

16. Axons on neurons in the brain are typically ____.
a. longer than those in the peripheral nervous system
b. shorter than those in the peripheral nervous system
c. about the same size as those in the peripheral nervous system
d. extremely variable in length, with some being very long and others very short

ANSWER: b

17. The junction between the adjoining neurons where the axon bulb of one neuron comes in proximity with specialized receptor sites on another neuron is called the ____.
a. synapse
b. myelin sheath
c. dendrite space
d. cellular gap

ANSWER: a

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18. The vesicles at the end of an axon bulb contain ____.
    a. sodium (Na+) ions
    b. neurotransmitters
    c. myelin
    d. DNA

ANSWER: b

19. Axons are necessary for neurons to be able to ____.
    a. receive neural impulses from other neurons
    b. duplicate themselves
    c. direct the development of the neuron
    d. send neural impulses to other neurons

ANSWER: d

20. A neuron's DNA exists within its ____.
    a. cell body
    b. dendrites
    c. axon
    d. axon bulb

ANSWER: a

21. If your neurosurgeon were able to take a neuron out of your brain and examine it, she would most likely find that ____.
    a. its axon would be very short
    b. it would have two cell bodies
    c. it would have more than one axon
    d. its cell body would not have any dendrites attached to it

ANSWER: a

22. The branch-like structures on the heads of neurons that receive signals from other neurons are called ____.
    a. dendrites
    b. myelin sheaths
    c. axon hillocks
    d. synapses

ANSWER: a

23. Each neuron in the brain can potentially form a synapse with up to ____ other neuron(s).
    a. 1
    b. 10
    c. 1000
    d. 10000

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ANSWER: d

24. If you wanted to trace the typical flow of information through a single neuron, you would have to start at the____, go through the ____, and end at the ____.
    a. dendrites; medulla; dendrites
    b. axon hillock; axon bulb; dendrites
    c. dendrites; axon; axon bulb
    d. axon bulb; brain stem; dendrites

ANSWER: c

25. If you needed to explain to your friend what a synapse is, what would you say?
    a. A synapse is the part of the neuron that receives incoming signals and initiates the action potential.
    b. A synapse is the tiny gap between the axon bulb of one neuron and the dendrites of another.
    c. A synapse is the insulation on the outside of the neuron.
    d. A synapse is the structure on axons that stores and releases neurotransmitters.

ANSWER: b

26. When your teacher is attempting to describe a postsynaptic neuron, she is essentially talking about a neuron that ____.
    a. is myelinated
    b. is unmyelinated
    c. receives input from another neuron
    d. sends messages to another neuron

ANSWER: c

27. A synapse is essentially a (n) ____.
    a. gap
    b. wire
    c. chemical
    d. electrical charge

ANSWER: a

28. Receptor sites for communication among neurons exist on ____.
    a. sodium ions
    b. neurotransmitters
    c. dendrites
    d. myelin

ANSWER: c

29. A specific receptor site and its specific neurotransmitter are analogous to ____.
    a. two managers discussing a decision
    b. a lock and the correct key

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c. a receptionist talking on the phone
d. a cue stick and a billiard ball

ANSWER: b

30. There are many more neural connections in the brain than the number of neurons because ____.
a. each neuron can synapse with many other neurons
b. neural connections also occur between glia cells
c. all that is needed for a neural connection is two different types of brain material
d. any two neurons can communicate in both directions across the same synapse

ANSWER: a

31. Which statement is most correct about the complexity of neurological processes in the brain?
a. Neurological processes are actually very simple, with just a few activities happening one right after another repeatedly.
b. Neurological processes are not understood at all, given our current knowledge base.
c. Neurological processes are totally understood now that we have the technology to observe them.
d. Neurological processes are very complex, with many activities happening at the same time.

ANSWER: d

32. The brain uses electrochemical energy that is produced by ____.
a. ions
b. alternating current
c. direct current
d. electrons

ANSWER: a

33. If Clark had no ions in his nervous system, ____.
a. his action potentials would be faster
b. his action potentials would be slower
c. he would not be able to generate any action potentials
d. he would be able to move, but he would not be able to think

ANSWER: c

34. If Mary's neurons were never able to achieve a potential more positive than –70 millivolts, ____.
a. her action potentials would be very slow
b. she would not be able to generate any action potentials
c. her action potentials would be very inconsistent
d. she would be able to move, but she would not be able to think

ANSWER: b

35. Which of the following is TRUE regarding the resting potential of a neuron?

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a. In mammals it is about –20 millivolts.
b. During its resting state, all ionized particles can move freely into and out of the neuron.
c. The potential is maintained by high concentrations of magnesium outside the neuron.
d. The predominant charge inside a neuron at rest is negative.

ANSWER: d

36. Which of the following neuron resting potentials is typical in mammals?
a. –70 millivolts
b. –45 millivolts
c. 0 millivolts
d. 5 millivolts

ANSWER: a

37. When the inside of the axon has a greater negative charge than the outside, it is safe to conclude that ____.
a. an action potential is not being generated in that part of the axon
b. the axon is depolarized
c. there is an especially large concentration of Na+ ions inside the axon
d. an action potential is being generated in that part of the axon

ANSWER: a

38. The action potential is directly created when ____.
a. vesicles in the axon release neurotransmitters
b. myelin is produced by the cell body
c. sodium (Na+) ions flood into the axon
d. DNA is released into the synapse

ANSWER: c

39. You are a neurosurgeon performing surgery on a 50-year-old man. When you insert an electrode into the axon of one of his neurons while it is not receiving or sending information, what voltage should you record with your instruments?
a. 55 mv
b. −55 mv
c. 70 mv
d. −70mv

ANSWER: d

40. When neurotransmitters bind with receptor sites, what is the essential event that eventually causes the postsynaptic neuron to generate an action potential?
a. the creation of myelin sheathing
b. the flooding of sodium (Na+) into the cell
c. the removal of anions from the cell
d. the generation of electrical current in the dendrites

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ANSWER: b

41. −70 millivolts is to ____ as −55 millivolts is to ____.
    a. resting potential; threshold of excitation
    b. threshold of excitation; resting potential
    c. home electrical capacity; the body's electrical capacity
    d. the body's electrical capacity; home electrical capacity

ANSWER: a

42. An action potential is a ____.
    a. chemical imbalance
    b. possible activity
    c. reflex movement
    d. neural impulse

ANSWER: d

43. Which phrase best describes how the action potential occurs?
    a. "all or none"
    b. "slow but sure"
    c. "speed equals intensity"
    d. "all for one, and one for all"

ANSWER: a

44. As one of Wilbur's neurons fires an action potential, the charge inside the neuron becomes ____.
    a. negative
    b. positive
    c. stable
    d. unpredictable

ANSWER: b

45. In mammals, the threshold of excitation is about ____.
    a. 55mv
    b. −70mv
    c. −55mv
    d. 70mv

ANSWER: c

46. Potassium ions (K+) will continue to leave the neuron until the neuron's ____.
    a. resting potential is depleted
    b. threshold of excitation is stimulated again
    c. resting potential is restored

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d. resting potential is positive

ANSWER: c

47. Why is it important for potassium ions (K+) to move out of the axon once an action potential has been fired?
    a. Because their continued presence would be damaging to the tissues of the axon
    b. So that the neuron will have the ability to generate another action potential
    c. Because of the required binding with potassium (K+) to activate the refractory period
    d. In order to create a more negative charge outside rather than inside the neuron

ANSWER: b

48. The refractory period is the ____.
    a. time it takes to fire an action potential
    b. period of time that neurotransmitters are active within the synapse
    c. time during which a neuron is restoring its resting potential after an action potential has been fired
    d. the total period of time it takes for a neuron to receive information from one neuron and transmit it to another one

ANSWER: c

49. If after firing once, Michal's neurons did not return to their resting potential, her neurons would be ____.
    a. unable to fire again
    b. able to fire more rapidly than normal
    c. seriously damaged from lack of rest
    d. totally normal

ANSWER: a

50. The refractory period occurs ____.
    a. during the night when our neurons are at rest
    b. only when inhibitory neurotransmitters are released
    c. between action potentials
    d. as the cell begins to depolarize

ANSWER: c

51. Once an action potential reaches the end of the axon, how does the information usually get to the next neuron?
    a. The action potential jumps across the synaptic cleft to the next neuron in the form of an electrical impulse.
    b. Myelin acts as a bridge to transport it across the synaptic cleft.
    c. Potassium ions (K+) move back and forth between neurons to carry the information across.
    d. Vesicles at the end of the axon release neurotransmitters which float across the synaptic cleft to the next neuron.

ANSWER: d

52. Neurotransmitters being released by a presynaptic neuron into the synapse are due to,____.
    a. the neuron being in a refractory period

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b. a large concentration of Na+ ions outside of the presynaptic axon
c. a high concentration of negative ions inside the neuron
d. action potentials that have occurred in the presynaptic neuron

ANSWER: d

53. How do neurotransmitters "communicate" with postsynaptic neurons?
a. Like a "key fitting into a lock," they bind with corresponding receptor sites on dendrites of the neuron.
b. Like "water over a dam," they build up until they flood into the next neuron through sheer force.
c. Like a "hot knife through butter," they easily penetrate right into the cell body through the dendrites.
d. Like "throwing darts," they are propelled across the synapse and communicate with the neuron wherever they land.

ANSWER: a

54. An axon that has a –55 mv electric potential across its membrane ____.
a. probably does not have any myelin sheathing
b. is going to fire an action potential
c. has a very large concentration of Na+ ions inside the axon
d. has just released several neurotransmitters

ANSWER: b

55. If you were to inject sodium (Na+) into a neuron in a rat's brain, what effect would it have on the neuron?
a. It would make the neuron more likely to fire an action potential.
b. It would make the neuron less likely to fire an action potential.
c. It would prevent the neuron from firing action potentials.
d. It would make the neuron fire action potentials that travel more slowly than normal.

ANSWER: a

56. A neuron firing an action potential is most like a person ____.
a. driving a car
b. playing basketball
c. turning on a light
d. running down the road

ANSWER: c

57. Excitation causes a postsynaptic cell to ____.
a. become more negative in its resting potential
b. become more positive in its resting potential
c. move further away from the threshold of an action potential
d. become more neutral in its resting potential

ANSWER: b

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58. Rick is given a medication that makes his neurons more positive in their resting potential. What effect will this most likely have on Rick's nervous system?

a. He will have more excitation in his nervous system.
b. He will have more inhibition in his nervous system.
c. He will have less excitation in his nervous system.
d. This drug will not affect the functioning of Rick's nervous system.

ANSWER: a

59. Suppose you take a drug that indirectly causes potassium (K+) to leave your postsynaptic neurons. What effect would the drug have?

a. Excitatory
b. Inhibitory
c. Hallucinogenic
d. Sedative

ANSWER: b

60. Suppose you have a neurological problem that could be fixed by increasing the likelihood that your neurons will fire action potentials. Your doctor may prescribe a drug that has what type of effect?

a. Impulsive
b. Binding
c. Excitatory
d. Inhibitory

ANSWER: c

61. Marta is injected with a drug that prevents sodium (Na+) from entering into neurons in the part of the brain that controls the movement of the arms. What effect will this drug most likely have on Marta?

a. She will more her arms spasmodically.
b. She will not be able to move her arms.
c. Her arms will be numb, but she will be able to move them.
d. She will likely go into a coma.

ANSWER: b

62. Suppose you take a drug that causes neurons in your brain to stop firing. What effects will the drug have?

a. Excitatory
b. Stimulating
c. Inhibitory
d. Stabilizing

ANSWER: c

63. Inhibition occurs when ____.

a. sodium ions (Na+) flood into the axon of a neuron
b. the resting potential of a postsynaptic neuron is moved closer to –55 millivolts

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c. a neurotransmitter makes a postsynaptic neuron less likely to fire an action potential

d. a neurotransmitter makes a presynaptic neuron more likely to fire

ANSWER: c

64. Elena is given a drug that moves the resting potential of her neurons to −90 mv. What effect will this likely have on Elena?

a. It will take less stimulation to get her neurons to fire action potentials.

b. It will take more stimulation to get her neurons to fire action potentials.

c. It will be impossible to get her neurons to fire action potentials.

d. Her neurons will begin to fire action potentials at random.

ANSWER: b

65. If you were to remove potassium ions (K+) from inside of a neuron, the net effect on the neuron results in ____.

a. excitation

b. inhibition

c. the firing of an action potential

d. rapid neuronal death

ANSWER: b

66. Melanie is given an injection of a drug that increases inhibition in her brain. The net effect of this drug will most likely be ____.

a. neuronal death

b. more action potentials in her brain

c. fewer action potentials in her brain

d. more rapid firing of action potentials

ANSWER: c

67. Reuptake is essential to normal neurological function because it ensures that the ____.

a. electrical current stays within the synapse

b. right amount of excitation and inhibition occurs

c. speed of action potentials is always at the highest level

d. neuron never enters a resting phase

ANSWER: b

68. Moving your arm requires ____.

a. inhibition only

b. excitation only

c. neither inhibition, nor excitation

d. both inhibition and excitation

ANSWER: d

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69. Which statement is TRUE regarding the processes of excitation and inhibition?
   a. In order for the body to work normally, neurotransmitters should usually be excitatory.
   b. In order for the body to work normally, neurotransmitters should usually be inhibitory.
   c. Both inhibitory and excitatory processes are necessary for normal neurological activity.
   d. Neither excitatory nor inhibitory processes are good for normal neurological activity.

ANSWER: c

70. Reuptake describes the ____.
   a. recycling and returning of neurotransmitters to the presynaptic neuron
   b. movement of ions back outside the axon after the action potential has been fired
   c. process of neurons stretching and then retracting as they communicate with neighboring neurons
   d. shrinking of myelin on the axons of neurons

ANSWER: a

71. Prozac inhibits the reuptake of the neurotransmitter serotonin. When you take Prozac, the effect of this drug will ____.
   a. reduce the action of serotonin in the brain
   b. increase the time serotonin spends in the synapses of the brain
   c. prevent the release of serotonin in the synapses of the brain
   d. prevent the absorption of serotonin in the postsynaptic neuron

ANSWER: b

72. If your teacher required you to learn the names and functions of all the neurotransmitters that researchers have identified, you would have to learn about ____ neurotransmitters.
   a. fewer than 50
   b. 50 to 75
   c. 76 to 100
   d. more than 100

ANSWER: d

73. The first neurotransmitter discovered was ____.
   a. acetylcholine
   b. dopamine
   c. serotonin
   d. epinephrine

ANSWER: a

74. Dr. Bush specializes in the study of hormones and neurotransmitters. His research would show that ____.
   a. some hormones behave like neurotransmitters
   b. hormones never behave like neurotransmitters
   c. hormones and neurotransmitters are actually the same thing

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d. hormones do not affect neurological activity

ANSWER: a

75. If you are currently taking a drug that affects your behavior, most likely, it is affecting the ____.
a. speed or your action potentials
b. strength of your action potentials
c. number of new neurons your brain produces
d. activity occurring within your synapses

ANSWER: d

76. Most psychoactive drugs taken by humans primarily affect the ____.
a. movement of ions across the membrane of the axon
b. activity of neurotransmitters in the synapse
c. development of myelin around the axon
d. creation or death of neurons in the brain

ANSWER: b

77. Alzheimer's patients are often prescribed medications that are designed to improve awareness and memory. The neurotransmitter most likely to be affected by these drugs is ____.
a. testosterone
b. GABA
c. acetylcholine
d. adrenaline

ANSWER: c

78. One of the reasons that your grandfather with Alzheimer's disease has memory problems might be a (n) ____.
a. increased supply of serotonin in his brain
b. decreased supply of Na+ around his neurons
c. decreased supply of acetylcholine in his brain
d. increased supply of myelin around his axons

ANSWER: c

79. Alzheimer's disease has been associated with loss of neurons that produce ____.
a. dopamine
b. endorphins
c. acetylcholine
d. GABA

ANSWER: c

80. Hedda takes a drug that increases the amount of acetylcholine in her brain. Hedda is most likely taking this drug for which condition?

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a. multiple sclerosis
b. Alzheimer's disease
c. Parkinson's disease
d. Schizophrenia

ANSWER: b

81. Recent research has suggested that acetylcholine plays a role in ____.
a. memory and awareness
b. sleep and pain perception
c. sex and eating
d. motivation and weight loss

ANSWER: a

82. The fact that people gain pleasure from eating and sexual activity is at least partially due to the effects of neurotransmitters. Which neurotransmitter is the most likely source of this pleasure?
a. Epinephrine
b. Glutamate
c. Endorphins
d. Dopamine

ANSWER: d

83. Treating a patient with Parkinson's disease with a drug that increases dopamine activity too greatly could lead to symptoms of ____.
a. depression
b. autism
c. schizophrenia
d. paralysis

ANSWER: c

84. Treating a patient with schizophrenia with a drug that decreases dopamine activity too greatly could lead to symptoms of ____.
a. Parkinson's disease
b. autism
c. anxiety
d. dissociative identity disorder

ANSWER: a

85. Parkinson's disease is to ____ as schizophrenia is to ____.
a. small amounts of serotonin; small amounts of acetylcholine
b. small amounts of dopamine; large amounts of dopamine
c. large amounts of serotonin; small amounts of serotonin

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d. large amounts of acetylcholine; large amounts of dopamine

ANSWER: b

86. A person with schizophrenia who takes a drug that increases brain levels of dopamine will most likely ____.
a. experience reduced symptoms
b. experience increased symptoms
c. become depressed
d. exhibit the symptoms of Parkinson's disease

ANSWER: b

87. George has a disease that is associated with a lack of dopamine-producing neurons in his brain. George most likely has ____.
a. multiple sclerosis
b. cancer
c. Parkinson's disease
d. Alzheimer's disease

ANSWER: c

88. Emilio is taking a drug for his Parkinson's disease. What effect would you expect this drug to have on Emilio's brain?
a. Increase dopamine levels
b. Increase serotonin levels
c. Increase acetylcholine levels
d. Increase endorphin levels

ANSWER: a

89. Parkinson's disease is associated with the loss of neurons in an area of the brain richest in ____.
a. serotonin
b. acetylcholine
c. dopamine
d. norepinephrine

ANSWER: c

90. Which statement is TRUE regarding dopamine?
a. High levels of dopamine are related with symptoms of autism.
b. Low levels of dopamine are related with symptoms of Parkinson's disease.
c. Dopamine makes activities like sex and eating less pleasurable.
d. Dopamine was the first neurotransmitter to be discovered.

ANSWER: b

91. Those who are prescribed Prozac are presumed to have ____ in their brain.
a. high levels of GABA

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b. low levels of acetylcholine
c. high levels of dopamine
d. low levels of serotonin

ANSWER: d

92. Which neurotransmitter is the primary target of drugs, such as Prozac, that are used to treat depression?
a. Norepinephrine
b. Serotonin
c. Dopamine
d. Acetylcholine

ANSWER: b

93. Many sedative medications such as Valium and phenobarbital exert their effects by acting on ____.
a. glutamate
b. endorphins
c. dopamine
d. GABA

ANSWER: d

94. The chief inhibitory neurotransmitter in the brain is ____, and the chief excitatory neurotransmitter is ____.
a. GABA; glutamate
b. epinephrine; norepinephrine
c. serotonin; dopamine
d. acetylcholine; GABA

ANSWER: a

95. The symptoms of depression that may follow heavy use of MDMA (ecstasy) may result from depleted levels of ____.
a. dopamine
b. serotonin
c. GABA
d. glutamate

ANSWER: b

96. The chief excitatory neurotransmitter in the brain is ____.
a. serotonin
b. dopamine
c. GABA
d. glutamate

ANSWER: d

97. Juan, a 9-year-old boy, was in an accident and suffered a brain injury. Which neurotransmitter will most likely most

help Juan recover functioning after injury?

a. acetylcholine
b. serotonin
c. glutamate
d. norepinephrine

ANSWER: d

98. A person may be prescribed Valium in order to ____ activity.

a. increase dopamine
b. increase GABA
c. decrease serotonin
d. decrease glutamate

ANSWER: b

99. Your college roommate likes to binge drink on Saturday nights. After one particularly bad weekend, she becomes concerned about the effects of so much alcohol on her brain. Knowing that you are studying the brain in psychology, she asks you to explain the effects of alcohol on the brain. You should tell her that alcohol affects the function of the neurotransmitter ____.

a. acetylcholine
b. dopamine
c. GABA
d. norepinephrine

ANSWER: c

100. Dr. Hebda injects a large dose of the neurotransmitter glutamate into the brain of a living rat. What effect would this most likely have on the rat?

a. The rat will become much more intelligent.
b. The rat will experience the death of many neurons.
c. The rat will become very hungry.
d. The rat will exhibit symptoms of schizophrenia.

ANSWER: b

101. If you were to insert an electrode at random into the brain, the odds are that the neuron you would hit would be one that uses the neurotransmitter ____.

a. glutamate
b. serotonin
c. acetylcholine
d. endorphin

ANSWER: a

102. Which of the following is primarily an inhibitory neurotransmitter?

a. Acetylcholine

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b. Norepinephrine
c. Glutamate
d. GABA

ANSWER: d

103. Which of the following is primarily an excitatory neurotransmitter?
a. Glutamate
b. Serotonin
c. Dopamine
d. GABA

ANSWER: a

104. Endorphins ____.
a. are a type of neurotransmitter that block pain messages
b. facilitate and increase the activity of dopamine
c. create the sense of fatigue and pain felt when the body is stressed
d. are associated with cell death following brain injury

ANSWER: a

105. If you have just completed a vigorous physical workout, your central nervous system is most likely to have ____.
a. decreased levels of dopamine
b. decreased levels of serotonin
c. increased levels of endorphins
d. increased levels of GABA

ANSWER: c

106. Based on the available research, which statement is TRUE?
a. Exercise increases endorphin release.
b. Chocolate is the only food that causes endorphin release in the brain.
c. It takes about 45 minutes to release endorphins after consuming fatty foods.
d. Endorphins increase sensitivity to pain when an injury has occurred.

ANSWER: a

107. The two main divisions of the nervous system are the ____ and the ____.
a. brain; spinal cord
b. muscles; organs
c. parasympathetic nervous system; sympathetic nervous system
d. central nervous system; peripheral nervous system

ANSWER: d

108. The central nervous system includes the ____.

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a. sympathetic & parasympathetic systems
b. brain and spinal cord
c. internal organs and muscles
d. somatic and autonomic systems

ANSWER: b

109. The branch of the nervous system that includes neurons that run between the brain and the muscles AND between the brain and the internal organs is the ____.
a. central nervous system
b. peripheral nervous system
c. somatic nervous system
d. autonomic nervous system

ANSWER: b

110. Motor neurons are to ____ as sensory neurons are to ____.
a. outward; inward
b. inward; outward
c. inhibitory; excitatory
d. excitatory; inhibitory

ANSWER: a

111. On the dance floor, when you want to make an impressive dance move, information is sent through your ____ neurons to make your muscles respond appropriately.
a. parasympathetic
b. motor
c. sensory
d. autonomic

ANSWER: b

112. Which of the following is a component of the autonomic nervous system?
a. the sympathetic nervous system
b. the central nervous system
c. the peripheral nervous system
d. the somatic nervous system

ANSWER: a

113. When making a drive to the basket in a basketball game, your ____ nervous system sends signals to your muscles to coordinate your movements.
a. somatic
b. sympathetic
c. parasympathetic

d. autonomic

ANSWER: a

114. When you reach out and accidentally touch a hot stove, information is sent through ____ neurons to tell your central nervous system that it is hot.

a. sympathetic
b. autonomic
c. sensory
d. motor

ANSWER: c

115. The autonomic nervous system allows us to ____.

a. walk and talk
b. remember important events
c. reason logically about difficult concepts
d. breath without having to think about it

ANSWER: d

116. The autonomic nervous system involves neurons that control ____.

a. the sensory systems
b. skeletal muscles
c. internal organs
d. the cortex of the brain

ANSWER: c

117. The parasympathetic nervous system ____.

a. governs organs during times of stress
b. is a branch of the somatic nervous system
c. helps return heart rate, blood pressure, and respiration to normal levels
d. governs voluntary motor actions

ANSWER: c

118. After cheering wildly at an exciting football game your body may begin to relax on the way home. This relaxation reflects activity of the ____ nervous system.

a. parasympathetic
b. sympathetic
c. somatic
d. voluntary

ANSWER: a

119. Which of the following includes the sympathetic nervous system?

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a. The parasympathetic nervous system
b. The somatic nervous system
c. The autonomic nervous system
d. None of these

ANSWER: c

120. You have just witnessed a car accident. Your heart rate and respiration rate are likely to be elevated due to ____ nervous system activity.

a. somatic
b. parasympathetic
c. iconic
d. sympathetic

ANSWER: d

121. The sympathetic nervous system activates a(n) ____ response, and the parasympathetic nervous system activates a(n) ____ response.

a. stress; calming
b. calming; stress
c. involuntary; voluntary
d. voluntary; involuntary

ANSWER: a

122. Kiesha was driving in her car when a tractor-trailer pulled out in front of her and almost caused an accident. Which branch of Kiesha's nervous system would be most responsible for the functioning of her internal organs during this crisis?

a. somatic
b. sympathetic
c. parasympathetic
d. endocrine

ANSWER: b

123. Which of the following is part of the hindbrain?

a. Medulla
b. Reticular formation
c. Cerebral cortex
d. Limbic system

ANSWER: a

124. Whereas the hindbrain is the ____ part of the brain, the forebrain is the ____ part of the brain.

a. emotional; physical
b. physical; life-sustaining
c. intellectual; emotional

d. primitive; intellectual

ANSWER: d

125. The medulla is responsible for ____.
a. decision making
b. biological drives such as hunger and thirst
c. voluntary movement
d. heartbeat and respiration

ANSWER: d

126. The pons is part of the ____.
a. forebrain
b. midbrain
c. hindbrain
d. spinal cord

ANSWER: c

127. The medulla and the pons are both ____.
a. part of the midbrain
b. crucial to life
c. responsible for arm and leg movement
d. involved in higher cognitive function

ANSWER: b

128. Tan was in a diving accident. He hit his head on some rocks and suffered severe damage to his brainstem. In particular, he damaged his medulla. Knowing what you know about the brain, what effect will this injury most likely have on Tan?
a. He will have difficulty balancing his body.
b. He will have problems with his short-term memory.
c. He will have problems with his vision.
d. He will have problems sustaining life.

ANSWER: d

129. Of the following, alcohol primarily impairs the functioning of the ____.
a. hypothalamus
b. cerebellum
c. thalamus
d. amygdala

ANSWER: b

130. A person whose cerebellum is damaged would most likely experience problems with ____.

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a. breathing
b. thinking
c. physical coordination
d. consciousness

ANSWER: c

131. Which part of the brain plays an important role in sleep, attention, and consciousness?
a. Limbic system
b. Cerebellum
c. Hippocampus
d. Reticular formation

ANSWER: d

132. The medulla is to ____ as the reticular formation is to ____.
a. muscle movement; emotion
b. judgment; vision
c. breathing; arousal
d. pleasure drives; aggression

ANSWER: c

133. Which brain structure is part of the forebrain?
a. Medulla
b. Pons
c. Cerebellum
d. Amygdala

ANSWER: d

134. Contrary to the structures of the hindbrain and the midbrain, most structures of the forebrain are ____.
a. duplicated in right and left hemispheres
b. largely made up of neurons and glia
c. not able to communicate with each other
d. not part of the central nervous system

ANSWER: a

135. Recent research has indicated that the amygdala may play a role in how we ____.
a. perceive and respond to emotion-evoking stimuli
b. process and remember information, such as names and dates
c. develop a tolerance for addictive substances
d. move from various states of consciousness, such as from wakefulness to sleep

ANSWER: a

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136. Recent research has shown that persons with autism spectrum disorders experience abnormal activity in the ____.
   a. medulla
   b. cerebellum
   c. pons
   d. amygdala

ANSWER: d

137. Suppose that you are unable to remember any of the events or episodes of your life. This may be because of damage to your ____.
   a. frontal lobe
   b. occipital lobe
   c. hippocampus
   d. septum

ANSWER: c

138. In the case of S.M. reported in your textbook, S.M. has not experienced which emotion during her adult life?
   a. Anger
   b. Curiosity
   c. Fear
   d. Happiness

ANSWER: c

139. Based on the case of H.M., the hippocampus appears to be important in ____.
   a. experiencing pleasurable sensations
   b. sustaining life
   c. making logical judgments
   d. forming memories for events

ANSWER: d

140. Which statement is TRUE regarding the case of H.M. presented in the textbook?
   a. The surgery to reduce his epileptic seizures destroyed his hypothalamus.
   b. His brain lesions led to an inability to remember the faces of family members.
   c. He was almost completely unable to learn new motor skills.
   d. His memory for events prior to the surgery remained intact.

ANSWER: d

141. Based on the research conducted with London taxi drivers and bus drivers, we can conclude that ____.
   a. the taxi drivers' larger amygdalae caused them to be able to remember complicated routes
   b. memorizing maps increased the size of bus drivers' hippocampi but not those of taxi drivers because bus drivers must drive consistent routes
   c. portions of the hippocampus enlarged as the taxi drivers memorized complicated maps

d. except in cases of abnormal functioning, there is no relationship between the hippocampus and spatial memory

ANSWER: c

142. Research presented in the textbook suggests that the hippocampus plays a role in which of the following?

a. Memory and stress
b. Pleasure and pain
c. Hunger and thirst
d. Surprise and fear

ANSWER: a

143. The thalamus is to ____ as the hypothalamus is to ____.

a. sensation; perception
b. sensation; homeostasis
c. pleasure; movement
d. emotion; intellect

ANSWER: b

144. Most of the input from our senses travels through the ____ on the way to the appropriate part of the cortex for further processing.

a. hypothalamus
b. pons
c. thalamus
d. hippocampus

ANSWER: c

145. Suppose your body is having difficulty maintaining homeostasis in temperature, thirst, or hunger. This may be due to damage to your ____.

a. hypothalamus
b. hippocampus
c. pons
d. thalamus

ANSWER: a

146. The hypothalamus ____.

a. maintains vegetative functions like breathing
b. helps to maintain homeostasis in the body
c. is critical to memory function
d. is a sensory relay system

ANSWER: b

147. The structure in the brain that plays the biggest role in physiological motivation is the ____.

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a. hippocampus
b. hypothalamus
c. amygdala
d. thalamus

ANSWER: b

148. The most convoluted and folded cortex would belong to which animal?
a. Human
b. Dog
c. Cat
d. Rat

ANSWER: a

149. Which part of the brain forms the outside covering of the hemispheres?
a. The forebrain
b. The corpus callosum
c. The anterior commissure
d. The cortex

ANSWER: d

150. Which of the following names a lobe of the cortex?
a. Frontal
b. Ventral
c. Medial
d. Central

ANSWER: a

151. The lobes of the brain tend to be wired contralaterally, which means that ____.
a. the major pathways run at right angles to each other
b. the corpus callosum runs from the front to the back
c. each hemisphere governs the opposite side of the body
d. both sides work together in most intellectual and behavioral tasks

ANSWER: c

152. You may not want to spend money to attend a seminar on becoming more of a right-brain thinker in light of recent research. What do these findings indicate?
a. All important thinking actually occurs in the left hemisphere.
b. The right hemisphere is more resistant than the left hemisphere to change.
c. The right hemisphere is actually the verbal side, and the left hemisphere is the creative side.
d. Both sides work together in most intellectual and behavioral tasks.

ANSWER: d

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153. Although both hemispheres of the cortex work together, the left hemisphere seems to be more active during ____ processing, while the right hemisphere seems to be more active during ____.

a. emotional; intellectual
b. linguistic; spatial
c. intellectual; emotional
d. spatial; linguistic

ANSWER: b

154. Broca's area is located in the ____ lobe of the cortex.

a. right temporal
b. left frontal
c. right frontal
d. left temporal

ANSWER: b

155. Damage to Wernicke's area typically leads to an inability to ____.

a. recognize faces
b. perceive visual stimuli
c. understand spoken language
d. regulate emotional behavior

ANSWER: c

156. Wernicke's area is to ____ as Broca's area is to ____.

a. sensing touch; responding to touch
b. seeing; hearing
c. understanding speech; producing speech
d. emotional processing; intellectual processing

ANSWER: c

157. Due to untreated high blood pressure, Namir suffered a small stroke. While in rehab, his occupational therapist asked if he wanted to go to the supermarket—but, Namir heard "Do usen't go the markest else some?" Where might Namir's brain injury be located?

a. limbic system
b. Broca's area
c. Wernicke's area
d. somatosensory cortex

ANSWER: c

158. Research about the corpus callosum suggests that ____.

a. the corpus callosum of females is far less active than that of males, resulting in greater lateralization
b. differences observed between males and females may be related more to brain size than to sex

c. certain regions of the corpus callosum tend to be larger in males, resulting in systematic differences in information processing
d. male-female differences in the corpus callosum vary by culture, suggesting a role for development

ANSWER: b

159. Suppose a person's brain is examined and found to be smaller and have a larger number of connections between hemispheres than average. This means that the person is more likely to be ___ than ____.
a. female; male
b. intelligent; unintelligent
c. young; old
d. uneducated; educated

ANSWER: a

160. Michael Gazzaniga's split-brain patients ____.
a. were unable to name objects they saw in their left visual field
b. could not determine the direction of sounds in the environment
c. had difficulty determining body position
d. gradually developed two separate personalities

ANSWER: a

161. A person who undergoes split-brain surgery is most likely to do so in an effort to treat ____.
a. muscular dystrophy
b. epilepsy
c. schizophrenia
d. dissociative identity disorder

ANSWER: b

162. When information is received only in the right hemisphere of a split-brain patient, the patient is ____.
a. able to verbally describe the information, but cannot draw a picture of it
b. unable to understand the information
c. unable to verbally describe the information
d. unable to draw a picture of the information

ANSWER: c

163. Motor-sensory cortex areas comprise about ____ of the cortex, and association cortex areas comprise about ____ of the cortex.
a. 75%; 25%
b. 25%; 75%
c. 40%; 60%
d. 60%; 40%

ANSWER: b

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164. The motor cortex is located in the ____ lobe of the cortex.
a. parietal
b. occipital
c. temporal
d. frontal

ANSWER: d

165. Based on the experience of Phineas Gage, who had a metal rod accidentally shot through part of his head, it appears that the ____.
a. occipital lobe regulates visual perception
b. occipital lobe regulates the sense of touch and temperature
c. frontal lobe regulates judgment and emotional response
d. frontal lobe regulates motor control

ANSWER: c

166. As we age, blood flow to the brain declines particularly in the ____.
a. occipital lobe
b. prefrontal cortex
c. limbic system
d. left frontal lobe

ANSWER: b

167. The somatosensory cortex serves as the leading edge of the ____ lobe.
a. temporal
b. parietal
c. occipital
d. motor cortex

ANSWER: b

168. Another name for the back part of the occipital lobe is the ____.
a. visual cortex
b. motor cortex
c. homunculus
d. corpus callosum

ANSWER: a

169. Pavia slips and falls in the bathroom and bangs her head on the tile floor. She begins to see “stars” and flashes of light, indicating some activation of brain cells in the ____.
a. reticular formation
b. parietal lobe
c. frontal lobe

d. occipital lobe

ANSWER: d

170. The temporal lobes are particularly important in the processing of ____ and ____.

a. memory; emotions
b. vision; hearing
c. hearing; speech comprehension
d. emotions; thoughts

ANSWER: c

171. Which brain imaging techniques allow for the observation of structure but do not allow observation of brain activity?

a. PET scan and fMRI scan
b. EEG and fMRI scan
c. MRI scan and fMRI scan
d. CAT scan and MRI scan

ANSWER: d

172. Suppose your neurosurgeon wants to get a good picture of your brain in action. What technique is she most likely to use?

a. CAT scan
b. MRI scan
c. X-ray
d. PET scan

ANSWER: d

173. EEGs are useful for measuring ____.

a. electrical activity in large areas of the brain
b. the structure and size of brain organs
c. neurotransmitter activity between neurons in the nervous system
d. blood flow in the central nervous system

ANSWER: a

174. Researchers wish to know which part of a rat's brain is most active as the rat listens to music. Which of the following technologies is most likely to be useful to the researchers in this situation?

a. a CAT scan
b. a MRI
c. a PET scan
d. an X-ray

ANSWER: c

175. The use of brain pacemakers to treat depression is associated with which technology for studying the brain?

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a. CAT scans
b. PET scans
c. fMRI
d. brain stimulation

ANSWER: d

176. Suppose you want to track which neurons in the brain are active at a given moment. Which technique would you use?
a. CAT scan
b. brain stimulation
c. fMRI
d. EEG

ANSWER: c

177. In contrast to the endocrine system, the nervous system ____.
a. is faster acting
b. is purely chemical in nature
c. produces longer-lasting stimulation
d. relies on blood circulation to transport hormones

ANSWER: a

178. The two major communication systems within the body are the nervous system and the ____ system.
a. limbic
b. sympathetic
c. endocrine
d. cortical

ANSWER: c

179. The nervous system is to ____ as the endocrine system is to ____.
a. growth and development; sleep and hunger
b. sleep and hunger; growth and development
c. prolonged; brief
d. fast acting; slow acting

ANSWER: d

180. In terms of working together, the nervous system and the endocrine system ____.
a. always work independently from each other
b. often work together to influence biological activity
c. work together only during reflex activity
d. never work together to influence biological activity

ANSWER: b

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181. When we are motivated to engage in sexual activity, hormones of the ____ system may play a large role in this motivation.

a. endocrine
b. limbic
c. nervous
d. somatic nervous

ANSWER: a

182. In the nervous system information is passed through the body's ____, while in the endocrine system information is passed through the body's ____.

a. glia; neurons
b. bloodstream; neurons
c. neurons; bloodstream
d. neurons; glia

ANSWER: c

183. Two hours after Halle was almost hit by a car, her body is still feeling the effects of this scare. These residual effects are most likely due to the function of Halle's ____ system.

a. nervous
b. endocrine
c. circulatory
d. digestive

ANSWER: b

184. The structure in the brain that connects the endocrine system and the nervous system is the ____.

a. hippocampus
b. hypothalamus
c. amygdala
d. thalamus

ANSWER: b

185. Hormones in the endocrine system ____.

a. have a shorter-lasting effect than neurotransmitters in the nervous system
b. exert a quicker effect than neurotransmitters in the nervous system
c. are regulated by the hippocampus, which is part of the nervous system
d. are primarily released by special organs in the body in response to signals from the pituitary gland

ANSWER: d

186. The sex hormones called estrogens are produced by the ____, while the sex hormones called androgens are produced by the ____.

a. adrenal glands; thyroid glands

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b. thyroid glands; adrenal glands
c. testes; ovaries
d. ovaries; testes

ANSWER: d

187. When the sympathetic nervous system is active, the ____ releases epinephrine and norepinephrine into the bloodstream helping to increase respiration, heart rate, and blood pressure.
a. thyroid gland
b. adrenal medulla
c. pituitary gland
d. striate cortex

ANSWER: b

188. Which progression represents the correct sequence for secretion of hormones?
a. Hypothalamus, pituitary gland, endocrine glands, organs of the body
b. Endocrine glands, hypothalamus, organs of the body, pituitary gland
c. Pituitary gland, organs of the body, hypothalamus, endocrine glands
d. Organs of the body, endocrine glands, pituitary gland, hypothalamus

ANSWER: a

189. Which of the following helps in regulating the energy used in our body?
a. Thyroid
b. Adrenal
c. Pituitary
d. Pineal

ANSWER: a

190. Blood sugar levels in the body are regulated by which part of the endocrine system?
a. Pancreas
b. Thyroid gland
c. Gonads
d. Adrenal cortex

ANSWER: a

191. Jonna’s immune system seems to be compromised. Her doctor has determined that the problem lies in her endocrine system. Which part of Jonna’s endocrine system is most likely related to her poor immune system functioning?
a. Adrenal medulla
b. Adrenal cortex
c. Pituitary gland
d. Thyroid gland

ANSWER: b

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192. Which gland plays a role in sexual maturation?
   a. Pineal gland
   b. Adrenal gland
   c. Pancreas
   d. Thyroid

ANSWER: a

193. The nucleus of a neuron is contained in the ____.
   a. cell body
   b. axons
   c. dendrites
   d. myelin sheath

ANSWER: a

194. Current estimates suggest we have around ____ neurons in our brain.
   a. 800 million
   b. 6 billion
   c. 46 billion
   d. 86 billion

ANSWER: d

195. Synapses occur ____.
   a. at any place along a dendrite
   b. only at the head of a dendrite
   c. only at the tail of a dendrite
   d. only at gaps in the myelin sheath

ANSWER: a

196. Charged particles that play an important role in the firing of action potentials in the nervous system are called ____.
   a. hormones
   b. transmitters
   c. ions
   d. precursors

ANSWER: c

197. The potential difference at which a neuron will fire an action potential is called the ____.
   a. excitatory potential
   b. least noticeable difference
   c. potentiation trigger
   d. threshold of excitation

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ANSWER: d

198. Each type of neurotransmitter has a specific ____, and each type of receptor site has a specific ____.
   a. configuration; molecular shape
   b. molecular shape; configuration
   c. inhibitory potential; excitatory potential
   d. excitatory potential; inhibitory potential

ANSWER: b

199. When a neurotransmitter makes the postsynaptic cell more positive inside, ____ has occurred.
   a. inhibition
   b. excitation
   c. transformation
   d. substitution

ANSWER: b

200. Jean-Paul is a skilled meditator. As a result, he might be expected to have a larger ____.
   a. hippocampus
   b. amygdala
   c. thalamus
   d. pineal

ANSWER: a

201. Describe the similarities and differences between the nervous and endocrine systems.

ANSWER: The nervous system is an electrochemical system of communication within the body that uses cells called neurons to convey information. The endocrine is a chemical system of communication in the body that uses chemical messengers, called hormones, to affect organ function and behavior.

202. Describe the basic processes involved in the transmission of information from the beginning of one neuron to the beginning of the next neuron.

ANSWER: When a neuron is at rest, meaning it is not actively conducting a signal, there is an imbalance in the types of ions found inside and outside the cell walls of the neuron. When a neuron receives input from other neurons, these incoming signals enter at the dendrites and travel across the cell body to the axon. These signals can make the inside of the cell more positive or more negative. If the incoming signals make the inside of the neuron more positive, the inside of the neuron may become positive enough to reach the neuron's threshold of excitation and the neuron fires off an action potential. When the action potential reaches the axon bulb of the presynaptic (sending) neuron, it causes the release of neurotransmitters into the synapse. The neurotransmitter molecules float in the fluid-filled synapse. Some of them will quickly drift across the synapse and come into contact with the tulip-shaped receptor sites lined up on the dendrites of the postsynaptic (receiving) neuron.

203. Identify three different types of neurotransmitters and describe their typical effects in the brain.

ANSWER: Answers will vary.

Neurotransmitter	Functions

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Acetylcholine	Excites skeletal muscles; inhibits heart action; memory
Dopamine	Movement; learning; attention; motivation and reward
Serotonin	Sleep; arousal; mood; eating; pain perception
Norepinephrine	Sleep; arousal; mood
GABA	Chief inhibitor; regulates arousal
Glutamate	Chief excitatory neurotransmitter; many diverse functions
Endorphins	Suppression of pain; eating; cardiovascular functioning

204. Describe three different physical or psychological disorders and the neurotransmitter systems that appear to be involved.

ANSWER: Answers will vary.

Neurotransmitter	Related Diseases & Clinical Conditions
Acetylcholine	Alzheimer's disease
Dopamine	Parkinson's disease; schizophrenia; substance abuse
Serotonin	Depression; obsessive compulsive disorder and other anxiety disorders; eating disorders; chronic pain
Norepinephrine	Depression and other mood disorders
GABA	Some anxiety disorders; some seizure disorders
Glutamate	Neural death following head injuries
Endorphins	Depression

205. Describe the basic structure of the nervous system (including its subsystems) in the human body.

ANSWER: At the broadest level, the nervous system is divided into the brain and spinal cord, known as the central nervous system (CNS), and the remaining components of the nervous system, referred to collectively as the peripheral nervous system (PNS). The peripheral nervous system is further divided into the somatic nervous system and the autonomic nervous system. The latter is divided into the sympathetic nervous system and the parasympathetic nervous system.

206. Describe the basic structure of the brain, starting with the locations of the hindbrain, midbrain, and forebrain and then listing their important components.

ANSWER: The hindbrain sits directly above the spinal cord and is named for its position at the bottom of the brain. The hindbrain is the most "primitive" part of the brain, involved in the most basic life-sustaining functions. The hindbrain makes up a good portion of the brainstem, a series of brain structures that are essential for life. The hindbrain consists of three structures: the medulla, the pons, and the cerebellum.

The forebrain resides in the top part of the skull and regulates complex mental processes such as thinking and emotional control. It is the largest region of the brain and includes structures that regulate many emotional, motivational, and cognitive processes. The structures of the limbic system govern emotional and motivational processes, and other forebrain structures govern sensory processing and motivation. The wrinkled and folded external surface of the brain, the cerebral cortex, governs high-level processes such as cognition and language.

Between the hindbrain and the forebrain is the midbrain, which acts as a connection between the more basic functions of the hindbrain and the complex mental processes of the forebrain. Without the midbrain, the hindbrain could not supply the forebrain with the neural impulses it needs to remain active and to keep us conscious. For psychologists, one of the most interesting midbrain structures is the reticular formation.

207. Describe the effect of having a split brain. What would happen if information were given only to the right or the left hemisphere?

ANSWER: Working with split-brain people, researchers have a chance to study the functioning of each hemisphere

independent of the other. For example, split-brain research helped researchers conclude that the left hemisphere enables us to produce speech. Researcher Michael Gazzaniga (1967) briefly flashed pictures of familiar objects to the right and left visual fields of split-brain people and asked them to identify the objects. When an object is briefly presented to the right peripheral field of vision, the resulting visual information is sent directly to the left hemisphere of the brain. Because Broca's area is in the left hemisphere for most people, Gazzaniga found that the average split-brain person could verbally identify the object.

But what about an object presented to the person's left peripheral field of vision? When an object is briefly shown on the far left side, the resulting visual information is sent directly to the right hemisphere of the brain. Recall that most people do not have a Broca's area in their right hemisphere. In a normal brain, the information travels from the right hemisphere across the corpus callosum to the language centers in the left hemisphere. However, in split-brain individuals, this cannot happen. Without the corpus callosum, Gazzaniga's split-brain could not transmit the knowledge of what they were seeing to the language centers in their left hemisphere. The right brain knew what the objects were, but it could not inform the "speaking" left brain! Predictably, the split-brain people were unable to name the objects they saw in their left visual fields. Interestingly, in this situation, split- brain people were able to point to the objects in a drawing—provided they used their left hand (which is controlled by the right brain). Split-brain research has helped us begin to sort out the relative contributions that the right and left hemispheres make to everyday cognitive processes.

208. Describe the specialization of function in the four lobes of the brain.

ANSWER: Much of the frontal lobe is association cortex. We know more about the association areas of the frontal lobe than any other lobes. Broca's area in the association area of the left frontal lobe is, as previously mentioned, involved in the production of speech. It also appears that the frontal lobe association areas play a role in cognitive processes such as attention, problem solving, judgment, the planning and executing of behavior, and certain aspects of personality. At the back of the frontal lobe (behind the prefrontal cortex) lies the motor cortex or primary motor area, a narrow band of cortex that allows us to execute motor movements. The motor cortex on the right side of the brain affects movement on the left side of the body, and vice versa. Additionally, specific points along the motor cortex correspond to particular points on the body.

As with the frontal lobe, much of the parietal lobe is association cortex, but we know much less about the specific functions of these association areas. We do know that the motor-sensory areas of the parietal lobe play a role in sensation. A thin strip of the parietal lobe affects our sense of touch, pressure, and pain. This strip, called the somatosensory cortex, or primary somatosensory area, lies directly behind the motor cortex, along the leading edge of the parietal lobe.

The occipital lobe of the brain is located at the very back of the skull, above the cerebellum. Much of the occipital lobe is dedicated to processing visual information. The visual cortex, or primary visual area, of the occipital lobe is composed of layers of tissue that contain long axonal fibers. An action potential is stimulated in specialized cells of the visual cortex when our eyes receive specific types of visual stimuli from the outside world. For instance, some cells begin to fire only when we see lines, and other cells fire only when we see circular shapes. Like a computer, our brain integrates all the incoming neural impulses from these specialized cells in the visual cortex to enable us to perceive what we are viewing.

The temporal lobe is in front of the occipital lobe and just below the parietal and frontal lobes—roughly behind our ears inside the skull. Not surprisingly, one of the major functions of the temporal lobe is the processing of auditory information, or hearing. The temporal lobe area devoted to hearing is the auditory cortex, or primary auditory area, located on the upper edge of the temporal lobe. In addition to the auditory cortex, the left temporal lobe of most people contains Wernicke's area, which is responsible for the comprehension of speech.

209. Describe the techniques that scientists use to image or study the brain.

ANSWER:

Technique	Description	Aspect Measured
Computerized Axial Tomography (CAT Scan)	Multiple X-ray beams are passed through the brain from different angles. A computer then	Brain structures

	analyzes the X-rays that exit the head and uses this information to build a very detailed picture of the brain and its structures. CAT scans can be used to diagnose tumors, strokes, certain diseases, and the structural features of the brain.	
Magnetic Resonance Imaging (MRI)	A magnetic field is used to excite the atoms in the body, and the energy emitted by these atoms is used to construct a highly detailed computer-generated picture of the brain's structure.	Brain structures
Positron Emission Tomography (PET Scan)	Radioactive glucose (the brain's fuel source) is injected into the bloodstream. The computer measures which areas of the brain are consuming the most glucose, meaning that they are most active.	Areas of activity in the brain
Functional MRI (fMRI)	Uses MRI technology to track which neurons in the brain are most active at a given moment by examining the energy released by hemoglobin molecules in the bloodstream.	Areas of activity in the brain; brain structures
Electroencephalography (EEG)	Measures changes in electrical voltage at points along the scalp and yields information on gross patterns of brain activation.	Patterns of electrical activity in the lobes of the brain
Brain Stimulation	By stimulating specific areas of the brain, researchers can see what effect this stimulation has on behavior. Doctors also use this technology to treat conditions such as depression. By implanting brain "pacemakers," doctors can stimulate areas of the brain that are not functioning properly.	Cognitive and behavioral reactions to stimulation of brain locations

210. Describe how the endocrine system provides a communication pathway.

ANSWER: The endocrine system is a chemical system of communication that relies on the action of specialized organs called endocrine glands that are located throughout the body. When stimulated, endocrine glands release chemicals called hormones into the bloodstream. These hormones circulate through the bloodstream until they reach other organs in the body. Our internal organs are equipped with special receptor sites to accept these hormones. The endocrine system is considerably slower than the nervous system in relaying messages because it relies on blood circulating through the veins and arteries of the cardiovascular system to transport hormones throughout the body. The stimulation created by hormones, however, tends to last longer than the stimulation caused by action potentials at the synapse.

211. Describe how one neuron communicates with another neuron in the brain.

ANSWER: Stimulation is received from other neurons through the dendrites. If there is enough stimulation for the receiving neuron to reach its threshold of excitation, an action potential begins, which conveys the information with a ripple effect along the length of the axon until it reaches the neuron's axonal bulbs. Stimulation of vesicles in the axon bulbs causes the release of neurotransmitters which conveys the signal to the postsynaptic neuron.

212. There has been a mix up in two patient's prescriptions and each has received the other person's medication. Sheryl, who is diagnosed with Parkinson's disease, has accidentally been given a medication that decreases dopamine levels.

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Guillermo, diagnosed with schizophrenia, is given a medication that increases dopamine levels. Fortunately, the error is caught in time and Sheryl and Guillermo are given the correct medication before they take a dose. Hypothetically, describe what might have happened if Sheryl and Guillermo had indeed taken the wrong medicines.

ANSWER: Parkinson's disease is a neurological disorder marked by a significant decrease in the dopamine produced by the brain. This decrease in dopamine results in a variety of neuromuscular impairments. If Sheryl had been given a medication that further decreased levels of dopamine, we would expect her symptoms to become even worse. In contrast, schizophrenia is thought to be in part due to an excess of dopamine in the brain. If Guillermo had been given a medication that increased the availability of dopamine, then symptoms of schizophrenia (such as hallucinations, delusions, bizarre behavior, etc.) might well have increased.

213. Compare the neurotransmitter system and the endocrine system as means of conveying information throughout the body.

ANSWER: The neurotransmitter system, consisting of both excitatory and inhibitory elements, transmits information rapidly through means of various neurotransmitters. The hormonal system transmits information less rapidly, but with effects that last longer. Thus, neurotransmitters and hormones provide a complimentary communication system which is capable of both rapid and more long-lasting responses as the occasion demands.

214. How do the structures of the hindbrain differ in function from the cortex?

ANSWER: The "primitive" brain consists of those structures which make up the hindbrain: medulla, pons, and cerebellum. The medulla allows for the preservation of such basic functions as heart rate, breathing; and such automatic functions as sneezing, coughing, and swallowing. The pons also helps in respiration, as well as dreaming, and sensory processing. The cerebellum aids in such functions as balance, muscle coordination, and motor-skill memory. Without the primitive side of our brain, some of the most basic life-support and neural processes would cease. In contrast, the most advanced portion of the brain is the forebrain. This area consists of the frontal, temporal, parietal, and occipital lobes. There are also locations within the forebrain of further specialization such as Broca's area, and Wernicke's area for language, and the motor/sensory cortexes. The various forebrain regions allow for further development of higher functions such as problem-solving, speech, reading, vision, etc.

215. What advantages do Magnetic Resonance Imaging (MRI) and Positron Emission Tomography (PET scan) offer in studying the brain?

ANSWER: The MRI uses a magnetic field to create a computer-generated image of the brain. This allows physicians and psychologists to study the brain's structure in great detail. The PET scan uses radioactive glucose to gauge which areas are most active. The PET scan allows psychologists and physicians to see how the brain is working by showing which areas consume the most radioactive glucose.