Biological Psychology International Edition 14th edition Kalat Test Bank

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Name:_____ Class:_____ Date:_____

01 The Cellular Foundations of Behavior

1. What was the profound question posed by Gottfried Leibniz?
   a. What is the nature of matter and energy?
   b. Where do we go when we die?
   c. How can people learn to live together?
   d. Why is there something instead of nothing?

ANSWER: d

2. What is meant by the mind–body problem?
   a. Where in the body is the mind located?
   b. Why are certain types of brain activity conscious?
   c. What happens during an out-of-body experience?
   d. Do you mind what I do with your body?

ANSWER: b

3. What is biological psychology's point of view?
   a. The only effective way to treat psychological problems is through medications.
   b. Evolution steadily makes us better and smarter.
   c. We behave as we do because of evolved brain mechanisms.
   d. Mind and brain are fundamentally separate entities.

ANSWER: c

4. When you touch something, where does the conscious perception occur?
   a. In your hand
   b. In your brain
   c. Between your hand and your brain
   d. In both your hand and your brain

ANSWER: b

5. What happens when you see something?
   a. You send sight rays out of your eyes.
   b. Light rays cause a response in your brain.
   c. You send out sight rays that bounce back to your eyes.
   d. Light rays cause your eyes to send out sight rays.

ANSWER: b

6. What does monism mean?
   a. Both heredity and environment contribute to differences in behavior.
   b. Both hemispheres of the brain contribute to mental experience.
   c. You can think about only one thing at a time.
   d. Brain activity and mental experience are the same thing.

ANSWER: d

7. What is the opposite of dualism?
   a. Vegetarianism

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b. Pacifism
c. Monism
d. Solipsism

ANSWER: c

8. Mental activity and certain types of brain activity are, so far as we can tell, inseparable. This statement is consistent with _____.
a. Leibnitzism
b. Descartism
c. dualism
d. monism

ANSWER: d

9. Your textbook lists which of these as one of the three points you should remember forever?
a. Glutamate and GABA are the most abundant transmitters in the brain.
b. The difference between human brains and other brains is mainly one of size.
c. Mental activity and brain activity are inseparable.
d. Ethical restraints put limits on what we can learn about the human brain.

ANSWER: c

10. Your textbook lists which of these as one of the three points you should remember forever?
a. People differ in their sensations and behaviors because of brain differences.
b. The transmission of an action potential depends on movements of sodium and potassium.
c. The human brain is fundamentally different from that of all other species.
d. Scientists agree that they will never understand the brain fully.

ANSWER: a

11. Which of these is NOT one of the types of explanation that biological psychologists use?
a. The intention behind the behavior
b. The brain mechanisms of the behavior
c. How the behavior developed
d. How the behavior evolved

ANSWER: a

12. What does a "functional" explanation of a behavior state?
a. Why something evolved as it did
b. How something develops during early life
c. What intention someone has when doing something
d. What brain chemistry produced an action

ANSWER: a

13. Moths fly away from a bat call because it triggers a reflex that turns the body. What type of explanation is this?
a. Physiological
b. Ontogenetic

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c. Evolutionary
d. Functional

ANSWER: a

14. Moths turn away from anything they hear because that behavior enhances the chance of survival. What type of explanation is this?
a. Physiological
b. Ontogenetic
c. Evolutionary
d. Functional

ANSWER: d

15. A bird sings because testosterone has caused one part of its brain to grow. What type of explanation is this?
a. Physiological
b. Ontogenetic
c. Evolutionary
d. Functional

ANSWER: a

16. A bird sings a particular song because it heard it during a sensitive period early in life. What type of explanation is this?
a. Physiological
b. Ontogenetic
c. Evolutionary
d. Functional

ANSWER: b

17. Two bird species sing similar songs because they had a recent ancestor in common. What type of explanation is this?
a. Physiological
b. Ontogenetic
c. Evolutionary
d. Functional

ANSWER: c

18. A male bird sings because the song attracts females and warns other males away. What type of explanation is this?
a. Physiological
b. Ontogenetic
c. Evolutionary
d. Functional

ANSWER: d

19. What are the four categories of biological explanations?
a. Cortical, subcortical, spinal, and peripheral
b. Electrical, chemical, mechanical, and intentional

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c. Excitatory, inhibitory, compensatory, and combinational
d. Physiological, ontogenetic, evolutionary, and functional

ANSWER: d

20. What does an ontogenetic explanation emphasize?
a. Intention
b. Development
c. Culture
d. Mechanism

ANSWER: b

21. Explaining behavior by how the nervous system matures is what type of explanation?
a. Dualistic
b. Ontogenetic
c. Evolutionary
d. Functional

ANSWER: b

22. How does an evolutionary explanation of behavior differ from a functional explanation?
a. An evolutionary explanation predicts how the behavior will change in the future.
b. An evolutionary explanation relates a behavior to the maturation of the nervous system.
c. An evolutionary explanation explains why a behavior is advantageous.
d. An evolutionary explanation traces a behavior to ancestral species.

ANSWER: d

23. A human infant grasps anything placed in the palm of the hand because of a reflex controlled by the spinal cord. What type of explanation is this?
a. Physiological
b. Ontogenetic
c. Evolutionary
d. Functional

ANSWER: a

24. A human infant grasps anything placed in the palm of the hand, but the reflex fades over time as inhibition develops. What type of explanation is this?
a. Physiological
b. Ontogenetic
c. Evolutionary
d. Functional

ANSWER: b

25. Human infants grasp anything placed in the palm of the hand because humans inherited this response from monkey-like ancestors. What type of explanation is this?
a. Physiological

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b. Ontogenetic
c. Evolutionary
d. Functional

ANSWER: c

26. An infant monkey grasps anything placed in the palm of the hand because this response enables it to cling to its mother. What type of explanation is this?
a. Physiological
b. Ontogenetic
c. Evolutionary
d. Functional

ANSWER: d

27. What education is usually necessary for someone to direct a research laboratory?
a. A high school degree
b. An undergraduate major in a scientific field
c. A master's degree
d. A doctorate degree

ANSWER: d

28. Of the following, which is the most likely to conduct tests to determine the abilities and disabilities of people with brain damage?
a. Counseling psychologist
b. Neurochemist
c. Comparative psychologist
d. Neuropsychologist

ANSWER: d

29. What does a comparative psychologist compare?
a. Theories
b. Animal species
c. Brain areas
d. Neurotransmitters

ANSWER: b

30. What is one reason for doing research on laboratory animals instead of humans?
a. Research on animals enables us to predict how they will evolve.
b. More research grants are available for laboratory research than for human research.
c. Some mechanisms are easier to understand in another species.
d. Ethical restraints do not apply to laboratory research.

ANSWER: c

31. What do "minimalists" say about animal research?
a. Only minimal restraints should apply to animal research.

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b. Only government researchers should be allowed to do animal research.
c. Only medical researchers should be allowed to do animal research.
d. Only certain types of animal research should be acceptable.

ANSWER: d

32. What do "abolitionists" say about animal research?
a. Only certain types of animal research should be acceptable.
b. So little animal research happens today that it is not worth worrying about.
c. Animals have the same rights as humans.
d. All laws and regulations about laboratory research should be abolished.

ANSWER: d

33. What are "the three Rs" that apply to animal research?
a. Receive, replace, reuse
b. Remember, recover, reform
c. Rebuke, reverse, refuse
d. Reduction, replacement, refinement

ANSWER: d

34. In the United States, who decides whether a proposal for animal research is acceptable?
a. The experimenters themselves
b. The experimenters' department chairperson
c. An Institutional Animal Care and Use Committee
d. The Society for the Prevention of Cruelty to Animals

ANSWER: c

35. Sometimes a patient is invited to participate in a research study in which investigators will record from brain cells while the skull is open for brain surgery. What is the main ethical problem here?
a. The pain the recordings will cause
b. Being sure the informed consent is truly voluntary
c. The probable damage to the cells being recorded
d. The difficulty of comparing results with other investigators

ANSWER: b

36. Most research on the human brain has used a nonrepresentative sample of people, such as just men, or just white Americans. This type of sample poses the biggest problem for research on what topic?
a. Brain anatomy
b. Evolution of synaptic mechanisms
c. Effects of drugs
d. Mechanisms of sensory organs

ANSWER: c

37. About how many neurons are in the human brain, and how variable is it?
a. 86 million, and the number varies only slightly among individuals

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b. 86 million, and people vary in their neuron number more than they do in height
c. 86 billion, and the number varies only slightly among individuals
d. 86 billion, and people vary in their neuron number more than they do in height

ANSWER: d

38. Santiago Ramón y Cajal was famous for which of the following discoveries?
a. Transmission at the synapses depends on chemicals.
b. Mental illness has a biological basis.
c. Genetic differences influence behavioral development.
d. The brain is composed of cells.

ANSWER: d

39. Who first demonstrated that the brain is composed of individual cells?
a. Charles Scott Sherrington
b. Santiago Ramón y Cajal
c. Otto Loewi
d. Camillo Golgi

ANSWER: b

40. Why were biologists of the 1800s uncertain about whether the brain consisted of separate cells?
a. Microscopes at that time were too expensive for biologists to use.
b. Most scientists at the time believed in mind–body dualism.
c. Most scientists at the time thought synaptic transmission was electrical.
d. Neurons do not look like the body's other cells.

ANSWER: d

41. What was unique about the time when Golgi and Cajal shared the Nobel Prize?
a. Each one delivered the other one's acceptance speech.
b. They combined their acceptance speeches into a single address.
c. They both gave their acceptance speeches in Latin.
d. Their acceptance speeches contradicted each other.

ANSWER: d

42. What type of structures allow controlled entry of important chemicals through the plasma membrane of neurons?
a. Lipid channels
b. Protein channels
c. Lipid receptors
d. Protein receptors

ANSWER: b

43. Which structure in a cell performs metabolism to provide energy?
a. Membrane
b. Ribosome
c. Nucleus

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d. Mitochondrion

ANSWER: d

44. Which part of a neuron has chromosomes?
    a. The synapse
    b. The cell body
    c. The axon
    d. The dendrites

ANSWER: b

45. What function do mitochondria perform?
    a. Metabolism
    b. Protein synthesis
    c. Blood–brain barrier
    d. Protection of the chromosomes

ANSWER: a

46. Which cell structure has its own genes, separate from those in the nucleus?
    a. Ribosome
    b. Mitochondrion
    c. Membrane
    d. Endoplasmic reticulum

ANSWER: b

47. In which of these ways do mitochondria differ from the rest of the body?
    a. Mitochondria are inherited by RNA instead of DNA.
    b. Mitochondria are products of digestion instead of inheritance.
    c. You inherit mitochondria from your mother.
    d. You inherit mitochondria from your father.

ANSWER: c

48. Which of these would become more likely as a result of decreased mitochondrial activity?
    a. Epilepsy
    b. Thirst
    c. Depression
    d. Alcohol abuse

ANSWER: c

49. Why would impairment of mitochondria affect the brain more than other organs?
    a. Mitochondria form in the brain and then migrate to other organs.
    b. Mitochondria are essential for the blood–brain barrier.
    c. The brain synthesizes a wider variety of proteins than other organs.
    d. The brain uses more energy than other organs.

ANSWER: d

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50. Compared to other cells, what is most unusual about neurons?
    a. Membrane
    b. Volume
    c. Shape
    d. Color
ANSWER: c

51. Where is the soma of a motor neuron?
    a. In the cerebral cortex
    b. In the spinal cord
    c. In a muscle
    d. In the cerebellum
ANSWER: b

52. Which of these is one of the ways in which axons differ from dendrites?
    a. Axons curve, and dendrites are straight.
    b. Axons have a constant diameter, and dendrites taper.
    c. Axons convey messages toward the soma, and dendrites convey away from it.
    d. Axons convey messages electrically, and dendrites convey messages chemically.
ANSWER: b

53. How long are the longest axons?
    a. No more than a few millimeters
    b. Approximately five centimeters
    c. More than a meter
    d. Twice as long as the cell's largest dendrite
ANSWER: c

54. How many dendrites and axons does a neuron have?
    a. Any number of dendrites, and any number of axons
    b. Any number of dendrites, and no more than one axon
    c. Three dendrites and one axon
    d. Just one of each
ANSWER: b

55. A neuron is likely to have more than one of which of the following?
    a. Soma
    b. Axon
    c. Dendrite
    d. Nucleus
ANSWER: c

56. What do dendritic spines do?

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a. They increase the area available for synapses.
b. They hold the neuron in position.
c. They synthesize proteins.
d. They metabolize fuels.

ANSWER: a

57. As a rule, axons convey information toward what?
a. Their soma
b. Another cell
c. A glia cell
d. The myelin sheath

ANSWER: b

58. If you were to accidentally touch a hot stove with your hand, you would quickly pull your hand away. The information carried to the muscles in your arm to make them contract was carried by _____.
a. afferent neurons
b. efferent neurons
c. intrinsic neurons
d. sensory neurons

ANSWER: b

59. What does a myelin sheath do?
a. It insulates axons.
b. It establishes the blood–brain barrier.
c. It conducts action potentials.
d. It surrounds a synapse.

ANSWER: a

60. In what way are invertebrate axons different than vertebrate axons?
a. Vertebrate axons have a thicker diameter.
b. Vertebrate axons have a faster sodium–potassium pump.
c. Vertebrate axons have fewer branches.
d. Vertebrate axons have myelin sheaths.

ANSWER: d

61. What is the difference between afferent and efferent axons?
a. Afferent axons are in the central nervous system, and efferent axons in the periphery.
b. Efferent axons are in the central nervous system, and afferent axons in the periphery.
c. Efferent axons carry information in, and afferent axons carry it out.
d. Afferent axons carry information in, and efferent axons carry it out.

ANSWER: d

62. Which animals have the longest axons?
a. The fastest animals

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b. The most intelligent animals
c. The largest animals
d. The animals with the longest life span

ANSWER: c

63. Which type of neuron, if any, has the shortest axons?
a. Sensory neuron
b. Motor neuron
c. Intrinsic neuron or interneuron
d. No difference among them

ANSWER: c

64. What type of cell synchronizes the activity of a related group of axons?
a. Astrocytes
b. Microglia
c. Oligodendrocytes
d. Schwann cells

ANSWER: a

65. What type of cell removes dead neurons and prunes ineffective synapses?
a. Astrocytes
b. Microglia
c. Oligodendrocytes
d. Schwann cells

ANSWER: b

66. According to the idea of a tripartite synapse, a synapse depends on the tip of an axon, the neuron receiving the message, and what else?
a. The sodium–potassium pump
b. Blood cells
c. One or more microglia
d. An astrocyte

ANSWER: d

67. According to the idea of a tripartite synapse, what does an astrocyte do at a synapse?
a. Stores mitochondria for later use
b. Synthesizes proteins to repair membranes
c. Electrically stimulates the axon to release its transmitter
d. Releases chemicals to modify input to the receiving cell

ANSWER: d

68. Why do we need a blood–brain barrier?
a. To prevent proteins from leaking out of the brain
b. To prevent high blood pressure from damaging the brain

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c. To enable more nutrition to reach the brain
d. To protect the brain from viruses and harmful chemicals

ANSWER: d

69. What is a disadvantage of the blood–brain barrier?
a. It produces electrical discharges.
b. It forces the body to maintain high blood pressure.
c. It keeps most nutrients out of the brain.
d. It puts a limit on brain size.

ANSWER: c

70. Why are brain cancers so difficult to treat?
a. Microglia tends to spread tumors within the brain.
b. Chemotherapy drugs do not cross the blood–brain barrier.
c. The brain receives more nutrition than any other organ.
d. Brain cancers affect neurons and glia cells equally.

ANSWER: b

71. What type of chemical crosses the blood–brain barrier freely?
a. Any chemical that has no electrical charge
b. Any chemical that has nutritional value
c. Any chemical that dissolves in fat
d. Any chemical that dissolves in water

ANSWER: c

72. The brain uses active transport to pump which of the following into the brain?
a. Antidepressant drugs
b. Glucose
c. Water
d. Oxygen

ANSWER: b

73. Because heroin exerts its effects faster than morphine, which of the following can we infer?
a. Heroin crosses the blood–brain barrier more easily.
b. Heroin carries a stronger electrical charge.
c. Heroin dissolves more easily in the blood.
d. Heroin has less similarity to the body's own chemicals.

ANSWER: a

74. How do glucose and amino acids cross the blood–brain barrier?
a. With active transport by proteins
b. By dissolving in the fats of the membrane
c. Through the gaps between endothelial cells
d. By being broken down into their elements and then reassembled

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ANSWER: a

75. What is the brain's main fuel?
    a. Complex carbohydrates
    b. Fats
    c. Proteins
    d. Glucose

ANSWER: d

76. Which vitamin does the brain most need to metabolize glucose?
    a. Vitamin A
    b. Vitamin B-1, thiamine
    c. Vitamin B-6, pyridoxine
    d. Vitamin D

ANSWER: b

77. Can your gut bacteria do any good for your brain? If so, what?
    a. Yes, they release chemicals that cross the lining of the intestines into the blood.
    b. Yes, they generate the body's circadian rhythm.
    c. Yes, they repair damage in the digestive system.
    d. No, they are only harmful.

ANSWER: a

78. What is one reason why antibiotic drugs sometimes cause anxiety and depression?
    a. The drugs sometimes stimulate extra activity by the mitochondria.
    b. The drugs sometimes fail to enter the brain.
    c. The drugs sometimes remove helpful bacteria from the gut.
    d. The drugs sometimes strengthen the blood–brain barrier.

ANSWER: c

79. What is one known reason why brain activity differs from one person to another?
    a. People have different hair colors.
    b. People have different eye colors.
    c. People have different species of bacteria in their intestines.
    d. People have different astrological signs.

ANSWER: c

80. Which of the following is one known way by which stress can lead to depression?
    a. By preventing thiamine from entering the brain
    b. By changing the acid-to-base balance of the blood
    c. By impairing the ability of the eye's lens to focus
    d. By altering the bacteria in the intestines

ANSWER: d

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81. What is the advantage of an action potential for transmitting information, as compared to electrical conduction?
    a. An action potential conveys information more rapidly.
    b. An action potential does not decrease intensity as it travels.
    c. An action potential conveys information to more cells.
    d. An action potential can alter its amplitude and velocity.

ANSWER: b

82. When a neuron is at rest, how does the electrical charge compare for the inside and outside of the membrane?
    a. The answer varies from one neuron to another.
    b. The inside and outside are electrically neutral.
    c. The inside has a positive charge.
    d. The inside has a negative charge.

ANSWER: d

83. How are sodium and potassium distributed across the neuron membrane?
    a. Both are more concentrated inside the cell.
    b. Both are more concentrated outside the cell.
    c. Sodium is more inside, and potassium is more outside.
    d. Sodium is more outside, and potassium is more inside.

ANSWER: d

84. What does the sodium–potassium pump do?
    a. It pumps sodium and potassium out of the neuron.
    b. It pumps sodium and potassium into the neuron.
    c. It pumps sodium in and potassium out.
    d. It pumps sodium out and potassium in.

ANSWER: d

85. When the neuron membrane is at rest, what forces are acting on sodium ions?
    a. Both the electrical gradient and the concentration gradient tend to push them out of the cell.
    b. Both the electrical gradient and the concentration gradient tend to pull them into the cell.
    c. The electrical gradient pushes them out, and the concentration gradient pulls them in.
    d. The electrical gradient pulls them in, and the concentration gradient pushes them out.

ANSWER: a

86. When the membrane is at rest, why don't sodium ions enter the cell?
    a. The concentration gradient pushes them out.
    b. The electrical gradient pushes them out.
    c. Both the concentration gradient and the electrical gradient push them out.
    d. The sodium gates are closed.

ANSWER: d

87. When the neuron membrane is at rest, what forces are acting on potassium ions?
    a. Both the electrical gradient and the concentration gradient tend to push them out of the cell.

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b. Both the electrical gradient and the concentration gradient tend to pull them into the cell.
c. The electrical gradient pushes them out, and the concentration gradient pulls them in.
d. The electrical gradient pulls them in, and the concentration gradient pushes them out.

ANSWER: d

88. Why are sodium ions distributed across the neuron membrane the way they are?
a. The sodium–potassium pump pushes them out of the cell.
b. The sodium–potassium pump pulls them into the cell.
c. The electrical gradient forces them out of the cell.
d. The concentration gradient forces them out of the cell.

ANSWER: a

89. What does depolarization of a neuron membrane mean?
a. Increasing its negative charge
b. Decreasing its negative charge
c. Making it unable to conduct an action potential
d. Causing it to change shape

ANSWER: b

90. When a neuron membrane is depolarized enough to reach its threshold, what happens?
a. The membrane opens its sodium channels.
b. The membrane closes its sodium channels.
c. The membrane closes its potassium channels.
d. The sodium–potassium pump stops working.

ANSWER: a

91. When a neuron membrane opens, what happens at once?
a. Potassium ions rapidly enter the cell.
b. Potassium ions rapidly leave the cell.
c. Sodium ions rapidly enter the cell.
d. Sodium ions rapidly leave the cell.

ANSWER: c

92. What causes an action potential?
a. Sodium and potassium ions exchanging positions within the cell
b. Potassium ions leaving the cell
c. Sodium ions leaving the cell
d. Sodium ions entering the cell

ANSWER: d

93. When a neuron membrane is depolarized enough to reach its threshold, which ion channels open, if any?
a. Just the sodium channels
b. Both the sodium and potassium channels
c. Just the potassium channels

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d. Neither the sodium nor the potassium channels

ANSWER: b

94. What is the all-or-none law of the action potential?
a. Either all the sodium ions cross the membrane, or none of them do.
b. For a given neuron, all action potentials are about equal in amplitude and velocity.
c. At a given moment, either all neurons fire an action potential, or none of them do.
d. At a given moment, either all sodium channels along the axon open, or none of them do.

ANSWER: d

95. Because of the all-or-none law of the action potential, what is an axon unable to change?
a. The frequency with which it produces action potentials
b. The size of its action potentials
c. The type of input it receives
d. The distribution of sodium and potassium across its membrane

ANSWER: b

96. Because of the all-or-none law, what is the only way an axon can signal the difference between a weak signal and a strong signal?
a. By changing the amplitude of its action potentials
b. By changing the velocity of its action potentials
c. By changing the frequency of its action potentials
d. By changing the direction of its action potentials

ANSWER: c

97. The all-or-none law constrains which of the following?
a. The dendrites
b. The axon
c. The cell body
d. All three

ANSWER: b

98. When does the all-or-none law apply?
a. Whenever a neuron receives a combination of excitatory and inhibitory messages
b. Whenever a neuron has been inactive for more than 500 milliseconds
c. Whenever a neuron is stimulated above its threshold
d. Whenever adjacent neurons are stimulated at the same time

ANSWER: c

99. If a membrane is depolarized to twice its threshold, what happens?
a. An action potential does not occur.
b. The action potential is the same as usual.
c. The action potential is stronger than usual.
d. The action potential is faster than usual.

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ANSWER: b

100. Which of the following opens the sodium and potassium channels of the axon?
   a. A change of concentration
   b. A change of voltage
   c. A change of resistance
   d. A change of temperature

ANSWER: b

101. At the peak of the action potential, what stops more sodium ions from crossing the membrane?
   a. The sodium–potassium pump pushes them out.
   b. The sodium gates close.
   c. The concentration gradient no longer attracts sodium.
   d. Sodium chemically reacts with the potassium.

ANSWER: b

102. After the peak of the action potential, what brings the membrane back to its resting potential?
   a. Sodium ions flow passively out of the cell.
   b. Potassium ions flow passively out of the cell.
   c. The sodium–potassium pump restores the normal balance.
   d. Glia cells intervene to prevent further electrical change.

ANSWER: b

103. If a drug partly blocked a membrane's potassium channels, what would be the result?
   a. Action potentials would travel more rapidly.
   b. The cell's resting potential would be close to zero.
   c. The axon would no longer have a refractory period.
   d. Each action potential would last longer than usual.

ANSWER: d

104. After the peak of the action potential, what enables the membrane to get back to its resting potential?
   a. The sodium channels remain open but the potassium channels close.
   b. The sodium channels close but the potassium channels remain open.
   c. Both the sodium channels and the potassium channels close.
   d. Both the sodium channels and the potassium channels remain open.

ANSWER: b

105. How do local anesthetic drugs such as Novocain prevent pain?
   a. They attach to the chromosomes in the cell's nucleus.
   b. They decrease the activity of the mitochondria.
   c. They block sodium channels on the membrane.
   d. They block potassium channels on the membrane.

ANSWER: c

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106. What is the absolute refractory period of an axon?
   a. The time when its sodium concentration is equal to its potassium concentration
   b. The time when its membrane potential crosses zero
   c. The time when it is preparing to produce an action potential
   d. The time when it is incapable of producing an action potential

ANSWER: d

107. What causes the absolute refractory period of an axon?
   a. The sodium channels are closed.
   b. The sodium–potassium pump is working harder than usual.
   c. The sodium–potassium pump has stopped working.
   d. The glia cells have covered the nodes of Ranvier.

ANSWER: a

108. If an axon did not have an absolute refractory period, what would happen?
   a. The action potential would slow down and stop.
   b. The membrane would have a long delay between one action potential and the next.
   c. The axon would alternate between excitatory and inhibitory messages.
   d. The membrane would go into permanent depolarization.

ANSWER: d

109. Suppose the threshold of a neuron was the same as the neuron's resting potential. What would happen?
   a. The cell would go into permanent depolarization.
   b. The cell would be unable to produce any action potentials.
   c. The cell would produce a spontaneous action potential after each refractory period.
   d. The cell would produce one action potential, and then stop.

ANSWER: d

110. If axon A can produce more action potentials per second than axon B, what can we conclude?
   a. Axon A has a longer absolute refractory period.
   b. Axon A has a shorter absolute refractory period.
   c. Axon A has a higher threshold for excitation.
   d. Axon A has a lower threshold for excitation.

ANSWER: a

111. If one action potential started at the cell body (orthodromic) and another one started at the tip of the axon (antidromic), what would happen when they met at the center?
   a. Each would continue in its own direction.
   b. Each would bounce back the way it came.
   c. Both would cease.
   d. They would damage the axon.

ANSWER: c

112. If one action potential started at the cell body (orthodromic) and another one started at the tip of the axon

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(antidromic), they would stop when they met at the center. Why?
a. The overstimulation would damage the axon.
b. Each run into the other one's refractory period.
c. The sodium–potassium pump would cause the action potentials to cease.
d. Each would fail to find the usual synaptic ending.
ANSWER: b

113. What does myelin accomplish?
a. Faster action potentials
b. Shorter absolute refractory periods
c. Spatial summation
d. Temporal summation
ANSWER: a

114. How is an action potential conducted in a myelinated axon?
a. Through a sequence of synapses
b. By a relay from one node of Ranvier to the next
c. Without any movement of sodium or potassium
d. In one jump from the start to the finish
ANSWER: b

115. In a myelinated axon, how would the action potential be affected if the nodes were much closer together?
a. The amplitude of the action potential would increase.
b. Transmission of the action potential would be slower.
c. The action potential might not be able to jump from one node to the next.
d. The action potential would back-propagate to the previous node.
ANSWER: b

116. In a myelinated axon, how would the action potential be affected if the nodes were much farther apart?
a. The amplitude of the action potential would increase.
b. Transmission of the action potential would be slower.
c. The action potential might not be able to jump from one node to the next.
d. The action potential would back-propagate to the previous node.
ANSWER: c

117. What is the term for a neuron with no axon or a very short one?
a. Inactive neuron
b. Aberrant neuron
c. Local neuron
d. Degenerate neuron
ANSWER: c

118. Which of the following is true for a local neuron with no axon?
a. It receives messages but cannot send them.

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b. It has graded potentials instead of action potentials.
c. It has a larger than average cell body.
d. It has longer than average dendrites.

ANSWER: b

119. Why is so little research done on local neurons?
a. Local neurons are tiny.
b. Local neurons are uncommon.
c. Local neurons do not convey information.
d. Local neurons are immature.

ANSWER: a

120. Which of the following is a nonsensical statement?
a. The refractory period prevents the axon from going into permanent depolarization.
b. Some people behave differently because of the bacteria in their intestines.
c. People typically use only 10 percent of their brain.
d. Many chemicals in the blood cannot get into the brain.

ANSWER: c

121. About what percentage of the brain does a person ordinarily use?
a. 10 percent
b. 30 percent
c. 50 percent
d. 100 percent

ANSWER: d

122. Our universe has equal amounts of matter and antimatter.
a. True
b. False

ANSWER: False

123. When you see something, you send sight rays out of your eyes.
a. True
b. False

ANSWER: False

124. When people try to imagine something "in their mind's eye," some have a detailed experience, and some have no experience at all.
a. True
b. False

ANSWER: True

125. Most neuropsychologists have a mixture of psychological and medical training.
a. True

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b. False

ANSWER: True

126. Most research laboratories are headed by someone with a master's degree.
a. True
b. False

ANSWER: False

127. The number of neurons is nearly the same for all healthy adult humans.
a. True
b. False

ANSWER: False

128. Santiago Ramón y Cajal used special staining techniques to show that the brain is composed of individual cells.
a. True
b. False

ANSWER: True

129. Most chemicals pass freely through the membrane of a neuron.
a. True
b. False

ANSWER: False

130. Decreased activity of mitochondria can lead to depression.
a. True
b. False

ANSWER: True

131. People inherit all their mitochondria from their mother.
a. True
b. False

ANSWER: True

132. Dendrites contain the nuclei, ribosomes, mitochondria, and other structures found in most cells.
a. True
b. False

ANSWER: False

133. Glia have dendrites and axons.
a. True
b. False

ANSWER: False

134. Neurons are distinguished from other cells by their shape.
a. True

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b. False

ANSWER: True

135. The greater the surface area of a dendrite, the more information it can receive from other neurons.
a. True
b. False

ANSWER: True

136. Dendritic spines increase the area available for synapses.
a. True
b. False

ANSWER: True

137. An efferent axon carries information away from a structure.
a. True
b. False

ANSWER: True

138. It is possible to describe the same axon as both afferent and efferent.
a. True
b. False

ANSWER: True

139. Astrocytes synchronize the activity of a group of neurons.
a. True
b. False

ANSWER: True

140. Microglia removes viruses, fungi, and dead cells from the brain.
a. True
b. False

ANSWER: True

141. The primary role of glial cells is to act like "glue" or scaffolding to support the neurons.
a. True
b. False

ANSWER: False

142. Schwann cells and oligodendrocytes produce myelin.
a. True
b. False

ANSWER: True

143. The blood–brain barrier is made up of closely packed glial cells.
a. True

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b. False

ANSWER: False

144. The brain uses more energy and oxygen than all other organs combined.
a. True
b. False

ANSWER: False

145. One reason for variations in people's behavior is that they have different types of bacteria in their intestines.
a. True
b. False

ANSWER: True

146. Gut bacteria release both helpful and harmful chemicals.
a. True
b. False

ANSWER: True

147. Action potentials occur in both axons and dendrites.
a. True
b. False

ANSWER: False

148. Sodium ions are always more concentrated outside a neuron membrane than inside.
a. True
b. False

ANSWER: True

149. The resting potential of the neuron membrane prepares it to respond rapidly to a stimulus.
a. True
b. False

ANSWER: True

150. An axon indicates the strength of a stimulus by altering the amplitude or velocity of its action potentials.
a. True
b. False

ANSWER: False

151. The all-or-none law applies to both axons and dendrites.
a. True
b. False

ANSWER: False

152. Local anesthetic drugs such as Novocain block pain by attaching to sodium gates in the neuron membrane.
a. True

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b. False

ANSWER: True

153. The sodium–potassium pump enables a neuron membrane to return to its resting potential shortly after an action potential.

a. True

b. False

ANSWER: False

154. When an action potential starts, it back-propagates into the cell body and its dendrites.

a. True

b. False

ANSWER: True

155. Back-propagation of the action potential into the dendrite of the sending neuron facilitates changes associated with learning.

a. True

b. False

ANSWER: True

156. Other things being equal, myelinated axons conduct impulses faster than unmyelinated ones do.

a. True

b. False

ANSWER: True

157. Many local neurons do not have an axon.

a. True

b. False

ANSWER: True

158. People typically use only 10 percent of their brain.

a. True

b. False

ANSWER: False

159. The two kinds of cells that compose the brain are neurons and _____.

ANSWER: Glia

160. The scientist who demonstrated that the brain consists of individual cells was _____.

ANSWER: Cajal
Ramon y Cajal
Santiago Ramon y Cajal

161. The cell structure that performs metabolism to provide energy is the _____.

ANSWER: Mitochondrion

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162. The interruptions in a myelin sheath are the _____.
ANSWER: Nodes of Ranvier

163. A neuron with its axon and dendrites confined to a single structure is called a(n) _____.
ANSWER: Intrinsic

164. The mechanism that blocks most harmful chemicals from entering the brain is the _____.
ANSWER: Blood–brain barrier

165. Chemicals can freely pass through the blood–brain barrier if they dissolve in _____.
ANSWER: Fats

166. The main source of nutrition for the brain is _____.
ANSWER: Glucose

167. To use glucose, the brain needs _____.
ANSWER: Thiamine
Vitamin B-1

168. The resting potential of the neuron membrane is caused mainly by the negatively charged _____ inside the cell.
ANSWER: Proteins

169. An axon produces an action potential only if the depolarization reaches the cell's _____.
ANSWER: Threshold

170. The action potential reaches its peak when the _____ gates in the membrane close.
ANSWER: Sodium

171. The time just after the peak of an action potential, when the membrane is unable to produce another action potential, is the _____ period.
ANSWER: Absolute refractory

172. The insulating material that covers many vertebrate axons, enabling them to conduct action potentials faster, is called _____.
ANSWER: Myelin

173. Santiago Ramón y Cajal made what discovery about the brain?
ANSWER: He demonstrated that the brain consists of individual neurons.

174. Why would we expect an interneuron (intrinsic neuron) to have a shorter axon than a sensory or motor neuron?
ANSWER: An interneuron has its axon confined within one structure in the brain.

175. Describe the structure of the blood–brain barrier and explain why it is important.
ANSWER: Tightly joined endothelial cells form the capillary walls in the brain, making the blood–brain barrier. This protects the brain from harmful viruses, bacteria, and chemicals that might otherwise be able to enter the brain and cause damage.

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176. Provide a summary of the all-or-none law of action potentials.

ANSWER: The amplitude and velocity of the action potential are roughly the same every time and they are independent of the intensity of the stimulus that initiated it.

177. Describe how the brain transports essential chemicals.

ANSWER: The brain has several transport mechanisms. Small, uncharged molecules, including oxygen and carbon dioxide, cross freely. Water crosses through special protein channels in the wall of the endothelial cells. Also, molecules that dissolve in the fats of the membrane cross easily. Examples include vitamins A and D and all the drugs that affect the brain—from antidepressants and other psychiatric drugs to illegal drugs such as heroin. How fast a drug takes effect depends partly on how readily it dissolves in fats and therefore crosses the blood–brain barrier. For a few other chemicals, the brain uses active transport, a protein-mediated process that expends energy to pump chemicals from the blood into the brain. Chemicals that are actively transported into the brain include glucose (the brain's main fuel), amino acids (the building blocks of proteins), and others.

178. How could COVID-19 harm the brain, even if the virus does not enter the brain?

ANSWER: The virus constricts capillaries and thereby decreases blood flow to the brain. It also increases the immune response, and an excessive immune response can attack the body's organs, including the brain.

179. What are the advantage and disadvantage of sending information by action potentials instead of electricity?

ANSWER: The advantage is that the message arrives intact. An electrical impulse in your body would weaken as it passed over distance. The disadvantage is that a stimulus starting closer to the brain reaches it sooner than one starting farther away. You could also say that a disadvantage is that your brain is always just slightly out of date on what is happening in the body.

180. Describe the key aspects of the resting potential.

ANSWER: A neuron is covered by a membrane that prevents most chemicals from passing. When at rest, the membrane maintains an electrical gradient, also known as polarization—a difference in electrical charge between the inside and outside of the cell. The neuron inside the membrane has a slightly negative electrical potential with respect to the outside, mainly because of negatively charged proteins inside the cell. This difference in voltage is called the resting potential. Sodium ions are concentrated mostly outside the cell, and potassium ions are concentrated mostly inside.

181. What would happen if the sodium–potassium pump of a neuron stopped working?

ANSWER: With each action potential, the sodium concentration inside the cell would increase, until eventually the cell became permanently depolarized and unable to produce more action potentials.

182. When the neuron membrane is at rest, how do the electrical gradient and concentration gradient affect sodium ions and potassium ions?

ANSWER: Both gradients tend to pull sodium into the cell. The electrical gradient tends to pull potassium into the cell, and the concentration gradient tends to push it out.

183. How does an axon indicate the strength of the stimulus that excited it?

ANSWER: The axon can vary the frequency with which it produces action potentials.

184. After the peak of the action potential, what causes the membrane to return to its resting potential?

ANSWER: Potassium ions leave the cell, during a time when their gates are more open than usual.

185. In a myelinated axon, how would the action potential be affected if the nodes were much closer together? How might it be affected if the nodes were much farther apart?

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ANSWER: If the nodes were closer, the action potential would travel more slowly. If they were much farther apart, the current might not be able to stimulate the next node enough to reach its threshold.

186. Explain the function and process of a neuron's refractory period.

ANSWER: Beginning at the peak of an action potential, the cell is in a refractory period, during which it resists the production of further action potentials. In the first part of this period, the absolute refractory period, the membrane cannot produce an action potential, regardless of the stimulation, because the sodium gates have snapped shut. During the second part, the relative refractory period, a stronger-than-usual stimulus is necessary to initiate an action potential. Throughout both the absolute and relative refractory periods, potassium is flowing out of the cell at a faster-than-usual rate. The refractory period prevents the action potential from flowing backward in the axon.

187. What is the role of the myelin sheath?

ANSWER: Myelin sheath is a fatty substance produced by glial cells that wraps around the axons of neurons and speeds up neurotransmission. It can also provide the axon with nutrients needed for proper functioning.

188. Using motor and sensory neurons as examples, explain the difference between afferent and efferent axons.

ANSWER: An afferent axon brings information into a structure, whereas an efferent axon carries information away from a structure. Sensory neurons detect sensory information (e.g., light and pressure) and convert that energy into neural impulses. That information is sent to the brain via afferent pathways. Motor neurons carry information from the brain and spinal cord to muscles and glands via efferent pathways. Within the nervous system, an axon can be an efferent from one structure and an afferent to another.

189. What are the advantages and disadvantages of the blood–brain barrier?

ANSWER: The blood–brain barrier blocks most viruses and other harmful chemicals from entering the brain. However, it also makes it difficult for nutrients to enter the brain, and it prevents chemotherapy drugs and many other medications from entering the brain.

190. If you have a cavity filled at the dentist, you might receive Novocain to prevent feeling any pain. How does Novocain exert that effect?

ANSWER: It binds to sodium channels on the axon and thereby prevents sodium from entering. If sodium cannot cross the membrane, an action potential cannot travel to the brain to send the pain message.

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