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Chapter 2: Structure and Functions of Cells of the Nervous System

Total Assessment Guide (T.A.G.)

Topic	Question Type	Remember the Facts	Understand the Concepts	Apply What You Know
Introduction	Multiple Choice	1,2		
	Fill-In			
	Essay			
Cells of the Nervous System	Multiple Choice	3-5,9-23,27,29-31, 33, 34,37,38,40,41	6-8,24-26,28,32, 36,39,42-44	35,45
	Fill-In	110-117		
	Essay	130-131		
Communication Within a Neuron	Multiple Choice	46,52,53,58-67, 69,72,75,76,78	49-51,54-57,68,71, 73,74,77,79-84	47,48,70
	Fill-In	119-121	118	
	Essay	132,134	133,135	
Communication Between Neurons	Multiple Choice	85,86,91,92,97,100, 102,103, 105-109	87-90,95,96,98, 99,101,104	93,94
	Fill-In	122-129		
	Essay		136,138	137

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Multiple-Choice Questions

1. The primary symptom shown by Kathryn (the woman described in the chapter opening vignette) was

a. severe nausea.
b. inability to sleep.
c. muscle weakness.
d. distortions of memory.
e. difficulty in recognizing human faces.

Difficulty Level: Easy
Skill Level: Remember the Facts
Topic: Introduction
Learning Objective: 2.1 Contrast features of the central and peripheral nervous systems.
Answer: C
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

2. The official diagnosis that Kathryn (the woman described in the chapter opening vignette) received was

a. lupus.
b. multiple sclerosis.
c. myasthenia gravis.
d. muscular dystrophy.
e. organic pathogenesis.

Difficulty Level: Easy
Skill Level: Remember the Facts
Topic: Introduction
Learning Objective: 2.1 Contrast features of the central and peripheral nervous systems.
Answer: C
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

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3. _____ neurons gather information from the environment related to light, odors, and contact of our skin with objects.

a. Sensory
b. Motor
c. Inter-
d. Relay inter-
e. Local inter-

Difficulty Level: Easy
Topic: The Nervous System: An Overview
Skill Level: Remember the Facts
Learning Objective: 2.1 Contrast features of the central and peripheral nervous systems.
Answer: A
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

4. _____ neurons function to contract muscles.

a. Sensory
b. Motor
c. Inter-
d. Relay
e. Local

Difficulty Level: Easy
Topic: The Nervous System: An Overview
Skill Level: Remember the Facts
Learning Objective: 2.1 Contrast features of the central and peripheral nervous systems.
Answer: B
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

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5. _____ are located only within the central nervous system.

a. Sensory
b. Motor
c. Relay interneurons
d. Projection neurons
e. Schwann cells

Difficulty Level: Moderate

Topic: The Nervous System: An Overview
Skill Level: Remember the Facts
Learning Objective: 2.1 Contrast features of the central and peripheral nervous systems.
Answer: C
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

6. Rollo was considering an update to his wardrobe. As he felt the various fabrics in the suit store, the clerk (who was well-versed in neuroscience) commented, "Ah, the cells registering the feeling of those textures must be firing rapidly." "Yes," Rollo replied. "There's heightened activity in my _____ nervous system because of it."

a. central
b. peripheral
c. autonomic
d. parasympathetic
e. sympathetic

Difficulty Level: Difficult
Topic: The Nervous System: An Overview
Skill Level: Understand the Concepts
Learning Objective: 2.1 Contrast features of the central and peripheral nervous systems.
Answer: B
APA Learning Objective: 1.2 Develop a working knowledge of psychology's content domains.

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7. Trixie's stomach begins to rumble, reminding her that she skipped breakfast this morning. This hunger signal is sent to Trixie's brain, which is part of her _____ nervous system.

a. peripheral
b. central
c. enteric
d. human
e. local circuit

Difficulty Level: Easy
Topic: The Nervous System: An Overview
Skill Level: Understand the Concepts
Learning Objective: 2.1 Contrast features of the central and peripheral nervous systems.
Answer: B
APA Learning Objective: 1.2 Develop a working knowledge of psychology's content domains.

8. The _____ system is that portion of the nervous system that lies outside of the brain and spinal cord.

a. extraspinal
b. central nervous
c. enteric nervous
d. human nervous
e. peripheral nervous

Difficulty Level: Easy
Topic: The Nervous System: An Overview
Skill Level: Understand the Concepts
Learning Objective: 2.1 Contrast features of the central and peripheral nervous systems.
Answer: E
APA Learning Objective: 1.2 Develop a working knowledge of psychology's content domains.

9. The nucleus of a nerve cell is located within the

a. soma.
b. axon.
c. axon terminals.
d. dendrites.
e. mitochondria.

Difficulty Level: Easy
Topic: Neurons
Skill Level: Remember the Facts
Learning Objective: 2.2 Distinguish among the structures of a neuron.
Answer: A
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

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10. The portion of a neuron that carries information toward its cell body is called the

a. dendrite.
b. axon terminal.
c. presynaptic membrane.
d. soma.
e. glial membrane.

Difficulty Level: Easy
Topic: Neurons
Skill Level: Remember the Facts
Learning Objective: 2.2 Distinguish among the structures of a neuron.
Answer: A
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

11. When an impulse enters a neuron, it is received by the _____ and passed to the next cell via the _____.

a. dendrite; axon
b. axon; dendrite
c. soma; axon
d. soma; dendrite
e. axon; soma

Difficulty Level: Easy

Topic: Neurons
Skill Level: Remember the Facts
Learning Objective: 2.2 Distinguish among the structures of a neuron.
Answer: A
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

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12. When substances are transported from the terminal buttons at the end of an axon back to the soma, this process is referred to as

a. retrograde axoplasmic transport.
b. systemic axoplasmic transport.
c. anterograde axoplasmic transport.
d. peripheral axoplasmic transport.
e. anterograde somatoplasmic transport.

Difficulty Level: Difficult
Topic: Neurons
Skill Level: Remember the Facts
Learning Objective: 2.2 Distinguish among the structures of a neuron.
Answer: A
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

13. When substances are transported from the soma to the terminal buttons at the end of an axon, this process is referred to as

a. retrograde axoplasmic transport.
b. systemic axoplasmic transport.
c. anterograde axoplasmic transport.
d. peripheral axoplasmic transport.
e. anterograde somatoplasmic transport.

Difficulty Level: Difficult
Topic: Neurons
Skill Level: Remember the Facts
Learning Objective: 2.2 Distinguish among the structures of a neuron.
Answer: C
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

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14. In order to cross the synapse between two neurons, a substance called _____ is released from the first cell (presynapse) to activate or inhibit the second cell (postsynapse).

a. neurotransmitter
b. protein
c. kinesin
d. dynein
e. mitochondria

Difficulty Level: Moderate
Topic: Neurons
Skill Level: Remember the Facts
Learning Objective: 2.2 Distinguish among the structures of a neuron.
Answer: A
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

15. The membrane of a nerve cell consists of

a. protein molecules.
b. vesicle remnants.
c. a double layer of lipid molecules.
d. cytoplasm.
e. a single layer of lipid molecules interlaced with a layer of protein molecules.

Difficulty Level: Easy
Topic: Neurons
Skill Level: Remember the Facts
Learning Objective: 2.2 Distinguish among the structures of a neuron.
Answer: C
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

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16. Neurotransmitter molecules are most commonly secreted from the

a. glial cell.
b. dendrite.
c. axon terminal buttons.
d. dendritic apposition.
e. soma.

Difficulty Level: Easy
Topic: Neurons
Skill Level: Remember the Facts
Learning Objective: 2.2 Distinguish among the structures of a neuron.
Answer: C
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

17. A key function of specialized lipid molecules located in the nerve cell is to

a. detect the presence of hormones outside the cell.
b. form the cell membrane.
c. form channels to carry ions in and out of the cell.
d. transport molecules into the cell.
e. transport vesicles within the neuron.

Difficulty Level: Moderate
Topic: Neurons
Skill Level: Remember the Facts
Learning Objective: 2.2 Distinguish among the structures of a neuron.
Answer: B
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

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18. Which pairing has a cell structure correctly matched with the function most closely associated with that structure?

a. nucleolus; production of cytoplasm
b. ribosomes; production of DNA
c. lipid bilayer; production of ribosomes
d. nucleolus; production of ribosomes
e. mRNA; production of cytoplasm

Difficulty Level: Difficult
Topic: Neurons
Skill Level: Remember the Facts
Learning Objective: 2.2 Distinguish among the structures of a neuron.
Answer: D
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

19. Which cell structure is the site of protein production?

a. vesicles
b. ribosomes
c. genes
d. myelin
e. the nucleolus

Difficulty Level: Moderate
Topic: Neurons
Skill Level: Remember the Facts
Learning Objective: 2.2 Distinguish among the structures of a neuron.
Answer: B
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

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20. Which pairing represents a correct match between a neuronal organelle and its function?

a. mitochondria; extraction of energy
b. Golgi apparatus; extraction of energy
c. endoplasmic reticulum; breakdown of proteins
d. microtubules; transport of chemicals through the cell membrane
e. mitochondria; formation of vesicles

Difficulty Level: Moderate
Topic: Neurons
Skill Level: Remember the Facts
Learning Objective: 2.2 Distinguish among the structures of a neuron.
Answer: A
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

21. Which pairing represents a correct match between a neuronal organelle and its function?

a. mitochondria; production of fat-like molecules
b. fusion pores; breakdown of proteins
c. mitochondria; formation of vesicles
d. microtubules; transport of molecules between the soma and the axon terminals
e. release-ready vesicles; extraction of energy for cell use

Difficulty Level: Easy
Topic: Neurons
Skill Level: Remember the Facts
Learning Objective: 2.2 Distinguish among the structures of a neuron.
Answer: D
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

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22. The semiliquid substance that fills the space surrounded by the cell membrane of a neuron is called

a. the cytoskeleton.
b. messenger ribonucleic acid.
c. cytoplasm.
d. .a dendritic spine
e. the myelin sheath.

Difficulty Level: Easy
Topic: Neurons
Skill Level: Remember the Facts
Learning Objective: 2.2 Distinguish among the structures of a neuron.
Answer: C
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

23. The cell nucleus of a neuron contains _____, which are long strands of deoxyribonucleic acid.

a. mitochondria
b. microtubules
c. chromosomes
d. cytoplasm
e. adenosine

Difficulty Level: Easy
Topic: Neurons
Skill Level: Remember the Facts
Learning Objective: 2.2 Distinguish among the structures of a neuron.
Answer: C
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

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24. What is the correct sequence of structures and processes leading from gene activation to protein synthesis?

a. genes – ribosomes – mRNA – protein synthesis
b. genes – mRNA – DNA – ribosomes – protein synthesis
c. genes – mRNA – ribosomes – protein synthesis
d. genes – ribosomes – DNA – mRNA – protein synthesis
e. genes – DNA – mRNA – protein synthesis

Difficulty Level: Difficult
Topic: Neurons
Skill Level: Understand the Concepts
Learning Objective: 2.2 Distinguish among the structures of a neuron.
Answer: C
APA Learning Objective: 1.2 Develop a working knowledge of psychology's content domains.

25. Which statement regarding axoplasmic transport is correct?

a. The dynein molecule is involved in anterograde axoplasmic transport.
b. Retrograde axoplasmic transport involves moving substances from the soma to the axon terminals.
c. The kinesin molecule is involved in retrograde axoplasmic transport.
d. Retrograde transport is about half as fast as anterograde axoplasmic transport.
e. Transport of materials occurs only in one direction.

Difficulty Level: Difficult
Topic: Neurons
Skill Level: Understand the Concepts
Learning Objective: 2.2 Distinguish among the structures of a neuron.
Answer: D
APA Learning Objective: 1.2 Develop a working knowledge of psychology's content domains.

26. Which statement regarding axoplasmic transport is correct?

a. Dendrograde transport involves moving substances from the dendrites to the soma.
b. Retrograde transport involves moving substances from the soma to the axon terminals.
c. The kinesin molecule is involved in anterograde transport.
d. Retrograde transport is twice as fast as anterograde transport.
e. The dynein molecule is involved in anterograde transport.

Difficulty Level: Difficult
Topic: Neurons
Skill Level: Understand the Concepts
Learning Objective: 2.2 Distinguish among the structures of a neuron.
Answer: C
APA Learning Objective: 1.2 Develop a working knowledge of psychology's content domains.

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27. Movement of cargo from one end of an axon to the other involves _____ along the _____.

a. axoplasmic transport; myelin sheath
b. facilitated diffusion; exterior of the cell membrane
c. facilitated diffusion; neurofilaments
d. protein synthesis; microtubules
e. axoplasmic transport; microtubules

Difficulty Level: Moderate
Topic: Neurons
Skill Level: Remember the Facts
Learning Objective: 2.2 Distinguish among the structures of a neuron.
Answer: E
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

28. What statement about axons is true?

a. Axons receive information from other neurons.
b. Axons can only be two inches long.
c. Axons house the mitochondria.
d. Axons create DNA used by a neuron.
e. The longest axon in a human stretches from the foot to the base of the brain.

Difficulty Level: Moderate
Topic: Neurons
Skill Level: Understand the Concepts
Learning Objective: 2.2 Distinguish among the structures of a neuron.
Answer: E
APA Learning Objective: 1.2 Develop a working knowledge of psychology's content domains.

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29. Neurons in the central nervous system are provided nutrients, oxygen, and physical support by _____ cells.

a. Schwann
b. glial
c. microtubule
d. stem
e. Purkinje

Difficulty Level: Easy
Topic: Supporting Cells
Skill Level: Remember the Facts
Learning Objective: 2.3 Compare supporting cells in the central and peripheral nervous systems.
Answer: B
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

30. _____ are supporting cells that provide myelination to axons.

a. Leydig cells
b. Astrocytes
c. Microglia
d. Oligodendrocytes
e. Microtubules

Difficulty Level: Easy
Topic: Supporting Cells
Skill Level: Remember the Facts
Learning Objective: 2.3 Compare supporting cells in the central and peripheral nervous systems.
Answer: D
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

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31. _____ are star-shaped glial cells that participate in phagocytosis and structurally support neurons in the brain.

a. Microglia
b. Astrocytes
c. Master cells
d. Microtubules
e. Oligodendrocytes

Difficulty Level: Easy
Topic: Supporting Cells
Skill Level: Remember the Facts
Learning Objective: 2.3 Compare supporting cells in the central and peripheral nervous systems.
Answer: B
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

32. Which process is a key a function of glial cells?

a. protection of the outer surface of the brain
b. removal of physical debris from the brain
c. secretion of cerebrospinal fluid in the brain
d. movement of vesicles along the axons
e. the emergence and conduction of action potentials

Difficulty Level: Moderate
Topic: Supporting Cells
Skill Level: Understand the Concepts
Learning Objective: 2.3 Compare supporting cells in the central and peripheral nervous systems.
Answer: B
APA Learning Objective: 1.2 Develop a working knowledge of psychology's content domains.

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33. Neurons make up about _____ of the volume of the central nervous system.

a. three-quarters
b. half
c. one-quarter
d. one-third
e. one-tenth

Difficulty Level: Moderate
Topic: Supporting Cells
Skill Level: Remember the Facts
Learning Objective: 2.3 Compare supporting cells in the central and peripheral nervous systems.
Answer: B
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

34. The _____ are a kind of "neuron glue" that play a role in providing nourishment for neurons.

a. phagocytes
b. Schwann cells
c. dendrocytes
d. astrocytes
e. microtubules

Difficulty Level: Easy
Topic: Supporting Cells
Skill Level: Remember the Facts
Learning Objective: 2.3 Compare supporting cells in the central and peripheral nervous systems.
Answer: D
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

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35. A drug that specifically killed _____ cells would be expected to alter the physical and nutritional support of brain cells.

a. phagocyte
b. Schwann
c. microglia
d. astrocyte
e. microtubule

Difficulty Level: Moderate
Topic: Supporting Cells
Skill Level: Apply What You Know
Learning Objective: 2.3 Compare supporting cells in the central and peripheral nervous systems.
Answer: D
APA Learning Objective: 1.3 Describe applications of psychology.

36. The process of phagocytosis involves

a. the removal of neuronal debris.
b. the transfer of glucose from a glial cell to a neuron.
c. the wrapping of fatty material around an axon membrane.
d. structural support of a nerve cell.
e. the degradation of transmitter molecules within a synapse.

Difficulty Level: Easy
Topic: Supporting Cells
Skill Level: Understand the Concepts
Learning Objective: 2.3 Compare supporting cells in the central and peripheral nervous systems.
Answer: A
APA Learning Objective: 1.2 Develop a working knowledge of psychology's content domains.

37. The scar tissue generated in the brain by the natural action of _____ acts to impede the regrowth of nerve cells.

a. astrocytes
b. microglia
c. Schwann cells
d. axon terminals
e. dendrites

Difficulty Level: Difficult
Topic: Supporting Cells
Skill Level: Remember the Facts
Learning Objective: 2.3 Compare supporting cells in the central and peripheral nervous systems.
Answer: A
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

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38. Myelination of axons is accomplished by

a. oligodendrocytes.
b. microglia.
c. astrocytes.
d. neurocytes.
e. the blood-brain barrier.

Difficulty Level: Easy
Topic: Supporting Cells
Skill Level: Remember the Facts
Learning Objective: 2.3 Compare supporting cells in the central and peripheral nervous systems.
Answer: A
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

39. How does myelin cover an axon?

a. through the natural decay of astrocytes
b. in a series of small segments with gaps between them
c. by constricting the terminal buttons while leaving the remainder of the axon unaffected
d. in one continuous sheath
e. through the interweaving of astrocytes and microglia

Difficulty Level: Easy
Topic: Supporting Cells
Skill Level: Understand the Concepts
Learning Objective: 2.3 Compare supporting cells in the central and peripheral nervous systems.
Answer: B
APA Learning Objective: 1.2 Develop a working knowledge of psychology's content domains.

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40. _____ are support cells that serve as part of the immune system in the brain.

a. Schwann cells
b. Teracytes
c. Dendrocytes
d. Astrocytes
e. Microglia

Difficulty Level: Easy
Topic: Supporting Cells
Skill Level: Remember the Facts
Learning Objective: 2.3 Compare supporting cells in the central and peripheral nervous systems.
Answer: E
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

41. Which statement regarding Schwann cells is correct?

a. Schwann cells provide myelin for cells in the peripheral nervous system.
b. Schwann cells are found within the brain.
c. Schwann cells are found within the central nervous system.
d. Schwann cells cluster in bundles of 25 or more to myelinate a dendrite.
e. Schwann cells remove the cellular debris left by dead neurons in brain.

Difficulty Level: Difficult
Topic: Supporting Cells
Skill Level: Remember the Facts
Learning Objective: 2.3 Compare supporting cells in the central and peripheral nervous systems.
Answer: A
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

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42. Regrowth of a damaged axon can occur more readily in the peripheral nervous system than in the brain because

a. Schwann cells form barriers to axon regrowth.
b. Schwann cells form cylinders through which new axons can grow and innervate a target cell nerve cell.
c. Schwann cells generate a chemical signal that instructs nerve cells to die.
d. Astrocytes form cylinders through which new axons can grow and innervate a target cell nerve cell.
e. Oligodendroglia form barriers to axon regrowth.

Difficulty Level: Moderate
Topic: Supporting Cells
Skill Level: Understand the Concepts
Learning Objective: 2.3 Compare supporting cells in the central and peripheral nervous systems.
Answer: B
APA Learning Objective: 1.2 Develop a working knowledge of psychology's content domains.

43. A medical scan shows that a particular substance has spread throughout a patient's body via the bloodstream but has not entered the patient's brain. This finding demonstrates the existence of

a. the blood-brain barrier.
b. blood efficacy.
c. microcytes.
d. the lipid bilayer.
e. the doctrine of specific nerve energies.

Difficulty Level: Easy
Topic: The Blood–Brain Barrier
Skill Level: Understand the Concepts
Learning Objective: 2.4 Assess the function of the blood–brain barrier.
Answer: A
APA Learning Objective: 1.2 Develop a working knowledge of psychology's content domains.

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44. Which statement regarding the blood–brain barrier is correct?

a. The barrier is uniform, protecting all brain structures.
b. The barrier pumps glucose out of the brain and into the bloodstream.
c. The barrier functions to regulate the chemical composition of the extracellular fluid surrounding the brain cells.
d. The barrier is formed by cells that line the capillaries of the brain.
e. The ventricles have a blood–brain barrier.

Difficulty Level: Moderate
Topic: The Blood–Brain Barrier
Skill Level: Understand the Concepts
Learning Objective: 2.4 Assess the function of the blood–brain barrier.
Answer: C
APA Learning Objective: 1.2 Develop a working knowledge of psychology's content domains.

45. Activation of cells within the _____ by a poison in the blood would be predicted to produce _____.

a. nucleus accumbens; visual hallucinations
b. hippocampus; locomotion
c. hypothalamus; movement disorders
d. area postrema; vomiting
e. hippocampus; expressions of rage

Difficulty Level: Moderate
Topic: The Blood–Brain Barrier
Skill Level: Apply What You Know
Learning Objective: 2.4 Assess the function of the blood–brain barrier.
Answer: D
APA Learning Objective: 1.3 Describe applications of psychology.

46. The normal order of activation during neuronal transmission is

a. axon –> dendrite –> cell body –> axon terminals.
b. axon terminals –> cell body –> axon –> dendrite.
c. dendrite –> cell body –> axon –> terminal button.
d. cell body –> axon –> dendrite –> axon terminal.
e. dendrite –> axon terminal –> cell body –> axon.

Difficulty Level: Moderate
Topic: Neural Communication: An Overview
Skill Level: Remember the Facts
Learning Objective: 2.5 Explain the process of neural communication in a reflex.
Answer: C
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

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47. Xiao Ling takes a big gulp of her coffee and the heat sears her mouth. Although the pain is so great that her reflex is to spit out the coffee, she does not do so. The reflex to spit out the coffee is inhibited at the

a. sensory neuron.
b. interneuron.
c. motor neuron.
d. glial cell.
e. astrocyte.

Difficulty Level: Easy
Topic: Neural Communication: An Overview
Skill Level: Apply What You Know
Learning Objective: 2.5 Explain the process of neural communication in a reflex.
Answer: C
APA Learning Objective: 1.3 Describe applications of psychology.

48. Arne was studying for his neuroscience exam when he felt a tickle on his arm. Seeing a large spider creeping toward his elbow, Arne jerked his arm automatically. What might be the neural path for this action?

a. sensory neuron –> interneuron –> motor neuron –> muscle
b. interneuron –> sensory neuron –> motor neuron –> muscle
c. motor neuron –> sensory neuron –> interneuron –> muscle
d. sensory neuron –> motor neuron –> interneuron –> muscle
e. motor neuron –> interneuron –> sensory neuron –> muscle

Difficulty Level: Easy
Topic: Neural Communication: An Overview
Skill Level: Apply What You Know
Learning Objective: 2.5 Explain the process of neural communication in a reflex.
Answer: A
APA Learning Objective: 1.3 Describe applications of psychology.

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49. The message that gets conducted along an axon consists of

a. neurotransmitter flowing through the axon.
b. interneuron inhibition.
c. changes in electrical charge.
d. interneuron excitation.
e. emissions from microtubules.

Difficulty Level: Easy
Topic: Electrical Potentials of Axons
Skill Level: Understand the Concepts
Learning Objective: 2.6 Describe membrane potential, resting potential, hyperpolarization, depolarization, and the action potential.
Answer: C
APA Learning Objective: 1.2 Develop a working knowledge of psychology's content domains.

50. Very small sensors called _____ measure the changes in electrical activity that take place across an axon membrane.

a. microelectrodes
b. voltmeters
c. micrometers
d. voltametric sensors
e. microdiodes

Difficulty Level: Easy
Topic: Electrical Potentials of Axons
Skill Level: Understand the Concepts
Learning Objective: 2.6 Describe membrane potential, resting potential, hyperpolarization, depolarization, and the action potential.
Answer: A
APA Learning Objective: 1.2 Develop a working knowledge of psychology's content domains.

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51. The interior of a neuron at rest

a. has the same ionic concentrations as the environment outside the neuron.
b. is at the same voltage potential as the environment outside the neuron.
c. has a higher sodium concentration than the environment outside the neuron.
d. is negatively charged relative to the environment outside the neuron.
e. has a lower potassium concentration than the environment outside the neuron.

Difficulty Level: Moderate
Topic: Electrical Potentials of Axons
Skill Level: Understand the Concepts
Learning Objective: 2.6 Describe membrane potential, resting potential, hyperpolarization, depolarization, and the action potential.
Answer: D
APA Learning Objective: 1.2 Develop a working knowledge of psychology's content domains.

52. Any difference in electrical charge across the axon membrane is defined as the _____ potential.

a. membrane
b. local
c. glial
d. action
e. axon

Difficulty Level: Easy
Topic: Electrical Potentials of Axons
Skill Level: Remember the Facts
Learning Objective: 2.6 Describe membrane potential, resting potential, hyperpolarization, depolarization, and the action potential.
Answer: A
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

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53. The _____ potential is defined as the difference in electrical charge between the inside and the outside of an undisturbed axon membrane.

a. resting
b. local
c. resting
d. action
e. axon

Difficulty Level: Moderate
Topic: Electrical Potentials of Axons
Skill Level: Remember the Facts
Learning Objective: 2.6 Describe membrane potential, resting potential, hyperpolarization, depolarization, and the action potential.
Answer: A
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

54. An electrical change in the inside of an axon from -70 mV to -90 mV would be classified as

a. depolarization.
b. threshold potential.
c. action potential.
d. hyperpolarization.
e. excitatory local potential.

Difficulty Level: Easy
Topic: Electrical Potentials of Axons
Skill Level: Understand the Concepts
Learning Objective: 2.6 Describe membrane potential, resting potential, hyperpolarization, depolarization, and the action potential.
Answer: D
APA Learning Objective: 1.2 Develop a working knowledge of psychology's content domains.

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55. When the inside of an axon becomes more positive relative to the environment outside the neuron, _____ has taken place.

a. depolarization
b. a resting potential
c. an action potential
d. hyperpolarization
e. an inhibitory local potential

Difficulty Level: Moderate
Topic: Electrical Potentials of Axons
Skill Level: Understand the Concepts
Learning Objective: 2.6 Describe membrane potential, resting potential, hyperpolarization, depolarization, and the action potential.
Answer: A
APA Learning Objective: 1.2 Develop a working knowledge of psychology's content domains.

56. If the inner voltage of a neuron is -70 mV and application of stimulation results in a -95 mV charge, the stimulation had a _____ effect. On the other hand, a resultant charge of +40 mV would be a _____ effect.

a. hyperpolarizing; depolarizing
b. depolarizing; hyperpolarizing
c. repolarizing; depolarizing
d. repolarizing; hyperpolarizing
e. hyperpolarizing; repolarizing

Difficulty Level: Easy
Topic: Electrical Potentials of Axons
Skill Level: Understand the Concepts
Learning Objective: 2.6 Describe membrane potential, resting potential, hyperpolarization, depolarization, and the action potential.
Answer: A
APA Learning Objective: 1.2 Develop a working knowledge of psychology's content domains.

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57. A(n) _____ will be recorded from a nerve cell whose membrane potential rises above the threshold of excitation.

a. action potential
b. local potential
c. downward shift of the threshold of excitation
d. upward shift of the membrane threshold
e. long-term change in the membrane potential

Difficulty Level: Easy
Topic: Electrical Potentials of Axons
Skill Level: Understand the Concepts
Learning Objective: 2.6 Describe membrane potential, resting potential, hyperpolarization, depolarization, and the action potential.
Answer: A
APA Learning Objective: 1.2 Develop a working knowledge of psychology's content domains.

58. The _____ is the voltage level at which an action potential is triggered in a patch of axon membrane.

a. resting potential
b. hyperpolarization level
c. threshold of excitation
d. rate level
e. refractory period

Difficulty Level: Easy
Topic: Electrical Potentials of Axons
Skill Level: Remember the Facts
Learning Objective: 2.6 Describe membrane potential, resting potential, hyperpolarization, depolarization, and the action potential.
Answer: C
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

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59. A cup of sugar is poured into a gallon of hot water and allowed to sit undisturbed. After a few days, we would expect that the process of _____ will ensure that the sugar molecules are evenly distributed throughout the water.

a. retrograde transport
b. diffusion
c. anterograde transport
d. electrostatic pressure
e. salinity

Difficulty Level: Easy
Topic: The Membrane Potential
Skill Level: Remember the Facts
Learning Objective: 2.7 Summarize how diffusion, electrostatic pressure, and the sodium–potassium pump help establish membrane potential.
Answer: B
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

60. A substance that forms oppositely charged particles when dissolved in water is known as a(n)

a. ion.
b. molecule.
c. electrolyte.
d. cation.
e. anion.

Difficulty Level: Easy
Topic: The Membrane Potential
Skill Level: Remember the Facts
Learning Objective: 2.7 Summarize how diffusion, electrostatic pressure, and the sodium–potassium pump help establish membrane potential.
Answer: C
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

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61. _____ are charged particles formed when an electrolyte dissolves in water.

a. Ions
b. Solvents
c. Neurotransmitters
d. Electrons
e. Solutes

Difficulty Level: Easy
Topic: The Membrane Potential
Skill Level: Remember the Facts
Learning Objective: 2.7 Summarize how diffusion, electrostatic pressure, and the sodium–potassium pump help establish membrane potential.
Answer: A
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

62. A cation would be attracted to

a. another cation.
b. an anion.
c. a sodium ion.
d. a potassium ion.
e. a calcium ion.

Difficulty Level: Moderate
Topic: The Membrane Potential
Skill Level: Remember the Facts
Learning Objective: 2.7 Summarize how diffusion, electrostatic pressure, and the sodium–potassium pump help establish membrane potential.
Answer: B
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

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63. _____ are negatively charged ions.

a. Transmitters
b. Solvents
c. Electrolytes
d. Cations
e. Anions

Difficulty Level: Easy
Topic: The Membrane Potential
Skill Level: Remember the Facts
Learning Objective: 2.7 Summarize how diffusion, electrostatic pressure, and the sodium–potassium pump help establish membrane potential.
Answer: E
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

64. The process by which similarly charged particles repel each other and are thus moved within a medium is called

a. diffusion.
b. carrier-mediated transport.
c. refraction.
d. electrostatic pressure.
e. diffraction.

Difficulty Level: Moderate
Topic: The Membrane Potential
Skill Level: Remember the Facts
Learning Objective: 2.7 Summarize how diffusion, electrostatic pressure, and the sodium–potassium pump help establish membrane potential.
Answer: D
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

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65. Which statement is true regarding ion distribution across the axon membrane?

a. Chloride ions are more concentrated inside the axon membrane.
b. Potassium ions are more concentrated outside the cell membrane.
c. The action potential is the balance point between diffusion and electrostatic pressure.
d. Sodium ions are more concentrated outside the axon membrane.
e. Sodium ions are more concentrated inside the axon membrane.

Difficulty Level: Easy

Topic: The Membrane Potential
Skill Level: Remember the Facts
Learning Objective: 2.7 Summarize how diffusion, electrostatic pressure, and the sodium–potassium pump help establish membrane potential.
Answer: D
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

66. Movement of _____ ions _____ the axon would be induced by the force of diffusion.

a. chloride; out of
b. sodium; into
c. potassium; into
d. organic; into
e. sodium; out of

Difficulty Level: Easy
Topic: The Membrane Potential
Skill Level: Remember the Facts
Learning Objective: 2.7 Summarize how diffusion, electrostatic pressure, and the sodium–potassium pump help establish membrane potential.
Answer: B
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

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67. Sodium ions move out of an axon because of

a. the opening of sodium channels.
b. the opening of voltage-gated channels.
c. the synthesis of kinesin.
d. electrostatic pressure.
e. sodium-potassium transporters.

Difficulty Level: Moderate
Topic: The Membrane Potential
Skill Level: Remember the Facts
Learning Objective: 2.7 Summarize how diffusion, electrostatic pressure, and the sodium–potassium pump help establish membrane potential.
Answer: E
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

68. As a consequence of the activity of sodium-potassium transporters,

a. extracellular sodium concentrations are kept low.
b. intracellular sodium concentrations are kept very high.
c. extracellular potassium concentrations are kept very high.
d. intracellular sodium concentrations are kept low.
e. very little energy is required to maintain ionic differences across the membrane.

Difficulty Level: Moderate
Topic: The Membrane Potential
Skill Level: Understand the Concepts
Learning Objective: 2.7 Summarize how diffusion, electrostatic pressure, and the sodium–potassium pump help establish membrane potential.
Answer: D
APA Learning Objective: 1.2 Develop a working knowledge of psychology's content domains.

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69. The Na+/K+ pump removes _____ Na+ ions and adds _____ K+ ions.

a. 3; 2
b. 2; 3
c. 3; 4
d. 2; 4
e. 4; 3

Difficulty Level: Difficult
Topic: The Membrane Potential
Skill Level: Remember the Facts
Learning Objective: 2.7 Summarize how diffusion, electrostatic pressure, and the sodium–potassium pump help establish membrane potential.
Answer: A
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

70. When students enter a classroom, they tend to spread themselves out (provided there are enough desks to do so). In biological terms, this effect would be similar to

a. electrostatic pressure.
b. ionic movement.
c. diffusion.
d. derealization.
e. ionic static.

Difficulty Level: Moderate
Topic: The Membrane Potential
Skill Level: Apply What You Know
Learning Objective: 2.7 Summarize how diffusion, electrostatic pressure, and the sodium–potassium pump help establish membrane potential.
Answer: C
APA Learning Objective: 1.3 Describe applications of psychology.

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71. Which statement regarding the action potential is correct?

a. The action potential is conducted along a dendrite.
b. The action potential is conducted faster in unmyelinated nerve cells.
c. The action potential is an all-or-none electrical event.
d. The action potential amplitude is higher for an intense signal.
e. The action potential amplitude depends on its location along the axon.

Difficulty Level: Moderate
Topic: The Action Potential
Skill Level: Understand the Concepts
Learning Objective: 2.9 Describe conduction of the action potential.
Answer: C
APA Learning Objective: 1.2 Develop a working knowledge of psychology's content domains.

72. The specialized protein molecules located in an axon membrane that can open or close are known as

a. receptors.
b. voltage transporters.
c. autoreceptors.
d. ion channels.
e. sodium-potassium transporters.

Difficulty Level: Moderate
Topic: The Action Potential
Skill Level: Remember the Facts
Learning Objective: 2.8 Summarize the series of ion movements during the action potential.
Answer: D
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

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73. Which statement about an action potential is true?

a. More sodium channels are opened at a lower voltage level than are potassium channels.
b. The action potential requires 10 msec for completion.
c. The action potential requires the activity of the sodium-potassium transporters during the rising phase.
d. More potassium channels are opened at a lower voltage than are sodium channels.
e. Diffusion is due to a prolonged change in sodium conductance.

Difficulty Level: Moderate
Topic: The Action Potential
Skill Level: Understand the Concepts
Learning Objective: 2.8 Summarize the series of ion movements during the action potential.
Answer: A
APA Learning Objective: 1.2 Develop a working knowledge of psychology's content domains.

74. Sodium ions will be pushed into a resting neuron by the forces of _____ and _____.

a. inactivation of potassium channels; diffusion
b. electrostatic pressure; sodium-potassium pump activation
c. sodium-potassium pump activation; diffusion
d. ion channel inactivation; diffusion
e. diffusion; electrostatic pressure

Difficulty Level: Moderate
Topic: The Membrane Potential
Skill Level: Understand the Concepts
Learning Objective: 2.8 Summarize the series of ion movements during the action potential.
Answer: E
APA Learning Objective: 1.2 Develop a working knowledge of psychology's content domains.

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75. Which ion channel action is correctly matched with its resulting change in membrane potential?

a. entry of a negative ion; hyperpolarization
b. entry of a positive ion; hyperpolarization
c. exit of a positive ion; depolarization
d. exit of a negative ion; hyperpolarization
e. inactivation of sodium-potassium transporters; depolarization

Difficulty Level: Difficult
Topic: The Action Potential
Skill Level: Remember the Facts
Learning Objective: 2.8 Summarize the series of ion movements during the action potential.
Answer: A
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

76. Which of the following events restores the membrane potential from the peak of the action potential back to the resting level?

a. Sodium ions move into the cell.
b. Potassium ions move out of the cell.
c. Potassium ions move into the cell.
d. Chloride ions move into the cell.
e. Protein anions move out of the cell.

Difficulty Level: Moderate
Topic: The Action Potential
Skill Level: Remember the Facts
Learning Objective: 2.8 Summarize the series of ion movements during the action potential.
Answer: B
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

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77. As the action potential travels the length of an axon

a. it decreases in amplitude at a consistent rate of 2 mV per millimeter.
b. it increases in speed of conduction.
c. it remains constant in size.
d. it stops at some point, unless reenergized by an influx of chromium ions.
e. it decreases in amplitude relative to the length of the axon.

Difficulty Level: Moderate

Topic: Conduction of the Action Potential
Skill Level: Understand the Concepts
Learning Objective: 2.9 Describe conduction of the action potential.
Answer: C
APA Learning Objective: 1.2 Develop a working knowledge of psychology's content domains.

78. Which conclusion is consistent with the all-or-none law?

a. The action potential will diminish to near 0 mV when transmitted down a long axon.
b. The action potential fires at the same rate regardless of the inputs to the neuron.
c. The action potential is conducted more rapidly down the axon as it reaches the axon terminal.
d. The action potential is produced whenever the membrane potential reaches the threshold of excitation.
e. The action potential travels only in one direction.

Difficulty Level: Moderate
Topic: Conduction of the Action Potential
Skill Level: Remember the Facts
Learning Objective: 2.9 Describe conduction of the action potential.
Answer: D
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

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79. The nervous system accounts for variation in the intensity of incoming sensory stimulation by means of variations in the _____ of a neuron.

a. repolarization rate
b. resting potential
c. speed of conduction of action potentials
d. total amplitude of the action potential
e. firing rate

Difficulty Level: Moderate
Topic: Conduction of the Action Potential
Skill Level: Understand the Concepts
Learning Objective: 2.9 Describe conduction of the action potential.
Answer: E
APA Learning Objective: 1.2 Develop a working knowledge of psychology's content domains.

80. If a bowling ball fell on your foot, the action potentials triggered by that event would differ from a feather falling on your foot. The action potentials for the bowling ball would be

a. larger in size and faster in occurrence.
b. the same size as for the feather, but they would be slower in occurrence.
c. the same size as for the feather, but they would be faster in occurrence.
d. larger in size and slower in occurrence.
e. smaller in size and faster in occurrence.

Difficulty Level: Moderate
Topic: Conduction of the Action Potential
Skill Level: Understand the Concepts
Learning Objective: 2.9 Describe conduction of the action potential.
Answer: C
APA Learning Objective: 1.2 Develop a working knowledge of psychology's content domains.

81. In a myelinated axon, ions can enter and leave the axonal membrane only at

a. the terminal buttons.
b. the soma.
c. the nodes of Ranvier.
d. the segment of membrane beneath the Schwann cell wrapping.
e. the midpoint along the axonal membrane.

Difficulty Level: Moderate
Topic: Conduction of the Action Potential
Skill Level: Understand the Concepts
Learning Objective: 2.9 Describe conduction of the action potential.
Answer: C
APA Learning Objective: 1.2 Develop a working knowledge of psychology's content domains.

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82. Which important advantage is associated with saltatory conduction?

a. More sodium ions have to be pumped out of the cell after an action potential.
b. Myelin allows the nerve cell to recycle neurotransmitter molecules.
c. Less neurotransmitter is required to send a message across the synapse.
d. Myelin speeds up the velocity at which an axon can conduct an action potential.
e. Myelin requires that nerve cell axons be larger in order to conduct a signal rapidly.

Difficulty Level: Difficult
Topic: Conduction of the Action Potential
Skill Level: Understand the Concepts
Learning Objective: 2.9 Describe conduction of the action potential.
Answer: D
APA Learning Objective: 1.2 Develop a working knowledge of psychology's content domains.

83. Which advantage is associated with myelination?

a. Myelin changes the height of an action potential.
b. Myelin increases the energy requirements of the nerve cell.
c. Myelin slows down conduction speed.
d. Myelin lowers the threshold for induction of an action potential.
e. Myelin speeds up conduction of an impulse down an axon.

Difficulty Level: Moderate
Topic: Conduction of the Action Potential
Skill Level: Understand the Concepts
Learning Objective: 2.9 Describe conduction of the action potential.
Answer: E
APA Learning Objective: 1.2 Develop a working knowledge of psychology's content domains.

84. Saltatory conduction is rapid because

a. an action potential gets retriggered at each node of Ranvier.
b. myelinated axons have more leakage through their membranes.
c. myelinated axons are larger in diameter.
d. myelinated axons have more ion channels per unit area than do non-myelinated axons.
e. nodes of Ranvier have a higher threshold of activation.

Difficulty Level: Moderate
Topic: Conduction of the Action Potential
Skill Level: Understand the Concepts
Learning Objective: 2.9 Describe conduction of the action potential.
Answer: A
APA Learning Objective: 1.2 Develop a working knowledge of psychology's content domains.

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85. The junction between the terminal button at the end of an axonal branch of one neuron and the membrane of another neuron is called the

a. synapse.
b. conduction area.
c. vesicle.
d. ligand.
e. release zone.

Difficulty Level: Easy
Topic: Structure of Synapses
Skill Level: Remember the Facts
Learning Objective: 2.10 Identify the presynaptic structures involved in synaptic communication.
Answer: A
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

86. Small synaptic vesicles contain _____, whereas large synaptic vesicles contain _____.

a. neurotransmitters; peptides
b. peptides; neurotransmitters
c. proteins; peptides
d. peptides; proteins
e. neurotransmitters; proteins

Difficulty Level: Difficult
Topic: Structure of Synapses
Skill Level: Remember the Facts
Learning Objective: 2.10 Identify the presynaptic structures involved in synaptic communication.
Answer: A
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

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87. Signals are carried across the synapse by

a. a direct electrical connections between the two cells.
b. the secretion of neurotransmitter molecules into the synapse.
c. the transfer of ions from one cell to another.
d. carrier molecules.
e. the sodium-potassium pump.

Difficulty Level: Moderate
Topic: Release of Neurotransmitters
Skill Level: Understand the Concepts
Learning Objective: 2.11 Describe the process of neurotransmitter release.
Answer: B
APA Learning Objective: 1.2 Develop a working knowledge of psychology's content domains.

88. Communication of neural signals across a synapse involves

a. the opening of neurotransmitter-gated channels in the axon terminal.
b. voltage changes that open chloride channels in the presynaptic membrane.
c. vesicles that take up neurotransmitter molecules into the axon terminal.
d. the binding of neurotransmitter at postsynaptic receptors triggering membrane potentials.
e. direct electrical contact between the pre- and postsynaptic membranes.

Difficulty Level: Moderate
Topic: Release of Neurotransmitters
Skill Level: Understand the Concepts
Learning Objective: 2.11 Describe the process of neurotransmitter release.
Answer: D
APA Learning Objective: 1.2 Develop a working knowledge of psychology's content domains.

89. The largest number of small vesicles would be expected to be located within the _____ of a neuron.

a. dendritic spines
b. soma
c. postsynaptic membrane
d. release zone
e. axon hillock

Difficulty Level: Easy
Topic: Structure of Synapses
Skill Level: Understand the Concepts
Learning Objective: 2.10 Identify the presynaptic structures involved in synaptic communication.
Answer: D
APA Learning Objective: 1.2 Develop a working knowledge of psychology's content domains.

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90. _____ fill synaptic vesicles with neurotransmitter, whereas _____ contribute to the release of neurotransmitters.

a. Transport proteins; trafficking proteins
b. Cations; clefts
c. Dendritic spines; the nodes of Ranvier
d. Intracellular membranes; extracellular membranes
e. Anions; ligands

Difficulty Level: Difficult
Topic: Structure of Synapses
Skill Level: Understand the Concepts
Learning Objective: 2.10 Identify the presynaptic structures involved in synaptic communication.
Answer: A
APA Learning Objective: 1.2 Develop a working knowledge of psychology's content domains.

91. Synaptic vesicles are produced in the

a. neuron soma.
b. dendrites.
c. glial cells.
d. neuron lysosomes.
e. astrocytes.

Difficulty Level: Moderate
Topic: Structure of Synapses
Skill Level: Remember the Facts
Learning Objective: 2.10 Identify the presynaptic structures involved in synaptic communication.
Answer: A
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

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92. Calcium ions (Ca^{2+}) are found in their highest concentration in

a. the soma.
b. terminal buttons.
c. intracellular fluid.
d. synaptic clefts.
e. extracellular fluid.

Difficulty Level: Moderate
Topic: Release of Neurotransmitters
Skill Level: Remember the Facts
Learning Objective: 2.11 Describe the process of neurotransmitter release.
Answer: E
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

93. Placing neurons and their synaptic contacts into a medium containing no calcium ions would be expected to

a. decrease the time required to move sodium ions out of the axon terminal.
b. enhance the voltage changes associated with the action potential.
c. increase the number of neurotransmitter molecules released from the axon terminal.
d. prolong the refractory period of the action potential.
e. prevent the release of neurotransmitter into the synapse.

Difficulty Level: Difficult
Topic: Release of Neurotransmitters
Skill Level: Apply What You Know
Learning Objective: 2.11 Describe the process of neurotransmitter release.
Answer: E
APA Learning Objective: 1.3 Describe applications of psychology.

94. If Ca^{2+} was blocked,

a. Na+ would be stuck inside of the cell.
b. neurotransmitters could not be released from the cell.
c. voltage-gated ion channels would remain closed.
d. passive channels would close.
e. passive channels would open.

Difficulty Level: Difficult
Topic: Release of Neurotransmitters
Skill Level: Apply What You Know
Learning Objective: 2.11 Describe the process of neurotransmitter release.
Answer: B
APA Learning Objective: 1.3 Describe applications of psychology.

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95. Which statement is true regarding postsynaptic receptors?

a. The effects of hormones do not involve receptor activation.
b. Neurotransmitters act on binding sites on receptors to exert their effects.
c. Receptors are insensitive to drugs.
d. Neuromodulators are ligands that come from outside the body.
e. Hormone receptors are found in all tissues except brain.

Difficulty Level: Difficult
Topic: Activation of Receptors
Skill Level: Understand the Concepts
Learning Objective: 2.12 Contrast ionotropic and metabotropic receptors.
Answer: B
APA Learning Objective: 1.2 Develop a working knowledge of psychology's content domains.

96. In order to produce a depolarization or hyperpolarization of the postsynaptic membrane, neurotransmitters

a. diffuse widely in the brain to produce changes in metabolism.
b. act through ionotropic receptors to activate a second messenger.
c. are released into the synapse from the soma.
d. open ion channels in the postsynaptic membrane.
e. alter ion channel activity for minutes at a time.

Difficulty Level: Easy
Topic: Activation of Receptors
Skill Level: Understand the Concepts
Learning Objective: 2.12 Contrast ionotropic and metabotropic receptors.
Answer: D
APA Learning Objective: 1.2 Develop a working knowledge of psychology's content domains.

97. After a vesicle fuses with the presynaptic membrane and releases its contents into the synaptic cleft, the membrane is

a. destroyed by astrocytes.
b. incorporated into the postsynaptic membrane.
c. recycled to form new vesicles.
d. degraded and the debris removed from the axon terminal.
e. incorporated into the mitochondria.

Difficulty Level: Easy
Topic: Release of Neurotransmitters
Skill Level: Remember the Facts
Learning Objective: 2.11 Describe the process of neurotransmitter release.
Answer: C
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

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98. Which pair correctly matches a receptor type with the effect it produces?

a. metabotropic; direct opening of an ion channel
b. ionotropic; more time required to open an ion channel
c. metabotropic; G protein activation leads to activation of a second messenger
d. metabotropic; rapid opening of a single ion channel
e. metabotropic; rapid short-lived effects on ion channels

Difficulty Level: Difficult
Topic: Activation of Receptors
Skill Level: Understand the Concepts
Learning Objective: 2.12 Contrast ionotropic and metabotropic receptors.
Answer: C
APA Learning Objective: 1.2 Develop a working knowledge of psychology's content domains.

99. In comparison to ionotropic receptors, metabotropic receptors

a. have effects that occur quickly and last longer.
b. have effects that take longer to begin and last longer.
c. have effects that take longer to begin but dissipate quickly.
d. have effects that occur quickly and disappear quickly.
e. act directly on ion channels.

Difficulty Level: Difficult
Topic: Activation of Receptors
Skill Level: Understand the Concepts
Learning Objective: 2.12 Contrast ionotropic and metabotropic receptors.
Answer: B
APA Learning Objective: 1.2 Develop a working knowledge of psychology's content domains.

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100. With regard to the release of neurotransmitters in the brain, *kiss and run* refers to a situation in which the vesicle

a. releases most of its contents into the cleft and then remains attached to the presynaptic membrane.
b. closes before releasing any molecules and then moves to the cell interior.
c. remains open until the next action potential is triggered.
d. releases most of its contents into the cleft, after which it breaks away from the presynaptic membrane and is refilled.
e. merges completely with the presynaptic membrane.

Difficulty Level: Moderate
Topic: Release of Neurotransmitters
Skill Level: Remember the Facts
Learning Objective: 2.11 Describe the process of neurotransmitter release.
Answer: D
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

101. Which receptor type is correctly paired with the effect it produces?

a. ionotropic; direct opening of an ion channel
b. ionotropic; more time required to open an ion channel
c. ionotropic; G protein activation leads to activation of a second messenger
d. metabotropic; second-messenger effects are specific to neuronal communication
e. metabotropic; rapid short-lived effects on ion channels

Difficulty Level: Difficult
Topic: Activation of Receptors
Skill Level: Understand the Concepts
Learning Objective: 2.12 Contrast ionotropic and metabotropic receptors.
Answer: A
APA Learning Objective: 1.2 Develop a working knowledge of psychology's content domains.

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102. An influx of ____ or _____ ions across a cell membrane results in EPSPs.

a. Na+; Ca^{2+}
b. Cl-; Na+
c. Ca^{2+}; Cl-
d. Cl-; K+
e. A-; K+

Difficulty Level: Difficult
Topic: Postsynaptic Potentials
Skill Level: Remember the Facts
Learning Objective: 2.13 Compare EPSPs and IPSPs in postsynaptic cells.
Answer: A
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

103. Inhibiting _____ neurons makes a behavior more likely to occur, whereas _____ inhibitory neurons makes a behavior less likely to occur.

a. excitatory; inhibiting
b. sodium; magnesium
c. inhibitory; exciting
d. inhibitory; inhibiting
e. excitatory; exciting

Difficulty Level: Moderate
Topic: Effects of Postsynaptic Potentials: Neural Integration
Skill Level: Remember the Facts
Learning Objective: 2.14 Summarize neural integration of EPSPs and IPSPs.
Answer: C
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

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104. The postsynaptic potentials induced by most neurotransmitters are terminated by

a. disruption of the postsynaptic receptor.
b. enzymatic degradation of the transmitter molecule.
c. inhibition of transmitter synthesis.
d. facilitation of transmitter release.
e. reuptake of the molecule into the axon terminal.

Difficulty Level: Moderate
Topic: Termination of Postsynaptic Potentials
Skill Level: Understand the Concepts
Learning Objective: 2.15 Explain how postsynaptic potentials are terminated.
Answer: E
APA Learning Objective: 1.2 Develop a working knowledge of psychology's content domains.

105. The postsynaptic potentials induced by acetylcholine are terminated via

a. disruption of the nicotinic postsynaptic receptor.
b. enzymatic degradation via acetylcholinesterase.
c. inhibition of acetylcholine synthesis.
d. facilitation of acetylcholine release.
e. reuptake of acetylcholine.

Difficulty Level: Moderate
Topic: Termination of Postsynaptic Potentials
Skill Level: Remember the Facts
Learning Objective: 2.15 Explain how postsynaptic potentials are terminated.
Answer: B
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

106. Autoreceptors are located on the

a. ionotropic inhibitors.
b. presynaptic membrane.
c. endoplasmic reticulum.
d. postsynaptic membrane.
e. mitochondria.

Difficulty Level: Moderate
Topic: Autoreceptors
Skill Level: Remember the Facts
Learning Objective: 2.16 Distinguish autoreceptors from postsynaptic receptors.
Answer: B
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

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107. When the activity of an axoaxonic synapse increases the release of a neurotransmitter, the process is called

a. presynaptic facilitation.
b. postsynaptic inhibition.
c. gap release.
d. postsynaptic facilitation.
e. presynaptic inhibition.

Difficulty Level: Difficult
Topic: Other Types of Synapses
Skill Level: Remember the Facts
Learning Objective: 2.17 Identify synapses other than those involved in neural integration.
Answer: A
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

108. Neuromodulators are

a. rarely of a peptide form.
b. secreted from neurons, but dispersed widely in the brain.
c. inevitably inhibitory.
d. secreted from a neuron and only affect an adjacent neuron.
e. typically secreted in very small amounts compared to neurotransmitters.

Difficulty Level: Easy
Topic: Nonsynaptic Chemical Communication
Skill Level: Remember the Facts
Learning Objective: 2.18 Describe examples of nonsynaptic communication.
Answer: B
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

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109. Most _____ are secreted into the extracellular fluid from endocrine glands or tissues.

a. neurotransmitters
b. neuropeptides
c. modulators
d. hormones
e. pheromones

Difficulty Level: Easy
Topic: Nonsynaptic Chemical Communication
Skill Level: Remember the Facts
Learning Objective: 2.18 Describe examples of nonsynaptic communication.
Answer: D
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

Fill-in-the-Blank Questions

110. Motor neurons control the activity of the _____.

Difficulty Level: Easy
Topic: The Nervous System: An Overview
Skill Level: Remember the Facts
Learning Objective: 2.1 Contrast features of the central and peripheral nervous systems.
Answer: muscles
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

111. The central nervous system consists of the _____ and the _____.

Difficulty Level: Easy
Topic: The Nervous System: An Overview
Skill Level: Remember the Facts
Learning Objective: 2.1 Contrast features of the central and peripheral nervous systems.
Answer: brain; spinal cord
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

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112. When substances are transported from the terminal buttons at the end of an axon back to the soma, this process is referred to as _____.

Difficulty Level: Difficult
Topic: Neurons
Skill Level: Remember the Facts
Learning Objective: 2.2 Distinguish among the structures of a neuron.
Answer: retrograde axoplasmic transport
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

113. The cell membrane is formed by a dual layer of _____ molecules.

Difficulty Level: Moderate
Topic: Neurons
Skill Level: Remember the Facts
Learning Objective: 2.2 Distinguish among the structures of a neuron.
Answer: lipid
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

114. _____ are bead-like structures that extract energy from nutrients.

Difficulty Level: Moderate
Topic: Neurons
Skill Level: Remember the Facts
Learning Objective: 2.2 Distinguish among the structures of a neuron.
Answer: Mitochondria
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

115. The myelin sheath surrounding axons in the central nervous system is formed by _____.

Difficulty Level: Difficult
Topic: Supporting Cells
Skill Level: Remember the Facts
Learning Objective: 2.3 Compare supporting cells in the central and peripheral nervous systems.
Answer: oligodendrocytes
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

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116. Some chemicals are excluded from entering the brain due to selective permeability of the _____ barrier.

Difficulty Level: Easy
Topic: The Blood–Brain Barrier
Skill Level: Remember the Facts
Learning Objective: 2.4 Assess the function of the blood–brain barrier.
Answer: blood–brain
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

117. The _____ is a part of the brain that controls vomiting. The blood–brain barrier is much weaker there, permitting neurons in this region to detect the presence of toxic substances in the blood.

Difficulty Level: Difficult
Topic: The Blood–Brain Barrier
Skill Level: Remember the Facts
Learning Objective: 2.4 Assess the function of the blood–brain barrier.
Answer: area postrema
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

118. In a neuron at rest, the interior of the cell is more _____ charged than is the exterior of the cell.

Difficulty Level: Easy
Topic: Electrical Potentials of Axons
Skill Level: Understand the Concepts
Learning Objective: 2.6 Describe membrane potential, resting potential, hyperpolarization, depolarization, and the action potential.
Answer: negatively
APA Learning Objective: 1.2 Develop a working knowledge of psychology's content domains.

119. The process of _____ ensures that ions will distribute themselves evenly through a solvent.

Difficulty Level: Moderate
Topic: The Membrane Potential
Skill Level: Remember the Facts
Learning Objective: 2.7 Summarize how diffusion, electrostatic pressure, and the sodium–potassium pump help establish membrane potential.
Answer: diffusion
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

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120. The pressure on a cation to enter into the cell, where there is a negative charge, is referred to as _____.

Difficulty Level: Moderate
Topic: The Membrane Potential
Skill Level: Remember the Facts
Learning Objective: 2.6 Describe membrane potential, resting potential, hyperpolarization, depolarization, and the action potential.
Answer: electrostatic pressure
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

121. In a myelinated axon, ions enter or leave the axon membrane only at the _____.

Difficulty Level: Moderate
Topic: Conduction of the Action Potential
Skill Level: Remember the Facts
Learning Objective: 2.9 Describe conduction of the action potential.
Answer: nodes of Ranvier
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

122. Synaptic vesicles are found in the greatest numbers around the part of a presynaptic membrane that faces _____.

Difficulty Level: Difficult
Topic: Structure of Synapses
Skill Level: Remember the Facts
Learning Objective: 2.9 Describe conduction of the action potential.
Answer: the synaptic cleft
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

123. _____ fill vesicles with neurotransmitter, and _____ are involved in the release of neurotransmitters and recycling of the vesicles.

Difficulty Level: Moderate
Topic: Structure of Synapses
Skill Level: Remember the Facts
Learning Objective: 2.10 Identify the presynaptic structures involved in synaptic communication.
Answer: Transport proteins; trafficking proteins
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

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124. The ion _____ is required for the release of neurotransmitter from the presynaptic terminal.

Difficulty Level: Easy
Topic: Release of Neurotransmitters
Skill Level: Remember the Facts
Learning Objective: 2.11 Describe the process of neurotransmitter release.
Answer: calcium
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

125. _____ receptors involve the direct opening of an ion channel, whereas _____ receptors involve the action of second-messenger molecules inside the postsynaptic cell.

Difficulty Level: Moderate
Topic: Activation of Receptors
Skill Level: Remember the Facts
Learning Objective: 2.12 Contrast ionotropic and metabotropic receptors.
Answer: Ionotropic; metabotropic
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

126. An action potential either occurs or it does not. This is known as _____.

Difficulty Level: Moderate
Topic: Conduction of the Action Potential
Skill Level: Remember the Facts
Learning Objective: 2.9 Describe conduction of the action potential.
Answer: the all-or-none law
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

127. Postsynaptic potentials are terminated either by _____ or enzymatic deactivation.

Difficulty Level: Moderate
Topic: Termination of Postsynaptic Potentials
Skill Level: Remember the Facts
Learning Objective: 2.15 Explain how postsynaptic potentials are terminated.
Answer: reuptake
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

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128. _____ are metabotropic receptors located in the presynaptic membrane that provide negative feedback onto neurotransmitter release.

Difficulty Level: Moderate
Topic: Autoreceptors
Skill Level: Remember the Facts
Learning Objective: 2.16 Distinguish autoreceptors from postsynaptic receptors.
Answer: Autoreceptors
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

129. _____ refers to the process of EPSPs and IPSPs interacting to have either an end result of excitation or inhibition.

Difficulty Level: Easy
Topic: Effects of Postsynaptic Potentials: Neural Integration
Skill Level: Remember the Facts
Learning Objective: 2.14 Summarize neural integration of EPSPs and IPSPs.
Answer: Neural integration
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

Essay Questions

130. Describe the organelles that comprise the neuron soma.

Difficulty Level: Moderate
Topic: Neurons
Skill Level: Remember the Facts
Learning Objective: 2.2 Distinguish among the structures of a neuron.
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.
Answer: The organelles lie within the cytoplasm of the neuron. The soma organelles include:

- Ribosomes: produce proteins.
- Microtubules: responsible for transport around the interior of the neuron.
- Mitochondria: provide energy to the neuron.
- Cytoskeleton: gives the neuron its shape.

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131. Compare the general functions of the three types of glial cell in the brain.

Difficulty Level: Moderate
Topic: Supporting Cells
Skill Level: Remember the Facts
Learning Objective: 2.3 Compare supporting cells in the central and peripheral nervous systems.
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.
Answer: Oligodendrocytes form myelin in the central nervous system, which speeds up neural conduction speed. Astroglia provide support and nutrition for neurons. Microglia are involved in brain immune function.

132. Explain how changes in ion movements can result in an action potential.

Difficulty Level: Moderate
Topic: The Action Potential
Skill Level: Remember the Facts
Learning Objective: 2.8 Summarize the series of ion movements during the action potential.
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.
Answer: At rest, the interior of an axon membrane has more negative charges relative to the exterior. Movement of positive charges (sodium) into the axon results in an action potential (a rapid reversal of the membrane potential).

133. What property of the neuron membrane produces the all-or-none law?

Difficulty Level: Difficult
Topic: Conduction of the Action Potential
Skill Level: Understand the Concepts
Learning Objective: 2.9 Describe conduction of the action potential.
APA Learning Objective: 1.2 Develop a working knowledge of psychology's content domains.
Answer: Voltage-gated ion channels of the axon membrane remain closed until the membrane potential reaches the threshold of excitation (a fixed voltage). If the membrane potential reaches the threshold of excitation, an action potential occurs; if not, no action potential occurs.

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134. Explain what is meant by decremental conduction.

Difficulty Level: Difficult
Topic: Conduction of the Action Potential
Skill Level: Remember the Facts
Learning Objective: 2.9 Describe conduction of the action potential.
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.
Answer: A subthreshold local action potential degrades in size as it sweeps along the axon membrane.

135. Explain how the presence of myelin on an axon speeds up conduction velocity.

Difficulty Level: Difficult
Topic: Conduction of the Action Potential
Skill Level: Understand the Concepts
Learning Objective: 2.9 Describe conduction of the action potential.
APA Learning Objective: 1.2 Develop a working knowledge of psychology's content domains.
Answer: In saltatory conduction, the axon is wrapped in a fatty membrane called myelin, which insulates the membrane from the extracellular fluid. The action potential does not have to depolarize every segment of the membrane; rather, only those at the widely separated nodes of Ranvier (gaps between the myelin segments) are depolarized. This causes the action potential to appear to "jump" from node to node along the axon.

136. Contrast ionotropic and metabotropic receptors.

Difficulty Level: Easy
Topic: Activation of Receptors
Skill Level: Understand the Concepts
Learning Objective: 2.12 Contrast ionotropic and metabotropic receptors.
APA Learning Objective: 1.2 Develop a working knowledge of psychology's content domains.
Answer: Ionotropic receptors directly control ion channels, whereas metabotropic receptors use a series of intermediate steps, involving G-proteins, to modulate distant ion channels.

137. What would you expect to happen if the enzyme AChE were to be disabled in your body?

Difficulty Level: Moderate
Topic: Termination of Postsynaptic Potentials
Skill Level: Apply What You Know
Learning Objective: 2.15 Explain how postsynaptic potentials are terminated.
APA Learning Objective: 1.3 Describe applications of psychology.

Answer: The acetylcholine (Ach) activity in your body would greatly increase, because AChE normally serves to degrade ACh. Later, this would lead to overstimulation of cholinergic receptors.

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138. Explain how autoreceptors dampen neuronal activity.

Difficulty Level: Moderate
Topic: Autoreceptors
Skill Level: Understand the Concepts
Learning Objective: 2.16 Distinguish autoreceptors from postsynaptic receptors.
APA Learning Objective: 1.2 Develop a working knowledge of psychology's content domains.
Answer: Autoreceptors are sensitive to the neurotransmitters released by a particular neuron. Activation of the autoreceptor produces negative feedback—either reduced cell firing or reduced synthesis/release of the neurotransmitter. The net effect is to modulate the amount of neurotransmitter in the synapse (and at the postsynaptic receptors).

Revel Quizzes

The following questions appear at the end of each module and at the end of the chapter in Revel for *Physiology of Behavior*, 13th Edition.

Assignment: Quiz: Cells of the Nervous System
EOM Q2.1.1
Question: You reach out and touch a piece of cloth, feeling its texture. The cells that gather this sensory information are part of the _____ nervous system.

a. parasympathetic
b. autonomic
c. central
d. peripheral

Answer: D
Consider This: There are two primary divisions of the nervous system, one of which is responsible for sensations; LO 2.1: Contrast features of the central and peripheral nervous systems.
Learning Objective: 2.1: Contrast features of the central and peripheral nervous systems.
Difficulty Level: Moderate
Skill Level: Apply What You Know

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EOM Q2.1.2
Question: A neuron first receives a message in a(n) _____. The message is then passed along a thin, long portion of the cell called the _____.

a. dendrite; axon
b. soma; axon
c. axon; dendrite
d. dendrite; soma

Answer: A
Consider This: Each part of a neuron has a specific function, with the "trees" generally receiving information; LO 2.2: Distinguish among the structures of a neuron.
Learning Objective: 2.2: Distinguish among the structures of a neuron.
Difficulty Level: Easy
Skill Level: Understand the Concepts

EOM Q2.1.3
Question: _____ are supporting cells that can provide myelination to multiple axons at once.

a. Microglia
b. Astrocytes
c. Oligodendrocytes
d. Schwann cells

Answer: C
Consider This: Myelination to multiple axons only occurs in the central nervous system; LO 2.3: Compare supporting cells in the central and peripheral nervous systems.
Learning Objective: 2.3: Compare supporting cells in the central and peripheral nervous systems.
Difficulty Level: Easy
Skill Level: Remember the Facts

EOM Q2.1.4
Question: _____ are glial cells that participate in phagocytosis, provide lactate for cells, and structurally support neurons in the brain.

a. Microglia
b. Astrocytes
c. Oligodendrocytes
d. Schwann cells

Answer: B
Consider This: The name of the correct type of glial cell denotes its shape; LO 2.3: Compare supporting cells in the central and peripheral nervous systems.
Learning Objective: 2.3: Compare supporting cells in the central and peripheral nervous systems.
Difficulty Level: Easy
Skill Level: Remember the Facts

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EOM Q2.1.5
Question: The purpose of the blood-brain barrier is to:
a. protect the brain from accidental impacts.
b. block the entrance of some substances into the brain.
c. block neurotransmitters from being released.
d. provide a cushion for the brain.
Answer: B
Consider This: It may be harmful if every substance introduced into our bloodstream could enter the brain; LO 2.4: Assess the function of the blood-brain barrier.
Learning Objective: 2.4: Assess the function of the blood-brain barrier.
Difficulty Level: Easy
Skill Level: Remember the Facts

Assignment: Quiz: Communication Within a Neuron
EOM Q2.2.1
Question: As you study for your neuroscience exam, you feel a tickle on your arm. You look and see a large spider, and you jerk your arm automatically. What might be the neural path for this action?
a. Sensory neuron– interneuron– motor neuron– muscle
b. Interneuron– sensory neuron– motor neuron– muscle
c. Motor neuron– sensory neuron– interneuron– muscle
d. Sensory neuron– motor neuron– interneuron– muscle
Answer: A
Consider This: The final action is a motor activity; LO 2.5: Explain the process of neural communication in a reflex.
Learning Objective: 2.5: Explain the process of neural communication in a reflex.
Difficulty Level: Moderate
Skill Level: Apply What You Know

EOM Q2.2.2
Question: The resting membrane potential is:
a. -70 mV.
b. -80 mV.
c. 10 mV.
d. 55 mV.
Answer: A
Consider This: The inside of the cell is negatively charged; LO 2.6: Describe membrane potential, resting potential, hyperpolarization, depolarization, and the action potential.
Learning Objective: 2.6: Describe membrane potential, resting potential, hyperpolarization, depolarization, and the action potential.
Difficulty Level: Easy
Skill Level: Remember the Facts

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EOM Q2.2.3
Question: When students enter a classroom, they tend to spread themselves out, provided that there are enough desks to do so. In biological terms, this effect would be called:

a. electrostatic pressure.
b. ionic movement.
c. diffusion.
d. antisocialism.

Answer: C
Consider This: Other words that mean the same thing include disperse, spread out, or disseminate; LO 2.7: Summarize how diffusion, electrostatic pressure, and the sodium-potassium pump help establish membrane potential.
Learning Objective: 2.7: Summarize how diffusion, electrostatic pressure, and the sodium-potassium pump help establish membrane potential.
Difficulty Level: Moderate
Skill Level: Apply What You Know

EOM Q2.2.4
Question: For Na+ ions, _____ push(es) them into a cell.

a. electrostatic pressure
b. diffusion
c. neither electrostatic pressure nor diffusion
d. both electrostatic pressure and diffusion

Answer: D
Consider This: There is tremendous pressure on Na+ to enter the cell; LO 2.7: Summarize how diffusion, electrostatic pressure, and the sodium-potassium pump help establish membrane potential.
Learning Objective: 2.7: Summarize how diffusion, electrostatic pressure, and the sodium-potassium pump help establish membrane potential.
Difficulty Level: Moderate
Skill Level: Understand the Concepts

EOM Q2.2.5
Question: Which statement is true with respect to saltatory conduction?

a. The word “saltatory” means “to crawl.”
b. Saltatory conduction occurs only along myelinated axons.
c. Saltatory conduction does not occur at the nodes of Ranvier.
d. Saltatory conduction slows down action potentials.

Answer: B
Consider This: Saltatory conduction is advantageous; LO 2.9 Describe conduction of the action potential.
Learning Objective: 2.9: Describe conduction of the action potential.
Difficulty Level: Moderate
Skill Level: Understand the Concepts

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Assignment: Quiz: Communication Between Neurons
EOM Q2.3.1
Question: Small synaptic vesicles contain _____, whereas large synaptic vesicles contain _____.

a. neurotransmitters; peptides
b. peptides; neurotransmitters
c. proteins; peptides
d. peptides; proteins

Answer: A
Consider This: The small vesicles are found in all terminal buttons, near the release zone; LO 2.10: Identify the presynaptic structures involved in synaptic communication.
Learning Objective: 2.10: Identify the presynaptic structures involved in synaptic communication.
Difficulty Level: Moderate
Skill Level: Analyze It

EOM Q2.3.2
Question: If a cell fires at an extremely high rate, the cell will release neurotransmitter from the:

a. release-ready, recycling pool, and reserve pool vesicles.
b. release-ready vesicles only.
c. recycling pool vesicles only.
d. reserve pool vesicles only.

Answer: A
Consider This: Release-ready and recycling pool vesicles make up about 11-16% of the total number of vesicles available; LO 2.11: Describe the process of neurotransmitter release.
Learning Objective: 2.11: Describe the process of neurotransmitter release.
Difficulty Level: Difficult
Skill Level: Analyze It

EOM Q2.3.3
Question: In comparison to ionotropic receptors, metabotropic receptors:

a. have effects that begin more quickly.
b. have effects that last longer.
c. have effects that last for a briefer duration.
d. act directly on ion channels.

Answer: B
Consider This: Metabotropic receptors have to act via a G protein; LO 2.12: Contrast ionotropic and metabotropic receptors.
Learning Objective: 2.12: Contrast ionotropic and metabotropic receptors.
Difficulty Level: Difficult
Skill Level: Analyze It

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EOM Q2.3.4
Question: Influx of ____ or _____ ions result in EPSPs.

a. Na+; Ca2+
b. Cl-; Na+
c. Ca2+; Cl-
d. Ca+; K+

Answer: A
Consider This: Cations result in excitatory effects; LO 2.13: Compare the functions of EPSPs and IPSPs in postsynaptic cells.
Learning Objective: 2.13: Compare EPSPs and IPSPs in postsynaptic cells.
Difficulty Level: Moderate
Skill Level: Understand the Concepts

EOM Q2.3.5
Question: After release of the neurotransmitter serotonin, the neurotransmitter is transported back into the cell to be reused. This process is called:

a. degradation.
b. reuptake.
c. exocytosis.
d. release-ready.

Answer: B
Consider This: This method largely results in the neurotransmitter being recycled, not destroyed; LO 2.15: Explain how postsynaptic potentials are terminated.
Learning Objective: 2.15: Explain how postsynaptic potentials are terminated.
Difficulty Level: Easy
Skill Level: Remember the Facts

Assignment: Chapter Quiz: Structure and Functions of Cells of the Nervous System
EOC Q2.1
Question: Sally's stomach begins to rumble, reminding her that she skipped breakfast this morning. This hunger signal is sent to the brain, which is part of the _____ nervous system.

a. peripheral
b. central
c. autonomic
d. sympathetic

Answer: B
Consider This: The brain is encased in bone; LO 2.1: Contrast features of the central and peripheral nervous systems.
Learning Objective: 2.1: Contrast features of the central and peripheral nervous systems.
Difficulty Level: Moderate
Skill Level: Apply What You Know

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EOC Q2.2
Question: When substances are transported from the terminal buttons at the end of the axon back to the soma, this process is called _____ axoplasmic transport.

a. retrograde
b. systemic
c. anterograde
d. peripheral

Answer: A
Consider This: The substance would be returning to the source, or moving backwards; LO 2.2: Distinguish among the structures of a neuron.
Learning Objective: 2.2: Distinguish among the structures of a neuron.
Difficulty Level: Easy
Skill Level: Remember the Facts

EOC Q2.3
Question: In order to cross the synapse between two cells, a substance called a _____ is released from the presynaptic cell to activate or inhibit the postsynaptic cell.

a. neurotransmitter
b. protein
c. kinesin
d. dynein

Answer: A
Consider This: Some of these substances include serotonin or dopamine; LO 2.2: Distinguish among the structures of a neuron.
Learning Objective: 2.2: Distinguish among the structures of a neuron.
Difficulty Level: Easy
Skill Level: Remember the Facts

EOC Q2.4
Question: Experiences such as feeling hungry or seeing color in the environment are made possible by the:

a. sensory neurons.
b. interneurons.
c. motor neurons.
d. glial cells.

Answer: A
Consider This: These cells would also be responsible for tactile experiences, smells, or tastes; LO 2.1: Contrast features of the central and peripheral nervous systems.
Learning Objective: 2.1: Contrast features of the central and peripheral nervous systems
Difficulty Level: Moderate
Skill Level: Understanding the Concepts

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EOC Q2.5
Question: A scan shows that a particular substance has spread throughout the body via the bloodstream but has not entered the brain. This finding demonstrates the existence of:

a. the blood-brain barrier.
b. the doctrine of specific nerve energies.
c. blood efficacy.
d. medicine effects.

Answer: A
Consider This: Certain substances are unable to enter into the brain due to their size, lipid insolubility, or charge; LO 2.4: Assess the function of the blood-brain barrier.
Learning Objective: 2.4: Assess the function of the blood-brain barrier.
Difficulty Level: Easy
Skill Level: Understand the Concepts

EOC Q2.6
Question: Susie takes a huge drink of her coffee, assuming that the temperature is tolerable, and the heat sears her mouth. Although the pain is so great that her reflex is to spit out the coffee, she does not do so. The reflex to spit out the coffee is inhibited at the:

a. sensory neuron.
b. interneuron.
c. motor neuron.
d. glial cell.

Answer: C
Consider This: Inhibition of the reaction would not result in Susie not feeling the coffee burn; LO 2.5: Explain the process of neural communication in a reflex.
Learning Objective: 2.5: Explain the process of neural communication in a reflex.
Difficulty Level: Moderate
Skill Level: Apply What You Know

EOC Q2.7
Question: If the inner voltage of a cell is -70 mV and application of stimulation results in a -95 mV charge, the stimulation had a _____ effect. On the other hand, a resultant charge of +40 mV would reflect a _____ effect.

a. hyperpolarizing; depolarizing
b. depolarizing; hyperpolarizing
c. repolarizing; depolarizing
d. repolarizing; hyperpolarizing

Answer: A
Consider This: “Hyper-” refers to becoming more of that characteristic, whereas “de-” means to move toward the opposite of that characteristic; LO 2.6: Describe membrane potential, resting potential, hyperpolarization, depolarization, and the action potential.
Learning Objective: 2.6: Describe membrane potential, resting potential, hyperpolarization, depolarization, and the action potential.
Difficulty Level: Moderate
Skill Level: Analyze It

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EOC Q2.8
Question: A cation would be attracted to:
a. another cation.
b. an anion.
c. a sodium ion.
d. a potassium ion.
Answer: B
Consider This: The attraction principles of ions are similar to those of magnets; LO 2.7: Summarize how diffusion, electrostatic pressure, and the sodium–potassium pump help establish membrane potential.
Learning Objective: 2.7: Summarize how diffusion, electrostatic pressure, and the sodium–potassium pump help establish membrane potential.
Difficulty Level: Easy
Skill Level: Remember the Facts

EOC Q2.9
Question: The Na+/K+ pump removes _____ Na+ ions and adds _____ K+ ions.
a. 3; 2
b. 2; 3
c. 3; 4
d. 2; 4
Answer: A
Consider This: It is important to remove more Na+ because of its possible cell toxicity in high concentrations; LO 2.7: Summarize how diffusion, electrostatic pressure, and the sodium–potassium pump help establish membrane potential.
Learning Objective: 2.7: Summarize how diffusion, electrostatic pressure, and the sodium–potassium pump help establish membrane potential.
Difficulty Level: Easy
Skill Level: Remember the Facts

EOC Q2.10
Question: If a bowling ball fell on your foot, the action potentials would differ from a feather falling on your foot. The action potentials for the bowling ball would be:
a. larger in size and faster in occurrence.
b. the same size as for the feather, but they would be slower in occurrence.
c. the same size as for the feather, but they would be faster in occurrence.
d. larger in size and slower in occurrence.
Answer: C
Consider This: Action potentials always involve the same process of ionic movements regardless of the experienced sensation; LO 2.9: Describe conduction of the action potential.
Learning Objective: 2.9: Describe conduction of the action potential.
Difficulty Level: Difficult
Skill Level: Apply What You Know

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EOC Q2.11
Question: Which choice correctly orders the three pools of synaptic vesicles, from MOST common to LEAST common?

a. recycling, reserve, release-ready
b. release-ready, recycling, reserve
c. reserve, recycling, release-ready
d. release-ready, reserve, recycling

Answer: C
Consider This: The least common pool uses a kiss and run process; LO 2.11: Describe the process of neurotransmitter release.
Learning Objective: 2.11: Describe the process of neurotransmitter release.
Difficulty Level: Moderate
Skill Level: Understand the Concepts

EOC Q2.12
Question: With respect to the four main types of neurotransmitter-dependent ion channels in the postsynaptic membrane, _____ channels are to EPSPs as _____ channels are to IPSPs.

a. sodium; calcium
b. calcium; sodium
c. sodium; potassium
d. potassium; sodium

Answer: C
Consider This: Depolarization occurs when sodium channels open. LO 2.13: Compare EPSPs and IPSPs in postsynaptic cells.
Learning Objective: 2.13: Compare EPSPs and IPSPs in postsynaptic cells.
Difficulty Level: Difficult
Skill Level: Analyze It

EOC Q2.13
Question: Autoreceptors are located on the:

a. postsynaptic cell
b. golgi apparatus
c. endoplasmic reticulum
d. presynaptic cell

Answer: D
Consider This: Autoreceptors are responsible for monitoring the level of neurotransmitter in the cleft in order to upregulate or downregulate production; LO 2.16: Distinguish autoreceptors from postsynaptic receptors.
Learning Objective: 2.16: Distinguish autoreceptors from postsynaptic receptors.
Difficulty Leve: Easy
Skill Level: Remember the Facts

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EOC Q2.14
Question: _____ is the process whereby EPSPs and IPSPs interact to yield a net result of either excitation or inhibition.

a. Immigration
b. Innervation
c. Importation
d. Integration

Answer: D
Consider This: The correct term means to combine together; LO 2.14: Summarize neural integration of EPSPs and IPSPs.
Learning Objective: 2.14: Summarize neural integration of EPSPs and IPSPs.
Difficulty Level: Easy
Skill Level: Remember the Facts

EOC Q2.15
Question: Hormones and neuromodulators differ from neurotransmitters in that:

a. they are chemicals and neurotransmitters are not.
b. they disperse less widely than neurotransmitters.
c. they disperse more widely than neurotransmitters.
d. they are fast acting compared to neurotransmitters.

Answer: C
Consider This: Hormones contribute to lasting and slow changes in the body; LO 2.18: Describe examples of nonsynaptic communication.
Learning Objective: 2.18: Describe examples of nonsynaptic communication.
Difficulty Level: Moderate
Skill Level: Analyze It

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