Psychology An Exploration 5th edition Ciccarelli Test Bank

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TOTAL ASSESSMENT GUIDE

Chapter 2
The Biological Perspective

Learning Objectives	Remember the Facts	Understand the Concepts	Apply What You Know	Analyze It
Introduction	1, 2, 146, 180, 181, 215			
2.1 Identify the parts of a neuron and the function of each.	3–10, 12, 13, 17, 18, 20–26, 191–194, 220, 221, 234	15, 19	16	11, 14
2.2 Explain the action potential.	27–29, 31, 195–197, 220, 234	30, 32, 34		33
2.3 Describe how neurons use neurotransmitters to communicate with each other and with the body.	35–37, 39, 41, 45, 47, 49, 51, 53, 54, 56, 199, 222–224	38, 42, 43, 58, 59, 198	46, 48, 50, 57	40, 44, 52, 55
2.4 Describe how lesioning studies and brain stimulation are used to study the brain.	60		235	61
2.5 Compare and contrast neuroimaging techniques for mapping the brain's structure and function.	62, 66, 69–71, 200, 225	65	63, 64, 67, 68, 72, 73, 75, 235	74
2.6 Identify the different structures of the hindbrain and the function of each.	76, 78, 79, 81, 83, 85, 86, 201		77, 80, 82, 84, 87, 88, 90-91	89
2.7 Identify the structures of the brain that are involved in emotion, learning, memory, and motivation.	92–94, 97, 98, 100, 102–104	99, 106	96, 101, 105, 202	95
2.8 Identify the parts of the cortex that process the different senses and those that control movement of the body.	107–110, 112–114, 117, 118, 121, 122, 125, 132, 203–205, 236	115, 226	111, 116, 119, 120, 123, 124, 127–129, 131	126, 130
2.9 Recall the function of association areas of the cortex, including those especially crucial for language.	133, 134, 136, 227, 228, 236		135, 137, 138	
2.10 Explain how some brain functions differ between the left and right hemispheres.	139, 142, 206	143, 145, 207, 229	140, 141, 144	230

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Learning Objectives	Remember the Facts	Understand the Concepts	Apply What You Know	Analyze It
2.11 Describe how the components of the central nervous system interact and how they may respond to experiences or injury.	147–153, 155, 208–212, 237	156	154, 157, 159, 160	158, 231
2.12 Differentiate the roles of the somatic and autonomic nervous systems.	161, 163–166, 170, 171, 173–175, 177, 213, 214, 238	162, 168	167, 169, 172, 176, 178, 179	231, 232
2.13 Explain why the pituitary gland is known as the "master gland."	182, 239			
2.14 Recall the role of various endocrine glands.	184, 216, 232		183	
2.15 Describe how the autonomic nervous system and body are impacted by stress.	217–219, 239	188, 189		185–187, 190, 233, 240

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Name _____

Chapter 2 – Quick Quiz 1

1. Which part of the neuron is responsible for maintaining the life of the cell?
   a) axon
   b) soma
   c) dendrite
   d) cell membrane

2. _____ plays a critical role as a neurotransmitter that stimulates skeletal muscles to contract.
   a) Acetylcholine
   b) GABA
   c) Dopamine
   d) Endorphin

3. A brain-imaging method using radio waves and magnetic fields of the body to produce detailed images of the brain is called _____.
   a) magnetic resonance imaging (MRI)
   b) electroencephalography (EEG)
   c) positron emission tomography (PET)
   d) computed tomography (CT)

4. What part of the brain acts as a relay station for incoming sensory information?
   a) hypothalamus
   b) thalamus
   c) cerebellum
   d) pituitary gland

5. Which of the following regions contains the primary visual cortex?
   a) frontal lobe
   b) parietal lobe
   c) temporal lobe
   d) occipital lobe

6. Which of the following is/are functions of the right hemisphere?
   a) perception, expression of emotions, and recognition of patterns
   b) sense of time and rhythm
   c) speech, handwriting, and calculation
   d) language processing in most individuals

7. The two main divisions of the nervous system are the _____ and _____.
   a) brain; spinal cord
   b) autonomic nervous system; somatic nervous system
   c) peripheral nervous system; central nervous system
   d) glands; muscles

8. Which part of the nervous system takes the information received from the senses, makes sense out of it, makes decisions, and sends commands out to the muscles and the rest of the body?
   a) spinal cord
   b) brain
   c) reflexes
   d) interneurons

9. The part of the autonomic nervous system that is responsible for reacting to stressful events and bodily arousal is called the _____ nervous system.
   a) central
   b) somatic
   c) sympathetic
   d) parasympathetic

10. The hormone released by the pineal gland that reduces body temperature and prepares you for sleep is _____.
   a) melatonin
   b) DHEA
   c) parathormone
   d) thyroxin

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Chapter 2 – Quick Quiz 1
Answer Key

1. b Explanation: The soma is responsible for maintaining the life of the cell. (Topic: 2.1 Structure of the Neuron: The Nervous System's Building Block, Skill Level: Remember the Facts, Difficulty Level: Moderate, Learning Objective: 2.1 Identify the parts of a neuron and the function of each, APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.)

2. a Explanation: Acetylcholine is an excitatory neurotransmitter that stimulates muscles to contract. (Topic: 2.3 Neurotransmission, Skill Level: Remember the Facts, Difficulty Level: Easy, Learning Objective: 2.3 Describe how neurons use neurotransmitters to communicate with each other and with the body, APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.)

3. a Explanation: MRI is a brain-imaging method using radio waves and magnetic fields of the body. (Topic: 2.5 Neuroimaging Techniques, Skill Level: Remember the Facts, Difficulty Level: Difficult, Learning Objective: 2.5 Compare and contrast neuroimaging techniques for mapping the brain's structure and function, APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.)

4. b Explanation: The thalamus acts as a relay station. (Topic: 2.7 Structures Under the Cortex: The Limbic System, Skill Level: Remember the Facts, Difficulty Level: Difficult, Learning Objective: 2.7 Identify the structures of the brain that are involved in emotion, learning, memory, and motivation, APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.)

5. d Explanation: The occipital lobes contain the primary visual cortex. (Topic: 2.8 The Cortex, Skill Level: Remember the Facts, Difficulty Level: Easy, Learning Objective: 2.8 Identify the parts of the cortex that process the different senses and those that control movement of the body, APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.)

6. a Explanation: Perception, expression of emotions, and recognition of patterns are functions of the right hemisphere. (Topic: 2.10 The Cerebral Hemispheres, Skill Level: Understand the Concepts, Difficulty Level: Moderate, Learning Objective: 2.10 Explain how some brain functions differ between the left and right hemispheres, APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.)

7. c Explanation: The two main divisions of the nervous system are the central and peripheral nervous systems. (Topic: 2.11–2.12 The Nervous System: The Rest of the Story, Skill Level: Remember the Facts, Difficulty Level: Easy, Learning Objective: None, APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.)

8. b Explanation: Interpreting information from the senses and sending commands to the rest of the body are responsibilities of the brain. (Topic: 2.11 The Central Nervous System: The "Central Processing Unit," Skill Level: Remember the Facts, Difficulty Level: Easy, Learning Objective: 2.11 Describe how the components of the central nervous system interact and how they may respond to experiences or injury, APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.)

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9. c Explanation: The sympathetic nervous system is responsible for reacting to stressful events and bodily arousal. (Topic: 2.12 The Peripheral Nervous System, Skill Level: Remember the Facts, Difficulty Level: Moderate, Learning Objective: 2.12 Differentiate the roles of the somatic and autonomic nervous systems, APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.)

10. a Explanation: The pineal gland secretes melatonin. (Topic: 2.14 Other Endocrine Glands, Skill Level: Remember the Facts, Difficulty Level: Easy, Learning Objective: 2.14 Recall the role of various endocrine glands, APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.)

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Name _____

Chapter 2 – Quick Quiz 2

1. The branchlike structures that receive messages from other neurons are called _____.
   a) axons
   b) nerve bundles
   c) dendrites
   d) synapses

2. Which of the following are tiny sacs in a synaptic knob that release chemicals into the synapse?
   a) synaptic vesicles
   b) synaptic nodes
   c) terminal buttons
   d) synaptic gaps

3. The point at which the nerves from the left side of the body cross over into the right side of the brain, and vice versa, is the _____.
   a) reticular activating system
   b) pons
   c) medulla
   d) cerebellum

4. The _____ is the part of the brain responsible for the formation of long-term memories.
   a) amygdala
   b) hypothalamus
   c) fornix
   d) hippocampus

5. Which of the following is the upper part of the brain consisting of two cerebral hemispheres and the structures that connect them?
   a) occipital lobe
   b) cerebrum
   c) corpus callosum
   d) cerebellum

6. Which of the following is the section of the brain located at the rear and bottom of each cerebral hemisphere and contains the visual centers of the brain?
   a) occipital lobe
   b) parietal lobe
   c) temporal lobe
   d) frontal lobe

7. The area of the frontal lobe that is devoted to the production of fluent speech is _____ area.
   a) Broca's
   b) Gall's
   c) Wernicke's
   d) Korsakoff's

8. Which of the following are responsible for acting as a facilitator of communication between neurons?
   a) motor neurons
   b) interneurons
   c) sensory neurons
   d) reflexes

9. Every deliberate action you make, such as pedaling a bike, walking, scratching, or smelling a flower, involves neurons in the _____ nervous system.
   a) sympathetic
   b) somatic
   c) parasympathetic
   d) autonomic

10. Which endocrine gland controls all of the other endocrine glands?
   a) thyroid
   b) adrenal
   c) thymus
   d) pituitary

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Chapter 2 – Quick Quiz 2
Answer Key

1. c Explanation: Dendrites receive messages from other neurons. (Topic: 2.1 Structure of the Neuron: The Nervous System's Building Block, Skill Level: Remember the Facts, Difficulty Level: Easy, Learning Objective: 2.1 Identify the parts of a neuron and the function of each, APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.)

2. a Explanation: Synaptic vesicles are structures within the synaptic knobs. (Topic: 2.3 Neurotransmission, Skill Level: Remember the Facts, Difficulty Level: Moderate, Learning Objective: 2.3 Describe how neurons use neurotransmitters to communicate with each other and with the body, APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.)

3. c Explanation: The medulla is the point where nerves cross over. (Topic: 2.6 The Hindbrain , Skill Level: Remember the Facts, Difficulty Level: Moderate, Learning Objective: 2.6 Identify the different structures of the hindbrain and the function of each, APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.)

4. d Explanation: The hippocampus is responsible for the formation of long-term memories. (Topic: 2.7 Structures Under the Cortex: The Limbic System, Skill Level: Remember the Facts, Difficulty Level: Moderate, Learning Objective: 2.7 Identify the structures of the brain that are involved in emotion, learning, memory, and motivation, APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.)

5. b Explanation: The cerebrum consists of the two cerebral hemispheres and the structures that connect them. (Topic: 2.8 The Cortex , Skill Level: Remember the Facts, Difficulty Level: Difficult, Learning Objective: 2.8 Identify the parts of the cortex that process the different senses and those that control movement of the body, APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.)

6. a Explanation: The occipital lobes contain the visual centers of the brain. (Topic: 2.8 The Cortex, Skill Level: Remember the Facts, Difficulty Level: Easy, Learning Objective: 2.8 Identify the parts of the cortex that process the different senses and those that control movement of the body, APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.)

7. a Explanation: Broca's area is devoted to the production of fluent speech. (Topic: 2.9 The Association Areas of the Cortex, Skill Level: Remember the Facts, Difficulty Level: Moderate, Learning Objective: 2.9 Recall the function of association areas of the cortex, including those especially crucial for language, APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.)

8. b Explanation: Interneurons connect the sensory neurons to the motor neurons. (Topic: 2.11 The Central Nervous System: The "Central Processing Unit," Skill Level: Remember the Facts, Difficulty Level: Easy, Learning Objective: 2.11 Describe how the components of the central nervous system interact and how they may respond to experiences or injury, APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.)

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9. b Explanation: The somatic nervous system controls voluntary muscle movement. (Topic: 2.12 The Peripheral Nervous System, Skill Level: Understand the Concepts, Difficulty Level: Difficult, Learning Objective: 2.12 Differentiate the roles of the somatic and autonomic nervous systems, APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.)

10. d Explanation: The pituitary gland controls all other endocrine glands. (Topic: 2.13 The Pituitary: Master of the Hormonal Universe, Skill Level: Remember the Facts, Difficulty Level: Easy, Learning Objective: 2.13 Explain why the pituitary gland is known as the "master gland," APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.)

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2 The Biological Perspective

MULTIPLE CHOICE

1. The function of the _____ is to carry information to and from all parts of the body.
a) soma
Incorrect. The primary responsibility of the soma is to maintain the life of the neuron.
b) synapse
c) nervous system
Correct. Sending information to and from all parts of the body is the primary function of the nervous system.
d) endorphins
Answer: c
Learning Objective: None
Topic: 2.1–2.3 Neurons and Neurotransmitters
Difficulty Level: Easy
Skill Level: Remember the Facts
% correct 91 a= 2 b= 4 c= 91 d=33 *r* = .32
% correct 100 a= 0 b= 0 c= 100 d= 0 *r* = .00
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

2. The nervous system is defined as _____.
a) a complex network of cells that carries information to and from all parts of the body
Correct. The nervous system is a complex network of cells that carry information to and from all parts of the body.
b) a specialized cell that makes up the brain and nervous system
c) all nerves and neurons that are not contained in the brain and spinal cord but that run throughout the body itself
Incorrect. The nervous system includes networks of neurons that are in the brain and spinal cord.
d) a gland located in the brain that secretes human growth hormone
Answer: a
Learning Objective: None
Topic: 2.1–2.3 Neurons and Neurotransmitters
Difficulty Level: Easy
Skill Level: Remember the Facts
% correct 92 a= 92 b= 1 c= 6 d= 1 *r* = .27
% correct 94 a= 94 b= 1 c=4 d= 0 *r* = .26
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

3. The branch of life sciences that involves the structure and function of neurons, nerves, and nervous tissue is called _____.
a) neuroscience
Correct. This is the branch of life sciences that covers these topics.
b) bioscience
Incorrect. The correct answer is neuroscience.
c) brain scientology
d) neurostemology
Answer: a
Learning Objective: 2.1 Identify the parts of a neuron and the function of each.
Topic: 2.1 Structure of the Neuron: The Nervous System's Building Block
Difficulty Level: Easy

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Skill Level: Remember the Facts
APA Learning Objective: 1.2 Develop a working knowledge of psychology's content domains.

4. The branch of neuroscience that focuses on the biological bases of psychological processes, behavior, and learning is called _____.
a) biological psychology
Correct. This is the branch of neuroscience that covers these topics.
b) bioscience
Incorrect. The correct answer is biological psychology, which is also called behavioral neuroscience.
c) brain scientology
d) neurostemology
Answer: a
Learning Objective: 2.1 Identify the parts of a neuron and the function of each.
Topic: 2.1 Structure of the Neuron: The Nervous System's Building Block
Difficulty Level: Moderate
Skill Level: Remember the Facts
APA Learning Objective: 1.2 Develop a working knowledge of psychology's content domains.

5. A specialized cell that makes up the nervous system that receives and sends messages within that system is called a _____.
a) glial cell
Incorrect. Glial cells serve as a structure for neurons.
b) neuron
Correct. A neuron is a specialized cell that makes up the nervous system that receives and sends messages within that system.
c) cell body
d) myelin sheath
Answer: b
Learning Objective: 2.1 Identify the parts of a neuron and the function of each.
Topic: 2.1 Structure of the Neuron: The Nervous System's Building Block
Difficulty Level: Easy
Skill Level: Remember the Facts
% correct 96 a= 4 b= 96 c= 0 d= 0 $r = .19$
% correct 97 a= 2 b= 97 c= 1 d= 0 $r = .39$
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

6. The part of the neuron whose name literally means "branch" is _____.
a) axon
Incorrect. Dendrite is the correct answer.
b) dendrite
Correct. Dendrite comes from the word tree.
c) myelin
d) soma
Answer: b
Learning Objective: 2.1 Identify the parts of a neuron and the function of each.
Topic: 2.1 Structure of the Neuron: The Nervous System's Building Block
Difficulty Level: Moderate
Skill Level: Remember the Facts
% correct 77 a= 20 b= 77 c= 1 d= 1 $r = .32$
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

7. The branchlike structures that *receive* messages from other neurons are called _____.
a) axons
Incorrect. Axons send but do not receive messages.
b) nerve bundles

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c) dendrites
Correct. Dendrites receive messages from other neurons.
d) synapses
Answer: c
Learning Objective: 2.1 Identify the parts of a neuron and the function of each.
Topic: 2.1 Structure of the Neuron: The Nervous System's Building Block
Difficulty Level: Easy
Skill Level: Remember the Facts
% correct 84 a= 10 b= 2 c= 84 d= 4 *r* = .39
% correct 83 a=11 b= 0 c= 83 d= 5 *r* = .31
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

8. Which part of the neuron is responsible for maintaining the life of the cell?
a) axon
b) soma
Correct. The soma is responsible for maintaining the life of the cell.
c) dendrite
d) cell membrane
Incorrect. The soma is responsible for maintaining the life of the cell.
Answer: b
Learning Objective: 2.1 Identify the parts of a neuron and the function of each.
Topic: 2.1 Structure of the Neuron: The Nervous System's Building Block
Difficulty Level: Moderate
Skill Level: Remember the Facts
% correct 70 a= 5 b= 70 c= 2 d= 23 *r* = .37
% correct 74 a= 0 b= 74 c= 26 d= 1 *r* = .32
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

9. The part of a neuron that contains the nucleus and keeps the entire cell alive and functioning is the _____.
a) axon
b) cell membrane
Incorrect. The soma is responsible for maintaining the life of the cell.
c) dendrite
d) soma
Correct. The soma is responsible for maintaining the life of the cell.
Answer: d
Learning Objective: 2.1 Identify the parts of a neuron and the function of each.
Topic: 2.1 Structure of the Neuron: The Nervous System's Building Block
Difficulty Level: Moderate
Skill Level: Remember the Facts
% correct 67 a= 7 b= 23 c= 2 d= 67 *r* = .56
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

10. The *soma* is also sometimes referred to as the _____.
a) axon
b) cell body
Correct. The soma is also called the cell body.
c) dendrite
d) cell membrane
Incorrect. The soma is also called the cell body.
Answer: b
Learning Objective: 2.1 Identify the parts of a neuron and the function of each.
Topic: 2.1 Structure of the Neuron: The Nervous System's Building Block
Difficulty Level: Easy
Skill Level: Remember the Facts

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APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

11. Dendrite is to axon as _____.
a) send is to receive
Incorrect. This is the opposite of the correct answer.
b) send is to regulate
c) receive is to send
Correct. Dendrites are treelike parts of the neuron that are designed to receive messages. The axon sends messages to other neurons.
d) receive is to release
Answer: c
Learning Objective: 2.1 Identify the parts of a neuron and the function of each.
Topic: 2.1 Structure of the Neuron: The Nervous System's Building Block
Difficulty Level: Moderate
Skill Level: Analyze It
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

12. Which part of a neuron is attached to the soma and carries messages out to other cells?
a) soma
b) axon
Correct. The axon carries messages to other cells.
c) dendrite
Incorrect. Dendrites receive messages.
d) cell membrane
Answer: b
Learning Objective: 2.1 Identify the parts of a neuron and the function of each.
Topic: 2.1 Structure of the Neuron: The Nervous System's Building Block
Difficulty Level: Easy
Skill Level: Remember the Facts
% correct 81 a= 2 b= 81 c= 14 d= 4 $r = .31$
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

13. The function of the neuron's axon is to _____.
a) carry messages to other cells
Correct. The function of the axon is to carry messages to other cells.
b) regulate the neuron's life processes
c) receive messages from neighboring neurons
Incorrect. Dendrites, not axons, receive messages.
d) insulate against leakage of electrical impulses
Answer: a
Learning Objective: 2.1 Identify the parts of a neuron and the function of each.
Topic: 2.1 Structure of the Neuron: The Nervous System's Building Block
Difficulty Level: Moderate
Skill Level: Remember the Facts
% correct 67 a= 67 b= 2 c= 10 d= 21 $r = .41$
% correct 80 a= 80 b= 6 c= 13 d= 2 $r = .30$
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

14. _____ receive messages from other neurons and _____ send messages to other neurons.
a) Axons; dendrites
Incorrect. Axons send messages, and dendrites receive messages.
b) Axon; soma
c) Soma; glial cells
d) Dendrites; axons
Correct. Dendrites receive messages, and axons carry messages to other cells.

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Answer: d
Learning Objective: 2.1 Identify the parts of a neuron and the function of each.
Topic: 2.1 Structure of the Neuron: The Nervous System's Building Block
Difficulty Level: Moderate
Skill Level: Analyze It
% correct 71 a= 23 b= 3 c= 4 d= 71 *r* = .39
% correct 78 a= 17 b= 3 c= 1 d= 78 *r* = .46
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

15. Which sequence BEST represents the order in which a neuron receives and transmits information?
a) dendrites, cell body, axon, axon terminals
Correct. The dendrite receives a message, the cell body processes it, the axon takes a message to the axon terminals, and the terminal buttons release neurotransmitters.
b) axon terminals, dendrites, cell body, axon
c) cell body, dendrites, axon terminals, axon
Incorrect. Every part of this answer is out of the correct order.
d) axon, cell body, dendrites, axon terminals
Answer: a
Learning Objective: 2.1 Identify the parts of a neuron and the function of each.
Topic: 2.1 Structure of the Neuron: The Nervous System's Building Block
Difficulty Level: Moderate
Skill Level: Understand the Concepts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

16. Your psychology professor asks you to describe the correct sequence of neural structures that an impulse travels through during neural conduction. Which sequence will you offer?
a) dendrites, axon, soma, synaptic knob
b) terminal buttons, axon, soma, dendrites
c) axon, soma, dendrites, synaptic knob
Incorrect. The neural impulse begins with the receipt of messages by the dendrites.
d) dendrites, soma, axon, synaptic knob
Correct. This answer describes the correct sequence.
Answer: d
Learning Objective: 2.1 Identify the parts of a neuron and the function of each.
Topic: 2.1 Structure of the Neuron: The Nervous System's Building Block
Difficulty Level: Moderate
Skill Level: Apply What You Know
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

17. What term is used to describe the bulbs located at the end of the axon?
a) axon terminals
Correct. The axon terminals are located at the end of the axon.
b) synaptic vesicles
Incorrect. Synaptic vesicles are structures within the synaptic knobs.
c) synapses
d) receptor sites
Answer: a
Learning Objective: 2.1 Identify the parts of a neuron and the function of each.
Topic: 2.1 Structure of the Neuron: The Nervous System's Building Block
Difficulty Level: Moderate
Skill Level: Remember the Facts
% correct 59 a= 59 b= 15 c= 3 d= 22 *r* = .48
% correct 52 a= 52 b= 20 c= 13 d= 15 *r* = .38
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

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18. What is the term used to describe the rounded areas on the ends of the axon?
a) synaptic vesicles
Incorrect. Synaptic vesicles are structures within the synaptic knobs.
b) axons
c) dendrites
d) synaptic knobs
Correct. Synaptic knobs are located at the tip of each axon.
Answer: d
Learning Objective: 2.1 Identify the parts of a neuron and the function of each.
Topic: 2.1 Structure of the Neuron: The Nervous System's Building Block
Difficulty Level: Moderate
Skill Level: Remember the Facts
% correct 73 a= 24 b= 1 c= 2 d= 73 *r* = .33
% correct 75 a= 19 b= 1 c= 5 d= 75 *r* = .20
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

19. What are two roles of glial cells?
a) acting as insulation and providing structure to surrounding neurons
Correct. This answer defines two roles of glial cells.
b) shaping cells and moving new neurons into place
Incorrect. Glial cells provide structure and insulation to neurons.
c) regulating metabolic activity and serving as pain detectors
d) monitoring neural transmission and releasing hormones in the brain
Answer: a
Learning Objective: 2.1 Identify the parts of a neuron and the function of each.
Topic: 2.1 Structure of the Neuron: The Nervous System's Building Block
Difficulty Level: Difficult
Skill Level: Understand the Concepts
% correct 59 a= 59 b= 4 c= 11 d= 22 *r* = .32
% correct 61 a= 61 b= 8 c= 7 d= 24 *r* = .32
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

20. A cell in the human nervous system whose primary function is to provide insulation and structure for neurons on which they may develop and work is called a(n) _____.
a) epidermal cell
b) adipose cell
c) glial cell
Correct. Glial cells serve as a structure on which neurons develop and work.
d) myelin sheath
Incorrect. The myelin sheath does not serve as a structure on which neurons develop and work.
Answer: c
Learning Objective: 2.1 Identify the parts of a neuron and the function of each.
Topic: 2.1 Structure of the Neuron: The Nervous System's Building Block
Difficulty Level: Difficult
Skill Level: Remember the Facts
% correct 46 a= 3 b= 1 c= 46 d= 51 *r* = .34
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

21. Two specialized types of glial cells are called _____ and _____, which contribute to the production of myelin.
a) occipital; lobitical
b) oligodendrocytes; Schwann cells
Correct. These are two types of glial cells.
c) occipital; Schwann
Incorrect. These are not both types of glial cells.

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d) oligodendrocytes; lobitical
Answer: b
Learning Objective: 2.1 Identify the parts of a neuron and the function of each.
Topic: 2.1 Structure of the Neuron: The Nervous System's Building Block
Difficulty Level: Difficult
Skill Level: Remember the Facts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

22. What is the function of myelin?
a) to serve as a structure for neurons
Incorrect. This is the function of glial cells, not myelin.
b) to monitor neural activity
c) to speed up the neural impulse
Correct. Myelin speeds up the neural impulse.
d) to produce neurotransmitters
Answer: c
Learning Objective: 2.1 Identify the parts of a neuron and the function of each.
Topic: 2.1 Structure of the Neuron: The Nervous System's Building Block
Difficulty Level: Moderate
Skill Level: Remember the Facts
% correct 71 a= 14 b= 7 c= 71 d= 9 r = .33
% correct 62 a= 28 b= 3 c= 62 d= 8 r = .44
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

23. Which statement about myelin is TRUE?
a) It is made of a fatty substance.
Correct. Myelin is made up of a fatty type of tissue produced by certain glial cells.
b) It is covered by axons.
Incorrect. Myelin covers axons. It is not covered by axons.
c) It inhibits neural communication.
d) It slows down neuronal operations.
Answer: a
Learning Objective: 2.1 Identify the parts of a neuron and the function of each.
Topic: 2.1 Structure of the Neuron: The Nervous System's Building Block
Difficulty Level: Moderate
Skill Level: Remember the Facts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

24. One purpose of _____ is to speed up the neural message traveling down the axon.
a) the receptor site
b) axon terminals
Incorrect. Axon terminals do not speed up the neural impulse.
c) myelin
Correct. Myelin speeds up the neural impulse.
d) a synaptic vesicle
Answer: c
Learning Objective: 2.1 Identify the parts of a neuron and the function of each.
Topic: 2.1 Structure of the Neuron: The Nervous System's Building Block
Difficulty Level: Moderate
Skill Level: Remember the Facts
% correct 78 a= 2 b= 8 c= 78 d= 13 r = .31
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

25. A group of axons bundled together coated in myelin that travels together through the body is called a _____.

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a) synaptic vesicle
b) nerve
Correct. Bundles of myelin-coated axons travel together in cables called nerves.
c) neurilemma
Incorrect. Neurilemma enable damaged neurons to repair themselves.
d) myelinated pathway
Answer: b
Learning Objective: 2.1 Identify the parts of a neuron and the function of each.
Topic: 2.1 Structure of the Neuron: The Nervous System's Building Block
Difficulty Level: Moderate
Skill Level: Remember the Facts
% correct 60 a= 20 b= 60 c= 6 d= 14 *r* = .49
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

26. A nerve is a group of _____ bundled together.
a) axons
Correct. Nerves are bundles of myelin-coated axons.
b) interneurons
c) dendrites
Incorrect. Dendrites are part of the neuron.
d) glial cells
Answer: a
Learning Objective: 2.1 Identify the parts of a neuron and the function of each.
Topic: 2.1 Structure of the Neuron: The Nervous System's Building Block
Difficulty Level: Difficult
Skill Level: Remember the Facts
% correct 37 a= 37 b= 37 c= 8 d= 18 *r* = .31
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

27. When a cell is "at rest," it is in a state called the _____.
a) stopping point
b) obcipitation junction
Incorrect. This is a fictitious word.
c) resting potential
Correct. A cell at rest is in a state called the resting potential.
d) action potential
Answer: c
Learning Objective: 2.2 Explain the action potential.
Topic: 2.2 Generating the Message Within the Neuron: The Neural Impulse
Difficulty Level: Easy
Skill Level: Remember the Facts
% correct 85 a= 1 b= 0 c= 85 d= 13 *r* = .41
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

28. What do we call the state of a neuron when it is NOT firing a neural impulse?
a) action potential
Incorrect. Action potential is the state a neuron is in when firing a neural impulse.
b) resting potential
Correct. Resting potential is the state a neuron is in when not firing a neural impulse.
c) myelination signal
d) transmission impulse
Answer: b
Learning Objective: 2.2 Explain the action potential.
Topic: 2.2 Generating the Message Within the Neuron: The Neural Impulse
Difficulty Level: Easy

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Skill Level: Remember the Facts
% correct 84 a= 11 b= 84 c= 1 d=4 *r* = .18
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

29. The state during which a neuron contains more negatively charged ions inside the cell than outside the cell and is NOT firing is referred to as the _____.
a) action potential
Incorrect. Action potential is the state a neuron is in when firing.
b) quiet potential
c) synaptic potential
d) resting potential
Correct. Resting potential is the state a neuron is in when a cell is not firing a neural impulse.
Answer: d
Learning Objective: 2.2 Explain the action potential.
Topic: 2.2 Generating the Message Within the Neuron: The Neural Impulse
Difficulty Level: Easy
Skill Level: Remember the Facts
% correct 85 a= 4 b= 4 c= 7 d= 85 *r* = .19
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

30. The electrical charge that a neuron at rest maintains is due to the presence of a high number of _____ charged ions inside the neuron's membrane.
a) actively
b) passively
c) negatively
Correct. Negatively charged ions inside the neuron's membrane are what give rise to a negative resting potential.
d) positively
Incorrect. It is during the action potential that the positively charged ions flow into the neuron and outnumber the negatively charged ions.
Answer: c
Learning Objective: 2.2 Explain the action potential.
Topic: 2.2 Generating the Message Within the Neuron: The Neural Impulse
Difficulty Level: Moderate
Skill Level: Understand the Concepts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

31. When the electrical potential in a cell is in action versus a resting state, this electrical charge reversal is known as the _____.
a) resting potential
Incorrect. This would be when a cell continued to be at rest.
b) excitation reaction
c) action potential
Correct. This is the state in which the electrical charge is reversed.
d) permeable reaction
Answer: c
Learning Objective: 2.2 Explain the action potential.
Topic: 2.2 Generating the Message Within the Neuron: The Neural Impulse
Difficulty Level: Moderate
Skill Level: Remember the Facts
% correct 75 a= 14 b= 10 c= 75 d= 1 *r* = .31
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

32. The term "fire," when referring to neural transmission, indicates that a neuron _____.
a) has become less positive in charge
b) has received, in its dendrites, appropriate inputs from other neurons

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Correct. A neuron fires after the dendrites receive enough stimulation to trigger the cell body to generate an action potential.

c) is unable to transmit information to another neuron

d) has become more negative in polarity

Incorrect. In fact, the firing state of the neuron occurs when it generates a positive charge rather than a negative charge.

Answer: b
Learning Objective: 2.2 Explain the action potential.
Topic: 2.2 Generating the Message Within the Neuron: The Neural Impulse
Difficulty Level: Difficult
Skill Level: Understand the Concepts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

33. During an action potential, the electrical charge inside the neuron is _____ the electrical charge outside the neuron.

a) positive compared to

Correct. There are more positively charged ions inside the cell than outside.

b) larger than

c) negative compared to

Incorrect. During resting potential, the inside is more negatively charged.

d) smaller than

Answer: a
Learning Objective: 2.2 Explain the action potential.
Topic: 2.2 Generating the Message Within the Neuron: The Neural Impulse
Difficulty Level: Difficult
Skill Level: Analyze It
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

34. When a neuron fires, it fires in a(n) _____ fashion, as there is no such thing as "partial" firing.

a) all-or-none

Correct. This term accurately describes neuronal firing.

b) here-and-now

c) off-and-on

d) hit-or-miss

Incorrect. This is not the term scientists use to refer to neuronal firing.

Answer: a
Learning Objective: 2.2 Explain the action potential.
Topic: 2.2 Generating the Message Within the Neuron: The Neural Impulse
Difficulty Level: Easy
Skill Level: Understand the Concepts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

35. The saclike structures found inside the synaptic knob containing chemicals are called _____.

a) axon terminals

Incorrect. The axon terminals are limb-like structures.

b) synapses

c) synaptic vesicles

Correct. Synaptic vesicles are structures within the synaptic knobs.

d) receptor sites

Answer: c
Learning Objective: 2.3 Describe how neurons use neurotransmitters to communicate with each other and with the body.
Topic: 2.3 Neurotransmission
Difficulty Level: Moderate
Skill Level: Remember the Facts

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% correct 69 a= 5 b= 8 c= 69 d= 17 *r* = .53
% correct 64 a= 20 b= 12 c= 64 d= 14 *r* = .45
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

36. Which term is used to describe the tiny sacs in an axon terminal that release chemicals into the synapse?
a) synaptic vesicles
Correct. Synaptic vesicles are structures within the synaptic knobs.
b) synaptic nodes
c) terminal buttons
Incorrect. Terminal buttons are the same as synaptic knobs.
d) synaptic gaps
Answer: a
Learning Objective: 2.3 Describe how neurons use neurotransmitters to communicate with each other and with the body.
Topic: 2.3 Neurotransmission
Difficulty Level: Difficult
Skill Level: Remember the Facts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

37. A chemical found in the synaptic vesicles that, when released, has an effect on the next cell is called a _____.
a) glial cell
b) neurotransmitter
Correct. Neurotransmitters are stored in the synaptic vesicles.
c) precursor cell
d) synapse
Incorrect. The synapse is the space between the synaptic knob of one cell and the dendrites of the next cell.
Answer: b
Learning Objective: 2.3 Describe how neurons use neurotransmitters to communicate with each other and with the body.
Topic: 2.3 Neurotransmission
Difficulty Level: Moderate
Skill Level: Remember the Facts
% correct 74 a= 4 b= 74 c= 4 d= 18 *r* = .34
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

38. Which statement about neurotransmitters is CORRECT?
a) Neurotransmission may be enhanced by reuptake of the neurotransmitter back into the axon terminal.
b) Neurotransmitters bind to receptor sites that are specific to that type of neurotransmitter.
Correct. Neurotransmitters bind to specific sites.
c) Neurotransmitters are responsible for communication within one neuron.
d) Neurotransmitters can bind to any receptor site.
Incorrect. Neurotransmitters bind to specific sites.
Answer: b
Learning Objective: 2.3 Describe how neurons use neurotransmitters to communicate with each other and with the body.
Topic: 2.3 Neurotransmission
Difficulty Level: Moderate
Skill Level: Understand the Concepts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

39. The fluid-filled space between the synaptic knob of one cell and the dendrites of the next cell is called the _____.
a) receptor site

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Incorrect. Molecules that float across the synapse fit themselves into receptor sites, thus activating the next cell.
b) synapse or synaptic gap
Correct. The synapse is the space between the axon of a sending neuron and the dendrites of a receiving neuron.
c) synaptic knob
d) axon terminal
Answer: b
Learning Objective: 2.3 Describe how neurons use neurotransmitters to communicate with each other and with the body.
Topic: 2.3 Neurotransmission
Difficulty Level: Easy
Skill Level: Remember the Facts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

40. The action potential causes neurotransmitters to be released into the _____.
a) myelin sheath
b) axon
c) synapse
Correct. Neurotransmitters are released into the synapse.
d) synaptic vesicle
Incorrect. Neurotransmitters are stored in the synaptic vesicle.
Answer: c
Learning Objective: 2.3 Describe how neurons use neurotransmitters to communicate with each other and with the body.
Topic: 2.3 Neurotransmission
Difficulty Level: Difficult
Skill Level: Analyze It
% correct 59 a= 8 b= 11 c= 59 d= 22 *r* = .32
% correct 56 a= 5 b= 16 c= 56 d= 27 *r* = .35
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

41. _____ are three-dimensional proteins on the surface of the dendrites or certain cells of the muscles and glands that are shaped to fit only certain neurotransmitters.
a) Neurotransmitters
b) Axons
c) Synaptic vesicles
Incorrect. Neurotransmitters are stored in the synaptic vesicle.
d) Receptor sites
Correct. Molecules that float across the synapse fit themselves into receptor sites like keys fitting into a lock, thus activating the next cell.
Answer: d
Learning Objective: 2.3 Describe how neurons use neurotransmitters to communicate with each other and with the body.
Topic: 2.3 Neurotransmission
Difficulty Level: Easy
Skill Level: Remember the Facts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

42. Which structure is like a locked door that only certain neurotransmitter keys can unlock?
a) synapses
Incorrect. Synapses are microscopic fluid-filled spaces between neurons.
b) receptor sites
Correct. Only certain neurotransmitters can fit into receptor sites.
c) neural chiasms
d) response terminals
Answer: b

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Learning Objective: 2.3 Describe how neurons use neurotransmitters to communicate with each other and with the body.
Topic: 2.3 Neurotransmission
Difficulty Level: Moderate
Skill Level: Understand the Concepts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

43. _____ synapses make it more likely that a neuron will send its message to other neurons, whereas _____ synapses make it less likely that a neuron will send its message.
a) Excitatory; inhibitory
Correct. Excitatory synapses turn cells on and inhibitory ones turn cells off.
b) Inhibitory; excitatory
Incorrect. Inhibitory synapses turn cells off and excitatory ones turn cells on.
c) Augmentation; depletion
d) Depletion; augmentation
Answer: a
Learning Objective: 2.3 Describe how neurons use neurotransmitters to communicate with each other and with the body.
Topic: 2.3 Neurotransmission
Difficulty Level: Easy
Skill Level: Understand the Concepts
% correct 89 a= 89 b= 8 c= 3 d= 0 *r* = .48
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

44. Agonist is to antagonist as _____.
a) neuromodulator is to neurotransmitter
b) reuptake is to receptor
c) mimic is to block
Correct. Agonists mimic neurotransmitters by stimulating specific receptor sites, and antagonists block receptor sites.
d) block is to mimic
Incorrect. This is the opposite of the correct answer.
Answer: c
Learning Objective: 2.3 Describe how neurons use neurotransmitters to communicate with each other and with the body.
Topic: 2.3 Neurotransmission
Difficulty Level: Moderate
Skill Level: Analyze It
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

45. Curare, a poison, works by _____.
a) blocking receptor sites and acting as an antagonist for acetylcholine
Correct. This drug acts as an antagonist for acetylcholine.
b) stimulating the release of excessive amounts of acetylcholine
Incorrect. This drug inhibits the release of acetylcholine.
c) stimulating the release of neurotransmitters
d) inhibiting the production of inhibitory neurotransmitters
Answer: a
Learning Objective: 2.3 Describe how neurons use neurotransmitters to communicate with each other and with the body.
Topic: 2.3 Neurotransmission
Difficulty Level: Difficult
Skill Level: Remember the Facts
% correct 30 a= 30 b= 26 c= 20 d= 24 *r* = .23
% correct 41 a= 41 b= 24 c= 22 d= 13 *r* = .22

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APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

46. After being bitten by a black widow spider, Veronica starts to convulse. This is a result of a _____.
a) lack of GABA being released into her bloodstream
Incorrect. This would not cause convulsions.
b) resurgence of neurotransmitters overstimulating her brain stem
c) surge of chemicals blocking the transmission of fluids to the spinal cord
d) flood of acetylcholine releasing into the body's muscle system
Correct. This is the result of the bite. The result can also include death.
Answer: d
Learning Objective: 2.3 Describe how neurons use neurotransmitters to communicate with each other and with the body.
Topic: 2.3 Neurotransmission
Difficulty Level: Difficult
Skill Level: Apply What You Know
APA Learning Objectives: 1.1 Describe key concepts, principles, and overarching themes in psychology; 1.3 Describe applications of psychology.

47. _____ plays a critical role as a neurotransmitter that stimulates skeletal muscles to contract.
a) Acetylcholine
Correct. Acetylcholine is an excitatory neurotransmitter that stimulates muscles to contract.
b) GABA
Incorrect. GABA is an inhibitory neurotransmitter.
c) Dopamine
d) Endorphin
Answer: a
Learning Objective: 2.3 Describe how neurons use neurotransmitters to communicate with each other and with the body.
Topic: 2.3 Neurotransmission
Difficulty Level: Difficult
Skill Level: Remember the Facts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

48. Peyton has been experiencing a serious memory problem. An interdisciplinary team has ruled out a range of causes and believes that a neurotransmitter is involved. Which neurotransmitter is most likely involved in this problem?
a) GABA
Incorrect. GABA has a tranquilizing effect.
b) dopamine
c) serotonin
d) acetylcholine
Correct. Acetylcholine is found in a part of the brain responsible for forming new memories.
Answer: d
Learning Objective: 2.3 Describe how neurons use neurotransmitters to communicate with each other and with the body.
Topic: 2.3 Neurotransmission
Difficulty Level: Moderate
Skill Level: Apply What You Know
% correct 33 a= 0 b= 26 c=41 d= 33 $r = .19$
APA Learning Objectives: 1.1 Describe key concepts, principles, and overarching themes in psychology; 1.3 Describe applications of psychology.

49. Which neurotransmitter is associated with sleep, mood, and appetite?
a) GABA
Incorrect. GABA is associated with helping calm anxiety.

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b) serotonin
Correct. Serotonin is associated with mood, sleep, and appetite.
c) dopamine
d) acetylcholine
Answer: b
Learning Objective: 2.3 Describe how neurons use neurotransmitters to communicate with each other and with the body.
Topic: 2.3 Neurotransmission
Difficulty Level: Difficult
Skill Level: Remember the Facts
% correct 60 a= 6 b= 60 c= 25 d= 8 *r* = .26
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

50. Corrado has decided to seek medical help for mood disturbances and appetite problems he has been having. At a biological level, which neurotransmitter is most likely involved in the problems Corrado is experiencing?
a) GABA
Incorrect. GABA is involved in sleep and inhibits movement but is not associated with mood or appetite.
b) dopamine
c) serotonin
Correct. Serotonin is associated with mood and appetite.
d) acetylcholine
Answer: c
Learning Objective: 2.3 Describe how neurons use neurotransmitters to communicate with each other and with the body.
Topic: 2.3 Neurotransmission
Difficulty Level: Moderate
Skill Level: Apply What You Know
APA Learning Objectives: 1.1 Describe key concepts, principles, and overarching themes in psychology; 1.3 Describe applications of psychology.

51. GABA functions as _____.
a) the major neurotransmitter involved in voluntary movements
b) an inhibitory neurotransmitter in the brain
Correct. GABA is an inhibitory neurotransmitter.
c) the neurotransmitter responsible for slowing intestinal activity during stress
d) the major excitatory neurotransmitter in the brain
Incorrect. GABA is an inhibitory neurotransmitter.
Answer: b
Learning Objective: 2.3 Describe how neurons use neurotransmitters to communicate with each other and with the body.
Topic: 2.3 Neurotransmission
Difficulty Level: Difficult
Skill Level: Remember the Facts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

52. The main excitatory neurotransmitter in the nervous system that plays a role in the relay of memory and learning is _____.
a) glutamate
Correct. Glutamate is a neurotransmitter involved in these processes.
b) serotonin
c) dopamine
d) acetylcholine
Incorrect. Acetylcholine is not associated with these effects.
Answer: a

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Learning Objective: 2.3 Describe how neurons use neurotransmitters to communicate with each other and with the body.
Topic: 2.3 Neurotransmission
Difficulty Level: Difficult
Skill Level: Analyze It
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

53. Endorphins are _____.
a) found where neurons meet skeletal muscles
b) less powerful than enkephalins
c) pain-controlling chemicals
Correct. Endorphins are pain-controlling chemicals.
d) radically different in function from neurotransmitters
Incorrect. Endorphins are *neurotransmitters.*
Answer: c
Learning Objective: 2.3 Describe how neurons use neurotransmitters to communicate with each other and with the body.
Topic: 2.3 Neurotransmission
Difficulty Level: Moderate
Skill Level: Remember the Facts
% correct 74 a= 4 b= 7 c= 74 d= 15 *r* = .41
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

54. Pain-controlling chemicals in the body are called _____.
a) neural regulators
Incorrect. Not all neural regulators are endorphins.
b) histamines
c) androgens
d) endorphins
Correct. Endorphins are pain-controlling chemicals.
Answer: d
Learning Objective: 2.3 Describe how neurons use neurotransmitters to communicate with each other and with the body.
Topic: 2.3 Neurotransmission
Difficulty Level: Easy
Skill Level: Remember the Facts
% correct 81 a= 3 b= 7 c= 8 d= 81 *r* = .42
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

55. Because they have similar chemical structures, morphine and heroin are able to lock into receptor sites for _____.
a) GABA
Incorrect. Opiates are not able to lock into GABA receptor sites.
b) serotonin
c) dopamine
d) endorphins
Correct. Endorphins are a natural substance that has the same effect as opiates.
Answer: d
Learning Objective: 2.3 Describe how neurons use neurotransmitters to communicate with each other and with the body.
Topic: 2.3 Neurotransmission
Difficulty Level: Difficult
Skill Level: Analyze It
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

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56. Reuptake is _____.
a) a chemical that is released into the synaptic gap
Incorrect. Reuptake is a process.
b) a protein molecule on the dendrite or cell body of a neuron that will interact only with specific neurotransmitters
c) a process by which neurotransmitters are taken back into the synaptic vesicles
Correct. This is the definition of reuptake.
d) a chemical that plays a role in learning and attention
Answer: c
Learning Objective: 2.3 Describe how neurons use neurotransmitters to communicate with each other and with the body.
Topic: 2.3 Neurotransmission
Difficulty Level: Moderate
Skill Level: Remember the Facts
% correct 77 a= 7 b= 13 c= 77 d= 3 *r* = .41
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

57. Casey is squirting mustard on her hot dog. She realizes she has put too much and sucks up some of it back into the squeeze bottle. This process is similar to _____.
a) the action potential
b) receptor site bindings
c) reverse polarity
Incorrect. It's not clear what "reverse polarity" means or how it would apply in this context.
d) reuptake
Correct. Reuptake occurs when excess neurotransmitters are reabsorbed into the sending neuron.
Answer: d
Learning Objective: 2.3 Describe how neurons use neurotransmitters to communicate with each other and with the body.
Topic: 2.3 Neurotransmission
Difficulty Level: Difficult
Skill Level: Apply What You Know
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology; 1.3 Describe applications of psychology.

58. How is acetylcholine removed from the synapse?
a) It is broken down by an enzyme.
Correct. It is broken down by an enzyme.
b) It is taken back up in the synapse.
Incorrect. It is broken down by an enzyme.
c) It dissipates in the surrounding body fluids.
d) Acetylcholine is one of the few neurotransmitters that is continually present in the synapse.
Answer: a
Learning Objective: 2.3 Describe how neurons use neurotransmitters to communicate with each other and with the body.
Topic: 2.3 Neurotransmission
Difficulty Level: Difficult
Skill Level: Understand the Concepts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

59. Enzymatic degradation is the process by which an excess of the neurotransmitter called _____ is removed from synapses. Other neurotransmitters tend to be removed via the process of reuptake.
a) dopamine
b) GABA
c) morphaline
Incorrect. Enzymatic degradation does not take place in this case.

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d) acetylcholine
Correct. ACh cannot be removed via reuptake, and so it requires enzymatic degradation.
Answer: d
Learning Objective: 2.3 Describe how neurons use neurotransmitters to communicate with each other and with the body.
Topic: 2.3 Neurotransmission
Difficulty Level: Difficult
Skill Level: Understand the Concepts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

60. Insertion into the brain of a thin insulated wire through which an electrical current is sent that destroys the brain cells at the tip of the wire is called _____.
a) lesioning
Correct. Lesioning destroys brain cells.
b) ESB
Incorrect. ESB stimulates brain cells.
c) EEG
d) CT scanning
Answer: a
Learning Objective: 2.4 Describe how lesioning studies and brain stimulation are used to study the brain.
Topic: 2.4 Methods for Studying Specific Regions of the Brain
Difficulty Level: Easy
Skill Level: Remember the Facts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

61. Which abbreviation does NOT belong with the others?
a) fMRI
Correct. fMRI is a neuroimaging technique; all the others are brain stimulation techniques.
b) ESB
Incorrect. All the techniques listed here (except fMRI) are ways of performing electrical stimulation of the brain, or ESB.
c) TMS
d) DBS
Answer: a
Learning Objective: 2.4 Describe how lesioning studies and brain stimulation are used to study the brain.
Topic: 2.4 Methods for Studying Specific Regions of the Brain
Difficulty Level: Moderate
Skill Level: Analyze It
APA Learning Objective: 2.4 Interpret, design, and conduct basic psychological research.

62. _____ is a brain-imaging method that takes computer-controlled X-rays of the brain.
a) Electroencephalography (EEG)
b) Magnetic resonance imaging (MRI)
Incorrect. MRI is a brain-imaging method using radio waves and magnetic fields of the body.
c) Positron emission tomography (PET)
d) Computed tomography (CT)
Correct. CT scans take computer-controlled X-rays of the brain.
Answer: d
Learning Objective: 2.5 Compare and contrast neuroimaging techniques for mapping the brain's structure and function.
Topic: 2.5 Neuroimaging Techniques
Difficulty Level: Difficult
Skill Level: Remember the Facts
% correct 30 a= 16 b= 42 c= 11 d= 30 $r = .30$
APA Learning Objective: 2.4 Interpret, design, and conduct basic psychological research.

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63. Violet is in the hospital about to undergo a brain-imaging process that involves taking many X-rays from different angles aided by the use of a computer. What type of imaging technique is being used?
a) electroencephalography (EEG)
b) magnetic resonance imaging (MRI)
Incorrect. MRI is a brain-imaging method using radio waves and magnetic fields of the body.
c) positron emission tomography (PET)
d) computed tomography (CT)
Correct. CT scans take computer-controlled X-rays of the brain.
Answer: d
Learning Objective: 2.5 Compare and contrast neuroimaging techniques for mapping the brain's structure and function.
Topic: 2.5 Neuroimaging Techniques
Difficulty Level: Difficult
Skill Level: Apply What You Know
% correct 37 a= 18 b= 42 c= 4 d= 37 *r* = .30
APA Learning Objective: 2.4 Interpret, design, and conduct basic psychological research.

64. If Michele's doctor has taken a series of images of her brain using X-rays, then she has likely had a(n) _____.
a) EEG
Incorrect. An electroencephalogram is a graphical representation of the electrical activity in the brain.
b) MRI
c) CT scan
Correct. CT scans use X-rays to create such images.
d) PET scan
Answer: c
Learning Objective: 2.5 Compare and contrast neuroimaging techniques for mapping the brain's structure and function.
Topic: 2.5 Neuroimaging Techniques
Difficulty Level: Difficult
Skill Level: Apply What You Know
APA Learning Objectives: 1.3 Describe applications of psychology; 2.4 Interpret, design, and conduct basic psychological research.

65. A brain-imaging method called _____ takes advantage of the magnetic properties of different atoms to take sharp, three-dimensional images of the brain.
a) electroencephalography (EEG)
b) magnetic resonance imaging (MRI)
Correct. MRI is a brain-imaging method using radio waves and magnetic fields of the body.
c) positron emission tomography (PET)
d) computed tomography (CT)
Incorrect. CT scans use X-rays.
Answer: b
Learning Objective: 2.5 Compare and contrast neuroimaging techniques for mapping the brain's structure and function.
Topic: 2.5 Neuroimaging Techniques
Difficulty Level: Moderate
Skill Level: Understand the Concepts
APA Learning Objective: 2.4 Interpret, design, and conduct basic psychological research.

66. A brain-imaging method using radio waves and magnetic fields of the body to produce detailed images of the brain is called _____.
a) electroencephalography (EEG)
b) magnetic resonance imaging (MRI)

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Correct. MRI is a brain-imaging method using radio waves and magnetic fields of the body.
c) positron emission tomography (PET)
d) computed tomography (CT)
Incorrect. CT scans use X-rays.
Answer: b
Learning Objective: 2.5 Compare and contrast neuroimaging techniques for mapping the brain's structure and function.
Topic: 2.5 Neuroimaging Techniques
Difficulty Level: Moderate
Skill Level: Remember the Facts
% correct 64 a= 19 b= 64 c= 7 d= 10 *r* = .20
% correct 81 a= 17 b= 81 c= 0 d= 2 *r* = .29
APA Learning Objective: 2.4 Interpret, design, and conduct basic psychological research.

67. Khalif is in the hospital and is about to undergo a brain-imaging process that involves placing him inside a magnetic field so that a computer can create three-dimensional images of his brain. What procedure is he about to undergo?
a) electroencephalography (EEG)
b) magnetic resonance imaging (MRI)
Correct. MRI is a brain-imaging method using radio waves and magnetic fields of the body.
c) computed tomography (CT)
Incorrect. CT scans use X-rays.
d) positron emission tomography (PET)
Answer: b
Learning Objective: 2.5 Compare and contrast neuroimaging techniques for mapping the brain's structure and function.
Topic: 2.5 Neuroimaging Techniques
Difficulty Level: Easy
Skill Level: Apply What You Know
% correct 93 a= 4 b= 93 c= 0 d= 4 *r* = .29
APA Learning Objectives: 1.3 Describe applications of psychology; 2.4 Interpret, design, and conduct basic psychological research.

68. Small metal disks are pasted onto Ruby's scalp, and they are connected by wire to a machine that translates the electrical energy from her brain into wavy lines on a moving piece of paper. From this description, it is evident that Ruby's brain is being studied through the use of _____.
a) a CT scan
Incorrect. CT scans take computer-controlled X-rays of the brain.
b) functional magnetic resonance imaging (fMRI)
c) a microelectrode
d) an electroencephalogram (EEG)
Correct. Electroencephalograms record brain wave patterns.
Answer: d
Learning Objective: 2.5 Compare and contrast neuroimaging techniques for mapping the brain's structure and function.
Topic: 2.5 Neuroimaging Techniques
Difficulty Level: Easy
Skill Level: Apply What You Know
% correct 81 a= 10 b= 5 c= 4 d= 81 *r* = .35
APA Learning Objectives: 1.3 Describe applications of psychology; 2.4 Interpret, design, and conduct basic psychological research.

69. Which apparatus is designed to record the brain wave patterns produced by electrical activity of the brain's cortex, just below the scalp?
a) deep lesioning

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Incorrect. Lesioning involves the insertion of a thin insulated wire into the brain.
b) YYZ
c) EEG
Correct. EEG records brain wave patterns.
d) CT scan
Answer: c
Learning Objective: 2.5 Compare and contrast neuroimaging techniques for mapping the brain's structure and function.
Topic: 2.5 Neuroimaging Techniques
Difficulty Level: Moderate
Skill Level: Remember the Facts
APA Learning Objective: 2.4 Interpret, design, and conduct basic psychological research.

70. Which equipment is used to monitor brain waves?
a) CT scan
Incorrect. A CT scan is a brain-imaging method.
b) functional magnetic resonance imaging
c) microelectrode
d) electroencephalograph
Correct. Electroencephalographs monitor brain waves.
Answer: d
Learning Objective: 2.5 Compare and contrast neuroimaging techniques for mapping the brain's structure and function.
Topic: 2.5 Neuroimaging Techniques
Difficulty Level: Difficult
Skill Level: Remember the Facts
% correct 31 a= 27 b= 19 c= 22 d= 31 $r = .37$
APA Learning Objective: 2.4 Interpret, design, and conduct basic psychological research.

71. Which of the following is a brain-imaging method in which radioactive sugar is injected into the subject and a computer compiles a color-coded image of the activity of the brain?
a) electroencephalography (EEG)
b) computed tomography (CT)
c) positron emission tomography (PET)
Correct. PET scan provides a color-coded image of the activity of the brain.
d) functional magnetic resonance imaging (fMRI)
Incorrect. FMRI does not involve radioactive sugar.
Answer: c
Learning Objective: 2.5 Compare and contrast neuroimaging techniques for mapping the brain's structure and function.
Topic: 2.5 Neuroimaging Techniques
Difficulty Level: Difficult
Skill Level: Remember the Facts
% correct 48 a= 25 b= 12 c= 48 d= 13 $r = .37$
APA Learning Objective: 2.4 Interpret, design, and conduct basic psychological research.

72. Aisha's physician refers her to a medical center in order to have the biochemical activity in her brain analyzed. She is given an injection of a radioactive glucose-like substance and then is told to lie down with her head in a scanner. The technique being used is _____.
a) positron emission tomography
Correct. PET involves injecting a radioactive glucose into the patient.
b) functional magnetic resonance imaging
Incorrect. FMRI does not involve injecting the patient with glucose.
c) microelectrode recording
d) electroencephalography

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Answer: a
Learning Objective: 2.5 Compare and contrast neuroimaging techniques for mapping the brain's structure and function.
Topic: 2.5 Neuroimaging Techniques
Difficulty Level: Moderate
Skill Level: Apply What You Know
APA Learning Objectives: 1.3 Describe applications of psychology; 2.4 Interpret, design, and conduct basic psychological research.

73. Catalina needs to have a neuroimaging test that will track the activity of her brain, but her physician and her technician want to use a radioactive tracer that is more easily obtained than those used for PET. Which technique offers the BEST alternative based on Catalina's needs?

a) electroencephalography (EEG)
b) computed tomography (CT)
c) functional positron emission tomography (fPET)

Incorrect. There is no neuroimaging technique called fPET.

d) single photon emission computed tomography (SPECT)

Correct. SPECT provides this benefit relative to PET scans.

Answer: d
Learning Objective: 2.5 Compare and contrast neuroimaging techniques for mapping the brain's structure and function.
Topic: 2.5 Neuroimaging Techniques
Difficulty Level: Moderate
Skill Level: Apply What You Know
APA Learning Objectives: 1.3 Describe applications of psychology; 2.4 Interpret, design, and conduct basic psychological research.

74. Compared to fMRI, fNIRS is _____.

a) structural rather than functional
b) a quieter but limited procedure

Correct. There are both advantages and disadvantages associated with fNIRS.

c) only used on infants
d) louder but less invasive

Incorrect. These are not attributes associated with fNIRS

Answer: b
Learning Objective: 2.5 Compare and contrast neuroimaging techniques for mapping the brain's structure and function.
Topic: 2.5 Neuroimaging Techniques
Difficulty Level: Moderate
Skill Level: Analyze It
APA Learning Objective: 2.4 Interpret, design, and conduct basic psychological research.

75. A researcher wants to obtain a "movie" of changes in the activity of the brain using images from different time periods. Which of these would be the BEST choice for this researcher?

a) electroencephalography (EEG)
b) computed tomography (CT)
c) positron emission tomography (PET)

Incorrect. PET provides a color-coded image of the activity of the brain, not moving images of the brain.

d) functional magnetic resonance imaging (fMRI)

Correct. An fMRI takes MRI images and combines them into a moving image of the brain.

Answer: d
Learning Objective: 2.5 Compare and contrast neuroimaging techniques for mapping the brain's structure and function.
Topic: 2.5 Neuroimaging Techniques
Difficulty Level: Difficult

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Skill Level: Apply What You Know
% correct 40 a= 25 b= 18 c= 15 d= 40 *r* = .20
APA Learning Objective: 2.4 Interpret, design, and conduct basic psychological research.

76. The _____ is a structure in the brain stem responsible for life-sustaining functions, such as breathing and heart rate.
a) reticular activating system
b) pons
Incorrect. The pons plays a role in sleep, dreaming, left-right body coordination, and arousal.
c) medulla
Correct. The medulla is responsible for life-sustaining functions.
d) cerebellum
Answer: c
Learning Objective: 2.6 Identify the different structures of the hindbrain and the function of each.
Topic: 2.6 The Hindbrain
Difficulty Level: Difficult
Skill Level: Remember the Facts
% correct 59 a= 3 b= 19 c= 59 d= 18 *r* = .27
% correct 60 a= 3 b= 14 c= 60 d= 22 *r* = .22
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

77. An auto accident rendered Nathan's nervous system unable to send messages for him to breathe, so he is on a respirator. Which brain structure was damaged in the accident?
a) pons
Incorrect. The pons plays a role in sleep, dreaming, left-right body coordination, and arousal.
b) medulla
Correct. The medulla is responsible for breathing.
c) cerebellum
d) reticular formation
Answer: b
Learning Objective: 2.6 Identify the different structures of the hindbrain and the function of each.
Topic: 2.6 The Hindbrain
Difficulty Level: Difficult
Skill Level: Apply What You Know
% correct 48 a= 10 b= 48 c= 37 d= 5 *r* = .22
APA Learning Objectives: 1.1 Describe key concepts, principles, and overarching themes in psychology; 1.3 Describe applications of psychology.

78. The structure through which the sensory nerves from the left side of the body cross over into the right side of the brain (and vice versa) is called the _____.
a) reticular activating system
b) pons
Incorrect. The pons connects the upper portion of the brain to the lower portion.
c) medulla
Correct. This is the point where sensory nerves cross over.
d) cerebellum
Answer: c
Learning Objective: 2.6 Identify the different structures of the hindbrain and the function of each.
Topic: 2.6 The Hindbrain
Difficulty Level: Moderate
Skill Level: Remember the Facts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

79. The _____ is a structure in the brain stem that plays a role in sleep, dreaming, left-right body coordination, and arousal.

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a) reticular activating system
b) pons
Correct. The pons plays a role in sleep, dreaming, left-right body coordination, and arousal.
c) medulla
Incorrect. The medulla is responsible for life-sustaining functions but does not play a role in sleep, dreaming, and arousal.
d) cerebellum
Answer: b
Learning Objective: 2.6 Identify the different structures of the hindbrain and the function of each.
Topic: 2.6 The Hindbrain
Difficulty Level: Difficult
Skill Level: Remember the Facts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

80. A college student is having difficulty staying awake during the day and sleeping through the night. Her difficulties are MOST likely due to problems in the _____.
a) hippocampus
Incorrect. The hippocampus is responsible for the formation of long-term memory and does not play a role in keeping people awake and alert.
b) pons
Correct. The pons plays a role in sleep, dreaming, and arousal.
c) medulla
d) cerebellum
Answer: b
Learning Objective: 2.6 Identify the different structures of the hindbrain and the function of each.
Topic: 2.6 The Hindbrain
Difficulty Level: Difficult
Skill Level: Apply What You Know
% correct 44 a= 15 b= 44 c= 25 d= 16 *r* = .22
% correct 41 a= 31 b= 41 c= 12 d= 16 *r* = .47
APA Learning Objectives: 1.1 Describe key concepts, principles, and overarching themes in psychology; 1.3 Describe applications of psychology.

81. Which brain structure is primarily responsible for the ability to selectively attend to certain kinds of information in one's surroundings, and become alert to changes in the environment?
a) reticular formation
Correct. The reticular formation plays a role in selective attention.
b) pons
Incorrect. The pons plays a role in sleep, dreaming, and arousal but not in selective attention.
c) medulla
d) cerebellum
Answer: a
Learning Objective: 2.6 Identify the different structures of the hindbrain and the function of each.
Topic: 2.6 The Hindbrain
Difficulty Level: Moderate
Skill Level: Remember the Facts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

82. Since Naomi suffered a head injury in a car accident 3 months ago, she has not experienced dreams as she did in the past. She used to have vivid, active dreams. Which part of her brain was most likely affected during the car accident and is related to her problem dreaming?
a) pons
Correct. The pons has been shown to influence sleep and dreaming as well as arousal.
b) cerebellum
c) cerebral cortex

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d) pituitary gland
Incorrect. The correct answer is the pons.
Answer: a
Learning Objective: 2.6 Identify the different structures of the hindbrain and the function of each.
Topic: 2.6 The Hindbrain
Difficulty Level: Difficult
Skill Level: Apply What You Know
% correct 46 a= 46 b= 22 c= 32 d= 1 *r* = .40
APA Learning Objectives: 1.1 Describe key concepts, principles, and overarching themes in psychology; 1.3 Describe applications of psychology.

83. What is the main function of the reticular formation?
a) to control thinking
b) to regulate emotions
c) to control levels of alertness and arousal
Correct. The reticular formation controls levels of alertness and arousal.
d) to coordinate involuntary, rapid, fine motor movements
Incorrect. This is the role of the cerebellum.
Answer: c
Learning Objective: 2.6 Identify the different structures of the hindbrain and the function of each.
Topic: 2.6 The Hindbrain
Difficulty Level: Difficult
Skill Level: Remember the Facts
% correct 37 a= 3 b= 30 c= 37 d= 30 *r* = .20
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

84. Maricella is typing her term paper in the computer lab. Although a class is going on just a few feet away, she does not seem to notice. Which e brain structure allows Maricella to focus on her typing and ignore the distractions that surround her?
a) reticular formation
Correct. The reticular formation plays an important role in selective attention.
b) pons
Incorrect. The pons plays a role in sleep, dreaming, and arousal but not in selective attention.
c) medulla
d) cerebellum
Answer: a
Learning Objective: 2.6 Identify the different structures of the hindbrain and the function of each.
Topic: 2.6 The Hindbrain
Difficulty Level: Moderate
Skill Level: Apply What You Know
APA Learning Objectives: 1.1 Describe key concepts, principles, and overarching themes in psychology; 1.3 Describe applications of psychology.

85. The cerebellum _____.
a) controls blood pressure
b) is involved in emotional behavior
c) coordinates involuntary, rapid, fine motor movement
Correct. The cerebellum does coordinates involuntary, rapid, fine motor movement.
d) relays messages from the sensory receptors
Incorrect. The cerebellum coordinates involuntary, rapid, fine motor movement.
Answer: c
Learning Objective: 2.6 Identify the different structures of the hindbrain and the function of each.
Topic: 2.6 The Hindbrain
Difficulty Level: Moderate
Skill Level: Remember the Facts

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% correct 65 a= 4 b= 14 c= 65 d= 17 *r* = .25
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

86. Which brain structure coordinates involuntary, rapid, fine motor movement?
a) medulla
b) pons
c) reticular formation
Incorrect. The reticular formation is not involved in the coordination of movement.
d) cerebellum
Correct. The cerebellum controls and coordinates involuntary, rapid, fine motor movement.
Answer: d
Learning Objective: 2.6 Identify the different structures of the hindbrain and the function of each.
Topic: 2.6 The Hindbrain
Difficulty Level: Easy
Skill Level: Remember the Facts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

87. Damage to the cerebellum is likely to result in which outcome?
a) difficulty playing basketball
Correct. The cerebellum coordinates movements that have to happen in rapid succession.
b) complete absence of sleeping
Incorrect. The pons plays a role in sleep and dreaming.
c) restoring homeostasis
d) delusional thinking
Answer: a
Learning Objective: 2.6 Identify the different structures of the hindbrain and the function of each.
Topic: 2.6 The Hindbrain
Difficulty Level: Difficult
Skill Level: Apply What You Know
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

88. Simone has been unable to participate in her gymnastics class and has become very uncoordinated since she was involved in an accident in which she suffered a head injury. As a result of the accident, she is likely to have suffered damage to her _____.
a) cerebellum
Correct. This part of the brain controls coordination and balance.
b) medulla
c) cerebral cortex
d) hypothalamus
Incorrect. This is not the correct part of the brain that controls these functions.
Answer: a
Learning Objective: 2.6 Identify the different structures of the hindbrain and the function of each.
Topic: 2.6 The Hindbrain
Difficulty Level: Moderate
Skill Level: Apply What You Know
APA Learning Objectives: 1.1 Describe key concepts, principles, and overarching themes in psychology; 1.3 Describe applications of psychology.

89. What have researchers recently discovered about the cerebellum?
a) It is composed primarily of glial cells and very few neurons.
b) Some humans are born with a missing cerebellum, yet show no deficits in functioning.
Incorrect. This would be an unlikely set of events.
c) It is involved in coordinating some higher brain functions that were previously thought to only involve other structures.
Correct. The cerebellum is responsible for more than just balance and fine motor coordination.

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d) Most of the cerebellum is located in the forebrain, with some connections back to the reticular formation
Answer: c
Learning Objective: 2.6 Identify the different structures of the hindbrain and the function of each.
Topic: 2.6 The Hindbrain
Difficulty Level: Moderate
Skill Level: Analyze It
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

90. Alice has been diagnosed with spinocerebellar degeneration. The first stage of the disease involves tremors and unsteady gait. In the later stages, she will be unable to stand or walk and will be uncoordinated in her movements. This disease affects the part of the brain called the _____.
a) hippocampus
b) amygdala
c) cerebellum
Correct. This is the part of the brain that is affected by this disease.
d) cerebral cortex
Incorrect. This is not the part of the brain that is affected.
Answer: c
Learning Objective: 2.6 Identify the different structures of the hindbrain and the function of each.
Topic: 2.6 The Hindbrain
Difficulty Level: Moderate
Skill Level: Apply What You Know
APA Learning Objectives: 1.1 Describe key concepts, principles, and overarching themes in psychology; 1.3 Describe applications of psychology.

91. Giuseppe receives a sharp blow to the back of his head, causing him to go to the hospital for tests and brain imaging. He complains that he is having difficulty coordinating his movements, sitting upright without leaning or falling over, and controlling his fine motor skills. Which area of the hindbrain will the emergency room physician most likely see injured when examining Giuseppe's assessments?
a) reticular formation
Incorrect. If Giuseppe had difficult remaining alert, his reticular formation might have been damaged; he's alert, just uncoordinated.
b) pons
c) cerebellum
Correct. The cerebellum is responsible for controlling these kinds of behaviors.
d) medulla
Answer: c
Learning Objective: 2.6 Identify the different structures of the hindbrain and the function of each.
Topic: 2.6 The Hindbrain
Difficulty Level: Difficult
Skill Level: Apply What You Know
APA Learning Objectives: 1.1 Describe key concepts, principles, and overarching themes in psychology; 1.3 Describe applications of psychology.

92. The _____ is a group of several brain structures located primarily under the cortex, and is involved primarily in learning, emotion, memory, and motivation.
a) limbic system
Correct. This structure is involved in learning, memory, emotion, and motivation.
b) cerebellum
c) cerebral cortex
d) cerebrum
Incorrect. The cerebrum consists of the cerebral hemispheres and connecting structures.
Answer: a
Learning Objective: 2.7 Identify the structures of the brain that are involved in emotion, learning, memory, and motivation.

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Topic: 2.7 Structures Under the Cortex: The Limbic System
Difficulty Level: Moderate
Skill Level: Remember the Facts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

93. The structures of the limbic system play an important role in _____ and _____.
a) heart rate; breathing
b) breathing; decision making
c) memory; emotion
Correct. These structures play a role in memory and emotion.
d) spatial tasks; sequential tasks
Incorrect. The limbic system does not play an important role in these tasks.
Answer: c
Learning Objective: 2.7 Identify the structures of the brain that are involved in emotion, learning, memory, and motivation.
Topic: 2.7 Structures Under the Cortex: The Limbic System
Difficulty Level: Easy
Skill Level: Remember the Facts
% correct 58 a= 28 b= 5 c= 58 d= 8 *r* = .30
% correct 44 a= 26 b= 22 c=44 d= 7 *r* = .40
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

94. What part of the brain acts as a relay station for incoming sensory information?
a) hypothalamus
Incorrect. The hypothalamus regulates sleep, hunger, thirst, and sexual drive.
b) thalamus
Correct. The thalamus acts as a relay station.
c) cerebellum
d) pituitary gland
Answer: b
Learning Objective: 2.7 Identify the structures of the brain that are involved in emotion, learning, memory, and motivation.
Topic: 2.7 Structures Under the Cortex: The Limbic System
Difficulty Level: Difficult
Skill Level: Remember the Facts
% correct 48 a= 19 b= 48 c= 25 d= 8 *r* = .53
% correct 48 a= 22 b= 48 c= 22 d= 8 *r* = .48
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

95. The thalamus is often compared to a _____.
a) triage nurse
Correct. The thalamus can be compared to a triage nurse because it routes sensory information to different parts of the cerebral cortex depending on priority and urgency.
b) fast-food menu
Incorrect. There is really nothing about this answer that could be considered correct.
c) stop sign
d) bus stop
Answer: a
Learning Objective: 2.7 Identify the structures of the brain that are involved in emotion, learning, memory, and motivation.
Topic: 2.7 Structures Under the Cortex: The Limbic System
Difficulty Level: Moderate
Skill Level: Analyze It
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

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96. Arjun loves the smell of the grass after it rains. This is a result of his _____, which has/have received signals from neurons in his sinus cavity.
a) thalamus
b) olfactory bulbs
Correct. This is the part of the brain that is related to the sense of smell.
c) opticfactory bulbs
d) hippocampus
Incorrect. The correct answer is the olfactory bulbs.
Answer: b
Learning Objective: 2.7 Identify the structures of the brain that are involved in emotion, learning, memory, and motivation.
Topic: 2.7 Structures Under the Cortex: The Limbic System
Difficulty Level: Moderate
Skill Level: Apply What You Know
% correct 75 a= 14 b= 75 c= 0 d= 12 *r* = .43
APA Learning Objectives: 1.1 Describe key concepts, principles, and overarching themes in psychology; 1.3 Describe applications of psychology.

97. Which brain structure is very small but extremely powerful, and is located near the pituitary gland?
a) hippocampus
b) thalamus
Incorrect. The thalamus acts as a relay station for incoming sensory information.
c) hypothalamus
Correct. The hypothalamus is a very small but extremely powerful brain structure.
d) amygdala
Answer: c
Learning Objective: 2.7 Identify the structures of the brain that are involved in emotion, learning, memory, and motivation.
Topic: 2.7 Structures Under the Cortex: The Limbic System
Difficulty Level: Moderate
Skill Level: Remember the Facts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

98. Eating, drinking, sexual behavior, sleeping, and body temperature are most strongly influenced by the _____.
a) hippocampus
b) thalamus
Incorrect. The thalamus acts as a relay station for incoming sensory information and is not involved in eating, drinking, sexual behavior, sleeping, and body temperature.
c) hypothalamus
Correct. The hypothalamus regulates sleep, hunger, thirst, and sex.
d) amygdala
Answer: c
Learning Objective: 2.7 Identify the structures of the brain that are involved in emotion, learning, memory, and motivation.
Topic: 2.7 Structures Under the Cortex: The Limbic System
Difficulty Level: Difficult
Skill Level: Remember the Facts
% correct 50 a= 12 b= 24 c= 50 d= 14 *r* = .21
% correct 59 a= 8 b= 11 c= 59 d= 22 *r* = .32
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

99. Which outcome is a likely effect of damage to the hypothalamus?
a) reduced use of left arm
b) deregulation of hormones

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Correct. The hypothalamus regulates the pituitary gland and therefore damage can result in the deregulation of hormones.

c) development of aphasia

Incorrect. Damage to Broca's and Wernicke's areas plays a role in the development of aphasia.

d) reduced ability to reason

Answer: b
Learning Objective: 2.7 Identify the structures of the brain that are involved in emotion, learning, memory, and motivation.
Topic: 2.7 Structures Under the Cortex: The Limbic System
Difficulty Level: Moderate
Skill Level: Understand the Concepts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

100. The _____ is the part of the brain responsible for the formation of long-term memories.

a) hippocampus

Correct. The hippocampus is responsible for the formation of long-term memories.

b) hypothalamus

Incorrect. The hypothalamus regulates sleep, hunger, thirst, and sex and is not involved in memory.

c) fornix

d) amygdala

Answer: a
Learning Objective: 2.7 Identify the structures of the brain that are involved in emotion, learning, memory, and motivation.
Topic: 2.7 Structures Under the Cortex: The Limbic System
Difficulty Level: Moderate
Skill Level: Remember the Facts
% correct 59 a= 59 b= 19 c= 0 d= 22 *r* = .45
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

101. If you have a problem forming lasting memories, doctors might check for damage to the area of the brain called the _____.

a) hippocampus

Correct. The hippocampus is responsible for the formation of long-term memories.

b) hypothalamus

Incorrect. The hypothalamus regulates sleep, hunger, thirst, and sex, but not memory.

c) fornix

d) amygdala

Answer: a
Learning Objective: 2.7 Identify the structures of the brain that are involved in emotion, learning, memory, and motivation.
Topic: 2.7 Structures Under the Cortex: The Limbic System
Difficulty Level: Moderate
Skill Level: Apply What You Know
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

102. People suffering from Alzheimer's disease have much lower levels of acetylcholine in the _____.

a) hippocampus

Correct. Acetylcholine is involved in the memory function of the hippocampus.

b) hypothalamus

Incorrect. The hypothalamus regulates sleep, hunger, thirst, and sex, but not memory.

c) fornix

d) amygdala

Answer: a
Learning Objective: 2.7 Identify the structures of the brain that are involved in emotion, learning, memory, and motivation.

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Topic: 2.7 Structures Under the Cortex: The Limbic System
Difficulty Level: Difficult
Skill Level: Remember the Facts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

103. Which of the following brain structures is located near the hippocampus and is responsible for fear responses and memory of fear?
a) hippocampus
b) hypothalamus
Incorrect. The hypothalamus regulates sleep, hunger, thirst, and sex, not fear responses.
c) fornix
d) amygdala
Correct. The amygdala is responsible for fear responses and memory of fear.
Answer: d
Learning Objective: 2.7 Identify the structures of the brain that are involved in emotion, learning, memory, and motivation.
Topic: 2.7 Structures Under the Cortex: The Limbic System
Difficulty Level: Difficult
Skill Level: Remember the Facts
% correct 37 a= 3 b= 51 c= 8 d= 37 *r* = .29
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

104. Rats that have a damaged _____ will show no fear when placed next to a cat.
a) hippocampus
b) hypothalamus
Incorrect. The hypothalamus regulates sleep, hunger, thirst, and sex, not fear responses.
c) fornix
d) amygdala
Correct. The amygdala is responsible for fear responses and memory of fear.
Answer: d
Learning Objective: 2.7 Identify the structures of the brain that are involved in emotion, learning, memory, and motivation.
Topic: 2.7 Structures Under the Cortex: The Limbic System
Difficulty Level: Difficult
Skill Level: Remember the Facts
% correct 49 a= 27 b= 23 c= 1 d= 49 *r* = .52
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

105. Ernie the monkey has had his amygdala surgically removed. A snake (a natural predator of monkeys) is then placed in his cage. What is Ernie most likely to do?
a) attack the snake instantly and bash it around the cage
b) offer the snake some grapes and lettuce from his food bin
c) show no fear of the snake
Correct. The amygdala is important in registering and responding to fearful stimuli; with his amygdala excised, Ernie is unlikely to have a fear response.
d) pet the snake and cradle it in his lap
Incorrect. Ernie probably wouldn't do this, but he also probably wouldn't avoid the snake, as his natural instincts might otherwise compel him to do.
Answer: c
Learning Objective: 2.7 Identify the structures of the brain that are involved in emotion, learning, memory, and motivation.
Topic: 2.7 Structures Under the Cortex: The Limbic System
Difficulty Level: Difficult
Skill Level: Apply What You Know

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APA Learning Objectives: 1.1 Describe key concepts, principles, and overarching themes in psychology; 1.3 Describe applications of psychology.

106. Which of these brain structures is NOT part of the limbic system?
a) hypothalamus
Incorrect. The hypothalamus is a structure located in the limbic system.
b) hippocampus
c) basal ganglia
Correct. The basal ganglia are not considered part of the limbic system.
d) thalamus
Answer: c
Learning Objective: 2.7 Identify the structures of the brain that are involved in emotion, learning, memory, and motivation.
Topic: 2.7 Structures Under the Cortex: The Limbic System
Difficulty Level: Moderate
Skill Level: Understand the Concepts
APA Learning Objectives: 1.1 Describe key concepts, principles, and overarching themes in psychology; 1.3 Describe applications of psychology.

107. The outermost part of the brain, made up of tightly packed neurons and only a tenth of an inch thick, is called the _____.
a) amygdala
b) medulla
c) cerebellum
Incorrect. The cerebellum is not the outermost part of the brain.
d) cortex
Correct. The outermost part of the brain is called the cortex.
Answer: d
Learning Objective: 2.8 Identify the parts of the cortex that process the different senses and those that control movement of the body.
Topic: 2.8 The Cortex
Difficulty Level: Easy
Skill Level: Remember the Facts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

108. The cortex is divided into two sections referred to as _____.
a) cerebral hemispheres
Correct. The two sections of the cortex are called cerebral hemispheres.
b) cerebellums
Incorrect. The cerebellum is not a section of the cortex.
c) corpus callosums
d) neurotransmitters
Answer: a
Learning Objective: 2.8 Identify the parts of the cortex that process the different senses and those that control movement of the body.
Topic: 2.8 The Cortex
Difficulty Level: Easy
Skill Level: Remember the Facts
% correct 91 a= 91 b= 3 c= 5 d= 0 $r = .29$
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

109. The thick band of neurons that connects the right and left cerebral hemispheres is called the _____.
a) cortex
Incorrect. The cortex is the outermost part of the brain.
b) cerebrum

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c) corpus callosum
Correct. The corpus callosum connects the right and left cerebral hemispheres.
d) cerebellum
Answer: c
Learning Objective: 2.8 Identify the parts of the cortex that process the different senses and those that control movement of the body.
Topic: 2.8 The Cortex
Difficulty Level: Easy
Skill Level: Remember the Facts
% correct 90 a= 3 b= 1 c= 90 d= 5 *r* = .51
% correct 81 a=0 b= 4 c= 81 d= 15 *r* = .54
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

110. The _____ lobe is the section of the brain located at the rear and bottom of each cerebral hemisphere, and contains the visual centers of the brain.
a) occipital
Correct. The occipital lobes contain the visual centers of the brain.
b) parietal
Incorrect. The parietal lobe contains the somatosensory cortex, not the visual centers.
c) temporal
d) frontal
Answer: a
Learning Objective: 2.8 Identify the parts of the cortex that process the different senses and those that control movement of the body.
Topic: 2.8 The Cortex
Difficulty Level: Easy
Skill Level: Remember the Facts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

111. After Jayla suffers a severe blow to the back of her head, she reports that she is unable to see, although her eyes are uninjured. A doctor would suspect an injury in Jayla's _____ lobe.
a) occipital
Correct. The occipital lobes contain the visual centers of the brain.
b) parietal
Incorrect. The parietal lobes contain the somatosensory cortex, not the visual centers.
c) temporal
d) frontal
Answer: a
Learning Objective: 2.8 Identify the parts of the cortex that process the different senses and those that control movement of the body.
Topic: 2.8 The Cortex
Difficulty Level: Moderate
Skill Level: Apply What You Know
APA Learning Objectives: 1.1 Describe key concepts, principles, and overarching themes in psychology; 1.3 Describe applications of psychology.

112. Which of the following regions contains the primary visual cortex?
a) occipital lobe
Correct. The occipital lobes contain the primary visual cortex.
b) parietal lobe
Incorrect. The parietal lobes contain the somatosensory cortex, not the primary visual cortex.
c) temporal lobe
d) frontal lobe
Answer: a
Learning Objective: 2.8 Identify the parts of the cortex that process the different senses and those that control

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movement of the body.
Topic: 2.8 The Cortex
Difficulty Level: Easy
Skill Level: Remember the Facts
% correct 82 a= 82 b= 4 c= 14 d= 0 *r* = .47
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

113. The part of the occipital lobe that is responsible for receiving visual information from the eyes is called the _____.
a) primary visual cortex
Correct. The occipital lobes contain the primary visual cortex.
b) somatosensory cortex
Incorrect. The parietal lobes contain the somatosensory cortex.
c) temporal lobe
d) frontal lobe
Answer: a
Learning Objective: 2.8 Identify the parts of the cortex that process the different senses and those that control movement of the body.
Topic: 2.8 The Cortex
Difficulty Level: Moderate
Skill Level: Remember the Facts
% correct 74 a= 74 b= 18 c= 8 d= 3 *r* = .30
% correct 79 a= 79 b= 14 c= 5 d= 2 *r* = .36
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

114. The section of the brain responsible for interpreting the visual information in the primary visual cortex is called the _____.
a) visual association cortex
Correct. This region of the brain is responsible for interpreting visual information.
b) somatosensory cortex
Incorrect. The somatosensory cortex processes information from the skin and internal body receptors for touch, temperature, and body position, not visual information.
c) temporal lobe
d) frontal lobe
Answer: a
Learning Objective: 2.8 Identify the parts of the cortex that process the different senses and those that control movement of the body.
Topic: 2.8 The Cortex
Difficulty Level: Easy
Skill Level: Remember the Facts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

115. Damage to the _____ would result in an inability to identify and comprehend what is seen through the eyes.
a) visual association cortex
Correct. This part of the brain is responsible for interpreting visual information.
b) primary visual cortex
Incorrect. The primary visual cortex receives visual information from the eyes but does not interpret it.
c) temporal lobe
d) frontal lobe
Answer: a
Learning Objective: 2.8 Identify the parts of the cortex that process the different senses and those that control movement of the body.
Topic: 2.8 The Cortex
Difficulty Level: Difficult

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Skill Level: Understand the Concepts
% correct 20 a= 20 b= 26 c= 36 d= 19 *r* = .30
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

116. Xander decided to learn how to wrestle. On his first day of practice, a seasoned wrestler slammed the back of Xander's head to the mat. He was shaken and reported to the trainer that he "saw stars" after he hit his head. It is likely that Xander's _____ was temporarily affected as a result of the slam and caused him to "see stars."
a) corpus callosum
b) occipital lobe
Correct. This part of the brain is in the back of the head and controls vision.
c) parietal lobe
Incorrect. This is not correct, as the occipital lobe controls vision.
d) somatosensory cortex
Answer: b
Learning Objective: 2.8 Identify the parts of the cortex that process the different senses and those that control movement of the body.
Topic: 2.8 The Cortex
Difficulty Level: Difficult
Skill Level: Apply What You Know
% correct 92 a= 2 b= 92 c= 3 d= 3 *r* = .34
APA Learning Objectives: 1.1 Describe key concepts, principles, and overarching themes in psychology; 1.3 Describe applications of psychology.

117. Which brain region contains the somatosensory cortex?
a) occipital lobe
Incorrect. This region contains the primary visual cortex.
b) parietal lobe
Correct. The parietal lobes contain the somatosensory cortex.
c) temporal lobe
d) frontal lobe
Answer: b
Learning Objective: 2.8 Identify the parts of the cortex that process the different senses and those that control movement of the body.
Topic: 2.8 The Cortex
Difficulty Level: Moderate
Skill Level: Remember the Facts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

118. The _____ lobes are located at the top and back of each cerebral hemisphere, and contain the centers for touch, body position, and temperature.
a) frontal
b) temporal
Incorrect. The temporal lobes are responsible for the sense of hearing and meaningful speech, not for touch, body position, or temperature.
c) occipital
d) parietal
Correct. The parietal lobes contain the centers for touch, body position, and temperature.
Answer: d
Learning Objective: 2.8 Identify the parts of the cortex that process the different senses and those that control movement of the body.
Topic: 2.8 The Cortex
Difficulty Level: Difficult
Skill Level: Remember the Facts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

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119. Mario is trying to decide whether the bathtub water is too hot by dipping his toe into it. Hugo is listening to music on his smartphone. Santiago is looking at a beautiful painting in an art museum. Which person's parietal lobe is likely to be the most active?

a) Mario

Correct. The processing of "touch" information such as this is handled by the parietal lobe.

b) Hugo

Incorrect. Auditory processing is handled by the temporal lobe, not the parietal lobe.

c) Santiago

d) Hugo and Santiago are, but Mario is not.

Answer: a
Learning Objective: 2.8 Identify the parts of the cortex that process the different senses and those that control movement of the body.
Topic: 2.8 The Cortex
Difficulty Level: Difficult
Skill Level: Apply What You Know
APA Learning Objectives: 1.1 Describe key concepts, principles, and overarching themes in psychology; 1.3 Describe applications of psychology.

120. Aaradhya was in an automobile accident that resulted in an injury to her brain. Her sense of touch has been affected. Which part of the brain is the most likely site of the damage?

a) frontal lobe

b) temporal lobe

Incorrect. The temporal lobes are responsible for the sense of hearing and meaningful speech, not touch.

c) occipital lobe

d) parietal lobes

Correct. The parietal lobes contain the centers for touch, body position, and temperature.

Answer: d
Learning Objective: 2.8 Identify the parts of the cortex that process the different senses and those that control movement of the body.
Topic: 2.8 The Cortex
Difficulty Level: Moderate
Skill Level: Apply What You Know
% correct 65 a= 20 b= 11 c= 4 d= 65 *r* = .30
% correct 62 a= 18 b= 16 c= 5 d= 62 *r* = .32
APA Learning Objectives: 1.1 Describe key concepts, principles, and overarching themes in psychology; 1.3 Describe applications of psychology.

121. Which region of the brain contains the auditory cortex?

a) temporal lobes

Correct. The temporal lobes contain the auditory cortex.

b) parietal lobes

Incorrect. The parietal lobes contain the somatosensory cortex but not the auditory cortex.

c) frontal lobes

d) occipital lobes

Answer: a
Learning Objective: 2.8 Identify the parts of the cortex that process the different senses and those that control movement of the body.
Topic: 2.8 The Cortex
Difficulty Level: Moderate
Skill Level: Remember the Facts
% correct 63 a= 63 b=7 c= 22 d= 7 *r* = .44
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

122. The _____lobes are located just behind the temples and contain neurons responsible for the sense of hearing and meaningful speech.

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a) temporal
Correct. The temporal lobes are responsible for the sense of hearing and meaningful speech.
b) parietal
Incorrect. The parietal lobes are not involved with hearing or speech.
c) frontal
d) occipital
Answer: a
Learning Objective: 2.8 Identify the parts of the cortex that process the different senses and those that control movement of the body.
Topic: 2.8 The Cortex
Difficulty Level: Moderate
Skill Level: Remember the Facts
% correct 72 a= 72 b= 15 c= 8 d= 5 *r* = .51
% correct 79 a= 79 b= 12 c= 4 d= 5 *r* = .40
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

123. Leo was skateboarding when a cat jumped right in front of him, causing him to fall. When he fell, he landed on the side of his head. Shortly afterward, Leo complained that he could not understand what people were saying to him. Which lobe of the cerebral cortex would have been most affected by this fall, given what Leo experienced?
a) frontal lobe
b) temporal lobe
Correct. The comprehension of language is one of the many tasks handled by the temporal lobe.
c) parietal lobe
d) occipital lobe
Incorrect. The occipital lobe is responsible for visual processing and does not play any role in the comprehension of language.
Answer: b
Learning Objective: 2.8 Identify the parts of the cortex that process the different senses and those that control movement of the body.
Topic: 2.8 The Cortex
Difficulty Level: Difficult
Skill Level: Apply What You Know
APA Learning Objectives: 1.1 Describe key concepts, principles, and overarching themes in psychology; 1.3 Describe applications of psychology.

124. Isaiah is having trouble deciding what he wants to eat for breakfast. Which lobe of his brain is especially active as he makes his selection?
a) temporal lobe
Incorrect. This part of the brain is responsible for the sense of hearing and meaningful speech.
b) parietal lobe
c) frontal lobe
Correct. The frontal lobes are responsible for decision-making skills.
d) occipital lobe
Answer: c
Learning Objective: 2.8 Identify the parts of the cortex that process the different senses and those that control movement of the body.
Topic: 2.8 The Cortex
Difficulty Level: Difficult
Skill Level: Apply What You Know
% correct 64 a= 10 b= 21 c= 64 d= 5 *r* = .42
% correct 66 a= 8 b= 26 c= 66 d= 1 *r* = .38
APA Learning Objectives: 1.1 Describe key concepts, principles, and overarching themes in psychology; 1.3 Describe applications of psychology.

125. Which of the following lobes are involved in planning, memory, and personality?

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a) temporal lobes
Incorrect. This part of the brain is responsible for the sense of hearing and meaningful speech, not planning, memory, or personality.
b) parietal lobes
c) frontal lobes
Correct. The frontal lobes are involved in planning, memory, and personality.
d) occipital lobes
Answer: c
Learning Objective: 2.8 Identify the parts of the cortex that process the different senses and those that control movement of the body.
Topic: 2.8 The Cortex
Difficulty Level: Moderate
Skill Level: Remember the Facts
% correct 70 a= 11 b= 0 c= 70 d= 18 *r* = .30
% correct 70 a= 10 b= 2 c= 70 d= 18 *r* = .34
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

126. What are the executive functions performed by the frontal lobes?
a) self-awareness, restraint, planning, time management
Correct. These are all examples of executive functions.
b) emotion recognition and fear arousal

c) feeding, aggression, and thirst regulation
d) sleep and wakefulness, arousal, alertness
Incorrect. These functions are more likely to be controlled in the hindbrain.
Answer: a
Learning Objective: 2.8 Identify the parts of the cortex that process the different senses and those that control movement of the body.
Topic: 2.8 The Cortex
Difficulty Level: Moderate
Skill Level: Analyze It
APA Learning Objectives: 1.1 Describe key concepts, principles, and overarching themes in psychology; 1.2 Develop a working knowledge of psychology's content domains; 1.3 Describe applications of psychology.

127. Phineas Gage tragically had a tamping iron propelled through his skull, causing damage to his left frontal lobe. As a result of the accident, Phineas Gage _____.
a) died from his injuries
b) was unable to control the movement of his arms and legs
c) lost his sense of hearing
Incorrect. Hearing is handled by the temporal lobe, not the frontal lobe of the brain.
d) lacked emotional control for some time after the accident
Correct. After Gage's accident, his emotion regulation skills were affected.
Answer: d
Learning Objective: 2.8 Identify the parts of the cortex that process the different senses and those that control movement of the body.
Topic: 2.8 The Cortex
Difficulty Level: Difficult
Skill Level: Apply What You Know
APA Learning Objective: 1.2 Develop a working knowledge of psychology's content domains.

128. Emily was driving through a rough part of town late at night when a stray bullet hit the front side of her head. Both the left and right sides of her frontal lobe were severely damaged. As a result of the accident, Emily most likely _____.
a) was rendered temporarily blind
Incorrect. This is not a likely consequence of damage to this region of the brain.

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b) communicated through a series of grunts and hand gestures
c) lost her sense of smell
d) engaged in perseveration
Correct. Repeating the same movements over and over can be a consequence of this kind of damage.
Answer: d
Learning Objective: 2.8 Identify the parts of the cortex that process the different senses and those that control movement of the body.
Topic: 2.8 The Cortex
Difficulty Level: Moderate
Skill Level: Apply What You Know
APA Learning Objectives: 1.1 Describe key concepts, principles, and overarching themes in psychology; 1.3 Describe applications of psychology.

129. Ever since Trey suffered a brain injury by falling from a ladder, his wife has continued to tell his doctor that his personality has changed. He used to be fun loving and carefree, but he is now more critical and yells at his children for seemingly little reason. Trey is likely to have suffered damage to the _____ lobe of his cortex.
a) occipital
Incorrect. If his vision were affected, this would be accurate.
b) parietal
c) temporal
d) frontal
Correct. The frontal lobes are connected to personality and decision-making processes.
Answer: d
Learning Objective: 2.8 Identify the parts of the cortex that process the different senses and those that control movement of the body.
Topic: 2.8 The Cortex
Difficulty Level: Difficult
Skill Level: Apply What You Know
APA Learning Objectives: 1.1 Describe key concepts, principles, and overarching themes in psychology; 1.3 Describe applications of psychology.

130. When do mirror neurons fire?
a) when we perform an action, or when we watch another person perform that same action
Correct. Mirror neurons are fired under these conditions.
b) after the hippocampus has identified a stimulus in the environment as being a threat
c) when we anticipate performing an action in the future
d) when we see an actual image of ourselves, but not when we see a manipulated image of ourselves
Incorrect. This is not the kind of "mirroring" implied in the term.
Answer: a
Learning Objective: 2.8 Identify the parts of the cortex that process the different senses and those that control movement of the body.
Topic: 2.8 The Cortex
Difficulty Level: Difficult
Skill Level: Analyze It
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

131. Imani was in an automobile accident and suffered an injury to her brain, resulting in paralysis of her left arm. What part of Imani's brain was injured?
a) auditory association area
b) motor cortex
Correct. The motor cortex is responsible for sending motor commands to the muscles of the somatic nervous system.
c) association areas
d) somatosensory cortex
Incorrect. This area processes information from the skin and internal body receptors for touch, temperature, and body position, but is not involved with arm muscles.

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Answer: b
Learning Objective: 2.8 Identify the parts of the cortex that process the different senses and those that control movement of the body.
Topic: 2.8 The Cortex
Difficulty Level: Easy
Skill Level: Apply What You Know
% correct 82 a= 0 b= 82 c= 5 d= 11 *r* = .36
APA Learning Objectives: 1.1 Describe key concepts, principles, and overarching themes in psychology; 1.3 Describe applications of psychology.

132. Messages from the brain to the muscles and glands in the body begin their journey in the _____.
a) auditory association area
b) motor cortex
Correct. Messages from the brain to the muscles and glands begin their journey in the motor cortex.
c) association areas
d) somatosensory cortex
Incorrect. This area is not involved with muscles and glands.
Answer: b
Learning Objective: 2.8 Identify the parts of the cortex that process the different senses and those that control movement of the body.
Topic: 2.8 The Cortex
Difficulty Level: Moderate
Skill Level: Remember the Facts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

133. Incoming sensory messages are made sense of in _____.
a) Broca's area
Incorrect. Broca's area is devoted to the production of speech rather than helping people make sense of incoming sensory input.
b) the motor projection areas
c) the association areas
Correct. The association areas help people make sense of incoming sensory input.
d) Wernicke's area
Answer: c
Learning Objective: 2.9 Recall the function of association areas of the cortex, including those especially crucial for language.
Topic: 2.9 The Association Areas of the Cortex
Difficulty Level: Difficult
Skill Level: Remember the Facts
% correct 41 a= 20 b= 14 c= 41 d= 25 *r* = .49
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

134. The area of the frontal lobe that is devoted to the production of fluent speech is _____ area.
a) Broca's
Correct. Broca's area is devoted to the production of fluent speech.
b) Gall's
c) Wernicke's
Incorrect. Wernicke's area is devoted to the production of meaningful language.
d) Korsakoff's
Answer: a
Learning Objective: 2.9 Recall the function of association areas of the cortex, including those especially crucial for language.
Topic: 2.9 The Association Areas of the Cortex
Difficulty Level: Moderate
Skill Level: Remember the Facts

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% correct 74 a= 74 b= 3 c= 19 d= 4 *r* = .31
% correct 73 a= 73 b= 3 c= 21 d= 4 *r* = .27
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

135. Will was admitted to the hospital last week after he fell. When Will's son visited, he found that his father was unable to get words out in a smooth, connected fashion. If Will's difficulty speaking is due to brain damage, what is the likely location of the damage?

a) Broca's area

Correct. Broca's area is devoted to the production of fluent speech.

b) Gall's area

c) Wernicke's area

Incorrect. Wernicke's area is devoted to the production of meaningful language.

d) Korsakoff's area

Answer: a
Learning Objective: 2.9 Recall the function of association areas of the cortex, including those especially crucial for language.
Topic: 2.9 The Association Areas of the Cortex
Difficulty Level: Moderate
Skill Level: Apply What You Know
% correct 75 a= 75 b= 2 c= 22 d= 2 *r* = .35
APA Learning Objectives: 1.1 Describe key concepts, principles, and overarching themes in psychology; 1.3 Describe applications of psychology.

136. The area at the back of the left temporal lobe that is crucial in the ability to listen, process, and understand what others are saying is _____ area.

a) Broca's

Incorrect. Broca's area is devoted to the production of fluent speech.

b) Gall's

c) Wernicke's

Correct. Wernicke's area is devoted to the production of meaningful language.

d) Korsakoff's

Answer: c
Learning Objective: 2.9 Recall the function of association areas of the cortex, including those especially crucial for language.
Topic: 2.9 The Association Areas of the Cortex
Difficulty Level: Difficult
Skill Level: Remember the Facts
% correct 49 a= 37 b= 8 c= 49 d= 6 *r* = .35
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

137. Sara suffered a head injury in a car accident last week. Since that time, she is able to speak fluently but uses the wrong words when expressing herself. Sara may be exhibiting _____ aphasia.

a) Broca's

Incorrect. A person with Broca's aphasia has halting speech and mispronounces words but does not use the wrong words.

b) Gall's

c) Wernicke's

Correct. A person with Wernicke's aphasia often uses the wrong words.

d) Korsakoff's

Answer: c
Learning Objective: 2.9 Recall the function of association areas of the cortex, including those especially crucial for language.
Topic: 2.9 The Association Areas of the Cortex
Difficulty Level: Moderate
Skill Level: Apply What You Know

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APA Learning Objectives: 1.1 Describe key concepts, principles, and overarching themes in psychology; 1.3 Describe applications of psychology.

138. Zachary's mother is usually meticulous in her presentation. When picking her up for a family dinner, Zachary noticed that her makeup was only applied to the right side of her face. Her hair was also brushed on the right side, but on the left it was matted and uncombed. He immediately took her to the hospital as it was clear that she was unaware of any problems. Zachary's mother was diagnosed with _____, which is evidenced by damage to the association areas of the right hemisphere.

a) Wernicke's aphasia
b) Broca's aphasia
Incorrect. If her speech were affected, this could be the possible cause.
c) spatial neglect
Correct. This would be the cause of her attention to the right side of her body and neglecting the left.
d) split-brain
Answer: c
Learning Objective: 2.9 Recall the function of association areas of the cortex, including those especially crucial for language.
Topic: 2.9 The Association Areas of the Cortex
Difficulty Level: Difficult
Skill Level: Apply What You Know
APA Learning Objectives: 1.1 Describe key concepts, principles, and overarching themes in psychology; 1.3 Describe applications of psychology.

139. The _____ is the upper part of the brain consisting of two cerebral hemispheres and the structures that connect them.

a) occipital lobe
b) cerebrum
Correct. The cerebrum consists of the two cerebral hemispheres and the structures that connect them.
c) corpus callosum
d) cerebellum
Incorrect. The cerebellum is at the base of the skull, not the upper part of the brain.
Answer: b
Learning Objective: 2.10 Explain how some brain functions differ between the left and right hemispheres.
Topic: 2.10 The Cerebral Hemispheres
Difficulty Level: Difficult
Skill Level: Remember the Facts
% correct 41 a= 2 b= 41 c= 40 d= 18 *r* = .35
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

140. Since Penelope underwent a split-brain operation as a child, we can infer that she likely had a history of _____.

a) mental illness
b) severe epilepsy
Correct. Severe epilepsy is one of the very few medical conditions that is treated by using a split-brain procedure.
c) anosognosia
d) frontal lobe damage
Incorrect. Split-brain procedures are not used to treat frontal lobe damage; in fact, it would make no sense at all to use this procedure for this type of medical problem.
Answer: b
Learning Objective: 2.10 Explain how some brain functions differ between the left and right hemispheres.
Topic: 2.10 The Cerebral Hemispheres
Difficulty Level: Easy
Skill Level: Apply What You Know
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

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141. Nina has decided to undergo surgery to treat her severe epilepsy. Consequently, her doctors will use a surgical procedure in which they will sever her _____.

a) parietal lobe

b) corpus callosum

Correct. The corpus callosum is the thick band of axons that connects the left and right cerebral hemispheres. It is what is severed during a split-brain procedure to treat severe epilepsy.

c) cerebral cortex

d) subcortical structure

Incorrect. In order to treat severe epilepsy, the corpus callosum is cut in a split-brain procedure. This is a last treatment effort and is only done in the most serious cases.

Answer: b
Learning Objective: 2.10 Explain how some brain functions differ between the left and right hemispheres.
Topic: 2.10 The Cerebral Hemispheres
Difficulty Level: Moderate
Skill Level: Apply What You Know
APA Learning Objectives: 1.1 Describe key concepts, principles, and overarching themes in psychology; 1.3 Describe applications of psychology.

142. Researcher Roger Sperry won a Nobel Prize for his research on hemispheric specialization. Sperry studied the effects of severing the _____, which joins the two hemispheres of the brain.

a) medulla

b) pons

c) pituitary gland

Incorrect. This part of the brain is not severed in split-brain individuals.

d) corpus callosum

Correct. In a split-brain procedure, this part of the brain is severed, creating "two brains in one body."

Answer: d
Learning Objective: 2.10 Explain how some brain functions differ between the left and right hemispheres.
Topic: 2.10 The Cerebral Hemispheres
Difficulty Level: Easy
Skill Level: Remember the Facts
APA Learning Objective: 1.2 Develop a working knowledge of psychology's content domains.

143. Traditionally, many have made the simplistic analogy that the left brain is to the right brain as _____.

a) logical is to artistic

Correct. Though recent research suggests that this analogy may not be completely accurate, it is what most people have believed about the brain for many years.

b) verbal is to analytical

c) intuitive is to perceptual

Incorrect. Traditionally, the left brain has been thought of as analytical, and the right brain has been thought of as perceptual.

d) intuitive is to analytical

Answer: a
Learning Objective: 2.10 Explain how some brain functions differ between the left and right hemispheres.
Topic: 2.10 The Cerebral Hemispheres
Difficulty Level: Moderate
Skill Level: Understand the Concepts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

144. If Otto's brain is like that of most people, then language functions will be dominant in his _____.

a) corpus callosum

b) occipital lobe

c) right hemisphere

Incorrect. The right hemisphere does not control language for most people.

d) left hemisphere

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Correct. For most people, the left hemisphere controls language.
Answer: d
Learning Objective: 2.10 Explain how some brain functions differ between the left and right hemispheres.
Topic: 2.10 The Cerebral Hemispheres
Difficulty Level: Moderate
Skill Level: Apply What You Know
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

145. Which functions are dominant in the right hemisphere?
a) perception, recognition of emotion, and recognition of patterns
Correct. These are functions of the right hemisphere.
b) sense of time and rhythm
c) speech, handwriting, and calculation
d) language processing in most individuals
Incorrect. This is a function of the left hemisphere.
Answer: a
Learning Objective: 2.10 Explain how some brain functions differ between the left and right hemispheres.
Topic: 2.10 The Cerebral Hemispheres
Difficulty Level: Moderate
Skill Level: Understand the Concepts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

146. The two main divisions of the nervous system are the _____ and _____.
a) brain; spinal cord
b) autonomic nervous system; somatic nervous system
Incorrect. The autonomic and somatic nervous systems are divisions of the peripheral nervous system.
c) peripheral nervous system; central nervous system
Correct. These are the two main divisions of the nervous system.
d) glands; muscles
Answer: c
Learning Objective: None
Topic: 2.11–2.12 The Nervous System: The Rest of the Story
Difficulty Level: Easy
Skill Level: Remember the Facts
% correct 73 a=8 b= 18 c= 73 d= 0 r = .42
% correct 68 a= 18 b= 13 c= 68 d= 0 r = .47
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

147. The brain and spinal cord are two components of the _____.
a) central nervous system
Correct. The brain and spinal cord are two components of the central nervous system.
b) somatic nervous system
c) peripheral nervous system
Incorrect. The two components of the peripheral nervous system are the autonomic and somatic nervous systems.
d) autonomic nervous system
Answer: a
Learning Objective: 2.11 Describe how the components of the central nervous system interact and how they may respond to experiences or injury.
Topic: 2.11 The Central Nervous System: The "Central Processing Unit"
Difficulty Level: Easy
Skill Level: Remember the Facts
% correct 100 a= 100 b= 0 c= 0 d= 0 r = .00
% correct 94 a= 94 b= 2 c= 1 d= 2 r = .39
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

148. The central nervous system consists of _____.

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a) the parasympathetic and sympathetic divisions
Incorrect. These are divisions of the autonomic nervous system.
b) the brain and spinal cord
Correct. The brain and spinal cord are the two most basic components of the central nervous system.
c) muscles and glands
d) sense organs and sensory neurons
Answer: b
Learning Objective: 2.11 Describe how the components of the central nervous system interact and how they may respond to experiences or injury.
Topic: 2.11 The Central Nervous System: The "Central Processing Unit"
Difficulty Level: Moderate
Skill Level: Remember the Facts
% correct 77 a= 17 b= 77 c= 0 d= 6 *r* = .24
% correct 82 a= 16 b= 82 c= 1 d= 2 *r* = .32
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

149. Which part of the nervous system takes the information received from the senses, makes sense out of it, makes decisions, and sends commands out to the muscles and the rest of the body?
a) spinal cord
Incorrect. The spinal cord carries messages between the body and the brain.
b) brain
Correct. That is the responsibility of the brain.
c) reflexes
d) interneurons
Answer: b
Learning Objective: 2.11 Describe how the components of the central nervous system interact and how they may respond to experiences or injury.
Topic: 2.11 The Central Nervous System: The "Central Processing Unit"
Difficulty Level: Easy
Skill Level: Remember the Facts
% correct 85 a= 7 b= 85 c= 1 d= 7 *r* = .21
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

150. The long bundle of neurons that carries messages between the body and the brain and is responsible for very fast, lifesaving reflexes is called the _____.
a) spinal cord
Correct. The spinal cord carries messages between the body and the brain.
b) brain
Incorrect. The brain receives messages from the spinal cord.
c) reflexes
d) interneurons
Answer: a
Learning Objective: 2.11 Describe how the components of the central nervous system interact and how they may respond to experiences or injury.
Topic: 2.11 The Central Nervous System: The "Central Processing Unit"
Difficulty Level: Easy
Skill Level: Remember the Facts
% correct 89 a= 89 b= 0 c= 2 d= 9 *r* = .31
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

151. The _____ is a long bundle of neurons that functions as a carrier of messages between the brain and the body and is responsible for certain reflexes.
a) spinal cord
Correct. The spinal cord carries messages between the body and the brain.
b) cerebellum

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c) somatic nervous system
Incorrect. The somatic nervous system carries information from the senses to the central nervous system (CNS) and from the CNS to voluntary muscles of the body.
d) amygdala
Answer: a
Learning Objective: 2.11 Describe how the components of the central nervous system interact and how they may respond to experiences or injury.
Topic: 2.11 The Central Nervous System: The "Central Processing Unit"
Difficulty Level: Moderate
Skill Level: Remember the Facts
% correct 77 a= 77 b= 2 c= 19 d= 2 *r* = .29
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

152. Which of the following are the three basic types of neurons?
a) reflexes, sensory neurons, motor neurons
Incorrect. Reflexes are not a type of neuron.
b) sensory neurons, motor neurons, stem cells
c) motor neurons, stem cells, reflexes
d) interneurons, sensory neurons, motor neurons
Correct. All of these are neurons.
Answer: d
Learning Objective: 2.11 Describe how the components of the central nervous system interact and how they may respond to experiences or injury.
Topic: 2.11 The Central Nervous System: The "Central Processing Unit"
Difficulty Level: Easy
Skill Level: Remember the Facts
% correct 89 a= 3 b= 7 c= 0 d= 89 *r* = .36
% correct 79 a= 13 b= 8 c= 0 d= 79 *r* = .31
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

153. Neurons that carry information from the senses to the spinal cord are called _____.
a) motor neurons
b) interneurons
Incorrect. Interneurons connect sensory neurons to the motor neurons.
c) sensory neurons
Correct. Sensory neurons carry information from the senses to the spinal cord.
d) reflexes
Answer: c
Learning Objective: 2.11 Describe how the components of the central nervous system interact and how they may respond to experiences or injury.
Topic: 2.11 The Central Nervous System: The "Central Processing Unit"
Difficulty Level: Moderate
Skill Level: Remember the Facts
% correct 75 a= 19 b= 5 c= 75 d= 0 *r* = .32
% correct 80 a= 11 b= 9 c= 80 d= 1 *r* = .28
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

154. LaKeisha stepped on a piece of glass and quickly pulled her foot away from that sharp object. Which of the following are responsible for sending a message to the muscles in LaKeisha's foot, resulting in her pulling her foot away from the piece of glass?
a) motor neurons
Correct. Motor neurons carry messages from the central nervous system to the muscles of the body.
b) interneurons
Incorrect. Interneurons connect the sensory neurons to the motor neurons.
c) sensory neurons

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d) reflexes
Answer: a
Learning Objective: 2.11 Describe how the components of the central nervous system interact and how they may respond to experiences or injury.
Topic: 2.11 The Central Nervous System: The "Central Processing Unit"
Difficulty Level: Difficult
Skill Level: Apply What You Know
% correct 58 a= 58 b= 2 c= 18 d= 21 *r* = .27
APA Learning Objectives: 1.1 Describe key concepts, principles, and overarching themes in psychology; 1.3 Describe applications of psychology.

155. Neurons found in the center of the spinal cord that receive information from sensory neurons and send commands to the muscles through the motor neurons are called _____.
a) motor neurons
Incorrect. Motor neurons carry messages from the central nervous system to the muscles of the body.
b) interneurons
Correct. Interneurons connect the sensory neurons to the motor neurons.
c) sensory neurons
d) reflexes
Answer: b
Learning Objective: 2.11 Describe how the components of the central nervous system interact and how they may respond to experiences or injury.
Topic: 2.11 The Central Nervous System: The "Central Processing Unit"
Difficulty Level: Moderate
Skill Level: Remember the Facts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

156. Which of the following are responsible for acting as a facilitator of communication between neurons?
a) motor neurons
Incorrect. Motor neurons carry messages from the central nervous system to the muscles of the body.
b) interneurons
Correct. Interneurons connect the sensory neurons to the motor neurons.
c) sensory neurons
d) reflexes
Answer: b
Learning Objective: 2.11 Describe how the components of the central nervous system interact and how they may respond to experiences or injury.
Topic: 2.11 The Central Nervous System: The "Central Processing Unit"
Difficulty Level: Easy
Skill Level: Understand the Concepts
% correct 80 a= 8 b= 80 c= 8 d= 3 *r* = .37
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

157. Rashad put his hand on a hot stove. Which neuron is responsible for sending a pain message up his spinal column, where it would then enter into the main area of the spinal cord?
a) motor neuron
b) interneuron
Incorrect. Interneurons connect the sensory neurons to the motor neurons.
c) sensory neuron
Correct. Sensory neurons carry information from the senses to the spinal cord.
d) reflex
Answer: c
Learning Objective: 2.11 Describe how the components of the central nervous system interact and how they may respond to experiences or injury.
Topic: 2.11 The Central Nervous System: The "Central Processing Unit"

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Difficulty Level: Easy
Skill Level: Apply What You Know
% correct 90 a= 5 b= 3 c= 90 d= 1 *r* = .27
APA Learning Objectives: 1.1 Describe key concepts, principles, and overarching themes in psychology; 1.3 Describe applications of psychology.

158. Why do many reflexes, such as pulling your hand away from a hot iron, happen so quickly?
a) They involve the neurotransmitter GABA rather than dopamine.
b) The message involved does not have to go all the way to the brain.
Correct. The message goes to the central area of the spinal cord and not up to the brain.
c) The speed of processing is faster in the frontal lobes than in the occipital lobes.
d) The path that reflexes follow to the brain is direct and does not involve any neurotransmitters.
Incorrect. The message involved does not have to go all the way to the brain.
Answer: b
Learning Objective: 2.11 Describe how the components of the central nervous system interact and how they may respond to experiences or injury.
Topic: 2.11 The Central Nervous System: The "Central Processing Unit"
Difficulty Level: Difficult
Skill Level: Analyze It
% correct 49 a= 17 b= 49 c= 14 d= 21 *r* = .51
APA Learning Objectives: 1.1 Describe key concepts, principles, and overarching themes in psychology; 1.3 Describe applications of psychology.

159. Rupert suffered a brain injury as a result of hitting his head while waterskiing. One of the problems that developed was that Rupert could not pronounce certain words correctly for a long period of time until he had undergone extensive speech therapy; he can now speak as he did before his accident. This is an example of the brain's _____, which allowed the structure and function of his brain cells to change to adjust to the trauma.
a) adaptology
b) stagnation
c) neuroplasticity
Correct. This allowed Rupert's brain to adapt after the trauma.
d) reflex arc
Incorrect. Neuroplasticity accounts for Rupert's brain allowing him to speak correctly despite damage.
Answer: c
Learning Objective: 2.11 Describe how the components of the central nervous system interact and how they may respond to experiences or injury.
Topic: 2.11 The Central Nervous System: The "Central Processing Unit"
Difficulty Level: Moderate
Skill Level: Apply What You Know
APA Learning Objectives: 1.1 Describe key concepts, principles, and overarching themes in psychology; 1.3 Describe applications of psychology.

160. "Grrrr…." said Umberto. "Errrggghhhhh……" "What in the world are you doing there, sweating and straining and turning red in the face?" cried Mallory. "I'm trying….to….generate….new neurons….in my brain," gasped Umberto, as he attempted to squeeze out a few more. Although his specific approach seems destined to fail, in which brain region does Umberto stand the best chance of neurogenesis?
a) olfactory bulbs *Incorrect. Human olfactory bulbs do not exhibit neurogenesis.*
b) striatum
Correct. Some strong but preliminary evidence has been documented for neurogenesis in the striatum.
c) organ of Corti
d) hypothalamus
Answer: b
Learning Objective: 2.11 Describe how the components of the central nervous system interact and how they may respond to experiences or injury.
Topic: 2.11 The Central Nervous System: The "Central Processing Unit"

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Difficulty Level: Difficult
Skill Level: Apply What You Know
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

161. The peripheral nervous system consists of _____.
a) all of the nerves and neurons that are not in the brain and spinal cord
Correct. The peripheral nervous system consists of all the nerve cells that are not in the brain and spinal cord.
b) all of the nerves in the brain and the spinal cord
Incorrect. The central nervous system consists of the brain and spinal cord.
c) the spinal cord and autonomic system
d) the brain and the autonomic system
Answer: a
Learning Objective: 2.12 Differentiate the roles of the somatic and autonomic nervous systems.
Topic: 2.12 The Peripheral Nervous System
Difficulty Level: Moderate
Skill Level: Remember the Facts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

162. The division of the nervous system that allows the brain and the spinal cord to communicate with the sensory systems of the eyes, ears, skin, and mouth and allows the brain and spinal cord to control the muscles and glands of the body is called the _____ system.
a) peripheral nervous
Correct. The peripheral nervous system allows the brain and spinal cord to communicate with the sensory systems and control the muscles and glands.
b) central nervous
Incorrect. The peripheral nervous system enables the central nervous system, which consists of the brain and spinal cord, to communicate with the sensory systems and control the muscles and glands.
c) endocrine
d) secondary nervous
Answer: a
Learning Objective: 2.12 Differentiate the roles of the somatic and autonomic nervous systems.
Topic: 2.12 The Peripheral Nervous System
Difficulty Level: Moderate
Skill Level: Understand the Concepts
% correct 69 a= 69 b= 22 c= 7 d= 1 r = .43
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

163. The peripheral nervous system consists of the _____ and _____ nervous systems.
a) autonomic; somatic
Correct. The peripheral nervous system consists of the autonomic and somatic nervous systems.
b) autonomic; sympathetic
c) parasympathetic; somatic
d) parasympathetic; sympathetic
Incorrect. These are the two divisions of the autonomic nervous system.
Answer: a
Learning Objective: 2.12 Differentiate the roles of the somatic and autonomic nervous systems.
Topic: 2.12 The Peripheral Nervous System
Difficulty Level: Difficult
Skill Level: Remember the Facts
% correct 53 a= 53 b= 7 c= 5 d= 35 r = .33
% correct 57 a= 57 b= 11 c= 7 d= 25 r = .40
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

164. Voluntary muscles are controlled by the _____ nervous system.
a) somatic

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Correct. The somatic nervous system controls voluntary muscles.
b) autonomic
Incorrect. The autonomic nervous system controls involuntary muscles.
c) sympathetic
d) parasympathetic
Answer: a
Learning Objective: 2.12 Differentiate the roles of the somatic and autonomic nervous systems.
Topic: 2.12 The Peripheral Nervous System
Difficulty Level: Moderate
Skill Level: Remember the Facts
% correct 69 a= 69 b= 17 c=11 d= 3 *r* = .46
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

165. The subdivision of the peripheral nervous system that is made up of all nerves carrying messages from the senses to the central nervous system and all nerves carrying messages from the central nervous system to skeletal muscles is called the _____ nervous system.
a) autonomic
Incorrect. The autonomic nervous system consists of nerves that control all of the involuntary muscles, organs, and glands.
b) parasympathetic
c) somatic
Correct. This describes the somatic nervous system.
d) central
Answer: c
Learning Objective: 2.12 Differentiate the roles of the somatic and autonomic nervous systems.
Topic: 2.12 The Peripheral Nervous System
Difficulty Level: Difficult
Skill Level: Remember the Facts
% correct 59 a= 25 b= 13 c= 59 d= 3 *r* = .46
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

166. In the peripheral nervous system, _____ carry messages from the senses to the spinal cord.
a) autonomic nerves
b) sensory pathway neurons
Correct. Sensory pathway neurons carry messages from sense receptors.
c) motor pathway neurons
Incorrect. Motor pathway neurons travel from the central nervous system to the voluntary muscles.
d) autonomic neurons
Answer: b
Learning Objective: 2.12 Differentiate the roles of the somatic and autonomic nervous systems.
Topic: 2.12 The Peripheral Nervous System
Difficulty Level: Easy
Skill Level: Remember the Facts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

167. Deion is typing on his laptop keyboard. The motion of his fingers on the keys is most likely being controlled by his _____.
a) autonomic nervous system
b) sensory pathway neurons
Incorrect. These neurons make up the nerves that come from the sensory organs.
c) motor pathway neurons
Correct. Movements of fingers are associated with motor pathway neurons, which control voluntary muscles.
d) autonomic neurons
Answer: c
Learning Objective: 2.12 Differentiate the roles of the somatic and autonomic nervous systems.

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Topic: 2.12 The Peripheral Nervous System
Difficulty Level: Difficult
Skill Level: Apply What You Know
APA Learning Objectives: 1.1 Describe key concepts, principles, and overarching themes in psychology; 1.3 Describe applications of psychology.

168. Every deliberate action you make, such as pedaling a bike, walking, or raising your hand in class, involves neurons in the _____ nervous system.
a) sympathetic
b) somatic
Correct. The somatic nervous system controls voluntary muscle movement.
c) parasympathetic
d) autonomic
Incorrect. The autonomic nervous system consists of nerves that control all of the involuntary muscles, organs, and glands.
Answer: b
Learning Objective: 2.12 Differentiate the roles of the somatic and autonomic nervous systems.
Topic: 2.12 The Peripheral Nervous System
Difficulty Level: Difficult
Skill Level: Understand the Concepts
% correct 50 a= 12 b= 50 c= 12 d= 25 $r = .23$
% correct 60 a= 14 b= 60 c= 11 d= 14 $r = .21$
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

169. As she walks out of the kitchen, Millie turns out the light. In this example, Millie's _____ nervous system is active.
a) sympathetic
b) parasympathetic
c) autonomic
Incorrect. Turning out the light requires voluntary muscle movement.
d) somatic
Correct. Turning out the light requires voluntary muscle movement.
Answer: d
Learning Objective: 2.12 Differentiate the roles of the somatic and autonomic nervous systems.
Topic: 2.12 The Peripheral Nervous System
Difficulty Level: Difficult
Skill Level: Apply What You Know
% correct 48 a= 8 b= 14 c= 30 d= 48 $r = .42$
APA Learning Objectives: 1.1 Describe key concepts, principles, and overarching themes in psychology; 1.3 Describe applications of psychology.

170. Involuntary muscles are controlled by the _____ nervous system.
a) somatic
Incorrect. The somatic nervous system controls voluntary muscles.
b) autonomic
Correct. The autonomic nervous system controls involuntary muscles like the heart, stomach, and intestines.
c) sympathetic
d) parasympathetic
Answer: b
Learning Objective: 2.12 Differentiate the roles of the somatic and autonomic nervous systems.
Topic: 2.12 The Peripheral Nervous System
Difficulty Level: Moderate
Skill Level: Remember the Facts
% correct 64 a= 14 b= 64 c= 14 d= 9 $r = .27$
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

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171. The subdivision of the peripheral nervous system that consists of nerves that control all of the involuntary muscles, organs, and glands is called the _____ nervous system.
a) somatic
Incorrect. The somatic nervous system controls voluntary muscles.
b) autonomic
Correct. The autonomic nervous system controls involuntary muscles and glands.
c) sympathetic
d) parasympathetic
Answer: b
Learning Objective: 2.12 Differentiate the roles of the somatic and autonomic nervous systems.
Topic: 2.12 The Peripheral Nervous System
Difficulty Level: Moderate
Skill Level: Remember the Facts
% correct 71 a= 10 b= 71 c= 10 d= 7 *r* = .26
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

172. When you see someone you have a crush on and your heart pounds, your hands get sweaty, and your cheeks feel hot, your _____ nervous system is active.
a) skeletal
b) spinal
c) autonomic
Correct. The autonomic nervous system controls involuntary muscles and glands.
d) somatic
Incorrect. The somatic nervous system controls voluntary muscles.
Answer: c
Learning Objective: 2.12 Differentiate the roles of the somatic and autonomic nervous systems.
Topic: 2.12 The Peripheral Nervous System
Difficulty Level: Moderate
Skill Level: Apply What You Know
APA Learning Objectives: 1.1 Describe key concepts, principles, and overarching themes in psychology; 1.3 Describe applications of psychology.

173. The autonomic nervous system has two divisions: the _____ and the _____.
a) central; peripheral
Incorrect. The two divisions of the autonomic nervous system are the sympathetic and parasympathetic nervous systems.
b) sympathetic; parasympathetic
Correct. These are the divisions of the autonomic nervous system.
c) receptors; effectors
d) limbic; endocrine
Answer: b
Learning Objective: 2.12 Differentiate the roles of the somatic and autonomic nervous systems.
Topic: 2.12 The Peripheral Nervous System
Difficulty Level: Easy
Skill Level: Remember the Facts
% correct 96 a= 4 b= 96 c= 0 d= 0 *r* = .19
% correct 91 a= 6 b= 91 c= 1 d= 3 *r* = .22
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

174. Which component of the nervous system mobilizes the body during times of stress?
a) central
b) somatic
c) sympathetic
Correct. The sympathetic nervous system mobilizes the body in times of stress.

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d) parasympathetic
Incorrect. The parasympathetic nervous system restores the body to normal functioning after arousal.
Answer: c
Learning Objective: 2.12 Differentiate the roles of the somatic and autonomic nervous systems.
Topic: 2.12 The Peripheral Nervous System
Difficulty Level: Moderate
Skill Level: Remember the Facts
% correct 60 a= 8 b= 12 c= 60 d= 20 *r* = .37
% correct 69 a= 3 b= 10 c= 69 d= 17 *r* = .47
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

175. The part of the autonomic nervous system that is responsible for reacting to stressful events and bodily arousal is called the _____ nervous system.
a) central
b) somatic
c) sympathetic
Correct. The sympathetic nervous system is responsible for reacting to stressful events and bodily arousal.
d) parasympathetic
Incorrect. The parasympathetic nervous system restores the body to normal functioning after arousal.
Answer: c
Learning Objective: 2.12 Differentiate the roles of the somatic and autonomic nervous systems.
Topic: 2.12 The Peripheral Nervous System
Difficulty Level: Moderate
Skill Level: Remember the Facts
% correct 66 a= 5 b= 9 c= 66 d= 19 *r* = .40
% correct 79 a= 1 b= 5 c= 79 d= 14 *r* = .40
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

176. As Li Min is walking across campus, a car swerves toward her. Her heart races and sweat breaks out as she jumps out of harm's way. This mobilization of energy is due to the action of Li Min's _____ nervous system.
a) somatic
b) skeletal
c) parasympathetic
Incorrect. The parasympathetic nervous system restores the body to normal functioning after arousal.
d) sympathetic
Correct. The sympathetic nervous system is responsible for reacting to stressful events and bodily arousal.
Answer: d
Learning Objective: 2.12 Differentiate the roles of the somatic and autonomic nervous systems.
Topic: 2.12 The Peripheral Nervous System
Difficulty Level: Moderate
Skill Level: Apply What You Know
% correct 73 a= 11 b= 0 c= 16 d= 73 *r* = .48
% correct 81 a= 11 b= 0 c= 9 d= 81 *r* = .51
APA Learning Objectives: 1.1 Describe key concepts, principles, and overarching themes in psychology; 1.3 Describe applications of psychology.

177. The branch of the autonomic nervous system that restores the body to normal functioning after arousal and is responsible for day-to-day functioning of the organs and glands is called the _____.
a) spinal cord
b) somatic nervous system
c) sympathetic nervous system
Incorrect. The sympathetic nervous system is responsible for reacting to stressful events and bodily arousal.
d) parasympathetic nervous system
Correct. The parasympathetic nervous system restores the body to normal functioning after arousal.
Answer: d

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Learning Objective: 2.12 Differentiate the roles of the somatic and autonomic nervous systems.
Topic: 2.12 The Peripheral Nervous System
Difficulty Level: Moderate
Skill Level: Remember the Facts
% correct 66 a= 2 b= 9 c= 23 d= 66 *r* = .37
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

178. Eli is studying alone in his room late at night when he hears a loud noise downstairs. His heartbeat increases significantly and his breathing becomes shallow. He wonders if a burglar has entered the house and decides to investigate. When he gets downstairs, he discovers his cat has knocked over a plant stand. His body begins to relax and return to normal. Which part of his nervous system was responsible for putting Eli's body on "high alert" when he did not know the source of the sound?

a) spinal cord
b) somatic nervous system
c) sympathetic nervous system
Correct. The sympathetic nervous system mobilizes the body in times of stress.
d) parasympathetic nervous system
Incorrect. The parasympathetic nervous system restores the body to normal functioning after arousal.

Answer: c
Learning Objective: 2.12 Differentiate the roles of the somatic and autonomic nervous systems.
Topic: 2.12 The Peripheral Nervous System
Difficulty Level: Moderate
Skill Level: Apply What You Know
APA Learning Objectives: 1.1 Describe key concepts, principles, and overarching themes in psychology; 1.3 Describe applications of psychology.

179. Eli is studying alone in his room late at night when he hears a loud noise downstairs. His heartbeat increases significantly and his breathing becomes shallow. He wonders if a burglar has entered the house and decides to investigate. When he gets downstairs, he discovers his cat has knocked over a plant stand. His body begins to relax and return to normal. Which part of his nervous system is responsible for returning Eli to a normal state?

a) spinal cord
b) somatic nervous system
c) sympathetic nervous system
Incorrect. The sympathetic nervous system mobilizes the body in times of stress.
d) parasympathetic nervous system
Correct. The parasympathetic nervous system restores the body to normal functioning after arousal.

Answer: d
Learning Objective: 2.12 Differentiate the roles of the somatic and autonomic nervous systems.
Topic: 2.12 The Peripheral Nervous System
Difficulty Level: Moderate
Skill Level: Apply What You Know
APA Learning Objectives: 1.1 Describe key concepts, principles, and overarching themes in psychology; 1.3 Describe applications of psychology.

180. Hormones are chemicals that are secreted and go directly into _____.

a) the bloodstream
Correct. Hormones are secreted by endocrine glands and go into the bloodstream.
b) specific organs
c) nerve endings
d) the brain
Incorrect. Hormones go directly into the bloodstream.

Answer: a
Learning Objective: None
Topic: 2.13–2.15 The Endocrine Glands
Difficulty Level: Difficult

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Skill Level: Remember the Facts
% correct 59 a= 59 b= 12 c= 8 d= 21 *r* = .42
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

181. Endocrine glands _____.
a) secrete hormones directly into the bloodstream
Correct. Endocrine glands do secrete hormones.
b) are chemicals released into the bloodstream
Incorrect. Glands are not chemicals; they are organs that secrete chemicals.
c) are an extensive network of specialized cells
d) are a thin layer of cells coating the axons
Answer: a
Learning Objective: None
Topic: 2.13–2.14 The Endocrine Glands
Difficulty Level: Easy
Skill Level: Remember the Facts
% correct 91 a= 91 b= 5 c= 2 d= 2 *r* = .56
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

182. The pituitary gland is the "master gland" of the endocrine system, but it in turn is controlled by the _____.
a) thalamus
Incorrect. The pituitary gland is not controlled by the thalamus.
b) pons
c) hypothalamus
Correct. The pituitary gland can be thought of as the master of the endocrine system, but it is still controlled by the hypothalamus in the brain.
d) amygdala
Answer: c
Learning Objective: 2.13 Explain why the pituitary gland is known as the "master gland."
Topic: 2.13 The Pituitary: Master of the Hormonal Universe
Difficulty Level: Moderate
Skill Level: Remember the Facts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

183. Assunta just received the results of a complete physical that found her body is not producing enough insulin. Which endocrine gland is affecting her body's ability to produce insulin?
a) adrenal
Incorrect. The adrenal glands have nothing to do with insulin. They secrete sex hormones and hormones that regulate salt intake.
b) thymus
c) thyroid
d) pancreas
Correct. The pancreas controls the level of blood sugar in the body.
Answer: d
Learning Objective: 2.14 Recall the role of various endocrine glands.
Topic: 2.14 Other Endocrine Glands
Difficulty Level: Difficult
Skill Level: Apply What You Know
APA Learning Objectives: 1.1 Describe key concepts, principles, and overarching themes in psychology; 1.3 Describe applications of psychology.
184. The sex glands, which secrete hormones that regulate sexual development and behavior as well as reproduction, are called _____.
a) the pancreas
b) the gonads

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Correct. Gonads are sex glands.
c) cortisol
Incorrect. Cortisol is a hormone that is released when the body experiences stress.
d) the hypothalamus
Answer: b
Learning Objective: 2.14 Recall the role of various endocrine glands.
Topic: 2.14 Other Endocrine Glands
Difficulty Level: Easy
Skill Level: Remember the Facts
% correct 87 a= 1 b= 87 c= 3 d= 9 *r* = .50
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

185. The alarm stage of the general adaptation syndrome is similar to _____ .
a) "fight or flight"
Correct. The body is mobilized for some kind of active response.
b) "running on fumes"
c) "damn the torpedoes"
d) "lay down and die"
Incorrect. This suggests a later stage of this syndrome.
Answer: a
Learning Objective: 2.15 Describe how the autonomic nervous system and body are impacted by stress.
Topic: 2.15 Hormones and Stress
Difficulty Level: Moderate
Skill Level: Analyze It
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

186. People living under stressful conditions tend to get sick more often than they would otherwise. How do researchers in psychoneuroimmunology explain this phenomenon?
a) The stress response in the long run leads to a lowering of the heart rate, which makes the heart inefficient.
Incorrect. This is not the typical response to stress.
b) The body's resources are strengthened, as occurs with a vaccine or inoculation, but the introduction of that small amount of pathogen weakens the overall system.
c) The stress response reduces immune system functioning, thus making us more vulnerable to diseases.
Correct. Researchers in the field of psychoneuroimmunology believe that the stress response reduces immune system functioning, thus making us more vulnerable to diseases.
d) The stress response makes muscles stronger, which places a greater burden on the heart and respiratory systems.
Answer: c
Learning Objective: 2.15 Describe how the autonomic nervous system and body are impacted by stress.
Topic: 2.15 Hormones and Stress
Difficulty Level: Moderate
Skill Level: Analyze It
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

187. "Maintaining stability through change" is the central idea underlying _____ .
a) homeostasis
Incorrect. Homeostatic models have shown themselves to be insufficient in this context.
b) mimetics
c) chronosis
d) allostatis
Correct. This is the key concept behind allostatis.
Answer: d
Learning Objective: 2.15 Describe how the autonomic nervous system and body are impacted by stress.
Topic: 2.15 Hormones and Stress
Difficulty Level: Moderate

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Skill Level: Analyze It
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.
188. The "HPA" axis is an abbreviation for _____ .
a) hormonal-pubertal-adrenal circuit
b) hypothalamus-pituitary-adrenal cortex
Correct. HPA stands for hypothalamus, pituitary gland, and adrenal cortex.
c) hippocampus-pituitary-amygdala circuit
Incorrect. These are not the brain structures activated in this context.
d) hazard-potential-ahead response loop
Answer: b
Learning Objective: 2.15 Describe how the autonomic nervous system and body are impacted by stress.
Topic: 2.15 Hormones and Stress
Difficulty Level: Moderate
Skill Level: Understand the Concepts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.
189. What is coronary heart disease?
a) a buildup of plaque in the arteries of the heart
Correct. This is how this disease is defined.
b) a synonym for *heart attack*
c) the presence of abnormally high blood pressure
d) a sudden seizure of the heart, causing it to stop beating
Incorrect. This is not the definition of coronary heart disease.
Answer: a
Learning Objective: 2.15 Describe how the autonomic nervous system and body are impacted by stress.
Topic: 2.15 Hormones and Stress
Difficulty Level: Moderate
Skill Level: Understand the Concepts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.
190. How might stress assist in the growth of a tumor?
a) Actually, it doesn't.
Incorrect. The research is unequivocal in its finding of a strong relationship between stress and the development of cancer; however, this does not mean that stress causes *cancer.*
b) by causing a reduction in the effectiveness of NK cells
Correct. Because stress inhibits the natural killer cells that fight off precancerous invaders, stress can leave us vulnerable to the growth of a cancerous tumor.
c) by causing the tumor to develop in the first place
d) by destroying brain cells
Answer: b
Learning Objective: 2.15 Describe how the autonomic nervous system and body are impacted by stress.
Topic: 2.15 Hormones and Stress
Difficulty Level: Moderate
Skill Level: Analyze It
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

TRUE OR FALSE

191. One function of the nervous system is to send information to and receive information from all parts of the body.
Answer: True
Learning Objective: 2.1 Identify the parts of a neuron and the function of each.
Topic: 2.1 Structure of the Neuron: The Nervous System's Building Block
Difficulty Level: Easy
Skill Level: Remember the Facts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

192. The axon receives messages from other neurons.

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Answer: False
Learning Objective: 2.1 Identify the parts of a neuron and the function of each.
Topic: 2.1 Structure of the Neuron: The Nervous System's Building Block
Difficulty Level: Moderate
Skill Level: Remember the Facts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

193. Glial cells provide structure for neurons.
Answer: True
Learning Objective: 2.1 Identify the parts of a neuron and the function of each.
Topic: 2.1 Structure of the Neuron: The Nervous System's Building Block
Difficulty Level: Difficult
Skill Level: Remember the Facts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

194. Myelin not only insulates the neuron, it also slows down the neural message, helping with transmission of messages traveling down the axon.
Answer: False
Learning Objective: 2.1 Identify the parts of a neuron and the function of each.
Topic: 2.1 Structure of the Neuron: The Nervous System's Building Block
Difficulty Level: Easy
Skill Level: Remember the Facts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

195. A neuron's cell membrane is semipermeable.
Answer: True
Learning Objective: 2.2 Explain the action potential.
Topic: 2.2 Generating the Message Within the Neuron: The Neural Impulse
Difficulty Level: Moderate
Skill Level: Remember the Facts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

196. Neurons that are at rest remain electrically charged.
Answer: True
Learning Objective: 2.2 Explain the action potential.
Topic: 2.2 Generating the Message Within the Neuron: The Neural Impulse
Difficulty Level: Easy
Skill Level: Remember the Facts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

197. During a resting potential, the neuron is positively charged inside and negatively charged outside.
Answer: False
Learning Objective: 2.2 Explain the action potential.
Topic: 2.2 Generating the Message Within the Neuron: The Neural Impulse
Difficulty Level: Difficult
Skill Level: Remember the Facts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

198. A synapse is like a locked door that only certain neurotransmitter keys can unlock.
Answer: False
Learning Objective: 2.3 Describe how neurons use neurotransmitters to communicate with each other and with the body.
Topic: 2.3 Neurotransmission
Difficulty Level: Easy
Skill Level: Understand the Concepts

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APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

199. Acetylcholine is an agonist or an excitatory neurotransmitter also found in a part of the brain responsible for forming new memories and stimulating muscle contraction.
Answer: True
Learning Objective: 2.3 Describe how neurons use neurotransmitters to communicate with each other and with the body.
Topic: 2.3 Neurotransmission
Difficulty Level: Difficult
Skill Level: Remember the Facts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

200. Positron emission tomography (PET) is a brain-imaging method using radio waves and magnetic fields of the body to produce detailed images of the brain.
Answer: False
Learning Objective: 2.5 Compare and contrast neuroimaging techniques for mapping the brain's structure and function.
Topic: 2.5 Neuroimaging Techniques
Difficulty Level: Difficult
Skill Level: Remember the Facts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

201. The medulla is responsible for people's ability to selectively attend to certain kinds of information in their surroundings.
Answer: False
Learning Objective: 2.6 Identify the different structures of the hindbrain and the function of each.
Topic: 2.6 The Hindbrain
Difficulty Level: Moderate
Skill Level: Remember the Facts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

202. A person who suffered brain damage is likely to have problems controlling his emotions as a result of damage to the connection between the occipital lobe and the medulla.
Answer: False
Learning Objective: 2.7 Identify the structures of the brain that are involved in emotion, learning, memory, and motivation.
Topic: 2.7 Structures Under the Cortex: The Limbic System
Difficulty Level: Moderate
Skill Level: Apply What You Know
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

203. The cortex "wrinkles" as a result of fluid filling the brain over the lifespan.
Answer: False
Learning Objective: 2.8 Identify the parts of the cortex that process the different senses and those that control movement of the body.
Topic: 2.8 The Cortex
Difficulty Level: Difficult
Skill Level: Remember the Facts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

204. Researchers in the field of autism are considering that the condition is related to a faulty mirror neuron system in the brain.
Answer: True
Learning Objective: 2.8 Identify the parts of the cortex that process the different senses and those that control movement of the body.

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Topic: 2.8 The Cortex
Difficulty Level: Difficult
Skill Level: Remember the Facts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

205. The occipital lobes contain the visual cortex, where visual signals are processed.
Answer: True
Learning Objective: 2.8 Identify the parts of the cortex that process the different senses and those that control movement of the body.
Topic: 2.8 The Cortex
Difficulty Level: Easy
Skill Level: Remember the Facts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

206. The cerebrum is divided into two hemispheres that control opposite sides of the body.
Answer: True
Learning Objective: 2.10 Explain how some brain functions differ between the left and right hemispheres.
Topic: 2.10 The Cerebral Hemispheres
Difficulty Level: Easy
Skill Level: Remember the Facts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

207. The cerebellum is severed in individuals who are considered to have a "split brain" during a surgical procedure to control epileptic seizures.
Answer: False
Learning Objective: 2.10 Explain how some brain functions differ between the left and right hemispheres.
Topic: 2.10 The Cerebral Hemispheres
Difficulty Level: Moderate
Skill Level: Understand the Concepts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

208. The central nervous system consists of the brain and spinal cord.
Answer: True
Learning Objective: 2.11 Describe how the components of the central nervous system interact and how they may respond to experiences or injury.
Topic: 2.11 The Central Nervous System: The "Central Processing Unit"
Difficulty Level: Easy
Skill Level: Remember the Facts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

209. Motor neurons carry messages from sense organs to the spinal cord.
Answer: False
Learning Objective: 2.11 Describe how the components of the central nervous system interact and how they may respond to experiences or injury.
Topic: 2.11 The Central Nervous System: The "Central Processing Unit"
Difficulty Level: Easy
Skill Level: Remember the Facts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

210. Interneurons connect sensory neurons to the motor neurons.
Answer: True
Learning Objective: 2.11 Describe how the components of the central nervous system interact and how they may respond to experiences or injury.
Topic: 2.11 The Central Nervous System: The "Central Processing Unit"
Difficulty Level: Moderate

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Skill Level: Remember the Facts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

211. Neuroplasticity is the concept that when the brain is injured, it is unable to change the structure and function of the cells to adjust to the damage.
Answer: False
Learning Objective: 2.11 Describe how the components of the central nervous system interact and how they may respond to experiences or injury.
Topic: 2.11 The Central Nervous System: The "Central Processing Unit"
Difficulty Level: Difficult
Skill Level: Remember the Facts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

212. Stem cells can become other cells, such as blood cells, nerve cells, and brain cells.
Answer: True
Learning Objective: 2.11 Describe how the components of the central nervous system interact and how they may respond to experiences or injury.
Topic: 2.11 The Central Nervous System: The "Central Processing Unit"
Difficulty Level: Moderate
Skill Level: Remember the Facts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

213. The somatic nervous system is made up of nerves carrying messages from the central nervous system to the muscles of the body.
Answer: True
Learning Objective: 2.12 Differentiate the roles of the somatic and autonomic nervous systems.
Topic: 2.12 The Peripheral Nervous System
Difficulty Level: Difficult
Skill Level: Remember the Facts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

214. Activation of the sympathetic nervous system leads to pupil dilation, inhibition of digestion, and an accelerated heartbeat.
Answer: True
Learning Objective: 2.12 Differentiate the roles of the somatic and autonomic nervous systems.
Topic: 2.12 The Peripheral Nervous System
Difficulty Level: Easy
Skill Level: Remember the Facts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

215. Endocrine glands secrete chemicals directly into the body's tissues through specialized ducts.
Answer: False
Learning Objective: None
Topic: 2.13–2.14 The Endocrine Glands
Difficulty Level: Easy
Skill Level: Remember the Facts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

216. The pineal gland secrets a hormone called insulin.
Answer: False
Learning Objective: 2.14 Recall the role of various endocrine glands.
Topic: 2.14 Other Endocrine Glands
Difficulty Level: Moderate
Skill Level: Remember the Facts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

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217. One stage of the general adaptation syndrome is "Activate."
Answer: False
Learning Objective: 2.15 Describe how the autonomic nervous system and body are impacted by stress.
Topic: 2.15 Hormones and Stress
Difficulty Level: Easy
Skill Level: Remember the Facts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

218. Allostatic overload can result in wear and tear on the brain and body due to prolonged exposure to elevated levels of hormones.
Answer: True
Learning Objective: 2.15 Describe how the autonomic nervous system and body are impacted by stress.
Topic: 2.15 Hormones and Stress
Difficulty Level: Difficult
Skill Level: Remember the Facts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

219. Type 2 diabetes is characterized by the body becoming resistant to the effects of insulin.
Answer: True
Learning Objective: 2.15 Describe how the autonomic nervous system and body are impacted by stress.
Topic: 2.15 Hormones and Stress
Difficulty Level: Difficult
Skill Level: Remember the Facts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

SHORT ANSWER

220. List three main parts of the human neuron and explain the role each plays in the transmission of neural communication.
Learning Objectives: 2.1 Identify the parts of a neuron and the function of each; 2.2 Explain the action potential.
Topics: 2.1 Structure of the Neuron: The Nervous System's Building Block; 2.2 Generating the Message Within the Neuron: The Neural Impulse
Difficulty Level: Moderate
Skill Level: Remember the Facts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

221. List two different functions of glial cells.
Learning Objective: 2.1 Identify the parts of a neuron and the function of each.
Topic: 2.1 Structure of the Neuron: The Nervous System's Building Block
Difficulty Level: Easy
Skill Level: Remember the Facts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

222. What is a synapse?
Learning Objective: 2.3 Describe how neurons use neurotransmitters to communicate with each other and with the body.
Topic: 2.3 Neurotransmission
Difficulty Level: Easy
Skill Level: Remember the Facts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

223. What are neurotransmitters? How do they operate when encountering a receptor site?

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Learning Objective: 2.3 Describe how neurons use neurotransmitters to communicate with each other and with the body.
Topic: 2.3 Neurotransmission
Difficulty Level: Easy
Skill Level: Remember the Facts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

224. Name three neurotransmitters and their functions.
Learning Objective: 2.3 Describe how neurons use neurotransmitters to communicate with each other and with the body.
Topic: 2.3 Neurotransmission
Difficulty Level: Difficult
Skill Level: Remember the Facts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

225. How does a magnetic resonance imaging (MRI) scan allow the exploration of the brain without the injection of chemicals? What is the difference between a traditional MRI and MRI spectroscopy?
Learning Objective: 2.5 Compare and contrast neuroimaging techniques for mapping the brain's structure and function.
Topic: 2.5 Neuroimaging Techniques
Difficulty Level: Difficult
Skill Level: Remember the Facts
APA Learning Objectives: 1.1 Describe key concepts, principles, and overarching themes in psychology; 2.4 Interpret, design, and conduct basic psychological research.

226. Why is the cortex in the brain so wrinkled?
Learning Objective: 2.8 Identify the parts of the cortex that process the different senses and those that control movement of the body.
Topic: 2.8 The Cortex
Difficulty Level: Moderate
Skill Level: Understand the Concepts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

227. What are the symptoms of Broca's aphasia?
Learning Objective: 2.9 Recall the function of association areas of the cortex, including those especially crucial for language.
Topic: 2.9 The Association Areas of the Cortex
Difficulty Level: Difficult
Skill Level: Remember the Facts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

228. What are the symptoms of Wernicke's aphasia?
Learning Objective: 2.9 Recall the function of association areas of the cortex, including those especially crucial for language.
Topic: 2.9 The Association Areas of the Cortex
Difficulty Level: Difficult
Skill Level: Remember the Facts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

229. Briefly explain Roger Sperry's split-brain procedure and the insights that were gained from studying split-brain patients.
Learning Objective: 2.10 Explain how some brain functions differ between the left and right hemispheres.
Topic: 2.10 The Cerebral Hemispheres
Difficulty Level: Moderate
Skill Level: Understand the Concepts

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APA Learning Objective: 1.2 Develop a working knowledge of psychology's content domains.

230. What are the operations for which the right and left cerebral hemispheres are dominant?
Learning Objective: 2.10 Explain how some brain functions differ between the left and right hemispheres.
Topic: 2.10 The Cerebral Hemispheres
Difficulty Level: Moderate
Skill Level: Analyze It
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

231. Explain the difference between the central nervous system (CNS) and the peripheral nervous system (PNS).
Learning Objectives: 2.11 Describe how the components of the central nervous system interact and how they may respond to experiences or injury; 2.12 Differentiate the roles of the somatic and autonomic nervous systems.
Topics: 2.11 The Central Nervous System: The "Central Processing Unit"; 2.12 The Peripheral Nervous System
Difficulty Level: Difficult
Skill Level: Analyze It
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

232. Name two hormones that are of particular interest to psychologists and state which gland they are related to and some of the tasks that these hormones perform.
Learning Objective: 2.14 Recall the role of various endocrine glands.
Topic: 2.14 Other Endocrine Glands
Difficulty Level: Difficult
Skill Level: Remember the Facts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

233. Describe what takes place during each of the three stages of the general adaptation syndrome.
Learning Objective: 2.15 Describe how the autonomic nervous system and body are impacted by stress.
Topic: 2.15 Hormones and Stress
Difficulty Level: Moderate
Skill Level: Analyze It
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

ESSAY

234. What is a neuron? Describe the major parts of a neuron and their functions. Explain the process of how a neural message is transmitted from the end of one neuron to the beginning of another and the process by which a neuron moves from a resting state (resting potential) to firing (action potential) and then back to a resting state.
Learning Objectives: 2.1 Identify the parts of a neuron and the function of each; 2.2 Explain the action potential.
Topics: 2.1 Structure of the Neuron: The Nervous System's Building Block; 2.2 Generating the Message Within the Neuron: The Neural Impulse
Difficulty Level: Moderate
Skill Level: Remember the Facts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

235. Choose any three methods that psychologists use to learn about the functions of the brain. Describe the method, how it works, and the type of information we can learn from it.
Learning Objectives: 2.4 Describe how lesioning studies and brain stimulation are used to study the brain; 2.5 Compare and contrast neuroimaging techniques for mapping the brain's structure and function.
Topics: 2.4 Methods for Studying Specific Regions of the Brain; 2.5 Neuroimaging Techniques
Difficulty Level: Difficult
Skill Level: Apply What You Know
APA Learning Objective: 2.4 Interpret, design, and conduct basic psychological research.

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236. Identify the four lobes of the cerebral cortex and identify the major functions that are controlled by each of them.
Learning Objectives: 2.8 Identify the parts of the cortex that process the different senses and those that control movement of the body; 2.9 Recall the function of association areas of the cortex, including those especially crucial for language.
Topics: 2.8 The Cortex; 2.9 The Association Areas of the Cortex
Difficulty Level: Moderate
Skill Level: Remember the Facts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

237. Describe the functions of the brain and the spinal cord. How are these functions similar? How are these functions dissimilar?
Learning Objective: 2.11 Describe how the components of the central nervous system interact and how they may respond to experiences or injury.
Topic: 2.11 The Central Nervous System: The "Central Processing Unit"
Difficulty Level: Easy
Skill Level: Remember the Facts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

238. What are the primary functions of the sympathetic and parasympathetic components of the peripheral nervous system? Describe a situation or experience in which activation of the sympathetic and parasympathetic divisions has occurred.
Learning Objective: 2.12 Differentiate the roles of the somatic and autonomic nervous systems.
Topic: 2.12 The Peripheral Nervous System
Difficulty Level: Easy
Skill Level: Remember the Facts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

239. How does the endocrine system influence behavior? Describe the functions of three glands and the hormones each secretes.
Learning Objectives: 2.13 Explain why the pituitary gland is known as the "master gland"; 2.14 Recall the role of various endocrine glands.
Topics: 2.13 The Pituitary: Master of the Hormonal Universe; 2.14 Other Endocrine Glands
Difficulty Level: Moderate
Skill Level: Remember the Facts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

240. Explain how stress plays a role in the onset of heart disease, diabetes, and cancer. Are the effects of stress direct or indirect in each case?
Learning Objectives: 2.15 Describe how the autonomic nervous system and body are impacted by stress.
Topics: 2.15 Hormones and Stress
Difficulty Level: Moderate
Skill Level: Analyze It
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

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Test Yourself

Pick the best answer.

1. In the structure of the neuron, the _____ receives messages from other cells.
a. axon
b. dendrite
c. soma
d. myelin

2. Oligodendrocytes and Schwann cells generate a fatty substance known as
a. soma.
b. glial.
c. myelin.
d. neurilemma.

3. Which of the following insulates and protects a neuron's axon, as well as helps speed along electrical impulses?
a. synaptic knobs
b. myelin sheath
c. receptor sites
d. neuromodulators

4. When a neuron is in the resting potential state, the neuron is negatively charged on the _____ and positively charged on the _____.
a. top, bottom
b. outside, inside
c. inside, outside
d. bottom, top

5. Which neurotransmitter stimulates skeletal muscle cells to contract but slows contractions of the heart?
a. GABA
b. acetylcholine (ACh)
c. serotonin
d. endorphin

6. Heroin mimics the actions of endorphins, inhibiting pain signals. Heroin is an example of a(n)
a. glial cell.
b. protagonist.
c. antagonist.
d. agonist.

7. Bailey is a subject in a study on memory and problem solving. The researcher is applying magnetic pulses to her brain through copper wire coils positioned directly above her scalp. Bailey's study would best be described as a(n) _____ technique.
a. EEG
b. invasive stimulation
c. noninvasive stimulation
d. PET

8. Which technique of studying the brain involves injecting the patient with radioactive glucose?
a. EEG
b. PET
c. MRI
d. CT

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9. Maria often sleeps soundly and rarely awakens to any outside noise. However, the cries of Maria's baby can awaken her immediately. What part of the brain is responsible for this reaction?
a. cerebellum
b. medulla
c. pons
d. reticular formation

10. Nicole and Camille are synchronized swimmers for their college swim team. They often work long hours to ensure the movements in their routine are perfectly timed. What part of their brains must Camille and Nicole rely most upon?
a. pons
b. medulla
c. cerebellum
d. reticular formation

11. Your psychology professor refers to this as the great relay station of the brain. What part is he or she referring to?
a. amygdala
b. hypothalamus
c. hippocampus
d. thalamus

12. Which part of the brain is involved in the creation of long-term, declarative memories and is often linked to Alzheimer's disease?
a. amygdala
b. thalamus
c. hypothalamus
d. hippocampus

13. Jessica suffered a severe blow to the back of her head when she was thrown from her horse. Subsequently, her occipital lobe has been injured. Which of her senses has the highest chance of being affected?
a. hearing
b. vision
c. touch
d. taste and smell

14. Jaime's grandfather recently suffered a stroke and has had difficulty with language production ever since. Most likely, he has experienced damage to the _____ area of his brain.
a. right frontal
b. right rear
c. left rear
d. left frontal

15. Felicia is recovering from a brain injury. She is able to speak fluently but often uses incorrect words in a sentence. In one instance at a friend's birthday party, she said, "I would like something to drink. Can I have some battery?" Felicia's problem may be a symptom of
a. Broca's aphasia.
b. spatial neglect.
c. visual agnosia.
d. Wernicke's aphasia.

16. Although the brain works largely as a whole, which of the following is not a correct pairing of hemisphere and function?
a. left: control of right-handed motor functions
b. right: control of right-handed motor functions

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c. right: recognition of faces
d. left: reading

17. Involuntary muscles are controlled by the _____ nervous system.
a. somatic
b. autonomic
c. sympathetic
d. parasympathetic

18. As you take notes, your heart beats at a normal rate. Your breathing is normal and your stomach slowly digests your earlier meal. What part of the peripheral nervous system is currently in action?
a. parasympathetic division
b. sympathetic division
c. autonomic division
d. somatic division

19. Which gland(s) influence all other glands within the endocrine system?
a. adrenal glands
b. pineal gland
c. thyroid gland
d. pituitary gland

20. Robert has had difficulty sleeping for the past 6 months, and his body seemingly no longer differentiates between night and day. His doctor believes the problem lies with Robert's endocrine system. What gland will Robert's physician focus on?
a. thyroid
b. pituitary
c. adrenal
d. pineal

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EXTRA BANK OF QUESTIONS

2: THE BIOLOGICAL PERSPECTIVE

2.1–2.3 Neurons and Neurotransmitters

2.1 Structure of the Neuron: The Nervous System's Building Block

1. The basic message-carrying cells of the nervous system are labeled _____.
a. dendrites
b. neurons
c. nerves
d. ganglia
Answer b % correct 91 a= 5 b= 91 c= 4 d= 0 *r* = .23

2. Neurons are _____.
a. cells in the brain that are believed to help clean and feed brain cells
b. cells that send and receive information
c. bundles of nerves
d. chemical transmitters found in the hypothalamus
Answer b % correct 96 a= 0 b= 96 c= 3 d= 1 *r* = .44

3. Specialized cells in the brain that send and receive information are called _____.
a. limbic cells
b. neurons
c. ganglia
d. gonads
Answer b % correct 83 a= 15 b= 83 c= 2 d= 0 *r* = .21

4. The smallest unit in the nervous system is the _____.
a. dendrite
b. neuron
c. axon
d. myelin sheath
Answer b % correct 64 a= 21 b= 64 c= 7 d= 8 *r* = .34

5. The cell that underlies the activity of the entire nervous system is the _____.
a. transmitter cell
b. amoeba
c. neuron
d. carcinoma
Answer c % correct 83 a= 16 b= 0 c= 83 d= 1 *r* = .34

6. The three parts of every neuron are _____.
a. myelin, glia, and cell body
b. dendrite, cell body, and axon
c. glia, dendrite, and axon
d. myelin, cell body, and dendrite
Answer b % correct 83 a= 1 b= 83 c= 3 d= 13 *r* = .23

7. A long structure leaving the cell body that action potential travel along is called the _____.

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a. cell membrane
b. dendrite
c. axon
d. myelin sheath
Answer c % correct 70 a= 3 b= 16 c= 70 d= 11 *r* = .38

8. Axons _____.
a. receive/detect neural impulses
b. carry messages away from a cell body
c. secrete chemicals to lubricate the cell body
d. are found in the cell body
Answer b % correct 80 a= 15 b= 80 c= 1 d= 3 *r* = .30
Answer b % correct 82 a= 15 b= 82 c= 1 d= 3 *r* = .36

9. Axons _____.
a. may be up to a quarter of a mile long
b. carry messages away from a cell body
c. are primarily responsible for the hypothalamic functions of regulation and motivation of sexual functions
d. are contained within the cell nucleus
Answer b % correct 89 a= 7 b= 89 c= 1 d= 3 *r* = .33

10. The part of the neuron that carries outgoing messages either to another neuron or to a muscle or gland is the _____.
a. myelin sheath
b. axon
c. dendrite
d. cell body
Answer b % correct 80 a= 1 b= 80 c= 19 d= 0 *r* = .21
Answer b % correct 81 a= 2 b= 81 c= 18 d= 0 *r* = .20

11. Dendrites _____.
a. may be up to a quarter of a mile long
b. carry messages to cell bodies
c. are primarily responsible for the hypothalamic functions of regulation and motivation of sexual functions
d. are contained within the cell nucleus
Answer b % correct 82 a= 10 b= 82 c= 4 d= 4 *r* = .26

12. _____ are short fibers that extend from the neurons and allow it to receive messages from other neurons.
a. Axons
b. Dendrites
c. Nerve bundles
d. Synapses
Answer b % correct 79 a= 19 b= 79 c= 1 d= 1 *r* = .38

13. The short fibers that extend from the neuron allowing it to receive messages from other neurons are _____.
a. axons
b. dendrites
c. nerve bundles
d. cell membranes
Answer b % correct 86 a= 1 b= 86 c= 1 d= 12 *r* = .26

14. The myelin sheath _____.
a. is a fatty substance protecting the dendrites
b. helps to speed up neural messages within the cell

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c. is found in all neurons
d. protects the cell's vesicles
Answer b % correct 51 a= 30 b= 51 c= 5 d= 14 *r* = .44
Answer b % correct 60 a= 25 b= 60 c= 6 d= 8 *r* = .40

15. The purpose of the myelin sheath is to _____.
a. provide a place for respiration and metabolism to occur
b. carry messages from the spinal cord to the brain
c. insulate the neuron so it can act more efficiently
d. receive messages from outside the neuron and carry them to the cell nucleus
Answer c % correct 87 a= 0 b= 3 c= 87 d= 10 *r* = .37

16. Neural messages travel faster on axons that _____.
a. are polarized
b. are not exposed to acetylcholine (ACh)
c. are located in the hypothalamus
d. have a myelin sheath
Answer d % correct 88 a= 6 b= 2 c= 5 d= 88 *r* = .35

2.2 Generating the Message Within the Neuron: The Neural Impulse

17. Which of the following is true of neural impulses in a single neuron?
a. The neuron may fire during the absolute refractory period.
b. The strength of a neural impulse increases as the strength of the incoming message gets stronger.
c. The strength of a neural impulse decreases as the strength of the incoming message gets stronger.
d. The strength of a neural impulse is the same each time the neuron fires.
Answer d % correct 60 a= 6 b= 30 c= 4 d= 60 *r* = .35

2.3 Neurotransmission

18. Which of the following neurotransmitters is known for its role in schizophrenia and Parkinson's disease?
a. acetylcholine
b. dopamine
c. serotonin
d. norepinephrine
Answer b % correct 80 a= 11 b= 80 c= 2 d= 7 *r* = .21

19. Endorphins _____.
a. are found where neurons meet skeletal muscles
b. are less powerful than enkaphalins
c. reduce pain messages in the brain
d. are radically different in function from neurotransmitters
Answer c % correct 86 a= 3 b= 3 c= 86 d= 8 *r* = .23

20. The small gap between adjacent neurons is the _____.
a. glia
b. myelin sheath
c. synaptic gap
d. terminal
Answer c % correct 83 a= 2 b= 6 c= 83 d= 9 *r* = .20

21. The neural impulse traveling down the axon is _____; it gets across the synapse by _____.

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a. electrical; remaining electrical but changing from positively charged to negatively charged
b. electrical; remaining electrical but changing from negatively charged to positively charged
c. electrical; being changed into a chemical message
d. chemical; being changed into an electrical message
Answer c % correct 50 a= 13 b= 22 c= 50 d= 13 *r* = .37

22. A nerve impulse from one neuron affects the activity of a neighboring neuron at a point of interaction called the _____.
a. corpuscle
b. synapse
c. transmission cleft
d. neuronal junction
Answer b % correct 96 a= 0 b= 96 c= 3 d= 1 *r* = .26

23. A synapse is most important in _____.
a. separating the medulla from the hindbrain
b. regulating the parasympathetic nervous system
c. the process of transmitting messages between neurons
d. connecting the basal ganglia
Answer c % correct 96 a= 2 b= 2 c= 96 d= 0 *r* = .37

24. Most axon terminals contain a number of tiny oval sacs called _____.
a. synaptic vesicles
b. synaptic knobs
c. neurotransmitters
d. receptor sites
Answer a % correct 41 a= 41 b= 6 c= 35 d= 15 *r* = .21

25. When a neural impulse reaches the end of an axon, it causes the tiny oval sacs at the end of the axon to release chemicals called _____.
a. effectors
b. neurotransmitters
c. stimulants
d. ions
Answer b % correct 95 a= 3 b= 95 c= 0 d= 2 *r* = .27

26. Claire, an emergency room physician, must quickly treat a patient who has been bitten by a black widow spider. Claire knows she must prevent the _____ in the patient's nervous system.
a. buildup of acetylcholine
b. buildup of catecholamines
c. breakdown of catecholamines
d. reabsorption of acetylcholine
Answer a % correct 73 a= 73 b= 2 c= 7 d= 18 *r* = .33

27. Despite its dangers, a young man continues to take cocaine because of the feeling of euphoria it produces in him. This powerful arousal of his nervous system is probably due to cocaine's ability to _____.
a. inhibit enzymes that break down neurotransmitters
b. increase the release of neurotransmitters
c. block the receptor sites for neurotransmitters
d. prevent neurotransmitters from being reabsorbed into the synaptic vesicles
Answer d % correct 40 a= 2 b= 22 c= 35 d= 40 *r* = .43

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2.6–2.10 From the Bottom Up: The Structures of the Brain

2.6 The Hindbrain

28. The medulla, pons, and cerebellum are all part of the _____.
a. midbrain
b. hindbrain
c. spinal cord
d. forebrain
Answer b % correct 89 a= 4 b= 89 c= 5 d= 2 *r* = .47

29. The part of the hindbrain that largely controls breathing, heart rate, and blood pressure is the _____.
a. cerebral cortex
b. pons
c. medulla
d. cerebellum
Answer c % correct 86 a= 3 b= 2 c= 86 d= 9 *r* = .29

30. A victim of a car wreck with head injuries, whose involuntary bodily processes (breathing, heartbeat, etc.) have been disturbed, probably has had damage done to the _____.
a. hindbrain
b. pons
c. medulla
d. forebrain
Answer c % correct 78 a= 10 b= 6 c= 78 d= 6 *r* = .36
Answer c % correct 81 a= 9 b= 1 c= 81 d= 9 *r* = .34

31. Damage to the medulla can seriously impair one's ability to _____.
a. sing
b. write
c. breathe
d. metabolize food
Answer c % correct 78 a= 3 b= 11 c= 78 d= 7 *r* = .35

32. If you are shot in the head and there is damage to the medulla, this can seriously impair your ability to _____.
a. sing
b. write
c. breathe
d. urinate
Answer c % correct 87 a= 2 b= 8 c= 87 d= 3 *r* = .31

33. The structure in the hindbrain that controls certain reflexes and coordinates the body's movements is the _____.
a. medulla
b. cerebellum
c. pons
d. reticular formation
Answer b % correct 70 a= 13 b= 70 c= 5 d= 12 *r* = .29

34. The cerebellum _____.
a. controls blood pressure
b. is involved in emotional behavior
c. coordinates actions so that movements are efficient
d. relays messages from the sensory receptors

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Answer c % correct 74 a= 4 b= 12 c= 74 d= 11 *r* = .44
Answer c % correct 84 a= 3 b= 5 c= 84 d= 8 *r* = .40

35. Pavati is recovering from a blow to her head and finds that she has great difficulty maintaining her balance and coordinating her movements. Injury to which part of Pavati's brain is likely to be causing her difficulties?
a. cerebellum
b. medulla
c. cerebral cortex
d. thalamus
Answer a % correct 47 a= 47 b= 18 c= 18 d= 17 *r* = .22
Answer a % correct 72 a= 72 b= 8 c= 18 d= 2 *r* = .37

36. The outer surface of the two cerebral hemispheres that regulates most complex behavior is called the _____.
a. cerebellum
b. corpus callosum
c. cerebral cortex
d. substantia nigra
Answer c % correct 74 a= 7 b= 12 c= 74 d= 7 *r* = .44

37. The part of the brain most people think of when they talk about the brain is the _____.
a. cerebral cortex
b. pons
c. medulla
d. cerebellum
Answer a % correct 50 a= 50 b= 3 c= 13 d= 34 *r* = .33

38. The part of our brain that MOST makes us human is the _____.
a. cerebellum
b. cerebral cortex
c. medulla
d. pons
Answer b % correct 65 a= 20 b= 65 c= 11 d= 4 *r* = .46

39. The forebrain is one of _____ operationally distinct sections of the brain.
a. two
b. three
c. four
d. five
Answer b % correct 57 a= 4 b= 57 c= 35 d= 4 *r* = .39

40. A neuroanatomist destroyed a dog's reticular formation to determine its function. Of the following, which is the most likely result?
a. The dog could no longer hear.
b. The dog could no longer see.
c. The dog lapsed into a complete and irreversible coma.
d. The dog became hyper alert and no longer slept normally.
Answer c % correct 36 a= 4 b= 21 c= 36 d= 39 *r* = .20

2.7 Structures Under the Cortex: The Limbic System

41. Eating, drinking, sexual behavior, temperature control, and sleeping are most strongly influenced by the _____.
a. medulla

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b. cerebral cortex
c. thalamus
d. hypothalamus
Answer d % correct 55 a= 10 b= 19 c= 15 d= 55 *r* = .40
Answer d % correct 71 a= 3 b= 5 c= 21 d= 71 *r* = .29

42. The part of the brain responsible for emotional behavior and regulating the nervous system in times of stress is the _____.
a. medulla
b. cerebellum
c. thalamus
d. hypothalamus
Answer d % correct 60 a= 8 b= 4 c= 28 d= 60 *r* = .35

43. Ryan is having great difficulty controlling his appetite. All he wants to do is eat, and no matter how much he eats, he is still hungry. His weight is approaching 400 pounds and he still constantly wants to eat. His physician says the problem is due to a disorder in a specific center of the brain. That brain center is most likely the _____.
a. medulla
b. cerebral cortex
c. thalamus
d. hypothalamus
Answer d % correct 51 a= 0 b= 10 c= 39 d= 51 *r* = .28

44. The brain's "relay station" is the _____.
a. hypothalamus
b. medulla
c. pons
d. thalamus
Answer d % correct 72 a= 10 b= 13 c= 4 d= 72 *r* = .51

45. Which part of the brain can be thought of as a major switching station that directs incoming information to the correct brain structure?
a. midbrain
b. thalamus
c. cerebellum
d. reticular activating system
Answer b % correct 50 a= 15 b= 50 c= 13 d= 21 *r* = .32

46. The structure in the center of the forebrain that relays sensory information is called the _____.
a. medulla
b. hypothalamus
c. pons
d. thalamus
Answer d % correct 63 a= 10 b= 12 c= 15 d= 63 *r* = .41

47. If the limbic system were destroyed, which of the following structures would be damaged?
a. cerebellum and corpus callosum
b. cerebellum and amygdala
c. amygdala and hippocampus
d. hippocampus and corpus callosum
Answer c % correct 69 a= 18 b= 8 c= 69 d= 3 *r* = .39

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2.8 The Cortex

48. The part of the brain that receives sensations of touch, balance, and bodily position and oversees spatial abilities is the _____ lobe.
a. occipital
b. temporal
c. parietal
d. frontal
Answer c % correct 61 a= 10 b= 15 c= 61 d= 13 *r* = .33

49. The part of the brain that receives sensations of touch, balance, and bodily position is the _____ lobe.
a. occipital
b. temporal
c. parietal
d. frontal
Answer c % correct 62 a= 9 b= 14 c= 62 d= 15 *r* = .51

50. Maya was in an automobile accident that resulted in an injury to her brain. She now has difficulty maintaining her balance and normal body positions. Her sense of touch has also been injured. The part of Maya's brain most likely injured was her _____ lobe.
a. occipital
b. temporal
c. parietal
d. frontal
Answer c % correct 66 a= 4 b= 13 c= 66 d= 16 *r* = .34

51. The part of the brain that helps process hearing and give meaning to words is the _____ lobe.
a. occipital
b. temporal
c. parietal
d. frontal
Answer b % correct 72 a= 9 b= 72 c= 12 d= 6 *r* = .37

52. Margot was in an automobile accident that resulted in an injury to her brain. She now has difficulty with her hearing and her memory. The part of Margot's brain most likely injured was her _____ lobe.
a. occipital
b. temporal
c. parietal
d. frontal
Answer b % correct 68 a= 10 b= 68 c= 11 d= 10 *r* = .34

53. The part of the brain that interprets visual information is the _____ lobe.
a. occipital
b. temporal
c. parietal
d. frontal
Answer a % correct 89 a= 89 b= 6 c= 3 d= 2 *r* = .26

54. The growth of a brain tumor has caused Zhang Wei's vision to suffer. Which lobe of his brain is being affected by the tumor's growth?
a. frontal lobe
b. occipital lobe
c. parietal lobe
d. temporal lobe
Answer b % correct 91 a= 2 b= 91 c= 4 d= 3 *r* = .23

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55. The site of many mental processes that are unique to humans (self-awareness, initiative, planning ability, and goal-directed behavior) is the _____ lobes.
a. occipital
b. temporal
c. parietal
d. frontal
Answer d % correct 68 a= 7 b= 12 c= 13 d= 68 *r* = .57

56. The motor impulses/commands associated with the muscular coordination and movements necessary for one to write originate in which lobe of the cerebral cortex?
a. temporal lobe
b. parietal lobe
c. occipital lobe
d. frontal lobe
Answer d % correct 55 a= 10 b= 33 c= 2 d= 55 *r* = .30

57. The somatosensory cortex is located in the _____ lobe of the brain.
a. frontal
b. occipital
c. parietal
d. temporal
Answer c % correct 47 a= 32 b= 10 c= 47 d= 11 *r* = .37

58. The motor cortex is located in the _____ lobe of the brain.
a. frontal
b. occipital
c. parietal
d. temporal
Answer a % correct 74 a= 74 b= 6 c= 21 d= 9 *r* = .38

59. The structure that connects the two hemispheres of the cerebral cortex is the _____.
a. corpus callosum
b. pineal gland
c. pons
d. reticular formation
Answer a % correct 84 a= 84 b= 0 c= 8 d= 8 *r* = .40
Answer a % correct 99 a= 99 b= 0 c= 1 d= 0 *r* = .02

60. The bundle of nerves that connects the two hemispheres of the brain is called the _____.
a. basal ganglia
b. longitudinal fissure
c. corpus callosum
d. somatosensory cortex
Answer c % correct 84 a= 7 b= 10 c= 84 d= 0 *r* = .40
Answer c % correct 88 a= 6 b= 3 c= 88 d= 3 *r* = .38

61. The corpus callosum _____.
a. is an integral area of the hindbrain
b. is responsible for taste and smell sensations
c. connects the left and right cerebral hemispheres
d. supports the reticular activating system
Answer c % correct 90 a= 3 b= 3 c= 90 d= 4 *r* = .39

62. The left and right cerebral hemispheres are connected by the _____.
a. occipital lobe

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b. pons
c. sylvian fissure
d. corpus callosum
Answer d % correct 95 a= 1 b= 2 c= 3 d= 95 *r* = .38

2.9 The Association Areas of the Cortex

63. The area in the back of the temporal lobe that is important in our ability to process and understand what others are saying is _____ area.
a. Korsakoff's
b. Wernicke's
c. Broca's
d. Sach's
Answer b % correct 60 a= 4 b= 60 c= 34 d= 1 *r* = .35

64. The notion that human language production is controlled primarily by the left cerebral cortex was first proposed by _____.
a. Paul Broca
b. Sally Shaywitz
c. Carl Wernicke
d. Hermann Ebbinghaus
Answer a % correct 53 a= 53 b= 3 c=35 d= 7 *r* = .31

2.10 The Cerebral Hemispheres

65. Which hemisphere of the cerebral cortex is usually dominant in spatial tasks?
a. front hemisphere
b. rear hemisphere
c. left hemisphere
d. right hemisphere
Answer d % correct 46 a= 13 b= 14 c= 27 d= 46 *r* = .46

66. Which hemisphere of the cerebral cortex is dominant in spatial tasks and concept formation?
a. front hemisphere
b. rear hemisphere
c. left hemisphere
d. right hemisphere
Answer d % correct 62 a= 17 b= 6 c= 16 d= 62 *r* = .29

67. Which hemisphere of the cerebral cortex is usually dominant in language tasks?
a. front hemisphere
b. rear hemisphere
c. left hemisphere
d. right hemisphere
Answer c % correct 66 a= 18 b= 3 c= 66 d= 13 *r* = .38
Answer c % correct 70 a= 8 b= 4 c= 70 d= 18 *r* = .38

68. The left cerebral hemisphere primarily controls _____.
a. the right side of the body
b. the left side of the body
c. all motor functions
d. spatial reasoning
Answer a % correct 91 a= 91 b= 2 c= 4 d= 3 *r* = .35

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69. After removal of a tumor from the LEFT side of her brain, Liv recovered well. However, some of her former abilities are now limited. Which of the following abilities are most likely affected?
a. coordinated walking movements
b. solving algebra equations
c. assembling puzzles
d. recognizing objects that she sees
Answer b % correct 68 a= 14 b= 68 c= 10 d= 8 *r* = .28

70. The hemisphere of the brain that acts as an interpreter, helping us with sequencing and logic, is the _____.
a. front hemisphere
b. rear hemisphere
c. left hemisphere
d. right hemisphere
Answer c % correct 51 a= 12 b= 4 c= 51 d= 33 *r* = .24

SPLIT-BRAIN RESEARCH

71. Individuals who have had their corpus callosum cut are said to have a _____.
a. split brain
b. disintegrating personality
c. cranial refraction
d. migraine headache
Answer a % correct 96 a= 96 b= 2 c= 2 d= 0 *r* = .35

72. "Split-brain" patients are patients who have had _____.
a. a prefrontal lobotomy
b. their cerebellum split in the middle
c. their corpus callosum cut
d. a skull fracture in which bone fragments penetrated into the brain
Answer c % correct 78 a= 7 b= 16 c= 78 d= 0 *r* = .36
Answer c % correct 90 a= 2 b= 8 c= 90 d= 0 *r* = .38

73. Assume that you are testing a split-brain human subject whose language center is in his left hemisphere. If you place a house key into his left hand, he will _____.
a. not be able to later select the object he was holding from a group of various objects
b. not be able to tell you what object he is presently holding
c. immediately be able to tell you what he is holding
d. be able to tell you what he is presently holding if allowed to think about it for several seconds
Answer b % correct 80 a= 5 b= 80 c= 6 d= 8 *r* = .24

74. A "split-brain" patient is asked to stare at a spot on a screen. When a picture of an object is shown to the left of the spot, the patient can _____.
a. identify the object verbally and pick it out of a group of hidden objects using her right hand
b. identify the object verbally and pick it out of a group of hidden objects using her left hand
c. pick the object out of a group of hidden objects using her left hand, but cannot identify it verbally
d. pick the object out of a group of hidden objects using her right hand, but cannot identify it verbally
Answer c % correct 46 a= 17 b= 8 c= 46 d= 29 *r* = .21

2.11–2.12 The Nervous System: The Rest of the Story

75. The nervous system is composed of two parts: _____.
a. the afferent nervous system and the efferent nervous system

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b. the central nervous system and the peripheral nervous system
c. the sympathetic nervous system and the parasympathetic nervous system
d. the brain and the spinal cord
Answer b % correct 96 a= 1 b= 96 c= 0 d= 3 *r* = .34

76. The brain is part of the _____ system.
a. nervous
b. endocrine
c. thalamic
d. cranial
Answer a % correct 92 a= 92 b= 3 c= 2 d= 3 *r* = .44

77. The system that relays messages in the form of electrochemical impulses throughout the body is called the _____ system.
a. arousal
b. nervous
c. limbic
d. endocrine
Answer b % correct 92 a= 0 b= 92 c= 5 d= 2 *r* = .20

78. The FIRST division of the nervous system consists of the _____.
a. central and peripheral nervous systems
b. brain and spinal cord
c. somatic and autonomic nervous systems
d. sympathetic and parasympathetic nervous systems
Answer a % correct 73 a= 73 b= 20 c= 4 d= 26 *r* = .41

2.11 The Central Nervous System: The "Central Processing Unit"

79. The two major divisions of the central nervous system are the _____.
a. left and right hemispheres
b. brain and autonomic systems
c. brain and spinal cord
d. peripheral and autonomic systems
Answer c % correct 90 a= 3 b= 1 c= 90 d= 6 *r* = .26

80. The brain is connected to the rest of the body via the _____.
a. corpus callosum
b. spinal cord
c. limbic system
d. cranial nerve
Answer b % correct 96 a= 0 b= 96 c= 2 d= 2 *r* = .21

81. The brain is connected to the other parts of the nervous system by the _____.
a. spinal cord
b. corpus callosum
c. brain stem
d. peripheral nervous system
Answer a % correct 58 a= 58 b= 2 c= 37 d= 3 *r* = .33

82. Which of the following most directly controls bodily reflexes?
a. peripheral nervous system
b. brain stem
c. spinal cord
d. hindbrain

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Answer c % correct 55 a= 30 b= 4 c= 55 d= 11 *r* = .37

83. Neurons in the brain that carry messages from one neuron to another and do most of the work of the nervous system are called _____.
a. afferent neurons
b. active neurons
c. efferent neurons
d. interneurons
Answer d % correct 42 a= 25 b= 14 c= 19 d= 42 *r* = .42

84. Neurons whose primary purpose is to carry messages from the spinal cord or the brain to the muscles and glands are called _____.
a. afferent neurons
b. active neurons
c. efferent neurons
d. interneurons
Answer c % correct 40 a= 27 b= 11 c= 40 d= 22 *r* = .21

85. Neurons whose primary purpose is to collect information from the sensory organs and carry that information to the spinal cord or brain are called _____.
a. afferent neurons
b. active neurons
c. efferent neurons
d. interneurons
Answer a % correct 43 a= 43 b= 14 c= 22 d= 19 *r* = .21

86. Justin learns that he has just won $1,000 in a statewide lottery and he literally jumps for joy. Which neurons are sending messages from his brain to his legs ordering them to jump?
a. sensory neurons
b. motor neurons
c. interaction neurons
d. association neurons
Answer b % correct 89 a= 4 b= 89 c= 2 d= 4 *r* = .34

87. What kind of neurons are connected to receptor cells in the skin, muscles, and joints?
a. peripheral neurons
b. interneurons
c. sensory neurons
d. motor neurons
Answer c % correct 70 a= 3 b= 5 c= 70 d= 22 *r* = .27

88. Delaney returns from a day at the beach to find she has developed a severe sunburn. Which neurons are sending the messages from her burned skin to her brain informing her of the pain from the burn?
a. sensory neurons
b. motor neurons
c. synaptic neurons
d. association neurons
Answer a % correct 88 a= 88 b= 2 c= 7 d= 3 *r* = .24

2.12 The Peripheral Nervous System

89. All nerve cells and fibers that are NOT in the brain or spinal cord make up the _____ nervous system.
a. central
b. peripheral

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c. autonomic
d. sympathetic
Answer b % correct 76 a= 9 b= 76 c= 10 d= 6 *r* = .48

90. The division of the nervous system that connects the brain and spinal cord to the rest of the body is the _____ system.
a. peripheral nervous
b. endocrine
c. central nervous
d. secondary nervous
Answer a % correct 42 a= 42 b= 12 c= 12 d= 4 *r* = .45

91. The autonomic and somatic nervous systems are divisions of the _____ system.
a. central
b. parasympathetic
c. peripheral
d. sympathetic
Answer c % correct 63 a= 22 b= 5 c= 63 d= 10 *r* = .28

92. The autonomic nervous system is responsible for _____.
a. controlling the skeletal muscles
b. sending sensory input to the brain
c. making choices and decisions
d. the activity of internal organs and glands
Answer d % correct 70 a= 9 b= 11 c= 9 d= 70 *r* = .35

93. The part of the nervous system that allows the brain to regulate digestion, heart rate, and respiration without our conscious attention is the _____.
a. autonomic nervous system
b. central nervous system
c. somatic nervous system
d. spinal cord
Answer a % correct 77 a= 77 b= 20 c= 3 d= 0 *r* = .27

94. The process of digesting your last snack or meal and the unconscious regulation of your breathing are all primarily rooted in the _____ nervous system.
a. autonomic
b. limbic
c. somatic
d. secondary
Answer a % correct 66 a= 66 b= 12 c= 18 d= 4 *r* = .44

95. The autonomic nervous system is made up of what two systems?
a. central and peripheral nervous systems
b. receptors and effectors
c. sympathetic and parasympathetic divisions
d. limbic and endocrine systems
Answer c % correct 79 a= 9 b= 5 c= 79 d= 7 *r* = .36

96. The autonomic nervous system is divided into two parts. These are termed the _____ nervous systems.
a. ascending and descending
b. frontal and temporal
c. left and right
d. parasympathetic and sympathetic
Answer d % correct 96 a= 2 b= 2 c= 0 d= 96 *r* = .43

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97. The parasympathetic and sympathetic divisions make up the _____.
a. motor cortex
b. endocrine system
c. autonomic nervous system
d. neocortex
Answer c % correct 97 a= 2 b= 0 c= 97 d= 1 *r* = .31

98. The nervous system called the "fight or flight" system is the _____ system.
a. central
b. parasympathetic
c. somatic
d. sympathetic
Answer d % correct 74 a= 5 b= 10 c= 10 d= 74 *r* = .45

99. The branch of the autonomic nervous system that prepares the body for quick action in an emergency is the _____ division.
a. central
b. secondary
c. sympathetic
d. parasympathetic
Answer c % correct 73 a= 1 b= 7 c=73 d= 19 *r* = .34

100. When the sympathetic nervous system assumes control of the involuntary bodily processes during a stressful situation, which of the following changes is likely to occur?
a. digestion stops
b. less blood is pumped to muscles
c. air passages become smaller
d. sweat glands are less active
Answer a % correct 68 a= 68 b= 12 c= 16 d= 3 *r* = .45

101. Calm is to aroused as _____ is to _____.
a. parasympathetic; sympathetic
b. autonomic; motor
c. sympathetic; parasympathetic
d. central; peripheral
Answer a % correct 77 a= 77 b= 3 c= 21 d= 0 *r* = .31

102. A deer waits motionlessly, hidden in the thicket as a band of hunters approaches. As the hunters get closer, their dogs bark, picking up the scent of their prey. In a futile effort to escape, the deer bolts. Which of the following most accurately describes the nervous system of the hunted deer at this point?
a. Its sympathetic nerve fibers are more active than its parasympathetic nerve fibers.
b. Its parasympathetic nerve fibers are more active than its sympathetic nerve fibers.
c. Both its sympathetic and parasympathetic nerve fibers are equally active.
d. Neither its sympathetic nor its parasympathetic nerve fibers are aroused.
Answer a % correct 77 a= 77 b= 13 c= 10 d= 0 *r* = .37

103. It's midnight, and you are alone in your room studying. You hear a loud crash outside your room, and your whole body reacts instantly and furiously. The system that produces these reactions is the _____ system.
a. central nervous
b. sympathetic nervous
c. parasympathetic nervous
d. limbic
Answer b % correct 80 a= 6 b= 80 c= 12 d= 3 *r* = .52

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104. One evening Rory was walking to the dorm from the gym when she was stopped by two men who demanded her money. Since she was a good athlete, Rory decided to make a run for it. Pretending to open her purse, she suddenly turned and dashed off. Although pursued, Rory outran her assailants. During this incident, which part of Rory's nervous system was most directly responsible for her successful escape?
a. midbrain
b. parasympathetic nervous system
c. forebrain
d. sympathetic nervous system
Answer d % correct 78 a= 2 b= 14 c= 6 d= 78 *r* = .45

2.13–2.14 The Endocrine Glands

105. The glands that secrete hormones directly into the bloodstream are called _____ glands.
a. lymph
b. exocrine
c. hippocampal
d. endocrine
Answer d % correct 77 a= 6 b= 10 c= 7 d= 77 *r* = .31

106. Endocrine glands are glands that secrete _____.
a. excitory neurotransmitters
b. inhibitory neurotransmitters
c. hormones
d. enzymes
Answer c % correct 73 a= 12 b= 5 c= 73 d= 10 *r* = .25

107. The _____ system is made up of glands that release hormones into the bloodstream.
a. motor
b. endocrine
c. limbic
d. autonomic
Answer b % correct 81 a= 2 b= 81 c= 11 d= 6 *r* = .38

108. Chemical substances released by the endocrine glands to help regulate bodily functions are _____.
a. enzymes
b. neurotransmitters
c. antigens
d. hormones
Answer d % correct 63 a= 14 b= 18 c= 4 d= 63 *r* = .51

109. The thyroid and pituitary glands are parts of the _____ system.
a. gonad
b. endocrine
c. steroid
d. lymphatic
Answer b % correct 84 a= 1 b= 84 c= 0 d= 15 *r* = .35

2.13 The Pituitary: Master of the Hormonal Universe

110. The pituitary gland is controlled by the _____.
a. brain stem
b. hypothalamus

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c. reticular formation
d. spinal cord
Answer b % correct 73 a= 10 b= 73 c= 11 d= 5 *r* = .37

2.14 Other Endocrine Glands

111. The pea-sized gland that is stimulated by light and helps regulate activity levels over the course of a day is the _____ gland.
a. adrenal
b. pituitary
c. pineal
d. thyroid
Answer c % correct 61 a= 13 b= 22 c= 61 d= 5 *r* = .43

112. The _____ gland produces the hormone that regulates the body's rate of metabolism.
a. pituitary
b. adrenal
c. thyroid
d. parathyroid
Answer c % correct 55 a= 34 b= 10 c= 55 d= 1 *r* = .22

113. Rocco has been overweight since childhood. He diets frequently and can lose weight, but always seems to gain it back because he is unable to control his eating. Rocco may have a problem with his _____.
a. catecholamine level
b. thyroid gland
c. pituitary gland
d. limbic system
Answer b % correct 87 a= 4 b= 87 c= 4 d= 3 *r* = .22

114. Cooper is 13 years old, and he has recently noticed some remarkable changes in himself. Over the past few months his voice has started to change, growing deeper. He has begun to grow pubic hair, as well as the beginnings of a facial beard. He is also filling out, with his muscles developing rapidly. These changes in Cooper are probably due to the action of the _____.
a. gonads
b. thyroid gland
c. pineal gland
d. adrenal gland
Answer a % correct 60 a= 60 b= 24 c= 10 d= 6 *r* = .32

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Revel Quizzes

The following questions appear at the end of each module and at the end of the chapter in Revel for *Psychology: An Exploration*, Fifth Edition.

EOM Quiz 2.1–2.3 Neurons and Neurotransmitters

EOM Q2.1.1
Which part of the neuron carries information from the cell body to axon terminals?
a) axon
b) dendrite
c) soma
d) myelin

Answer: a
Consider This: This is a fiber that branches out into several shorter fibers that have swellings or little knobs on the ends.
Difficulty: Easy
Objective: LO 2.1 Identify the parts of a neuron and the function of each.
Skill: Remember the Facts
Topic: Neurons and Neurotransmitters

EOM Q2.1.2
Which one of the following is NOT a function of glial cells?
a) generating action potentials
b) getting nutrients to the neurons
c) cleaning up the remains of dead neurons
d) generating myelin

Answer: a
Consider This: While historically viewed as support cells for neurons, the expanded roles of glia are still being discovered.
Difficulty: Easy
Objective: LO 2.1 Identify the parts of a neuron and the function of each.
Skill: Remember the Facts
Topic: Neurons and Neurotransmitters

EOM Q2.1.3
When a neuron's resting potential is occurring, the neuron is _____ charged on the inside.
a) negatively
b) positively
c) both positively and negatively
d) neutrally

Answer: a
Consider This: A neuron that's at rest is not currently firing a neural impulse or message.
Difficulty: Easy
Objective: LO 2.2 Explain the action potential.
Skill: Remember the Facts
Topic: Neurons and Neurotransmitters

EOM Q2.1.4
Neurotransmitters must pass from the axon terminal of one cell to receptor sites on an adjacent cell's dendrite or soma by crossing a fluid-filled space called the
a) synapse.

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b) neuron.
c) reuptake inhibitor.
d) glial cell.

Answer: a
Consider This: Neurotransmitters originate inside neurons and must cross this gap between adjacent neurons to transmit messages.
Difficulty: Easy
Objective: LO 2.3 Describe how neurons use neurotransmitters to communicate with each other and with the body.
Skill: Remember the Facts
Topic: Neurons and Neurotransmitters

EOM Q2.1.5
The venom of a black widow spider acts as a(n) _____ by mimicking the effects of acetylcholine.
a) agonist
b) protagonist
c) antagonist
d) glial cell

Answer: a
Consider This: This is a chemical substance that mimics or enhances the effects of a neurotransmitter.
Difficulty: Easy
Objective: LO 2.3 Describe how neurons use neurotransmitters to communicate with each other and with the body.
Skill: Remember the Facts
Topic: Neurons and Neurotransmitters

EOM Q2.1.6
Which of the following is associated with pain relief?
a) endorphins
b) acetylcholine
c) glutamate
d) serotonin

Answer: a
Consider This: When a person is hurt, these pain relieving chemicals are released when a neurotransmitter signaling pain reaches the brain.
Difficulty: Easy
Objective: LO 2.3 Describe how neurons use neurotransmitters to communicate with each other and with the body.
Skill: Remember the Facts
Topic: Neurons and Neurotransmitters

EOM Quiz 2.4–2.5 Looking Inside the Living Brain

EOM Q2.2.1

Which of the following techniques involves passing a mild current through the brain to activate certain structures without damaging them?
a) electrical stimulation of the brain (ESB)
b) electroconvulsive tomography (ECT)
c) magnetic resonance imaging (MRI)
d) deep brain lesioning

Answer: a
Consider This: This has become an important technique in psychology, as its use in animals has informed us in many areas of investigation, including new directions for therapy.
Difficulty: Moderate

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Objective: LO 2.4 Describe how lesioning studies and brain stimulation are used to study the brain.
Skill: Understand the Concepts
Topic: Looking Inside the Living Brain

EOM Q2.2.2

Which of the following techniques analyzes blood oxygen levels to look at the functioning of the brain?
a) fMRI
b) EEG
c) CT
d) PET

Answer: a
Consider This: In this technique, a modification of a method typically used for imaging brain structure is used to assess brain function.
Difficulty: Moderate
Objective: LO 2.5 Compare and contrast neuroimaging techniques for mapping the brain's structure and function.
Skill: Understand the Concepts
Topic: Looking Inside the Living Brain

EOM Q2.2.3

Dr. Carr is conducting a research study. She wants to measure the physical connectivity in the research participants' brains by imaging their white matter. Which of the following methods will she use?
a) diffusion tensor imaging (DTI)
b) MRI spectroscopy
c) functional magnetic resonance imaging (fMRI)
d) computed tomography (CT)

Answer: a
Consider This: This technique uses MRI technology; it has been used to investigate both normal function and structural changes associated with various disorders and conditions.
Difficulty: Moderate
Objective: LO 2.5 Compare and contrast neuroimaging techniques for mapping the brain's structure and function.
Skill: Apply What You Know
Topic: Looking Inside the Living Brain

EOM Q2.2.4

If you were suffering from neurological problems and your neurologist wanted to have a study done of your brain and its electrical functioning, which of the following techniques would be most appropriate?
a) EEG
b) PTI
c) PET
d) DTI

Answer: a
Consider This: This technique involves having metal or sponge-like electrodes placed directly onto your scalp.
Difficulty: Moderate
Objective: LO 2.5 Compare and contrast neuroimaging techniques for mapping the brain's structure and function.
Skill: Apply What You Know
Topic: Looking Inside the Living Brain

EOM Quiz 2.6–2.10: From the Bottom Up: The Structures of the Brain

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EOM Q2.3.1
Which brain structure relays incoming sensory information?
a) thalamus
b) hypothalamus
c) reticular formation
d) pons

Answer: a
Consider This: This structure might process that sensory information before sending it on to the part of the cortex that deals with that kind of sensation.
Difficulty: Easy
Objective: LO 2.7 Identify the structures of the brain that are involved in emotion, learning, memory, and motivation.
Skill: Remember the Facts
Topic: From the Bottom Up: The Structures of the Brain

EOM Q2.3.2
If you were to develop a rare condition in which you were not able to remember to be afraid of certain situations, animals, or events, which part of the brain would most likely be damaged?
a) amygdala
b) cingulate cortex
c) hypothalamus
d) thalamus

Answer: a
Consider This: This is involved in fear responses and memory of fear.
Difficulty: Moderate
Objective: LO 2.7 Identify the structures of the brain that are involved in emotion, learning, memory, and motivation.
Skill: Apply What You Know
Topic: From the Bottom Up: The Structures of the Brain

EOM Q2.3.3
What part of the brain can sometimes be referred to as the “rind” or outer covering?
a) cortex
b) thalamus
c) medulla
d) corpus callosum

Answer: a
Consider This: This is very recognizable surface anatomy because it is full of wrinkles.
Difficulty: Easy
Objective: LO 2.8 Identify the parts of the cortex that process the different senses and those that control movement of the body.
Skill: Remember the Facts
Topic: From the Bottom Up: The Structures of the Brain

EOM Q2.3.4
In which of the following lobes of the cortex would you find the primary visual cortex?
a) occipital
b) frontal
c) temporal
d) parietal

Answer: a

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Consider This: This is located at the base of the cortex, toward the back of the brain.
Difficulty: Easy
Objective: LO 2.8 Identify the parts of the cortex that process the different senses and those that control movement of the body.
Skill: Remember the Facts
Topic: From the Bottom Up: The Structures of the Brain

EOM Q2.3.5
You have a dream in which you wake up to find that people around you are using words that make no sense. What's more, your friends don't seem to understand you when you speak. At one point in your dream, your mom tells you that you almost forgot your tree limb today. When you give her a puzzled look, she holds up your lunchbox and repeats, "You know, your tree limb." Your predicament in your dream is most like which of the following disorders?
a) Wernicke's aphasia
b) Broca's aphasia
c) apraxia
d) spatial neglect

Answer: a
Consider This: A person with this condition is able to speak fluently and pronounce words correctly, but the words would be the wrong ones entirely.
Difficulty: Moderate
Objective: LO 2.9 Recall the function of cortical association areas, including those especially crucial for language.
Skill: Apply What You Know
Topic: From the Bottom Up: The Structures of the Brain

EOM Quiz: 2.11–2.12: The Nervous System: The Rest of the Story

EOM Q2.4.1
If you touch a hot stove, your spinal cord can prompt you to withdraw your hand without having to send the message all the way to the brain. This is due to what scientists call
a) the reflex arc.
b) neuroplasticity.
c) the parasympathetic nervous system.
d) the sympathetic nervous system.

Answer: a
Consider This: Having this controlled by the spinal cord alone allows for very fast response times.
Difficulty: Easy
Objective: LO 2.11 Describe how the components of the central nervous system interact and how they may respond to experiences or injury.
Skill: Apply What You Know
Topic: The Nervous System: The Rest of the Story

EOM Q2.4.2
What is the process whereby the structure and function of brain cells change in response to trauma, damage, or even learning?
a) neuroplasticity
b) shallow lesioning
c) deep lesioning
d) cell regeneration

Answer: a

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Consider This: Dendrites grow and new synapses are formed in at least some areas of the brain as people learn new things throughout life.
Difficulty: Easy
Objective: LO 2.11 Describe how the components of the central nervous system interact and how they may respond to experiences or injury.
Skill: Remember the Facts
Topic: The Nervous System: The Rest of the Story

EOM Q2.4.3
The neurons of the sensory pathway contain
a) afferent neurons.
b) efferent neurons.
c) both efferent and afferent neurons.
d) voluntary muscle fibers.

Answer: a
Consider This: The sensory pathway comprises all the nerves carrying messages from the senses to the central nervous system.
Difficulty: Moderate
Objective: LO 2.12 Differentiate the roles of the somatic and autonomic nervous systems.
Skill: Apply What You Know
Topic: The Nervous System: The Rest of the Story

EOM Q2.4.4
Yvette's ability to reach for and pick up her book is largely due to the functions of the _____ pathway of the _____ nervous system.
a) motor; somatic
b) sensory; somatic
c) autonomic; peripheral
d) parasympathetic; autonomic

Answer: a
Consider This: This pathway is all the nerves carrying messages from the central nervous system to the voluntary, or skeletal, muscles of the body.
Difficulty: Moderate
Objective: LO 2.12 Differentiate the roles of the somatic and autonomic nervous systems.
Skill: Apply What You Know
Topic: The Nervous System: The Rest of the Story

EOM Q2.4.5
Which of the following would be active if you have just narrowly missed having an automobile accident?
a) sympathetic division
b) parasympathetic division
c) somatic division
d) motor division

Answer: a
Consider This: This is called the "fight-or-flight system" because it allows people and animals to deal with all kinds of stressful events.
Difficulty: Moderate
Objective: LO 2.12 Differentiate the roles of the somatic and autonomic nervous systems.
Skill: Apply What You Know
Topic: The Nervous System: The Rest of the Story

EOM Quiz 2.13–2.15: The Endocrine Glands

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EOM Q2.5.1
Your friend Dana has suffered from diabetes for her entire life. She regularly tests her blood to make sure her sugar levels are not too high or low. Which gland in her endocrine system is responsible for regulating her blood sugar?
a) pancreas
b) thyroid
c) pituitary
d) adrenal

Answer: a
Consider This: This gland secretes insulin and glucagon.
Difficulty: Moderate
Objective: LO 2.14 Recall the role of various endocrine glands.
Skill: Apply What You Know
Topic: Distant Connections: The Endocrine Glands

EOM Q2.5.2
Buck has always been thin. In fact, he often seems to be able to eat whatever he wants without gaining weight. The doctor told his parents that Buck's _____ gland is the cause of his fast metabolism.
a) thyroid
b) pituitary
c) adrenal
d) pancreas
Answer: a
Consider This: This gland secretes a hormone that controls the burning of energy.
Difficulty: Moderate
Objective: LO 2.14 Recall the role of various endocrine glands.
Skill: Apply What You Know
Topic: Distant Connections: The Endocrine Glands

EOM Q2.5.3
Although oxytocin has been tied to a variety of prosocial behaviors such as "love" and "trust," some researchers believe that in humans, it may actually work to increase _____.
a) the importance of some social stimuli
b) heart rate and empathy
c) negative pair bonding
d) social loafing

Answer: a
Consider This: Oxytocin's effects depend on what people believe about themselves in relation to other people and what they believe about achieving close social relationships.
Difficulty: Moderate
Objective: LO 2.14 Recall the role of various endocrine glands.
Skill: Understand the Concepts
Topic: Distant Connections: The Endocrine Glands

EOM Q2.5.4
Of the following, which is NOT one of the stages of the general adaptation syndrome?
a) compensation
b) alarm
c) resistance
d) exhaustion

Answer: a
Consider This: People experience these stages many times throughout life.
Difficulty: Moderate
Objective: LO 2.15 Describe how the autonomic nervous system and body are impacted by stress.

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Skill: Understand the Concepts
Topic: Hormones and Stress

EOM Q2.5.5
Stress can depress the release of _____ cells, whose primary function is to suppress viruses and destroy tumor cells.
a) natural killer (NK)
b) paracrine
c) histamine
d) blastocyst
Answer: a
Consider This: This cell has as its main functions the suppression of viruses and the destruction of tumor cells.
Difficulty: Moderate
Objective: LO 2.15 Describe how the autonomic nervous system and body are impacted by stress.
Skill: Understand the Concepts
Topic: Hormones and Stress

Chapter 2 Quiz: The Biological Perspective

EOC Q2.1
In the structure of the neuron, the _____ receives messages from other cells.
a) dendrite
b) axon
c) soma
d) myelin

Answer: a
Consider This: This structure looks like the branches of a tree.
Difficulty: Easy
Objective: LO 2.1 Identify the parts of a neuron and the function of each.
Skill: Remember the Facts
Topic: Neurons and Neurotransmitters

EOC Q2.2
Oligodendrocytes and Schwann cells generate a fatty substance known as
a) myelin.
b) glial.
c) soma.
d) neurilemma.
Answer: a
Consider This: This substance wraps around the shaft of the axons, forming an insulating and protective sheath.
Difficulty: Easy
Objective: LO 2.1 Identify the parts of a neuron and the function of each.
Skill: Remember the Facts
Topic: Neurons and Neurotransmitters

EOC Q2.3
Which of the following helps electrical impulses speed along down the length of the axon?
a) myelin sheath
b) synaptic knobs
c) receptor sites
d) neuromodulators

Answer: a

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Consider This: Sections of myelin bump up next to each other on the axon.
Difficulty: Easy
Objective: LO 2.1 Identify the parts of a neuron and the function of each.
Skill: Remember the Facts
Topic: Neurons and Neurotransmitters

EOC Q2.4
When a neuron is in the resting potential state, the neuron is negatively charged on the _____ and positively charged on the _____.
a) inside; outside
b) outside; inside
c) top; bottom
d) bottom; top

Answer: a
Consider This: A neuron that's at rest—not currently firing a neural impulse or message—is actually electrically charged.
Difficulty: Easy
Objective: LO 2.2 Explain the action potential.
Skill: Remember the Facts
Topic: Neurons and Neurotransmitters

EOC Q2.5
Which neurotransmitter stimulates skeletal muscle cells to contract but slows contractions of the heart?
a) acetylcholine (ACh)
b) GABA
c) serotonin
d) endorphin

Answer: a
Consider This: This was the first neurotransmitter ever identified; it is often found at the synapses between neurons and muscle cells.
Difficulty: Easy
Objective: LO 2.3 Describe how neurons use neurotransmitters to communicate with each other and with the body.
Skill: Remember the Facts
Topic: Neurons and Neurotransmitters

EOC Q2.6
Heroin mimics the actions of endorphins, inhibiting pain signals. Heroin is an _____ for endorphins.
a) agonist
b) protagonist
c) antagonist
d) glial cell

Answer: a
Consider This: This can mimic or enhance the effects of neurotransmitters on the receptor sites of the next cell.
Difficulty: Easy
Objective: LO 2.3 Describe how neurons use neurotransmitters to communicate with each other and with the body.
Skill: Remember the Facts
Topic: Neurons and Neurotransmitters

EOC Q2.7
Sandy is a subject in a study on memory and problem solving. The researcher is applying magnetic pulses to her brain through copper wire coils positioned directly above her scalp. Sandy's study would best be described as a(n) _____ technique.

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a) noninvasive stimulation
b) EEG
c) invasive stimulation
d) PET

Answer: a
Consider This: In this technique, the resulting magnetic fields stimulate neurons in the targeted area of the cortex.
Difficulty: Easy
Objective: LO 2.4 Describe how lesioning studies and brain stimulation are used to study the brain.
Skill: Remember the Facts
Topic: Methods for Studying Specific Regions of the Brain

EOC Q2.8
Which technique of studying the brain involves injecting the patient with radioactive glucose?
a) PET
b) EEG
c) MRI
d) CT

Answer: a
Consider This: Active brain areas require energy. In this technique, brain activity is examined by identifying which cells are using up the radioactive glucose.
Difficulty: Moderate
Objective: LO 2.5 Compare and contrast neuroimaging techniques for mapping the brain's structure and function.
Skill: Understand the Concepts
Topic: Looking Inside the Living Brain

EOC Q2.9
Selena often sleeps soundly and rarely awakens to any outside noise. However, the cries of her baby can awaken her immediately. What part of the brain is responsible for this reaction?
a) reticular formation
b) medulla
c) pons
d) cerebellum

Answer: a
Consider This: This is the part of the brain that helps keep people alert and aroused.
Difficulty: Moderate
Objective: LO 2.6 Identify the different structures of the hindbrain and the function of each.
Skill: Apply What You Know
Topic: From the Bottom Up: The Structures of the Brain

EOC Q2.10
Nicole and Camille are synchronized swimmers for their college swim team. They often work long hours to ensure the movements in their routine are perfectly timed. What part of their brains must Camille and Nicole rely most upon?
a) cerebellum
b) medulla
c) pons
d) reticular formation

Answer: a
Consider This: This part of the brain coordinates voluntary movements that have to happen in rapid succession.
Difficulty: Moderate
Objective: LO 2.6 Identify the different structures of the hindbrain and the function of each.

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Skill: Apply What You Know
Topic: From the Bottom Up: The Structures of the Brain

EOC Q2.11
Your psychology professor refers to this as the primary relay station for sensory information. What structure are they referring to?
a) thalamus
b) hypothalamus
c) hippocampus
d) amygdala

Answer: a
Consider This: Recent research has also suggested that this part of the brain may affect the functioning of task-specific regions of the cortex.
Difficulty: Moderate
Objective: LO 2.7 Identify the structures of the brain that are involved in emotion, learning, memory, and motivation.
Skill: Apply What You Know
Topic: From the Bottom Up: The Structures of the Brain

EOC Q2.12
Which part of the brain is involved in the creation of long-term, declarative memories and is often linked to Alzheimer's disease?
a) hippocampus
b) thalamus
c) hypothalamus
d) amygdala

Answer: a
Consider This: This is the Greek word for "seahorse," and it was given to this brain structure because the first scientists who dissected the brain thought it looked like a seahorse.
Difficulty: Easy
Objective: LO 2.7 Identify the structures of the brain that are involved in emotion, learning, memory, and motivation.
Skill: Remember the Facts
Topic: From the Bottom Up: The Structures of the Brain

EOC Q2.13
Tracy suffered a severe blow to the back of her head when she was thrown from her horse. Subsequently, her occipital lobe has been injured. Which of her senses has the highest chance of being affected?
a) vision
b) hearing
c) touch
d) taste and smell

Answer: a
Consider This: The primary cortical processing area for this sensory modality is found in the occipital lobe.
Difficulty: Moderate
Objective: LO 2.8 Identify the parts of the cortex that process the different senses and those that control movement of the body.
Skill: Apply What You Know
Topic: From the Bottom Up: The Structures of the Brain

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EOC Q2.14
Sumit's grandfather recently suffered a stroke and has had difficulty with language production ever since. Most likely, he has experienced damage to the _____ area of his brain.
a) left frontal
b) right rear
c) left rear
d) right frontal

Answer: a
Consider This: This area coordinates various brain areas, allowing a person to speak smoothly and fluently.
Difficulty: Moderate
Objective: LO 2. 9 Recall the function of cortical association areas, including those especially crucial for language.
Skill: Apply What You Know
Topic: From the Bottom Up: The Structures of the Brain

EOC Q2.15
Robbie is recovering from a brain injury. He is able to speak fluently but often uses incorrect words in a sentence. In one instance at a friend's birthday party, he said, "I would like something to drink. Can I have some battery?" Robbie's problem may be a symptom of
a) Wernicke's aphasia.
b) spatial neglect.
c) visual agnosia.
d) Broca's aphasia.

Answer: a
Consider This: People with this condition are able to speak fluently and pronounce words correctly, but the words would be the wrong ones entirely.
Difficulty: Moderate
Objective: LO 2.9 Recall the function of cortical association areas, including those especially crucial for language.
Skill: Apply What You Know
Topic: From the Bottom Up: The Structures of the Brain

EOC Q2.16
Although the brain works largely as a whole, which of the following is *not* a correct pairing of hemisphere and function?
a) right; control of right-handed motor functions
b) left; control of right-handed motor functions
c) right; recognition of faces
d) left; reading

Answer: a
Consider This: An organizational feature of the cortex is that for specific regions, each hemisphere is responsible for the opposite side of the body, either for control or for receiving information.
Difficulty: Moderate
Objective: LO 2.10 Explain how some brain functions differ between the left and right hemispheres.
Skill: Understand the Concepts
Topic: From the Bottom Up: The Structures of the Brain

EOC Q2.17
Involuntary muscles are controlled by the _____ nervous system.
a) autonomic
b) somatic
c) sympathetic

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d) parasympathetic

Answer: a
Consider This: Involuntary muscles, such as the heart, stomach, and intestines, are controlled by clumps of neurons located on or near the spinal column.
Difficulty: Easy
Objective: LO 2.12 Differentiate the roles of the somatic and autonomic nervous systems.
Skill: Remember the Facts
Topic: The Nervous System: The Rest of the Story

EOC Q2.18
As you take notes, your heart beats at a normal rate. Your breathing is normal and your stomach slowly digests your earlier meal. What part of the peripheral nervous system is currently in action?
a) parasympathetic
b) autonomic
c) sympathetic
d) somatic

Answer: a
Consider This: This system is sometimes called the "rest and digest" system.
Difficulty: Easy
Objective: LO 2.12 Differentiate the roles of the somatic and autonomic nervous systems.
Skill: Remember the Facts
Topic: The Nervous System: The Rest of the Story

EOC Q2.19
Which stage of the general adaptation syndrome is accompanied by activation of the sympathetic nervous system?
a) alarm
b) resistance
c) exhaustion
d) termination

Answer: a
Consider This: The adrenal glands release hormones that increase heart rate, blood pressure, and the supply of blood sugar, resulting in a burst of energy.
Difficulty: Moderate
Objective: LO 2.15 Describe how the autonomic nervous system and body are impacted by stress.
Skill: Understand the Concepts
Topic: Hormones and Stress

EOC Q2.20
_____ refers to an individual's capacity to effectively cope with and quickly recover from the adverse physiological, psychological, and social outcomes of stress.
a) resilience
b) resistance
c) differentiation
d) diffusion

Answer: a
Consider This: Constant exposure to these stress mediators can have damaging effects on the brain and the brain's ability to interact successfully with the rest of the body.
Difficulty: Moderate
Objective: LO 2.15 Describe how the autonomic nervous system and body are impacted by stress.
Skill: Understand the Concepts
Topic: Hormones and Stress

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Chapter 2 *The Biological Perspective*

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CHAPTER AT A GLANCE

Detailed Outline	*Instructor Resources*	*Revel Features*
Neurons and Neurotransmitters Structure of the Neuron: The Nervous System's Building Block Generating the Message Within the Neuron: The Neural Impulse Neurotransmission	**Learning Objectives:** 2.1, 2.2, 2.3 **Lecture Launchers:** 2.1, 2.2, 2.3 **Activities & Exercises:** 2.1, 2.2	Opening Video: *The Biological Perspective* Video: *Figure 2.1: The Structure of the Neuron* Video: *Figure 2.2: The Neural Impulse Action Potential* Video: *Figure 2.3: The Synapse* Video: *Figure 2.4: Neurotransmitters: Reuptake*
Looking Inside the Living Brain Methods for Studying Specific Regions of the Brain Neuroimaging Techniques	**Learning Objectives:** 2.4, 2.5 **Lecture Launchers:** 2.7, 2.8, 2.9, 2.10, 2.11 **Activities & Exercises:** 2.12	
From the Bottom Up: The Structures of the Brain The Hindbrain Structures Under the Cortex: The Limbic System The Cortex The Association Areas of the Cortex The Cerebral Hemispheres	**Learning Objectives:** 2.6, 2.7, 2.8, 2.9, 2.10 **Lecture Launchers:** 2.12, 2.13, 2.14, 2.15, 2.16, 2.17, 2.18, 2.19 **Activities & Exercises:** 2.6, 2.7, 2.8, 2.9 **Handout:** 2.1	Video: *Parts of the Brain*
The Nervous System: The Rest of the Story The Central Nervous System: The "Central Processing Unit" The Peripheral Nervous System	**Learning Objectives:** 2.11, 2.12 **Lecture Launchers:** 2.4, 2.5, 2.20 **Activities & Exercises:** 2.3, 2.4, 2.5	Video: *Figure 2.15: The Spinal Cord Reflex* Video: *Overview of Neuroplasticity*
The Endocrine Glands The Pituitary: Master of the Hormonal Universe Other Endocrine Glands Hormones and Stress	**Learning Objectives:** 2.13, 2.14, 2.15 **Lecture Launcher:** 2.6	
Applying Psychology to Everyday Life: Minimizing the Impact of Adult Attention-Deficit/Hyperactivity Disorder	**Learning Objective:** 2.16	Video: *Applying Psychology to Everyday Life: Minimizing the Impact of Adult Attention-Deficit/Hyperactivity Disorder* Shared Writing: APA Goal 3: Ethical and Social Responsibility: The Biological Perspective

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LEARNING OBJECTIVES

2.1 Identify the parts of a neuron and the function of each.

2.2 Explain the action potential.

2.3 Describe how neurons use neurotransmitters to communicate with each other and with the body.

2.4 Describe how lesioning studies and brain stimulation are used to study the brain.

2.5 Compare and contrast neuroimaging techniques for mapping the brain's structure and function.

2.6 Identify the different structures of the hindbrain and the function of each.

2.7 Identify the structures of the brain that are involved in emotion, learning, memory, and motivation.

2.8 Identify the parts of the cortex that process the different senses and those that control movement of the body.

2.9 Recall the function of cortical association areas, including those especially crucial for language.

2.10 Explain how some brain functions differ between the left and right hemispheres.

2.11 Describe how the components of the central nervous system interact and how they may respond to experiences or injury.

2.12 Differentiate the roles of the somatic and autonomic nervous systems.

2.13 Explain why the pituitary gland is known as the "master gland."

2.14 Recall the role of various endocrine glands.

2.15 Describe how the autonomic nervous system and body are impacted by stress.

2.16 Identify potential strategies for positively coping with attention-deficit/hyperactivity disorder.

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RAPID REVIEW

The **nervous system** is composed of a complex network of cells throughout the body. The field of **neuroscience** is a branch of the life sciences that deals with the structure and functioning of the brain and the neurons, nerves, and nervous tissue that form the nervous system. **Biological psychology** or **behavioral neuroscience** is the branch of neuroscience that focuses on the biological bases of psychological processes, behavior, and learning, and it is the primary area associated with the biological perspective in psychology.

The cells in the nervous system that carry information are called **neurons**. Information enters at the **dendrites**, flows through the cell body (or **soma**) and down the **axon**. The end of the axon branches out into several shorter fibers that have swellings or little knobs on the ends called **axon terminals**, which are responsible for communicating with other nerve cells.

Although neurons are the cells that carry the information, most of the nervous system consists of **glial cells** that provide food, support, and insulation to the neuron cells. The insulation around the neuron is called **myelin** and works in a way similar to the plastic coating on an electrical wire. Bundles of myelin-coated axons are wrapped together in cable-like structures called **nerves**.

Clustering outside the neuron, sodium ions are primed to enter the cell. When the cell is resting (the electrical potential is in a state called the **resting potential**, because the cell is at rest), the sodium ions are stuck outside. The movement of an electrical signal across a neuron is called the **action potential**. During the action potential, ions are exchanged across the membrane due to diffusion and electrostatic pressure. A neuron fires the action potential in an **all-or-none** manner: The neuron is either firing at full strength or it is not firing at all. When the electrical signal travels down the axon and reaches the other end of the neuron called the **axon terminal**, it causes the **neurotransmitters** in the **synaptic vesicles** to be released into the fluid-filled **synapse** between the two cells. Neurotransmitters can have either an excitatory or inhibitory effect on the receiving cell and, once neurotransmission occurs, it is terminated through reuptake and the action of enzymes.

Two techniques used to study the brain involve either destroying a specific area of the brain (**lesioning**) or stimulating a specific brain area to see the effect. Researchers have developed several methods such as **CT**, **MRI**, **EEG**, **PET**, **fMRI**, and **NIRS**.

The brain can be roughly divided into three sections: the forebrain, the midbrain, and the hindbrain. Various structures within the brain include the brain stem, **medulla**, **pons**, **reticular formation (RF)**, **cerebellum**, the **limbic system**, which includes the **thalamus**, **olfactory bulbs**, **hypothalamus**, **hippocampus**, **amygdala**, and cingulate cortex, **cortex**, **cerebrum**, **cerebral hemispheres**, **corpus callosum**, **occipital lobes**, **parietal lobes**, **somatosensory cortex**, **temporal lobes**, **frontal lobes**, and **motor cortex**. **Mirror neurons**, neurons that fire when we perform an action and also when we see someone else perform that action, may explain a great deal of the social learning that takes place in humans starting in infancy.

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Association areas are the areas within each of the lobes that are responsible for "making sense" of all the incoming information. **Broca's area** is located in the left frontal lobe and **Wernicke's area** is located in the left temporal lobe; both play a role in language. The cerebrum is made up of the two cerebral hemispheres and the structures connecting them. Split-brain research helped scientists understand that the two cerebral hemispheres are not identical.

The **central nervous system (CNS)** is made up of the brain and the **spinal cord**. **Afferent (sensory) neurons** send information from the senses to the spinal cord, whereas **efferent (motor) neurons** send commands from the spinal cord to the muscles. **Interneurons** connect sensory and motor neurons and help coordinate the signals. The **peripheral nervous system (PNS)** is made up of all the nerves and neurons that are not in the brain or spinal cord and is divided into two parts: the **somatic nervous system** and the **autonomic nervous system**. The autonomic nervous system is in turn divided into two parts: the **sympathetic division** and the **parasympathetic division**.

The **endocrine glands** represent a second communication system in the body. The endocrine glands secrete chemicals called **hormones** directly into the bloodstream. The **pituitary gland** is located in the brain and secretes the hormones that control milk production, salt levels, and the activity of other glands. The **pineal gland** is also located in the brain and regulates the sleep cycle through the secretion of melatonin. The **thyroid gland** is located in the neck and releases a hormone that regulates metabolism. The **pancreas** controls the level of blood sugar in the body, whereas the **gonad** sex glands regulate sexual behavior and reproduction. The **adrenal glands** play a critical role in regulating the body's response to stress.

Hans Selye was a pioneer in the study of the physical consequences of exposure to stressors and proposed the **general adaptation syndrome**, consisting of alarm, resistance, and exhaustion phases. Researchers in the field of **psychoneuroimmunology**, who study the effects of psychological factors on the **immune system**, have found that stress causes an increase in the activity of the immune system. During chronic stress, the immune system no longer works correctly. High levels of stress have been linked to increased risk of **coronary heart disease** and **Type 2 diabetes**. Also, stress can decrease the amount of **natural killer cells**, which are the cells responsible for fighting cancerous growths.

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LECTURE GUIDE

I. NEURONS AND NEUROTRANSMITTERS

Lecture Launchers and Discussion Topics

- 2.1 Neurotransmitters: Chemical Communicators of the Nervous System
- 2.2 Exceptions to the Rules
- 2.3 The Glue of Life: Neuroglial Cells

Classroom Activities, Demonstrations, and Exercises

- 2.1 Using Dominoes to Understand the Action Potential
- 2.2 Environmental Influences on the Brain

Learning Objective 2.1 Identify the parts of a neuron and the function of each.

A. Structure of the neuron: The nervous system's building block

1. The **nervous system** is an extensive network of specialized cells that carries information to and from all parts of the body. **Neuroscience** is a branch of the life sciences that deals with the structure and function of neurons, nerves, and nervous tissue. **Biological psychology** or behavioral neuroscience is a branch of neuroscience that focuses on the biological bases of psychological processes, behavior, and learning.

2. The **neuron** is the basic cell that makes up the nervous system and that receives and sends messages within that system. **Dendrites** are branchlike structures of a neuron that receive messages from other neurons. The **soma** is the cell body of the neuron responsible for maintaining the life of the cell. The **axon** is a tubelike structure of a neuron that carries the neural message from the cell body to the **axon terminals,** enlarged ends of axonal branches, specialized for communication with other cells.

3. **Glial cells** provide support for the neurons to grow on and around, deliver nutrients to neurons, produce myelin to coat axons, clean up waste products and dead neurons, influence information processing, and influence the generation of new neurons during prenatal development. **Myelin** is a layer of fatty substances produced by certain glial cells that coat the axons of neurons to insulate, protect, and speed up the neural impulse. **Nerves** are bundles of axons coated in myelin that travel together through the body.

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Learning Objective 2.2 Explain the action potential.

B. Generating the message within the neuron: The neural impulse

1. At rest, the neuron is negatively charged inside and positively charged outside. **Diffusion** is the process of molecules moving from areas of high concentration to areas of low concentration. The **resting potential** is the state of the neuron when not firing a neural impulse.

2. The **action potential**, consisting of a reversal of the electrical charge within the axon, releases the neural impulse. When a neuron fires, it fires in an **all-or-none** fashion, meaning that it fires completely or does not fire at all.

Learning Objective 2.3 Describe how neurons use neurotransmitters to communicate with each other and with the body.

C. Neurotransmission

1. Sending the message to other cells: The synapse

   a. The **synaptic vesicles** are saclike structures found inside the synaptic knob containing chemicals. A **neurotransmitter** is a chemical found in the synaptic vesicles that, when released, has an effect on the next cell. The **synapse (synaptic gap)** is microscopic fluid-filled space between the axon terminal of one cell and the dendrites or soma of the next cell. **Receptor sites** are three-dimensional proteins on the surface of the dendrites or certain cells of the muscles and glands, which are shaped to fit only certain neurotransmitters.

   b. An **excitatory synapse** is a synapse at which a neurotransmitter causes the receiving cell to fire, whereas an **inhibitory synapse** is a synapse at which a neurotransmitter causes the receiving cell to stop firing.

2. Neurotransmitters: Messengers of the network

   a. **Antagonists** are chemical substances that block or reduce a cell's response to the action of other chemicals or neurotransmitters. **Agonists** are chemical substances that mimic or enhance the effects of a neurotransmitter on the receptor sites of the next cell, increasing or decreasing the activity of that cell.

   b. Important neurotransmitters include acetylcholine (ACh), norepinephrine (NE), serotonin, gamma-aminobutyric acid (GABA), glutamate, and endorphins.

3. Cleaning up the synapse: Reuptake and enzymes

   a. **Reuptake** is the process by which neurotransmitters are taken back into the synaptic vesicles.

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b. In a process of **enzyme degradation**, the structure of a neurotransmitter is altered so it can no longer act on a receptor.

II. LOOKING INSIDE THE LIVING BRAIN

Lecture Launchers and Discussion Topics

- 2.7 Psychophysiological Measurement
- 2.8 Berger's Wave
- 2.9 Lie Detectors 2.0
- 2.10 Women, Men, and PETs
- 2.11 Using fMRI and MEG to Study Phantom Limb Pain

Classroom Activities, Demonstrations, and Exercises

- 2.12 Diagnostic Brain Imaging or Electrophysiology

Learning Objective 2.4 Describe how lesioning studies and brain stimulation are used to study the brain.

A. Methods for studying specific regions of the brain
   1. Lesioning studies

      a. **Lesioning** involves the insertion of a thin, insulated electrode into the brain through which an electrical current is sent, destroying the brain cells at the tip of the wire.

      b. By studying areas of brain damage we learn the functions that various areas of the brain control.

   2. Brain stimulation

      a. Invasive techniques: Stimulating from the inside. Deep brain stimulation (DBS) is an invasive technique; optogenetics may offer a comparable alternative.

      b. Noninvasive techniques: Stimulating from the outside. Transcranial magnetic stimulation (TMS), repetitive TMS (rTMS), and transcranial direct current stimulation (tDCS) are noninvasive procedures.

Learning Objective 2.5 Compare and contrast neuroimaging techniques for mapping the brain's structure and function.

B. Neuroimaging techniques

   1. Mapping structure

      a. **Computed tomography (CT)** is a brain-imaging method using computer-

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controlled X-rays of the brain.

b. **Magnetic resonance imaging (MRI)** is a brain-imaging method using radio waves and magnetic fields of the body to produce detailed images of the brain.

2. Mapping function

a. The **electroencephalogram (EEG)** is a recording of the electrical activity of large groups of cortical neurons just below the skull, most often using scalp electrodes.

b. Magnetoencephalography (MEG) is used to explore information processing differences in language disorders.

c. **Positron emission tomography (PET)** is a brain-imaging method in which a radioactive sugar is injected into the subject and a computer compiles a color-coded image of the activity of the brain.

d. **Functional MRI (fMRI)** is an MRI-based brain-imaging method that allows for functional examination of brain areas through changes in brain oxygenation.

e. **Near-infrared spectroscopy (NIRS)** is another noninvasive brain-imaging technique.

III. FROM THE BOTTOM UP: THE STRUCTURES OF THE BRAIN

Lecture Launchers and Discussion Topics

- 2.12 The Importance of a Wrinkled Cortex
- 2.13 Brain's Bilingual Broca
- 2.14 A New Look at Phineas Gage
- 2.15 Freak Accidents and Brain Injuries
- 2.16 Understanding Hemispheric Function
- 2.17 Handedness, Eyedness, Footedness, Facedness
- 2.18 Workplace Problems: Left-Handedness
- 2.19 The Results of a Hemispherectomy

Classroom Activities, Demonstrations, and Exercises

- 2.6 Mapping the Brain
- 2.7 Football and Brain Damage
- 2.8 Hemispheric Lateralization
- 2.9 Hemispheric Communication and the Split Brain

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Learning Objective 2.6 Identify the different structures of the hindbrain and the function of each.

A. The hindbrain

1. Medulla: The **medulla** is the first large swelling at the top of the spinal cord, forming the lowest part of the brain, which is responsible for life-sustaining functions such as breathing, swallowing, and heart rate.

2. Pons: The **pons** is the larger swelling above the medulla that connects the top of the brain to the bottom and that plays a part in sleep, dreaming, left-right body coordination, and arousal.

3. Reticular formation: The **reticular formation (RF)** is an area of neurons running through the middle of the medulla and the pons and slightly beyond that is responsible for general attention, alertness, and arousal.

4. Cerebellum: The **cerebellum** is part of the lower brain located behind the pons that controls and coordinates involuntary, rapid, fine motor movement and may have some cognitive functions.

Learning Objective 2.7 Identify the structures of the brain that are involved in emotion, learning, memory, and motivation.

B. Structures under the cortex: The limbic system

1. The **limbic system** is a group of several brain structures located primarily under the cortex and involved in learning, emotion, memory, and motivation.

2. Thalamus

   a. The **thalamus** is part of the limbic system located in the center of the brain, this structure relays sensory information from the lower part of the brain to the proper areas of the cortex and processes some sensory information before sending it to its proper area.

   b. **Olfactory bulbs** are two bulblike projections of the brain located just above the sinus cavity and just below the frontal lobes that receive information from the olfactory receptor cells. Smell is the only sense that does not have to first pass through the thalamus.

3. Hypothalamus: The **hypothalamus** is a small structure in the brain located below the thalamus and directly above the pituitary gland, responsible for motivational behavior such as sleep, hunger, thirst, and sex.

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4. Hippocampus: The **hippocampus** is a curved structure located within each temporal lobe, responsible for the formation of long-term declarative memories.

5. Amygdala: The **amygdala** is a brain structure located near the hippocampus, responsible for fear responses and memory of fear.

6. Cingulate cortex: This structure plays an important role in emotional and cognitive processing.

Learning Objective 2.8 Identify the parts of the cortex that process the different senses and those that control movement of the body.

C. The cortex

1. The **cortex** is the outermost covering of the brain consisting of densely packed neurons, responsible for higher thought processes and interpretation of sensory input.

2. Cerebral hemispheres

   a. The **cerebrum** is the upper part of the brain consisting of the two hemispheres and the structures that connect them.

   b. The **cerebral hemispheres** are the two sections of the cortex on the left and right sides of the brain.

   c. The **corpus callosum** is the thick band of neurons that connects the right and left cerebral hemispheres.

3. Occipital lobes: The **occipital lobe** is a section of the brain located at the rear and bottom of each cerebral hemisphere containing the primary visual centers of the brain.

4. Parietal lobes

   a. The **parietal lobes** are sections of the brain located at the top and back of each cerebral hemisphere containing the centers for touch, temperature, and body position.

   b. The **somatosensory cortex** is an area of cortex at the front of the parietal lobes responsible for processing information from the skin and internal body receptors for touch, temperature, and body position.

5. Temporal lobes: The **temporal lobes** are areas of the cortex located along the side of the brain, starting just behind the temples, containing the neurons responsible for the sense of hearing and meaningful speech.

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6. Frontal lobes

a. **Frontal lobes** are areas of the brain located in the front and top, responsible for higher mental processes and decision making as well as the production of fluent speech.

b. The **motor cortex** is the rear section of the frontal lobe, responsible for sending motor commands to the muscles of the somatic nervous system.

c. **Mirror neurons** are neurons that fire when an animal or person performs an action and also when an animal or person observes that same action being performed by another.

Learning Objective 2.9 Recall the function of cortical association areas, including those especially crucial for language.

D. The association areas of the cortex

1. **Association areas** are areas within each lobe of the cortex responsible for the coordination and interpretation of information, as well as higher mental processing.

2. Broca's area

a. Broca's area is responsible for producing fluent, understandable speech.

b. **Broca's aphasia** is a condition resulting from damage to Broca's area, causing the affected person to be unable to speak fluently, to mispronounce words, and to speak haltingly.

3. Wernicke's area

a. Wernicke's area is responsible for the understanding of language.

b. **Wernicke's aphasia** is a condition resulting from damage to Wernicke's area, causing the affected person to be unable to understand or produce meaningful language.

4. **Spatial neglect** is a condition produced most often by damage to the parietal lobe association areas of the right hemisphere, resulting in an inability to recognize objects or body parts in the left visual field.

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Learning Objective 2.10 Explain how some brain functions differ between the left and right hemispheres.

E. The cerebral hemispheres

1. Split-brain research

   a. Research has shown that the left hemisphere specializes in language, speech, handwriting, math calculation, sense of time and rhythm (mathematical in nature), and analytical thinking.

   b. The right side of the brain processes information globally and controls emotional expression, spatial perception, and recognition of faces, patterns, melodies, and emotions.

2. Handedness

   a. Handedness is the tendency to use one hand for most fine motor skills.

   b. Roughly 90 percent of individuals are right-handed; handedness appears to be largely influenced by genetics.

IV. THE NERVOUS SYSTEM: THE REST OF THE STORY

Lecture Launchers and Discussion Topics

- 2.4 Brain Metaphors
- 2.5 The Cranial Nerves
- 2.20 Stressed? Not Much!!

Classroom Activities, Demonstrations, and Exercises

- 2.3 Demonstrating Neural Conduction: The Class as a Neural Network
- 2.4 The Dollar Bill Drop
- 2.5 Reaction Time and Neural Processing

Learning Objective 2.11 Describe how the components of the central nervous system interact and how they may respond to experiences or injury.

A. The central nervous system: The "central processing unit"

1. The **central nervous system (CNS)** is part of the nervous system consisting of the brain and the spinal cord.

2. The brain

3. The spinal cord

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a. The **spinal cord** is a long bundle of neurons that carries messages between the body and the brain and is responsible for very fast, lifesaving reflexes.

b. **Afferent (sensory) neurons** carry information from the senses to the central nervous system. **Efferent (motor) neurons** carry messages from the central nervous system to the muscles of the body.

c. **Interneurons** are found in the center of the spinal cord and receive information from the afferent neurons and send commands to the muscles through the efferent neurons. Interneurons also make up the bulk of the neurons in the brain. The **reflex arc** is the connection of the afferent neurons to the interneurons to the efferent neurons, resulting in a reflex action.

4. Damage to the central nervous system, neuroplasticity, and neurogenesis

a. **Neuroplasticity** is the ability within the brain to constantly change both the structure and function of many cells in response to experience or trauma.

b. **Neurogenesis** is the formation of new neurons that occurs primarily during prenatal development but may also occur at lesser levels in some brain areas during adulthood.

c. **Stem cells** are special cells found in all the tissues of the body that are capable of becoming other cell types when those cells need to be replaced due to damage or wear and tear.

d. **Epigenetics** is the interaction between genes and environmental factors influencing gene activity; environmental factors include diet, life experiences, and physical surroundings.

Learning Objective 2.12 Differentiate the roles of the somatic and autonomic nervous systems.

B. The peripheral nervous system

1. The **peripheral nervous system (PNS)** all nerves and neurons that are not contained in the brain and spinal cord but that run through the body itself. The PNS can be divided into the **somatic nervous system,** which consists of nerves that carry information from the senses to the CNS and from the CNS to the voluntary muscles of the body, and the **autonomic nervous system (ANS)**, which consists of nerves that control all of the involuntary muscles, organs, and glands.

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2. The somatic nervous system

   a. The **sensory pathway** involves nerves coming from the sensory organs to the CNS containing afferent neurons.

   b. The **motor pathway** involves nerves coming from the CNS to the voluntary muscles, containing efferent neurons.

3. The autonomic nervous system

   a. The sympathetic division: The **sympathetic division (fight-or-flight system)**, also called the sympathetic nervous system (SNS), is part of the ANS that is responsible for reacting to stressful events and bodily arousal.

   b. The parasympathetic division: The **parasympathetic division (eat-drink-and-rest system)**, also called the parasympathetic nervous system (PNS), is part of the ANS that restores the body to normal functioning after arousal and is responsible for the day-to-day functioning of the organs and glands.

V. THE ENDOCRINE GLANDS

Lecture Launchers and Discussion Topics

- 2.6 Hormone Imbalances

Learning Objective 2.13 Explain why the pituitary gland is known as the "master gland."

A. The pituitary: Master of the hormonal universe

1. **Endocrine glands** have no ducts and secrete chemicals called **hormones** directly into the bloodstream.

2. The **pituitary gland** located in the brain secretes human growth hormone and influences all other hormone-secreting glands (also known as the master gland). In women**, oxytocin** is a hormone released by the posterior pituitary gland that is involved in reproductive and parental behaviors.

Learning Objective 2.14 Recall the role of various endocrine glands.

B. Other endocrine glands

1. The pineal gland: **pineal gland** is an endocrine gland located near the base of the cerebrum and secretes melatonin.

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2. The thyroid gland: **thyroid gland** is an endocrine gland found in the neck and regulates metabolism by secreting thyroxin.

3. The pancreas: the **pancreas** is an endocrine gland that controls the levels of sugar in the blood by secreting insulin and glucagons.

4. The gonads: the **gonads** are the sex glands, including **ovaries** (female gonads or sex glands) and **testes** (male gonads or sex glands), that secrete hormones that regulate sexual development and behavior as well as reproduction.

5. The adrenal glands: the **adrenal glands** are endocrine glands located on top of each kidney that secrete over 30 different hormones to deal with stress, regulate salt intake, and provide a secondary source of sex hormones affecting the sexual changes that occur during adolescence.

Learning Objective 2.15 Describe how the autonomic nervous system and body are impacted by stress.

C. The General Adaptation Syndrome

1. The general adaptation syndrome is the body's reaction to stress.

2. Three stages of reaction are alarm, resistance, and exhaustion.

D. Immune system and stress

1. **Immune system**: the system of cells, organs, and chemicals of the body that responds to attacks from diseases, infections, and injuries.

2. **Psychoneuroimmunology:** the study of the effects of psychological factors such as stress, emotions, thoughts, and behavior on the immune system.

3. Allostasis and allostatic load

4. Heart disease: **coronary heart disease (CHD)** is the buildup of a waxy substance called plaque in the arteries of the heart.

5. Diabetes: **Type 2 diabetes** typically occurs in middle adulthood when the body either becomes resistant to the effects of insulin or can no longer secrete enough insulin to maintain normal glucose levels.

6. Cancer: Cancer depresses the release of **natural killer (NK) cells**, the immune-system cells responsible for suppressing viruses and destroying tumor cells.

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VI. APPLYING PSYCHOLOGY TO EVERYDAY LIFE: MINIMIZING THE IMPACT OF ADULT ATTENTION-DEFICIT/HYPERACTIVITY DISORDER

Learning Objective 2.16 Identify potential strategies for positively coping with attention-deficit/hyperactivity disorder.

A. Attention-deficit/hyperactivity disorder (ADHD) involves behavioral and cognitive aspects of inattention, impulsivity, and hyperactivity that people likely do not outgrow.

B. Positive coping strategies may include both behavioral and cognitive strategies.

VII. CHAPTER SUMMARY

Classroom Activities, Demonstrations, and Exercises

- 2.10 Crossword Puzzle
- 2.11 Fill in the Blanks

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LECTURE LAUNCHERS AND DISCUSSION TOPICS

- 2.1 Neurotransmitters: Chemical Communicators of the Nervous System
- 2.2 Exceptions to the Rules
- 2.3 The Glue of Life: Neuroglial Cells
- 2.4 Brain Metaphors
- 2.5 The Cranial Nerves
- 2.6 Hormone Imbalances
- 2.7 Psychophysiological Measurement
- 2.8 Berger's Wave
- 2.9 Lie Detectors 2.0
- 2.10 Women, Men, and PETs
- 2.11 Using fMRI and MEG to Study Phantom Limb Pain
- 2.12 The Importance of a Wrinkled Cortex
- 2.13 Brain's Bilingual Broca
- 2.14 A New Look at Phineas Gage
- 2.15 Freak Accidents and Brain Injuries
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- 2.20 Stressed? Not Much!!

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Lecture Launcher 2.1 Neurotransmitters: Chemical Communicators of the Nervous System

In 1921, a scientist in Austria put two living hearts in a fluid bath that kept them beating. He then stimulated the vagus nerve of one heart. This bundle of neurons that serves the parasympathetic nervous system caused a reduction in the heart's rate of beating. A substance was released by the nerve of the first heart and transported through the fluid to the second heart. The second heart reduced its rate of beating. The substance released from the vagus nerve of the first heart was later identified as acetylcholine, one of the first neurotransmitters to be identified. Although many other neurotransmitters have now been identified, we continue to think of acetylcholine as one of the most important neurotransmitters. Curare is a poison that was discovered by South American Indians. They put it on the tips of the darts they shoot from their blowguns. Curare blocks acetylcholine receptors, and paralysis of internal organs results. The victim is unable to breathe and eventually dies. A substance in the venom of black widow spiders stimulates release of acetylcholine at synapses. Botulism toxin, found in improperly canned foods, blocks release of acetylcholine at the synapses and has a deadly effect. It takes less than one millionth of a gram of this toxin to kill a person. A deficit of acetylcholine is associated with Alzheimer's disease, which afflicts a high percentage of older adults.

Many neurotransmitters have been identified in the years since 1921, and there is increasing evidence of their importance in human behavior. Psychoactive drugs affect consciousness because of their effects on synaptic transmission. For example, cocaine and the amphetamines prolong the action of certain neurotransmitters and opiates imitate the action of natural neuromodulators called the endorphins. It appears that the neurotransmitters dopamine, norepinephrine, and serotonin are associated with some of the most severe forms of mental illness.

There are probably only a few ounces of these substances in the body, but they may have a profound effect on mood, memory, perception, and behavior. Could intelligence be primarily a matter of having plenty of the right neurotransmitter at the right synapses?

Background information and videos can be found online by searching "Otto Loewi."

Lecture Launcher 2.2 Exceptions to the Rules

In an introductory psychology class, students learn the basic rules that generally govern neuronal communication. In many cases, however, the exceptions to these rules may be as important as the rules themselves. Several of these exceptions are described below.

Rule 1: Neuron-to-neuron signaling is chemical, not electrical.
Exception: Gap junctions

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Although it is generally the case that a neuron's electrical signal must first be converted to a chemical signal to excite or inhibit another neuron, this is not always the case. Some neurons have gap junctions, which connect their intracellular fluids. This means that the electrical signal can flow directly from one neuron to another. Unlike chemical synapses, most electrical synapses formed by gap junctions are bidirectional, meaning that electrical signals can travel in both directions through the gap junctions. Gap junctions also contain gates, which can be closed to prevent the electrical signal from being passed to the neighboring neuron.

Rule 2: Axons always synapse on dendrites.
Exception: Axo-axonic and axosomatic synapses

Axons can form synapses on all parts of a postsynaptic neuron. Synapses located on the soma (i.e., cell body) of a neuron are often inhibitory. In other words, transmitters released at these axosomatic synapses make it harder for the postsynaptic neuron to reach the threshold for generating an action potential. When an axon synapses on the axon of another neuron, it is called an axo-axonic synapse. Because these synapses usually occur near the end of the axon, they have no effect on whether the postsynaptic cell generates an axon potential. Instead, axo-axonic synapses usually modulate how much neurotransmitter is released from the postsynaptic neuron.

Rule 3: Action potentials only travel in one direction.
Exception: Back-propagating action potentials

Action potentials begin at the axon hillock, where the axon emerges from the soma. From there, the action potential travels down the axon and away from the soma. At the same time, however, a back-propagating action potential can travel from the axon hillock, through the soma, and into the dendrites. Back-propagating action potentials are thought to affect the functioning of receptors located in the soma and dendrites.

Kandel, E., Schwartz, J., & Jessell, T. (2012). *Principles of neural science* (5th ed.). New York: McGraw-Hill.

Lecture Launcher 2.3 The Glue of Life: Neuroglial Cells

Glia is derived from the Greek word for glue and is an appropriate name for the cells that surround all neurons, sealing them together. Glial cells outnumber neurons ten to one and, although tiny in size, still make up half of the brain's bulk. Unlike neurons, glia cells do not possess excitable membranes and so cannot transmit information in the way neurons do. Yet so many thousands of cells must be there for some purpose.

Researchers studying the brain have suggested that glia can take up, manufacture, and release chemical transmitters and so may help maintain or regulate synaptic transmission. Other researchers suggest that glia can manufacture and possibly transmit other kinds of molecules, such as proteins. The anatomy of some glial cells is striking in this regard, for they seem to form

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a conduit between blood vessels and neurons, and so may bring nourishment to the neurons. It is thought that these cells may have important functions during prenatal development and recovery from brain injury. One role of the glia is known definitely: Certain kinds of glia, called by the tongue-twisting name *oligodendroglia,* form the myelin sheath that insulates central nervous system axons and speeds conduction of the nerve impulse. A counterpart called a Schwann cell performs the same role for the neurons that make up peripheral nerves.

The study of glia is difficult because these tiny cells are inextricably entwined with neurons. As the most numerous cell type in the brain, their potential importance is vast, and investigation of their function is currently yielding amazing results.

Lecture Launcher 2.4 Brain Metaphors

Metaphors can help us understand systems we cannot directly observable through reference to things that are more familiar and perhaps better understood (Weiner, 1991). Our understanding of the human brain and its activity has been helped through a reliance on metaphor. The metaphors used, however, have changed over time.

Hydraulic models. Thinkers such as Galen and Descartes described the brain as a pneumatic/hydraulic system, relying on the "newfangled" plumbing systems dominant during their lifetimes. Galen, for example, believed that the liver generated "spirits" or gases that flowed to the brain, where they then formed "animal spirits" that flowed throughout the nervous system. Descartes expanded on this view, adding that the pineal gland (the supposed seat of the soul) acted on the animal spirits to direct reasoning and other behaviors. In short, the brain was a septic tank, storing, mixing, and directing the flow of spirit gases throughout the body for the purposes of behavior and action.

Mechanical and telephone models. With the advent of new technology came new metaphors for the brain. During the Industrial Revolution, machine metaphors dominated and, in particular, the brain was conceived as a complex mechanical apparatus involving (metaphorical) levers, gears, trip-hammers, and pulleys. During the 1920s, the brain developed into a slightly more sophisticated machine resembling a switchboard; the new technology of the telephone provided a new metaphor. Inputs, patch cords, outputs, and busy signals (though no "call waiting") dominated explanations of brain activity. This metaphor, however, faltered by viewing the brain as a system that shut down periodically, as when no one was dialing a number. We now know, of course, that the brain is continually active.

Computer models. Starting in the late 1950s, metaphors for the brain have relied on computer technology. Input, output, memory, storage, information processing, and circuitry were all terms that seemed equally suited to talking about computer chips and neurons. Although perhaps a better metaphor than plumbing or telephones, the computer model eventually showed its

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shortcomings. As a descriptive device, however, this metaphor can at least suggest limits in our understanding and point the way to profitable areas of research.

Weiner, B. (1991). Metaphors in motivation and attribution. *American Psychologist*, *46*, 921–930.

Lecture Launcher 2.5 The Cranial Nerves

The textbook discusses various divisions of the nervous system. You may want to add a description of the cranial nerves to your outline of the nervous system. Although the function of the cranial nerves is not different from that of the sensory and motor nerves in the spinal cord, they do not enter and leave the brain through the spinal cord. There are 12 cranial nerves (numbered 1 to 12 and ordered from the front to the back of the brain) that primarily transmit sensory information and control motor movements of the face and head. The 12 cranial nerves are the following:

1. *Olfactory*. A sensory nerve that transmits odor information from the olfactory receptors to the brain.
2. *Optic*. A sensory nerve that transmits information from the retina to the brain.
3. *Oculomotor*. A motor nerve that controls eye movements, the iris (and therefore pupil size), lens accommodation, and tear production.
4. *Trochlear*. A motor nerve that is also involved in controlling eye movements.
5. *Trigeminal*. A sensory and motor nerve that conveys somatosensory information from receptors in the face and head and controls muscles involved in chewing.
6. *Abducens*. Another motor nerve involved in controlling eye movements.
7. *Facial*. A nerve that conveys sensory information and controls motor and parasympathetic functions associated with facial muscles, taste, and the salivary glands.
8. *Auditory-vestibular*. A sensory nerve with two branches, one of which transmits information from the auditory receptors in the cochlea and the other conveys information concerning balance from the vestibular receptors in the inner ear.
9. *Glossopharyngeal*. A nerve that conveys sensory information and controls motor and parasympathetic functions associated with the taste receptors, throat muscles, and salivary glands.
10. *Vagus*. A nerve that primarily transmits sensory information and controls autonomic functions of the internal organs in the thoracic and abdominal cavities.
11. *Spinal accessory*. A motor nerve that controls head and neck muscles.
12. *Hypoglossal*. A motor nerve that controls tongue and neck muscles.

As is their custom, medical students have developed several mnemonics for memorizing the

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cranial nerves. Some of the family-friendly ones include the following:

On **O**ld **O**lympus' **T**iny **T**ops, **A** **F**riendly **V**iking **G**rew **V**ines **A**nd **H**ops

Oh **O**nce **O**ne **T**akes **T**he **A**natomy **F**inal **V**ery **G**ood **V**acations **A**re **H**eavenly

One **O**f **O**ur **T**wo **T**iming **A**dults **F**ound **V**ery **G**ood **V**alues **A**t **H**ome

On **O**ccasion **O**ur **T**rusty **T**ruck **A**cts **F**unny. **V**ery **G**ood **V**ehicle **A**ny **H**ow

On **O**ur **O**verseas **T**rip **T**o **A**rgentina **F**ound **V**ery **G**rand **V**illas **A**nd **H**uts

Lecture Launcher 2.6 Hormone Imbalances

Various problems are caused by imbalances within the endocrine system. The following disorders and medical problems are associated with abnormal levels within the pituitary, thyroid, and adrenal glands.

Pituitary Malfunctions

Hypopituitary Dwarfism

If the pituitary secretes too little of its growth hormone during childhood, the person will be very small although normally proportioned.

Giantism

If the pituitary gland secretes too much growth hormone while a child is still in the growth period, the long bones of the body in the legs and other areas grow very, very long—a height of 9 feet is not unheard of. The organs of the body also increase in size, and the person may have health problems associated with both the extreme height and the organ size.

Acromegaly

If too much growth hormone is secreted after the major growth period is ended, the person's long bones will not get longer, but the bones in the face, hands, and feet will increase in size, producing abnormally large hands, feet, and facial bone structure. The famous wrestler/actor Andre the Giant (Andre Rousimoff) had this condition, as did the actor Rondo Hatton.

Thyroid Malfunctions

Hypothyroidism

In hypothyroidism, the thyroid does not secrete enough thyroxin, resulting in a slower than normal metabolism. The person with this condition will feel sluggish and lethargic, have little energy, and tend to be obese.

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Hyperthyroidism

In hyperthyroidism, the thyroid secretes too much thyroxin, resulting in an overly active metabolism. This person will be thin, nervous, tense, and excitable. This person will also be able to eat large quantities of food without gaining weight.

Adrenal Gland Malfunctions

Among the disorders that can result from malfunctioning of the adrenal glands are Addison's disease (which is caused by adrenal insufficiency) and Cushing's syndrome (caused by elevated levels of cortisol). In the former, fatigue, low blood pressure, weight loss, nausea, diarrhea, and muscle weakness are some of the symptoms, whereas for the latter, obesity, high blood pressure, a "moon" face, and poor healing of skin wounds are common. John F. Kennedy and Helen Reddy were well-known Addisonians.

If there is a problem with too much secretion of the sex hormones in the adrenals, virilism and premature puberty are possible problems. Virilism results in women with beards on their faces and men with exceptionally low, deep voices. Premature puberty, or full sexual development while still a child, is a result of too many sex hormones during childhood. (Puberty is considered premature if it occurs before age 8 in girls and age 9 in boys.) Treatment is possible using hormones to control the appearance of symptoms but must begin early in the disorder.

Lecture Launcher 2.7 Psychophysiological Measurement

Various strategies exist for measuring activity in the brain, including techniques such as PET (positron emission tomography), TMS (transcranial magnetic stimulation), and MRI (magnetic resonance imaging). There are, of course, other bodily systems and other techniques for measuring them, many of which rely on the electrophysical activity of the body.

EMG—Electromyography. An electromyogram records the action potential given off by contracting muscle fibers. A common example is the recording of facial EMG, in which either inserted electrodes or surface electrodes record the activity of muscles as they pose various expressions.

EGG—Electrogastrography. Electrogastrograms provide a record of smooth muscle activity in the abdomen. The contractions of the stomach or intestines, for example, can be measured by comparing the readings from a surface electrode attached to the abdomen with those of an electrode attached to the forearm. In the special case of measuring contractions in the esophagus, surface electrodes are attached to a balloon, which is "swallowed" by the person being measured. EGG may be used successfully to gain information about fear, anxiety, or other emotional states.

EOG—Electrooculography. Readings from electrodes placed around the posterior of the eyes

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are the basis for EOG. Electrical signals result from small saccadic eye movements as well as more gross movements that can be directly observed. EOG can be used for measuring rapid eye movements during sleep.

EKG—Electrocardiography. EKG records changes in electrical potential associated with the heartbeat. Electrodes are placed at various locations on the body, and their recordings yield five waves that can be analyzed: P-waves, Q-waves, R-waves, S-waves, and T-waves. EKG may be used by psychologists to supplement observations relevant to stress, heart disease, or Type A behavior patterns.

EDA—Electrodermal Activity. Formerly called *galvanic skin response*, *skin resistance*, and *skin conductance*, EDA refers to the electrical activity of the skin. As activity in the sympathetic nervous system increases, it causes the eccrine glands to produce sweat. This activity of the eccrine glands can be measured by EDA, regardless of whether or not sweat actually rises to the skin surface. The folklore of "sweaty palms" associated with a liar might be measured using this technique.

EEG—Electroencephalography. EEG provides information about the electrical activity of the brain, as recorded by surface electrodes attached to the scalp. EEG has been used in a variety of ways to gather information about brain activity under a wide range of circumstances.

Pneumography. Pneumographs measure the frequency and amplitude of breathing and are obtained through a relatively straightforward procedure. A rubber tube placed around the chest expands and contracts in response to the person's inhalations and exhalations. These changes can then be recorded with either an ink pen or electrical signal.

Lecture Launcher 2.8 Berger's Wave

Ask if anyone knows what is meant by the term *Berger's wave*. Explain that the study of electrical activity in the brain was once limited to studies in which different kinds of measuring devices were attached to the exposed brains of animals. Studies involving humans were rare; researchers could only measure the electrical activity of the living human brain in individuals who had genetic defects of their skull bones that caused the skin of their scalps to be in direct contact with the surfaces of their brains.

All this changed when a German physicist named Hans Berger, after several years of painstaking research, discovered that it was possible to amplify and measure the electrical activity of the brain by attaching special electrodes to the scalp that, in turn, sent impulses to a machine that graphed them. In his research, Berger discovered several types of waves, one of which he called the "alpha" wave for no other reason than it was the first one he discovered (alpha is the first letter of the Greek alphabet). He kept his research a secret until he published an article about it in 1929. The alpha wave is also sometimes called *Berger's wave* in honor of Berger's discovery.

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Although Berger achieved one of the most important discoveries in the history of neuroscience, his life was not a happy one. Shortly after his article was published, the Nazis rose to power in Germany, which greatly distressed him. In addition, his work was not valued in Germany; he was far better known in the United States. As a result, Berger fell into a deep depression in 1941 and hanged himself.

Gloor, P. (1969). Hans Berger and the discovery of the electroencephalogram. *Electroencephalography and Clinical Neurophysiology*: Supplement 28, 1–36.

Millett, D. (2001). Hans Berger: From psychic energy to the EEG. *Perspectives in Biological Medicine*, *44*(4), 522–542.

Wiedemann, H. R. (1994). Hans Berger (1873–1941). *European Journal of Pediatrics*, *153*(10), 705.

Lecture Launcher 2.9 Lie Detectors 2.0

A staple of police and lawyer television shows is the "lie detector" scene, in which the suspect is hooked up to a polygraph machine and asked a series of questions about a crime. As the questions are asked, the needles on the polygraph record the suspect's heart rate, breathing, skin conductance, and other physiological responses to the questions. Polygraph machines have been used in this way by law enforcement agencies for many years. The principle behind the test is that the act of lying causes an involuntary change in the autonomic nervous system, which can be detected by the polygraph. The accuracy of polygraph machines, however, is controversial, and in many courts they are inadmissible as evidence. More recently, some researchers have tried to create a new generation of lie detectors that can measure activity in the brain directly. These techniques look for patterns in the brain that, at least in theory, correlate with lying.

One technique that might be adapted to the use of lie detectors is electroencephalography, more commonly referred to as EEG. During an EEG recording, electrodes are placed at various locations on the scalp. These electrodes are capable of picking up the electrical activity produced by neurons located in different parts of the brain. Although the activity of individual neurons cannot be identified, the patterns of electrical activity produced by thousands of neurons working together can be a sign that the brain is functioning in a particular way. EEGs may be useful as lie detectors by identifying event-related potentials (ERPs). An ERP is a brief electrical change that occurs at a reliable point in time relative to a specific event. For example, it has been found that 300 to 500 ms after a person has been shown something that is unexpected or novel, there is a brief electrical change in that person's EEG. Theoretically, this ERP could be used to determine if a subject has previous knowledge of a piece of evidence. For instance, an ERP occurring 300 ms after being shown a picture of the murder weapon might indicate that the suspect had not seen the murder weapon before.

More recently, functional magnetic resonance imaging (fMRI) has been suggested as a potential method for lie detection. fMRI works by detecting the increase in blood flow to more active

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regions in the brain. This is not to be confused with structural MRIs, which can only create an image of tissues, bones, and so on. When a person performs a task in an fMRI (e.g., adding two numbers together), the brain regions required to perform the task will become active. This activity will cause a change in blood flow that the fMRI can detect. Because different brain regions are involved in recounting an actual event than are involved in making up a story, it is possible that fMRI is capable of determining whether someone is lying or telling the truth. Some researchers have found that, even if a lie is well rehearsed, it still appears to activate different brain regions than telling the truth does.

Despite media interest in new forms of lie detection, many experts agree that the EEG and fMRI approaches currently suffer from the same issues that polygraphs do. For example, although the newer techniques measure brain activity much more directly, there is concern about their reliability. Although certain brain activity might suggest that a person is lying, unless the technology can deliver accuracy of almost 100 percent, innocent people may be convicted of crimes they did not commit. It is also unclear whether people could find ways to "trick" the machines by performing certain mental tasks during testing. Until these questions can be answered, it is unlikely that the polygraph will be replaced anytime soon.

Farah, M. J., Hutchinson, J. B., Phelps, E. A., & Wagner, A. D. (2014). Functional MRI-based lie detection: Scientific and societal challenges. *Nature Reviews | Neuroscience*, *15*, 123–131.

Ganis, G., Kosslyn, S., Stose, S., Thompson, W., & Yurgelun-Todd, D. (2003). Neural correlates of different types of deception: An fMRI investigation. *Cerebral Cortex*, *13*(8), 830–836.

Wolpe, P., Foster K., & Langleben, D. (2005). Emerging neurotechnologies for lie detection: Promises and perils. *American Journal of Bioethics*, *5*(2), 39–49.

Lecture Launcher 2.10 Women, Men, and PETs

The 1990s were dubbed "the decade of the brain," and it is true that remarkable advances have been made by the neurosciences in discovering how the brain operates. Several studies suggest that the operation of men's and women's brains may differ in significant ways.

For example, Ruben Gur and his colleagues at the University of Pennsylvania recorded positron emission tomography (PET) scans of men and women who were asked to think of nothing in particular. That is, the research participants were instructed to relax and let their brains idle as they exerted as little mental effort as possible. The researchers found that for most participants the task was difficult to complete; PET scans revealed that these idle minds nonetheless hummed with activity. The locus of that activity, however, differed between the sexes. Men's brains often showed activity in the limbic system, whereas women often showed activity in the posterior cingulate gyrus. The meaning of these differences is difficult to interpret; the difficulty is compounded by the 13 men and 4 women who showed patterns of activity characteristic of their opposite sex peers. As an early peek into the brain, however, they hint that the centers of activity

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for "blank" brains differ for women and men.

In a separate study, researchers at the University of California, Irvine, asked 22 men and 22 women to solve SAT math problems while undergoing a PET scan. Half of each group had SAT math scores above 700, whereas the other half had scores below 540. The temporal lobes of the 700+ men showed heightened activity during the math task, although this was not true for the women; the 700+ women's temporal lobes were no more intensively used than those of the women scoring below 540. Richard Haier, who helped lead the study, speculates that women in the top group might be using their brains more efficiently than women in the average-scoring group. More generally, although both men and women did well at the task, their brains were operating differently to accomplish it.

Ruben and Raquel Gur also studied men's and women's brains in response to emotional expressions (Erwin et al., 1992). Shown pictures of either happy or sad faces, both men and women were quite adept at spotting happiness. Women, however, could identify sadness about 90 percent of the time, regardless of whether it was on the face of a man or a woman. By comparison, men were accurate in spotting sadness 90 percent of the time on a man's face but only 70 percent of the time if the expression was on a woman's face. Once again, PET scans revealed that women's brains did not have to work as hard at this task as did men's brains; in fact, women's limbic systems were less active than the limbic systems of the poor-scoring men.

There are a number of other differences between women's and men's brains. Women tend to have a larger corpus callosum than men, for example. Women may also have a higher concentration of neurons in their cortexes than men. But the meaning behind these differences is a matter that is far from decided.

Begley, S. (1995, March 27). Gray matters. *Newsweek*, 48–54.

Erwin, R. J., Gur, R. C., Gur, R. E., Skolnick, B. et al. (1992). Facial emotion discrimination I: Task construction and behavioral findings in normal subjects. *Psychiatry Research*, *42*, 231–240.

Zaldi, Z. (2010). Gender differences in human brain: A review. *The Open Anatomy Journal*, *2*, 37–55.

Lecture Launcher 2.11 Using fMRI and MEG to Study Phantom Limb Pain

The concept of pain sensation means different things to different people. Many students are aware of phantom pain sensation and are very curious about it. Medical professionals have recorded many cases of what has come to be called "phantom limbs." Phantom limb phenomenon occurs when a person who has had an amputation of some body part, such as an arm or leg, reports feeling sensations from the missing limb. Phantom limb refers to the subjective sensory awareness of an amputated body part and may include numbness, itchiness, temperature, posture, volume, or movement. For example, one man whose left arm was amputated just above the elbow during a horrific car accident claimed that he could still feel the

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arm as a kind of ghostly presence. He could feel himself wiggling nonexistent fingers and "grabbing" objects that would have been in his reach had his arm still been there (Ramachandran & Blakeslee, 1998). Phantom sensations may take years to fade and usually do so from the end of the limb up to the body—in other words, a phantom arm seems to get shorter and shorter until it can no longer be felt. In addition to legs and arms there have been cases of phantom breasts, bladders, rectums, vision, hearing, and internal organs.

Phantom limb pain refers to the specific case of painful sensations that appear to reside in the amputated body part. Patients have variously reported pins-and-needles sensations, burning sensations, shooting pains that seem to travel up and down the limb, and cramps, as though the severed limb was in an uncomfortable and unnatural position. Many amputees often experience several types of pain; others report that the sensations are unlike other pain they've experienced. Unfortunately, some estimates suggest that over 70 percent of amputees still experience intense pain even 25 years after amputation. Most treatments for phantom limb pain (there are over 50 types of therapy) help only about 7 percent of sufferers.

What causes these phantom sensations? Researchers at Humboldt University in Berlin have suggested that the most severe type of this pain occurs in amputees whose brains undergo extensive sensory reorganization. Magnetic responses were measured in the brains of 13 arm amputees in response to light pressure on their intact thumbs, pinkies, lower lips, and chins. These responses were then mapped onto the somatosensory cortex controlling that side of the body. Because of the brain's contralateral control over the body, the researchers were able to estimate the location of the somatosensory sites for the missing limb. They found that those amputees who reported the most phantom limb pain also showed the greatest cortical reorganization. Somatosensory areas for the face encroached into regions previously reserved for the amputated fingers.

Renowned neuroscientist Dr. V. S. Ramachandran has investigated many cases of phantom limb sensations in his career. He believes that using the noninvasive techniques of magnetoencephalograms and functional MRIs to examine people who experience these phenomena can teach us much about the relationship between sensory experience and consciousness. Researchers have long known that touching certain points on the stump of the amputation (and in some cases on the person's face) can produce phantom sensations in a missing arm or fingers (Ramachandran & Hirstein, 1998). Older explanations of phantom limb sensations have called it an illusion brought on by the irritation of the nerve endings in the stump due to scar tissue. But using anesthesia on the stump does not remove the phantom limb sensations or the pain experienced by some patients in the missing limb, so that explanation is not adequate. Ramachandran and colleagues suggest instead that phantom limb sensations may occur because areas of the face and body near the stump "take over" the nerve functions that were once in the control of the living limb, creating the false impression that the limb is still

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there, feeling and moving. This "remapping" of the limb functions, along with the sensations from the neurons ending at the stump, and the person's mental "body image" work together to produce phantom limb sensations.

Although these findings do not by themselves solve the riddle of phantom limb pain, they do offer avenues for future research. For example, damage to the nervous system may cause a strengthening of connections between somatosensory cells and the formation of new ones. Phantom limb pain may result due to an imbalance of pain messages from other parts of the brain. As another possibility, pain may result from a remapping of somatosensory areas that infringes on pain centers close by.

Boas, R. A., Schug, S. A., & Acland, R. H. (1993). Perineal pain after rectal amputation: A 5-year follow-up. *Pain*, 52, 67–70.

Bower, B. (1995). Brain changes linked to phantom-limb pain. *Science News*, *147*, 357.

Brena, S. F., & Sammons, E. E. (1979). Phantom urinary bladder pain – Case report. *Pain*, *7*, 197–201.

Bressler, B., Cohen, S. I., & Magnussen, F. (1955). Bilateral breast phantom and breast phantom pain. *Journal of Nervous and Mental Disease*, *122*, 315–320.

Dorpat, T. L. (1971). Phantom sensations of internal organs. *Comprehensive Psychiatry*, *12*, 27–35.

Katz, J. (1993). The reality of phantom limbs. *Motivation and Emotion*, *17*, 147–179.

Ramachandran, V. S., & Blakeslee, S. (1998). *Phantoms in the brain*. New York: William Morrow.

Ramachandran, V. S., & Hirstein, W. (1998). The perception of phantom limbs: The D. O. Hebb lecture. *Brain*, *121*, 1603–1630.

Shreeve, J. (1993, June). Touching the phantom. *Discover*, 35–42.

Lecture Launcher 2.12 The Importance of a Wrinkled Cortex

At the beginning of your lecture on the structure and function of the brain, ask students to explain why the cerebral cortex is wrinkled. There are always a few students who correctly answer that the wrinkled appearance of the cerebral cortex allows it to have a greater surface area while fitting in a relatively small space (i.e., the head). To demonstrate this point to your class, hold a plain, white sheet of paper in your hand and then crumple it into a small, wrinkled ball. Note that the paper retains the same surface area yet is now able to fit into a much smaller space, such as your hand. You can then mention that the brain's actual surface area, if flattened out, would be roughly the size of a newspaper page. Laughs usually erupt when the class imagines what our heads would look like if we had to accommodate an unwrinkled, newspaper-sized cerebral cortex!

Lecture Launcher 2.13 Brain's Bilingual Broca

Se potete parlare Italiano, allore potete capire questa sentenza. Of course, if you only speak English, you probably only understand *this* sentence. If you speak both languages, then by this point in the paragraph you should be really bored.

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Bilingual speakers who come to their bilingualism in different ways show different patterns of brain activity. Joy Hirsch of Memorial Sloan-Kettering Cancer Center in New York and her colleagues monitored the activity in Broca's area in the brains of bilingual speakers who acquired their second language starting in infancy and compared it to the activity of bilingual speakers who adopted a second language in their teens. Participants were asked to silently recite brief descriptions of an event from the previous day, first in one language and then in the other. A functional magnetic resonance image (fMRI) was taken during this task. All of the 12 adult speakers were equally fluent in both languages, used both languages equally often, and represented speakers of English, French, and Turkish, among other tongues.

Hirsch and her colleagues found that among the infancy-trained speakers, the same region of Broca's area was active, regardless of the language they used. Among the teenage-trained speakers, however, a different region of Broca's area was activated when using the acquired language. Similar results were found in Wernicke's area in both groups. Although the full meaning of these results is a matter of some debate (i.e., do they reflect sensitivity in Broca's area to language exposure or pronounced differences in adult versus childhood language learning?), they nonetheless reveal an intriguing link between *la testa e le parole*.

Bower, B. (1997, July 12). Brains show signs of two bilingual roads. *Science News*, *152*, 23.

Lecture Launcher 2.14 A New Look at Phineas Gage

For over 30 years, Jack and Beverly Wilgus had a daguerreotype portrait (i.e., a type of early photograph) of a well-dressed young man with one eye closed. Because the photograph showed the young man holding what appeared to be part of a harpoon, the Wilguses believed that the man was a nineteenth-century whaler who had lost his eye, perhaps in a whaling accident. It was only after a copy of the portrait was posted online that the couple was told that the object in the man's hands did not appear to be a harpoon. Then, in 2008, a person viewing the image online posted a comment that the young man may be Phineas Gage, making the "harpoon" the infamous tamping rod that was blasted through his skull and brain. By carefully examining the rod in the daguerreotype and by comparing the young man's face to the cast made of Gage's head after his death, the Wilguses were able to confirm that the portrait is almost certainly that of Phineas Gage, made sometime after his accident. Importantly, this is the only known photograph of the man who became one of the most famous case studies in psychology.

One of the consequences of the portrait's discovery has been a renewed debate about how Gage's injuries affected his personality and behavior. Many psychology textbooks explain that the accident left Gage a permanently changed man with his once well-balanced, gregarious, and hardworking personality replaced with profane, inconsiderate, and impulsive behavior for the rest of his life. This, however, is not necessarily supported by the few original sources researchers have to go on. For example, although the evidence clearly indicates that Gage had major psychological changes for a period after his accident, we also know that Gage later spent

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many years driving stagecoaches before he died in 1860, 12 years after the accident. Many have questioned whether the postaccident Phineas Gage commonly described in introductory psychology classes could have performed the tasks required to drive a stagecoach, interact with passengers, and be reliable enough to maintain employment for long periods at a time. Does this indicate that many of the psychological changes Gage suffered were temporary? Certainly the newly discovered daguerreotype of a healthy-looking and well-kept Phineas Gage lends further support to the idea that Phineas was able to largely recover from his accident, both physically and mentally. If true, the case of Phineas Gage may be as much a story about the incredible plasticity of the brain and its ability to compensate for the loss of specific brain regions as it is about the localization of specific functions.

The newly discovered portrait of Phineas Gage can be found by searching online for "Phineas Gage daguerreotype."

Macmillan, M. (2008). Phineas Gage–Unraveling the myth. *The Psychologist*, *21*(9), 828–831.

Lecture Launcher 2.15 Freak Accidents and Brain Injuries

Students may be interested in the unusual cases of individuals who have experienced brain injuries due to freak accidents with nail guns. One example involved Isidro Mejia, a construction worker in Southern California, who had six nails driven into his head when he fell from a roof onto his coworker who was using a nail gun. (X-ray images of the embedded nails can be found at several sites online.) Incredibly, none of the nails caused serious damage to Mejia's brain. One nail lodged near his spinal cord, and another came very close to his brain stem. Immediate surgery and treatment with antibiotics prevented deadly infections that could have been caused by the nails. In a similar accident, a construction worker in Colorado ended up with a nail lodged in his head due to a nail gun mishap. Unlike Mejia, Patrick Lawler didn't realize he had a nail in his head for 6 days. The nail was discovered when he visited a dentist due to a "toothache." It appears that Lawler fired a nail into the roof of his mouth. The nail barely missed his brain and the back of his eye.

Nail Gun /Victim Lives. (2004, September 10). *Current Science*, *90*(1), 14.
Additional resources can be found by searching "Isidro Mejia" or "Patrick Lawler" online.

Lecture Launcher 2.16 Understanding Hemispheric Function

A variation on the rather dubious statement that "we only use one tenth of our brain" is that "we only use one half (hemisphere) of our brain." Research suggests that each cerebral hemisphere is specialized to perform certain tasks (e.g., left hemisphere/language; right hemisphere/ visuospatial relationships) with the abilities of one hemisphere being complementary to the other. From this claim came numerous distortions, oversimplifications, and unwarranted extensions, many of which are discussed in two interesting reviews of this trend toward

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"dichotomania" (Corballis, 1980; Levy, 1985). For example, the left hemisphere has been described variously as logical, intellectual, deductive, convergent, and "Western," whereas the right hemisphere has been described as intuitive or creative, sensuous, imaginative, divergent, and "Eastern." Even complex tasks are described as right or left hemispheric because of their language component. In every individual one hemisphere supposedly dominates, affecting that person's mode of thought, skills, and approach to life. One commonly cited but questionable test for dominance is to note the direction of gaze when a person is asked a question (left gaze signaling right-hemispheric activity, right gaze showing left-hemispheric activity). Advertisements have claimed that artistic abilities can be improved if the right hemisphere is freed, and public schools have been blamed for stifling creativity by emphasizing left-hemispheric skills and by neglecting to teach to the children's right hemisphere.

Corballis and Levy explode these myths and trace their development. In reality, the two hemispheres are quite similar and can function remarkably well even if separated by split-brain surgery. Each hemisphere does have specialized abilities, but the two hemispheres work together in all complex tasks. For example, writing a story involves left-hemispheric input concerning syntax but right-hemispheric input for developing an integrated structure and for using humor or metaphor. The left hemisphere is neither the sole determinant of logic nor is the right hemisphere essential for creativity. Disturbances of logic are more prevalent with right-hemispheric damage, and creativity is not necessarily affected. Although one hemisphere can be somewhat more active than the other, no individual is purely "right brained" or "left brained." Also, eye movement and hemispheric activity patterns poorly correlate with cognitive style or occupation. Finally, because of the coordinated, interactive manner of the functioning of both hemispheres, educating or using only the right or left hemisphere is impossible (without split-brain surgery).

Corballis, M. C. (1980). Laterality and myth. *American Psychologist*, *35*, 284–295.
Levy, J. (1985). Right brain, left brain: Fact or fiction? *Psychology Today*, *19*, 38–45.

Lecture Launcher 2.17 Handedness, Eyedness, Footedness, Facedness

Although the title sounds like a Dr. Seuss rhyme, it actually does make sense to neuropsychologists. Most people are familiar with the concept of handedness. The human population is distributed across many people who are adept at using their right hands for most tasks, some who have greater skill using the left hand, and a smaller proportion of those who are equally skilled using either hand (or who alternate hands for certain tasks). The concepts of footedness, leggedness, eyedness, and facedness may be less familiar to the layperson, although they stem from the same principle as handedness.

The basis of these distinctions lies in the concept of laterality. Just as the cerebral hemispheres show specialization (e.g., left hemisphere for language functions, right hemisphere for visual-spatial functions), so too are there preferences or asymmetries in other body regions. The concept

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of eyedness, then, refers to the preference for using one eye over another, such as when squinting to thread a needle. Footedness and leggedness similarly refer to a preference for one limb over the other; drummers and soccer players will attest to the importance of being equally adept at using either foot and to the difficulty in achieving that skill. Finally, facedness refers to the strength with which information is conveyed by the right or left side of the face. It has been suggested that verbal information shows a right-face bias whereas emotional expressions are more strongly shown on the left side of the face, although these conclusions remain somewhat controversial.

Why are these distinctions useful? They play their largest role in the areas of sensation and perception, engineering psychology, and neuropsychology. Studies of reaction time, human-machine interaction, ergonomic design, and so on, take into account the preferences and dominance of some body systems over others. In the case of facedness and emotional expression, researchers are working to illuminate the link between facial expressions and cerebral laterality. Given the right hemisphere's greater role in emotional activities, the contralateral control between the right hemisphere and the left hemiface becomes an important proving ground for investigating both brain functions and the qualities of expression.

Borod, J. C., Caron, H. S., & Koff, E. (1981). Asymmetry of facial expression related to handedness, footedness, and eyedness: A quantitative study. *Cortex*, *17*, 381–390.

Ekman, P., Hagar, C. J., & Friesen, W. V. (1981). The symmetry of emotional and deliberate facial actions. *Psychophysiology*, *18*, 101–106.

Friedlander, W. J. (1971). Some aspects of eyedness. *Cortex*, *7*, 357–371.

McGuigan, F. J. (1994). *Biological psychology: A cybernetic science.* Englewood Cliffs, NJ: Prentice Hall.

Sackheim, H. A., Gur, R. C., & Saucy, M. C. (1978). Emotions are expressed more intensely on the left side of the face. *Science*, *202*, 434–436.

Lecture Launcher 2.18 Workplace Problems: Left-Handedness

Within Canada and the United States, there are approximately 33 million people who are left-handed. It has been shown that left-handed individuals are 25 percent more likely in general and 51 percent more likely if working with tools and machinery to have accidents at work than are right-handed individuals. Accommodations such as being able to rearrange the work area and having tools available that are both left- and right-handed would make the workplace safer. Have students suggest ways that the workplace could be made safer or even what could be done in the classroom to make it easier for students who are left-handed to take notes or tests. What about the mouse on computers? The mouse is actually made for people who are right-handed. How adaptable must a left-handed person become in order not to be frustrated by using a right-handed mouse?

Resources can be found by searching handedness and safety online.

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Lecture Launcher 2.19 The Results of a Hemispherectomy

When Matthew was 6 years old, surgeons removed half of his brain.

His first 3 years of life were completely normal. Just before he turned 4, however, Matthew began to experience seizures that did not respond to drug treatment. The seizures were both life threatening and frequent (as often as every 3 minutes). The eventual diagnosis was Rasmussen's encephalitis, a rare and incurable condition of unknown origin.

The surgery, a hemispherectomy, was performed at Johns Hopkins Hospital in Baltimore. A few dozen such operations are performed each year in the United States, usually as a treatment for Rasmussen's and for forms of epilepsy that destroy the cortex but do not cross the corpus callosum. After surgeons removed Matthew's left hemisphere, the empty space quickly filled with cerebrospinal fluid.

Although the surgery left a scar that ran along one ear and disappeared under his hair, his face had no lopsidedness. The only other visible effects of the operation were a slight limp and limited use of his right arm and hand. Matthew had no right peripheral vision in either eye. He had weekly speech and language therapy sessions. For example, a therapist displayed cards that might say "fast things" and Matthew had to name as many fast things as he could in 20 seconds. He did not offer as many examples as other children his age. However, he made progress in the use of language, perhaps as a result of fostering and accelerating the growth of dendrites.

Matthew's case indicates the brain's remarkable plasticity. Furthermore, it is interesting to note that Matthew's personality never changed throughout the seizures and surgery.

Boyle, M. (1997, August 1). Surgery to remove half of brain reduces seizures. *Austin American-Statesman*, A18.

Rasmussen, T., Olszewski, J., & Lloyd-Smith, D. (1958). Focal seizures due to chronic localized encephalitis. *Neurology*, *8*(6), 435–445.

Swerdlow, J. L. (1995, June). Quiet miracles of the brain. *National Geographic*, *87*, 2–41.

Vining, E. P., Freeman, J. M., Pillas, D. J., Uematsu, S., Carson, B. S., Brandt, J., Boatman, D., Pulsifer, M. B., & Zuckerberg, A. (1997). Why would you remove half a brain? The outcome of 58 children after hemispherectomy—the Johns Hopkins experience: 1968 to 1996. *Pediatrics*, *100*(2 Pt 1), 163–171.

Lecture Launcher 2.20 Stressed? Not Much!

When beginning a discussion on the parts of the nervous system, remind students that the autonomic nervous system is set up to provide balance between excitation and relaxation in the body. Ask students to describe the last time they felt stress and trace it back to the functions of the sympathetic nervous system. Ask them to think about the last time a long-term stressor finally was gone and they felt the calming effects of the parasympathetic nervous system. The sympathetic nervous system is set up to prepare us to fight or flee a major stressor. Use that to explain the changes in the body seen when the sympathetic nervous system is activated. Changes

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such as dilated pupils, increased heart rate, decreased digestion, and increased glucose release all are parts of sympathetic nervous system activation that helps us prepare to fight or flee. Ask students to predict the effects of parasympathetic activation in the body.

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CLASSROOM ACTIVITIES, DEMONSTRATIONS, AND EXERCISES

- 2.1 Using Dominoes to Understand the Action Potential
- 2.2 Environmental Influences on the Brain
- 2.3 Demonstrating Neural Conduction: The Class as a Neural Network
- 2.4 The Dollar Bill Drop
- 2.5 Reaction Time and Neural Processing
- 2.6 Mapping the Brain
- 2.7 Football and Brain Damage
- 2.8 Hemispheric Lateralization
- 2.9 Hemispheric Communication and the Split Brain
- 2.10 Crossword Puzzle
- 2.11 Fill in the Blanks
- 2.12 Diagnostic Brain Imaging or Electrophysiology

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Activity 2.1 Using Dominoes to Understand the Action Potential

Walter Wagor suggests using real dominoes to demonstrate the so-called domino effect of the action potential as it travels along the axon. For this demonstration, you'll need a smooth tabletop surface (at least 5 feet long) and one or two sets of dominoes. Set up the dominoes beforehand, on their ends and about an inch apart, so that you can push the first one over and cause the rest to fall in sequence. Proceed to knock down the first domino in the row and students should clearly see how the "action potential" is passed along the entire length of the axon. You can then point out the concept of refractory period by showing that, no matter how hard you push on the first domino, you will not be able to repeat the domino effect until you take the time to set the dominoes back up (i.e., the resetting time for the dominoes is analogous to the refractory period for neurons). You can then demonstrate the all-or-none characteristic of the axon by resetting the dominoes and pushing so lightly on the first domino that it does not fall. Just as the force on the first domino has to be strong enough to knock it down before the rest of the dominoes will fall, the action potential must be there in order to perpetuate itself along the entire axon. Finally, you can demonstrate the advantage of the myelin sheath in axonal transmission. For this demonstration, you'll need to set up two rows of dominoes (approximately 3 or 4 feet long) next to each other. The second row of dominoes should have foot-long sticks (e.g., plastic rulers) placed end to end in sequence on top of the dominoes. By placing the all-domino row and the stick-domino row parallel to each other and pushing the first domino in each, you can demonstrate how much faster the action potential can travel if it can jump from node to node rather than having to be passed on sequentially, single domino by single domino. Ask your students to discuss how this effect relates to myelinization.

Wagor, W. F. (1990). Using dominoes to help explain the action potential. In V. P. Makosky, C. C. Sileo, L. G. Whittemore, C. P. Landry, & M. L. Skutley (Eds.), *Activities handbook for the teaching of psychology: Vol. 3* (pp. 72–73). Washington, DC: American Psychological Association.

Activity 2.2 Environmental Influences on the Brain

You might want to remind students that brain function and structure are subject to environmental influences. Ask students to identify the behaviors that are important for keeping the brain healthy and functioning well. The following are some possibilities:

Good nutrition, especially during childhood. Adequate nutrition is vital for proper brain development. Even in adults, diet may influence brain function. Studies show that although high levels of cholesterol may be bad for your heart, low levels of cholesterol may be bad for your brain. Low cholesterol may be associated with low levels of the neurotransmitter serotonin, which can result in higher levels of aggression and depression.

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Mental stimulation. High levels of stimulation help to form neural connections that in turn enhance brain function.

Physical fitness. Studies have shown that aerobic fitness has an impact on the density of capillaries in the brain. More capillaries result in greater blood flow to the brain.

Maternal health during pregnancy. The uterine environment can have an enormous impact on the brain development of a fetus. Women who do not have adequate nutrition, who drink, smoke, or do drugs, or who are exposed to certain environmental toxins are more likely to have children with lower IQs and learning disabilities.

Stress management. When we are highly stressed, it interferes with brain function and has been shown to actually promote the death of brain cells involved in memory.

Activity 2.3 Demonstrating Neural Conduction: The Class as a Neural Network

In this engaging exercise suggested by Paul Rozin and John Jonides, students in the class simulate a neural network and get a valuable lesson in the speed of neural transmission. Depending on your class size, arrange 15 to 40 students so that students can place their right hand on the right shoulder of the person in front of them. Note that students in every other row will have to face backward to form a snaking chain so that all students (playing the role of individual neurons) are connected to each other. Explain to students that their task as a neural network is to send a neural impulse from one end of the room to the other. The first student in the chain will squeeze the shoulder of the next person who, upon receiving this "message," will deliver (i.e., "fire") a squeeze to the next person's shoulder and so on, until the last person receives the message. Before starting the neural impulse, ask students (as "neurons") to label their parts; they typically have no trouble stating that their arms are axons, their fingers are axon terminals, and their shoulders are dendrites.

To start the conduction, the instructor should start the timer on a stopwatch while simultaneously squeezing the shoulder of the first student. The instructor should then keep time as the neural impulse travels around the room, stopping the timer when the last student/neuron calls out "stop." This process should be repeated once or twice until the time required to send the message stabilizes (i.e., students will be much slower the first time around as they adjust to the task). Next, explain to students that you want them to again send a neural impulse, but this time you want them to use their ankles as dendrites. That is, each student will "fire" by squeezing the ankle of the person in front of them. While students are busy shifting themselves into position for this exercise, ask them if they expect transmission by ankle squeezing to be faster or slower than transmission by shoulder squeezing. Most students will immediately recognize that the ankle squeezing will take longer because of the greater distance the message (from the ankle as

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opposed to the shoulder) has to travel to reach the brain. Repeat this transmission once or twice and verify that it indeed takes longer than the shoulder squeeze.

This exercise—a student favorite—is highly recommended as a great icebreaker during the first few weeks of the semester, and it also makes the somewhat dry subject of neural processing come alive.

Rozin, P., & Jonides, J. (1977). Mass reaction time measurement of the speed of the nerve impulse and the duration of mental processes in class. *Teaching of Psychology*, *4*, 91–94.

Activity 2.4 The Dollar Bill Drop

After engaging in the neural network exercise, follow it up with the "dollar bill drop" (Fisher, 1979), which not only delights students but also clearly illustrates the speed of neural transmission. Ask students to get into pairs and to come up with one crisp, flat, one-dollar bill between them (or something larger, if they trust their fellow classmates!). First, each member of the pair should take turns trying to catch the dollar bill with their nondominant (for most people, the left) hand as they drop it from their dominant (typically right) hand. To do this, they should hold the bill vertically so that the top center of the bill is held by the thumb and middle finger of their dominant hand. Next, they should place the thumb and middle finger of their nondominant hand around the dead center of the bill, as close as they can get without touching it. When students drop the bill from one hand, they should be able to easily catch it with the other before it falls to the ground.

Now that students are thoroughly unimpressed, ask them to replicate the drop, only this time one person should try to catch the bill (i.e., with the thumb and middle finger of the nondominant hand) while the other person drops it (i.e., from the top center of the bill). Student "droppers" are instructed to release the bill without warning, and "catchers" are warned not to grab before the bill is dropped. (Students should take turns playing dropper and catcher.) There will be stunned looks all around as dollar bills whiz to the ground. Ask students to explain why it is so much harder to catch it from someone other than themselves. Most will instantly understand that when catching from ourselves, the brain can simultaneously signal us to release and catch the bill, but when trying to catch it from someone else, the signal to catch the bill can't be sent until the eyes (which see the drop) signal the brain to do so, which is unfortunately a little too late.

Fisher, J. (1979). *Body magic*. Briarcliff Manor, NY: Stein and Day.

Activity 2.5 Reaction Time and Neural Processing

Yet another exercise that illustrates the speed of neural processing is suggested by E. Rae Harcum. The point made by this simple but effective exercise is that reaction times increase as

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more response choices become available (i.e., because more difficult choices in responses involve more neuronal paths and more synapses, both of which slow neural transmission). Depending on your class size, recruit two equal groups of students (10 to 20 per group is ideal) and have each group stand together at the front of the room. First, explain that all subjects are to respond as quickly as possible to the name of a U.S. president. Then give written instructions to each group so that neither group knows the instructions given to the other. One group should be instructed to raise their right hands if the president served before Abraham Lincoln and to raise their left hands if the president served after Lincoln. The other group should be instructed simply to raise their left hands when they hear a president's name. Ask participants and audience members to note which group reacts more quickly. When all students are poised and ready to go (i.e., hands level with shoulders and ready to raise), say "ready" and then "Reagan." The group with the simpler reaction time task should be faster than the group whose task requires a choice.

Harcum, E. R. (1988). Reaction time as a behavioral demonstration of neural mechanisms for a large introductory psychology class. *Teaching of Psychology*, *4*, 208–209.

Activity 2.6 Mapping the Brain

To engage students in learning brain anatomy, search online for some simple coloring pages that contain the lobes of the brain, Broca's and Wernicke's areas, and the primary motor cortex and somatosensory cortex. Ask students to color in the regions and, using their color coding, list the function of each of the areas they colored.

Activity 2.7 Football and Brain Damage

Coaches and medical experts have known for a while that the severe hits that football players take on the field can lead to concussions, blackouts, and permanent damage. More recently, however, there has been increasing concern that the effects of repeated hits to the head may not manifest themselves until decades later. Early studies suggest that former National Football League (NFL) players suffer high rates of memory and other cognitive problems years after retiring and that they also may develop these problems earlier than non-football players do. NFL players may also be vulnerable to higher rates of depression and Alzheimer's disease.

To investigate this problem, groups like the Sports Legacy Institute have begun to encourage former NFL players to donate their brains to science when they die. Already, the brains of a handful of players have been examined with shocking results. Almost all of the brains show high levels of a protein called *tau*, which is suspected of being involved in several neurodegenerative disorders including Alzheimer's disease. The presence of high levels of tau may explain why football players have a tendency to develop cognitive impairments long after their playing days

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are over. More disturbing still, high levels of tau were also found in the brain of an 18-year-old high school football player who died.

After introducing students to this issue, have the class discuss the possible implications for social and sports policy. Should football playing be stopped? Should the rules of the game be changed to eliminate hard hitting? If necessary, pose the following additional questions to stimulate discussion: Everyone knows football is dangerous, but does the fact that these cognitive impairments may take decades to develop make them somehow different? Is the risk of permanent cognitive disability different than the risk of permanent physical disability? Wrestlers, soccer players, boxers, and other types of athletes are also at risk for long-term brain damage. Should these sports be changed or banned?

After discussing the issue in class, have students respond to the following writing prompt.

Writing prompt: Describe a longitudinal and then a cross-sectional study that could be used to determine if professional football players show higher than normal rates of cognitive impairment. Explain some of the advantages and disadvantages of the two designs.

Sample answer: A longitudinal study might choose a few football players and test them every 10 years using the same cognitive tests to see how their abilities change over time. A cross-sectional study might find a group of 65-year-old retired football players and compare their cognitive functioning to 65-year-olds who did not play football. The longitudinal study would provide a more complete view of how cognitive function might decline but would take decades to complete and may suffer from attrition. The cross-sectional study would be a lot easier to perform but would only offer a "snapshot" of cognitive function. You could not tell, for example, if football players develop cognitive impairment earlier than non-football players typically do.

Miller, G. (2009). A late hit for pro football players. *Science*, *7*, 670–672.

Activity 2.8 Hemispheric Lateralization

Hemispheric lateralization results in eyedness, handedness, footedness, earedness, facedness, and other silly-sounding words with important implications (see related Lecture Launcher 2.17). Lateralization results from the specialization of each hemisphere for different tasks, such as reading facial expressions, speaking, solving spatial problems, or performing analytic tasks. Although neuropsychologists use sophisticated measures to determine this lateralization, this simple exercise allows students to gauge their own brain organization.

With both eyes open, have students hold up their right thumbs at arm's length under an object across the room directly in front of them. As they alternately close their left and right eyes, their thumbs should appear to jump to the right or to the left with respect to the distant object. For those who are right-eyed, their thumbs should jump to the right when they close their right eyes

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but stay as is when they close their left eyes. The opposite pattern should occur among those who are left-eyed. Students who see little or no jumping are among the 41 percent of the population who are neither strongly left-eyed nor right-eyed.

As a second test, ask for a volunteer. Present the student with the first paragraph of this exercise (or any suitable short passage) to memorize, a yardstick, a clock with a second hand, a pencil, and a pad of paper. First, time how long the volunteer can balance the yardstick on the tip of their right index finger while standing on the right foot. Next, measure the time as the volunteer balances the yardstick on their left index finger while standing on the left foot. Finally, repeat these tests while the volunteer recites the memorized passage. Speech will be localized on the side of the brain opposite the hand that is most disrupted by the memorization task.

Another demonstration, suggested by Morton Ann Gernsbacher, requires students to move their right hand and right foot simultaneously in a clockwise direction for a few seconds. Next ask that the right hand and left foot be moved in a clockwise direction. Then have students make circular movements in opposite directions with the right hand and the left foot. Finally, have students attempt to move the right hand and right foot in opposite directions. This generally produces laughter as students discover that this procedure is most difficult to do even though they are sure before they try it that it would be no problem to perform. A simple alternative activity is to ask students to pat their heads and to rub their stomachs clockwise and then switch to a counterclockwise motion. The pat will show slight signs of rotation as well.

The brain is lateralized to some extent, which makes some activities difficult to perform. Challenge your students to explain why activities of these types are difficult to execute. This will generally lead to interesting discussions and the assertion by some students that this type of behavior is no problem. Students who have been trained in martial arts, dance, drumming, or gymnastics generally have less difficulty completing these activities due to their rigorous physical training.

Haseltine, E. (1999, June). Brain works: Your better half. *Discover*, 112.

Kemble, E. D. (1987). Cerebral lateralization. In V. P. Makosky, L. G. Whittemore, and A. M. Rogers (Eds.), *Activities handbook for the teaching of psychology* (Vol. 2) (pp. 33–36). Washington, DC: American Psychological Association.

Kemble, E. D., Filipi, T., & Gravlin, L. (1985). Some simple classroom experiments on cerebral lateralization. *Teaching of Psychology*, *12*, 81–83.

Activity 2.9 Hemispheric Communication and the Split Brain

Even after reading the textbook and listening to your lecture, many students may have difficulty conceptualizing the effects of a split-brain operation on an individual's behavior. Morris (1991) described five activities designed to simulate the behavior of split-brain patients. All of the activities have the same basic setup. You will need to solicit two right-handed volunteers and

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seat them next to each other at a table, preferably in the same chair. The volunteer on the left represents the left hemisphere, and the other student is the right hemisphere. The students are instructed to place their outer hands behind their backs and their inner hands on the table with their hands crossed, representing the right and left hands of the split-brain patient. Finally, the student representing the right hemisphere is instructed to remain silent for the remainder of the activity. In one of the activities described by Morris, both students are blindfolded and a familiar object (Morris suggested a retractable ballpoint pen) is placed in the left hand of the "split-brain patient" (the hand associated with the right hemisphere). Then ask the "right hemisphere" student if they can identify the object, reminding them that they must do so nonverbally. Next, ask the "right hemisphere" to try to communicate, without using language, what the object is to the "left hemisphere." Your more creative volunteers may engage in behaviors that attempt to communicate what the object is through sound or touch. If your "right hemisphere" has difficulty in figuring out how to communicate, ask the class for suggestions. This demonstration can be used to elicit discussion about why only the "left hemisphere" student can talk, the laterality of the different senses, and how split-brain patients are able to adjust their behavior to accommodate. You should refer to Morris's original article for descriptions of the other activities.

Morris, E. J. (1991). Classroom demonstration of behavioral effects of the split-brain operation. *Teaching of Psychology*, *18*, 226–228.

Activity 2.10 Crossword Puzzle

Copy and distribute **Handout Master 2.1** to students as a homework or in-class review assignment.

Answers for the crossword puzzle:

Across

1. Neurotransmitter that causes the receiving cell to stop firing. **inhibitory**
3. The cell body of the neuron, responsible for maintaining the life of the cell. **soma**
4. Endocrine gland located near the base of the cerebrum that secretes melatonin. **pineal**
7. Glands that secrete chemicals called hormones directly into the bloodstream. **endocrine**
8. Long tubelike structure that carries the neural message to other cells. **axon**
10. Chemical found in the synaptic vesicles that, when released, has an effect on the next cell. **neurotransmitter**
13. Bundles of axons coated in myelin that travel together through the body. **nerves**
14. Branchlike structures that receive messages from other neurons. **dendrites**
15. Endocrine gland found in the neck that regulates metabolism. **thyroid**

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17. Thick band of neurons that connects the right and left cerebral hemispheres. **corpus callosum**
19. Part of the nervous system consisting of the brain and spinal cord. **central**

Down
2. Part of the limbic system located in the center of the brain that acts as a relay from the lower part of the brain to the proper areas of the cortex. **thalamus**
4. Endocrine gland that controls the levels of sugar in the blood. p**ancreas**
5. Layer of fatty substances produced by certain glial cells that coats the axons of neurons to insulate, protect, and speed up the neural impulse. **myelin**
6. The basic cell that makes up the nervous system and receives and sends messages within that system. **neuron**
8. Chemical substances that mimic or enhance the effects of a neurotransmitter on the receptor sites of the next cell. **agonists**
9. Part of the lower brain that controls and coordinates involuntary, rapid, fine motor movement. **cerebellum**
11. Process by which neurotransmitters are taken back into the synaptic vesicles. **reuptake**
12. A group of several brain structures located under the cortex and involved in learning, emotion, memory, and motivation. **limbic**
16. Chemicals released into the bloodstream by endocrine glands. **hormones**
18. Brain structure located near the hippocampus, responsible for fear responses and memory of fear. **amygdala**

Activity 2.11 Fill in the Blanks

Copy and distribute **Master Handout 2.2** to students as a homework or in-class review assignment.

<u>Answers for Fill in the Blanks</u>

1. nervous system
2. neuron
3. axon
4. dendrites
5. soma
6. myelin
7. nerves
8. ions
9. resting potential
10. synaptic vesicles

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11. neurotransmitters
12. excitatory
13. agonists
14. spinal cord
15. sensory neuron
16. peripheral nervous
17. somatic nervous
18. autonomic nervous
19. sympathetic division
20. electroencephalograph
21. cerebellum
22. thalamus
23. pons
24. reticular formation
25. hippocampus
26. amygdala
27. cortex
28. corpus callosum
29. occipital cortex
30. parietal cortex
31. temporal lobes
32. frontal lobes
33. endocrine
34. adrenal glands

Activity 2.12 Diagnostic Brain Imaging or Electrophysiology

To help students begin to understand the powerful tools neurologists and neuroscientists have to learn about the brain and to help in diagnosing conditions of the brain, provide them with **Handout Master 2.3**. This handout describes people who are struggling with brain disorders who might present themselves to a doctor or clinic. Students are asked to review the section on brain-imaging technologies and determine a method they might be able to use to help in the diagnosis of the patient. There are no right or wrong answers for rookie neuroscientists, and some students may consider costs, patient condition, and other factors as well as what procedure works best in their decisions. Encouraging students to explain their reasons for selecting a specific diagnostic technology can lead into a discussion on the pros and cons of each of the brain-imaging technologies discussed in the text.

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HANDOUT MASTERS

- 2.1 Crossword Puzzle
- 2.2 Fill in the Blanks
- 2.3 Diagnostic Brain Imaging

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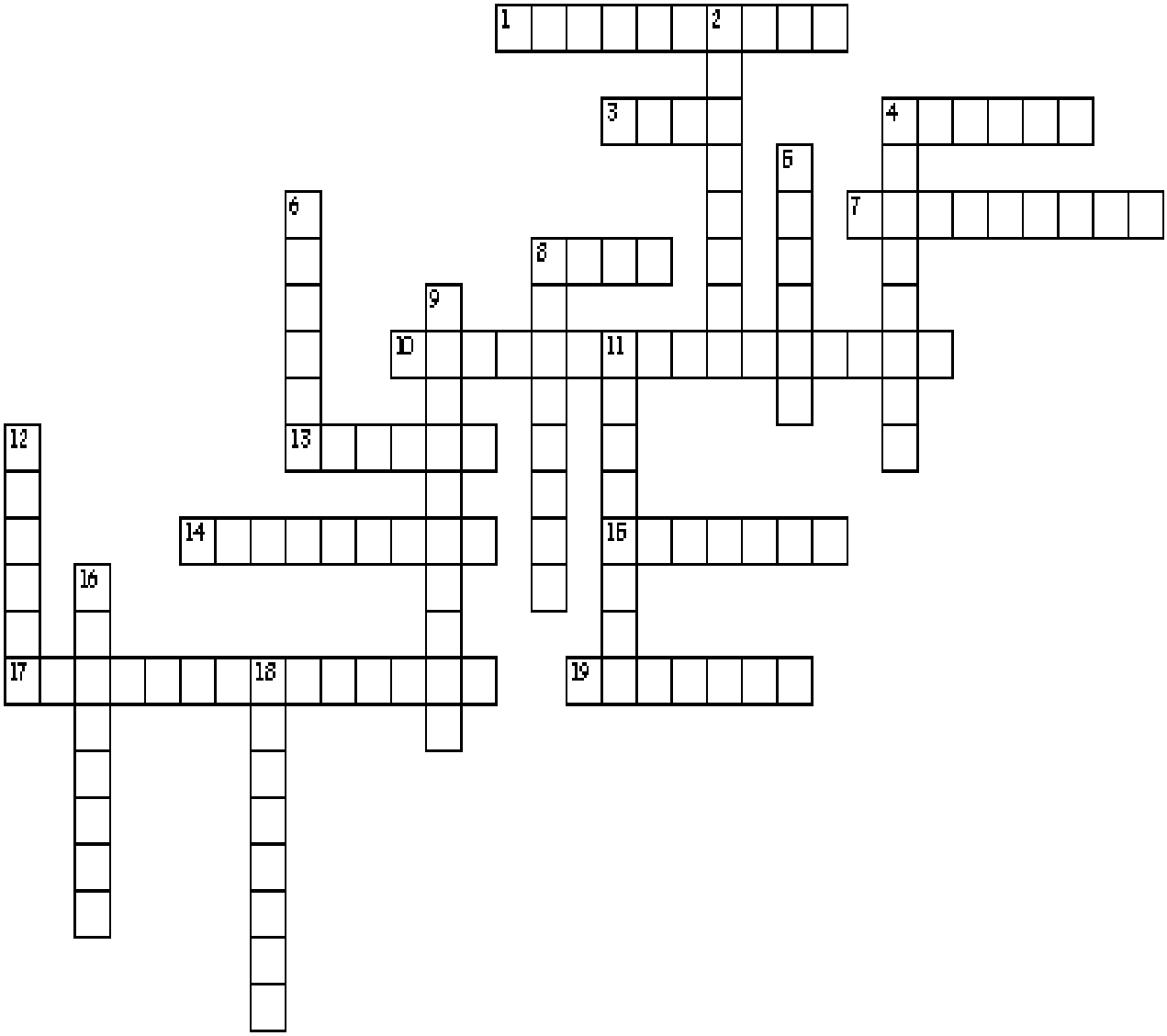
Handout Master 2.1
Crossword Puzzle



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Across

1. Neurotransmitter that causes the receiving cell to stop firing.
3. The cell body of the neuron, responsible for maintaining the life of the cell.
4. Endocrine gland located near the base of the cerebrum that secretes melatonin.
7. Glands that secrete chemicals called hormones directly into the bloodstream.
8. Long tubelike structure that carries the neural message to other cells.
10. Chemical found in the synaptic vesicles that, when released, has an effect on the next cell.
13. Bundles of axons coated in myelin that travel together through the body.
14. Branchlike structures that receive messages from other neurons.
15. Endocrine gland found in the neck that regulates metabolism.
17. Thick band of neurons that connects the right and left cerebral hemispheres.
19. Part of the nervous system consisting of the brain and spinal cord.

Down

2. Part of the limbic system located in the center of the brain that acts as a relay from the lower part of the brain to the proper areas of the cortex.
4. Endocrine gland that controls the levels of sugar in the blood.
5. Layer of fatty substances produced by certain glial cells that coats the axons of neurons to insulate, protect, and speed up the neural impulse.
6. The basic cell that makes up the nervous system and receives and sends messages within that system.
8. Chemical substances that mimic or enhance the effects of a neurotransmitter on the receptor sites of the next cell.
9. Part of the lower brain that controls and coordinates involuntary, rapid, fine motor movement.
11. Process by which neurotransmitters are taken back into the synaptic vesicles.
12. A group of several brain structures located under the cortex and involved in learning, emotion, memory, and motivation.
16. Chemicals released into the bloodstream by endocrine glands.
18. Brain structure located near the hippocampus, responsible for fear responses and memory of fear.

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Handout Master 2.2
Fill in the Blanks

1. An extensive network of specialized cells that carries information to and from all parts of the body is called the _____ _____.
2. The basic cell that makes up the nervous system and receives and sends messages within that system is called a _____.
3. The long tubelike structure that carries the neural message to other cells on the neuron is the _____
4. On a neuron, the branchlike structures that receive messages from other neurons are the _____.
5. The cell body of the neuron responsible for maintaining the life of the cell and containing the mitochondria is the _____.
6. The fatty substance produced by certain glial cells that coats the axons of neurons to insulate, protect, and speed up the neural impulse is the _____.
7. The bundles of axons in the body that travel together through the body are known as the _____.
8. The charged particles located inside and outside of the neuron are called _____.
9. The state of the neuron when not firing a neural impulse is known as the _____ _____.
10. The _____ _____ are sac-like structures found inside the synaptic knob containing chemicals.
11. _____ are chemicals found in the synaptic vesicles that, when released, have an effect on the next cell.
12. The _____ neurotransmitter causes the receiving cell to fire.
13. The _____ mimic or enhance the effects of a neurotransmitter on the receptor sites of the next cell, increasing or decreasing the activity of that cell.
14. The _____ _____ is a long bundle of neurons that carries messages to and from the body to the brain and is responsible for very fast, lifesaving reflexes.

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15. A neuron that carries information from the senses to the central nervous system and is also known as the afferent is called a _____ _____.
16. All nerves and neurons that are not contained in the brain and spinal cord but that run through the body itself are in the _____ _____ system.
17. The division of the PNS consisting of nerves that carry information from the senses to the CNS and from the CNS to the voluntary muscles of the body is the _____ _____ system.
18. The _____ _____ system division of the PNS consisting of nerves that control all of the involuntary muscles, organs, and glands.
19. The part of the ANS that is responsible for reacting to stressful events and bodily arousal is called the _____ _____ of the nervous system.
20. A machine designed to record the brain wave patterns produced by electrical activity of the surface of the brain is called an _____.
21. The part of the lower brain located behind the pons that controls and coordinates involuntary, rapid, fine motor movement is called the _____.
22. Part of the limbic system located in the center of the brain, this structure relays sensory information from the lower part of the brain to the proper areas of the cortex and processes some sensory information before sending it to its proper area and is called the _____.
23. The larger swelling above the medulla that connects the top of the brain to the bottom and that plays a part in sleep, dreaming, left-right body coordination, and arousal is called the _____.
24. The _____ _____ is an area of neurons running through the middle of the medulla and the pons and slightly beyond that is responsible for selective attention.
25. The _____ is a curved structure located within each temporal lobe responsible for the formation of long-term memories and the storage of memory for location of objects.
26. The _____ is a brain structure located near the hippocampus responsible for fear responses and memory of fear.

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27. The _____ is the outermost covering of the brain consisting of densely packed neurons that is responsible for higher thought processes and interpretation of sensory input.
28. The thick band of neurons that connects the right and left cerebral hemispheres is called the _____ _____.
29. The section of the brain located at the rear and bottom of each cerebral hemisphere containing the visual centers of the brain is the called the _____ _____.
30. The section of the brain located at the top and back of each cerebral hemisphere containing the centers for touch, taste, and temperature sensations is called the _____ _____.
31. The _____ _____ are the areas of the cortex located just behind the temples containing the neurons responsible for the sense of hearing and meaningful speech.
32. The _____ _____ are areas of the cortex located in the front and top of the brain that are responsible for higher mental processes and decision making as well as the production of fluent speech.
33. The _____ glands secrete chemicals called hormones directly into the bloodstream.
34. The endocrine glands located on top of each kidney that secrete over 30 different hormones to deal with stress, regulate salt intake, and provide a secondary source of sex hormones affecting the sexual changes that occur during adolescence are called the _____ _____.

Word List for Fill in the Blanks

adrenal glands
agonists
amygdala
autonomic nervous
axon
cerebellum
corpus callosum
cortex

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dendrites
electroencephalograph
endocrine
excitatory
frontal lobes
hippocampus
ions
myelin
nerves
nervous system
neuron
neurotransmitters
occipital cortex
parietal cortex
peripheral nervous
pons
resting potential
reticular formation
sensory neuron
soma
somatic nervous
spinal cord
sympathetic division
synaptic vesicles
temporal lobes
thalamus

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Handout Master 2.3
Diagnostic Brain Imaging

For each of the following patients, use the information provided to determine which procedure or technology would be most helpful in determining a diagnosis. There are no perfectly right or wrong answers, but you are asked to provide a justification for why you chose each methodology.

1. Chris has seizures every day that involve his entire body. They are not helped by medication and now neurologists want to investigate where in the brain the seizures are starting so that they can consider if surgical removal might be an option. What procedure would you recommend they use and why?

2. Suttuchi has been having headaches and on occasion has gotten dizzy and has had to sit down to avoid passing out. The neurologists working with her believe that she may have a tumor that is pressing on critical areas of the brain. What procedure would you recommend they use and why?

3. Fayeed has been having problems moving the left side of his body for about 2 weeks. When asked about his experience, he remembered a day 2 or 3 weeks ago when he felt weak and for

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a little time had great difficulty finding the words he needed to explain what he was feeling. His neurologists suspect that he has had a stroke or a series of strokes and want to determine how extensive the damage might be in the brain if that is the case. What procedure would you recommend they use to determine the potential damage in the brain?

4. Barrow is having extreme difficulty reading his schoolwork. He is in the fifth grade and should be fairly proficient now at reading. Doctors have thoroughly investigated his eyesight, eye tracking, and phonetic processing, but they believe that when he views the words, the right parts of the brain are not being used to decode the words. How might they further investigate these issues? Remember to defend your selection of procedure.

Created by L. Lockwood, Metropolitan State University of Denver; no third-party material included.

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REVEL FEATURES

Videos:

Opening Video: *The Biological Perspective*
Figure 2.1: The Structure of the Neuron
Figure 2.2: The Neural Impulse Action Potential
Figure 2.3: The Synapse
Figure 2.4: Neurotransmitters: Reuptake
Parts of the Brain
Figure 2.15: The Spinal Cord Reflex
Overview of Neuroplasticity
Applying Psychology to Everyday Life: Minimizing the Impact of Adult Attention-Deficit/Hyperactivity Disorder

Interactives:

Figure 2.6: Mapping Brain Structure

Figure 2.7: Mapping Brain Function

Aphasia Audio Flashcards

Experiment: Hemispheric Simulation

Figure 2.13: The Split-Brain Experiment

Figure 2.17: Functions of the Parasympathetic and Sympathetic Divisions of the Nervous System

Survey: Do You Fly or Fight?

Figure 2.18: The Endocrine Glands

Figure 2.19: General Adaptation Syndrome

Figure 2.20: Stress Duration and Illness

APA Goal 2 Figure

Journal Prompts:

Thinking Critically 2.1
You may see a lot of brain imaging studies in the news or online. Thinking back to the research methods discussed in Chapter One (Learning Objectives 1.6–1.11), what kinds of questions should you ask about these studies before accepting the findings as valid or applicable?

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Thinking Critically 2.2
Some people think that taking human growth hormone (HGH) supplements will help reverse the effects of aging. If this were true, what would you expect to see in the news media or medical journals? How would you expect HGH supplements to be marketed as a result?

Thinking Critically 2.3

1. What type of questions should you ask yourself when referring to case studies? Do the questions differ based on the case studies being modern or historical?
2. What kind of supports and structure might have been provided to Phineas through his post-accident jobs that would have possibly helped him with his recovery?
3. How might the modern study of psychology help us better understand other historical case studies?

Shared Writing Prompt:
Shared Writing: APA Goal 3: Ethical and Social Responsibility: The Biological Perspective
Dr. Z is conducting research on ADHD and is requiring members of his psychology class to participate. As part of the study, students are learning to control their brain activity by using feedback during an EEG. In doing so, half of the class is learning to enhance brain activity associated with improved attention. The other half is learning to increase brain activity associated with the inattentive symptoms of ADHD. He asks both groups to complete tests of attention and he shares the individual results of students in class, calling them by name and displaying their individual results. He did not gain approval from his university's institutional review board to conduct this study, claiming it was simply a pilot investigation. Refer back to the APA Ethical Guidelines discussed in Chapter One. What guidelines and standards are being violated?

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PRACTICE QUIZZES ANSWER KEY

Chapter 2 Answer Key

2.1–2.3 Practice Quiz Answer Key:

1. c; 2. d; 3. b; 4. b; 5. b; 6. c

2.4–2.5 Practice Quiz Answer Key:

1. c; 2. b; 3. b; 4. d

2.6–2.10 Practice Quiz Answer Key:

1. b; 2. d; 3. c; 4. b; 5. b

2.11–2.12 Practice Quiz Answer Key:

1. c; 2. c; 3. b; 4. b; 5. c

2.13–2.15 Practice Quiz Answer Key:

1. b; 2. b; 3. c; 4. c; 5. d

TEST YOURSELF ANSWER KEY

Chapter 2 Answer Key

Test Yourself

1. b; 2. c; 3. b; 4. c; 5. b; 6. d; 7. c; 8. b; 9. d; 10. c; 11. d; 12. d; 13. b; 14. d; 15. d; 16. b; 17. b; 18. a; 19. a; 20. a

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