Test Bank for Psychology 2nd Edition by Marin

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Test Bank

Chapter 2: Biology and Behavior

Total Assessment Guide (TAG)

	Learning Objective	Question Type	Remember the Facts	Understand the Concepts	Apply What You Know	Analyze It
2.1: Biological Models of Behavior		Multiple Choice		1		
		Essay				
2.1a Reductionism and Holistic Models	2.1a Describe the reductionist and holistic approaches to studying behavior.	Multiple Choice	3, 4, 5	8, 9	2, 7	6
		Essay				155, 156
2.1b Epigenetic Models	2.1b Define *epigenetics* and describe how the *epigenome* acts as a mediator between genetics and the environment.	Multiple Choice	12, 13, 14, 15, 18	11, 16, 19	10, 17	
		Essay				
2.1c Evolutionary Models	2.1c Understand the concepts of evolution and natural selection.	Multiple Choice	20, 21	22, 23		
		Essay				
2.2: The Nervous and Endocrine Systems		Multiple Choice				
		Essay				
2.2a Neurons	2.2a Describe the structure and function of neurons.	Multiple Choice	24, 25, 26, 27, 28, 30, 31, 32, 35, 36, 37, 38, 39, 40, 41	33, 34, 46	29, 42, 43, 44, 45, 47, 48	
		Essay			157	
2.2b Neuronal Transmission	2.2b Explain how neural messages are transmitted.	Multiple Choice	49, 50, 52, 54, 55, 57, 58, 61, 63, 64	51, 59, 60, 66, 67	56, 62, 65	53
		Essay			158	

2.2c Divisions of the Nervous System	2.2c Identify the major divisions of the nervous system.	Multiple Choice	68, 69, 70, 71, 72, 73, 75, 77, 79, 81, 84	78, 83	74, 76, 80, 82	
		Essay			159	
2.2d The Endocrine System	2.2d Explain the purpose and function of the endocrine system.	Multiple Choice	85, 86, 87	88, 89, 90, 92	91	
		Essay			160	
2.3: The Brain		Multiple Choice				
		Essay				
2.3a Studying the Brain	2.3a Describe the basic techniques for studying the brain.	Multiple Choice	97, 100	94, 96, 102	93, 95, 99, 101, 103	98
		Essay				161
2.3b Brain Structures	2.3b Differentiate between the major structures of the brain, including the hindbrain, midbrain, limbic system, and cerebral cortex.	Multiple Choice	104, 105, 110, 114, 116, 119, 121, 124, 128, 132, 133	112, 117, 118, 122, 125, 130	106, 107, 108, 109, 111, 113, 123, 126, 127, 129, 134, 135	115, 120, 131
		Essay			162, 163	
2.3c The Cerebral Hemispheres	2.3c Describe the two hemispheres of the brain.	Multiple Choice	136, 137, 139, 141, 144		138, 140	142, 143
		Essay				164
2.3d Neuroplasticity and Neurogenesis	2.3d Explain neuroplasticity and neurogenesis.	Multiple Choice	145, 149	146, 148, 150	147	
		Essay				165
2.4 Studies That Changed Psychology: Then and Now *Classic Study: One Brain or Two?*	2.4a: Describe how psychology may be applied to interpret and explain new behavioral phenomena.	Multiple Choice		151, 152		153
		Essay				
	2.4b: Demonstrate psychology information literacy through an understanding of research methods and design.	Multiple Choice				154
		Essay				

Chapter 2: Biology and Behavior

MULTIPLE CHOICE

1. Over time, psychologists have developed different _____ to act as a framework for organizing concepts and understanding behaviors, and to help with examining the origin of behaviors and predicting future outcomes.
    a) theoretical models
    b) neurological scripts
    c) sociological schemata
    d) social constructs

Answer: a
Learning Objective: None
Topic: 2.1 Biological Models of Behavior
Skill Level: Understand the Concepts
Difficulty Level: Moderate
APA Learning Objective: 1.2 Develop a working knowledge of psychology's content domains.

2. Mauricio is examining the engine of his motorcycle, trying to understand why he can't get maximum performance out of it. If he was a proponent of the concept of reductionism, what would he do?
    a) He would try using different fuel additives to see if that would generate better horsepower.
    b) He would break it down into its smaller pieces to examine what each one does.
    c) He would go out for a drive and listen carefully to the sound of the engine as it revs.
    d) He would switch out the entire engine for one that he knows is working properly.

Answer: b
Learning Objective: 2.1a Describe the reductionist and holistic approaches to studying behavior.
Topic: 2.1a Reductionism and Holistic Models
Skill Level: Apply What You Know
Difficulty Level: Moderate
APA Learning Objective: 1.2 Develop a working knowledge of psychology's content domains.

3. Taking a holistic approach is the idea that _____.
    a) reducing behavior to its most basic elements answers a lot of questions in psychology
    b) the biological processes underlying behavior are critical to understanding the purpose of a behavior
    c) the whole is always greater than the sum of its parts
    d) understanding behavior requires an understanding of the genetics of the organism

Answer: c
Learning Objective: 2.1a Describe the reductionist and holistic approaches to studying behavior.
Topic: 2.1a Reductionism and Holistic Models
Skill Level: Remember the Facts
Difficulty Level: Easy
APA Learning Objective: 1.2 Develop a working knowledge of psychology's content domains.

4. The biopsychosocial model was initially proposed by _____.
    a) John Watson
    b) Charles Darwin
    c) George Engel
    d) Phineas Gage
Answer: c
Learning Objective: 2.1a Describe the reductionist and holistic approaches to studying behavior.
Topic: 2.1a Reductionism and Holistic Models
Skill Level: Remember the Facts
Difficulty Level: Easy
APA Learning Objective: 1.2 Develop a working knowledge of psychology's content domains.

5. The biopsychosocial model is a(n) _____ model of human behavior.
    a) epigenetic
    b) reductionistic
    c) holistic
    d) evolutionist
Answer: c
Learning Objective: 2.1a Describe the reductionist and holistic approaches to studying behavior.
Topic: 2.1a Reductionism and Holistic Models
Skill Level: Remember the Facts
Difficulty Level: Easy
APA Learning Objective: 1.2 Develop a working knowledge of psychology's content domains.

6. Which of the following pairs of concepts would be considered the most opposite in nature?
    a) Hemispheric specialization and neuroplasticity
    b) The nervous system and the endocrine system
    c) Interpersonal and intergroup levels of analysis
    d) Reductionism and the holistic approach
Answer: d
Learning Objective: 2.1a Describe the reductionist and holistic approaches to studying behavior.
Topic: 2.1a Reductionism and Holistic Models
Skill Level: Analyze It
Difficulty Level: Moderate
APA Learning Objective: 1.2 Develop a working knowledge of psychology's content domains.

7. Janet is a physician at a major medical center. When making assessments and developing treatment plans, she considers her patients' mental health and social situations along with their current physical condition and symptoms. Janet is an adherent of the _____ model of healthcare.
    a) biopsychosocial
    b) biomedical
    c) sociological
    d) physiological
Answer: a
Learning Objective: 2.1a Describe the reductionist and holistic approaches to studying behavior.

Topic: 2.1a Reductionism and Holistic Models
Skill Level: Apply What You Know
Difficulty Level: Moderate
APA Learning Objective: 1.2 Develop a working knowledge of psychology's content domains.

8. Within the biopsychosocial model, which of the following levels of variables would include consideration of genetics and physiological structures?
    a) Biological variables
    b) Psychological variables
    c) Cultural variables
    d) Social variables
Answer: a
Learning Objective: 2.1a Describe the reductionist and holistic approaches to studying behavior.
Topic: 2.1a Reductionism and Holistic Models
Skill Level: Understand the Concepts
Difficulty Level: Easy
APA Learning Objective: 1.2 Develop a working knowledge of psychology's content domains.

9. Within the biopsychosocial model, which of the following levels of variables would include consideration of one's thoughts, emotions, and actions?
    a) Biological variables
    b) Psychological variables
    c) Cultural variables
    d) Social variables
Answer: b
Learning Objective: 2.1a Describe the reductionist and holistic approaches to studying behavior.
Topic: 2.1a Reductionism and Holistic Models
Skill Level: Understand the Concepts
Difficulty Level: Easy
APA Learning Objective: 1.2 Develop a working knowledge of psychology's content domains.

10. Jason carries the genes for a rare genetic disorder, but he does not have any symptoms of the disease. In this case, we can say that the disease is part of Jason's _____.
    a) genotype
    b) phenotype
    c) dominant-recessive pattern
    d) multifactorial inheritance
Answer: a
Learning Objective: 2.1b Define *epigenetics* and describe how the *epigenome* acts as a mediator between genetics and the environment.
Topic: 2.1b Epigenetic Models
Skill Level: Apply What You Know
Difficulty Level: Moderate
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

11. An individual's _____ refers to what that person looks like as a consequence of their genetic code and their environment.
    a) phenotype
    b) genotype
    c) sex chromosomes
    d) polygenic inheritance
Answer: a
Learning Objective: 2.1b Define *epigenetics* and describe how the *epigenome* acts as a mediator between genetics and the environment.
Topic: 2.1b Epigenetic Models
Skill Level: Understand the Concepts
Difficulty Level: Moderate
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

12. The "instruction manual" for your body, consisting of your genes, is called your _____.
    a) phenotype
    b) genome
    c) genotype
    d) epigenetics
Answer: c
Learning Objective: 2.1b Define *epigenetics* and describe how the *epigenome* acts as a mediator between genetics and the environment.
Topic: 2.1b Epigenetic Models
Skill Level: Remember the Facts
Difficulty Level: Easy
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

13. Human beings have _____ chromosomes in normal developmental cases.
    a) 13
    b) 23
    c) 32
    d) 46
Answer: d
Learning Objective: 2.1b Define *epigenetics* and describe how the *epigenome* acts as a mediator between genetics and the environment.
Topic: 2.1b Epigenetic Models
Skill Level: Remember the Facts
Difficulty Level: Easy
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.
% correct 92 a = 3 b = 2 c = 92 d = 3 $r = .25$

14. The complete set of all genes within a human cell is _____.

a) the epigenome
b) the human genome
c) the human phenotype
d) homogenetic inheritance

Answer: b
Learning Objective: 2.1b Define *epigenetics* and describe how the *epigenome* acts as a mediator between genetics and the environment.
Topic: 2.1b Epigenetic Models
Skill Level: Remember the Facts
Difficulty Level: Easy
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

15. The human genome contains about _____ genes.
a) 25,000
b) 45,000
c) 65,000
d) 85,000

Answer: a
Learning Objective: 2.1b Define *epigenetics* and describe how the *epigenome* acts as a mediator between genetics and the environment.
Topic: 2.1b Epigenetic Models
Skill Level: Remember the Facts
Difficulty Level: Easy
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

16. An architect builds a home from blueprints that contain the full plan for the layout of the house. In this case, the blueprints are like the _____ of the human, and the house is the _____.
a) homogenetics; epigenome
b) epigenome; phenotype
c) genotype; phenotype
d) homogenetics; genotype

Answer: c
Learning Objective: 2.1b Define *epigenetics* and describe how the *epigenome* acts as a mediator between genetics and the environment.
Topic: 2.1b Epigenetic Models
Skill Level: Understand the Concepts
Difficulty Level: Moderate
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

17. Every morning when they get to work, the crew of the local donut shop waits to be told what to do by their manager. Some of them clean, some of them make donuts, and some of them do paperwork. It is the manager who instructs each individual employee on their tasks for the day. If

you were to compare the donut shop to the human genetic system, the manager would serve as a(n) _____.

a) human genome
b) chromosome
c) DNA molecule
d) epigenome

Answer: d
Learning Objective: 2.1b Define *epigenetics* and describe how the *epigenome* acts as a mediator between genetics and the environment.
Topic: 2.1b Epigenetic Models
Skill Level: Apply What You Know
Difficulty Level: Difficult
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

18. The study of the relationship between a person's genetics and the environment in which that person lives is called _____.

a) neurology
b) biopsychosocialism
c) neuropathics
d) epigenetics

Answer: d
Learning Objective: 2.1b Define *epigenetics* and describe how the *epigenome* acts as a mediator between genetics and the environment.
Topic: 2.1b Epigenetic Models
Skill Level: Remember the Facts
Difficulty Level: Easy
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

19. When a caregiver provides good nutrition, cuddling, and protection, babies are more resilient to stress. This is a great example of _____.

a) epigenetics
b) survival of the fittest
c) the human genome
d) genotypic variability

Answer: a
Learning Objective: 2.1b Define *epigenetics* and describe how the *epigenome* acts as a mediator between genetics and the environment.
Topic: 2.1b Epigenetic Models
Skill Level: Understand the Concepts
Difficulty Level: Moderate
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

20. _____ models of human behavior focus primarily on behaviors that are adaptive—those that facilitate the survival of the species—and are shared by all humans.
    a) Holistic
    b) Biopsychosocial
    c) Evolutionary
    d) Epigenetic
Answer: c
Learning Objective: 2.1c Understand the concepts of evolution and natural selection.
Topic: 2.1c Evolutionary Models
Skill Level: Remember the Facts
Difficulty Level: Easy
APA Learning Objective: 1.2 Develop a working knowledge of psychology's content domains.

21. _____ developed the theory of evolution, arguing that all organisms evolve in particular ways over long periods of time and survive to pass on their genes to future generations of their species.
    a) Ivan Pavlov
    b) Charles Darwin
    c) Sigmund Freud
    d) Aristotle
Answer: b
Learning Objective: 2.1c Understand the concepts of evolution and natural selection.
Topic: 2.1c Evolutionary Models
Skill Level: Remember the Facts
Difficulty Level: Easy
APA Learning Objective: 1.2 Develop a working knowledge of psychology's content domains.

22. The concepts of variation, inheritance, and survival of the fittest are all essential components of Darwin's theory of _____.
    a) natural selection
    b) the human genome
    c) homeopathy
    d) osteopathy
Answer: a
Learning Objective: 2.1c Understand the concepts of evolution and natural selection.
Topic: 2.1c Evolutionary Models
Skill Level: Understand the Concepts
Difficulty Level: Easy
APA Learning Objective: 1.2 Develop a working knowledge of psychology's content domains.

23. The process of natural selection involves the inheritance of genes, the desire of organisms to survive, and the selective survival of those with characteristics that make them more resistant to dangers in the environment. What else is a critical component of natural selection?
    a) Variation in appearance and behaviors
    b) Mutations of the chromosomes
    c) Epigenome defects

d) Epigenetic flaws
Answer: a
Learning Objective: 2.1c Understand the concepts of evolution and natural selection.
Topic: 2.1c Evolutionary Models
Skill Level: Understand the Concepts
Difficulty Level: Moderate
APA Learning Objective: 1.2 Develop a working knowledge of psychology's content domains.

24. The function of the _____ is to carry information to and from all parts of the body.
a) soma
b) synapse
c) nervous system
d) endorphins
Answer: c
Learning Objective: 2.2a Describe the structure and function of neurons.
Topic: 2.2a Neurons
Skill Level: Remember the Facts
Difficulty Level: Easy
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.
% correct 91 a = 2 b = 4 c = 91 d = 33 *r* = .32
% correct 100 a = 0 b = 0 c = 100 d = 0 *r* = .00

25. The nervous system could be defined as_____.
a) a complex network of wiring and circuits that carries information to and from all parts of the body
b) a specialized system that is designed to release neurotransmitters into the bloodstream anywhere in the body
c) all nerves and neurons that are not contained in the brain and spinal cord but that run throughout the body itself
d) a system of glands, located throughout the body, that secrete hormones and release them into the bloodstream
Answer: a
Learning Objective: 2.2a Describe the structure and function of neurons.
Topic: 2.2a Neurons
Skill Level: Remember the Facts
Difficulty Level: Easy
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.
% correct 92 a = 92 b = 1 c = 6 d = 1 *r* = .27
% correct 94 a = 94 b = 1 c = 4 d = 0 *r* = .26

26. A specialized cell found in the nervous system that receives and sends messages within that system is called a _____.
a) glial cell
b) neuron

c) cell body
d) myelin sheath
Answer: b
Learning Objective: 2.2a Describe the structure and function of neurons.
Topic: 2.2a Neurons
Skill Level: Remember the Facts
Difficulty Level: Easy
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.
% correct 96 a = 4 b = 96 c = 0 d = 0 *r* = .19
% correct 97 a = 2 b = 97 c = 1 d = 0 *r* = .39

27. Neurons in the human body have one purpose, and that is to send messages to _____.
a) other neurons
b) glial cells
c) myelin sheaths
d) dendritic spines
Answer: a
Learning Objective: 2.2a Describe the structure and function of neurons.
Topic: 2.2a Neurons
Skill Level: Remember the Facts
Difficulty Level: Easy
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.
% correct 96 a = 96 b = 3 c = 1 d = 0 *r* = .25
% correct 95 a = 95 b = 4 c = 1 d = 0 *r* = .27

28. The human brain contains somewhere around _____ neurons.
a) 10 million
b) 50 million
c) 100 billion
d) 2 trillion
Answer: c
Learning Objective: 2.2a Describe the structure and function of neurons.
Topic: 2.2a Neurons
Skill Level: Remember the Facts
Difficulty Level: Easy
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.
% correct 80 a = 5 b = 16 c = 80 d = 9 *r* = .24

29. Dr. Chapin has just finished a delicate brain operation. He turns to a group of interns and says, “She probably lost about 1,000 _____, but since she still has over 100 billion left, she should recover nicely.”
a) medullary cells
b) neurons

c) dendrites
d) mammillary bodies
Answer: b
Learning Objective: 2.2a Describe the structure and function of neurons.
Topic: 2.2a Neurons
Skill Level: Apply What You Know
Difficulty Level: Moderate
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.
% correct 98 a = 1 b = 98 c = 1 d = 0 *r* = .21

30. The neuron is surrounded by a(n) _____, and it has a nucleus that contains genes.
a) axon
b) dendrite
c) cell membrane
d) myelin sheath
Answer: c
Learning Objective: 2.2a Describe the structure and function of neurons.
Topic: 2.2a Neurons
Skill Level: Remember the Facts
Difficulty Level: Easy
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.
% correct 82 a = 3 b = 3 c = 82 d = 13 *r* = .23

31. Every neuron has five parts: _____.
a) myelin, glia, soma, appendage, and apex
b) dendrite, soma, axon, axon terminals, and nucleus
c) glia, dendrite, axon, hormones, and cell body
d) myelin, soma, dendrite, astrocytes, and apex
Answer: b
Learning Objective: 2.2a Describe the structure and function of neurons.
Topic: 2.2a Neurons
Skill Level: Remember the Facts
Difficulty Level: Easy
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

32. In neurons, the branchlike structures that receive messages from other neurons are called _____.
a) axons
b) nerve bundles
c) dendrites
d) synapses
Answer: c
Learning Objective: 2.2a Describe the structure and function of neurons.

Topic: 2.2a Neurons
Skill Level: Remember the Facts
Difficulty Level: Easy
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.
% correct 84 a = 10 b = 2 c = 84 d = 4 *r* = .39
% correct 83 a = 11 b = 0 c = 83 d = 5 *r* = .31

33. Dendrites are covered in _____.
a) axon terminals
b) glia
c) myelin
d) receptors
Answer: d
Learning Objective: 2.2a Describe the structure and function of neurons.
Topic: 2.2a Neurons
Skill Level: Understand the Concepts
Difficulty Level: Moderate
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.
% correct 77 a = 20 b = 77 c = 1 d = 1 *r* = .32

34. _____ receive messages from other neurons, and _____ send messages to other neurons.
a) Axons; dendrites
b) Axons; soma
c) Soma; glial cells
d) Dendrites; axons
Answer: d
Learning Objective: 2.2a Describe the structure and function of neurons.
Topic: 2.2a Neurons
Skill Level: Understand the Concepts
Difficulty Level: Moderate
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.
% correct 71 a = 23 b = 3 c = 4 d = 71 *r* = .39
% correct 78 a = 17 b = 3 c = 1 d = 78 *r* = .46

35. Which part of a neuron is attached to the soma and carries messages out to other cells?
a) Soma
b) Axon
c) Dendrite
d) Cell membrane
Answer: b
Learning Objective: 2.2a Describe the structure and function of neurons.
Topic: 2.2a Neurons

Skill Level: Remember the Facts
Difficulty Level: Easy
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.
% correct 81 a = 2 b = 81 c = 14 d = 4 *r* = .31

36. The _____, or soma, is the single largest part of a human neuron. It contains the cell's DNA and is capable of coordinating the information processing for the cell.
a) myelin sheath
b) axon
c) dendrite
d) cell body
Answer: d
Learning Objective: 2.2a Describe the structure and function of neurons.
Topic: 2.2a Neurons
Skill Level: Remember the Facts
Difficulty Level: Easy
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

37. A long structure leaving the neuron cell body that action potentials travel along is called the _____.
a) cell membrane
b) dendrite
c) axon
d) myelin sheath
Answer: c
Learning Objective: 2.2a Describe the structure and function of neurons.
Topic: 2.2a Neurons
Skill Level: Remember the Facts
Difficulty Level: Easy
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.
% correct 70 a = 3 b = 16 c = 70 d = 11 *r* = .38

38. The function of the neuron's axon is to _____.
a) carry messages to other neurons
b) regulate the neuron's life processes
c) receive messages from neighboring neurons
d) insulate against leakage of electrical impulses
Answer: a
Learning Objective: 2.2a Describe the structure and function of neurons.
Topic: 2.2a Neurons
Skill Level: Remember the Facts
Difficulty Level: Easy

APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.
% correct 67 a = 67 b = 2 c = 10 d = 21 *r* = .41
% correct 80 a = 80 b = 6 c = 13 d = 2 *r* = .30

39. What is the term used to describe the projections located at the end of the axon?
    a) Axon terminals
    b) Synaptic vesicles
    c) Synapses
    d) Receptor sites
Answer: a
Learning Objective: 2.2a Describe the structure and function of neurons.
Topic: 2.2a Neurons
Skill Level: Remember the Facts
Difficulty Level: Easy
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.
% correct 59 a = 59 b = 15 c = 3 d = 22 *r* = .48
% correct 52 a = 52 b = 20 c = 13 d = 15 *r* = .38

40. Which of the following are the three basic types of neurons?
    a) Reflexes, sensory neurons, motor neurons
    b) Sensory neurons, motor neurons, stem cells
    c) Motor neurons, stem cells, reflexes
    d) Interneurons, sensory neurons, motor neurons
Answer: d
Learning Objective: 2.2a Describe the structure and function of neurons.
Topic: 2.2a Neurons
Skill Level: Remember the Facts
Difficulty Level: Easy
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.
% correct 89 a = 3 b = 7 c = 0 d = 89 *r* = .36
% correct 79 a = 13 b = 8 c = 0 d = 79 *r* = .31

41. Neurons that carry information from the senses to the brain and spinal cord are called _____.
    a) motor neurons
    b) interneurons
    c) sensory neurons
    d) reflexes
Answer: c
Learning Objective: 2.2a Describe the structure and function of neurons.
Topic: 2.2a Neurons
Skill Level: Remember the Facts
Difficulty Level: Easy

APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.
% correct 75 a = 19 b = 5 c = 75 d = 0 *r* = .32
% correct 80 a = 11 b = 9 c = 80 d = 1 *r* = .28

42. Mary steps on a sharp nail. Which neuron is responsible for sending a pain message up her spinal column, where it would then enter into the main area of the cord?
a) Motor neuron
b) Interneuron
c) Sensory neuron
d) Reflex
Answer: c
Learning Objective: 2.2a Describe the structure and function of neurons.
Topic: 2.2a Neurons
Skill Level: Apply What You Know
Difficulty Level: Moderate
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.
% correct 90 a = 5 b = 3 c = 90 d = 1 *r* = .27

43. A young woman returns from a day at the beach to find she has developed a severe sunburn. Which neurons are sending the message from her burned skin to her brain to inform her of the pain from the burn?
a) Sensory neurons
b) Motor neurons
c) Synaptic neurons
d) Association neurons
Answer: a
Learning Objective: 2.2a Describe the structure and function of neurons.
Topic: 2.2a Neurons
Skill Level: Apply What You Know
Difficulty Level: Moderate
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.
% correct 88 a = 88 b = 2 c = 7 d = 3 *r* = .24

44. LaKeisha places her hand on a hot stove and then quickly removes it. Which of the following are responsible for sending a message to the muscles in LaKeisha's hand, resulting in her pulling it away from the hot stove?
a) Motor neurons
b) Interneurons
c) Sensory neurons
d) Reflexes
Answer: a
Learning Objective: 2.2a Describe the structure and function of neurons.
Topic: 2.2a Neurons

Skill Level: Apply What You Know
Difficulty Level: Moderate
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.
% correct 58 a = 58 b = 2 c = 18 d = 521 *r* = .27

45. A young man reads in a letter 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
Learning Objective: 2.2a Describe the structure and function of neurons.
Topic: 2.2a Neurons
Skill Level: Apply What You Know
Difficulty Level: Moderate
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.
% correct 89 a = 4 b = 89 c = 2 d = 4 *r* = .34

46. Which of the following cells mediate the conversation between sensory and motor neurons?
a) Motor neurons
b) Interneurons
c) Sensory neurons
d) Reflexes
Answer: b
Learning Objective: 2.2a Describe the structure and function of neurons.
Topic: 2.2a Neurons
Skill Level: Understand the Concepts
Difficulty Level: Moderate
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.
% correct 80 a = 8 b = 80 c = 8 d = 3 *r* = .37

47. Ezra is standing over the crib of his son, Max, and he gives Max a big smile. To his delight, Max looks up and smiles back at him. Ezra starts blinking his eyes rapidly, and the child repeats the gesture. Which type of neurons are primarily involved in this mimicry?
a) Axo-axonal neurons
b) Interneurons
c) Dendritic neurons
d) Mirror neurons
Answer: d
Learning Objective: 2.2a Describe the structure and function of neurons.
Topic: 2.2a Neurons

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

48. Three-year-old Candace watches Timmy fall and scrape his knee. She immediately comforts him and provides him with empathy. Candace is using her _____.
    a) peripheral nervous system
    b) glial cell system
    c) mirror neuron system
    d) motor neuron system
Answer: c
Learning Objective: 2.2a Describe the structure and function of neurons.
Topic: 2.2a Neurons
Skill Level: Apply What You Know
Difficulty Level: Difficult
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

49. What do we call the state of a neuron when it is not firing a neural impulse?
    a) Action potential
    b) Resting potential
    c) Myelination signal
    d) Transmission impulse
Answer: b
Learning Objective: 2.2b Explain how neural messages are transmitted.
Topic: 2.2b Neuronal Transmission
Skill Level: Remember the Facts
Difficulty Level: Easy
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.
% correct 84 a = 11 b = 84 c = 1 d = 4 *r* = .18

50. 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
    b) quiet potential
    c) synaptic potential
    d) resting potential
Answer: d
Learning Objective: 2.2b Explain how neural messages are transmitted.
Topic: 2.2b Neuronal Transmission
Skill Level: Remember the Facts
Difficulty Level: Easy
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

% correct 85 a = 4 b = 4 c = 7 d = 85 *r* = .19

51. The overall electrical charge of a neuron that is "at rest" is _____.
    a) hyperneutral
    b) positive
    c) negative
    d) neutral
Answer: c
Learning Objective: 2.2b Explain how neural messages are transmitted.
Topic: 2.2b Neuronal Transmission
Skill Level: Understand the Concepts
Difficulty Level: Easy
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.
% correct 81 a = 3 b = 2 c = 73 d = 12 *r* = .27

52. When the electric potential in a cell is in firing versus a resting state, this electrical charge reversal is known as the _____.
    a) resting potential
    b) excitation reaction
    c) action potential
    d) permeable reaction
Answer: c
Learning Objective: 2.2b Explain how neural messages are transmitted.
Topic: 2.2b Neuronal Transmission
Skill Level: Remember the Facts
Difficulty Level: Easy
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.
% correct 75 a = 14 b = 10 c = 75 d = 1 *r* = .31

53. The neural impulse traveling down the axon is _____; it gets across the synapse by _____.
    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; changing into a chemical message
    d) chemical; changing into an electrical message
Answer: c
Learning Objective: 2.2b Explain how neural messages are transmitted.
Topic: 2.2b Neuronal Transmission
Skill Level: Analyze It
Difficulty Level: Difficult
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

% correct 50 a = 13 b = 22 c = 50 d = 13 *r* = .37

54. "All or none" is the principle stating that _____.
a) a neuron fires until it stops
b) a neuron fires at full strength or not at all
c) all the dendrites must be receiving messages telling the neuron to fire or it will not fire at all
d) all somas must be receiving messages telling the neuron to fire or it will not fire at all
Answer: a
Learning Objective: 2.2b Explain how neural messages are transmitted.
Topic: 2.2b Neuronal Transmission
Skill Level: Remember the Facts
Difficulty Level: Easy
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.
% correct 54 a = 54 b = 31 c = 10 d = 5 *r* = .37
% correct 41 a = 41 b = 52 c = 4 d = 3 *r* = .29

55. During the process of an action potential, the cell moves positively charged ions inside the membrane. This is called _____.
a) the all-or-none law
b) hyperpolarization
c) depolarization
d) neurotransmission
Answer: c
Learning Objective: 2.2b Explain how neural messages are transmitted.
Topic: 2.2b Neuronal Transmission
Skill Level: Remember the Facts
Difficulty Level: Easy
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

56. Often after playing a point, tennis players take a short break, drink water, wipe sweat off their hands, and prepare to play the next point. This process is very similar to the _____ in the neuron.
a) action potential
b) resting potential
c) refractory period
d) depolarization
Answer: c
Learning Objective: 2.2b Explain how neural messages are transmitted.
Topic: 2.2b Neuronal Transmission
Skill Level: Apply What You Know
Difficulty Level: Difficult
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

57. The action potential causes neurotransmitters to be released into the _____.
    a) myelin sheath
    b) axon
    c) synaptic gap
    d) synaptic vesicle
Answer: c
Learning Objective: 2.2b Explain how neural messages are transmitted.
Topic: 2.2b Neuronal Transmission
Skill Level: Remember the Facts
Difficulty Level: Easy
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.
% correct 59 a = 8 b = 11 c = 59 d = 22 *r* = .32
% correct 56 a = 5 b = 16 c = 56 d = 27 *r* = .35

58. 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
Learning Objective: 2.2b Explain how neural messages are transmitted.
Topic: 2.2b Neuronal Transmission
Skill Level: Remember the Facts
Difficulty Level: Easy
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.
% correct 96 a = 0 b = 96 c = 3 d = 1 *r* = .26

59. 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
Learning Objective: 2.2b Explain how neural messages are transmitted.
Topic: 2.2b Neuronal Transmission
Skill Level: Understand the Concepts
Difficulty Level: Moderate
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.
% correct 96 a = 2 b = 2 c = 96 d = 0 *r* = .37

60. _____ neurotransmitters make it more likely that a neuron will fire a message, whereas _____ neurotransmitters make it less likely that a neuron will send its message.
    a) Excitatory; inhibitory
    b) Inhibitory; excitatory
    c) Augmentation; depletion
    d) Depletion; augmentation
Answer: a
Learning Objective: 2.2b Explain how neural messages are transmitted.
Topic: 2.2b Neuronal Transmission
Skill Level: Understand the Concepts
Difficulty Level: Moderate
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.
% correct 89 a = 89 b = 8 c = 3 d = 0 *r* = .48

61. The analogy of a key fitting into a lock is used to describe what process in the brain?
    a) The refractory period
    b) A neurotransmitter binding to a receptor
    c) Action potential transmission
    d) The resting membrane potential
Answer: a
Learning Objective: 2.2b Explain how neural messages are transmitted.
Topic: 2.2b Neuronal Transmission
Skill Level: Remember the Facts
Difficulty Level: Easy
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

62. Sara 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
    b) Dopamine
    c) Serotonin
    d) Acetylcholine
Answer: d
Learning Objective: 2.2b Explain how neural messages are transmitted.
Topic: 2.2b Neuronal Transmission
Skill Level: Apply What You Know
Difficulty Level: Difficult
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.
% correct 33 a = 0 b = 26 c = 41 d = 33 *r* = .19

63. Which neurotransmitter is associated with sleep, mood, and appetite?
    a) GABA

b) Serotonin
c) Dopamine
d) Acetylcholine
Answer: b
Learning Objective: 2.2b Explain how neural messages are transmitted.
Topic: 2.2b Neuronal Transmission
Skill Level: Remember the Facts
Difficulty Level: Easy
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.
% correct 60 a = 6 b = 60 c = 25 d = 8 *r* = .26

64. Which of the following neurotransmitters is known for its role in memory enhancement?
a) GABA
b) Glutamate
c) Serotonin
d) Norepinephrine
Answer: a
Learning Objective: 2.2b Explain how neural messages are transmitted.
Topic: 2.2b Neuronal Transmission
Skill Level: Remember the Facts
Difficulty Level: Easy
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

65. Jacqui was in a car accident and broke her leg. While they were trying to remove her from the car, she did not detect the pain of the broken leg. What neurotransmitter was most likely helping her keep her pain in control so she could get out of the car?
a) Serotonin
b) Dopamine
c) Norepinephrine
d) Endorphins
Answer: d
Learning Objective: 2.2b Explain how neural messages are transmitted.
Topic: 2.2b Neuronal Transmission
Skill Level: Apply What You Know
Difficulty Level: Difficult
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.
% correct 81 a = 3 b = 7 c = 8 d = 81 *r* = .42

66. What are two roles of glial cells?
a) Acting as insulation and providing structure/support to surrounding neurons
b) Shaping cells and moving new neurons into place
c) Regulating metabolic activity and serving as pain detectors
d) Monitoring neural transmission and releasing hormones in the brain

Answer: a
Learning Objective: 2.2b Explain how neural messages are transmitted.
Topic: 2.2b Neuronal Transmission
Skill Level: Understand the Concepts
Difficulty Level: Moderate
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.
% correct 59 a = 59 b = 4 c = 11 d = 22 *r* = .32
% correct 61 a = 61 b = 8 c = 7 d = 24 *r* = .32

67. Communication between which two types of cells may be conducive to certain kinds of thoughts, such as imagination, creativity, and dreaming?
    a) Epidermal and adipose cells
    b) Glial cells and neurons
    c) Bipolar and amacrine cells
    d) Ganglion and axonal cells
Answer: b
Learning Objective: 2.2b Explain how neural messages are transmitted.
Topic: 2.2b Neuronal Transmission
Skill Level: Understand the Concepts
Difficulty Level: Moderate
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

68. The first major 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
Learning Objective: 2.2c Identify the major divisions of the nervous system.
Topic: 2.2c Divisions of the Nervous System
Skill Level: Remember the Facts
Difficulty Level: Easy
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.
% correct 73 a = 73 b = 20 c = 4 d = 26 *r* = .41

69. The brain and spinal cord are the major components that make up the _____.
    a) central nervous system
    b) somatic nervous system
    c) peripheral nervous system
    d) autonomic nervous system
Answer: a
Learning Objective: 2.2c Identify the major divisions of the nervous system.
Topic: 2.2c Divisions of the Nervous System

Skill Level: Remember the Facts
Difficulty Level: Easy
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.
% correct 100 a = 100 b = 0 c = 0 d = 0 *r* = .00
% correct 94 a = 94 b = 2 c = 1 d = 2 *r* = .39

70. The _____ is a long bundle of nerves that carries messages from the brain to the body and from the body to the brain. It is responsible for very fast reflexes.
a) spinal cord
b) corpus callosum
c) cerebrum
d) brainstem
Answer: a
Learning Objective: 2.2c Identify the major divisions of the nervous system.
Topic: 2.2c Divisions of the Nervous System
Skill Level: Remember the Facts
Difficulty Level: Easy
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.
% correct 89 a = 89 b = 0 c = 2 d = 9 *r* = .31

71. The peripheral nervous system consists of _____.
a) all the nerve cells that are outside of the brain and the spinal cord
b) all nerves in the brain and the spinal cord
c) the spinal cord and the autonomic system
d) the brain and the autonomic system
Answer: a
Learning Objective: 2.2c Identify the major divisions of the nervous system.
Topic: 2.2c Divisions of the Nervous System
Skill Level: Remember the Facts
Difficulty Level: Easy
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.
% correct 69 a = 69 b = 6 c = 15 d = 10 *r* = .45

72. The peripheral nervous system consists of the _____ and the _____ nervous systems.
a) parasympathetic; somatic
b) autonomic; sympathetic
c) autonomic; somatic
d) parasympathetic; sympathetic
Answer: c
Learning Objective: 2.2c Identify the major divisions of the nervous system.
Topic: 2.2c Divisions of the Nervous System
Skill Level: Remember the Facts

Difficulty Level: Easy
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.
% correct 53 a = 53 b = 7 c = 5 d = 35 *r* = .33
% correct 57 a = 57 b = 11 c = 7 d = 25 *r* = .40

73. The _____ nervous system regulates the muscles over which people have conscious control.
a) somatic
b) autonomic
c) sympathetic
d) parasympathetic
Answer: a
Learning Objective: 2.2c Identify the major divisions of the nervous system.
Topic: 2.2c Divisions of the Nervous System
Skill Level: Remember the Facts
Difficulty Level: Easy
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

74. Glinnis is pedaling her bicycle through the park. She is relying on her _____ nervous system to help her pedal.
a) sympathetic
b) somatic
c) parasympathetic
d) autonomic
Answer: b
Learning Objective: 2.2c Identify the major divisions of the nervous system.
Topic: 2.2c Divisions of the Nervous System
Skill Level: Apply What You Know
Difficulty Level: Difficult
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

75. Involuntary muscles and functions are controlled by the _____ nervous system.
a) somatic
b) autonomic
c) sympathetic
d) parasympathetic
Answer: b
Learning Objective: 2.2c Identify the major divisions of the nervous system.
Topic: 2.2c Divisions of the Nervous System
Skill Level: Remember the Facts
Difficulty Level: Easy
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

% correct 64 a = 14 b = 64 c = 14 d = 9 *r* = .27

76. The process of digesting your last snack or meal, or the unconscious regulation of your breathing, is primarily rooted in the _____ nervous system.
a) autonomic
b) limbic
c) somatic
d) secondary
Answer: a
Learning Objective: 2.2c Identify the major divisions of the nervous system.
Topic: 2.2c Divisions of the Nervous System
Skill Level: Apply What You Know
Difficulty Level: Difficult
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.
% correct 66 a = 66 b = 12 c = 18 d = 4 *r* = .44

77. The autonomic nervous system is divided into the _____ and the _____ divisions.
a) central; peripheral
b) sympathetic; parasympathetic
c) sensory; motor
d) limbic; endocrine
Answer: b
Learning Objective: 2.2c Identify the major divisions of the nervous system.
Topic: 2.2c Divisions of the Nervous System
Skill Level: Remember the Facts
Difficulty Level: Easy
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

78. Which component of the nervous system mobilizes the body in times of stress?
a) Central
b) Somatic
c) Sympathetic
d) Parasympathetic
Answer: c
Learning Objective: 2.2c Identify the major divisions of the nervous system.
Topic: 2.2c Divisions of the Nervous System
Skill Level: Understand the Concepts
Difficulty Level: Moderate
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.
% correct 60 a = 8 b = 12 c = 60 d = 20 *r* = .37
% correct 69 a = 3 b = 10 c = 69 d = 17 *r* = .47

79. 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
Learning Objective: 2.2c Identify the major divisions of the nervous system.
Topic: 2.2c Divisions of the Nervous System
Skill Level: Remember the Facts
Difficulty Level: Easy
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.
% correct 73 a = 1 b = 7 c = 73 d = 19 *r* = .34

80. As Molly 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 Molly's _____.
    a) somatic nervous system
    b) skeletal nervous system
    c) parasympathetic nervous system
    d) sympathetic nervous system
Answer: d
Learning Objective: 2.2c Identify the major divisions of the nervous system.
Topic: 2.2c Divisions of the Nervous System
Skill Level: Apply What You Know
Difficulty Level: Difficult
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.
% correct 73 a = 11 b = 0 c = 16 d = 73 *r* = .48
% correct 81 a = 11 b = 0 c = 9 d = 81 *r* = .51

81. 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 _____.
    a) central nervous system
    b) sympathetic nervous system
    c) parasympathetic nervous system
    d) limbic system
Answer: a
Learning Objective: 2.2c Identify the major divisions of the nervous system.
Topic: 2.2c Divisions of the Nervous System
Skill Level: Remember the Facts
Difficulty Level: Easy
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

% correct 80 a = 6 b = 80 c = 12 d = 3 *r* = .52

82. One night, Betty is walking home from the gym to her dorm. When she is approached by a strange man who clearly does not belong on campus, her pupils dilate and she gets goosebumps. What part of Betty's nervous system has been activated?
a) Somatic
b) Parasympathetic
c) Sympathetic
d) Autonomic
Answer: d
Learning Objective: 2.2c Identify the major divisions of the nervous system.
Topic: 2.2c Divisions of the Nervous System
Skill Level: Apply What You Know
Difficulty Level: Difficult
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.
% correct 78 a = 2 b = 14 c = 6 d = 78 *r* = .45

83. Calm is to aroused as _____ is to _____.
a) parasympathetic; sympathetic
b) autonomic; motor
c) sympathetic; parasympathetic
d) central; peripheral
Answer: a
Learning Objective: 2.2c Identify the major divisions of the nervous system.
Topic: 2.2c Divisions of the Nervous System
Skill Level: Understand the Concepts
Difficulty Level: Moderate
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.
% correct 77 a = 77 b = 3 c = 21 d = 0 *r* = .31

84. The branch of the autonomic nervous system that restores the body to normal functioning after arousal and is responsible for calming you down is called the _____.
a) spinal cord
b) somatic nervous system
c) sympathetic nervous system
d) parasympathetic nervous system
Answer: d
Learning Objective: 2.2c Identify the major divisions of the nervous system.
Topic: 2.2c Divisions of the Nervous System
Skill Level: Remember the Facts
Difficulty Level: Easy
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.
% correct 66 a = 2 b = 9 c = 23 d = 66 *r* = .37

85. The system that acts as a network of communication pathways between the brain and the body is called the _____.
    a) arousal system
    b) nervous system
    c) limbic system
    d) endocrine system
Answer: d
Learning Objective: 2.2d Explain the purpose and function of the endocrine system.
Topic: 2.2d The Endocrine System
Skill Level: Remember the Facts
Difficulty Level: Easy
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

86. Endocrine glands _____.
    a) secrete hormones directly into the bloodstream
    b) are chemicals released into the bloodstream
    c) are an extensive network of specialized cells
    d) are a thin layer of cells coating the axons
Answer: a
Learning Objective: 2.2d Explain the purpose and function of the endocrine system.
Topic: 2.2d The Endocrine System
Skill Level: Remember the Facts
Difficulty Level: Easy
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.
% correct 91 a = 91 b = 5 c = 2 d = 2 *r* = .56

87. The thyroid and pituitary glands are parts of the _____ system.
    a) gonadal
    b) endocrine
    c) nervous
    d) lymphatic
Answer: b
Learning Objective: 2.2d Explain the purpose and function of the endocrine system.
Topic: 2.2d The Endocrine System
Skill Level: Remember the Facts
Difficulty Level: Easy
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

88. Which of the following is responsible for secreting hormones that travel to other endocrine glands in various parts of the body, inspiring them to release their own hormones?
    a) Adrenal glands
    b) Thyroid gland

c) Pituitary gland
d) Gonads
Answer: c
Learning Objective: 2.2d Explain the purpose and function of the endocrine system.
Topic: 2.2d The Endocrine System
Skill Level: Understand the Concepts
Difficulty Level: Moderate
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

89. What are the two basic functions of the endocrine system?
a) An activation effect and a deactivation effect
b) Organizing "fight" or stimulating "flight"
c) An organizational role and an activation effect
d) Inhibition and disinhibition
Answer: c
Learning Objective: 2.2d Explain the purpose and function of the endocrine system.
Topic: 2.2d The Endocrine System
Skill Level: Understand the Concepts
Difficulty Level: Moderate
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

90. Sex-related hormones are produced during prenatal development and help determine whether the fetus will develop into a female or male. This kind of endocrine influence represents the _____ function of the endocrine system.
a) activation
b) actuarial
c) organizational
d) orthographic
Answer: c
Learning Objective: 2.2d Explain the purpose and function of the endocrine system.
Topic: 2.2d The Endocrine System
Skill Level: Understand the Concepts
Difficulty Level: Moderate
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.
% correct 89 a = 2 b = 1 c = 89 d = 8 *r* = .41

91. Joel is interested in studying the effects of hormones on a person's behavior. This interest came from reading high-profile cases in which athletes abused steroids and subsequently engaged in violent and aggressive behavior. Joel should probably explore getting an education in _____.
a) forensic psychology
b) neuropathic aggression
c) developmental psychology

d) behavioral endocrinology
Answer: d
Learning Objective: 2.2d Explain the purpose and function of the endocrine system.
Topic: 2.2d The Endocrine System
Skill Level: Apply What You Know
Difficulty Level: Difficult
APA Learning Objective: 1.2 Develop a working knowledge of psychology's content domains.

92. Which of the following terms best describes the relationship between the nervous and the endocrine systems?
a) Interdependent
b) Independent
c) Dependent
d) Unidirectional
Answer: a
Learning Objective: 2.2d Explain the purpose and function of the endocrine system.
Topic: 2.2d The Endocrine System
Skill Level: Understand the Concepts
Difficulty Level: Moderate
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

93. Following a stroke, Felipe struggled to form new memories. When he passed away, the doctor performing the autopsy noticed that much of Felipe's hippocampus was missing from his brain. The doctor concluded that the hippocampus is important in memory formation. This is an example of what technique for studying the brain?
a) Brain stimulation
b) Electroencephalogram
c) MRI
d) Case study
Answer: d
Learning Objective: 2.3a Describe the basic techniques for studying the brain.
Topic: 2.3a Studying the Brain
Skill Level: Apply What You Know
Difficulty Level: Difficult
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

94. Brain mapping is done by _____.
a) freezing the brain
b) stimulating the brain
c) damaging the brain
d) slicing the brain
Answer: b
Learning Objective: 2.3a Describe the basic techniques for studying the brain.
Topic: 2.3a Studying the Brain

Skill Level: Understand the Concepts
Difficulty Level: Moderate
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

95. Small metal disks are pasted onto Miranda's scalp and connected by wire to a machine that records her brainwaves. From this description, it is evident that Miranda's brain is being studied through the use of _____.
    a) computed tomography (CT)
    b) functional magnetic resonance imaging (fMRI)
    c) a microelectrode
    d) electroencephalography (EEG)
Answer: d
Learning Objective: 2.3a Describe the basic techniques for studying the brain.
Topic: 2.3a Studying the Brain
Skill Level: Apply What You Know
Difficulty Level: Difficult
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

96. Which of the following types of neuroimaging technology is used to monitor brainwaves?
    a) Computed tomography (CT)
    b) Functional magnetic resonance imaging (fMRI)
    c) Microelectrode
    d) Electroencephalography (EEG)
Answer: d
Learning Objective: 2.3a Describe the basic techniques for studying the brain.
Topic: 2.3a Studying the Brain
Skill Level: Understand the Concepts
Difficulty Level: Moderate
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.
% correct 31 a = 27 b = 19 c = 22 d = 31 *r* = .37

97. Which of the following is a brain-imaging method in which radioactive dye that attaches to glucose in the brain is injected into a person and a computer compiles a color-coded image of the activity of the person's brain?
    a) Electroencephalography (EEG)
    b) Computed tomography (CT)
    c) Positron emission tomography (PET)
    d) Functional magnetic resonance imaging (fMRI)
Answer: c
Learning Objective: 2.3a Describe the basic techniques for studying the brain.
Topic: 2.3a Studying the Brain
Skill Level: Remember the Facts
Difficulty Level: Easy

APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.
% correct 48 a = 25 b = 12 c = 48 d = 13 *r* = .37

98. Doctors believe that Sarka has a tumor in her brain, because she is having trouble speaking and remembering. Based on the doctors' prediction, which of the following techniques will they most likely use to make a diagnosis?
a) Positron emission tomography (PET)
b) Electroencephalography (EEG)
c) Brain stimulation
d) Computed tomography (CT)
Answer: d
Learning Objective: 2.3a Describe the basic techniques for studying the brain.
Topic: 2.3a Studying the Brain
Skill Level: Analyze It
Difficulty Level: Difficult
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

99. Researchers want to determine what part of the brain is most involved when a person is reading. Which of the following techniques are they most likely to use to study this question?
a) Brain stimulation
b) Magnetic resonance imaging (MRI)
c) Positron emission tomography (PET)
d) Computed tomography (CT)
Answer: c
Learning Objective: 2.3a Describe the basic techniques for studying the brain.
Topic: 2.3a Studying the Brain
Skill Level: Apply What You Know
Difficulty Level: Difficult
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

100. A brain-imaging method that takes computer-controlled X-rays to reveal "slices" of the brain is called _____.
a) electroencephalography (EEG)
b) magnetic resonance imaging (MRI)
c) positron emission tomography (PET)
d) computed tomography (CT)
Answer: d
Learning Objective: 2.3a Describe the basic techniques for studying the brain.
Topic: 2.3a Studying the Brain
Skill Level: Remember the Facts
Difficulty Level: Easy
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

% correct 30 a = 16 b = 42 c = 11 d = 30 *r* = .30

101. Ali is in the hospital and is about to undergo a brain-imaging process that involves taking many X-rays, aided by the use of a computer, to form a three-dimensional image. What type of imaging technique is being used?
a) Electroencephalography (EEG)
b) Magnetic resonance imaging (MRI)
c) Positron-emission tomography (PET)
d) Computed tomography (CT)
Answer: d
Learning Objective: 2.3a Describe the basic techniques for studying the brain.
Topic: 2.3a Studying the Brain
Skill Level: Apply What You Know
Difficulty Level: Difficult
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.
% correct 37 a = 18 b = 42 c = 4 d = 37 *r* = .30

102. A brain-imaging method that uses magnetic fields of the body to produce detailed images of the brain, with a high level of contrast, is called _____.
a) electroencephalography (EEG)
b) magnetic resonance imaging (MRI)
c) positron emission tomography (PET)
d) computed tomography (CT)
Answer: b
Learning Objective: 2.3a Describe the basic techniques for studying the brain.
Topic: 2.3a Studying the Brain
Skill Level: Understand the Concepts
Difficulty Level: Moderate
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.
% correct 64 a = 19 b = 64 c = 7 d = 10 *r* = .20
% correct 81 a = 17 b = 81 c = 0 d = 2 *r* = .29

103. Rashad is in the hospital and is about to undergo a brain-imaging process that involves assessing changes in various “fields” in his brain so that a computer can create images of the internal details of his brain. Which of the following methods is to be used?
a) Electroencephalography (EEG)
b) Magnetic resonance imaging (MRI)
c) Computed tomography (CT)
d) Positron emission tomography (PET)
Answer: b
Learning Objective: 2.3a Describe the basic techniques for studying the brain.
Topic: 2.3a Studying the Brain
Skill Level: Apply What You Know
Difficulty Level: Difficult

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

104. The hindbrain is one of _____ operationally distinct sections of the brain.
a) two
b) three
c) four
d) five
Answer: b
Learning Objective: 2.3b Differentiate between the major structures of the brain, including the hindbrain, midbrain, limbic system, and cerebral cortex.
Topic: 2.3b Brain Structures
Skill Level: Remember the Facts
Difficulty Level: Easy
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.
% correct 57 a = 4 b = 57 c = 35 d = 4 *r* = .39

105. The medulla, pons, and cerebellum are all part of the _____.
a) limbic system
b) corpus callosum
c) cerebral cortex
d) brainstem
Answer: d
Learning Objective: 2.3b Differentiate between the major structures of the brain, including the hindbrain, midbrain, limbic system, and cerebral cortex.
Topic: 2.3b Brain Structures
Skill Level: Remember the Facts
Difficulty Level: Easy
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

106. Damage to the _____ will most likely result in death or the need to be placed on life-sustaining machines.
a) reticular activating system
b) pons
c) medulla
d) cerebellum
Answer: c
Learning Objective: 2.3b Differentiate between the major structures of the brain, including the hindbrain, midbrain, limbic system, and cerebral cortex.
Topic: 2.3b Brain Structures
Skill Level: Apply What You Know
Difficulty Level: Difficult
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

107. An auto accident has rendered Chris's nervous system unable to send messages for him to balance his body when standing up. What part of Chris's brain has most likely been damaged?
a) Pons
b) Medulla
c) Cerebellum
d) Reticular formation
Answer: c
Learning Objective: 2.3b Differentiate between the major structures of the brain, including the hindbrain, midbrain, limbic system, and cerebral cortex.
Topic: 2.3b Brain Structures
Skill Level: Apply What You Know
Difficulty Level: Difficult
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.
% correct 48 a = 10 b = 48 c = 37 d = 5 *r* = .22

108. Joel has been in an accident, and doctors have declared him to be in a coma because he is unable to respond to his surroundings. Unfortunately, the doctors cannot tell that he is actually aware of everything that is happening to him. Joel most likely has damaged his _____.
a) hindbrain
b) pons
c) medulla
d) forebrain
Answer: b
Learning Objective: 2.3b Differentiate between the major structures of the brain, including the hindbrain, midbrain, limbic system, and cerebral cortex.
Topic: 2.3b Brain Structures
Skill Level: Apply What You Know
Difficulty Level: Difficult
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.
% correct 78 a = 10 b = 6 c = 78 d = 6 *r* = .36

109. 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
b) pons
c) medulla
d) cerebellum
Answer: b
Learning Objective: 2.3b Differentiate between the major structures of the brain, including the hindbrain, midbrain, limbic system, and cerebral cortex.
Topic: 2.3b Brain Structures
Skill Level: Apply What You Know
Difficulty Level: Difficult

APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.
% correct 44 a = 15 b = 44 c = 25 d = 16 *r* = .22
% correct 41 a = 31 b = 41 c = 12 d = 16 *r* = .47

110. Damage to this part of the brain can lead to ventral pontine syndrome, a condition sometimes called being "locked in."
a) Hippocampus
b) Pons
c) Medulla
d) Cerebellum
Answer: b
Learning Objective: 2.3b Differentiate between the major structures of the brain, including the hindbrain, midbrain, limbic system, and cerebral cortex.
Topic: 2.3b Brain Structures
Skill Level: Remember the Facts
Difficulty Level: Easy
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

111. Since Tony suffered a head injury in a car accident three months ago, he has not experienced dreams as he did in the past. He used to have vivid, active dreams. Which part of his brain related to dreaming was most likely affected by the car accident?
a) Pons
b) Cerebellum
c) Cerebral cortex
d) Pituitary gland
Answer: a
Learning Objective: 2.3b Differentiate between the major structures of the brain, including the hindbrain, midbrain, limbic system, and cerebral cortex.
Topic: 2.3b Brain Structures
Skill Level: Apply What You Know
Difficulty Level: Difficult
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.
% correct 46 a = 46 b = 22 c = 32 d = 1 *r* = .40

112. Which part of the midbrain is made up of groups of receptors that control auditory and visual receptors, and is also a component of our basic emotional system?
a) Basal ganglia
b) Substantia nigra
c) Putamen
d) Tectum
Answer: d
Learning Objective: 2.3b Differentiate between the major structures of the brain, including the hindbrain, midbrain, limbic system, and cerebral cortex.

Topic: 2.3b Brain Structures
Skill Level: Understand the Concepts
Difficulty Level: Moderate
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

113. Monique has been diagnosed with a specific psychological disorder. She researches her condition so that she can better understand it and learns that this particular illness has been linked to problems with the reticular formation in her midbrain. What diagnosis has Monique probably received?

a) Attention-deficit hyperactivity disorder (ADHD)
b) Major depressive disorder
c) Generalized anxiety disorder
d) Schizophrenia

Answer: a
Learning Objective: 2.3b Differentiate between the major structures of the brain, including the hindbrain, midbrain, limbic system, and cerebral cortex.
Topic: 2.3b Brain Structures
Skill Level: Apply What You Know
Difficulty Level: Moderate
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

114. What is the main function of the reticular formation, which connects to the reticular activating system?

a) To control thinking
b) To regulate emotions
c) To control levels of alertness
d) To coordinate involuntary rapid fine-motor movements

Answer: c
Learning Objective: 2.3b Differentiate between the major structures of the brain, including the hindbrain, midbrain, limbic system, and cerebral cortex.
Topic: 2.3b Brain Structures
Skill Level: Remember the Facts
Difficulty Level: Easy
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

115. A neuroanatomist destroyed a dog's reticular formation to determine its function. As a result, the dog most likely _____.

a) could no longer hear
b) could no longer see
c) lapsed into a complete and irreversible coma
d) became hyperalert and no longer slept normally

Answer: c

Learning Objective: 2.3b Differentiate between the major structures of the brain, including the hindbrain, midbrain, limbic system, and cerebral cortex.
Topic: 2.3b Brain Structures
Skill Level: Analyze It
Difficulty Level: Difficult
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.
% correct 36 a = 4 b = 21 c = 36 d = 39 *r* = .20

116. Which of the following is a group of several brain structures positioned in the center of the brain and involved in learning, emotion, memory, and addiction?
a) Limbic system
b) Cerebellum
c) Cerebral cortex
d) Cerebrum
Answer: a
Learning Objective: 2.3b Differentiate between the major structures of the brain, including the hindbrain, midbrain, limbic system, and cerebral cortex.
Topic: 2.3b Brain Structures
Skill Level: Remember the Facts
Difficulty Level: Easy
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.
% correct 54 a = 54 b = 14 c = 20 d = 12 *r* = .29
% correct 50 a = 50 b = 21 c = 22 d = 7 *r* = .44

117. The structures of the limbic system play an important role in _____ and _____.
a) heart rate; breathing
b) breathing; decision making
c) memory; emotion
d) spatial tasks; sequential tasks
Answer: c
Learning Objective: 2.3b Differentiate between the major structures of the brain, including the hindbrain, midbrain, limbic system, and cerebral cortex.
Topic: 2.3b Brain Structures
Skill Level: Understand the Concepts
Difficulty Level: Moderate
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.
% correct 58 a = 28 b = 5 c = 58 d = 8 *r* = .30
% correct 44 a = 26 b = 22 c = 44 d = 7 *r* = .40

118. If the limbic system was destroyed, which of the following pairs of structures would be damaged?
a) Cerebellum and corpus callosum
b) Cerebellum and amygdala

c) Amygdala and hippocampus
d) Hippocampus and corpus callosum
Answer: c
Learning Objective: 2.3b Differentiate between the major structures of the brain, including the hindbrain, midbrain, limbic system, and cerebral cortex.
Topic: 2.3b Brain Structures
Skill Level: Understand the Concepts
Difficulty Level: Moderate
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.
% correct 69 a = 18 b = 8 c = 69 d = 3 *r* = .39

119. Which part of the brain acts as a relay station for incoming sensory information?
a) Hypothalamus
b) Thalamus
c) Cerebellum
d) Pituitary gland
Answer: b
Learning Objective: 2.3b Differentiate between the major structures of the brain, including the hindbrain, midbrain, limbic system, and cerebral cortex.
Topic: 2.3b Brain Structures
Skill Level: Remember the Facts
Difficulty Level: Easy
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.
% correct 48 a = 19 b = 48 c = 25 d = 8 *r* = .53
% correct 48 a = 22 b = 48 c = 22 d = 8 *r* = .48

120. Jason has recently started running and is training for a 5K race. He notices that when he starts running, he immediately feels overheated, but within a minute or so he begins sweating, which reduces his core body temperature. Which part of the brain is responsible for this function of temperature regulation?
a) Hypothalamus
b) Hippocampus
c) Cerebellum
d) Tectum
Answer: a
Learning Objective: 2.3b Differentiate between the major structures of the brain, including the hindbrain, midbrain, limbic system, and cerebral cortex.
Topic: 2.3b Brain Structures
Skill Level: Analyze It
Difficulty Level: Difficult
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

121. The _____ is the part of the brain responsible for the formation of new memories.

a) hippocampus
b) hypothalamus
c) fornix
d) amygdala
Answer: a
Learning Objective: 2.3b Differentiate between the major structures of the brain, including the hindbrain, midbrain, limbic system, and cerebral cortex.
Topic: 2.3b Brain Structures
Skill Level: Remember the Facts
Difficulty Level: Easy
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.
% correct 59 a = 59 b = 19 c = 0 d = 22 *r* = .45

122. Rats that have a damaged _____ would probably show little or no fear when placed next to a cat.
a) hippocampus
b) hypothalamus
c) fornix
d) amygdala
Answer: d
Learning Objective: 2.3b Differentiate between the major structures of the brain, including the hindbrain, midbrain, limbic system, and cerebral cortex.
Topic: 2.3b Brain Structures
Skill Level: Understand the Concepts
Difficulty Level: Moderate
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.
% correct 49 a = 27 b = 23 c = 1 d = 49 *r* = .52

123. Emily was in an automobile accident and suffered an injury to her brain that resulted in her having difficulty controlling her left arm. What part of Emily's brain was injured?
a) Left motor cortex
b) Right motor cortex
c) Corpus callosum
d) Somatosensory cortex
Answer: b
Learning Objective: 2.3b Differentiate between the major structures of the brain, including the hindbrain, midbrain, limbic system, and cerebral cortex.
Topic: 2.3b Brain Structures
Skill Level: Apply What You Know
Difficulty Level: Difficult
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.
% correct 82 a = 0 b = 82 c = 5 d = 11 *r* = .36

124. Which of the following lobes are involved in planning, creativity, and movement?
    a) Temporal lobes
    b) Parietal lobes
    c) Frontal lobes
    d) Occipital lobes
Answer: c
Learning Objective: 2.3b Differentiate between the major structures of the brain, including the hindbrain, midbrain, limbic system, and cerebral cortex.
Topic: 2.3b Brain Structures
Skill Level: Remember the Facts
Difficulty Level: Easy
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

125. The motor cortex is located in the _____ lobe of the brain.
    a) frontal
    b) occipital
    c) parietal
    d) temporal
Answer: a
Learning Objective: 2.3b Differentiate between the major structures of the brain, including the hindbrain, midbrain, limbic system, and cerebral cortex.
Topic: 2.3b Brain Structures
Skill Level: Understand the Concepts
Difficulty Level: Moderate
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.
% correct 74 a = 74 b = 6 c = 21 d = 9 *r* = .38

126. Kai is a soccer player. The motor impulses he needs to kick the ball originate in which lobe of the cerebral cortex?
    a) Temporal
    b) Parietal
    c) Occipital
    d) Frontal
Answer: d
Learning Objective: 2.3b Differentiate between the major structures of the brain, including the hindbrain, midbrain, limbic system, and cerebral cortex.
Topic: 2.3b Brain Structures
Skill Level: Apply What You Know
Difficulty Level: Moderate
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.
% correct 55 a = 10 b = 33 c = 2 d = 55 *r* = .30

127. Darla was in an automobile accident that resulted in an injury to her brain. Her sense of

touch has been affected. Which lobe of her cerebral cortex is the most likely site of the damage?
a) Frontal
b) Temporal
c) Occipital
d) Parietal
Answer: d
Learning Objective: 2.3b Differentiate between the major structures of the brain, including the hindbrain, midbrain, limbic system, and cerebral cortex.
Topic: 2.3b Brain Structures
Skill Level: Apply What You Know
Difficulty Level: Difficult
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.
% correct 65 a = 20 b = 11 c = 4 d = 65 *r* = .30
% correct 62 a = 18 b = 16 c = 5 d = 62 *r* = .32

128. The somatosensory cortex is located in the _____ lobe of the brain.
a) frontal
b) occipital
c) parietal
d) temporal
Answer: c
Learning Objective: 2.3b Differentiate between the major structures of the brain, including the hindbrain, midbrain, limbic system, and cerebral cortex.
Topic: 2.3b Brain Structures
Skill Level: Remember the Facts
Difficulty Level: Easy
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.
% correct 47 a = 32 b = 10 c = 47 d = 11 *r* = .37

129. Jerry was in a terrible tractor accident, and after several days in the hospital, doctors decided that his left leg had to be amputated. Six months later, at home, Jerry often feels pain and itching in his left leg, even though it has been removed. This is referred to as _____ pain.
a) post-amputation traumatic
b) hysterical extremity
c) neurogenic
d) phantom limb
Answer: d
Learning Objective: 2.3b Differentiate between the major structures of the brain, including the hindbrain, midbrain, limbic system, and cerebral cortex.
Topic: 2.3b Brain Structures
Skill Level: Apply What You Know
Difficulty Level: Difficult

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

130. Which of the following regions of the brain contain the auditory cortex?
a) Temporal lobes
b) Parietal lobes
c) Frontal lobes
d) Occipital lobes
Answer: a
Learning Objective: 2.3b Differentiate between the major structures of the brain, including the hindbrain, midbrain, limbic system, and cerebral cortex.
Topic: 2.3b Brain Structures
Skill Level: Understand the Concepts
Difficulty Level: Moderate
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.
% correct 63 a = 63 b = 7 c = 22 d = 7 *r* = .44

131. Layla has difficulty recognizing spoken words, sometimes experiences memory problems, and occasionally has difficulty controlling her emotions. Which part of the brain is probably experiencing a problem that leads to this combination of symptoms?
a) Prefrontal cortex
b) Anterior parietal lobe
c) Right occipital lobe
d) Left temporal lobe
Answer: d
Learning Objective: 2.3b Differentiate between the major structures of the brain, including the hindbrain, midbrain, limbic system, and cerebral cortex.
Topic: 2.3b Brain Structures
Skill Level: Analyze It
Difficulty Level: Difficult
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

132. Which of the following regions contains the primary visual cortex?
a) Occipital lobe
b) Parietal lobe
c) Temporal lobe
d) Frontal lobe
Answer: a
Learning Objective: 2.3b Differentiate between the major structures of the brain, including the hindbrain, midbrain, limbic system, and cerebral cortex.
Topic: 2.3b Brain Structures
Skill Level: Remember the Facts
Difficulty Level: Easy

APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.
% correct 82 a = 82 b = 4 c = 14 d = 0 *r* = .47

133. The part of the occipital lobe that is responsible for receiving visual information from the eyes by way of the optic nerves is called the _____ cortex.
a) primary visual
b) somatosensory
c) auditory
d) visual association
Answer: a
Learning Objective: 2.3b Differentiate between the major structures of the brain, including the hindbrain, midbrain, limbic system, and cerebral cortex.
Topic: 2.3b Brain Structures
Skill Level: Remember the Facts
Difficulty Level: Easy
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

134. John has decided to learn how to wrestle. His first day at practice, a seasoned wrestler slams the back of his head to the mat. John is shaken and reports to the trainer that he "saw stars" after he hit his head. John "saw stars" because his _____ was temporarily affected as a result of the slam.
a) corpus callosum
b) occipital lobe
c) parietal lobes
d) somatosensory cortex
Answer: b
Learning Objective: 2.3b Differentiate between the major structures of the brain, including the hindbrain, midbrain, limbic system, and cerebral cortex.
Topic: 2.3b Brain Structures
Skill Level: Apply What You Know
Difficulty Level: Difficult
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.
% correct 92 a = 2 b = 92 c = 3 d = 3 *r* = .34

135. A brain tumor's growth has caused Dick's vision to suffer. Which lobe of the brain is being affected by the tumor's growth?
a) Frontal
b) Occipital
c) Parietal
d) Temporal
Answer: b
Learning Objective: 2.3b Differentiate between the major structures of the brain, including the hindbrain, midbrain, limbic system, and cerebral cortex.

Topic: 2.3b Brain Structures
Skill Level: Apply What You Know
Difficulty Level: Moderate
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.
% correct 91 a = 2 b = 91 c = 4 d = 3 *r* = .23

136. The cortex is divided into two sections referred to as _____.
a) cerebral hemispheres
b) cerebellums
c) corpus callosums
d) neurotransmitters
Answer: a
Learning Objective: 2.3c Describe the two hemispheres of the brain.
Topic: 2.3c The Cerebral Hemispheres
Skill Level: Remember the Facts
Difficulty Level: Easy
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.
% correct 91 a = 91 b = 3 c = 5 d = 0 *r* = .29

137. The thick band of neurons that connects the right and left cerebral hemispheres is called the _____.
a) cortex
b) cerebrum
c) corpus callosum
d) cerebellum
Answer: c
Learning Objective: 2.3c Describe the two hemispheres of the brain.
Topic: 2.3c The Cerebral Hemispheres
Skill Level: Remember the Facts
Difficulty Level: Easy
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.
% correct 90 a = 3 b = 1 c = 90 d = 5 *r* = .51
% correct 81 a = 0 b = 4 c = 81 d = 15 *r* = .54

138. Since the removal of a tumor from the left side of her brain, Sharon has recovered well. However, some of her former abilities are now limited. Which of the following abilities has most likely been affected?
a) Coordinated walking movements
b) Solving algebra equations
c) Assembling puzzles
d) Recognizing objects that she sees
Answer: b
Learning Objective: 2.3c Describe the two hemispheres of the brain.

Topic: 2.3c The Cerebral Hemispheres
Skill Level: Apply What You Know
Difficulty Level: Moderate
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.
% correct 68 a = 14 b = 68 c = 10 d = 8 *r* = .28

139. Which hemisphere of the cerebral cortex is better at math, logical reasoning, and language tasks?
a) Front
b) Rear
c) Left
d) Right
Answer: c
Learning Objective: 2.3c Describe the two hemispheres of the brain.
Topic: 2.3c The Cerebral Hemispheres
Skill Level: Remember the Facts
Difficulty Level: Easy
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

140. Malik has developed an illness that afflicts one specific area of his cerebral cortex. The primary symptom is that he has tremendous difficulty recognizing people's faces. Which area of his cerebral cortex has been affected?
a) Parietal lobe
b) Temporal lobe
c) Left hemisphere
d) Right hemisphere
Answer: d
Learning Objective: 2.3c Describe the two hemispheres of the brain.
Topic: 2.3c The Cerebral Hemispheres
Skill Level: Apply What You Know
Difficulty Level: Difficult
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

141. 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
Learning Objective: 2.3c Describe the two hemispheres of the brain.
Topic: 2.3c The Cerebral Hemispheres
Skill Level: Remember the Facts
Difficulty Level: Easy

APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.
% correct 91 a = 91 b = 2 c = 4 d = 3 *r* = .35

142. 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
Learning Objective: 2.3c Describe the two hemispheres of the brain.
Topic: 2.3c The Cerebral Hemispheres
Skill Level: Analyze It
Difficulty Level: Difficult
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.
% correct 80 a = 5 b = 80 c = 6 d = 8 *r* = .24

143. 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, and can identify it by touch
d) pick the object out of a group of hidden objects using her right hand, but cannot identify it verbally
Answer: c
Learning Objective: 2.3c Describe the two hemispheres of the brain.
Topic: 2.3c The Cerebral Hemispheres
Skill Level: Analyze It
Difficulty Level: Difficult
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

144. Split-brain surgery is often done to treat _____.
a) tumors
b) seizures
c) strokes
d) infections in the brain
Answer: b
Learning Objective: 2.3c Describe the two hemispheres of the brain.
Topic: 2.3c The Cerebral Hemispheres

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

145. The ability of the brain to change in response to experience or damage is called _____.
a) neural plasmosis
b)reticular formation
c) neurogenesis
d) neuroplasticity
Answer: d
Learning Objective: 2.3d Explain neuroplasticity and neurogenesis.
Topic: 2.3d Neuroplasticity and Neurogenesis
Skill Level: Remember the Facts
Difficulty Level: Easy
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

146. In regard to the brain, the term *plasticity* refers to _____.
a) being easily broken or "cracked"
b) the ability to adapt to new conditions
c) level of complexity
d) brittleness or rigidity
Answer: b
Learning Objective: 2.3d Explain neuroplasticity and neurogenesis.
Topic: 2.3d Neuroplasticity and Neurogenesis
Skill Level: Understand the Concepts
Difficulty Level: Moderate
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

147. Jack suffered a brain injury as a result of hitting his head while waterskiing. One of the problems that developed was that Jack could not pronounce certain words correctly for a long period of time; now that he has had extensive speech therapy, he can speak as he did before his accident. This is an example of the brain's _____, which allows the structure and function of his brain cells to change to adjust to the trauma.
a) adaptology
b) stagnation
c) neuroplasticity
d) reflex arc
Answer: c
Learning Objective: 2.3d Explain neuroplasticity and neurogenesis.
Topic: 2.3d Neuroplasticity and Neurogenesis
Skill Level: Apply What You Know
Difficulty Level: Moderate

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

148. Learning something new is represented by neural connections getting _____ in the brain.
a) weaker
b) rearranged
c) stronger
d) relocated
Answer: c
Learning Objective: 2.3d Explain neuroplasticity and neurogenesis.
Topic: 2.3d Neuroplasticity and Neurogenesis
Skill Level: Understand the Concepts
Difficulty Level: Moderate
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

149. _____ is the creation of new neurons in the adult brain.
a) Neurogenesis
b) Neural plasticity
c) Long-term potentiation
d) Synaptogenesis
Answer: a
Learning Objective: 2.3d Explain neuroplasticity and neurogenesis.
Topic: 2.3d Neuroplasticity and Neurogenesis
Skill Level: Remember the Facts
Difficulty Level: Easy
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

150. Which of the following is necessary for new cells in the brain to survive?
a) They must be able to build connections with other neurons.
b) Appropriate physical therapy needs to be prescribed.
c) The person must practice the behavior that is associated with those new cells.
d) They must be wrapped in glial cells.
Answer: a
Learning Objective: 2.3d Explain neuroplasticity and neurogenesis.
Topic: 2.3d Neuroplasticity and Neurogenesis
Skill Level: Understand the Concepts
Difficulty Level: Moderate
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

151. Gazzaniga and Sperry conducted research on epileptics who needed a specific surgery to hopefully help reduce the number of seizures they were having. This surgical procedure is called the _____.

a) left-brain procedure
b) right-brain procedure
c) split-brain procedure
d) midbrain procedure

Answer: c
Learning Objective: 2.4a: Describe how psychology may be applied to interpret and explain new behavioral phenomena.
Topic: 2.4 Studies That Changed Psychology: Then and Now
Skill Level: Understand the Concepts
Difficulty Level: Moderate
APA Learning Objective: 1.2 Develop a working knowledge of psychology's content domains.

152. In the study conducted by Gazzaniga and Sperry, when patients were asked to report on information presented only to the right hemisphere, what happened?

a) Patients were able to accurately report what was presented to their right hemisphere
b) Patients were able to describe what was presented to their right hemisphere, but they could not name any of the objects
c) Patients were completely mute
d) Patients rambled on with nonsense sentences

Answer: c
Learning Objective: 2.4a: Describe how psychology may be applied to interpret and explain new behavioral phenomena.
Topic: 2.4 Studies That Changed Psychology: Then and Now
Skill Level: Understand the Concepts
Difficulty Level: Moderate
APA Learning Objective: 1.2 Develop a working knowledge of psychology's content domains.

153. What were the conclusions of the Gazzaniga and Sperry study?

a) All people are either left-brained or right-brained.
b) The brain can operate as a whole, but function of the independent hemispheres can also be observed.
c) Once the corpus callosum is severed, the person will be unable to do anything beyond vegetative functioning.
d) The hemispheres can act independently, demonstrating full function on each side of the brain.

Answer: b
Learning Objective: 2.4a: Describe how psychology may be applied to interpret and explain new behavioral phenomena.
Topic: 2.4 Studies That Changed Psychology: Then and Now
Skill Level: Analyze It
Difficulty Level: Difficult
APA Learning Objective: 1.2 Develop a working knowledge of psychology's content domains.

154. In the Gazzaniga and Sperry study, what was the independent variable?

a) Verbally reporting what they had been asked to do
b) Accuracy at picking items out of a bag

c) Whether participants were presented information visually, through hearing, or by feeling
d) Whether or not participants had received the split-brain surgery

Answer: c
Learning Objective: 2.4b Demonstrate psychology information literacy through an understanding of research methods and design.
Topic: 2.4 Studies That Changed Psychology: Then and Now
Skill Level: Analyze It
Difficulty Level: Difficult
APA Learning Objective: 1.2 Develop a working knowledge of psychology's content domains.

ESSAY

155. Compare and contrast the reductionist and holistic models of studying human behavior.

Answer: Reductionism is the breaking down of complex phenomena into simpler components. It begins with a broad explanation of society and culture and then is brought down into a narrower explanation of mental systems and behavior. Reduction to the most basic level of neurobehavioral processes should be achieved. While this method is very detailed-oriented and easily gets down to the very basic elements of life, it can be criticized for allowing a lot of other information to be overlooked by the forced reduction of ideas. Holistic models prefer to look at the interaction of all of the elements of the individual and recognize that most behaviors are influenced by multiple factors. An example of this is the biopsychosocial model. This approach can be criticized, though, because through it we do not learn about the most basic of elements that contribute to behavior.
Learning Objective: 2.1a Describe the reductionist and holistic approaches to studying behavior.
Topic: 2.1a Reductionism and Holistic Models
Skill Level: Analyze It
Difficulty Level: Difficult
APA Learning Objective: 1.2 Develop a working knowledge of psychology's content domains.

156. Critique the biopsychosocial model for explaining behavior. Why might it be helpful and more accurate than other models, or why might it overcomplicate the evaluation of behavior? In your critique, include a definition of the model and provide examples of each of its elements.

Answer: Proposed by George Engel, this model suggested that you could only understand behavior if you considered the biological, psychological, and social aspects involved in the behavior. He believed that each of these three variables was an entire system operating within an even larger system. While the model provides a powerful framework for explaining behavior, it can be very difficult to study something that is so broad and, by its character, allows more than one variable to change at a time.
Learning Objective: 2.1a Describe the reductionist and holistic approaches to studying behavior.
Topic: 2.1a Reductionism and Holistic Models
Skill Level: Analyze It
Difficulty Level: Difficult

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

157. Analyze the four main parts of the human neuron by explaining how they are related in structure and function. Clearly identify the role that each plays in the transmission of neural communication.

Answer: The neuron consists of dendrites, a cell body, an axon, and axon terminals. The dendrites receive information from other cells. They increase the likelihood that cells will connect with them by branching out like the roots of a tree. The cell body contains the DNA for the cell. At the juncture between the cell body and the axon, the decision is made whether or not to fire an action potential. The axon is responsible for carrying an action potential from the cell body to the axon terminals, in preparation for sending a message on to the next cell. The axon can be myelinated or non-myelinated, which adjusts the speed that cell can use to transfer a new message; myelinated cells are the fastest. The axon terminals will connect with other cells' dendrites and cell bodies and transmit a chemical message to the next cell. While waiting for the action potential to come along, they store vesicles with neurotransmitter.
Learning Objective: 2.2a Describe the structure and function of neurons.
Topic: 2.2a Neurons
Skill Level: Apply What You Know
Difficulty Level: Difficult
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

158. Identify the primary neurotransmitters discussed in your text. Distinguish between them based on their proposed functions. Propose one potential impact if a person has particularly low levels of each neurotransmitter.

Answer: Acetylcholine is a neurotransmitter associated with memory function, arousal, and movement. Therefore, someone struggling with too little acetylcholine would have difficulty in forming new memories, making movements, and maintaining normal levels of arousal. Dopamine is a neurotransmitter associated with pleasure sensation and appetite suppression. Someone low in dopamine might overeat and have very little motivation to seek something pleasurable. Endorphins are critical chemicals for providing pain relief. Someone low on endorphins would experience more pain than normal. Glutamate is a neurotransmitter responsible for learning and memory enhancement. Obviously, if someone is low in glutamate, learning and memory would be reduced. Norepinephrine is a neurotransmitter implicated in arousal, mood, and appetite suppression. Someone with too little norepinephrine could suffer from low arousal, low mood, and decreased appetite suppression. Serotonin is a neurotransmitter that has been shown to play a role in mood, sleep, and appetite. Low levels of serotonin would lead to low mood, a lack of sleep, and a change in appetite. Lastly, GABA is indicated in sleep, anxiety, and tension. Low levels of GABA might lead to sleep disturbance, anxiety, and increased tension.
Learning Objective: 2.2b Explain how neural messages are transmitted.
Topic: 2.2b Neuronal Transmission
Skill Level: Apply What You Know

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

159. Compare and contrast the roles of the various divisions of the nervous system.

Answer: The nervous system is composed of the central nervous system and the peripheral nervous system. The central nervous system contains the brain and the spinal cord, and the peripheral nervous system contains all of the nerves outside of the brain and the spinal cord that interact in the body. Therefore, the central nervous system oversees incoming sensory information and creates a response to that information in the form of a behavior. The peripheral nervous system is further divided into the autonomic and somatic nervous systems. The somatic nervous system is made up of nerves over which you have conscious control and that help control voluntary movement. The autonomic nervous system controls involuntary bodily functions such as sweating, digestion, and organ secretions. The autonomic nervous system is further divided into two parts. One is the sympathetic nervous system, which oversees the fight-or-flight preparations of the body, and the other is the parasympathetic nervous system, which is the calming system that returns the body to its normal state after sympathetic nervous system arousal.
Learning Objective: 2.2c Identify the major divisions of the nervous system.
Topic: 2.2c Divisions of the Nervous System
Skill Level: Apply What You Know
Difficulty Level: Moderate
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

160. Distinguish between the organizational and activational functions of the endocrine system.

Answer: The organizational role of the endocrine system occurs when hormones are released during gestation and assist in signaling the fetus to develop either male or female structures. During gestation, the right hormones from the endocrine system must be released to allow the fetus to develop female or male genitalia, as indicated by the sex chromosomes. Activational effects temporarily influence the body and behavior, like when we need to respond to a stressful situation and the adrenal glands release adrenaline.
Learning Objective: 2.2d Explain the purpose and function of the endocrine system.
Topic: 2.2d The Endocrine System
Skill Level: Apply What You Know
Difficulty Level: Moderate
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

161. Compare and contrast the function and implementation of three methods for viewing the brain and its activity.

Answer: Students will compare three of the following:

EEG: This is a measure of electrical activity produced by neurons when they send their messages to other neurons. It involves placing electrodes on the surface of the person's head, where brainwaves can be recorded. It is a method to measure function in the brain.
PET: The PET scan involves injecting the individual with a dye that is radioactive and attaches to glucose. It then reflects areas of the brain where there is increased activity as the glucose is taken up by brain cells that need the energy. It is a method to measure function in the brain
fMRI: This uses the MRI technology by showing differing levels of electrical activity in the brain of patients while they are performing specific tasks. This technique is unique because it also gives you a picture of the brain, revealing its structure. Therefore, it is a method that can be used to observe both structure and function.
CT: A CT scan combines the use of X-rays and computers to generate a three-dimensional picture of the brain. It can be used to look for abnormalities in the structure of the brain.
MRI: A magnetic resonance image generates a three-dimensional computer image of the brain but provides better contrast and detail than the CT. The MRI is very good at showing the internal detail of the brain.

Learning Objective: 2.3a Describe the basic techniques for studying the brain.
Topic: 2.3a Studying the Brain
Skill Level: Analyze It
Difficulty Level: Moderate
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

162. Distinguish between the primary structures in the hindbrain and give a function for each. Describe the basic role of the hindbrain in overall brain function.

Answer: The medulla is a primary structure in the hindbrain that oversees functions like breathing, digesting, and the beating of the heart. The cerebellum is the small brain that comes off the back of the brain and is important in coordinating muscle movements, balance, posture, and equilibrium; it has also been shown to play a part in memory for language, emotions, and some higher-order human functions such as decision-making. The pons sits just above the medulla and serves as an area where sensory signals cross from one side of the body to the other side of the brain. It plays an important role in consciousness, sleep, and dreaming. The hindbrain, then, is critical for basic functions of the body, including breathing, heartbeat, organizing sleep and consciousness, and coordinating motor responses that assist with balance and posture.

Learning Objective: 2.3b Differentiate between the major structures of the brain, including the hindbrain, midbrain, limbic system, and cerebral cortex.
Topic: 2.3b Brain Structures
Skill Level: Apply What You Know
Difficulty Level: Difficult
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

163. Compare and contrast the location of the lobes of the brain and their primary functions.

Answer: The frontal lobes are called “frontal” because of their placement. They contain the motor cortex and are critical in motor movement. They also play a critical role in personality and complex thinking. The frontal lobes are the last to develop and are capable of some of the most complex functions of the brain, like higher-order thinking and decision making. The parietal lobes lie just behind the frontal lobes, on the top of the brain. They contain the somatosensory cortex and are critical in bringing in the sense of touch from our body. They assist in guiding the information that comes in from the senses to the correct area in the brain for decoding. Once the information is decoded, it is brought back together and assimilated as one piece of information. The temporal lobes lie just inside your ears. They contain important structures for language, memory, and emotion. They are critical in helping you to produce and understand speech, along with bringing in all of your auditory messages and decoding them for interpretation. The occipital lobes lie at the back of the brain, toward the bottom. They are responsible for our sense of vision. Information arrives in the occipital lobe from the eyes. Once there, parts of your visual experience are sent off to be identified by form, shape, color, etc. These various characteristics are then brought back together to form a full picture.
Learning Objective: 2.3b Differentiate between the major structures of the brain, including the hindbrain, midbrain, limbic system, and cerebral cortex.
Topic: 2.3b Brain Structures
Skill Level: Apply What You Know
Difficulty Level: Difficult
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

164. Compare and contrast the right and left cerebral hemispheres and their function?

Answer: The two hemispheres of the brain look very similar and are connected via the corpus callosum. This structure assists the hemispheres in performing acts that require both hemispheres. The majority of tasks require both hemispheres. However, the brain does demonstrate some level of specialization in each of the hemispheres. The left hemisphere appears to be better at math, language, and logical reasoning. The right side plays a larger role in recognizing faces, using your imagination, and drawing a picture.
Learning Objective: 2.3c Describe the two hemispheres of the brain.
Topic: 2.3c The Cerebral Hemispheres
Skill Level: Analyze It
Difficulty Level: Moderate
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

165. Compare and contrast the concepts of neuroplasticity and neurogenesis. Explain why they are critical processes in the brain.

Answer: Neuroplasticity is the ability of the brain to change itself in response to experience or damage. Therefore, it mostly occurs in existing brain tissue and involves the strengthening or weakening of connections between neurons. However, neuroplasticity can result in the growth of new neurons. Neuroplasticity plays a critical role in recovery from brain injury or

disease. *Neurogenesis* means "birth of neurons." It is used to describe the thousands of new neurons formed in the brain each day. For these new cells to survive, they must make connections with other cells. One day, our knowledge of neurogenesis may help us bring new treatment to those who suffer from brain injuries or disease. So neurogenesis is the birth of new cells, while neuroplasticity mostly consists of changes in existing cells.

Learning Objective: 2.3d Explain neuroplasticity and neurogenesis.
Topic: 2.3d Neuroplasticity and Neurogenesis
Skill Level: Analyze It
Difficulty Level: Difficult
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

REVEL QUIZ QUESTIONS

The following questions appear at the end of each module and at the end of the chapter in Revel for Psychology *2e.*

End of Module Quiz 2.1: Biological Models of Behavior

EOM Q2.1.1
Which model of behavior focuses on the interaction between biological, psychological, social, and cultural variables?

a) Reductionist
   CONSIDER THIS: This model was put forth by psychiatrist George Engel, who believed that the mind and body were connected and to promote health, one must consider the whole person. LO 2.1a Describe the reductionist and holistic approaches to studying behavior.
b) Levels of analysis
   CONSIDER THIS: This model was put forth by psychiatrist George Engel, who believed that the mind and body were connected and to promote health, one must consider the whole person. LO 2.1a Describe the reductionist and holistic approaches to studying behavior.
c) Biopsychosocial
d) Evolutionary
   CONSIDER THIS: This model was put forth by psychiatrist George Engel, who believed that the mind and body were connected and to promote health, one must consider the whole person. LO 2.1a Describe the reductionist and holistic approaches to studying behavior.

Answer: c
Learning Objective: 2.1a Describe the reductionist and holistic approaches to studying behavior.
Module: 2.1: Biological Models of Behavior
Difficulty Level: Easy
Skill Level: Remember the Facts

EOM Q2.1.2
What is the lowest level of explanation for a behavior according to a reductionist approach?

a) Neurobehavioral processes
b) Mental systems
   CONSIDER THIS: Reductionists want to reduce explanations to their most fundamental components. LO 2.1a Describe the reductionist and holistic approaches to studying behavior.
c) Culture
   CONSIDER THIS: Reductionists want to reduce explanations to their most fundamental components. LO 2.1a Describe the reductionist and holistic approaches to studying behavior.
d) Society
   CONSIDER THIS: Reductionists want to reduce explanations to their most fundamental

components. LO 2.1a Describe the reductionist and holistic approaches to studying behavior.

Answer: a
Learning Objective: 2.1a Describe the reductionist and holistic approaches to studying behavior.
Module: 2.1: Biological Models of Behavior
Difficulty Level: Easy
Skill Level: Understand the Concepts

EOM Q2.1.3
Which statement describes the role of the epigenome?

a) It is the physical structure that houses the human genome.
   CONSIDER THIS: Epigenome literally means "above the genome" and can control the genes like a dimmer switch, turning their influence higher or lower. LO 2.1b Define *epigenetics* and describe how the *epigenome* acts as a mediator between genetics and the environment.
b) It is the boss that controls gene activation.
c) It is the molecule that encodes each person's genetic blueprint.
   CONSIDER THIS: Epigenome literally means "above the genome" and can control the genes like a dimmer switch, turning their influence higher or lower. LO 2.1b Define epigenetics and describe how the *epigenome* acts as a mediator between genetics and the environment.
d) Its job is to combine chromosomes during conception.
   CONSIDER THIS: Epigenome literally means "above the genome" and can control the genes like a dimmer switch, turning their influence higher or lower. LO 2.1b Define epigenetics and describe how the *epigenome* acts as a mediator between genetics and the environment.

Answer: b
Learning Objective: 2.1b Define epigenetics and describe how the epigenome acts as a mediator between genetics and the environment.
Module: 2.1: Biological Models of Behavior
Difficulty Level: Easy
Skill Level: Remember the Facts

EOM Q2.1.4
According to evolutionary models, what is the driving force behind all human and animal behaviors?

a) Independence
   CONSIDER THIS: Evolutionary models focus primarily on behaviors that are adaptive and shared by all humans. LO 2.1c Understand the concepts of evolution and natural selection.
b) Survival
c) Aggression
   CONSIDER THIS: Evolutionary models focus primarily on behaviors that are adaptive and shared by all humans. LO 2.1c Understand the concepts of evolution and natural selection.

d) Social connection
CONSIDER THIS: Evolutionary models focus primarily on behaviors that are adaptive and shared by all humans. LO 2.1c Understand the concepts of evolution and natural selection.

Answer: b
Learning Objective: 2.1c Understand the concepts of evolution and natural selection.
Module: 2.1: Biological Models of Behavior
Difficulty Level: Easy
Skill Level: Understand the Concepts

EOM Q2.1.5
All of the following factors are important in understanding natural selection EXCEPT _____.

a) Variation
CONSIDER THIS: In evolutionary theory, inherited traits serve to help a species survive and reproduce. LO 2.1c Understand the concepts of evolution and natural selection.
b) Inheritance
CONSIDER THIS: In evolutionary theory, inherited traits serve to help a species survive and reproduce. LO 2.1c Understand the concepts of evolution and natural selection.
c) Survival
CONSIDER THIS: In evolutionary theory, inherited traits serve to help a species survive and reproduce. LO 2.1c Understand the concepts of evolution and natural selection.
d) free will

Answer: d
Learning Objective: 2.1c Understand the concepts of evolution and natural selection.
Module: 2.1: Biological Models of Behavior
Difficulty Level: Easy
Skill Level: Understand the Concepts

End of Module Quiz 2.2: The Nervous and Endocrine Systems

EOM Q2.2.1
Which part of the neuron houses the DNA for the cell?

a) Dendrite
CONSIDER THIS: This is the largest part of the cell, which is capable of coordinating the information processing for the cell. LO 2.2a Describe the structure and function of neurons.
b) Soma
c) Axon
CONSIDER THIS: This is the largest part of the cell, which is capable of coordinating the information processing for the cell. LO 2.2a Describe the structure and function of neurons.
d) Axon terminal
CONSIDER THIS: This is the largest part of the cell, which is capable of coordinating the information processing for the cell. LO 2.2a Describe the structure and function of neurons.

Answer: b
Learning Objective: 2.2a Describe the structure and function of neurons.
Module: 2.2: The Nervous and Endocrine Systems
Difficulty Level: Easy
Skill Level: Remember the Facts

EOM Q2.2.2
Like a lock and key, neurotransmitters attach themselves to _____ in the brain.

a) receptor sites
b) glial cells
   CONSIDER THIS: If the neurotransmitter molecule is able to open the lock, its message is communicated. LO 2.2a Describe the structure and function of neurons.
c) Receivers
   CONSIDER THIS: If the neurotransmitter molecule is able to open the lock, its message is communicated. LO 2.2a Describe the structure and function of neurons.
d) safe cells
   CONSIDER THIS: If the neurotransmitter molecule is able to open the lock, its message is communicated. LO 2.2a Describe the structure and function of neurons.

Answer: a
Learning Objective: 2.2a Describe the structure and function of neurons.
Module: 2.2: The Nervous and Endocrine Systems
Difficulty Level: Easy
Skill Level: Understand the Concepts

EOM Q2.2.3
Which important cells in the brain were originally thought to be only helper cells to neurons?

a) Mirror neurons
   CONSIDER THIS: These cells, which make up 90% of the cells in the brain, actually come in several types and serve important functions beyond assisting neurons. LO 2.2b Explain how neural messages are transmitted.
b) Glial cells
c) Interneurons
   CONSIDER THIS: These cells, which make up 90% of the cells in the brain, actually come in several types and serve important functions beyond assisting neurons. LO 2.2b Explain how neural messages are transmitted.
d) Somas
   CONSIDER THIS: These cells, which make up 90% of the cells in the brain, actually come in several types and serve important functions beyond assisting neurons. LO 2.2b Explain how neural messages are transmitted.

Answer: b
Learning Objective: 2.2b Explain how neural messages are transmitted.
Module: 2.2: The Nervous and Endocrine Systems
Difficulty Level: Easy
Skill Level: Understand the Concepts

EOM Q2.2.4

Which division of the nervous system is referred to as our "fight-or-flight" system?

a) Central nervous system
   CONSIDER THIS: This is the pathway of nerve systems between the central nervous system and the muscles and organs in the body. LO 2.2c Identify the major divisions of the nervous system.
b) Peripheral nervous system
   CONSIDER THIS: This is the pathway of nerve systems between the central nervous system and the muscles and organs in the body. LO 2.2c Identify the major divisions of the nervous system.
c) Somatic nervous system
   CONSIDER THIS: This is the pathway of nerve systems between the central nervous system and the muscles and organs in the body. LO 2.2c Identify the major divisions of the nervous system.
d) Sympathetic nervous system

Answer: d
Learning Objective: 2.2c Identify the major divisions of the nervous system.
Module: 2.2: The Nervous and Endocrine Systems
Difficulty Level: Easy
Skill Level: Remember the Facts

EOM Q2.2.5
The chief hormonal system in the body is called the _____.

a) sympathetic system
   CONSIDER THIS: This system of hormone-producing glands can trigger hormonal messages just as your brain sends electrical messages. LO 2.2d Explain the purpose and function of the endocrine system.
b) parasympathetic system
   CONSIDER THIS: This system of hormone-producing glands can trigger hormonal messages just as your brain sends electrical messages. LO 2.2d Explain the purpose and function of the endocrine system.
c) endocrine system
d) nervous system
   CONSIDER THIS: This system of hormone-producing glands can trigger hormonal messages just as your brain sends electrical messages. LO 2.2d Explain the purpose and function of the endocrine system.

Answer: c
Learning Objective: 2.2d Explain the purpose and function of the endocrine system.
Module: 2.2: The Nervous and Endocrine Systems
Difficulty Level: Easy
Skill Level: Understand the Concepts

End of Module Quiz 2.3: The Brain

EOM Q2.3.1
If a team of psychologists wanted to see whether brain wave patterns change during a daydream, which imaging technique should they use?

a) EEG
b) PET Scan
CONSIDER THIS: This machine measures the electrical activity produced by neurons as they fire their messages. LO 2.3a Describe the basic techniques for studying the brain.
c) CT Scan
CONSIDER THIS: This machine measures the electrical activity produced by neurons as they fire their messages. LO 2.3a Describe the basic techniques for studying the brain.
d) MRI
CONSIDER THIS: This machine measures the electrical activity produced by neurons as they fire their messages. LO 2.3a Describe the basic techniques for studying the brain.

Answer: a
Learning Objective: 2.3a Describe the basic techniques for studying the brain.
Module: 2.3: The Brain
Difficulty Level: Easy
Skill Level: Understand the Concepts

EOM Q2.3.2
Which hindbrain structure plays an important role in coordinating posture and balance?

a) Medulla
CONSIDER THIS: This structure also plays a part in memory for language, emotions, and higher-level functions such as decision making. LO 2.3b Differentiate between the major structures of the brain, including the hindbrain, midbrain, limbic system, and cerebral cortex.
b) Cerebellum
c) Pons
CONSIDER THIS: This structure also plays a part in memory for language, emotions, and higher-level functions such as decision making. LO 2.3b Differentiate between the major structures of the brain, including the hindbrain, midbrain, limbic system, and cerebral cortex.
d) Reticular formation
CONSIDER THIS: This structure also plays a part in memory for language, emotions, and higher-level functions such as decision making. LO 2.3b Differentiate between the major structures of the brain, including the hindbrain, midbrain, limbic system, and cerebral cortex.

Answer: b
Learning Objective: 2.3b Differentiate between the major structures of the brain, including the hindbrain, midbrain, limbic system, and cerebral cortex.
Module: 2.3: The Brain
Difficulty Level: Easy
Skill Level: Understand the Concepts

EOM Q2.3.3
Which statement describes the experience of split-brain patients?

a) The two hemispheres can no longer directly communicate with each other.
b) The communication between the two hemispheres is greatly improved.
CONSIDER THIS: This loss of hemispheric connection can sometimes result, for

example, in antagonistic behavior between hands. LO 2.3c Describe the two hemispheres of the brain.

c) They now live with only one functioning hemisphere.
CONSIDER THIS: This loss of hemispheric connection can sometimes result, for example, in antagonistic behavior between hands. LO 2.3c Describe the two hemispheres of the brain.

d) They have had one hemisphere removed.
CONSIDER THIS: This loss of hemispheric connection can sometimes result, for example, in antagonistic behavior between hands. LO 2.3c Describe the two hemispheres of the brain.

Answer: a
Learning Objective: 2.3c Describe the two hemispheres of the brain.
Module: 2.3: The Brain
Difficulty Level: Easy
Skill Level: Understand the Concepts

EOM Q2.3.4
Which brain structure acts as an information superhighway sending messages back and forth between the two hemispheres?

a) Medulla
CONSIDER THIS: If this band of nerve fibers is severed, the two halves of the brain can no longer communicate directly. LO 2.3c Describe the two hemispheres of the brain.

b) Hippocampus
CONSIDER THIS: If this band of nerve fibers is severed, the two halves of the brain can no longer communicate directly. LO 2.3c Describe the two hemispheres of the brain.

c) Cerebellum
CONSIDER THIS: If this band of nerve fibers is severed, the two halves of the brain can no longer communicate directly. LO 2.3c Describe the two hemispheres of the brain.

d) Corpus callosum

Answer: d
Learning Objective: 2.3c Describe the two hemispheres of the brain.
Module: 2.3: The Brain
Difficulty Level: Easy
Skill Level: Remember the Facts

EOM Q2.3.5
The brain's ability to change at any age is referred to as _____.

a) Neuroanatomy
CONSIDER THIS: The brain is far more flexible than scientists previously thought; the cortex can shrink or thicken, and the connections between neurons can be strengthened or weakened. LO 2.3d Explain neuroplasticity and neurogenesis.

b) plasticity

c) neurogenesis
CONSIDER THIS: The brain is far more flexible than scientists previously thought; the cortex can shrink or thicken, and the connections between neurons can be strengthened or weakened. LO 2.3d Explain neuroplasticity and neurogenesis.

d) hemispheric specialization
CONSIDER THIS: The brain is far more flexible than scientists previously thought; the cortex can shrink or thicken, and the connections between neurons can be strengthened or weakened. LO 2.3d Explain neuroplasticity and neurogenesis.

Answer: b
Learning Objective: 2.3d Explain neuroplasticity and neurogenesis.
Module: 2.3: The Brain
Difficulty Level: Easy
Skill Level: Remember the Facts

End of Module Quiz 2.4: Studies That Changed Psychology: Then and Now

EOM Q2.4.1
How accurate are books and motivational programs that tout being "left-brained" or "right-brained?"

a) Somewhat accurate; most people are right-brained, which explains why most people are right-handed.
CONSIDER THIS: How does scientific understanding of how the brain works match up to what these books and programs promote? LO 2.4a: Demonstrate psychology information literacy through an understanding of research methods and design.
b) Very accurate; left- or right-brained people behave vastly differently in the world.
CONSIDER THIS: How does scientific understanding of how the brain works match up to what these books and programs promote? LO 2.4a: Demonstrate psychology information literacy through an understanding of research methods and design.
c) Somewhat accurate; the majority of people are right-brained, so really it's just that hemisphere that should get attention.
CONSIDER THIS: How does scientific understanding of how the brain works match up to what these books and programs promote? LO 2.4a: Demonstrate psychology information literacy through an understanding of research methods and design.
d) Not very accurate; virtually everyone uses all of their brains all of the time.

Answer: d
Learning Objective: 2.4a: Demonstrate psychology information literacy through an understanding of research methods and design.
Module: 2.4: Studies That Changed Psychology: Then and Now
Difficulty Level: Moderate
Skill Level: Understand the Concepts

EOM Q2.4.2
Why might someone's corpus callosum be surgically severed?

a) To treat otherwise-intractable epilepsy
b) Because they volunteered to be part of a neuroscience experiment
CONSIDER THIS: Split-brain patients typically became that way because of a medical need for the procedure. LO2.4a: Demonstrate psychology information literacy through an understanding of research methods and design.
c) To remove dead brain cells
CONSIDER THIS: Split-brain patients typically became that way because of a medical

need for the procedure. LO 2.4a: Demonstrate psychology information literacy through an understanding of research methods and design.

d) To treat rare vision problems
CONSIDER THIS: Split-brain patients typically became that way because of a medical need for the procedure. LO 2.4a: Demonstrate psychology information literacy through an understanding of research methods and design.

Answer: a
Learning Objective: 2.4a: Demonstrate psychology information literacy through an understanding of research methods and design.
Module: 2.4: Studies That Changed Psychology: Then and Now
Difficulty Level: Easy
Skill Level: Remember the Facts

EOM Q2.4.3
What does contralateral control mean?

a) The left hemisphere controls the right hemisphere.
CONSIDER THIS: Contralateral control refers to a counterintuitive but well-established fact regarding how the brain functions. LO 2.4a: Demonstrate psychology information literacy through an understanding of research methods and design.

b) The right hemisphere controls the hindbrain.
CONSIDER THIS: Contralateral control refers to a counterintuitive but well-established fact regarding how the brain functions. LO 2.4a: Demonstrate psychology information literacy through an understanding of research methods and design.

c) Each hemisphere controls functions on the opposite side of the body.

d) Each hemisphere controls functions on its corresponding side of the body.
CONSIDER THIS: Contralateral control refers to a counterintuitive but well-established fact regarding how the brain functions. LO 2.4a: Demonstrate psychology information literacy through an understanding of research methods and design.

Answer: c
Learning Objective: 2.4a: Demonstrate psychology information literacy through an understanding of research methods and design.
Module: 2.4: Studies That Changed Psychology: Then and Now
Difficulty Level: Easy
Skill Level: Remember the Facts

EOM Q2.4.4
If a split-brain patient receives information only in the right hemisphere and is then asked to verbalize what she saw after seeing a picture of a moose, what is the patient likely to say?

a) "I saw a moose."
CONSIDER THIS: Recall which tasks are specialized in the left and right hemispheres. LO 2.4a: Demonstrate psychology information literacy through an understanding of research methods and design.

b) "I don't know what I saw."

c) "I saw an image, but the picture was too fuzzy to make out any details."
CONSIDER THIS: Recall which tasks are specialized in the left and right hemispheres.

LO 2.4a: Demonstrate psychology information literacy through an understanding of research methods and design.

d) "I saw an image of a large animal."
CONSIDER THIS: Recall which tasks are specialized in the left and right hemispheres.
LO 2.4a: Demonstrate psychology information literacy through an understanding of research methods and design.

Answer: b
Learning Objective: 2.4a: Demonstrate psychology information literacy through an understanding of research methods and design.
Module: 2.4: Studies That Changed Psychology: Then and Now
Difficulty Level: Moderate
Skill Level: Analyze It

EOM Q2.4.5
If a split-brain patient receives an image of a zucchini only in the right hemisphere and is then asked to pick up the actual item using her left hand, what is the patient likely to grasp?

a) Nothing
CONSIDER THIS: The right hemisphere would control the left hand, and the right hemisphere is where the information was received. LO 2.4a: Demonstrate psychology information literacy through an understanding of research methods and design.

b) A turnip
CONSIDER THIS: The right hemisphere would control the left hand, and the right hemisphere is where the information was received. LO 2.4a: Demonstrate psychology information literacy through an understanding of research methods and design.

c) A zucchini

d) An apple
CONSIDER THIS: The right hemisphere would control the left hand, and the right hemisphere is where the information was received. LO 2.4a: Demonstrate psychology information literacy through an understanding of research methods and design.

Answer: c
Learning Objective: 2.4a: Demonstrate psychology information literacy through an understanding of research methods and design.
Module: 2.4: Studies That Changed Psychology: Then and Now
Difficulty Level: Easy
Skill Level: Analyze It

Chapter 2 Quiz: Biology and Behavior

EOC Q2.1
Which model of behavior is being depicted here?

a) Holistic
CONSIDER THIS: This model breaks down complex phenomena into simpler components, just like a funnel focuses the flow of material from broad to narrow. LO 2.1a Describe the reductionist and holistic approaches to studying behavior.
b) Biopsychosocial
CONSIDER THIS: This model breaks down complex phenomena into simpler components, just like a funnel focuses the flow of material from broad to narrow. LO 2.1a Describe the reductionist and holistic approaches to studying behavior.
c) Reductionist
d) Epigenetic
CONSIDER THIS: This model breaks down complex phenomena into simpler components, just like a funnel focuses the flow of material from broad to narrow. LO 2.1a Describe the reductionist and holistic approaches to studying behavior.

Answer: c
Learning Objective: 2.1a Describe the reductionist and holistic approaches to studying behavior.
Module: Biology and Behavior
Difficulty Level: Easy
Skill Level: Understand the Concepts

EOC Q2.2
Each day at the high school, cafeteria employees wait for their daily assignment from the cafeteria manager. Some of the tasks include prepping food for lunch, overseeing the cash register, and preparing the serving line. If you were to relate the workings of the cafeteria to the human genome, which part would the manager be?

a) The X chromosome
CONSIDER THIS: This "boss" of the genome controls whether or not a particular gene will be "promoted," "fired," or "furloughed." LO 2.1b Define epigenetics and describe how the epigenome acts as a mediator between genetics and the environment.
b) DNA molecule
CONSIDER THIS: This "boss" of the genome controls whether or not a particular gene will be "promoted," "fired," or "furloughed." LO 2.1b Define epigenetics and describe how the epigenome acts as a mediator between genetics and the environment.
c) The gene
CONSIDER THIS: This "boss" of the genome controls whether or not a particular gene will be "promoted," "fired," or "furloughed." LO 2.1b Define epigenetics and describe how the epigenome acts as a mediator between genetics and the environment.
d) The epigenome

Answer: d
Learning Objective: 2.1b Define epigenetics and describe how the epigenome acts as a mediator between genetics and the environment.
Module: Biology and Behavior
Difficulty Level: Difficult
Skill Level: Analyze It

EOC Q2.3

Clarisse is majoring in biology. She has the opportunity to join a field study that will be researching the eastern turkey vulture. The professor leading the study told the volunteers that they will be examining the differences between subspecies, traits that make survival easier, and the degree to which those traits are passed onto offspring. Which theory will Clarisse's group be studying?

a) Natural selection
b) Darwinism
   CONSIDER THIS: The components of this approach include variation, inheritance, and survival of the fittest. LO 2.1c Understand the concepts of evolution and natural selection.
c) Avian inheritance
   CONSIDER THIS: The components of this approach include variation, inheritance, and survival of the fittest. LO 2.1c Understand the concepts of evolution and natural selection.
d) Biological replication
   CONSIDER THIS: The components of this approach include variation, inheritance, and survival of the fittest. LO 2.1c Understand the concepts of evolution and natural selection.

Answer: a
Learning Objective: 2.1c Understand the concepts of evolution and natural selection.
Module: Biology and Behavior
Difficulty Level: Moderate
Skill Level: Understand the Concepts

EOC Q2.4
The part of a neuron that receives information from neighboring neurons is called the _____.

a) dendrites
b) axon
   CONSIDER THIS: There are usually many of these structures on a single neuron. LO 2.2a Describe the structure and function of neurons.
c) Soma
   CONSIDER THIS: There are usually many of these structures on a single neuron. LO 2.2a Describe the structure and function of neurons.
d) Nucleus
   CONSIDER THIS: There are usually many of these structures on a single neuron. LO 2.2a Describe the structure and function of neurons.

Answer: a
Learning Objective: 2.2a Describe the structure and function of neurons.
Module: Biology and Behavior
Difficulty Level: Easy
Skill Level: Remember the Facts

EOC Q2.5
Specialized neurons that help us understand and empathize with others are called _____.

a) mirror neurons

b) motor neurons
CONSIDER THIS: These neurons have been found in the brains of many primates. LO 2.2a Describe the structure and function of neurons.
c) the sympathetic nervous system
CONSIDER THIS: These neurons have been found in the brains of many primates. LO 2.2a Describe the structure and function of neurons.
d) the empathetic nervous system
CONSIDER THIS: These neurons have been found in the brains of many primates. LO 2.2a Describe the structure and function of neurons.

Answer: a
Learning Objective: 2.2a Describe the structure and function of neurons.
Module: Biology and Behavior
Difficulty Level: Easy
Skill Level: Remember the Facts

EOC Q2.6
A young girl has recently developed an intense case of poison ivy. Which of her neurons are transmitting the messages of pain and itch to her brain?

a) Synaptic neurons
CONSIDER THIS: These neurons run from the receptors in our different senses to the brain and spinal cord. LO 2.2a Describe the structure and function of neurons.
b) Motor neurons
CONSIDER THIS: These neurons run from the receptors in our different senses to the brain and spinal cord. LO 2.2a Describe the structure and function of neurons.
c) Sensory neurons
d) Association neurons
CONSIDER THIS: These neurons run from the receptors in our different senses to the brain and spinal cord. LO 2.2a Describe the structure and function of neurons.

Answer: c
Learning Objective: 2.2a Describe the structure and function of neurons.
Module: Biology and Behavior
Difficulty Level: Easy
Skill Level: Remember the Facts

EOC Q2.7
What takes place when a neuron moves into a state of action potential?

a) Channels in the cell membrane open and positive ions rush into the cell.
b) Interneurons connect briefly with mirror neurons to produce motor output.
CONSIDER THIS: The formation of an action potential is one of the fundamental processes that takes place as neurons communicate with one another. LO 2.2b Explain how neural messages are transmitted.
c) A cell loses one or more of its dendrites.
CONSIDER THIS: The formation of an action potential is one of the fundamental processes that takes place as neurons communicate with one another. LO 2.2b Explain how neural messages are transmitted.

d) Positive and negative ions bond to one another to form axons.
CONSIDER THIS: The formation of an action potential is one of the fundamental processes that takes place as neurons communicate with one another. LO 2.2b Explain how neural messages are transmitted.

Answer: a
Learning Objective: 2.2b Explain how neural messages are transmitted.
Module: Biology and Behavior
Difficulty Level: Moderate
Skill Level: Analyze It

EOC Q2.8
Which of the following is NOT a major neurotransmitter found in the human brain?

a) Parathyroid
b) Dopamine
CONSIDER THIS: Neurotransmitters are chemical messengers in the brain, and usually are specialized for different kinds of functions. LO 2.2b Explain how neural messages are transmitted.
c) Serotonin
CONSIDER THIS: Neurotransmitters are chemical messengers in the brain, and usually are specialized for different kinds of functions. LO 2.2b Explain how neural messages are transmitted.
d) Glutamate
CONSIDER THIS: Neurotransmitters are chemical messengers in the brain, and usually are specialized for different kinds of functions. LO 2.2b Explain how neural messages are transmitted.

Answer: a
Learning Objective: 2.2b Explain how neural messages are transmitted.
Module: Biology and Behavior
Difficulty Level: Moderate
Skill Level: Analyze It

EOC Q2.9
While home alone one night, you hear the squeal of tires and a loud crash. Your body intensely reacts by jolting you out of your chair and propelling you toward the door. Which system has produced such a dramatic change so quickly?

a) Limbic system
CONSIDER THIS: This subdivision of the autonomic nervous system is the body's emergency nervous system. LO 2.2c Identify the major divisions of the nervous system.
b) Sympathetic nervous system
c) Somatic nervous system
CONSIDER THIS: This subdivision of the autonomic nervous system is the body's emergency nervous system. LO 2.2c Identify the major divisions of the nervous system.
d) Parasympathetic nervous system
CONSIDER THIS: This subdivision of the autonomic nervous system is the body's emergency nervous system. LO 2.2c Identify the major divisions of the nervous system.

Answer: b

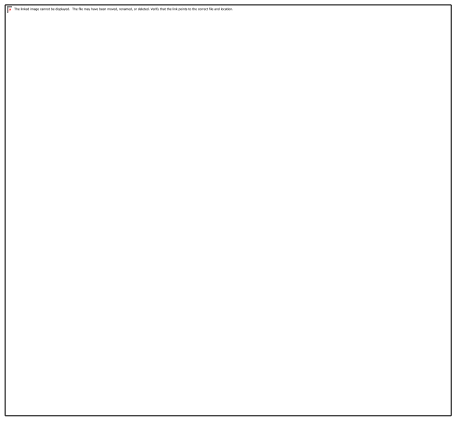
Learning Objective: 2.2c Identify the major divisions of the nervous system.
Module: Biology and Behavior
Difficulty Level: Easy
Skill Level: Remember the Facts

EOC Q2.10
The thyroid and pituitary gland play a major role in the _____ system.

a) Lymphatic
   CONSIDER THIS: This communication system is made up of a collection of hormone-producing glands. LO 2.2d Explain the purpose and function of the endocrine system.
b) Nervous
   CONSIDER THIS: This communication system is made up of a collection of hormone-producing glands. LO 2.2d Explain the purpose and function of the endocrine system.
c) Digestive
   CONSIDER THIS: This communication system is made up of a collection of hormone-producing glands. LO 2.2d Explain the purpose and function of the endocrine system.
d) endocrine

Answer: d
Learning Objective: 2.2d Explain the purpose and function of the endocrine system.
Module: Biology and Behavior
Difficulty Level: Easy
Skill Level: Remember the Facts

EOC Q2.11
Which brain-imaging method is being shown here?



a) Electroencephalography (EEG)
   CONSIDER THIS: This method is very important for showing internal detail but isn't able to capture fast-moving events. LO 2.3a Describe the basic techniques for studying the brain.
b) Positron emission tomography (PET)
   CONSIDER THIS: This method is very important for showing internal detail but isn't able to capture fast-moving events. LO 2.3a Describe the basic techniques for studying the brain.

c) Functional magnetic resonance imaging (fMRI)
CONSIDER THIS: This method is very important for showing internal detail but isn't able to capture fast-moving events. LO 2.3a Describe the basic techniques for studying the brain.
d) Magnetic resonance imaging (MRI)

Answer: d
Learning Objective: 2.3a Describe the basic techniques for studying the brain.
Module: Biology and Behavior
Difficulty Level: Moderate
Skill Level: Biology and Behavior

EOC Q2.12
A young man has been admitted to the hospital after a serious fall from a horse. He was not wearing a helmet, and as a result has suffered from an inability to form new memories. He can remember past events, but nothing since the fall. Which area of his brain was most likely damaged?

a) The hippocampus
b) The hypothalamus
CONSIDER THIS: This structure of the limbic system is involved in spatial awareness and memory. LO 2.3b Differentiate between the major structures of the brain, including the hindbrain, midbrain, limbic system, and cerebral cortex.
c) The pons
CONSIDER THIS: This structure of the limbic system is involved in spatial awareness and memory. LO 2.3b Differentiate between the major structures of the brain, including the hindbrain, midbrain, limbic system, and cerebral cortex.
d) The fornix
CONSIDER THIS: This structure of the limbic system is involved in spatial awareness and memory. LO 2.3b Differentiate between the major structures of the brain, including the hindbrain, midbrain, limbic system, and cerebral cortex.

Answer: a
Learning Objective: 2.3b Differentiate between the major structures of the brain, including the hindbrain, midbrain, limbic system, and cerebral cortex.
Module: Biology and Behavior
Difficulty Level: Moderate
Skill Level: Remember the Facts

EOC Q2.13
The two important functions in which the structures of the limbic system play a role are _____ and_____.

a) spatial tasks; sequential tasks
CONSIDER THIS: The limbic system, which also contains the brain's pleasure center, is made up of the thalamus, the hypothalamus, the hippocampus, and the amygdala. LO 2.3b Differentiate between the major structures of the brain, including the hindbrain, midbrain, limbic system, and cerebral cortex.
b) heart rate; breathing
CONSIDER THIS: The limbic system, which also contains the brain's pleasure center, is

made up of the thalamus, the hypothalamus, the hippocampus, and the amygdala. LO 2.3b Differentiate between the major structures of the brain, including the hindbrain, midbrain, limbic system, and cerebral cortex.

c) auditory; visual
CONSIDER THIS: The limbic system, which also contains the brain's pleasure center, is made up of the thalamus, the hypothalamus, the hippocampus, and the amygdala. LO 2.3b Differentiate between the major structures of the brain, including the hindbrain, midbrain, limbic system, and cerebral cortex.

d) memory; emotion

Answer: d
Learning Objective: 2.3b Differentiate between the major structures of the brain, including the hindbrain, midbrain, limbic system, and cerebral cortex.
Module: Biology and Behavior
Difficulty Level: Moderate
Skill Level: Understand the Concepts

EOC Q2.14
The left side of the body is primarily controlled by _____.

a) spatial reasoning
CONSIDER THIS: The brain is divided into two cerebral hemispheres, each of which is specialized for various tasks. LO 2.3c Describe the two hemispheres of the brain.

b) the right cerebral hemisphere

c) the left cerebral hemisphere
CONSIDER THIS: The brain is divided into two cerebral hemispheres, each of which is specialized for various tasks. LO 2.3c Describe the two hemispheres of the brain.

d) the temporal lobe
CONSIDER THIS: The brain is divided into two cerebral hemispheres, each of which is specialized for various tasks. LO 2.3c Describe the two hemispheres of the brain.

Answer: b
Learning Objective: 2.3c Describe the two hemispheres of the brain.
Module: Biology and Behavior
Difficulty Level: Easy
Skill Level: Understand the Concepts

EOC Q2.15
When used in reference to the human brain, the term "plasticity" means _____.

a) the brain's tendency to be easily broken or "cracked"
CONSIDER THIS: Scientists have learned that the cortex can shrink or thicken and that the connections between neurons can be strengthened or weakened. LO 2.3d Explain neuroplasticity and neurogenesis.

b) the brain's ability to flex under pressure
CONSIDER THIS: Scientists have learned that the cortex can shrink or thicken and that the connections between neurons can be strengthened or weakened. LO 2.3d Explain neuroplasticity and neurogenesis.

c) the brain's ability to adapt to new conditions

d) the brain's massive complexity
CONSIDER THIS: Scientists have learned that the cortex can shrink or thicken and that the connections between neurons can be strengthened or weakened. LO 2.3d Explain neuroplasticity and neurogenesis.

Answer: c
Learning Objective: 2.3d Explain neuroplasticity and neurogenesis.
Module: Biology and Behavior
Difficulty Level: Easy
Skill Level: Understand the Concepts

Chapter 2: Foundations of Behavior

CONTENTS

LEARNING OBJECTIVES

2.1: BIOLOGICAL MODELS OF BEHAVIOR
2.1a Describe the reductionist and holistic approaches to studying behavior.
2.1b Define *epigenetics* and describe how the epigenome acts as a mediator between genetics and the environment.
2.1c Understand the concepts of evolution and natural selection.

2.2: THE NERVOUS AND ENDOCRINE SYSTEMS
2.2a Describe the structure and function of neurons.
2.2b Explain how neural messages are transmitted.
2.2c Identify the major divisions of the nervous system.
2.2d Explain the purpose and function of the endocrine system.

2.3: THE BRAIN
2.3a Describe the basic techniques for studying the brain.
2.3b Differentiate between the major structures of the brain, including the hindbrain, midbrain, limbic system, and cerebral cortex.
2.3c Describe the two hemispheres of the brain.
2.3d Explain neuroplasticity and neurogenesis.

2.4 STUDIES THAT CHANGED PSYCHOLOGY: THEN AND NOW
Classic Study: One Brain or Two?
2.4a: Describe how psychology may be applied to interpret and explain new behavioral phenomena.
2.4b: Demonstrate psychology information literacy through an understanding of research methods and design.

CHAPTER OUTLINE AND LECTURE NOTES

Chapter Opener: *Phineas Gage: A Famous Case of Brain Injury* (See Revel video)

A. 2.1 BIOLOGICAL MODELS OF BEHAVIOR

1. **2.1a Reductionism and Holistic Models**
   2.1a Describe the reductionist and holistic approaches to studying behavior.
   Lecture Launcher: Critical Thinking About the Brain

   a. Reductionism

      Reductionism is the breaking down of complex phenomena into simpler components.

      Example: In theory, a blush can be *reduced* to the biological process involving blood vessels.

   b. Holistic Models

      A **holistic** approach is the idea that the whole is always greater than the sum of its parts.

      The **biopsychosocial model** includes the biological, physical, and social aspects of a person's behavior or condition.

2. **2.1b Epigenetic Models**
   2.1b Define *epigenetics* and describe how the *epigenome* acts as a mediator between genetics and the environment.
   Lecture Launcher: Research with Twins

   Your **genotype** is the "instruction manual" for your body. It consists of genes that provide codes for the complex structure of your internal body and its functioning.

   Your **phenotype** is your appearance or how you look on the outside.

   Chromosomes are made up of deoxyribonucleic acid (DNA), a molecule that encodes your genetic blueprint.

   The molecules that make up chromosomes combine in many different ways to form **genes.**

   The **human genome** is a complete set of human genes, about 25,000 of them.

The **epigenome** "boss" controls the genes that influence which gene will be promoted, fired (rendering it useless), or temporarily furloughed, and this can be influenced by environmental factors such as diet, stress, social networks, and environmental toxins.

The field of **epigenetics** is the study of the complex exchange between genetics and the environment.

Example: The type of care babies receive from their caregivers leads the epigenome to activate certain receptors, influencing the way they respond to stress. If the baby is fed properly, cuddled, and protected, these activities will promote the activation of a gene that allows the baby to stay calm in stressful situations. Later in life, when faced with stress, they will approach it more calmly than babies not exposed to proper feeding, cuddling, and protection. In abused babies, the epigenome may "fire" the genes responsible for staying calm under stress, rendering them inactive. Later in life, the inhibited stress response may increase the risk of antisocial behavior, violence, or even suicide when faced with stressful situations.

3. **2.1c Evolutionary Models**
   2.1c Understand the concepts of evolution and natural selection.

   Evolutionary models of human behavior focus primarily on behaviors that are adaptive (i.e., ones that have facilitated the survival of the species) and shared by all humans. In addition, evolutionary psychologists are interested in variations in behavior that are affected by social influences such as mating, parenting behavior, cultural beliefs, and attitudes.

   Darwin's **theory of evolution** supports the idea that the ability of an organism to change involves both genetic and environmental factors, resulting in **natural selection**.

   The process of natural selection contains the following components: **variation, inheritance, survival, and survival of the fittest.**

B. 2.2 THE NERVOUS AND ENDOCRINE SYSTEMS

1. **2.2a Neurons**
   2.2a Describe the structure and function of neurons.

   a. Neurons

      Your body's communication system is made up of microscopic cells called **neurons.**

      I. Structure of the Neuron

         Dendrites are covered in tiny receptors, special places on the cell membrane that are sensitive to incoming information.

The **soma** is the largest part of the cell and houses the cell's nucleus, which contains DNA.

The **axon** is a long, microscopic, cable-like structure coming off of the soma.

The **axon terminals** are at the ends of the axon and carry messages to other cells.

II. Types of Neurons

Sensory neurons run from the receptors of our different senses to the brain and spinal cord.

Motor neurons transmit impulses from the brain and spinal cord to other parts of the body, such as the muscles, skin, and glands.

Interneurons are located in the brain and spinal cord. They take in messages from sensory neurons and other interneurons.

2. 2.2b Neural Transmission
2.2b Explain how neural messages are transmitted.
Lecture Launcher: Neurotransmitters

a. Neural Transmission

I. The Nerve Impulse

When a neuron is not sending a message, it is in a state of **resting potential**.

When the neuron gets enough electrical stimulation from its neighbors, it moves into a state of **action potential**. The name for this electrical current passing through the cell is the **nerve impulse.**

The nerve impulse is **all-or-none**.

The cell then enters a brief *refractory period* where it cannot send another message.

II. Neurotransmitters

Neurotransmitters are chemicals contained in the axon terminals, that are released into the synaptic gap.

Once neurotransmitters are released, they must bind to a **receptor site** on the dendrites of the receiving cell.

Communication between neurons is an *electrochemical* process.

Neurotransmitters can be either **excitatory** (increase the likelihood that a neuron will fire a message) or **inhibitory** (decrease the likelihood that a neuron will fire a message).

Neurotransmitters include acetylcholine, endorphins, glutamate, GABA, serotonin, norepinephrine, and dopamine.

b. Glial Cells

Ninety percent of the cells in the brain are actually **glial cells**. Although they were once thought of as "helper" cells or glue between neurons, it has been discovered that there are several types of glial cells and that they serve important functions beyond assisting neurons.

3. 2.2c Divisions of the Nervous System
2.2c Identify the major divisions of the nervous system.
Lecture Launcher: The Enteric Nervous System

a. The Central Nervous System (CNS)

The **central nervous system (CNS)** involves all the neurons that make up your brain and spinal cord. The central nervous system coordinates skeletal and muscular systems for movement, responds to sensory information from the outside world, generates emotions, and stores memories.

b. The Peripheral Nervous System (PNS)

The **peripheral nervous system (PNS)** is the pathway of nerve systems between the central nervous system and the muscles and organs in the body. It is divided into additional subdivisions. The **somatic nervous system** is made up of nerves that you have conscious control over. The **autonomic nervous system** includes involuntary commands that control involuntary bodily functions such as respiration, digestion, and organ secretions. This system has two additional subdivisions, the **parasympathetic nervous system**, which calms or returns the body to its normal resting state, and the **sympathetic nervous system**, which preps the body for threatening situations.

4. 2.2d The Endocrine System
2.2d Explain the purpose and function of the endocrine system.
Lecture Launcher: Would You Like Fries with That Peptide?

The **endocrine system** is made up of a collection of hormone-producing glands that respond to imbalances in the body's internal state by releasing greater or lesser amounts of various hormones to react to events and maintain homeostasis.

The **pituitary gland** is the chief gland and is located in the center of your brain.

The endocrine system plays a role in organizing the structure of internal and external sexual structures in males and females. It can also have a temporary **activational effect** to help us respond to things like stress.

C. 2.3 THE BRAIN

1. **2.3a Studying the Brain**
   2.3a Describe the basic techniques for studying the brain.
   Lecture Launcher: Brain's Bilingual Broca
   Lecture Launcher: The Perception of Phantom Pain
   Lecture Launcher: Freak Accidents and Brain Injuries
   Lecture Launcher: The Cranial Nerves

   a. Case Studies

      Before the availability of diverse imaging methods, case studies of brain injury and behavior gave us information about brain function.

   b. Brain Stimulation

      Electrodes have been an important tool in the creation of a basic diagram of brain functioning called **brain mapping**. Parts of the brain are stimulated with electrodes and the patient's responses are observed. If various parts of the brain are merely touched, the patient will experience memories, emotions, muscular movements, and other bodily sensations. Today, electrical stimulation of the brain is used not only to study brain activity but also as therapy.

   c. Neuroimaging

      Thanks to new technology, scientists are able to peer into the brain without surgery and "see" its structure and activity. A variety of techniques, known collectively as **neuroimaging**, have been developed to create specialized pictures of the brain.

      EEG (electroencephalograph): Measures the electrical activity produced by neurons as they send, or fire, their messages.

      PET (positron emission tomography): Involves injecting radioactive glucose into the bloodstream. When the brain becomes active, the areas that are the most active take up the most glucose, and that can be measured on the scanner.

      CT scan (computerized tomography): A combination of super-fine X-rays and computer technology is used to create a three-dimensional picture that can reveal intricate slices of the brain.

MRI (magnetic resonance imaging) and **fMRI** (functional magnetic resonance imaging): The MRI generates three-dimensional computer images of the brain that have greater contrast and detail than a CT scan. The fMRI shows differing levels of electrical activity in the brain while the patient is performing tasks.

2. **2.3b Brain Structures**
   2.3b Differentiate between the major structures of the brain, including the hindbrain, midbrain, limbic system, and cerebral cortex.
   Lecture Launcher: Brain Anatomy

   a. The Hindbrain

   The **medulla** is an elongated structure that starts at the top of the neck and moves up through the base of the skull. It handles a lot of the "automatic" behavior like breathing and your heart beating.

   The **cerebellum** coordinates muscle movement and plays a role in posture, balance, and equilibrium.

   The **pons** sits on top of the medulla and serves as a crossroads for neural signals, where fibers cross from one side of the body to the other side of the brain.

   b. The Midbrain

   The **midbrain** is a small area positioned between the hindbrain and forebrain, providing connections between the lower and higher structures of the brain.

   The **tectum** controls auditory and visual responses and is a component of our basic emotional system.

   The **reticular formation** and its connections make up the *reticular activation system (RAS),* which keeps the brain alert and awake.

   c. The Forebrain: Limbic System

   The **forebrain** is the forwardmost part of the brain and is made up of the limbic system and the cerebral cortex. It controls the most complex and sophisticated thoughts and where the basic emotions originate in the forebrain.

   The **thalamus** sits right in the center of the brain and acts as a major relay station from the senses to the cortex.

   The **hypothalamus** secretes hormones and plays a role in integrating the nervous system and the endocrine system.

   The **hippocampus** is involved in spatial awareness as well as in memory.

The **amygdala** sits at the ends of the hippocampus and plays a role in memory and emotional responses.

d. The Forebrain: The Cerebral Cortex

The **cerebral cortex** is the wrinkled outer portion of the brain. It is responsible for perception, language, thought, and personality.

The **frontal lobes** contain the motor cortex, which is important in coordinating our physical movements. It also plays a key role in complex human thinking and personality.

The **parietal lobes** serve as the map for receiving sensory information from your body parts. The somatosensory cortex assigns differing amounts of brain tissue to body parts depending on their number of nerve endings and sensitivity to touch.

The **temporal lobes** contain several important structures related to language, memory, and emotion, and they contain the auditory cortex.

The **occipital lobe** contains the primary visual cortex and oversees our vision.

3. 2.3c The Cerebral Hemispheres
2.3c Describe the two hemispheres of the brain.
Lecture Launcher: Understanding Hemispheric Function
Lecture Launcher: The Results of a Hemispherectomy

Each hemisphere of the brain is primarily in charge of the opposite side of the body's functioning. These specialized brain functions controlled by one hemisphere or the other are referred to as *lateralization.*

a. Hemispheric Specialization

Hemispheric specialization is the idea that each half of the brain is responsible for different tasks.

The right side of the brain is said to analyze the "big picture" of the world around you, but pays little attention to minor details. The verbal, left side of the brain processes information in a more analytical way by combining small parts into a whole.

b. Split-Brain Research

Split-brain patients have their corpus callosum severed to prevent epileptic seizures. Split-brain tests are designed to send different information to each hemisphere so that the function of each hemisphere can be observed.

4. **2.3d Neuroplasticity and Neurogenesis**
   2.3d Explain neuroplasticity and neurogenesis.

   The ability of the brain to change itself in response to experience or damage is called **neuroplasticity**. The cortex can shrink or thicken, and the connections between neurons can be strengthened or weakened.

   Neurogenesis literally means "birth of neurons." Thousands of new neurons are formed in your brain each day, mostly in the areas responsible for learning and memory, but the majority of these will die before becoming functional.

D. 2.4 STUDIES THAT CHANGED PSYCHOLOGY: THEN AND NOW

   Classic Study: One Brain or Two?
   2.4a Describe how psychology may be applied to interpret and explain new behavioral phenomena.
   2.4b Demonstrate psychology information literacy through an understanding of research methods and design.

   Introduction: The brain constantly communicates from one hemisphere to the other. But what happens to people who no longer have that ability because they have had the split-brain procedure.

   Research Goals: Michael Gazzaniga and Roger Wolcott Sperry examined four split-brain patients to understand how the two halves of the brain are able to function independently.

   Research Method: A testing procedure was developed to determine the function of each hemisphere. In one type of test, pictures, words, or parts of words were displayed to the visual area in either the left or right hemisphere, but not both. In a second testing situation, split-brain patients could feel (but not see) a common object using either their left or right hands. In a third situation, auditory perception was examined. Patients were verbally instructed to find certain items by touch, reaching into a bag that contained many possible items. In each situation, the researchers predicted that the hemisphere in charge of the response—replying, reaching, or identifying—might act independently of the hemisphere that received the initial information.

   Results and Discussion: When participants were asked to verbally report what had been presented to the right hemisphere, they could not verbalize their experience. Because the information could not cross the corpus callosum to the "speaking" side of the brain, they could not tell you what had happened. They could identify the same object that had been presented to the right brain if they used their left hand to pick between potential objects.

   Conclusions: Normally the brain functions as an interconnected, cohesive unit. However, if the corpus callosum is cut, the hemispheres are capable of operating independently.

LECTURE LAUNCHERS AND DISCUSSION TOPICS

Critical Thinking About the Brain
Research with Twins
Neurotransmitters
The Enteric Nervous System
Would You Like Fries with That Peptide?
Brain's Bilingual Broca
The Perception of Phantom Pain
Freak Accidents and Brain Injuries
The Cranial Nerves
Brain Anatomy
Understanding Hemispheric Function
The Results of a Hemispherectomy

Lecture/Discussion: Critical Thinking About the Brain

Purpose: Students complete a brief one-minute assignment that involves critical thinking, personalizing, or deeper processing of information
Learning Structure: Ticket-In/One-Minute Papers
Time: 1–5 minutes
Class Size: Appropriate for any class size

Description: Students are given a couple minutes to answer a question posed by the instructor. These assignments can be used in a variety of ways—to verify attendance, to start discussion, to assess student knowledge, and to provide opportunities for critical thinking. Sample assignments are provided below:

1. **Brain function**. If you could enhance the function of one structure in your brain, what would it be? Suppose a television network wanted to create a superhero with your brain capabilities, what would you name the superhero?

2. **Hemisphere Dominance.** Would you consider yourself a right-brain or left-brain thinker? Why? Give examples to support your answer.

3. **Autonomic System.** Think of a time when you were very frightened. What sorts of bodily symptoms did you experience? Think of a time when you were very calm and relaxed. What sorts of bodily symptoms did you experience? List them.

4. **Heredity**. Are there any physical characteristics in your family tree that appear to be dominant —eye color, shape or size of the nose, height, hair color, dimples, and so on? List these dominant traits.

5. **Brain damage.** Do you know anyone who has had damage to their brain? What caused the damage—an illness, a trauma, a birth defect? What symptoms does the person have? Is the brain damage permanent?

Marin, A.J. (2011). *Interactive Learning Companion.* Boston: Pearson Education, Inc.

Lecture/Discussion: Research with Twins

Purpose: Students think critically about research using twins
Learning Structure: Three-Step Interview
Time: 15 minutes
Class Size: Appropriate with most class sizes

Description: One way that researchers have examined the role of genetics is through the examination of identical twins. Some studies of twins who have been reared apart have shown that twins have striking similarities in interests, beliefs, and attitudes. However, critics argue that if you ask enough questions, you can find a long list of commonalities between total strangers. To illustrate this, four member teams are divided into A's and B's. In the first step, the A's ask the B's 20 or so questions, and record anything they have in common. For example, they may ask their partner questions about music preferences, food likes, and personality traits. In step two, the B's interview the A's. Then, the pairs reunite and share their responses with the team. In a large class, the instructor can call on pairs to share with the class. Were students able to find commonalities with their partner? Are there ways to conduct research to find out if identical twins are more similar than two strangers? Are there other disadvantages to research with twins?

Marin, A.J. (2011). *Interactive Learning Companion.* Boston: Pearson Education, Inc.

Lecture/Discussion: Neurotransmitters

Purpose: Students learn about the major neurotransmitters and their effects
Learning Structure: Jigsaw
Time: 15–30 minutes
Class Size: Most appropriate for smaller classes

Steps to a jigsaw technique:

1. Organize students into groups of 4-6 people.
2. Assign one student in each group to be responsible for a different neurotransmitter.
3. Give students time to learn and process their assigned neurotransmitter.
4. Create "expert groups" of those students who were learning and processing the same neurotransmitter, and let them discuss the details of their neurotransmitter.
5. Have students return to their original "jigsaw" group and take turns sharing the neurotransmitters they've become expert on.
6. Have students complete a task or a quiz that's reliant on their having understood the material from the contributions of all their group members.

Marin, A.J. (2011). *Interactive Learning Companion.* Boston: Pearson Education, Inc.

Lecture/Discussion: The Enteric Nervous System

The enteric nervous system is a somewhat autonomous part of the autonomic nervous system. It includes neural networks that control digestion, local blood flow, mucosal transport and secretions, immune system function, endocrine function, and motor functions. The enteric nervous system lines the digestive tract and uses the same neurotransmitters as the central nervous system. It contains more neurons than the entire spinal cord. It is surrounded by a barrier similar to the blood-brain barrier. It communicates information to the brain, reporting the status of the digestive tract and the nutrients contained in it. Have students discuss why it might be important to have communication between the digestive tract and the brain, and ask them to reflect on why the enteric nervous system can act independently from the central nervous system.

Lecture/Discussion: Would You Like Fries with That Peptide?

Toast and juice for breakfast. Pasta salad for lunch. An orange, rather than a bagel, for an afternoon snack. These sound like reasonable dietary choices, involving some amount of deliberation and free will. However, our craving for certain foods at certain times of the day may be more a product of the brain than of the mind.

Sarah F. Leibowitz, Rockefeller University, has been studying food preferences for over a decade. What she has learned is that a stew of neurochemicals in the paraventricular nucleus, housed in the hypothalamus, plays a crucial role in helping to determine what we eat and when. Two in particular—neuropeptide Y and galanin—help guide the brain's craving for carbohydrates and for fat.

Here's how they work. Neuropeptide Y (NPY) is responsible for turning on and off our desire for carbohydrate. Animal studies have shown a striking correlation between NPY and carbohydrate intake; the more NPY produced, the more carbohydrates eaten, both in terms of meal size and duration. Earlier in the sequence, the stress hormone cortisol seems responsible, along with other factors, for upping the production of NPY. This stress ⇨ cortisol ⇨ NPY ⇨ carbohydrate craving sequence may help explain overweight due to high carbohydrate intake. But weight, and craving, relies on fat intake as well. Leibowitz has found that the neuropeptide galanin plays a critical role in this case. Galanin is the on/off switch for fat craving, correlating positively with fat intake; the more galanin produced, the heavier an animal will become. Galanin also triggers other hormones to process the fat consumed into stored fat. Galanin itself is triggered by metabolic cues resulting from burning fat as energy, but also from another source: estrogen.

NPY triggers a craving for carbohydrate, galanin triggers a craving for fat, but the two march to different drummers throughout a day's cycle. NPY has its greatest effects in the morning (at the start of the feeding cycle), after food deprivation (such as dieting), and during periods of stress. Galanin, by contrast, tends to increase after lunch and peaks toward the end of our daily feeding cycle.

The implications of this research are many. For example, the findings suggest that America's obsession with dieting is a losing proposition (but not around the waistline). Skipping meals, gulping appetite suppressers, or experiencing the stress of dieting will trigger NPY to encourage

carbohydrate consumption, which in turn can foster overeating. Paradoxically, then, by trying to fight nature we may stimulate it even more. As another example, the onset and maintenance of anorexia may be tied to the chemical cravings in the hypothalamus. Anorexia tends to develop during puberty, a time when estrogen is helping to trigger galanin's craving for fat consumption. Some women (due to societal demands, obsessive-compulsive tendencies, or other pressures) react to this fat trigger by trying to accomplish just the opposite; subsisting on very small, frequent, carbohydrate-rich meals. The problem is that the stress and starvation produced by this diet cause NPY to be released, confining dietary interest to carbohydrates, but also affecting the sex centers nearby in the hypothalamus. Specifically, NPY may act to shut down production of gonadal hormones.

Marano, H. E. (1993, January/February). Chemistry and craving. *Psychology Today, 74,* pp. 30–36.
http://www.rockefeller.edu/labheads/leibowitz/research.php

Lecture/Discussion: 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.

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 (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/Discussion: The Perception of Phantom Pain

The idea of feeling pain means different things to different people. Many students are aware of phantom pain sensations and are actually very curious as to what it is. 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 now-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 arm as a kind of ghostly presence. He could feel himself wiggling non-existent 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, one's 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, or 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? A recent study has shed light on the causes of phantom limb sensations. Researchers at Humboldt University in Berlin suggest 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 examination of people who experience these phenomena, using the noninvasive techniques of magnetoencephalograms and functional MRIs, 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 there, feeling and moving. This "remapping" of the limb functions, together 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., & 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.* William Morrow, NY.

Ramachandran, V. S. and 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,* pp. 35–42.

Lecture/Discussion: Freak Accidents and Brain Injuries

Students may be interested in the unusual cases of individuals who experience bizarre brain injuries due to freak accidents with nail guns. The most fascinating example involved Isidro Mejias, 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 imbedded nails can be found by "googling" Isidro Mejias. Incredibly, none of the nails caused serious damage to Mejia's brain. One nail lodged near his spinal cord, while 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 six 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. *Current Science,* A Weekly Reader publication, Sept. 10, 2004, v90 (1), Page 14.

Lecture/Discussion: 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 twelve 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 twelve cranial nerves are:

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*. 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*. This nerve conveys sensory information and controls motor and parasympathetic functions associated with the taste receptors, throat muscles, and salivary glands.

10. *Vagus*. 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.

Carlson, N. (1994). *Physiology of behavior* (5th ed.). Boston: Allyn and Bacon.

Thompson, R.F. (1993). *The brain: A neuroscience primer* (2nd ed.). New York: W. H. Freeman.

Reprinted from Hill, W.G. (1995). Instructor's resource manual for *Psychology* by S. F. Davis and J. J. Palladino. Englewood Cliffs, NJ: Prentice Hall.

Lecture/Discussion: Brain Anatomy

Purpose: Students learn about the critical structures of the brain and their function.
Learning Structure: Jigsaw
Time: 15–30 minutes
Class Size: Most appropriate for smaller classes

Steps to a jigsaw technique:

1. Organize students into groups of 4-6 people.
2. Assign one student in each group to be responsible for a different anatomical structure in the brain.
3. Give students time to learn and process their assigned anatomical structure and its function.
4. Create "expert groups" of those students who were learning and processing the same anatomical structure and let them discuss the details of their structure.
5. Have students return to their original "jigsaw" groups and take turns sharing the anatomical structures they've become expert on.
6. Have students complete a task or a quiz that's reliant on their having understood the material from the contributions of all their group members.

Marin, A.J. (2011). *Interactive Learning Companion.* Boston: Pearson Education, Inc.

Lecture/Discussion: 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 complementary to the other. From this came numerous distortions, oversimplifications, and unwarranted extensions, many of which are discussed in two interesting reviews of this trend toward "dichotomania" (Corballis, 1980; Levy, 1985). For example, the left hemisphere has been described variously as logical, intellectual, deductive, convergent, and "Western," while 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 hemisphere activity; right gaze showing left hemisphere activity). Advertisements have claimed that artistic abilities can be improved if the right hemisphere is freed, and the public schools have been blamed for stifling creativity by emphasizing left-hemisphere skills and by neglecting to teach 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 not the sole determinant of logic, nor is the right hemisphere essential for creativity. Disturbances of logic are more prevalent with right-hemisphere 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 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/Discussion: The Results of a Hemispherectomy

Matthew is eight years old now. Two years ago, surgeons removed half of his brain.

His first three years were completely normal. Just before he turned four, however, Matthew began to experience seizures, which did not respond to drug treatment. The seizures were severe (life threatening) and frequent (as often as every three 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.

The surgery left a scar that runs along one ear and disappears under his hair; however, his face has no lopsidedness. The only other visible effects of the operation are a slight limp and limited use of his right arm and hand. Matthew has no right peripheral vision in either eye. He undergoes weekly speech and language therapy sessions. For example, a therapist displays cards that might say "fast things" and Matt must name as many fast things as he can in 20 seconds. He does not offer as many examples as other children his age. However, he is making progress in the use of language perhaps as a result of fostering and accelerating the growth of dendrites.

The case of Matthew indicates the brain's remarkable plasticity. It is interesting to note that Matt's personality never changed through the seizures and surgery

Boyle, B. (1997, August 1). Surgery to remove half of brain reduces seizures. *Austin American-Statesman,* A18.

Swerdlow, J.L. (1995, June). Quiet miracles of the brain. *National Geographic, 87,* 2–41.

Adapted from Davis, S.F. & Palladino, J.J. (1996). Interactions: A newsletter to accompany *Psychology, 1(Spr),* 4.

YOUR TURN EXTENSION ACTIVITIES

2.1 Understanding the Biopsychosocial Model
2.2 The Speed of Neurons
2.3 Heads Up, Limbic System

Your Turn Extension Activity: *Understanding the Biopsychosocial Model*

YOUR TURN: 2.1: *Biopsychosocial perspective*

Revel Your Turn Description: In the Interactive figure 2.2, on *The Biopsychosocial Model*, students gain a better understanding of variables that make up each of the model's three factors.

In-class activity: *Understanding the Biopsychosocial Model*

Goal: Students become more familiar with the biopsychosocial model by identifying relationships between the factors and generating explanations for how the three factors may work together to influence the behavior in a single person.

Time to Complete: 10–20 minutes

Instructions: Begin by presenting or reminding students of the three elements that make up the biopsychosocial model:

- Biological Variables
- Psychological Variables
- Social and Cultural Variables

Step #1: Assign each student in the room to one of the following:

Emotional State	Physical Illness	Social Support
Coping Skills	Genetic Vulnerability	School
Personality	Nutrition	Peers
Health Related Habits	Immune Function	Family Circumstances
Self-Control	Disability	Religion
Self-Esteem	Medication Effects	Economic Status
Attitudes/Beliefs	Neurochemistry	Cultural Traditions

You can write the terms on index cards or sticky notes. Hand them out randomly and depending on the class size, you may need to make multiple copies of each label.

Step #2: Have students move about the room and try and find two other students to form a group. The group must consist of one person who has a label that falls into the "Biology" category, a second student must have a label from the "Psychological" category, and the third a label from the "Social and Cultural" category.

Step #3: Once students have formed a group, give them a few minutes to consider the following scenario:

A 22 year-old is about to graduate from college and look for their first job.

Have students discuss how each of their assigned factors might contribute to how a person experiences the job search process. The students should also discuss how each factor might in turn affect the other factors.

Step #4: Call on groups to report out to the larger class. Ask the class to determine if the group is properly comprised of one psychological, one biological, and one social and cultural factor.

Discussion: The point of the exercise is not only to help students identify what qualifies as a psychological, biological, or social and cultural variable, but also to illustrate to students that each factor influences the other. For example, a person with a disability (biological factor) might experience social stigma (a social factor) and therefore have low self-esteem (a psychological factor). Together, these factors could influence a person's confidence level during a job interview.

Your Turn Extension Activity: *The Speed of Neurons*

YOUR TURN: 2.2: *Neuron Parts*

Revel Your Turn Description: In the YT on the neuron, students learn about the parts of the neuron and in the surrounding text, how neurons send messages.

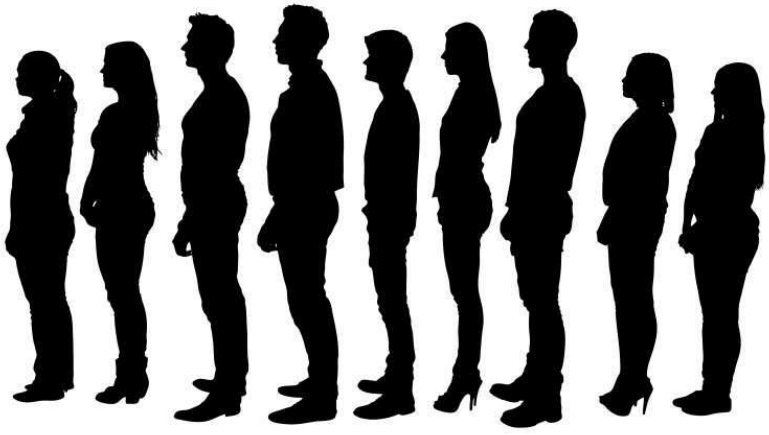
In-class activity: *The Speed of Neurons*

Goal: The goal of this Your Turn Extension Activity is to illustrate how long it takes for neurons to send messages. Students play the role of a group of neurons and participate in a reaction time experiment where they measure how quickly messages are sent in various conditions.

Time to Complete: 10 minutes

Instructions: You may want to start with an introduction on how quickly it seems that neurons are able to send messages. For example, when we touch a hot stove the message travels from our finger all the way to the pain centers in the brain and once we register the pain we quickly pull our hand away. The reality, though, is that often we will get burned in that situation because it actually takes time for the nerve impulse to travel through the neurons from the finger to the brain and back again.

1. Ask students to stand up and form a long chain. The classroom serves as the body, and each student represents a cluster of neurons. Students should all face the same direction, like dominoes, and should stand close enough to the students in front of them that they could reach out and touch their shoulder.



Credit: Andrey Popov/Shutterstock

2. In the first condition, when you say "go", the first person in the chain will reach out with their right hand and touch the right shoulder of the person in front of them. When a

student feels their shoulder squeezed, they should squeeze the shoulder of the person in front of them. Students should close their eyes during the experiment to avoid any visual cues. When the "message" has travelled to the last student in the chain they yell "stop". The instructor times how long it takes to send the message and records the response on the board for students to see. Repeat this exercise two more times, again, recording responses on the board.

3. In the second condition, when you say "go", the first person in the chain will reach out with their left hand and touch the left shoulder of the person in front of them. When a student feels their shoulder squeezed, they should squeeze the shoulder of the person in front of them. Students should close their eyes during the experiment to avoid any visual cues. When the "message" has travelled to the last student in the chain they yell "stop". The instructor times how long it takes to send the message and records the response on the board for students to see. Repeat this exercise two more times, again, recording responses on the board.

4. In the third condition, when you say "go", the first person in the chain will reach out with either hand and tap the shoe/foot of the person in front of them. It's good to have students start in a squatted or seated position, so that they are not wasting any time by having to get up or down during the timed experiment. Just like the first condition, when a student feels the tap on their foot, they then use their hand to tap the foot of the person next to them. Again, conduct the reaction time experiment for 3 trials and record the time on the board.

Discussion:

Ask students to examine the data from the reaction time experiment. Did they notice a practice effect? You will usually find a trend towards greater efficiency of neuronal activity with repeated trials. Which condition was faster—the hand to the shoulder, or the hand to the foot? Students will see that the shoulder to the hand is faster than the hand to the foot, but why? You can use this to discuss the differences in distance the message must travel between the two experimental conditions. Of the hand to shoulder conditions, was the left faster or the right? Why might this be the case?

Explanation: You may want to provide additional information about how neurons send messages. For example, different types of neurons send information at different speeds. Some signals may travel only about a mile an hour, while other signals can travel at speeds over 200 miles per hour. In 1849, scientist Hermann von Helmholtz measured the speed at which a nerve impulse travels along a nerve. He dissected a frog and used a calf muscle and the nerve that was attached. He would stimulate the nerve at various distances from the muscle and calculate how long it took for the muscle to contract. He estimated that the speed of a nerve impulse is roughly 27 meters per second (about 60 mph).

You might also was to talk about hemisphere dominance. With respect to the motor cortex that wraps across both hemispheres, most individuals have greater efficiency on the left side. The left

side of the brain is responsible for moving the right hand. For this reason, most individuals are right handed and students may see a faster reaction time in the right shoulder/right hand condition than the left shoulder/left hand condition.

Your Turn Extension Activity: *Heads Up, Limbic System*

YOUR TURN: 2.3: *Limbic System*

Revel Your Turn Description: In the YT on the *Limbic System*, students are asked to identify the structures that make up this system of the brain.

In-class activity: *Heads Up, Limbic System*

Goal: The purpose of this Your Turn Extension Activity is to give students the opportunity to review the structures that makeup the limbic system using a game format. Students can repeat the activity several times until they feel they've mastered the material.

Time to Complete: 10 minutes

Instructions: This activity is based on a popular phone app called "Heads up", which first appeared on the *Ellen Degeneres show*. To play the game one player places their phone on their forehead and a word appears that other players can see. The others give clues until the player with the phone guesses the word correctly.

This simple game can be modified for classroom use in several ways using psychology vocabulary of your choosing (see handout for Chapter 2/Session 2.3 key terms). Group the students into teams of 3 or 4. Student's take turns being the "guesser" and the "clue givers".

1) High-Tech Version: You can deliver the key terms to students by using a mobile device delivery system. You will need to enter the key terms prior to class and select the self-paced option so that during the game when a student guesses correctly, the next students in the group is able to advance to the next key term.

2) Low-Tech Version: Key terms can be written on index cards, shuffled face down, and then drawn and placed against the forehead. To intensify the game, ask students to time how long it takes to get through all the terms, and perhaps complete the game a second time trying to improve their response time. Or, teams can compete to see which group gets through the stack of terms first.

Handout 2.3: *Psychological Perspectives*

Hippocampus	**Amygdala**
Thalamus	**Hypothalamus**
Medulla	**Pons**
Tectum	**Reticular Formation**
Brain Mapping	**Neuroimaging**
EEG	**PET Scan**
CT Scan	**fMRI**

VIDEOS IN REVEL

Phineas Gage: A Famous Case of Brain Injury

Stock footage of moving train; part of chapter opening video

Genes and Chromosomes

Epigenetics: A Revolutionary Science

Take It from Me

Figure 2.4 Structure of the Neuron

Figure 2.5 Action Potential

Figure 2.6 Electrochemical Process Video Animation

Divisions of the Nervous System

The Cerebral Cortex

Figure 2.16 Split Brain Testing

Brain Damage and Neuroplasticity

Neurogenesis