

# TOTAL ASSESSMENT GUIDE

## Chapter 3 The Biological and Evolutionary Bases of Behavior

Topic		Factual	Conceptual	Applied
<b>Heredity and Behavior</b>	Multiple Choice	3-5, 11, 13, 15-20	1, 6-9	2, 10, 12, 14
	True/False	1-4		
	Fill-Ins	2	1, 3	
	Essay		1	
<b>The Nervous System in Action</b>	Multiple Choice	21, 23-24, 27, 31-35, 39-40, 43	28-29, 36	22, 25-26, 30, 37-38, 41-42
	True/False	5-6, 9	7-8	
	Fill-Ins	4		
	Essay	2, 3	2, 3	
<b>Biology and Behavior</b>	Multiple Choice	46, 49, 51-53, 55-56, 67, 69, 73, 76, 80-81, 84, 87, 89-90, 92-93, 98	45, 47, 57, 62, 83, 97	48, 50, 54, 58-61, 63-66, 68, 70-72, 74-75, 77-79, 82, 85-86, 88, 91, 94-96
	True/False	10, 13-18, 20	19	11-12
	Fill-Ins	6, 8, 10	5, 7, 9	
	Essay	2, 5	2, 4, 5	
<b>Psychology in Your Life: How Does Your Brain Determine Trust?</b>	Multiple Choice	44		
	True/False			
	Fill-Ins			
	Essay			

## Chapter 3: The Biological and Evolutionary Bases of Behavior

### Multiple Choice Questions

3.1-1. Nature is to nurture as heredity is to

a. evolution.

**Incorrect:** Evolution and heredity are both nature-based concepts. The best answer that correlates to nurture is environment.

b. aggression.

c. environment.

**Correct:** Nature refers to the effects of an individual's biology, including his/her genetic makeup. Nurture refers the features of the environment within which the individual was raised. To discover the causes of behavior, it is useful to be able to discriminate the forces of heredity from the forces of the environment.

d. natural selection.

Difficulty: 2

Page Ref: 47

Topic: Heredity and Behavior

Skill: Conceptual

Answer: c. environment.

% correct 85 a= 8 b= 0 c= 85 d= 8 r = .33

3.1-2. A prisoner is violent and hostile, although he wasn't always this way. His therapist believes that the environment the prisoner was raised in brought about his aggressive tendencies. The therapist is espousing the view that behavior is primarily influenced by

a. nature.

b. biology.

**Incorrect:** Influences of one's environment are connected to a "nurture" view of behavior development. This prisoner's therapist assesses the behaviors in question as having been produced by the environment in which he was raised. Therefore nurture is the best answer.

c. nurture.

**Correct:** Nurture refers to the effects of the environment on the behavior of the individual; in this case the therapist likely believes that all people are equally predisposed to aggression and that the particular environment in which they were raised creates more or less aggression in them.

d. heredity.

Difficulty: 2

Page Ref: 47

Topic: Heredity and Behavior

Skill: Applied

Answer: c. nurture.

3.1-3. The book *The Origin of Species* was written by

- a. Sigmund Freud.
- b. Charles Darwin.
- c. Sir Charles Sherrington.
- d. Peter and Rosemary Grant.

Difficulty: 1

Page Ref: 47

Topic: Heredity and Behavior

Skill: Factual

Answer: b. Charles Darwin.

% correct 98 a= 0 b= 98 c= 0 d= 2 r = .24

3.1-4. To help him explain the variety of species he observed during exploration of the Galápagos Islands, Charles Darwin suggested the process of

- a. bipedalism.
- b. encephalization.
- c. natural selection.
- d. behavior genetics.

Difficulty: 1

Page Ref: 47-48

Topic: Heredity and Behavior

Skill: Factual

Answer: c. natural selection.

% correct 96 a= 4 b= 0 c= 96 d= 0 r = .54

3.1-5. Charles Darwin noted that among the finches on the various Galápagos Islands, the factor that differentiated those that survived from those that didn't was

- a. the shape of their beaks.
- b. the nesting sites they chose.
- c. their speed and endurance in flying.
- d. their ability to camouflage their eggs.

Difficulty: 2

Page Ref: 48

Topic: Heredity and Behavior

Skill: Factual

Answer: a. the shape of their beaks.

3.1-6. According to the theory of natural selection,

- a. organisms prefer natural environments to artificial habitats.
- b. each organism has the ability to choose which of nature's laws it will follow.
- c. organisms that are well adapted to their environment will produce more offspring.

**Correct:** Over time, those organisms which are suited to their environment will become more numerous because they will better adapt and survive. Thus, they will be able to produce more offspring who will also have a good chance of surviving because they, too, will be suited to their environment.

- d. organisms that are well adapted to their environment will produce fewer offspring.

**Incorrect:** In fact, this is the opposite of the correct answer!

Difficulty: 2

Page Ref: 48

Topic: Heredity and Behavior

Skill: Conceptual

Answer: c. organisms that are well adapted to their environment will produce more offspring.

% correct 74 a= 19 b= 0 c= 74 d= 6 r = .60

3.1-7. In evolutionary terms, an individual's success is measured by the

- a. amount of territory one controls.

**Incorrect:** The most critical component of the theories of evolution is reproductive success of individual members of a species.

- b. degree of comfort an individual attains.
- c. number of offspring an individual produces.

**Correct:** If the species is well adapted to the environment it inhabits, it will produce and support more offspring who will in turn survive, produce, and support more offspring of their own.

- d. level of intelligence an individual acquires.

Difficulty: 2

Page Ref: 48

Topic: Heredity and Behavior

Skill: Conceptual

Answer: c. number of offspring an individual produces.

3.1-8. One explanation for new species is that they emerge when two populations from an original species become geographically separate. With respect to this explanation, contemporary research has shown that

- a. geographically isolating a species brings about its extinction.
- b. it is not possible to geographically isolate members of a species from one another.

**Incorrect:** This is not consistent with the information presented in your text. Geographic isolation is, in fact, a possibility.

c. there are many examples of new species that have emerged without geographic isolation.

**Correct:** Modern researchers have discovered that there are other influences on the emergence of two species from one than the influence of geographically different environments. For instance, different chemical cues may emerge for recognizing appropriate mates. If over time cues become distinct for two different groups of the same species, two different populations of the same species may emerge in the same geographical area.

d. new species never have ancestors in common with original species.

Difficulty: 3

Page Ref: 48-49

Topic: Heredity and Behavior

Skill: Conceptual

Answer: c. there are many examples of new species that have emerged without geographic isolation.

3.1-9. Members of a species who possess the range of physical and psychological attributes best adapted to the environment are most likely to survive. This concept is known as

a. natural selection.

**Incorrect:** Natural selection is a larger evolutionary concept. The best, most specific, answer to this question is survival of the fittest.

b. genotypical structure.

c. phenotypical structure. d. survival of the fittest.

**Correct:** To the extent that attributes that foster survival can be passed from one generation to the other and these adaptations match environmental stresses, the species is likely to survive.

Difficulty: 2

Page Ref: 49

Topic: Heredity and Behavior

Skill: Conceptual

Answer: d. survival of the fittest.

% correct 60 a= 36 b= 0 c= 4 d= 60 r = .23

3.1-10. As you enter a crowded room, you catch a glimpse of your friend's dark hair and slim frame. What you are noticing most directly are aspects of your friend's

a. genotype.

**Incorrect:** A genotype refers to one's genetic code, which is established at the moment of conception. The expression of that code is one's phenotype.

b. phenotype.

**Correct:** The outward characteristics of an individual—those that can be directly observed—are known as the phenotype.

c. adaptations.

d. selective advantage.

Difficulty: 2

Page Ref: 49

Topic: Heredity and Behavior

Skill: Applied

Answer: b. phenotype.

3.1-11. In the vocabulary of evolutionary theory, you have inherited \_\_\_\_\_ from your parents.

- a. a genotype
- b. a phenotype
- c. a behavioral repertory
- d. your outward appearance

Difficulty: 2

Page Ref: 49

Topic: Heredity and Behavior

Skill: Factual

Answer: a. a genotype

% correct 51 a= 13 b= 32 c= 51 d= 3 r = .45

3.1-12. Imagine, for a moment, that you are a finch and that you live in an environment in which seeds of all types are plentiful. Under these circumstances, the size of your beak would

- a. be irrelevant to your survival.

**Correct:** The size of your beak becomes relevant to survival when seeds are of specific size and shape and do or do not allow you to easily consume them.

- b. enhance your chances of survival.

**Incorrect:** If seeds of all sizes are available, then the size of your beak would not be relevant to your ability to gather and consume food.

- c. detract from your chances of survival.

- d. enhance your chances of survival, but not your offspring's chances.

Difficulty: 3

Page Ref: 49

Topic: Heredity and Behavior

Skill: Applied

Answer: a. be irrelevant to your survival.

% correct 82 a= 82 b= 16 c= 2 d= 0 r = .51

3.1-13. While surfing the Web, you stop at an anthropology website. There, you learn that natural selection favored two major adaptations in the evolution of the human species:

- a. fire and the wheel.
- b. reading and writing.
- c. language and emotion.
- d. bipedalism and encephalization.

Difficulty: 3

Page Ref: 50

Topic: Heredity and Behavior

Skill: Factual

Answer: d. bipedalism and encephalization.

% correct 87 a= 2 b= 2 c= 10 d= 87 r = .26

3.1-14. Your genetics professor has asked you to simplify the process of natural selection into a sequence of steps. Which of the following will your professor agree is the correct sequence?

- a. competition for resources, reproductive success, frequency of genotype increases, selection of fittest genotype, environmental pressure

**Incorrect:** In this response, the different steps are scrambled in several different locations. Please refer back to Figure 3.1 to see the correct order of steps.

- b. reproductive success, competition for resources, frequency of genotype increases, environmental pressure, selection of fittest genotype
- c. selection of fittest genotype, competition for resources, environmental pressure, reproductive success, frequency of that genotype increases
- d. environmental pressure, competition for resources, selection of fittest genotype, reproductive success, frequency of genotype increases

**Correct:** Only those who can reproduce can survive; the environment presents challenges to survival that must be met. The species that best adapt to the challenges survive to pass their genetic material on to their offspring, who in turn pass the genotype on . . . and the species continues, survives, and increases.

Difficulty: 3

Page Ref: 49 (Figure 3.1)

Topic: Heredity and Behavior

Skill: Applied

Answer: d. environmental pressure, competition for resources, selection of fittest genotype, reproductive success, frequency of genotype increases

% correct 96 a= 0 b= 2 c= 2 d= 96 r = .25

3.1-15. Gregor Mendel is best known for his research on

- a. how human intelligence is inherited.
- b. ethnic and racial differences.
- c. identical and fraternal twins.
- d. garden peas.

Difficulty: 1  
Page Ref: 51  
Topic: Heredity and Behavior  
Skill: Factual  
Answer: d. garden peas.  
% correct 83 a= 6 b= 0 c= 12 d= 83 r = .36

### 3.1-16. Sex chromosomes

- a. contain 23 pairs of genes.
- b. are identical for males and females.
- c. bring about the union of a sperm and an egg.
- d. code the development of male or female physical characteristics.

Difficulty: 2  
Page Ref: 51  
Topic: Heredity and Behavior  
Skill: Factual  
Answer: d. code the development of male or female physical characteristics.  
% correct 85 a= 6 b= 4 c= 6 d= 85 r = .24

3.1-17. In the human male, the sex chromosomes normally consist of a(n) \_\_\_\_\_ pair; in the human female they consist of a(n) \_\_\_\_\_ pair.

- a. XY; XX
- b. XX; XX
- c. YY; XX
- d. XX; YY

Difficulty: 2  
Page Ref: 51  
Topic: Heredity and Behavior  
Skill: Factual  
Answer: a. XY; XX  
% correct 94 a= 94 b= 0 c= 0 d= 6 r = .25  
% correct 93 a= 93 b= 0 c= 6. d= 0 r = .30

3.1-18. The goal of the Human Genome Project is to

- a. identify all of the human genes.
- b. verify Darwin's theory of natural selection.
- c. show research support for the major events in human evolution.
- d. build human-like robots or cyborgs.



Difficulty: 1  
Page Ref: 52  
Topic: Heredity and Behavior  
Skill: Factual  
Answer: a. identify all of the human genes.  
% correct 86 a= 86 b= 6 c= 8 d= 0 r = .51

- 3.1-19. Heritability is measured on a scale of
- 1.0 to +3.1.
  - 0 to 1.
  - 0 to 10.
  - 1 to 100.

Difficulty: 2  
Page Ref: 52  
Topic: Heredity and Behavior  
Skill: Factual  
Answer: b. 0 to 1.  
% correct 90 a= 4 b= 90 c= 4 d= 0 r = .39

3.1-20. In a study by Vink et al. (2009) described in your textbook, which of the following behaviors yielded a “rather large” heritability estimate of about 0.62 for monozygotic (identical) twins?

- preferring coffee over tea
- preferring baseball over football
- preferring to get dressed “pants first” over “shirt first”
- preferring a partner with their own hair color over a partner with a different hair color

Difficulty: 1  
Page Ref: 52  
Topic: Heredity and Behavior  
Skill: Factual  
Answer: a. Preferring coffee over tea

- 3.1-21. Which cell part and description is matched correctly?
- soma; contains the nucleus and cytoplasm that sustains its life
  - terminal button; extends outward from the cell body and receives incoming signals
  - dendrite; conducts information along its length, at the end of which can be found terminal buttons
  - axon; bulblike structure through which stimulation of nearby glands, muscles, or other neurons is made possible

Difficulty: 3

Page Ref: 54

Topic: The Nervous System in Action

Skill: Factual

Answer: a. soma; contains the nucleus and cytoplasm that sustains its life

3.1-22. The children in a classroom are playing the role of different parts of a neuron and arranging themselves in the order that information follows as it passes along the neuron. Beginning with incoming signals, the correct order is

a. dendrites, soma, axon, terminal buttons.

**Correct:** The dendrites pass information on to the soma or cell body, which integrates the information and passes it to the axon, which passes the information to the terminal buttons that are then able to stimulate other neurons (or glands, muscles, etc.) by releasing the neurotransmitter that is stored in them. The neurotransmitter crosses the synapse to the dendrites and the process starts again.

b. axon, dendrites, soma, terminal buttons.

**Incorrect:** Incoming chemical information is received by dendrites, so they would have to come first in the system. Then the information goes to the soma, the axon, and the terminal buttons.

c. terminal buttons, soma, dendrites, axon.

d. soma, terminal buttons, axon, dendrites.

Difficulty: 3

Page Ref: 54-55

Topic: The Nervous System in Action

Skill: Applied

Answer: a. dendrites, soma, axon, terminal buttons.

% correct 82 a= 82 b= 10 c= 0 d= 8 r= .46

3.1-23. At one end of the neuron are swollen, bulblike structures called \_\_\_\_\_, which make it possible for the neuron to stimulate nearby glands, muscles, or other neurons.

a. soma

b. axons

c. dendrites

d. terminal buttons

Difficulty: 2

Page Ref: 54-55

Topic: The Nervous System in Action

Skill: Factual

Answer: d. terminal buttons

% correct 88 a= 2 b= 0 c= 10 d= 88 r= .48

3.1-24. The primary function of \_\_\_\_\_ is to carry messages away from the central nervous system toward the muscles and glands.

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

Difficulty: 3

Page Ref: 54

Topic: The Nervous System in Action

Skill: Factual

Answer: c. motor neurons

% correct 58 a= 3 b= 12 c= 58 d= 25 r = .47

3.1-25. Imagine that you have gone to the garden to pick a rose. Unfortunately, when reaching for a flower, your thumb encounters a thorn and you jerk your hand away. What is the order in which information is communicated, from the time of the prick through withdrawal of your hand and realization of pain?

- a. sensory neuron, brain, interneuron, motor neuron
- b. sensory neuron, interneuron, motor neuron, brain

**Correct:** Sensory neurons take the information from the environment (the thorn) to an interneuron in the spinal cord. This interneuron stimulates a motor neuron, which excites appropriate muscles to pull your hand away from the thorn. Only after this has occurred does the brain receive the information; the perception of pain occurs in the brain after you have physically responded to the danger.

- c. motor neuron, interneuron, brain, sensory neuron

**Incorrect:** In this answer, motor and sensory neurons are reversed from their correct positions.

- d. brain, interneuron, sensory neuron, motor neuron

Difficulty: 3

Page Ref: 54-56

Topic: The Nervous System in Action

Skill: Applied

Answer: b. sensory neuron, interneuron, motor neuron, brain

3.1-26. While jotting down the numerous functions of glial cells being rattled off by your professor, you make an error: glial cells do NOT

- a. prevent the formation of a myelin sheath around axons.

**Correct:** Glial cells form this fatty insulation, which greatly increases the speed of neural transmission.

- b. make up a blood-brain barrier around blood vessels in the brain.
- c. help guide newborn neurons to appropriate locations in the brain.

d. take up excess neurotransmitters and other substances at the gaps between neurons.

**Incorrect:** This is not one of the functions of glial cells.

Difficulty: 3

Page Ref: 56

Topic: The Nervous System in Action

Skill: Applied

Answer: a. prevent the formation of a myelin sheath around axons.

3.1-27. The myelin sheath, which is found around some types of axons,

a. has no known function.

b. is composed of glial cells.

c. decreases the speed of nerve signal conduction.

d. increases the likelihood that harmful substances will reach the brain.

Difficulty: 2

Page Ref: 56

Topic: The Nervous System in Action

Skill: Factual

Answer: b. is composed of glial cells.

3.1-28. In loose terms, the “decision” as to whether a neuron will produce a response or not depends upon the

a. excitatory inputs it receives.

**Incorrect:** In deciding whether or not to create an action potential, a neuron’s soma weighs the information of both excitatory *and* inhibitory inputs that it receives from dendrites.

b. inhibitory inputs it receives.

c. removal of the action potential.

d. excitatory and inhibitory inputs it receives.

**Correct:** Whether the neuron fires or not will depend on the pattern of excitatory and inhibitory inputs over time. When inputs reach the right threshold, the neuron will fire. The decision to fire or not is made on the basis of information arriving at the dendrites, then integrated and passed on by the soma.

Difficulty: 3

Page Ref: 56

Topic: The Nervous System in Action

Skill: Conceptual

Answer: d. excitatory and inhibitory inputs it receives.

% correct 87 a= 10 b= 2 c= 0 d= 87 r = .35

3.1-29. When the neuron is inactive, we say it is in a resting state. When it is in such a state,

a. we say the neuron is depolarized.

**Incorrect:** Depolarization happens when a neuron shifts from its negative resting state to its positive action state.

b. potassium is being actively pumped out of the cell.

c. it does not have the capacity to respond to stimulation.

d. the fluid inside the neuron is slightly negative electrically, relative to the fluid outside the neuron.

**Correct:** The fluid inside the cell is polarized with respect to the fluid outside the cell (fluid inside the cell has a slightly more negative voltage). This slight polarization is called a resting potential.

Difficulty: 3

Page Ref: 57

Topic: The Nervous System in Action

Skill: Conceptual

Answer: d. the fluid inside the neuron is slightly negative electrically, relative to the fluid outside the neuron.

3.1-30. You arrive at class late, and walk in during the part of the lecture describing how action potentials work. The professor says, “the channels that allow sodium to flow into the neuron have just closed and the channels that allow potassium to flow out have opened.” You can conclude that the cell is

a. in its leaking state.

**Incorrect:** There is no such thing as a “leaking” state for a neuron.

b. in the process of being depolarized and will soon fire.

c. in the process of returning to its original resting state.

**Correct:** When the inside of the neuron becomes positive because sodium has rushed into it, the neuron is depolarized. The channels that allow sodium in then close and the channels that allow potassium to flow out open. The outflow of potassium allows the cell to return to a resting state. This progression happens successively down the axon until all of the axon has depolarized and then been returned to the resting state.

d. not behaving as it normally would and might be damaged.

Difficulty: 3

Page Ref: 57

Topic: The Nervous System in Action

Skill: Applied

Answer: c. in the process of returning to its original resting state.

3.1-31. In the context of the action potential, all of the following are consequences of the all-or-none law EXCEPT that

a. if the threshold is not reached, no action potential occurs.

- b. the size of the action potential does not diminish along the length of the axon.
- c. once started, the action potential needs no outside stimulation to keep going.
- d. the size of the action potential varies as a function of the intensity of stimulation.

Difficulty: 3

Page Ref: 57-58

Topic: The Nervous System in Action

Skill: Factual

Answer: d. the size of the action potential varies as a function of the intensity of stimulation.

% correct 73 a= 8 b= 10 c= 10 d= 73 r= .35

3.1-32. The nodes of Ranvier are found in

- a. myelinated neurons only.
- b. unmyelinated neurons only.
- c. the dendrites of the neuron.
- d. both myelinated and unmyelinated neurons.

Difficulty: 2

Page Ref: 58

Topic: The Nervous System in Action

Skill: Factual

Answer: a. myelinated neurons only.

3.1-33. During the absolute refractory period,

- a. neurons can fire continuously.
- b. no amount of further stimulation can induce another action potential to develop.
- c. only the strongest stimulation will cause another action potential to be generated.
- d. the neuron will fire to a stimulus that is slightly stronger than what is normally necessary.

Difficulty: 2

Page Ref: 58

Topic: The Nervous System in Action

Skill: Factual

Answer: b. no amount of further stimulation can induce another action potential to develop.

3.1-34. On the neuron, neurotransmitters are stored in

- a. synaptic vesicles.
- b. the nodes of Ranvier.
- c. the myelin sheath.
- d. synaptic clefts.

Difficulty: 2  
Page Ref: 58-59  
Topic: The Nervous System in Action  
Skill: Factual  
Answer: a. synaptic vesicles.  
% correct 61 a= 61 b= 13 c= 6 d= 19 r = .41

3.1-35. Which of the following most accurately reflects the sequence of events involved in synaptic transmission?

- a. binding of neurotransmitters to receptor molecules; dispersal across the synaptic cleft; rupturing of synaptic vesicles; action potential
- b. rupturing of synaptic vesicles; dispersal across the synaptic cleft; action potential; binding of neurotransmitters to receptor molecules
- c. action potential; rupturing of synaptic vesicles; dispersal across the synaptic cleft; binding of neurotransmitters to receptor molecules
- d. action potential; dispersal across the synaptic cleft; binding of neurotransmitters to receptor molecules; rupturing of synaptic vesicles

Difficulty: 3  
Page Ref: 58-59  
Topic: The Nervous System in Action  
Skill: Factual  
Answer: c. action potential; rupturing of synaptic vesicles; dispersal across the synaptic cleft; binding of neurotransmitters to receptor molecules  
% correct 61 a= 16 b= 13 c= 61 d= 10 r = .44

3.1-36. The image of a key fitting into a keyhole is most useful in understanding how

- a. synaptic vesicles are opened by an action potential.
- b. the end of one neuron fits snugly into another.
- Incorrect:** Remember that neurons are separated by microscopic gaps called synaptic clefts.
- c. ion channels open and close.
- d. neurotransmitters bind to receptor molecules.

**Correct:** Neurotransmitters bind to receptor molecules if no other neurotransmitters or chemical substances are attached to the receptor molecule and if the shape of the neurotransmitter matches the shape of the receptor molecule, just as a key fits into a keyhole.

Difficulty: 2  
Page Ref: 59  
Topic: The Nervous System in Action  
Skill: Conceptual  
Answer: d. neurotransmitters bind to receptor molecules.  
% correct 85 a= 10 b= 4 c= 2 d= 85 r = .21

3.1-37. A mystery writer can't decide how the victim will meet his end. One possibility is to have him suffer botulism poisoning, but curare, a poison used by Amazon Indians, is also a possibility. In either case, the victim's death will involve the neurotransmitter

a. acetylcholine.

**Correct:** The botulism toxin prevents the release of acetylcholine in the respiratory system, causing death by suffocation. Curare paralyzes lung muscles by occupying critical acetylcholine receptors so that the neurochemical cannot work as it normally does.

b. GABA.

c. dopamine.

**Incorrect:** Your authors discuss the poison curare and its effects on the neurotransmitter acetylcholine, not dopamine.

d. norepinephrine.

Difficulty: 2

Page Ref: 59

Topic: The Nervous System in Action

Skill: Applied

Answer: a. acetylcholine.

% correct 40 a= 40 b= 38 c= 10 d= 12 r = .42

3.1-38. A patient has just received a prescription drug that will decrease her high level of anxiety. It is most likely that the drug she has received will increase the activity of the neurotransmitter

a. acetylcholine.

b. GABA.

**Correct:** GABA inhibits neural activity; when levels of this neurotransmitter are low, people may experience anxiety or depression. Medications that help alleviate the symptoms of these disorders increase GABA activity.

c. nitric oxide.

**Incorrect:** Nitric oxide is not a neurotransmitter.

d. dopamine.

Difficulty: 2

Page Ref: 59

Topic: The Nervous System in Action

Skill: Applied

Answer: b. GABA.

% correct 49 a= 12 b= 49 c= 0 d= 39 r = .48

3.1-39. A student is interrupted while making notes for a test on neurotransmitter substances. When he returns to the task, he makes a mistake. Can you see the error?



- a. norepinephrine - depression
- b. dopamine - schizophrenia
- c. dopamine - Parkinson's disease
- d. norepinephrine - botulism

Difficulty: 3  
 Page Ref: 59-60  
 Topic: The Nervous System in Action  
 Skill: Factual  
 Answer: d. norepinephrine - botulism

3.1-40. Psychologists are especially interested in neurotransmitters that belong to the class of substances called catecholamines because research suggests that these substances play a major role in

- a. long-term memory.
- b. mood disturbances and schizophrenia.
- c. drug addiction.
- d. pain.

Difficulty: 3  
 Page Ref: 59-60  
 Topic: The Nervous System in Action  
 Skill: Factual  
 Answer: b. mood disturbances and schizophrenia.  
 % correct 63 a= 12 b= 63 c= 17 d= 8 r = .18

3.1-41. A friend is taking a drug awareness class. One of the things he learns is that LSD, a hallucinogenic drug that produces bizarre sensory experiences, is believed to work because it

- a. suppresses the effect of serotonin neurons.
- b. increases the production of serotonin.
- c. enhances the effect of serotonin, which is normally excitatory.
- d. removes serotonin from the body.

**Correct:** For some reason this serotonergic suppression is known to produce the hallucinogenic effects that are associated with LSD.  
**Incorrect:** While LSD does work by affecting the serotonin system, it is not by removing it from the body but rather by suppressing its effects on the body.

Difficulty: 3  
 Page Ref: 60  
 Topic: The Nervous System in Action  
 Skill: Applied  
 Answer: a. suppresses the effect of serotonin neurons.  
 % correct 23 a= 23 b= 0 c= 44 d= 33 r = .23

3.1-42. You come across a magazine article on endorphins. It doesn't surprise you that it is subtitled "the keys to paradise," because

a. they have the capacity to alter a person's mood state.

**Incorrect:** If you were talking about serotonin, for example, this would be a correct answer.

b. these substances can reduce the addictive properties of illegal drugs.

c. of their pleasure-pain controlling properties.

**Correct:** Endorphins are neuromodulators that play an important role in the regulation of emotional behavior—they modify or modulate the activity of the neuron that receives them postsynaptically.

d. many of the new prescription medications will have endorphins as their primary component.

Difficulty: 2

Page Ref: 60

Topic: The Nervous System in Action

Skill: Applied

Answer: c. of their pleasure-pain controlling properties.

3.1-43. A research participant is given a dose of the drug naloxone and then his arm is placed in a bucket of ice water, which is normally quite a painful experience. It is likely that the

a. participant will experience little or no pain.

b. participant will experience a placebo effect.

c. participant will undergo a painful experience.

d. participant's body will stop producing endorphins.

Difficulty: 3

Page Ref: 60

Topic: The Nervous System in Action

Skill: Factual

Answer: c. participant will undergo a painful experience.

3.1-44. Much of the research related to how our brains respond when we have to make decisions about trust has been focused on a hormone called oxytocin. Oxytocin

a. functions in our brains to enhance social bonds between animals.

b. is unlikely to have much of an impact on social behavior.

c. helps us to act on information that tells us that our trust has been broken.

d. influences brain activity no differently from a placebo.

Difficulty: 3

Page Ref: 61

Topic: Psychology in Your Life: How Does Your Brain Determine Trust?

Skill: Factual

Answer: a. functions in our brains to enhance social bonds between animals.

3.1-45. Historically speaking, the case of Phineas Gage, a railroad worker who was injured in 1848, is important because it provides evidence for a link between

a. verbal and motor behavior.

b. the brain and complex psychological processes.

**Correct:** The traumatic piercing of his brain led his doctor to hypothesize that personality and rational behavior might be based in the brain.

c. near-death experiences and motivation.

d. intellectual faculties and equilibrium.

**Incorrect:** These neurological functions were not the main lesson we learned from the tragic case of Phineas Gage.

Difficulty: 2

Page Ref: 61-62

Topic: Biology and Behavior

Skill: Conceptual

Answer: b. the brain and complex psychological processes.

% correct 71 a= 15 b= 71 c= 2 d= 8 r = .36

3.1-46. Broca's area in the brain is most closely associated with

a. memory.

b. emotion.

c. language.

d. physical movement.

Difficulty: 2

Page Ref: 62

Topic: Biology and Behavior

Skill: Factual

Answer: c. language.

% correct 61 a= 19 b= 10 c= 61 d= 10 r = .58

3.1-47. The problem with relying on participants whose brains have been accidentally damaged in order to understand brain functioning is that

a. researchers have no control over the location or extent of the damage.

**Correct:** To produce a well-founded understanding of the brain and its relationship to behavior and cognition, scientists need methods that allow them to specify the brain tissue that has been damaged or incapacitated.

- b. people with damaged brains no longer allow themselves to be studied by researchers.
- c. the brain damage is never extensive enough and does not produce noticeable changes in behavior.
- d. governmental agencies prohibit research with people who have suffered damage to their brains.

**Incorrect:** There is no such prohibition on research involving those who have suffered brain damage, though they must be cared for with the same ethical principles that govern all research.

Difficulty: 2

Page Ref: 62

Topic: Biology and Behavior

Skill: Conceptual

Answer: a. researchers have no control over the location or extent of the damage.

3.1-48. You see a notice to recruit participants for an experiment that will use rTMS. If you participated in such a study, you should expect that

- a. a series of words will be read to you rapidly through earphones.
- b. reversible “lesions” will inactivate areas of your brain.

**Correct:** Repetitive transcranial magnetic stimulation uses pulses of magnetic stimulation to create temporary reversible lesions in human brains so that, without any damage being done, brain regions will temporarily be inactive.

- c. you will be expected to make decisions with others in a group.
- d. you will be given a physical stress test and your oxygen levels will be monitored.

**Incorrect:** These are not procedures that will be included in an assessment using rTMS.

Difficulty: 2

Page Ref: 62

Topic: Biology and Behavior

Skill: Applied

Answer: b. reversible “lesions” will inactivate areas of your brain.

3.1-49. In a study by Cappelletti et al. (2008) described by your authors, the different parts of the brain associated with producing spoken nouns and spoken verbs were examined. Which of the following techniques was used to temporarily lesion specific brain areas in this study?

- a. fMRI
- b. rTMS
- c. EMG
- d. SPECT

Difficulty: 2

Page Ref: 62

Topic: Biology and Behavior

Skill: Factual  
Answer: b. rTMS

3.1-50. A project director is committed to using a noninvasive technique to examine the functions of the brain. If she is true to her word, she will avoid the use of

a. lesioning techniques.

**Correct:** Lesions are highly localized brain injuries. Lesions that create permanent damage to the brain can be carried out only with nonhuman animals. The ethics of this kind of research has now come under heightened scrutiny.

b. magnetic resonance imaging.

**Incorrect:** Magnetic resonance imaging does not “invade” the body of the person being assessed, so this would not be a neuroimaging technique to avoid.

c. positron emission tomography.

d. functional magnetic resonance imaging.

Difficulty: 2  
Page Ref: 62  
Topic: Biology and Behavior  
Skill: Applied  
Answer: a. lesioning techniques.

3.1-51. In the 1950s, Walter Hess examined 4500 brain sites in nearly 500 cats using which technique?

a. brain lesions

b. functional MRI

c. electrical recording

d. electrical stimulation

Difficulty: 1  
Page Ref: 62  
Topic: Biology and Behavior  
Skill: Factual  
Answer: d. electrical stimulation

3.1-52. The \_\_\_\_\_ shows where different types of activity are occurring in the brain and involves the use of a safe radioactive substance that is given to participants.

a. MRI

b. fMRI

c. PET scan

d. electroencephalogram

Difficulty: 2  
Page Ref: 63  
Topic: Biology and Behavior  
Skill: Factual  
Answer: c. PET scan  
% correct 64 a= 16 b= 8 c= 64 d= 12 r = .45

3.1-53. Which technique uses special radio receivers to detect information from resonating atoms in order to assess brain activity?

- a. MRI
- b. EEG
- c. PET scan
- d. electrical stimulation

Difficulty: 2  
Page Ref: 63  
Topic: Biology and Behavior  
Skill: Factual  
Answer: a. MRI

3.1-54. A researcher wants to be able to make precise claims about both the structure and the function of the brain. It will be best if she uses \_\_\_\_\_ to accomplish both goals.

- a. a PET scan

**Incorrect:** A PET scan does not give both information about structure and function. This would require an fMRI.

- b. EEG tracings
- c. functional MRI

**Correct:** The fMRI detects magnetic changes in blood flow to cells in the brain, allowing identification of cognitive functions such as attention, perception, language processing, and memory.

- d. electrical stimulation

Difficulty: 2  
Page Ref: 64  
Topic: Biology and Behavior  
Skill: Applied  
Answer: c. functional MRI

3.1-55. The nervous system is subdivided into two major divisions. What are they?

- a. somatic and autonomic
- b. peripheral and somatic

- c. central and peripheral
- d. sympathetic and parasympathetic

Difficulty: 2  
Page Ref: 64  
Topic: Biology and Behavior  
Skill: Factual  
Answer: c. central and peripheral  
% correct 61 a= 10 b= 6. c= 61 d= 23 r = .35

3.1-56. All the neurons of the brain and spinal cord make up the \_\_\_\_\_ nervous system.

- a. central
- b. somatic
- c. autonomic
- d. peripheral

Difficulty: 1  
Page Ref: 64  
Topic: Biology and Behavior  
Skill: Factual  
Answer: a. central  
% correct 87 a= 87 b= 10 c= 3 d= 0 r = .43

3.1-57. You remember as a child seeing an insect buzzing on a flower and trying to catch the insect. You may also remember the pain and your hand automatically jerking away. Although you didn't know it at the time, your reflexive withdrawal was controlled by your

- a. brain.

**Incorrect:** As your authors note, reflexive actions often do not require the immediate involvement of the brain.

- b. spinal cord.

**Correct:** Although the brain will be notified of the action, the spinal cord takes care of simple reflex actions on its own.

- c. frontal lobe.
- d. autonomic nervous system.

Difficulty: 3  
Page Ref: 64  
Topic: Biology and Behavior  
Skill: Conceptual  
Answer: b. spinal cord.

3.1-58. Involvement of the brain is not necessary for a person to

- a. shake someone else's hand.
- b. pull his or her hand from a hot stove.

**Correct:** The spinal cord is responsible for simple fast-action reflexes such as pulling a hand away from a hot stove.

- c. imagine what it feels like to be paralyzed.
- d. feel the difference between velvet and sandpaper.

**Incorrect:** The brain would have to interpret the tactile input from your sensory receptors, so this would not be a correct answer.

Difficulty: 2

Page Ref: 64

Topic: Biology and Behavior

Skill: Applied

Answer: b. pull his or her hand from a hot stove.

% correct 64 a= 0 b= 64 c= 26 d= 10 r = .33

3.1-59. A first-time marathon runner is learning that running a marathon can be quite stimulating. The applause from the spectators, sights along the road, and the pain in her legs are all experiences brought to her central nervous system by her

- a. CNS.
- b. brain.
- c. brain stem.

**Incorrect:** The brain stem is part of the brain, so it would not make sense as an answer to this question.

- d. peripheral nervous system.

**Correct:** The central nervous system is isolated from the outside world. It is the role of the peripheral nervous system to give the central nervous system information from sensory receptors and to then relay messages from the brain to the body's muscles and glands.

Difficulty: 3

Page Ref: 64

Topic: Biology and Behavior

Skill: Applied

Answer: d. peripheral nervous system.

% correct 76 a= 4 b= 12 c= 8 d= 76 r = .47

3.1-60. You are typing a letter to your friend. Suddenly, an image of a car wreck pops up on your screen and you are startled by it. In this situation, the act of typing the letter is regulated by your \_\_\_\_\_, while your response of fear is regulated by your \_\_\_\_\_.

- a. sympathetic division; parasympathetic division
- b. parasympathetic division; sympathetic division
- c. somatic nervous system; autonomic nervous system



**Correct:** The somatic system regulates the action of skeletal muscles and is involved with the behavior of writing. The autonomic system includes the sympathetic division, which governs responses to emergency situations.

d. autonomic nervous system; somatic nervous system

**Incorrect:** In fact, this is the opposite of the correct answer!

Difficulty: 3

Page Ref: 64

Topic: Biology and Behavior

Skill: Applied

Answer: c. somatic nervous system; autonomic nervous system

3.1-61. Each fifth grader is supposed to play the role of a part of the body for the school play. One of the children says that she is responsible for respiration, digestion, and arousal. You can surmise that she must be playing the role of the

a. spinal cord.

**Incorrect:** The spinal cord is not responsible for these important tasks, but rather the autonomic nervous system controls them.

b. somatic nervous system.

c. central nervous system.

d. autonomic nervous system.

**Correct:** The autonomic nervous system works even when we are asleep, sustaining basic life processes.

Difficulty: 2

Page Ref: 64

Topic: Biology and Behavior

Skill: Applied

Answer: d. autonomic nervous system.

% correct 67 a= 2 b= 13 c= 17 d= 67 r = .25

3.1-62. One way to conceptualize the relationship among the elements of the nervous system is to use a hierarchical organization. Using this kind of scheme, the

a. sympathetic and parasympathetic are divisions of the somatic nervous system.

b. peripheral nervous system can be divided into the somatic and autonomic nervous systems.

**Correct:** The somatic nervous system regulates the action of the body's skeletal muscles. The autonomic nervous system sustains basic life processes and survival of the organism.

c. autonomic nervous system is composed of the peripheral and central nervous systems.

**Incorrect:** The autonomic nervous system is comprised of the sympathetic and parasympathetic divisions.

d. two divisions of the central nervous system are the somatic and autonomic nervous systems.

Difficulty: 2

Page Ref: 65-66

Topic: Biology and Behavior

Skill: Conceptual

Answer: b. peripheral nervous system can be divided into the somatic and autonomic nervous systems.

3.1-63. Taking a shortcut through the park late one night, you catch a glimpse of movement in the shadows. Automatically, your \_\_\_\_\_ mobilizes your body into action and your \_\_\_\_\_ tells the muscles in your legs to run.

- a. sympathetic nervous system; spinal cord
- b. parasympathetic nervous system; brain
- c. sympathetic nervous system; somatic nervous system

**Correct:** The sympathetic branch of the peripheral nervous system is responsible for survival of the individual in emergency situations. The somatic system controls the skeletal muscles which are necessary for response to this emergency.

- d. parasympathetic nervous system; somatic nervous system

**Incorrect:** The second half of this answer is correct, but the first half should refer to the sympathetic nervous system.

Difficulty: 2

Page Ref: 64-65

Topic: Biology and Behavior

Skill: Applied

Answer: c. sympathetic nervous system; somatic nervous system

3.1-64. In the middle of the night, you hear two loud thumps outside your bedroom door. Your \_\_\_\_\_ nervous system increases your heart rate and sends blood away from internal organs to your muscles, preparing you for “fight or flight.” When you learn it is just your roommate coming in late, your \_\_\_\_\_ nervous system slows down your heart rate and calms you down.

- a. peripheral; somatic
- b. somatic; peripheral
- c. sympathetic; parasympathetic

**Correct:** The sympathetic system is responsible for response to emergency situations. The parasympathetic nervous system monitors the body’s internal routine operations and returns the body to its day-to-day state when the emergency is resolved.

- d. parasympathetic; sympathetic

**Incorrect:** In fact, this is the opposite of the correct answer!

Difficulty: 2

Page Ref: 65

Topic: Biology and Behavior

Skill: Applied

Answer: c. sympathetic; parasympathetic  
% correct 70 a= 23 b= 5 c= 70 d= 2 r = .40

3.1-65. A student is walking through an exhibit at the science museum entitled “The Living Brain.” The exhibit takes her from the outer layers of the brain to its deepest recesses. What is the route she will follow?

a. cerebrum, limbic system, brain stem

**Correct:** The brain has three interconnected layers. The cerebral cortex, the outer layer of the cerebrum wraps around the limbic system, which in turn wraps around the brain stem in the deepest recesses of the brain.

b. brain stem, limbic system, cerebrum

**Incorrect:** In fact, this is the opposite of the correct answer!

c. limbic system, cerebrum, brain stem

d. cerebrum, brain stem, limbic system

Difficulty: 3

Page Ref: 65

Topic: Biology and Behavior

Skill: Applied

Answer: a. cerebrum, limbic system, brain stem

% correct 45 a= 45 b= 25 c= 6 d= 23 r = .40

3.1-66. You are working with a friend to develop flash cards to help your study of brain structures and their functions. Your friend remembers correctly that the \_\_\_\_\_ is involved primarily in autonomic processes such as heart rate and breathing, and you remember that the \_\_\_\_\_ is involved in motivation, emotion and memory processes.

a. cerebrum; cerebral cortex

b. brain stem; limbic system

**Correct:** The brain stem is in the deepest recesses of the brain and contains structures primarily responsible for automatic functions that keep us alive. The limbic system envelops the brain stem.

c. limbic system; brain stem

**Incorrect:** In fact, this is the opposite of the correct answer!

d. cerebral cortex; brain stem

Difficulty: 3

Page Ref: 65

Topic: Biology and Behavior

Skill: Applied

Answer: b. brain stem; limbic system

3.1-67. In the brain, the \_\_\_\_\_ and its surface layer, the \_\_\_\_\_, integrates sensory information, coordinates your movements, and facilitates abstract thinking and reasoning.

- a. cerebrum; cerebral cortex
- b. cerebral cortex; cerebrum
- c. cerebellum; cerebral cortex
- d. cerebral cortex; cerebellum

Difficulty: 3

Page Ref: 65

Topic: Biology and Behavior

Skill: Factual

Answer: a. cerebrum; cerebral cortex

3.1-68. A child is having a tantrum. He tells his parents that he is going to hold his breath until he turns blue. Fortunately, the \_\_\_\_\_, which controls his breathing (along with the beating of his heart), won't let him do so.

- a. pons
- b. medulla

**Correct:** The medulla is located at the very top of the spinal cord within the brain stem. The medulla is essential for breathing, blood pressure, and the beating of the heart, which all happen automatically, without conscious control.

- c. amygdala

**Incorrect:** The amygdala does not play an active role in regulation of essential tasks, including respiration.

- d. hippocampus

Difficulty: 2

Page Ref: 67

Topic: Biology and Behavior

Skill: Applied

Answer: b. medulla

3.1-69. All of the following are located in the brain stem EXCEPT the

- a. hypothalamus.
- b. medulla.
- c. reticular formation.
- d. pons.

Difficulty: 2

Page Ref: 67

Topic: Biology and Behavior

Skill: Factual

Answer: a. hypothalamus.

3.1-70. While discussing the functions of the brain stem, the lecturer notices that many of his students appear to have fallen asleep. This reminds him of the \_\_\_\_\_, which arouses the cerebral cortex to attend to new stimulation and keeps the brain alert even during sleep.

a. pons

**Incorrect:** While the pons does play a role in arousal and sleep, it is the reticular formation that carries messages to the cerebral cortex regarding stimulation and monitoring of our surroundings.

b. medulla

c. cerebellum

d. reticular formation

**Correct:** This is a dense network of nerve cells that arouses the cerebral cortex to pay attention to new input even during sleep. Severe damage to this area results in a coma.

Difficulty: 2

Page Ref: 67

Topic: Biology and Behavior

Skill: Applied

Answer: d. reticular formation

% correct 40 a= 21 b= 30 c= 12 d= 40 r = .45

3.1-71. As you read this question, the \_\_\_\_\_ is relaying information from the eyes to cortical areas for vision.

a. thalamus

**Correct:** Fibers run from the reticular formation to the thalamus which channels incoming sensory information to the appropriate areas of the cerebral cortex where the information is processed.

b. cerebellum

c. hypothalamus

**Incorrect:** It is the other half of the diencephalon, the thalamus, which has this particular task.

d. reticular formation

Difficulty: 2

Page Ref: 68

Topic: Biology and Behavior

Skill: Applied

Answer: a. thalamus

% correct 70 a= 70 b= 12 c= 16 d= 2 r = .27

3.1-72. Imagine that the size of structures within people's brains grow as skills are developed. If this were true, you can predict that the size of the \_\_\_\_\_ in a ballerina or gymnast would be larger than normal because of their ability to coordinate bodily movements, control posture, and maintain equilibrium.

- a. thalamus
- b. cerebellum

**Correct:** The cerebellum is attached to the brain stem. Damage to this area interrupts the flow of smooth movement causing movement to appear uncoordinated. The cerebellum is also involved in the ability to learn and perform sequences of body movements.

- c. hippocampus

**Incorrect:** The hippocampus is not responsible for these tasks. It is the cerebellum that controls things like posture and balance.

- d. reticular formation

Difficulty: 2

Page Ref: 68

Topic: Biology and Behavior

Skill: Applied

Answer: b. cerebellum

% correct 81 a= 10 b= 81 c= 6 d= 4 r = .18

3.1-73. The limbic system includes the

- a. medulla, hippocampus, and pons.
- b. hypothalamus, cerebrum, and cerebellum.
- c. hypothalamus, hippocampus, and amygdala.
- d. reticular formation, amygdala, and thalamus.

Difficulty: 2

Page Ref: 68

Topic: Biology and Behavior

Skill: Factual

Answer: c. hypothalamus, hippocampus, and amygdala.

% correct 77 a= 77 b= 7 c= 12 d= 4 r = .54

3.1-74. As you leave class, you hear the professor mention that the next class will deal with the largest of the limbic system structures and one that is also implicated in the acquisition of memories. The most likely topic for the next class will be the

- a. hypothalamus and homeostasis.
- b. importance of the amygdala.

**Incorrect:** The amygdala is responsible for some of our memory functions, but the brain structure most salient in remembering is the hippocampus.

- c. characteristics of the hippocampus.

**Correct:** The hippocampus is the largest of the limbic structures. With damage to this area of the brain, we would likely still be able to learn new tasks but we would not be able to remember that we had learned them!

d. thalamus: the brain's relay station.

Difficulty: 2

Page Ref: 68

Topic: Biology and Behavior

Skill: Applied

Answer: c. the characteristics of the hippocampus.

3.1-75. A doctor on television is discussing the curious case of G.R., a patient who has suffered damage to his brain. G.R. believes that it is still 1970 and that the last Olympic games were held in Mexico in 1968, even though it is now the 21st century. Before the doctor divulges the part of the brain that is damaged in this individual, you predict that it is the

- a. thalamus.
- b. hypothalamus.
- c. hippocampus.

**Correct:** Damage to the hippocampus does not allow G.R. to put new information into long-term memory. He can remember the distant past, before the damage to his brain occurred. He could likely learn new tasks, but knowledge of learning them would not be stored in his long-term memory.

d. medulla.

**Incorrect:** The medulla does not control the acquisition and retention of memories. That is the job of the hippocampus.

Difficulty: 2

Page Ref: 68

Topic: Biology and Behavior

Skill: Applied

Answer: c. hippocampus.

% correct 77 a= 0 b= 12 c= 77 d= 10 r = .51

3.1-76. Damage to parts of this area of the brain may have a calming effect on "mean-spirited" people and has recently been implicated in the acquisition and use of knowledge related to threat and danger. It is the

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

Difficulty: 2

Page Ref: 68

Topic: Biology and Behavior

Skill: Factual

Answer: a. amygdala.

% correct 71 a= 71 b= 16 c= 6 d= 6 r = .40

3.1-77. A woman is a hypochondriac. She is always reading medical journals and is constantly experiencing imagined symptoms of medical problems. Lately, she has been gaining a lot of weight, and feels that her internal physiological processes are out of balance. She is most likely to conclude that she has suffered brain damage to her

a. amygdala.

**Incorrect:** The amygdala is not responsible for regulation of behaviors such as eating and drinking.

b. thalamus.

c. hypothalamus.

**Correct:** The hypothalamus is involved in the regulation of motivated behaviors such as eating. It maintains the body's internal equilibrium or homeostasis. When the body's energy reserves are low, the hypothalamus stimulates the organism to find food. Disregulation of the hypothalamus might affect both motivated eating and homeostasis.

d. parietal lobe.

Difficulty: 2

Page Ref: 68

Topic: Biology and Behavior

Skill: Applied

Answer: c. hypothalamus.

3.1-78. In science class, a nine-year-old is learning about how thermostats work. The teacher tells her that the furnace goes on when the temperature gets too cold, and then goes off when the temperature reaches a certain level. The student doesn't know it, but this operation is similar to the concept of

a. evolution.

b. determinism.

c. homeostasis.

**Correct:** Homeostasis is the maintenance of internal body equilibrium. When the body is low on energy, the hypothalamus stimulates the organism to find food. When the body's temperature drops, the hypothalamus causes blood vessel constriction or tiny involuntary movements (shivering) and motivates us to get warmer.

d. the action potential.

**Incorrect:** The action potential is the neural impulse that travels down a neuron, from dendrite to terminal button.

Difficulty: 2

Page Ref: 68



Topic: Biology and Behavior  
Skill: Applied  
Answer: c. homeostasis.

3.1-79. A child is playing an educational game called Brain Power. He reads clues about a part of the brain that occupies two-thirds of its total mass and that regulates higher thinking and emotional functions. He should recognize this part to be the

a. cerebrum.

**Correct:** The cerebrum dwarfs the rest of the brain and is divided into two hemispheres by the corpus callosum.

b. hypothalamus.

c. corpus callosum.

d. cerebral cortex.

**Incorrect:** The outer surface of the cerebrum is the cerebral cortex. This is not the best answer to this question.

Difficulty: 2

Page Ref: 68

Topic: Biology and Behavior

Skill: Applied

Answer: a. cerebrum.

3.1-80. The cerebrum is divided into two almost symmetrical halves, called the \_\_\_\_\_, which are connected by a mass of fibers called the \_\_\_\_\_.

a. nuclei; nerve fibers

b. lobes; cerebral connector

c. cerebral cortices; equator

d. cerebral hemispheres; corpus callosum

Difficulty: 2

Page Ref: 68

Topic: Biology and Behavior

Skill: Factual

Answer: d. cerebral hemispheres; corpus callosum

% correct 74 a= 3 b= 16 c= 6 d= 74 r = .53

3.1-81. With respect to the lobes of the brain, the frontal lobe is involved in \_\_\_\_\_ and the occipital lobe is the final destination for \_\_\_\_\_.

a. motor control; visual information

b. pain sensations; auditory sensations

c. planning activities; touch sensations

d. touch sensations; cognitive activities

Difficulty: 3

Page Ref: 68-69

Topic: Biology and Behavior

Skill: Factual

Answer: a. motor control; visual information

% correct 81 a= 81 b= 2 c= 7 d= 7 r = .37

3.1-82. While going for the ball in the soccer league championship, a player slips and hits the back of his head so hard that he “sees stars.” Which lobe of the brain was stimulated when he hit his head?

- a. frontal
- b. temporal
- c. parietal

**Incorrect:** It is the occipital lobe of the cerebrum where visual information is processed.

- d. occipital

**Correct:** This lobe is the final destination for visual information.

Difficulty: 2

Page Ref: 69

Topic: Biology and Behavior

Skill: Applied

Answer: d. occipital

3.1-83. Which statement most accurately describes what is going on in the brain when you are engaged in an everyday activity?

- a. Each activity is associated with only one lobe.

**Incorrect:** There are many activities that require multiple brain areas to be active, working in a coordinated fashion.

- b. For most activities, only the frontal lobes are active.

- c. Although the brain operates as a whole, some functions are associated with specific areas.

**Correct:** The structures of the brain work as a smoothly integrated unit. While each lobe has specific functions that may be interrupted or lost if the lobe is damaged, each lobe also contributes to the action of the brain in its entirety by interacting and cooperating with all other lobes.

- d. The brain operates as a unit, and no single area is necessary for any specific function.

Difficulty: 2

Page Ref: 69

Topic: Biology and Behavior

Skill: Conceptual

Answer: c. Although the brain operates as a whole, some functions are associated with specific areas.

% correct 94 a= 0 b= 0 c= 94 d= 6 r = .20

3.1-84. A friend is having trouble locating the motor cortex, so you try to help her out. You should explain that the motor cortex is located

- a. below the lateral fissure, in the temporal lobes.
- b. above the lateral fissure, in the occipital lobes.
- c. in front of the central sulcus, in the frontal lobes.
- d. just behind the central sulcus, in the left and right parietal lobes.

Difficulty: 1

Page Ref: 69

Topic: Biology and Behavior

Skill: Factual

Answer: c. in front of the central sulcus, in the frontal lobes.

% correct 42 a= 15 b= 12 c= 42 d= 31 r = .16

3.1-85. Imagine that you have been asked to give a short talk on the functioning of the auditory cortex. Make sure NOT to tell your audience that

- a. the auditory cortex is located in the two temporal lobes.

**Incorrect:** This is a correct statement, so there would be no reason not to tell this to your audience!

- b. the auditory cortex in each hemisphere receives information from both ears.
- c. the auditory cortex of the left hemisphere receives information only from the right ear.

**Correct:** The auditory cortex in each hemisphere receives information from both ears.

- d. different areas of the auditory cortex are involved in language comprehension and production of language.

Difficulty: 3

Page Ref: 70

Topic: Biology and Behavior

Skill: Applied

Answer: c. the auditory cortex of the left hemisphere receives information only from the right ear.

3.1-86. You are looking at a drawing that represents the relationship between the motor cortex and different parts of the body. What strikes you is that

- a. the shoulders are missing from the drawing.
- b. only the areas related to the eyes, ears, and nose are larger than normal.
- c. the feet are huge, compared to the rest of the body.

**Incorrect:** The feet may be bigger than some areas, but overall this is not an accurate statement.  
d. the areas related to the fingers, thumb, and the muscles that control speech are quite large.

**Correct:** The greater brain area coincides with the importance of different body parts in terms of manipulating objects, using tools, eating, and talking.

Difficulty: 2

Page Ref: 70

Topic: Biology and Behavior

Skill: Applied

Answer: d. the areas related to the fingers, thumb, and the muscles that control speech are quite large.

3.1-87. The majority of the cerebral cortex is involved in

- a. language behavior.
- b. processing sensory information.
- c. commanding the muscles to action.
- d. interpreting and integrating information.

Difficulty: 3

Page Ref: 71

Topic: Biology and Behavior

Skill: Factual

Answer: d. interpreting and integrating information.

3.1-88. After having suffered a stroke, a man is unable to plan his daily activities and finds it difficult to decide what to do for that day. You suspect that he has most likely suffered damage to his

- a. visual cortex.
- b. association cortex.
- c. primary motor area.
- d. primary somatosensory area.

**Correct:** Processes such as planning and decision-making are believed to occur in the association cortex, a part of the cerebral cortex.

**Incorrect:** The somatosensory area does not have the responsibility of higher-level functions, such as planning and sequencing of one's daily activities.

Difficulty: 3

Page Ref: 71

Topic: Biology and Behavior

Skill: Applied

Answer: b. association cortex.

% correct 64 a= 4 b= 64 c= 2 d= 30 r = .39

3.1-89. When Paul Broca carried out his autopsy on the patient known as “Tan,” he discovered damage in the \_\_\_\_\_ hemisphere; other patients studied by Broca who showed similar disruption of their language abilities had damage on the \_\_\_\_\_ side of their brains.

- a. left; left
- b. left; right
- c. right; left
- d. right; right

Difficulty: 2

Page Ref: 71

Topic: Biology and Behavior

Skill: Factual

Answer: a. left; left

% correct 67 a= 67 b= 4 c= 17 d= 8 r = .51

3.1-90. All you know about someone is that she is a “split-brain” patient. You can conclude that she

- a. has had her corpus callosum severed.
- b. will be unable to eat or walk unassisted.
- c. will probably demonstrate multiple personalities.
- d. has been born with the equivalent of half of a brain.

Difficulty: 2

Page Ref: 71

Topic: Biology and Behavior

Skill: Factual

Answer: a. has had her corpus callosum severed.

% correct 70 a= 70 b= 16 c= 14 d= 0 r = .55

3.1-91. A friend has been told by his girlfriend that his hormones are out of balance, so he decides to do a little research. He is compiling a list of all of the characteristics of hormones. Which of the following statements should you tell him to remove from his list? Hormones

- a. help fight infections and disease.  
**Correct:** Hormones do not play a role in the body’s immune response to infections and diseases.
- b. serve as the basis for mood changes.
- c. have general, rather than specific or targeted effects.  
**Incorrect:** Hormones are released into the blood and travel to distant target cells. Hormones exert their influences only at places that are genetically predetermined to respond to them. They influence diverse but specific target organs or tissues, thereby regulating an enormous range of biochemical processes.
- d. initiate, maintain, and stop development of primary and secondary sexual characteristics.

Difficulty: 2  
Page Ref: 73  
Topic: Biology and Behavior  
Skill: Applied  
Answer: a. help fight infections and disease.

3.1-92. In the brain, the \_\_\_\_\_ serves as a relay station between the endocrine system and the central nervous system.

- a. thalamus
- b. hippocampus
- c. hypothalamus
- d. cerebral cortex

Difficulty: 3  
Page Ref: 74  
Topic: Biology and Behavior  
Skill: Factual  
Answer: c. hypothalamus  
% correct 29 a= 42 b= 8 c= 29 d= 21 r = .37

3.1-93. The endocrine glands produce hormones that regulate various bodily functions. Which gland-function pair is mismatched?

- a. thyroid; metabolism
- b. parathyroid; glucose metabolism
- c. anterior pituitary; reactions to stress
- d. posterior pituitary; uterus contraction

Difficulty: 3  
Page Ref: 74  
Topic: Biology and Behavior  
Skill: Factual  
Answer: b. parathyroid; glucose metabolism

3.1-94. A classmate is working on her presentation on the endocrine system for class. You overhear her as she says, "This gland is often called the 'master gland' because it has an effect on the secretions of all the other endocrine glands." It sounds as though she is talking about the

- a. adrenals.
- b. pancreas.

**Incorrect:** The pancreas is important in your ability to metabolize glucose, but it is not the "master gland."

- c. pituitary.

**Correct:** The pituitary gland produces ten different kinds of hormones that influence the secretions of all the other endocrine glands, as well as a hormone that influences growth.  
d. hypothalamus.

Difficulty: 2  
Page Ref: 74  
Topic: Biology and Behavior  
Skill: Applied  
Answer: c. pituitary.

3.1-95. A young man has begun to look and sound more physically mature, with the beginnings of a beard and a deeper voice. These changes can be attributed to the secretions of the

- a. ovaries.
- b. pancreas.
- c. pituitary.

**Correct:** In males, secretions of the pituitary gland activate the testes to secrete testosterone, which stimulates the production of sperm and secondary sexual characteristics such as facial hair, voice change, and physical maturation.

- d. parathyroid.

**Incorrect:** The parathyroid is not responsible for the production of hormones that stimulate primary and secondary sexual characteristics.

Difficulty: 3  
Page Ref: 74  
Topic: Biology and Behavior  
Skill: Applied  
Answer: c. pituitary.

3.1-96. A magazine article describes a new drug that blocks the production of a hormone, preventing the release of ova and resulting in infertility in women. The hormone that is being blocked is most likely

- a. estrogen.

**Correct:** Estrogen production is stimulated by the pituitary gland. Estrogen is essential for the chain reaction that triggers the release of ova from the ovaries making a woman fertile.

- b. dopamine.
- c. adrenaline.

**Incorrect:** Estrogen is what prompts the release of ova in women, not adrenaline.

- d. testosterone.

Difficulty: 2  
Page Ref: 74  
Topic: Biology and Behavior

Skill: Applied

Answer: a. estrogen.

% correct 100 a=100 b=0 c=0 d=0 r = .00

3.1-97. If we can apply Mark Rosenzweig's research on rats raised in impoverished or enriched environments to humans, then we would encourage humans to live in a(n)

- a. environment that is deprived of unnecessary stimulation.
- b. environment that is full of stimulation when children, but not when adults.

**Incorrect:** In the research discussed in your textbook, even adults would benefit from enriched environments.

- c. enriched environment even after childhood.

**Correct:** Researchers have now determined that enriched environments not only affect the weight and thickness of young animals but continue to have this effect with adult animals.

- d. stressful environment in order to strengthen the functioning of the hippocampus.

Difficulty: 2

Page Ref: 74

Topic: Biology and Behavior

Skill: Conceptual

Answer: c. enriched environment even after childhood.

3.1-98. It has been reported that the production of new brain cells from naturally occurring stem cells occurs in the brains of adult mammals. This process is called

- a. plasticity.
- b. transformation.
- c. neurogenesis.
- d. reuptake.

Difficulty: 2

Page Ref: 75

Topic: Biology and Behavior

Skill: Factual

Answer: c. neurogenesis

% correct 70 a= 20 b= 4 c= 70 d= 6 r = .29

### True/False Questions

3.2-1. Charles Darwin wrote *The Origin of Species*.

- a. true
- b. false



Difficulty: 1  
Page Ref: 47  
Topic: Heredity and Behavior  
Skill: Factual  
Answer: a. true

3.2-2. Your observable characteristics are known as your genotype.

- a. true
- b. false

Difficulty: 2  
Page Ref: 49  
Topic: Heredity and Behavior  
Skill: Factual  
Answer: b. false

3.2-3. DNA is organized into units called genes.

- a. true
- b. false

Difficulty: 2  
Page Ref: 51  
Topic: Heredity and Behavior  
Skill: Factual  
Answer: a. true

3.2-4. The human genome contains about four million genes.

- a. true
- b. false

Difficulty: 2  
Page Ref: 52  
Topic: Heredity and Behavior  
Skill: Factual  
Answer: b. false

3.2-5. Interneurons are one type of neuron.

- a. true

b. false

Difficulty: 2

Page Ref: 54

Topic: The Nervous System in Action

Skill: Factual

Answer: a. true

3.2-6. An inflow of sodium causes a nerve cell to become depolarized.

a. true

b. false

Difficulty: 3

Page Ref: 56-57

Topic: The Nervous System in Action

Skill: Factual

Answer: a. true

3.2-7. The all-or-none law states that the size of the action potential is unaffected by increases in the intensity of stimulation beyond the threshold level.

a. true

b. false

Difficulty: 2

Page Ref: 57

Topic: The Nervous System in Action

Skill: Conceptual

Answer: a. true

3.2-8. During the absolute refractory period, further stimulation, no matter how intense, cannot cause another action potential to be generated.

a. true

b. false

Difficulty: 3

Page Ref: 58

Topic: The Nervous System in Action

Skill: Conceptual

Answer: a. true

3.2-9. GABA is the most common excitatory neurotransmitter in the brain.

- a. true
- b. false

Difficulty: 2  
Page Ref: 59  
Topic: The Nervous System in Action  
Skill: Factual  
Answer: b. false

3.2-10. Broca's area of the brain is most closely associated with emotional behavior.

- a. true
- b. false

Difficulty: 2  
Page Ref: 62  
Topic: Biology and Behavior  
Skill: Factual  
Answer: b. false

3.2-11. A patient is given a radioactive substance that eventually travels to the brain and allows for the production of detailed pictures of activity in the living brain. This individual has been given an MRI scan.

- a. true
- b. false

Difficulty: 2  
Page Ref: 63  
Topic: Biology and Behavior  
Skill: Applied  
Answer: b. false

3.2-12. The procedure known as repetitive transcranial magnetic stimulation (rTMS) should only be used in life-threatening situations, as it produces small but irreversible brain damage.

- a. true
- b. false

Difficulty: 2

Page Ref: 62  
Topic: Biology and Behavior  
Skill: Applied  
Answer: b. false

3.2-13. The peripheral nervous system consists of the brain, spinal cord, and cranial nerves that connect the body's sensory receptors to the central nervous system.

- a. true
- b. false

Difficulty: 2  
Page Ref: 64  
Topic: Biology and Behavior  
Skill: Factual  
Answer: b. false

3.2-14. The somatic nervous system is a subdivision of the peripheral nervous that regulates the actions of the body's skeletal muscles.

- a. true
- b. false

Difficulty: 2  
Page Ref: 64  
Topic: Biology and Behavior  
Skill: Factual  
Answer: a. true

3.2-15. The medulla and pons are two structures found within the cerebellum of the brain.

- a. true
- b. false

Difficulty: 2  
Page Ref: 67  
Topic: Biology and Behavior  
Skill: Factual  
Answer: b. false

3.2-16. The amygdala is the part of the limbic system that controls emotion, aggression, and the formation of emotional memory.

- a. true
- b. false

Difficulty: 2  
Page Ref: 74  
Topic: Biology and Behavior  
Skill: Factual  
Answer: a. true

3.2-17. One of the functions of the hypothalamus is to maintain the body's homeostasis.

- a. true
- b. false

Difficulty: 2  
Page Ref: 68  
Topic: Biology and Behavior  
Skill: Factual  
Answer: a. true

3.2-18. The parietal lobe is located at the front of the head and is the final destination for visual information.

- a. true
- b. false

Difficulty: 2  
Page Ref: 69  
Topic: Biology and Behavior  
Skill: Factual  
Answer: b. false

3.2-19. The size of a particular region of the body is directly related to the amount of space in the cerebral cortex devoted to that region. For example, the arms and legs occupy nearly one hundred times the space devoted to the fingers and hand.

- a. true
- b. false

Difficulty: 3  
Page Ref: 70  
Topic: Biology and Behavior

Skill: Conceptual

Answer: b. false

3.2-20. In males, the testes secrete testosterone, which stimulates production of sperm and may increase aggression and sexual desire.

a. true

b. false

Difficulty: 2

Page Ref: 74

Topic: Biology and Behavior

Skill: Factual

Answer: a. true

### Fill in the Blank Questions

3.3-1. Due to favorable adaptations to features of the environment, some members of a species reproduce more successfully than others. This captures the essence of the process called \_\_\_\_\_.

Difficulty: 2

Page Ref: 47-48

Topic: Heredity and Behavior

Skill: Conceptual

Answer: natural selection

3.3-2. The biological units of heredity are called \_\_\_\_\_. They are responsible for the transmission of traits and are tiny sections of \_\_\_\_\_.

Difficulty: 3

Page Ref: 51

Topic: Heredity and Behavior

Skill: Factual

Answer: genes; chromosomes

3.3-3. The relative influence of genetics versus environment in determining patterns of behavior is called \_\_\_\_\_.

Difficulty: 3

Page Ref: 52

Topic: Heredity and Behavior

Skill: Conceptual  
Answer: heritability

3.3-4. The gap between one neuron and another is called a(n) \_\_\_\_\_.

Difficulty: 1  
Page Ref: 58  
Topic: The Nervous System in Action  
Skill: Factual  
Answer: synapse

3.3-5. Due to its precision and clarity, researchers use a brain imaging technique known as \_\_\_\_\_. It combines benefits of both MRI and PET scans by detecting changes in the flow of blood to cells in the brain.

Difficulty: 3  
Page Ref: 64  
Topic: Biology and Behavior  
Skill: Conceptual  
Answer: functional magnetic resonance imaging (fMRI)

3.3-6. The autonomic nervous system has two divisions. The \_\_\_\_\_ subdivision deals with emergency response and the mobilization of energy, and the \_\_\_\_\_ subdivision monitors the routine operation of the body's internal functions and conserves and restores body energy.

Difficulty: 3  
Page Ref: 65  
Topic: Biology and Behavior  
Skill: Factual  
Answer: sympathetic; parasympathetic

3.3-7. The \_\_\_\_\_ is the part of the limbic system that is involved in the acquisition of explicit memories.

Difficulty: 3  
Page Ref: 68  
Topic: Biology and Behavior  
Skill: Conceptual  
Answer: hippocampus

3.3-8. The two hemispheres of the brain are connected by a thick mass of nerve fibers collectively referred to as the \_\_\_\_\_.

Difficulty: 2  
Page Ref: 68  
Topic: Biology and Behavior  
Skill: Factual  
Answer: corpus callosum

3.3-9. The \_\_\_\_\_ system manufactures and secretes chemical messengers called hormones into the bloodstream.

Difficulty: 2  
Page Ref: 73  
Topic: Biology and Behavior  
Skill: Conceptual  
Answer: endocrine

3.3-10. The \_\_\_\_\_ gland is often called the “master gland.”

Difficulty: 2  
Page Ref: 74  
Topic: Biology and Behavior  
Skill: Factual  
Answer: pituitary

### Essay Questions

3.4-1. One day, you take your teenage niece to the zoo and she becomes particularly fascinated with the birds in the aviary. She asks you why they all seem to have differently shaped beaks. Use the research of Charles Darwin and Peter and Rosemary Grant to explain why animals look the way they do today, incorporating a discussion of natural selection.

Difficulty: 3  
Page Ref: 47-49  
Topic: Heredity and Behavior  
Skill: Conceptual

Answer: The theory of natural selection proposed by Charles Darwin suggests that organisms that are well adapted to their environments will produce more offspring and therefore survive longer than those not so well-adapted. The Grants studied finches, their habits, environment, and population size. They took note of the ones that survived a terrible drought and why they survived when others didn't.



3.4-2. Diagram a neuron, label its parts, and describe how it works. In your description, be sure to provide a brief explanation of the resting potential and the action potential. Then, explain how information flows from neuron to neuron. How does information transmission in the nervous system differ from the information transmission that takes place in the endocrine system?

Difficulty: 3

Page Ref: 54-59; 73

Topic: The Nervous System in Action; Biology and Behavior

Skill: Conceptual/Factual

Answer: Include soma, dendrites, axon, terminal buttons, synapse, neurotransmitters, electrochemical action, and resting and action potentials. Glia and myelin sheath are also suggested. The endocrine system is a network of glands whose hormones are transmitted throughout the body in the bloodstream. The endocrine and nervous systems form complex communication systems in the body.

3.4-3. Describe and discuss four major neurotransmitters and their effects. Discuss how neurotransmitters are released from the neuron and the importance of neural transmission.

Difficulty: 2

Page Ref: 59-60

Topic: The Nervous System in Action

Skill: Factual/Conceptual

Answer: Include discussion of four of the following: acetylcholine, dopamine, serotonin, norepinephrine, glutamate, GABA, endorphins. Discuss how these neurochemical messengers are released from the terminal buttons of the axon into the synapse and taken up by the receiving neuron.

3.4-4. Neuroscientists have developed a variety of techniques for studying the workings of the brain and the relationship between the brain and behavior. Describe these methods along with the pros and cons of each. Why are these new imaging techniques so important to understanding the functions of the brain as they relate to behavior?

Difficulty: 3

Page Ref: 60-64

Topic: Biology and Behavior

Skill: Conceptual

Answer: Neuroscientists want to understand the brain at many levels, from visible structures to the properties of nerve cells. Researchers have developed a number of ways to produce lesions in order to study functioning of the brain. Give examples. Include discussion of PET scans, MRI, EEG, fMRI, and repetitive transcranial stimulation.

3.4-5. Draw a diagram of the organization of the nervous system, including the divisions and subdivisions. Give a brief description of the function of each of the parts of your diagram. What is the overall significance of having two major divisions of the nervous system?

Difficulty: 2

Page Ref: 64-66

Topic: Biology and Behavior

Skill: Conceptual/Factual

Answer: Include the central nervous system and peripheral nervous system, with the autonomic and somatic, sympathetic and parasympathetic nervous systems. Briefly define each. The CNS is vitally important, but it would be isolated from the outside world without the actions of the PNS.