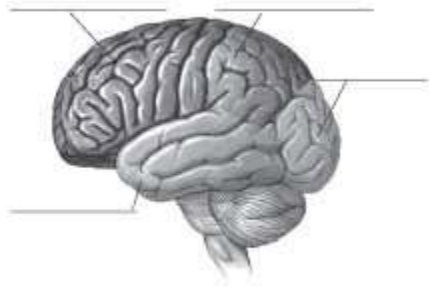
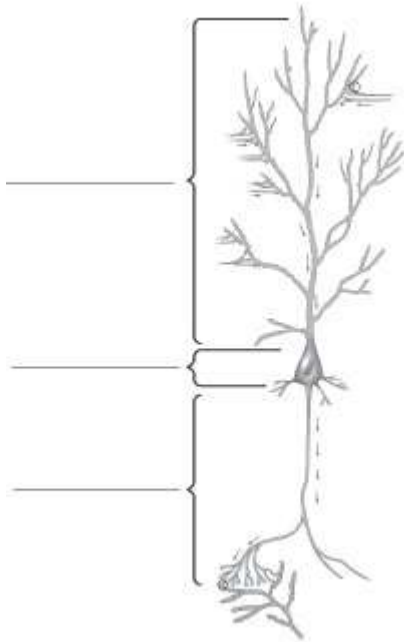


1. Label the four lobes of the cerebral cortex in the figure.



2. List two brain structures that are especially important for learning and memory. Briefly describe the involvement of each one.
3. Describe one piece of evidence that shows learning in invertebrates.
4. Label the parts of the neuron in the figure.

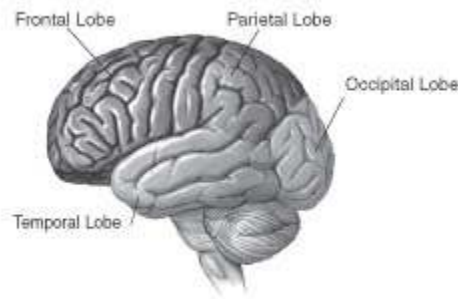


5. What was one of the problems with phrenology?
6. What is the difference between structural neuroimaging and functional neuroimaging?

7. Give an example of a reflex that humans have.
8. Describe the sensory and motor processes involved in crossing a busy street, including the areas of the brain that are involved.
9. Describe the process of transmitting messages from one neuron to the next.
10. Explain why experimental brain lesions in animals allow for greater precision than is typically possible in humans.
11. Explain what Karl Lashley meant by the engram. How did he attempt to find it? Was he successful? What did his findings teach us about learning in the brain?
12. Describe the process of single-cell recording. When would a researcher want to use this technique?
13. Describe the two techniques that can be used to stimulate neural activity.
14. Suppose one's roommate wants to take Ritalin (an attention-boosting drug) to help in remembering information for an upcoming exam. What should one tell the person?
15. Describe the procedures used to elicit long-term potentiation in a neuron.

## Answer Key

1.



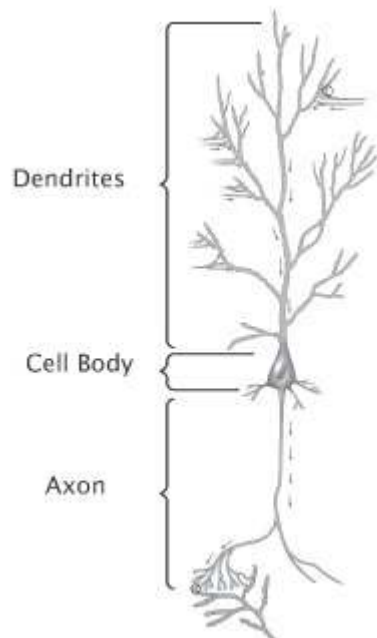
2. Grading criteria: There are four structures described in the chapter:

1. Thalamus—receives sensory input from the PNS
2. Basal ganglia—is important for learning skills (movement)
3. Hippocampus—is critical for learning new information and remembering autobiographical information
4. Amygdala—adds emotional content to memories

3. Grading criteria: There are two examples described in the chapter:

1. Octopus—finds its way through a maze, learns to open a jar for a food reward, learns to grab the correct ball by watching another octopus (social learning)
2. Nematodes—learn to approach or avoid tastes/odors

4.



5. Grading criteria: The main problem is that phrenology assumes that the shape of the skull reflects the shape of the brain, which is not true. Other acceptable answers: Gall studied only the skulls, not the actual brains, of living people; it was misused by quacks trying to make money; it was used to justify mistreatment of criminals and others

- deemed inferior to the ruling class.
6. Grading criteria: Structural neuroimaging allows one to see the anatomical areas but not their activity; functional neuroimaging allows one to look at the activity of brain areas.
  7. Grading criteria: There are numerous possible examples, including eyeblink, knee-jerk, newborns' sucking, diving reflex, palmar grasp reflex, among others. Answer must not be a learned response (e.g., salivating when driving past one's favorite restaurant, which is learned, not reflexive).
  8. Grading criteria: Some of the key components are as follows: watch for cars; visual input passes from eyes, through thalamus, to visual cortex; frontal cortex helps determine movements such as stepping down off the curb, how quickly to move legs; this information is sent to M1; M1 sends messages down to the brainstem, which connects to the spinal cord, and so the messages travel down spinal cord to muscles; one walks across the street.
  9. Grading criteria: Include basic details: presynaptic cell, release of neurotransmitter (and that it is a chemical), postsynaptic receptors bind to neurotransmitter, postsynaptic cell integrates the message and decides to fire if the signal is strong enough. (Ideally, explain that this is all-or-nothing.)
  10. Grading criteria: Explain that human brain lesions are usually due to accident/illness and vary from person to person, and can involve many brain areas; in animals, can disable specific single brain regions. Note that a general explanation of why animal research is justified would not be sufficient to answer this question.
  11. Grading criteria: The engram is the supposed physical change in the brain that forms the basis of a memory. Lashley tried to find the engram by lesioning different areas of rats' brains and examining the effect on them of learning to run a maze. He was not successful—no one area appeared to be crucial for remembering the maze. His results revealed that memories are not completely localized in the brain.
  12. Grading criteria: Single-cell recording involves implanting a microelectrode into a single neuron and transmitting the signal to speakers that "hear" the response; a stimuli is presented or the animal subject performs a task as changes in the response of the neuron are measured. Researchers would use this technique in order to find out what individual neurons' roles are in a behavior, which is more precise than determining entire brain areas involved.
  13. Grading criteria:
    1. Electrical stimulation of individual neurons—use electrodes to deliver electrical stimulation, causing a response in the neuron
    2. Transcranial magnetic stimulation—stimulate entire brain areas in humans with a strong magnetic pulse
  14. Grading criteria: Attention can improve memory in general; however, no good evidence exists at this time that any attention-boosting drugs improve memory in normal healthy people.
  15. Grading criteria: Include the main steps: Stimulate cell A, record from cell B; stimulate A with a burst of high-frequency stimulation; later, stimulate A again with weak stimulation, see that B responds more strongly than it did before.

1. Four people failed a difficult exam and are trying to forget about the experience. Which person will be MOST successful?
  - A) Manny, who has been staying awake for the past three nights
  - B) Jacob, who keeps thinking about how important this test was
  - C) Joan, who has taken up meditation
  - D) Bree, who enjoys listening to music, watching TV, and talking to her friends all at once
  
2. Early learning and memory researchers focused on behavior, rather than brain function, because:
  - A) they did not think the brain was involved in learning and memory.
  - B) they were not interested in how the brain was involved in learning and memory.
  - C) technology wasn't yet available for studying the complexities of the brain.
  - D) none of them knew how to study physiology.
  
3. The nervous system is:
  - A) mainly involved in cooling the blood.
  - B) considered the seat of learning and memory.
  - C) a relatively simple anatomical system.
  - D) devoted to the distribution and processing of information.
  
4. The central nervous system is made up of:
  - A) nerves and muscles.
  - B) sensory organs.
  - C) sensory and motor neurons.
  - D) the brain and the spinal cord.
  
5. If a friend pats one on the back, the neurons that carry the information from the touch receptors on one's back to one's brain are part of the:
  - A) central nervous system.
  - B) peripheral nervous system.
  - C) left hemisphere.
  - D) right hemisphere.
  
6. When one reaches to catch a basketball, the neurons that carry the message from one's brain to the muscles in one's arms and hands are part of the:
  - A) central nervous system.
  - B) peripheral nervous system.
  - C) left hemisphere.
  - D) right hemisphere.

7. In vertebrates, the nervous system is divided into the:
- A) brain and neurons.
  - B) parietal lobe and occipital lobe.
  - C) central nervous system and peripheral nervous system.
  - D) cerebellum and brainstem.
8. The LARGEST structure of the human brain is the:
- A) cerebral cortex.
  - B) frontal lobe.
  - C) cerebellum.
  - D) temporal lobe.
9. The structure that sits at the base of the brain is known as the:
- A) cerebral cortex.
  - B) parietal lobe.
  - C) brainstem.
  - D) frontal lobe.
10. If one falls and injures the back of one's head, which effect would MOST likely be experienced?
- A) difficulty understanding speech
  - B) difficulty seeing a friend's face
  - C) difficulty remembering names
  - D) difficulty feeling the difference between silk and sandpaper
11. The part of cerebral cortex that is important for processing visual elements is the:
- A) occipital lobe.
  - B) parietal lobe.
  - C) brainstem.
  - D) frontal lobe.
12. While sitting at the theater, Jonathan feels something crawling up his leg. He is able to realize it before he gets stung. Which part of the cerebral cortex is responsible for this realization?
- A) the temporal lobe
  - B) the parietal lobe
  - C) the brainstem
  - D) the frontal lobe

13. Mary is having trouble hearing her friends when they speak to her. Which part of her brain might be damaged?
- A) the frontal lobe
  - B) the parietal lobe
  - C) the temporal lobe
  - D) the occipital lobe
14. Which brain structure is involved in helping one learn the coordinated movements necessary for learning to ride a bike?
- A) the temporal lobe
  - B) the brainstem
  - C) the thalamus
  - D) the cerebellum
15. Which part of the brain helps regulate autonomic functions such as breathing?
- A) the cerebellum
  - B) the brainstem
  - C) the hippocampus
  - D) the temporal lobe
16. Which brain structure receives sensory information from the peripheral nervous system and relays this information to other parts of the brain?
- A) the thalamus
  - B) the basal ganglia
  - C) the amygdala
  - D) the hippocampus
17. Which brain structure is especially important for remembering one's eighth birthday party?
- A) the thalamus
  - B) the basal ganglia
  - C) the amygdala
  - D) the hippocampus
18. Remembering what information would be MOST likely to involve the amygdala?
- A) the details of one's first date
  - B) how one felt when graduating from high school
  - C) how to perform an intricate sequence of gymnastic moves
  - D) the definition of new terms in a psychology class

19. What is the study of similarities and differences between organisms' brains?
- A) conditioning
  - B) comparative neuroanatomy
  - C) neuropsychology
  - D) cognitive development
20. Which statement is TRUE?
- A) Animals must have both a central and peripheral nervous system in order to be able to learn.
  - B) Animals with larger brains have higher intelligence than animals with smaller brains.
  - C) Only vertebrates have both a central and a peripheral nervous system.
  - D) The cerebral cortex takes up about the same percentage of total brain volume in humans as it does in other vertebrates.
21. The ability of worms and jellyfish to learn is notable because they each have:
- A) a CNS but not a PNS.
  - B) no recognizable brain.
  - C) no neurons.
  - D) very large brainstems.
22. Studying invertebrate nervous systems is useful because invertebrates:
- A) have more simple nervous systems than vertebrates do.
  - B) have clearly defined central and peripheral nervous systems.
  - C) are incapable of learning, making it easier to study their other behaviors.
  - D) do not have any neurons in their nervous systems.
23. What is the usual function of dendrites?
- A) receiving signals from other neurons
  - B) transmitting information to other neurons
  - C) transferring oxygen from the blood to neurons
  - D) wrapping neurons in myelin
24. Which part(s) of a neuron transmit(s) information to other neurons?
- A) dendrites
  - B) the cell body
  - C) the axon
  - D) glia



25. Which statement is TRUE?
- A) There are more neurons than glia in the brain.
  - B) Neurons are all the same shape and size.
  - C) Some neurons have no axons.
  - D) Glia are not necessary for normal brain functioning.
26. What is the other name for the cell body?
- A) synapse
  - B) soma
  - C) axon
  - D) dendrite
27. Which cells provide functional and structural support to neurons?
- A) pyramidal cells
  - B) stellate cells
  - C) interneurons
  - D) glia
28. Multiple sclerosis is a disease in which \_\_\_\_; this interferes with neural function, leading to jerky muscle movements and impaired coordination, as well as problems with vision and speech.
- A) glia aren't necessary for function
  - B) interneurons are not able to connect two or more neurons
  - C) the myelin coating of axons degenerates
  - D) dendrites are unable to receive signals
29. The study of the relationship between the size and shape of different parts of people's skulls and their personalities and abilities is called:
- A) equipotentiality.
  - B) comparative brain anatomy.
  - C) phrenology.
  - D) neuropsychology.
30. Phrenology was a systematic study of the brain that was pursued by:
- A) Galen.
  - B) Aristotle.
  - C) Paul Broca.
  - D) Franz Joseph Gall.

31. Imagine a parent who has two children. The first child has a very large forehead, and the second child's head is very large at the back. According to the system of phrenology, the first child would excel at \_\_\_\_\_ and the second would excel at \_\_\_\_\_.
- A) planning and performing actions; remembering
  - B) remembering; seeing the world
  - C) seeing the world; planning and performing actions
  - D) planning and performing actions; seeing the world
32. Which neuroimaging technique uses changes in magnetic fields to generate images of internal brain structure?
- A) single-cell recording
  - B) lesions
  - C) computed tomography (CT)
  - D) magnetic resonance imaging (MRI)
33. Which brain imaging method is especially useful for studying the connections between brain regions?
- A) diffusion tensor imaging (DTI)
  - B) magnetic resonance imaging (MRI)
  - C) computed tomography (CT)
  - D) positron emission tomography (PET)
34. Which imaging method is particularly useful for physicians trying to assess brain injury, as well as diseases such as multiple sclerosis that specifically target axons?
- A) magnetic resonance imaging (MRI)
  - B) diffusion tensor imaging (DTI)
  - C) computed tomography (CT)
  - D) positron emission tomography (PET)
35. A doctor is concerned that Martha has dysfunction involving the axons of her brain. Which neuroimaging technique would BEST be able to detect this problem?
- A) positron emission tomography (PET)
  - B) diffusion tensor imaging (DTI)
  - C) computed tomography (CT) scan
  - D) magnetic resonance imaging (MRI)

36. If one puts a hand on a hot stove, one will automatically pull it away before realizing what has been done. This is an example of a(n) \_\_\_\_\_ behavior.
- A) reflexive
  - B) voluntary
  - C) learned
  - D) intentional
37. Which statement is an example of a reflexive behavior?
- A) Pavlov's dog salivating in response to a sound that has predicted food
  - B) a dog that has learned to sit to obtain a treat
  - C) a newborn sucking when encountering a nipple
  - D) a rat pressing a bar to obtain a drink of water
38. According to the Bell-Magendie law of neural specialization:
- A) reflexes are caused by spirits flowing from the brain into the muscles.
  - B) the brain plays a major role in reflexes like the "knee-jerk" response to a doctor's rubber mallet.
  - C) the spinal cord has one nerve system for sensing and another nerve system for responding.
  - D) spinal reflexes can be combined into complex sequences of movements that are the basis of all behavior.
39. The Bell-Magendie law:
- A) applies to the brainstem but not to the spinal cord.
  - B) proposes one nerve system for sensing and another for responding.
  - C) applies to the central nervous system but not to the peripheral nervous system.
  - D) proposes that the brain is divided into two hemispheres.
40. What would occur if the sensory fibers in one's arm were cut?
- A) One would still automatically jerk one's hand away from a hot stove.
  - B) One would have a limited range of motion in one's arm.
  - C) One would not be able to move one's arm at all.
  - D) One would not be able to feel a sharp poke on one's arm.
41. Many basic reflexes:
- A) do not require the brain's involvement.
  - B) use only the sensory neurons.
  - C) involve the pumping of spirits or fluids into the muscles.
  - D) end with input to the sensory neurons.

42. Incoming sensory information is passed from the thalamus to the:
- A) spinal cord.
  - B) muscles.
  - C) primary motor cortex.
  - D) primary sensory cortices.
43. Most sensory information enters the brain through the:
- A) thalamus.
  - B) occipital lobe.
  - C) primary motor cortex.
  - D) primary sensory cortices.
44. The primary sensory cortices:
- A) process the outputs that control movements.
  - B) are responsible for processing the more complex characteristics of stimuli.
  - C) are specialized for processing particular sensory stimuli.
  - D) send most of their output to the peripheral nervous system.
45. When one opens a door, which part of the brain is responsible for sending signals to the arm muscles, causing one to open the door?
- A) V1 (visual cortex)
  - B) the frontal cortex
  - C) M1 (motor cortex)
  - D) the basal ganglia and the cerebellum
46. The primary motor cortex is located in the \_\_\_\_\_ lobe.
- A) frontal
  - B) parietal
  - C) occipital
  - D) temporal
47. The motor cortex (M1) sends its output signals to the:
- A) frontal lobes.
  - B) basal ganglia.
  - C) cerebellum.
  - D) brainstem.

48. Which part of the brain is involved in the high-level planning of the movements involved in picking up and using a pencil?
- A) the frontal lobes
  - B) the basal ganglia
  - C) the cerebellum
  - D) the brainstem
49. Which parts of the brain help translate the high-level plans into concrete sets of movements?
- A) the frontal lobes and the temporal lobe
  - B) the basal ganglia and the cerebellum
  - C) the cerebral cortex and the brainstem
  - D) the primary motor cortex and the primary somatosensory cortex
50. If a pot of water is hotter than expected, it could produce a withdrawal response of the hand. This response was studied by Charles Sherrington and is known as a(n):
- A) peripheral response.
  - B) autonomic response.
  - C) reflex arc.
  - D) neural response.
51. What is the name of the narrow gap across which neurons pass chemical messages to each other?
- A) the axon
  - B) the dendrite
  - C) the synapse
  - D) the cell body
52. Most synapses are between the:
- A) axons of the presynaptic and the postsynaptic neurons.
  - B) dendrites of the presynaptic and the postsynaptic neurons.
  - C) axon of the presynaptic neuron and the dendrite of the postsynaptic neuron.
  - D) dendrite of the presynaptic neuron and the axon of the postsynaptic neuron.
53. Neurotransmitters are:
- A) chemical substances that carry messages between neurons.
  - B) the part of a neuron that receives signals from other neurons.
  - C) types of neurons that connect other neurons together.
  - D) types of neurons that have pyramid-shaped cell bodies.

54. Molecules on the surface of the postsynaptic cell that bind with and respond to neurotransmitters are called:
- A) synapses.
  - B) receptors.
  - C) neuromodulators.
  - D) glia.
55. Most neurons can produce and release \_\_\_\_\_ neurotransmitter(s) and can receive \_\_\_\_\_ neurotransmitter(s).
- A) many different; many different
  - B) only one; only one
  - C) only one; many different
  - D) many different; only one
56. After a neuron fires, there is a brief period during which it is unable to fire again. What is this period called?
- A) refractory
  - B) inactivation
  - C) postsynaptic
  - D) reuptake
57. Inactivation and reuptake are mechanisms for:
- A) inhibiting neurons from responding.
  - B) removing dead neurons from the brain.
  - C) increasing the amount of neurotransmitter that is released.
  - D) clearing neurotransmitters from the synapse.
58. Neurotransmitters that affect activity in entire brain areas, rather than just at a single synapse, are called:
- A) neuromodulators.
  - B) refractory transmitters.
  - C) glia.
  - D) reuptake transmitters.
59. The basic idea behind functional neuroimaging is that:
- A) researchers can learn about brain structures by removing them and observing any changes in behavior.
  - B) brain structures change color when they are active.
  - C) structures that are more active use more oxygen.
  - D) structures that are more active use less oxygen.

60. In functional neuroimaging, a difference image is used for determining:
- A) how long it takes a person to complete a memory task.
  - B) what percentage of the brain is being used at any given moment.
  - C) how much neural activity has changed relative to a baseline.
  - D) how much neural activity occurs while a person is relaxed.
61. Functional magnetic resonance imaging (fMRI):
- A) directly measures neural activity.
  - B) usually picks up more areas of brain activation than does positron emission tomography (PET).
  - C) requires injecting radioactive materials into the participant's bloodstream.
  - D) is faster than positron emission tomography (PET).
62. Which neuroimaging technique uses electrodes to record electrical activity emitted from a person's scalp?
- A) positron emission tomography (PET)
  - B) functional magnetic resonance imaging (fMRI)
  - C) electroencephalography (EEG)
  - D) computed tomography (CT)
63. If a researcher uses an EEG to measure the brain's response to a visual stimulus, neurons other than those that respond to visual stimuli will also be active. How do researchers determine which neurons are responding only to the visual stimulus?
- A) They present the visual stimulus at a very high intensity.
  - B) They measure the activity of just one neuron at a time.
  - C) They make sure to present only a visual stimulus and nothing else.
  - D) They take the average of several EEGs.
64. An event-related potential (ERP) is:
- A) the average of many EEGs across repetitions of an event.
  - B) a measure of the amount oxygen being used by brain structures.
  - C) a measure of the activity of a single neuron.
  - D) the electrical activity emitted from the scalp, recorded on a single trial.
65. In comparison to the fMRI and the PET, the EEG technique:
- A) is less expensive.
  - B) gives less precise information about rapid changes in the brain.
  - C) has better spatial precision.
  - D) is better at measuring metabolic activity in the brain.

66. What technique can be used to measure the firing pattern of a single neuron?
- A) positron emission tomography (PET)
  - B) functional magnetic resonance imaging (fMRI)
  - C) electroencephalography (EEG)
  - D) single-cell recording
67. Single-cell recordings:
- A) are very uncomfortable for animals when electrodes are implanted into their brains.
  - B) have been used to demonstrate cells that are "tuned" to particular body movements.
  - C) are taken from the surface of an animal's brain.
  - D) are used to determine the activity in large regions of the brain.
68. Which field involves the study of patients with specific types of brain damage in order to learn about the relation between brain function and behavior?
- A) neurophysiology
  - B) functional neuroimaging
  - C) neuropsychology
  - D) synaptic plasticity
69. What is an *engram*?
- A) a measure of the amount of electrical activity on a person's scalp
  - B) a change in synaptic transmission as a result of recent activity
  - C) a physical change in the brain that forms the basis of a memory
  - D) a map that shows which part of the body each region of M1 controls
70. Suppose researchers train a pigeon to peck at a blue disc to obtain food. They then lesion a very small part of its brain and find that the pigeon has forgotten that it needs to peck the blue disc for food. Such a finding would be evidence for:
- A) the theory of equipotentiality.
  - B) the Bell-Magendie law of neural specialization.
  - C) synaptic plasticity.
  - D) the engram.
71. The idea that memories are stored across the brain as a whole is called the:
- A) engram theory.
  - B) theory of equipotentiality.
  - C) localization theory.
  - D) phrenology theory.



72. One of the reasons Karl Lashley was unable to find evidence for the engram was that:
- A) he used too simple a task for assessing memory.
  - B) he limited his lesions to the cerebral cortex.
  - C) he was unable to lesion rat brains due to ethical constraints.
  - D) the memories of rats are too different from the memories of humans.
73. Which statement about the homunculus is FALSE?
- A) It represents the activity of neurons in the hippocampus.
  - B) It means "little man."
  - C) It is somewhat different for each individual.
  - D) It exaggerates the parts of the body that have more fine motor control.
74. The technique in which researchers activate parts of the brain by placing a magnet on the skull is called:
- A) single-cell recording.
  - B) transcranial magnetic stimulation (TMS).
  - C) functional magnetic resonance imaging (fMRI).
  - D) electroencephalography (EEG).
75. The illusion of feeling that a novel experience has happened before is called:
- A) hebbian learning.
  - B) synaptic plasticity.
  - C) memory.
  - D) déjà vu.
76. Classically conditioning animals by using one electrode to generate neural firing patterns that would occur during the sensation of a sound and pairing that with stimulation from a second electrode that provokes a reflexive motor response is known as what kind of training?
- A) classical
  - B) transcranial magnetic stimulation
  - C) virtual reality
  - D) operant
77. \_\_\_\_\_ are chemical substances that alter the biochemical functioning of the body.
- A) Glutamates
  - B) Drugs
  - C) GABAs
  - D) Acetylcholines

78. Which mechanism is NOT one by which drugs alter synaptic transmission?
- A) increasing the ability of the presynaptic neuron to produce neurotransmitter
  - B) increasing the ability of the presynaptic neuron to receive neurotransmitter
  - C) decreasing the ability of the presynaptic neuron to produce neurotransmitter
  - D) altering the mechanisms for clearing neurotransmitter from the synapse
79. Drugs are able to change the:
- A) behavior of the presynaptic neuron.
  - B) behavior of the postsynaptic neuron.
  - C) rate at which neurotransmitters are cleared from the synapse.
  - D) All of the answers are correct.
80. Which statement is FALSE?
- A) The influence of drugs on learning and memory is usually a side effect.
  - B) A given drug usually affects just one neurotransmitter system.
  - C) Drugs can alter the ability of postsynaptic receptors to receive neurotransmitters.
  - D) Drugs affect the brain by altering synaptic transmission.
81. Laci is trying to teach her toddler to use his manners. She gives him a cookie whenever he remembers to say "please." Which neurotransmitter regulates the toddler's use of manners to obtain the cookie?
- A) glutamate
  - B) dopamine
  - C) GABA
  - D) acetylcholine
82. What is synaptic plasticity?
- A) the ability of synapses to change as a result of experience
  - B) the finding that neurons are not rigid but can bend to connect with nearby neurons
  - C) the ability of neurons to absorb a stain of silver chromate
  - D) the finding that drugs can impact the release of neurotransmitters by the presynaptic neuron
83. Which drugs have been shown to clearly improve memory in healthy individuals?
- A) drugs that increase levels of acetylcholine in Alzheimer's patients
  - B) drugs that improve attention
  - C) drugs that treat sleep disorders
  - D) None of the answers is correct.

84. The idea that "neurons that fire together, wire together" was proposed by:
- A) Santiago Ramón y Cajal.
  - B) Camillo Golgi.
  - C) Donald Hebb.
  - D) Ivan Pavlov.
85. Long-term potentiation is when:
- A) neurons continue to respond long after a stimulus has been removed.
  - B) a recent strong stimulus causes a neuron to over-respond to a subsequent stimulus.
  - C) neurons respond in the absence of a stimulus.
  - D) a strong stimulus leads to a weaker-than-normal response in a neuron.
86. Long-term potentiation has been shown to occur:
- A) in the hippocampus, but not in other brain areas.
  - B) only when the presynaptic neuron is stimulated.
  - C) in all brain areas, except for the hippocampus.
  - D) when the presynaptic and postsynaptic neurons are active at the same time.
87. Which statement has NOT been proposed as a mechanism of LTP?
- A) Postsynaptic receptors become more responsive to inputs.
  - B) Presynaptic neurons are changed by a retrograde messenger.
  - C) New synapses are built.
  - D) Postsynaptic neurons release more neurotransmitters.
88. Long-term potentiation:
- A) was first observed in the thalamus.
  - B) occurs when the postsynaptic neuron is stimulated with a high-frequency burst.
  - C) can last for hours or even longer.
  - D) involves a weakening in synaptic transmission following recent activity.
89. When synaptic transmission becomes less effective as a result of recent activity, it is known as:
- A) long-term potentiation.
  - B) inhibition.
  - C) retrograde potentiation.
  - D) long-term depression.

## **Answer Key**

1. A
2. C
3. D
4. D
5. B
6. B
7. C
8. A
9. C
10. B
11. A
12. B
13. C
14. D
15. B
16. A
17. D
18. B
19. B
20. C
21. B
22. A
23. A
24. C
25. C
26. B
27. D
28. C
29. C
30. D
31. D
32. D
33. A
34. B
35. B
36. A
37. C
38. C
39. B
40. D
41. A
42. D
43. A
44. C

- 45. C
- 46. A
- 47. D
- 48. A
- 49. B
- 50. C
- 51. C
- 52. C
- 53. A
- 54. B
- 55. C
- 56. A
- 57. D
- 58. A
- 59. C
- 60. C
- 61. D
- 62. C
- 63. D
- 64. A
- 65. A
- 66. D
- 67. B
- 68. C
- 69. C
- 70. D
- 71. B
- 72. B
- 73. A
- 74. B
- 75. D
- 76. C
- 77. B
- 78. B
- 79. D
- 80. B
- 81. B
- 82. A
- 83. D
- 84. C
- 85. B
- 86. D
- 87. D
- 88. C
- 89. D

1. If one stubs one's toe, the painful sensation is carried to the brain by neurons in the:
  - A) occipital lobe.
  - B) frontal lobe.
  - C) central nervous system.
  - D) peripheral nervous system.
  
2. Which lobe of the cerebral cortex is responsible for processing things that one hears?
  - A) frontal
  - B) temporal
  - C) occipital
  - D) parietal
  
3. *Comparative neuroanatomy* refers to the examination of the similarities and differences among the:
  - A) brains of people of different ages.
  - B) cerebral hemispheres.
  - C) different lobes of the cerebral cortex.
  - D) brains of different organisms.
  
4. The ability of worms and jellyfish to learn is notable because they each have:
  - A) a CNS but not a PNS.
  - B) no recognizable brain.
  - C) no neurons.
  - D) very large brainstems.
  
5. Which part(s) of a neuron send(s) signals to other neurons?
  - A) dendrites
  - B) the cell body
  - C) the axon
  - D) glia
  
6. Phrenology involves:
  - A) scanning the brains of living humans using a magnetic field.
  - B) associating deficits in mental abilities with damage to specific brain regions.
  - C) associating bumps on the skull with abilities and personality traits.
  - D) examining which parts of the brain are damaged after a head injury.

7. A doctor is concerned that Martha has a dysfunction involving the axons of her brain. Which neuroimaging technique would BEST be able to detect this problem?
- A) phrenology
  - B) diffusion tensor imaging (DTI)
  - C) computed tomography (CT) scan
  - D) magnetic resonance imaging (MRI)
8. Which behavior is reflexive?
- A) a dog salivating in response to food
  - B) a student studying hard after receiving a poor grade
  - C) a pigeon pecking at a light to obtain food
  - D) a child saying "please" in order to get a cookie
9. The Bell-Magendie law:
- A) applies to the brainstem but not to the spinal cord.
  - B) proposes one nerve system for sensing and another for responding.
  - C) applies to the central nervous system but not to the peripheral nervous system.
  - D) proposes that the brain is divided into two hemispheres.
10. When one recognizes a friend at a party, which brain area is the first to receive the information from one's visual receptors?
- A) the primary visual cortex (V1)
  - B) the primary sensory cortex
  - C) the thalamus
  - D) the frontal cortex
11. Suppose researchers train a pigeon to peck at a blue disc to obtain food. They then lesion a very small part of its brain and find that the pigeon has forgotten that it needs to peck the blue disc for food. Such a finding would be evidence for:
- A) the theory of equipotentiality.
  - B) the Bell-Magendie law of neural specialization.
  - C) synaptic plasticity.
  - D) the engram.
12. In neuroimaging studies, researchers use a(n) \_\_\_\_\_ to determine how activity at each point in the image has changed relative to a baseline.
- A) engram
  - B) event-related potential
  - C) lesion
  - D) difference image

13. Functional magnetic resonance imaging (fMRI):
- A) directly measures neural activity.
  - B) usually picks up more areas of brain activation than does positron emission tomography (PET).
  - C) requires injecting radioactive materials into the participant's bloodstream.
  - D) is faster than positron emission tomography (PET).
14. Which mechanism is NOT one by which drugs alter synaptic transmission?
- A) increasing the ability of the presynaptic neuron to produce neurotransmitter
  - B) increasing the ability of the presynaptic neuron to receive neurotransmitter
  - C) decreasing the ability of the presynaptic neuron to produce neurotransmitter
  - D) altering the mechanisms for clearing neurotransmitter from the synapse
15. Long-term potentiation:
- A) was first observed in the thalamus.
  - B) occurs when the postsynaptic neuron is stimulated with a high-frequency burst.
  - C) can last for hours or even longer.
  - D) involves a weakening in synaptic transmission following recent activity.



## **Answer Key**

1. D
2. B
3. D
4. B
5. C
6. C
7. B
8. A
9. B
10. C
11. D
12. D
13. D
14. B
15. C