

Chapter 12 – Nervous System

Complete using BC Biology 12, pages 372 - 407

12.1 Nervous Tissue

pages 376 - 377

- The nervous system has two major anatomical divisions. The _____^(a) (CNS) consists of the _____^(b) and _____^(c) which are located midline of the body. The _____^(d) (PNS) consists of _____^(e) that carry _____^(f) messages to the CNS and _____^(g) commands from the CNS to the _____^(h) and _____⁽ⁱ⁾.
- Name and distinguish between the two types of cells in the nervous system.
 - _____:
 - _____:

Types of Neurons and Neuron Structure

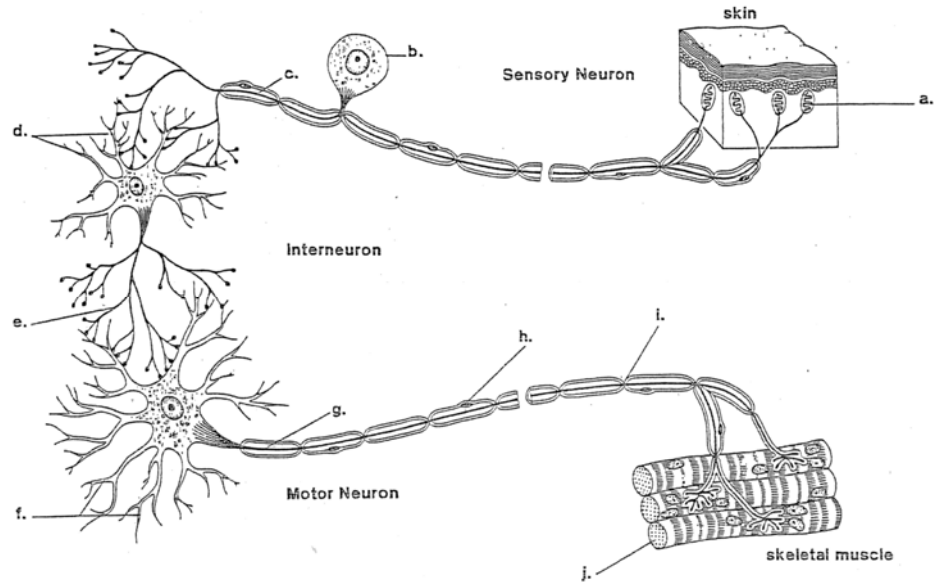
- Describe and state the function of the:
 - sensory neuron:** _____
 - interneuron:** _____
 - motor neuron:** _____
- Every neuron has the three parts listed here. What is the function of each? Draw a basic neuron in the box.
 - dendrite:** _____
 - cell body:** _____
 - axon:** _____



The first neuron feeling the social exclusion from the other cells.

5. Use arrows to show the direction of conduction then label the parts of the sensory neuron, the interneuron and the motor neuron, using the following list of terms (some terms may be used more than once). Make note of the structural differences between the 3 types of cells.

axon
cell body
dendrite
effector
node of Ranvier
Schwann cell
sensory receptor



Myelin Sheath

6. What is the myelin sheath produced by in the CNS? _____
7. The CNS is composed of two types of nervous tissues. What is the difference between white and grey matter?

8. The surface of the brain is _____^(a) matter and the _____^(b) matter lies deep within the brain. The central part of the spinal cord consists of _____^(c) matter and the _____^(d) matter surrounds it on the exterior.

12.2 Transmission of Nerve Impulses pages 377 - 381

9. What device is used to measure the electricity produced by a nerve impulse? _____
10. Create a brief definition the following terms:
- a. **resting potential:** _____

 - b. **sodium-potassium pump:** _____

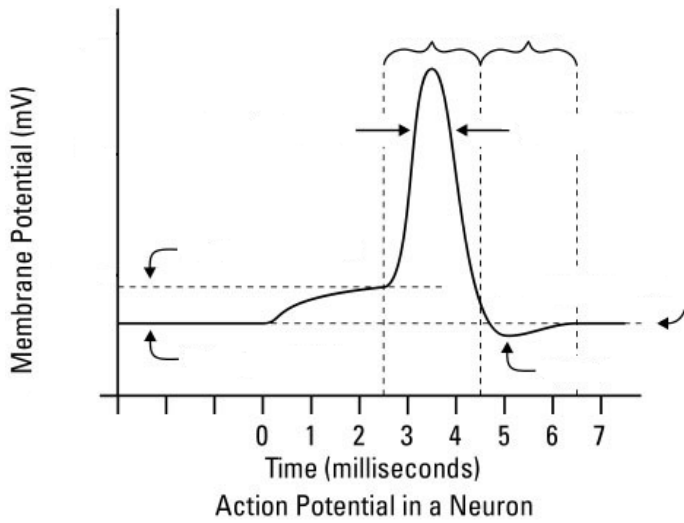
 - i. What specific type of integral protein are the “pumps”? _____
 - c. **action potential:** _____

 - d. **threshold:** _____

 - e. **refractory period:** _____

11. Since the axomembrane is more permeable to (*circle one of: sodium or potassium*), there are always more (*circle one of: positive or negative*) ions outside the membrane than inside.

12. Complete the graph below with the following terms: (A) *action potential*, (B) *depolarization*, (C) *hyperpolarization*, (D) *refractory period*, (E) *repolarization*, (F) *resting potential (x2)*, (G) *threshold*



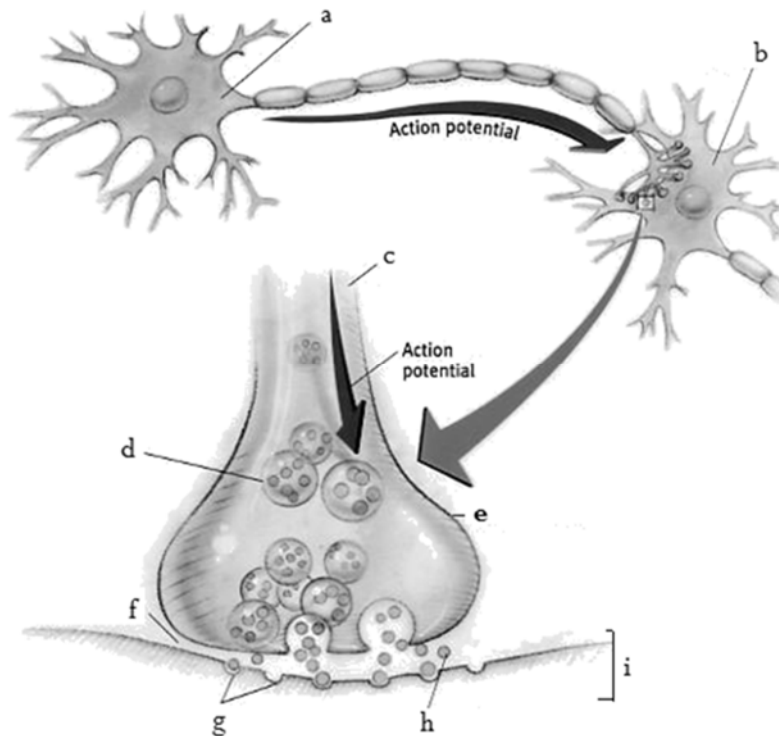
At what mV is the average...

- a. resting potential _____
- b. threshold _____
- c. peak of action potential _____

13. Describe the concept of "saltatory conduction". _____

Transmission Across a Synapse

14. Label the diagram below with the following terms: *axon terminal*, *neurotransmitter*, *postsynaptic neuron (x2)*, *presynaptic neuron (x2)*, *receptor sites*, *synaptic cleft*, *vesicles containing neurotransmitters*.



15. When nerve impulses reach an axon terminal, what element enters? _____
- What type of integral protein does the element enter through? _____
 - Explain the purpose of that element entering. _____

16. What is the difference between an excitatory and an inhibitory signal? Use the words *hyperpolarizing* and *depolarizing* in your explanation. _____

17. Use Figure 12.6 to create a graph to explain **synaptic integration**.



18. At least _____ different neurotransmitters have been identified. Name two of the most well-known ones.
- _____
 - _____

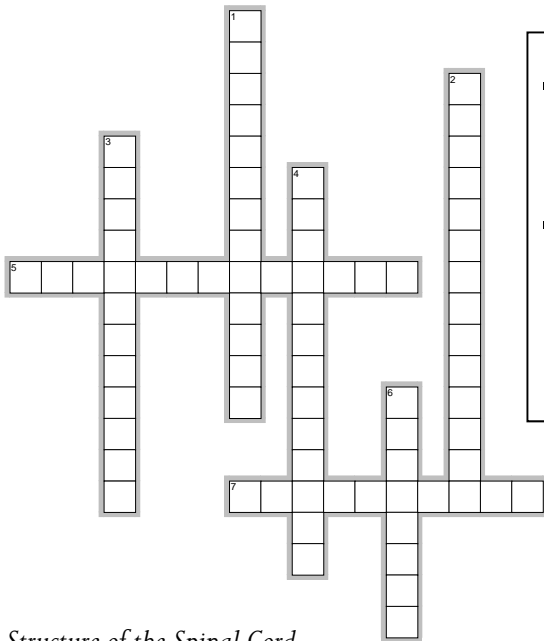
19. What prevents continuous stimulation (or inhibition) of postsynaptic membranes by neurotransmitters?
- _____
 - _____

20. Many drugs that affect the nervous system act either by _____^(a) or potentiating (_____^(b)) the action of neurotransmitters. Drugs can _____^(c) or _____^(d) the release of a neurotransmitter, _____^(e) the action of a neurotransmitter or block the _____^(f), or interfere with the _____^(g) of a neurotransmitter from a synaptic cleft.

21. What is “botox” and what is it used for? _____

22. Indicate where these statements are true (T) or false (F)
- ___ A single neuron synapse with only one other neuron.
 - ___ Integration is the summing up of excitatory and inhibitory signals
 - ___ The more inhibitory signals received, the more likely an axon will conduct a nerve impulse
 - ___ Norepinephrine is broken down by acetylcholinesterase (AChE) in the synaptic cleft
 - ___ Several venoms and poisons, insecticides and nerve agents interfere with the AChE enzyme

23. Complete the crossword after reading through pages 381 – 382.



Across

- 5. CSF accumulation also known as “water on the brain”; can cause brain damage.
- 7. Hollow interconnecting cavities in the brain; reservoir for CSF

Down

- 1. The spaces between the meninges are filled with _____ fluid.
- 2. These disks cushion and separate the vertebrae. May rupture and cause pain and loss of motor function.
- 3. Hollow area of the spinal cord; reservoir for CSF (2 words).
- 4. Opening in the skull through which the spinal cord enters (2 words).
- 6. Protective layers of membrane around the brain and spinal cord

Structure of the Spinal Cord

24. Why does the left side of our brain control the right side of our body and visa-versa? _____

25. The spinal cord serves as a means of _____^(a) between the brain and the _____^(b) that leave the cord. If the spinal cord is severed, we suffer a loss of sensation and a loss of voluntary control - that is _____^(c). The spinal cord is also the center for thousands of _____^(d) which allow us to respond to stimuli quickly and efficiently.

The Brain

26. Name the four major parts of the brain:

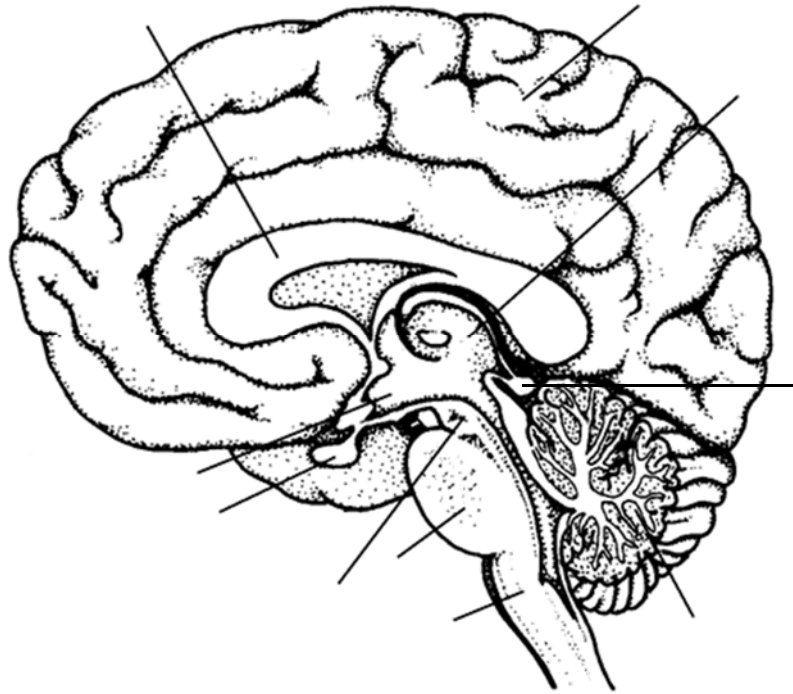
- a. _____: largest portion of human brain; higher thought processes
- b. _____: made up of hypothalamus and thalamus; maintains homeostasis
- c. _____: maintains posture and balance; enables coordination
- d. _____: midbrain, pons, medulla oblongata; connection to CNS

27. The lobes of the cerebrum

- a. _____: centers for reasoning and movement
- b. _____: centers for somatic sensing and taste
- c. _____: center for hearing
- d. _____: center for vision

28. Longitudinal (or sagittal) section of the brain. Label the following parts.

- A. medulla oblongata
- B. cerebrum
- C. thalamus
- D. cerebellum
- E. hypothalamus
- F. pituitary gland
- G. corpus callosum
- H. pons
- I. mid brain
- J. pineal gland



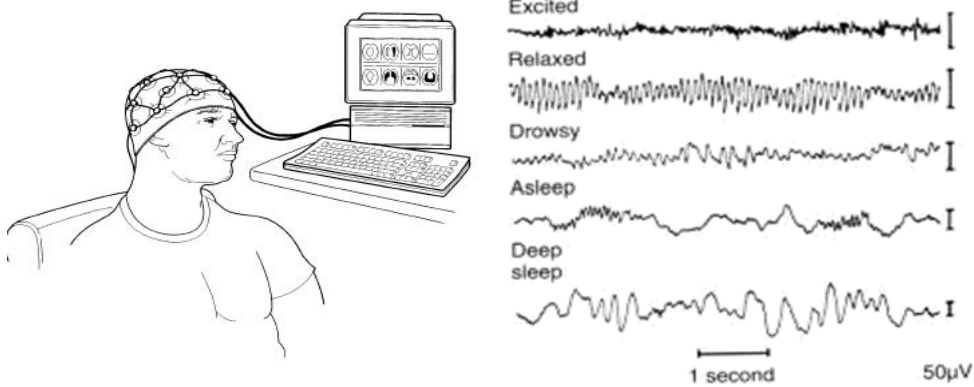
29. Match the above parts of the brain to the descriptions below.

- ___ communicates with and coordinates the activities of the other parts of the brain; separated in to two halves
- ___ top of brain stem; acts as a relay station for tracts passing between the cerebrum & spinal cord or cerebellum
- ___ bridge of white matter that allows communication between the two halves of the cerebrum
- ___ the “master gland” works to maintain homeostasis; links the nervous and endocrine systems
- ___ receives all sensory input (except smell); higher mental functions including memory and emotions
- ___ secretes melatonin which maintains our normal sleep-wake cycle
- ___ lies just below the hypothalamus; produces a variety of hormones
- ___ regulates vital functions like heartbeat, breathing and blood pressure; contains reflex centers as well
- ___ maintains posture and balance; coordinates muscles to work together for smooth movements
- ___ contains bundles of axons that travel between the cerebellum and rest of CNS; works with medulla oblongata

30. Name the brain terms for the following descriptions.

- A. The cerebrum is divided into the left and right _____
- B. Deep groove that separates the halves of the cerebrum _____
- C. Shallow grooves dividing each hemisphere into lobes _____
- D. Thin but highly convoluted outer layer of gray matter _____
- E. Folds or convolutions in structure D _____
- F. Helps us understand written and spoken words (sensory speech) _____
- G. Directs motor area to stimulate the muscles for speaking (motor speech) _____

31. Electrical activity of the brain can be recorded in the form of an _____



12.4 The Peripheral Nervous System

32. The peripheral nervous system (PNS) is composed of

a. **nerves:** _____

b. **ganglia:** _____

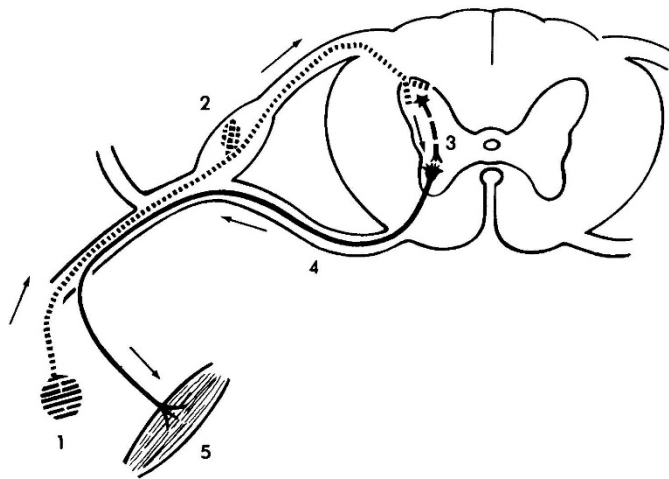
33. Humans have _____ pairs of **cranial nerves** attached to the _____ and _____ pairs of **spinal nerves** emerging from opening in the _____ of the _____

34. What is a “mixed nerve” ? _____

35. How does the **vagus nerve** differ from other cranial nerves? _____

36. Label this diagram of the reflex arc, using the following list of terms.

- effector
- interneuron
- motor neuron
- receptor
- sensory neuron



37. Describe the evolutionary purpose of a reflex arc. _____

38. Explain how the brain becomes aware of automatic reflex actions. _____

39. Indicate three ways in which the sympathetic and parasympathetic systems are similar.

a. _____

b. _____

c. _____

40. Complete the table. Your knowledge of the disorders will not be tested but rather is provided for interest sake.

Disorder	Description
Brain Disorders	
	Most common cause of dementia; begins with loss of memory and gradually loses the ability to perform any type of daily activity and becomes bedridden.
	Characterized by gradual loss of motor control; results from degeneration of neurons in brain that release dopamine.
	Most common neurological disease in young adults; myelin sheaths of the white matter in brain are destroyed by white blood cells.
	Disruption of the blood supply to the brain due to either leakage from small arteries or sudden loss from a thrombus (blood clot).
	Infection of the meninges that surround the brain and spinal cord; can be caused by either bacteria or viruses.
	Infectious agents that are thought to be made only of proteins that have been misfolded. Examples of diseases caused by these are: <ul style="list-style-type: none">•••
Spinal Cord Disorders	
	An injury that results in paralysis of the lower body and legs.
	An injury that results in paralysis of entire body below the neck.
	Also known as Lou Gehrig's disease; affects the motor nerve cells of the spinal cord; most deaths are due to failure of respiratory muscles.
Peripheral Nerve Disorders	
	Inflammatory disease that causes demyelination of peripheral nerve axons.
	Autoimmune disorder in which antibodies are formed that react against the acetylcholine receptor (AChR), preventing muscle stimulation.

- | | | | |
|-----------|-----------|-----------|-----------|
| 1. _____ | 14. _____ | 27. _____ | 40. _____ |
| 2. _____ | 15. _____ | 28. _____ | 41. _____ |
| 3. _____ | 16. _____ | 29. _____ | 42. _____ |
| 4. _____ | 17. _____ | 30. _____ | 43. _____ |
| 5. _____ | 18. _____ | 31. _____ | omit 44 |
| 6. _____ | 19. _____ | 32. _____ | 45. _____ |
| 7. _____ | 20. _____ | 33. _____ | 46. _____ |
| 8. _____ | 21. _____ | 34. _____ | 47. _____ |
| 9. _____ | 22. _____ | 35. _____ | 48. _____ |
| 10. _____ | 23. _____ | 36. _____ | 49. _____ |
| 11. _____ | 24. _____ | 37. _____ | |
| 12. _____ | 25. _____ | 38. _____ | |
| 13. _____ | 26. _____ | 39. _____ | |

51. _____

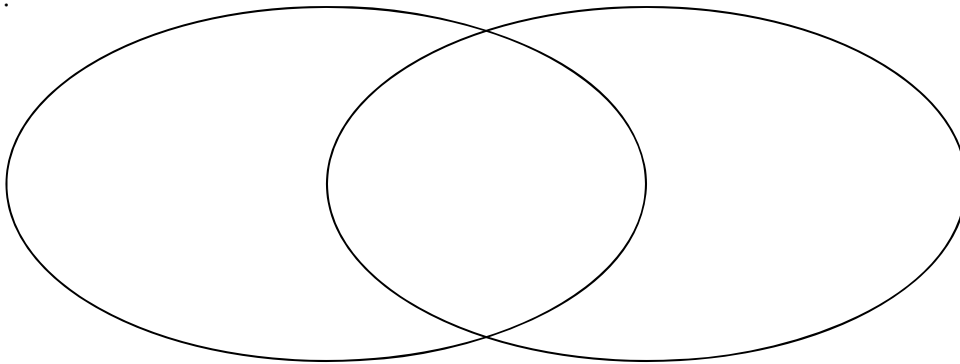
 53. _____

57. Sympathetic (S) or Parasympathetic (P)?

(a) _____ (b) _____ (c) _____ (d) _____ (e) _____ (f) _____ (g) _____ (h) _____ .

58. _____

59.



62. Think about which neurotransmitter would be blocked. _____

63. (a) _____ (b) _____

(c) _____

(d) _____

64. _____

65. _____ released by the _____