The Nervous System

1. Part A: Definitions: Define the following terms, **IN YOUR OWN WORDS, IN AS FEW WORDS AS CLARITY ALLOWS**.

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|  | Myelin sheath |  |
|  | Schwann cell |  |
|  | Node of Ranvier |  |
|  | PNS |  |
|  | CNS |  |
|  | ganglia |  |
|  | nerve |  |
|  | Cranial nerve |  |
|  | Dorsal root ganglion |  |
|  | receptor |  |
|  | effector |  |
|  | Somatic nervous system |  |
|  | reflex arc |  |
|  | Autonomic nervous system |  |
|  | meninges |  |
|  | Cerebrospinal fluid |  |
|  | Spinal cord |  |
|  | White matter |  |
|  | Gray matter |  |
|  | Cerbral cortex |  |

**Part B - Short Answers**

1. The peripheral nervous system may be divided into the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ division and the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ division.
2. A \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ neuron has a long axon and short dendrites.
3. In the first part of the nerve impulse, the ion \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ moves to the inside of the neuron.
4. The junction between one neuron and another is called a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
5. Each division of the autonomic nervous system controls the same organs, but they generally have \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ effects.
6. The largest portion of the human brain is the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
7. The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ nervous system causes the heartbeat to slow down.
8. The drug amphetamine has a chemical structure similar to the neurotransmitter \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
9. The cerebral cortex can be mapped. There are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ areas that receive impulses from sense organs and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ areas that initiate impulses that eventually cause muscles to contract.
10. The central nervous system contains the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
11. The peripheral nervous system contains \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
12. The somatic nervous system controls \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ muscles. The autonomic controls \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ muscle and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
13. The autonomic has two parts, the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ for emergency situations, and the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ for everyday situations.
14. List three parts of neurons and their functions below.

|  |  |
| --- | --- |
| **Part** | **Function** |
|  |  |
|  |  |
|  |  |

1. Label the neuron below.



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| --- | --- | --- | --- |
|  |  |  |  |
|  |  |  |  |

1. Again referring to the above diagram, what type of neuron is this? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. What would the structures at e) be right next to? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_or \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. Which structure above is most responsible for the fast speed of nerve transmission? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
4. Which structures above would contain acetylcholine? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
5. Across which “spaces” do nerve impulses “jump”? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
6. List the structures, in order, that a nerve impulse would travel through this neuron. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
7. Nerve impulses travel from neuron to neuron in one direction only, yet it is know that an impulse can be started in both directions in the middle of an axon. Which structure above is most responsible for nerve impulse transmission to be unidirectional? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
8. Observe the diagrams below: The diagram on the left shows a section of an axon during nerve transmission. The diagram on the right shows what this would look like on an oscilloscope screen.



1. In which direction is the impulse moving: from A to B or B to A? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. In the first diagram, which number corresponds to moving Sodium ions? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. In the second diagram, which number corresponds to moving Sodium ions? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
4. In the first diagram, which number corresponds to moving Potassium ions? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
5. In the second diagram, which number corresponds to moving Potassium ions? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
6. Which letter corresponds to the molecules responsible for the axoplasm having a polarity? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
7. Which region, C or D, has a higher concentration of Sodium ions? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
8. What is the reading on the oscilloscope, in millivolts, at h? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ mV
9. What is reading on the oscilloscope at I? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ mV
10. Which letter best corresponds to resting potential\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
11. What is happening from j to l? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
12. What is happening at l? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
13. What is happening at m? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
14. What is happening at n? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
15. Observe the diagram of a synapse below.



Label the following parts:

a) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

b) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

c) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

d) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

e) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

f) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Y) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

X) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Which region above will contain higher amounts of Calcium ions when the neuron is at rest? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. What direction will nerve impulses travel across this synapse? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Suppose “c” is an inhibitory neurotransmitter in one case, and an excitatory neurotransmitter in another case. What will be the effect of the following?

|  |  |  |
| --- | --- | --- |
| **Condition** | **If C is inhibitory n.t.** | **If C is excitatory n.t.** |
| 1. A drug is given that blocks the receptors for c |  |  |
| 1. A drug is given that blocks the reuptake of c by the presynaptic membrane |  |  |
| 1. A drug that looks just like c is administered |  |  |
| 1. A drug is given that destroys an enzyme that degrades c |  |  |
| 1. A drug is given that irreversibly binds to c is given |  |  |
| 1. A drug is given that decreases the amount of c that is produced |  |  |

1. Prozac® is a drug that selectively blocks the reuptake of the excitatory neurotransmitter Serotonin. Explain why this drug has been used successfully to treat many people suffering from the serious disorder, clinical depression.

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1. Fill in the blanks to indicate what happens during a spinal reflex arc. A stimulus is received by a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ organ, which initiates an impulse in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ neuron. The neuron takes the message to the cord and transmits it to the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. This neuron passes the impulse to the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ neuron, which takes the message from the cord and innervates a muscle causing a reaction to the stimulus.
2. Fill in the table below to indicate the functions of the parts of the brain.

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| **Part** | **Function** |
| cerebrum |  |
| thalamus |  |
| hypothalamus |  |
| cerebellum |  |
| medulla oblongata |  |