Sec.: _____ Name: _____

Experiment: EEG Activity & the Spinal Cord Anatomy (B. Science 10-35-3d)

Purpose: To observe the brain activity of humans and to examine the anatomy of the spinal cord.

Materials: polygraph and EEG equipment
spinal cord segments

Methods:

Part A: Human brain Activity (EEG)

1. Have the teacher hook up the EEG to a volunteer. Record the electrical activity of the brain for the volunteer. It is essential that the person be relaxed an does not move muscles. (Muscle activity creates electrical activity as well).
2. Sketch the EEG results while the volunteer is relaxed, and also for when the person is doing strenuous mental activity.

Part B: Anatomy of the Spinal Cord

1. Draw a sketch of the spinal cord. Draw and label the following parts: spinal cord, gray matter, white matter, and spinal nerves.
2. Label the following parts on the diagram provided: gray matter, white matter, pia matter, arachnid mater, dura mater, and spinal nerve.

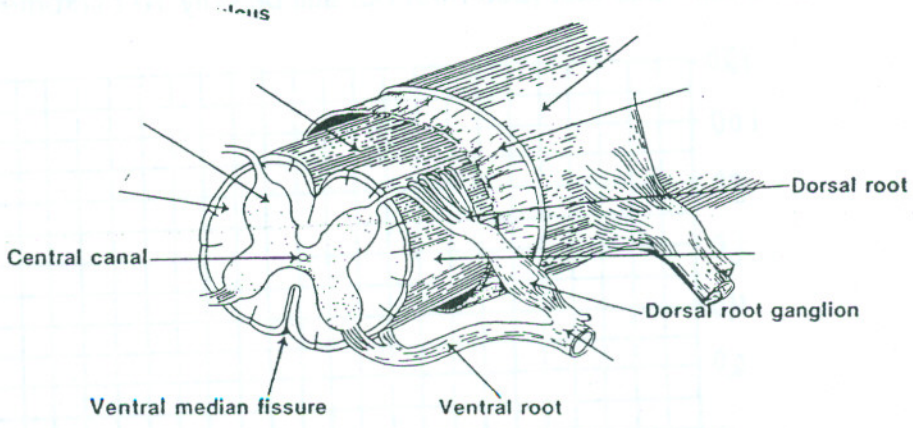
Results:

Part A: Human brain activity (EEG)

2. relaxed | strenuous mental activity

Part B: Anatomy of the Spinal Cord

1. 2.



Conclusions:

1. What is the cause for voltage inside one neuron in the brain? (Be specific)

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2. How is this voltage potential inside one neuron in the brain different from an EEG of the brain?

3. Describe the changes of the EEG brain pattern when someone changes from relaxed condition to strenuous mental activity.

4. How can the EEG be used as a diagnostic tool by a physician?

5. What is the purpose of the meninges around the spinal cord?

6. What is the fluid between the pia matter and the arachnoid layer?
What is its purpose?

7. What would happen to an individual who has been in an accident and has cut the spinal cord about one half the way down the length of it. Describe the changes in sensory input and motor output of the individual.

8. Why are the axons in the spinal cord myelinated?

9. Romans 1: 20 - 32. If we choose to reject God on a continual bases, what will God allow to happen to our brains (mind)? (quote vs. 28)

Discussion:

1. The data below show how the speed of an action potential is affected by the diameter of the axon.

Diameter (micrometer)	2	4	7	9	20
Speed (m/sec.)	10	20	30	40	90

Using the grid below, construct a line graph of the data. Plot the diameter of the axon on the horizontal axis and the speed of the action potential on the vertical axis (label the graph). What relationship does the diameter of the axon affect the speed of the conduction of the action potential?

2. Based on your graph, how fast would an action potential be propagated through an axon with a diameter of 14 micrometers?

3. Approximately how wide must the axon be to get conduction velocities of about 200 m/s?

4. Axons are usually not that wide, (as in question three), but conduction velocities in the neuron can go that fast. What added material does axons have to make the conduction this fast (200 m/s) but still be only 10 micrometers in diameter?