Name _____ Date _____ Period _____

Lab: Reaction Time

BIOLOGY: CHAPTER 29

Background: The brain processes stimuli from the environment through its five senses: sight, taste, touch, sound, and smell. Think of an example of how your brain processed each of these types of stimuli as you got ready for school this morning. ***Reaction time*** is the time interval between receiving a signal and acting on it – for example, the time between when a frog sees a fly land on an adjacent leaf and the flick of the frog's tongue to capture the tasty morsel. Reaction time often affects the making of measurements, such as when using a stopwatch to measure the time of a 100-m dash. The watch is started after the gun sounds and is stopped after the tape is broken. Both actions involve the reaction time.

Problem: Is there a measurable difference between the rate at which one can process sensory information obtained visually, orally, and tactually?

Materials:

- ruler or meter stick
- calculator

Hypothesis: (2 points) Guess which stimulus you can process faster: sight, sound, or touch. Write you hypothesis below. *(Make sure that it is an "if - then", statement)*

Procedure:

Part I: Visual

1. Obtain a meter stick.

2. Hold a meter stick vertically with the "0 cm" end down and approximately at waist height. (The 100 cm end would be high in the air)

3. Have your partner hold her writing hand with her thumb and forefinger held even with the bottom (0 cm end) of the meter stick with one digit on each side of it as if they were going to squeeze it.

4. Prepare to drop the meter stick.

5. Drop the meter stick and have your partner try to catch it as quickly as she can. Don't give any verbal warnings of when you will drop it.

6. Record the distance the meter stick fell (in cm) before your partner grabbed it by looking at the number of the meter stick their fingers grabbed. Enter your data in Data Table 1.

7. Repeat this procedure until you have recorded five data points with your right hand and five data points with your left hand.

8. Repeat for all the members in your lab group.

Taken and modified from: http://rhoyle.cusd.claremont.edu/mm/Course%20Assets/Biology/Labs/pdf%20-%20Nervous%20System%20Lab.pdf

Part II: Auditory

9. Repeat the procedure above, but this time has the "catcher" close his or her eyes. The dropper indicates when the meter stick is dropped by saying "Now". It is very important that the dropper says, "Now" exactly when the meter stick is dropped.

10. Record the distance the meter stick fell (in cm) in Data Table 1.

11. Repeat the exercise for the other partners.

Part III: Tactile

12. This time, the catcher closes his or her eyes again, and the dropper indicates the meter stick is being dropped by tapping the catcher on the shoulder.

13. Record the distance the meter stick fell (in cm) in Data Table 1.

14. Repeat the exercise for the other partners.

Data Table: (10 points) Use the following table to collect your data. Use the following physics equation below to covert the distance traveled in centimeters (**d**) into time in seconds (**t**) when you calculate averages for each individual and for the entire group.

$$t = 0.045\sqrt{d}$$

Data Table 1: Response Scores												
	Visual Stimulus				**Auditory Stimulus**				**Tactile Stimulus**			
	Person (distance in cm)				***Person (distance in cm)***				***Person (distance in cm)***			
	1	2	3	4	1	2	3	4	1	2	3	4
Right hand												
Left hand												
Calculate average distance traveled for each student below (in cm).												
Averages												
Calculate average reaction time in seconds for each student below. (Use the equation above)												
Calculate the average time in seconds for each group below												
	Average of group =				**Average of group =**				**Average of group =**			

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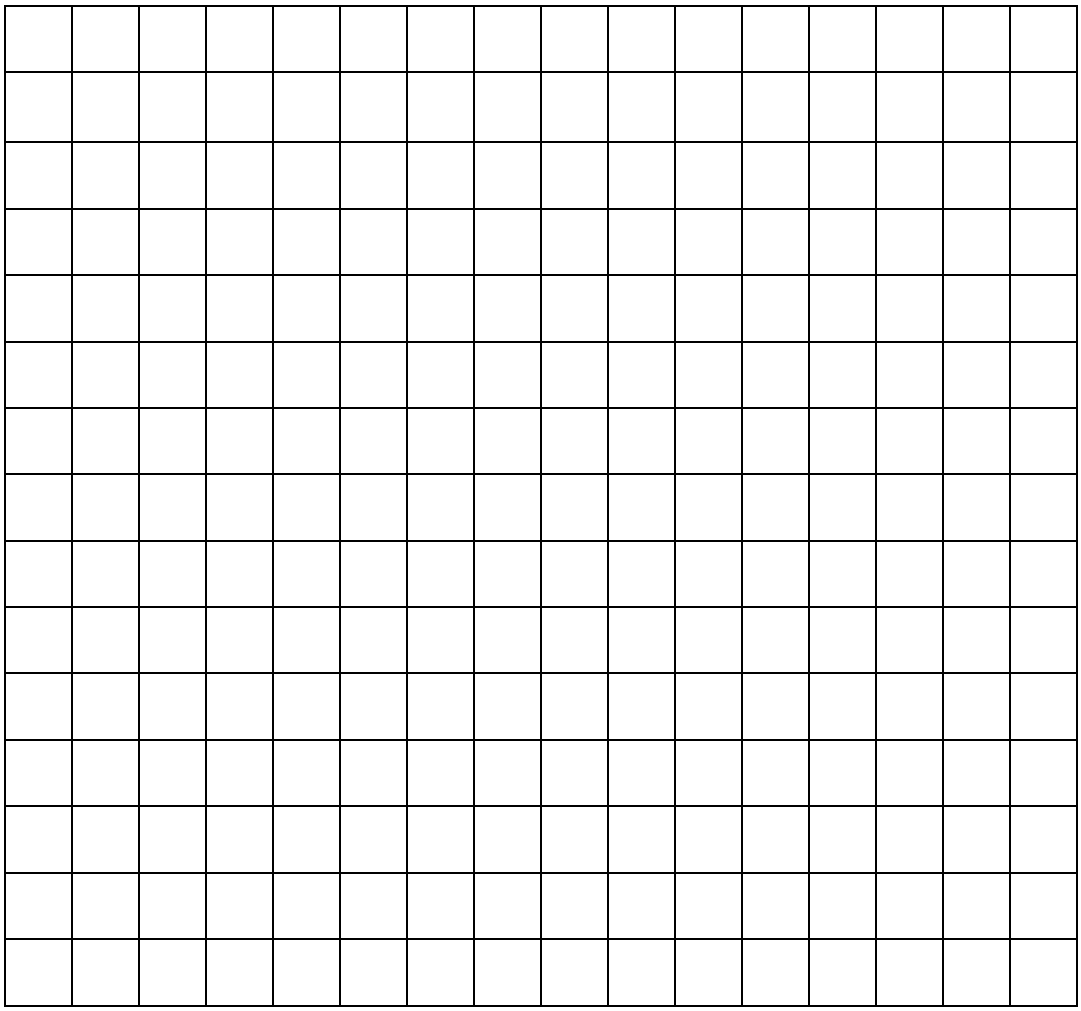
Graphing: (10 Points) create a graph from your data. You decide how best to represent your data in a graph. Make sure you label both x and y axis and title your graph.



Questions: (2 points each)

1. Which type of stimulus did your group respond to the best?

2. Why do you think that is?

3. Which type of stimulus did your group respond to the worst?

4. Why do you think that is?

5. Which hand is your writing hand?

6. Did you catch the ruler faster with your left hand or right hand? Why might this be so?

7. Why did you run several trials for each hand?

8. Explain why a message moving along nerve pathways takes time.

9. How might the results change if you did this experiment with a person of 70 years old? Why might this be so?

10. What is the definition of reaction time?

11. What are the quick, protective reactions that occur within your nervous system called?

Conclusion: (6 points) Was your hypothesis supported? Support your answer with your data. Were there any sources of error? What did you learn in this experiment?