Regents Biology

Name:.....

Date:.....Block:.....

Ya Ready?.....DRAW!

Measuring (Reaction) Time with a Ruler

Background:

It's a fabulous day! The sun is shining, school's out and you're out cruisin' Main Street New Paltz with the top down on your new convertible. Oh, did I happen to mention you won the lottery? Everything is going your way...until...

"...really officer. I tried to stop." Don't worry. Your luck didn't completely run out. Nobody was hurt and how expensive can a new bumper, grille and hood be anyway, right? You just weren't expecting the car in front of you to stop so suddenly. *You barely had time to hit the brakes.*

Nobody wants that story to happen to them. Well, maybe the lottery and the new convertible part but not the accident part. The fact is, most of you will be driving soon if you aren't already (yikes). Knowing about and planning for reaction time is an important part of not getting into accidents. And, in case you didn't know, if you hit another car from behind, in the eyes of the law it's your fault no matter what.

It takes time for your nervous system to receive sensory information (AKA *stimulus*) and transmit a message to whichever part of your body will be doing the reacting (AKA the *response*). The time it takes between stimulus (the car in front of you slams its brakes) and the response (you slam your brakes) is referred to as your *reaction time*. There are a many factors that can affect reaction time: age, amount of sleep, level of concentration, drugs (legal and illegal), even how far the nerve signal (AKA *impulse*) has to travel in the body.

Today, we are going to measure our reaction time in a far safer way than driving down the road waiting for a car to stop short in front of you. Instead, you will catch a meter stick as someone else drops it between your fingers. By measuring the distance it fell and taking gravity into account, you can calculate your reaction time

Objective: Calculate your average response time for catching a falling object.

Procedure:

1. Rest your arm on the edge of a desk with your arm sticking out over the side. Your partner should hold the meter stick in the air above your fingers with the 0 cm mark in between your thumb and forefinger. When your partner drops the meter stick, try to catch it as fast as you can. Record the measurement in cm of where you caught the meter stick in the data table below. You will need to repeat this 4 more times (5 times total) and record your data below.

2. When you are done, switch roles with your partner so they can measure their reaction time too.

Data:

Trial	Distance Meter Stick Fell (cm)
1	
2	
3	
4	
5	
Average	

There *is* a page two

Analysis: Calculate your reaction time using the formula below:

$$T = \sqrt{\frac{2d}{a}}$$

t = reaction time
d = average distance meter stick fell
a = acceleration due to gravity = 980 cm/sec^2

SHOW YOUR CALCULATIONS IN THE SPACE BELOW!!

Conclusion:

1. What was your calculated reaction time? INCLUDE UNITS!

2. What is the reaction time of a person who catches a meter stick at the 75 cm mark (starting at 50 cm)? **Show calculations!** How does this person's time compare to yours? Why might this be so?

3. Name three careers in which reaction time is important. For each career, give a specific example of why reaction time is so important.

4. Identify three stimulus-response relationships you carried out in class today.

5. How does distraction affect reaction time?

6. How is the blinking response a protective reflex?

Name _____ Date _____

CHAPTER REVIEW

CHAPTER 14

Know the Terms

Complete the following paragraphs using the list of words below.

neuron	nervous system	dendrite	refractory period
axon	effector	receptors	stimulus
motor	nerve	synapse	neurotransmitter
threshold	brain	myelin	ganglion

The (1) _____ provides an organism with a means of rapid response to a (2) _____. Structures that detect these sensations are called (3) _____. If these sensations are strong enough to be above a certain level, or (4) _____, they initiate an electrical impulse that travels through a cell, called a/an (5) _____. Bundles of these cells make up a/an (6) _____. Impulses enter a nerve cell known as a/an (7) _____, proceed across the body of the cell, and travel down the (8) _____.

When an impulse gets to the end of a nerve cell it must cross a gap, or (9) _____. This is accomplished through the release of a (10) _____ such as acetylcholine. The time required for a nerve cell to set up for the next impulse is known as the (11) _____.

In most animals, the accumulation of nerve tissue that coordinates nervous activity is known as the (12) _____. After it deciphers incoming impulses, it may send impulses out to a (13) _____ neuron, which leads to a/an (14) _____. The structure, which is either a gland or a muscle, will respond to the impulse.

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____
13. _____
14. _____

Define or describe the following words.

15. irritability: _____

16. myelin: _____

17. Schwann cell: _____

18. synapse: _____