REACTION TIME LAB

PROBLEM: How quickly can your body react?

Materials: Meter Stick   Calculator

Note: You will be calculating reaction time based on distance, not measuring it directly. You do not need a stop watch.

Procedure:

Reaction time is how long it takes for a message to travel along your nerve pathways.

1) Find a partner and grab a meter stick

2) Have a partner hold the meter stick at the end with the highest number.

3) Place the thumb and first finger of your left hand close to, but not touching, the end with the lowest number (it may help to have your partner stand while you sit on a stool).

4) When your partner drops the meter stick, try to catch it between your thumb and finger.

5) Record where the top of your thumb is when you catch the ruler. Use the correct number of sig figs in your measurement (remember, you want to include measured digits plus one estimated digit). Put this number in your data table as trial 1.

6) Repeat steps 2 to 5 three more times.

7) Repeat steps 2 to 5 four times using your right hand to catch the ruler.

8) Switch roles and drop the ruler for your partner.

9) **Calculate:** To complete your data table, calculate the time in seconds needed for the ruler to fall. To do this, use the equation:

$$d = 4.90 \ t^2$$

    Where d is the distance the ruler falls (in meters, not centimeters, so you may need to convert) and t is the time (which is what you'll be solving for).

11) Find the average for each column.

12) Answer all questions (found on back of lab sheet)

Partner 1:

Trial	Left Hand		Right Hand	
	Distance Ruler Falls (cm)	**Time in Seconds**	**Distance Ruler Falls (cm)**	**Time in Seconds**
1				
2				
3				
4				
Average				

Partner 2:

Trial	Left Hand		Right Hand	
	Distance Ruler Falls (cm)	Time in Seconds	Distance Ruler Falls (cm)	Time in Seconds
1				
2				
3				
4				
Average				

Questions:

Each partner should answer the following questions for whichever of his/her hands had the faster reaction time. Be sure to use the correct number of sig figs in all of your answers.

1. You calculated your reaction time in seconds. What is this reaction time in:
   a. Minutes?

   b. Hours?

   c. Days?

   d. Years?

2. You measured the distance the ruler fell in cm. What is this distance in:
   a. Inches (1 in. = 2.54 cm.)?

   b. Feet (1 ft. = 12 in.)?

   c. Miles (1 mi. = 5280 ft.)?

   d. Kilometers?

For the following questions, use the equation d = vt, where d is distance, v is speed, and t is time. Again, be sure to write your answers using the proper number of sig figs.

3. You are biking at a speed of 12.0 meters per second, when a squirrel runs in front of you and you hit the brake. How far do you travel during the time between when you see the squirrel and the time you react and hit the brake?

4. Now you're driving at a speed of 30 miles per hour when this same (very careless) squirrel runs in front of your car and you slam on the brakes. How far do you travel during the time between when you see the squirrel and the time you react and hit the brake? (Assume the reaction time for your foot on the pedal is the same as the reaction time for your hand.)

5. The careless squirrel is at it again. This time, he's jumping from tree to tree, searching for acorns, when he slips and falls. And you have the misfortune of being right in his path. He's falling at a speed of 0.05 km/min, and you glance up to see him when he's only 1.2 meters from your face.
   a. How much time do you have before he hits you (be careful with units, and be sure to use the correct number of sig figs)?

   b. Is this enough time for you to react and get out of his way?

6. You finally decide you've had enough of this squirrel, so you head back to your science classroom. You sit down at your desk, ready to learn (because you're an excellent student, naturally). Unfortunately, your friend doesn't feel the same way, and she throws a paper airplane at you from across the room. You, being the well-prepared student that you are, have made some measurements of the room. There are 3.00 desks between you and your friend, as well as 3.00 aisles. Each desk is 0.7500 meters wide, and each aisle is 0.43 meters wide.
   a. How far does the plane have to travel to reach you?

   b. How fast would the plane need to be moving for it to be able to reach you before you could react and swat it away?