

Physics

Name: _____

Assign - Reaction Time

Purpose: To measure reaction time due to three stimuli: sound, sight, and feel.

Materials: meter stick

Background:

Reaction time is the time between a stimulus and a response. For example, the stimulus may be visual, auditory, or tactile. In each case, you are required to process the stimulus from your eyes, ears, or body in your brain, thus reacting or responding to the stimulus. The rather short amount of time this takes is called your **reaction time**.

In today's experiment, you will measure your reaction time as a function of distance. This is an indirect measurement of your reaction time. You will be reacting to a dropped meter stick. Since we know how a dropped meter stick accelerates as it falls, we can calculate the time of fall simply by measuring the distance it falls. The quicker you react to a stimulus (sight, sound, touch), the shorter the distance traveled on the meter stick.

Time, distance, and acceleration are governed by the equation:

$$d = \frac{1}{2} g t^2$$

d = distance the meter stick falls in meter or centimeters

g = acceleration due to gravity, 9.80m/s² or 980 cm/s²

t = time of the fall in seconds

Make sure that you are consistent with your units when doing the calculations.

Procedure:

Reacting to Sight

Have your partner hold a meter stick between you thumb and fore finger. He will drop the stick. As soon as you see it fall grasp the stick and record how far it fell before you grabbed it. Repeat several times.

Reacting to Sounds

Have your partner hold a meter stick between you thumb and fore finger. Close your eyes. When he says, "Go!" he will drop the stick. As quickly as possible grasp the stick and record how far it fell before you grabbed it. Repeat several times.

Reacting to Feel

Have your partner hold a meter stick between you thumb and fore finger. Close your eyes. When he taps you he will drop the stick. As quickly as possible grasp the stick and record how far it fell before you grabbed it. Repeat several times.

Prediction: Predict which of the three trials will have the fastest reaction time. Justify your prediction...

Data:

trial	Distance (cm)		
	Sight	Sound	Feel
1			
2			
3			
4			
5			
Ave Dist:			
Ave Time (s)			

Analysis (at right): Determine the reaction times and averages. Show a sample calculation.

Questions:

1.) Which of the three trials had the fastest reaction times for you? Explain.

2.) What variables can effect your reaction time?

3.) Can one's reaction time be improved? If so, how?

4.) How can reaction time affect data and calculations in the physics lab?

5.) Look at data from your classmates. Do you see any trends among athletes, genders, etc...

Conclusions: What did you do? What did you find? What generalizations can you make?

Extension:

Knowing your average reaction time, take out a five dollar bill and measure its length. Predict on the basis of this measurement and the knowledge of your own reaction time whether you should be able to catch a dollar bill when your partner lets go of it. After writing down your prediction, try catching the bill with your partner. What differences (if any) are there between using the meter stick and using the dollar bill? There an old party trick where a person takes out a crisp bill and challenges guests to place a finger and thumb over the picture of the president and try to catch the bill when it is dropped. If they catch it, they can keep it. If not, they have to pay the host the sum of the bill. Could you make money this way?