10 Reaction Time

Purpose

To measure your reaction time

Required Equipment/Supplies

dollar bill
centimeter ruler

Discussion

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 for 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.

Procedure

Step 1: Hold a dollar bill so that the mid-point hangs between your partner's fingers. Challenge your partner to catch it by snapping his or her fingers shut, without moving the rest of the hand, when you release it. Also, have your partner hold the bill in the same way and see if you can catch it when it is released. What do you discover?

Now try it using a ruler as shown to the right. The distance the ruler will fall is found using

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

Simple rearrangement gives the time of fall in seconds.

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

$$t = \sqrt{\tfrac{2}{980}}\sqrt{d}$$

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

(For d in cm and t in s, we use $g = 980$ cm/s^2.)

Step 2: You and your partner will now take turns dropping a centimeter ruler between each other's fingers. Catch it and record the number of centimeters that passed during the reaction time it took each of you to catch the ruler each time. Each of you should drop the ruler three times. Then calculate your reaction time using the formula $t = 0.045\sqrt{d}$, where d is the average distance in centimeters.

Data Table A: Reaction Time Measured in Ruler-Catching Distance

Trial #	Starting Point (cm)	Ending Point (cm)	Distance Traveled (cm)
1			
2			
3			
Average			

Calculate your reaction time using the average for your three trials. Show your calculations.

your reaction time = _____

Analysis

1. Do you think your reaction time is always the same? Is your reaction time different for different stimuli?

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2. Suggest possible explanations why reaction times are different for different people.

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3. Do you think reaction time significantly affects measurements you might make when using timers for this course? How could you minimize its role?

4. What role does reaction time play in applying the brakes to your car in an emergency situation? Estimate the distance a car travels at 100 km/h due to your reaction time in braking.

5. List some examples where reaction time is important in sports.