

Reaction Time

Objective: In the previous two exercises you were able to obtain good results for the value of g (9.8 m/s^2) because you were able to measure both time and height with a high degree of accuracy. Suppose you did not have a computer and the appropriate interfacing equipment at your disposal for these measurements and you tried to obtain the same data with a stopwatch? One might assume that manual timing via the use of a stopwatch would result in greater random error, but that this could be compensated for by a very large number of trials. Does this mean that both methods of determining g would work equally well? As you will see this may not be strictly true.

People, like computers, take time to react to information and to process it. The difference is that a computer responds very quickly and reliably. In this exercise you will measure your reaction time.

Experimental: Rest your hand on the table and have your lab partner drop a metric ruler lengthwise between your fingers. Before your lab partner releases the ruler, its bottom end should be level with your fingers. The ruler should be released from rest without any signal that it is about to be released. The object is for you to catch the ruler as soon as you can after its release. By measuring the distance the ruler fell you can measure your reaction time. Take 10 trials and use:

$$t = \sqrt{\frac{2h_{ave}}{g}}$$

Data Analysis: Compare your reaction time with the time of flight from the previous lab. Would a stopwatch work as well as the computer for timing in this experiment? How could the experiment be modified to allow the use of a stopwatch if it were necessary to do so?

Some of you may have seen the old magician's trick of offering a \$20 bill to anyone who can catch the bill when the trickster releases it from rest with the bottom of the bill level with the thumb and forefinger of the person who intends to catch it. Why is it nearly impossible to earn \$20 by this method?