

Another FREE SAMPLE LAB from TOPS LEARNING SYSTEMS!

This TOPS Idea is taken from an original series of black-and-white line masters, adapted to stand alone as an independent mini-lesson. Please purchase our original book to get the whole in-depth program.

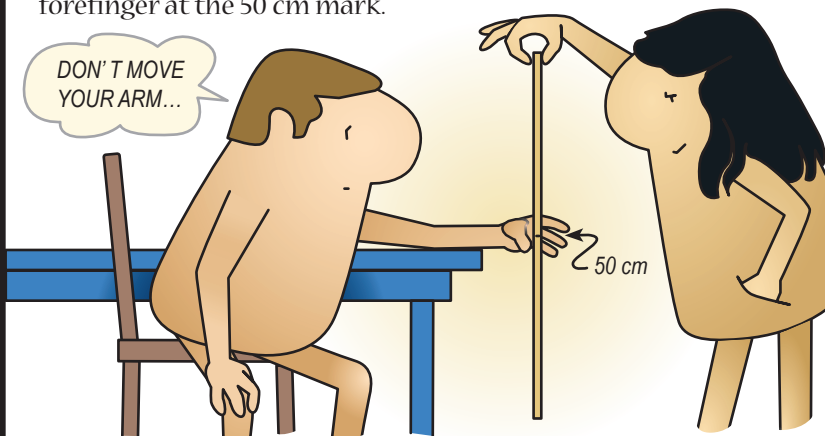
Find more at [www.TOPScience.org!](http://www.TOPScience.org)

reaction time

...adapted from **MOTION #21**
by TOPS Learning Systems

1. Rest your arm on a table, with your hand beyond the edge. Have a friend hold a meter stick between your open thumb and forefinger at the 50 cm mark.

2. Ask your friend to drop the stick without warning. Try to catch it by pinching your fingers together.



3. A meter stick falls d centimeters in t seconds, according to this equation:

$$t = \frac{\sqrt{d}}{22.1}$$

a. Calculate your *fastest* reaction time; your *average* reaction time.

b. What is the *slowest* reaction time your meter stick can possibly record?

$$* d = \frac{1}{2}gt^2$$

$$g = 980\text{cm/sec}^2$$

© 2008 by TOPS Learning Systems. Photocopies permitted if this notice appears. All rights reserved.

- 01 PENDULUMS (gr 8-12)
- 02 MEASURING LENGTH (gr 6-10)
- 03 GRAPHING (gr 6-10)
- 04 BALANCING (gr 6-11)
- 05 WEIGHING (gr 5-10)
- 06 METRIC MEASURE (gr 8-12)
- 07 MATH LAB (gr 7-12)
- 08 PROBABILITY (gr 6-10)
- 09 FLOATING & SINKING (gr 7-12)
- 10 ANALYSIS (gr 5-10)
- 11 OXIDATION (gr 6-10)
- 12 SOLUTIONS (gr 6-10)
- 13 COHESION/ADHESION (gr 6-10)
- 14 KINETIC MODEL (gr 7-12)
- 15 HEAT (gr 8-12)
- 16 PRESSURE (gr 7-12)
- 17 LIGHT (gr 6-11)
- 18 SOUND (gr 7-12)
- 19 ELECTRICITY (gr 8-12)
- 20 MAGNETISM (gr 8-12)
- 21 MOTION (gr 7-12)
- 22 MACHINES (gr 7-12)
- 23 ROCKS & MINERALS (gr 6-12)
- 31 PERFECT BALANCE (gr K-12)
- 32 ELECTRICITY (gr 3-8)
- 33 MAGNETISM (gr 3-8)
- 34 PENDULUMS (gr 4-9)
- 35 METRIC MEASURING (gr 5-9)
- 36 MORE METRICS (gr 6-10)
- 37 ANIMAL SURVIVAL (gr 3-8)
- 38 Green Thumbs: RADISHES (gr 3-8)
- 39 Green Thumbs: CORN & BEANS (gr 4-12)
- 40 EARTH, MOON & SUN (gr 7-12)
- 41 PLANETS & STARS (gr 7-12)
- 42 FOCUS POCUS (gr 5-10)
- 43 FAR OUT MATH (gr 9-12)
- 44 SCALE THE UNIVERSE (gr 5-12)
- 45 PI IN THE SKY (gr 5-12)
- 61 A SUMMER START (gr 1-8)
- 62 Intermediate ABC SOUP (gr 4-8)
- 63 PEACEFUL PROCEDURES (gr 1-8)
- 64 Primary ABC SOUP (gr 1-3)
- 71 Primary LENTIL SCIENCE (gr K-3)
- 72 Intermediate LENTIL SCIENCE (gr 3-6)
- 73 GET A GRIP Workstation (gr K-6)
- 91 GLOBAL TOPS (gr 3-10)
- 100 TRIPLE MAGNIFIER (gr 3-12)
- 200 CARTESIAN DIVER (adapts K-12)

OBJECTIVE

To measure reaction time by catching a dropped meter stick.

LAB NOTES

Make a photocopy of the activity above for each student or lab team.

Step 2. The "dropper" should give no clues suggesting the moment of release. A slow easing of grip on the meter stick allows it to fall without warning.

The "catcher" should call "ready" before each trial. The best place to watch the meter stick is at the top.

EVALUATION

Q. Drop a dollar bill instead of a meter stick. How fast must you react to catch it?

A. Half the length of a dollar bill = 7.7 cm.

$$t = \frac{\sqrt{7.7}}{22.1} = 0.125 \text{ seconds}$$

MATERIALS

A meter stick and a calculator.

ANSWERS

3a. The meter stick typically drops through a range of distances over several trials, from about 8 cm to 12 cm. This corresponds to reaction times ranging from 0.13 seconds to 0.16 seconds. Total all times and divide by number of trials to find the average.

3b. Beginning at 50 cm, the stick can fall only 50 cm before the catcher misses it completely.

$$t = \frac{\sqrt{50}}{22.1} = 0.32 \text{ seconds}$$

A slower reaction time is possible if the drop begins at 0 cm, allowing the stick to fall through a full 100 cm.

$$t = \frac{\sqrt{100}}{22.1} = 0.45 \text{ seconds}$$

EXTENSION

Apply masking tape along the meter stick (test first; tape may lift the markings). Calibrate the tape in 0.05 second intervals (0.05 sec, 0.10 sec, 0.15 sec:) so you can measure reaction time directly from the stick.

time (seconds)	distance (cm)
0	0
0.05	1.2
0.10	4.9
0.15	11.0
0.20	19.5
0.25	30.5
0.30	43.9

Change happens!

Check our home page for the latest update to our product list.



More science with simple things at www.topscience.org