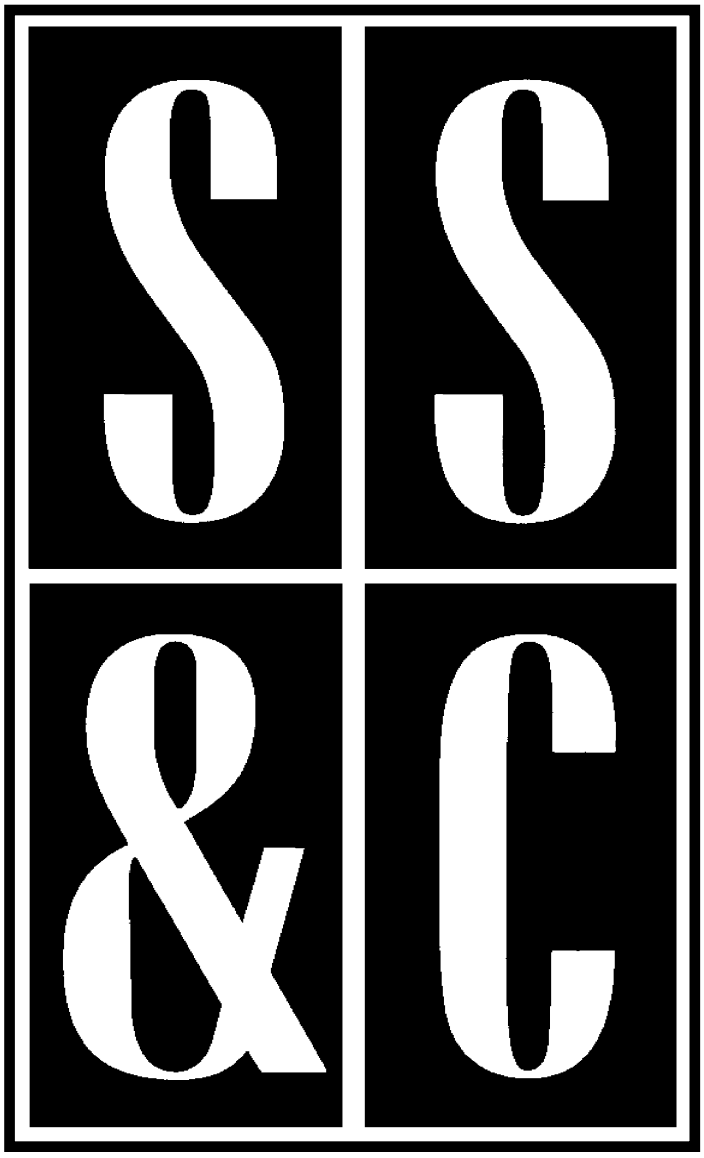
Scope, Sequence & Coordination

A National Curriculum Development and Evaluation Project for High School Science Education



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Student Materials

Learning Sequence Item:

916

Laws of Motion

March 1996
Adapted by: Carlee Boethger

Contents

This micro-unit was adapted by **Carlee Boethger** (Georgetown Day School, Washington, D.C.)

Science as Inquiry

It's Not Fair!

Procedure

Using the chalk, draw a 20 cm diameter circle at the far end of the felt. Place on pool ball at the center of this circle. On top of this pool ball balance the coin. Shoot the cue ball from the far end of the felt. The goal is to knock the ball hard enough so that the coin is flung outside the circle. If the coin lands outside the circle, you are awarded that coin as a prize.

Try other types of spins and other sorts of materials. What worked? What didn't?

Questions:

1. What sort of lab set up will guarantee that the player will lose the coin?

2. How might you change the lab materials in order to improve the chances of the player winning?

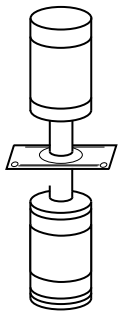
3. Can you design another carnival game that would apply the principle of inertia, or Newton's First Law, also?

Science as Inquiry

Soda Pop Bottle Wobble

Procedure:

Set up the lab as shown in the figure. With a rapid motion, remove the dollar bill from between the two bottles. Options: vary the position of the dollar bill.



Questions:

1. What techniques enable you to remove the dollar?

2. What type of bill seems to work best?

Science as Inquiry

Spheres of Influence

Procedure:

Determine the relative order of inertia of three spheres without using a balance. Come up with other ideas of measurement techniques, and organize these into a graph. Make inertia comparisons between various objects, ordering the masses from least to the greatest inertia. Discuss results, explain test ideas, procedures and conclusions.

Questions:

1. Although you used a different method of measuring inertia, did your results come out the same? Why or why not?

2. Which of your methods seem to be the most accurate? How do your results compare with your other classmates?

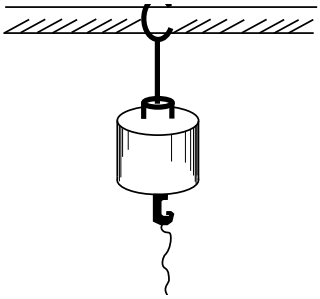
3. Could your methods of measuring work in a situation with no gravity? Explain your answer.

Science as Inquiry

Reaching the Breaking Point

Procedure:

Set up the experiment as shown in the figure. You may wish to use a door knob if the ring stand and clamp are not stable. Pull on the bottom thread very slowly. Where does the thread break? Pull on the bottom thread very quickly. Where does the thread break?



Questions:

1. Are your results consistent after several trials of the same set up? Why?

2. If you used very light masses, how would your results change?

3. What strength of thread could you use in order to have this lab turn out differently? Why?

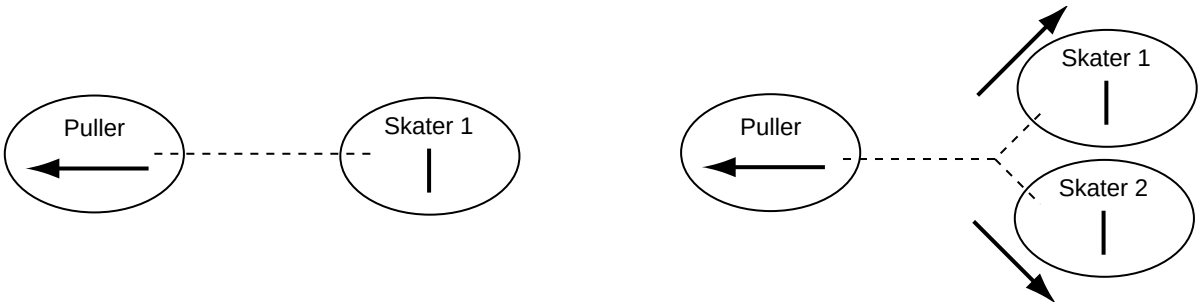
Science as Inquiry

He's Not My Brother, But He's Heavy

Procedure:

Decide who will be *Skater 1, Skater 2,* the *Puller,* and the *Observer.* It is important to maintain constant force. This will simplify the variables used within this experiment. *Skater 1*—while at rest—picks up the curved end of the spring balance, and the *Puller* picks up the hook end. With the *Observer* watching the needle on the spring balance, the *Puller* starts to pulling. (*Skater 1* should be pulled at a constant force.) Record data to include: a description of the motion of the needle as *Skater 1* begins to move; the velocity of *Skater 1* as the force remains constant; the student mass and; the average force used as read on the spring balance.

Add a second skater, *(Skater 2),* to this experiment—holding the spring balance as described above. Again, force should remain constant. Record the data obtained. Repeat the experiments above to show a contrast between the velocity of only one skater and the velocity of two skaters.



Questions:

1. What causes the initial motion of the spring balance needle?

2. What difference does the surface you are skating on have?

3. If your experiment calls for constant force and constant velocity, are there any questions?

4. What can you do to this lab arrangement in order to measure both constant force and constant velocity?