

# Activity

## Force and Acceleration

### Lab Preview

**Directions:** Answer these questions before you begin the Activity.

1. Why do you think goggles are listed as a safety precaution for this activity?

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2. According to Newton's first law of motion, what does it take to cause an object to begin moving from a state of rest?

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*If you stand at a stoplight, you will see cars stopping for red lights and then taking off when the light turns green. What makes the cars slow down? What makes them speed up? The cars accelerate because an unbalanced force is acting on them.*

### What You'll Investigate

How does an unbalanced force on a book affect its motion?

### Materials

tape  
paper clip  
10-N spring scale  
large book  
your science book  
triple beam balance  
\*electronic balance  
\*Alternate materials

### Goals

- **Observe** the effect of force on the acceleration of an object.
- **Interpret** the data collected for each trial.

### Safety Precautions

Proper eye protection should be worn at all times while performing this lab.

### Procedure

1. With a piece of tape, attach the paper clip to your textbook so that the paper clip is just over the edge of the book.
2. Use Table 1 in the Data and Observations section to record your observations.
3. If available, use a large balance to find the mass of your science book.
4. Place the book on the floor or on the surface of a long table. Use the paper clip to hook the spring scale to the book.
5. Pull the book across the floor at a slow but constant velocity. While pulling, read the force you are pulling with on the spring scale and record it in your table.
6. Repeat step 5 two more times, once accelerating slowly and once accelerating quickly. Be careful not to pull too hard. Your spring scale will read only up to 10 N.
7. Place a second book on top of the first book and repeat steps 4 through 6.

**Activity** (continued)**Data and Observations****Table 1**

<b>Force-Acceleration Data</b>			
	<b>Run</b>	<b>Force</b>	<b>Mass</b>
<b>One book</b>			
<b>Two books</b>			

**Conclude and Apply**

1. **Organize** the pulling forces from greatest to least for each set of trials. Do you see a relationship between force and acceleration? Explain your answer.

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2. How did adding the second book change the results? Explain your answer.

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**Communicating Your Data**

Compare your conclusions with those of other students in your class. **For more help, refer to the Science Skill Handbook.**

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