

## Investigating a Spring Clip

There are many ways to use potential energy. A spring clip is a device used to hold weights on a barbell. The spring clip stores energy when you compress it. In this lab, you will determine how the distance you compress a spring clip is related to the force you apply and to the spring's potential energy.

**Problem** How does the force you apply to a spring clip affect its elastic potential energy?

### Materials

- clamp
- spring clip
- masking tape
- metric ruler
- 50-newton spring scale
- graph paper

**Skills** Measuring, Using Tables and Graphs

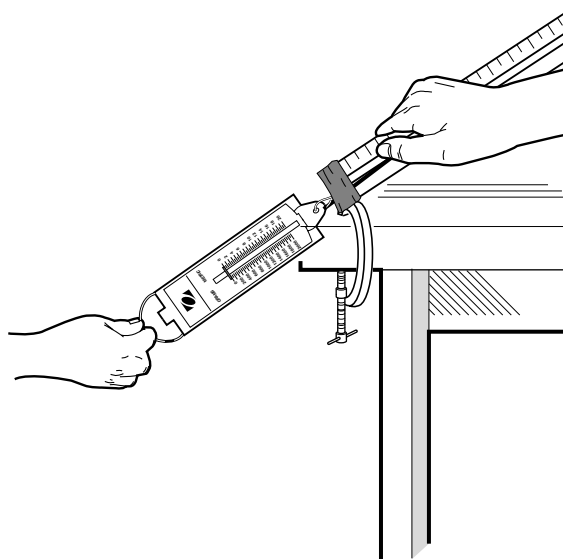
### Procedure

1. Using the clamp, firmly attach one handle of the spring clip to a tabletop, with the other handle facing up and away from the table, as shown.

**CAUTION:** Be careful not to pinch your fingers with the clamp or spring clip.

2. Remove the plastic cover from the upper handle of the spring clip. Hook the spring scale to the spring clip handle, as shown, and use masking tape to secure it. Have your teacher check your setup for safety before proceeding.

3. Have a classmate hold the ruler next to the spring clip, as shown. Record the starting position of the handle. (The reading on the spring scale should be zero.)



4. Slowly pull the spring scale down at a right angle to the upper handle until the handle moves 0.1 cm. In the data table, record the force and the position of the upper handle. Slowly release the scale back to the starting position.

**DATA TABLE**

Force (N)	Position of Upper Handle (cm)	Total Distance Moved (cm)

- Repeat Step 4, this time pulling the handle 0.2 cm from the starting position.
- Repeat Step 4 a few more times, pulling the handle 0.1 cm farther each time. Continue until the spring scale reaches its maximum force.
- Calculate the distance the handle moved each time you pulled it and record these values in the data table. Graph your data. Place the distance the handle moved on the vertical axis and the force that was applied on the horizontal axis.

**Analyze and Conclude**

**1. Using Graphs** What is the approximate relationship between the total distance you compressed the spring clip and the force you applied to it?

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**2. Classifying** What type of energy transfer did you use to compress the spring clip? What type of energy did the spring clip gain when it was compressed?

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**3. Drawing Conclusions** What relationship exists between the distance the spring clip was compressed and its potential energy? (*Hint:* The elastic potential energy of the spring clip equals the work done on it.)

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