

PROJECT

Applying Chapters 4–6

Investigating Elasticity

OBJECTIVE Explore the relationship between the length of a rubber band and the weight suspended from it.

Materials: paper cup, paper clip, masking tape, metric ruler, string, rubber band, hole punch, scissors, 100 pennies, graph paper or graphing calculator (optional)

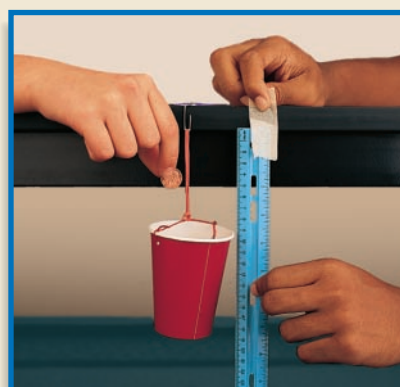
COLLECTING THE DATA



- 1 Punch two holes in the paper cup about $\frac{1}{2}$ inch from the top of the rim directly across from each other. Thread the string through the two holes. Tie off the string on both sides of the cup. Cut off any extra string on either end. Then attach the rubber band to the string.



- 2 Tape the paper clip to the edge of a table or desk so that one end hangs over the edge. Attach the rubber band to the end of the paper clip so the cup is hanging on the rubber band over the side of the table.



- 3 Tape the ruler to the edge of the table next to the rubber band with 0 on the ruler next to the top of the rubber band. Record the distance from the top of the rubber band to the bottom of the cup. This is the initial distance.

- 4 Add 10 pennies to the cup. Record the number of pennies you added to the cup and the distance from the top of the rubber band to the bottom of the cup.
- 5 Repeat **Step 4** several more times, each time increasing the number of pennies placed in the cup until you have 50 pennies in the cup.

INVESTIGATING THE DATA

1. Make a scatter plot of the data you have collected. Describe any patterns you see.
2. Find an equation for a best-fitting line. You may want to use a graphing calculator or a computer.
3. Explain what the y-intercept and the slope mean in terms of your data.
4. Describe a reasonable domain and the range of your equation. Write inequalities to represent both.

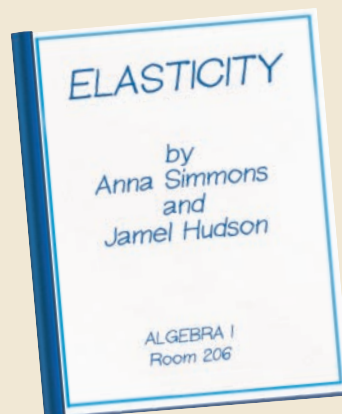
MAKING CONJECTURES

5. Make a conjecture about what the distance from the top of the rubber band to the bottom of the cup would be if you placed 100 pennies in the cup.
6. Test your conjecture. What relationship do you see between the number of pennies used and the length of the stretch?

In Exercises 7 and 8, discuss your results with others in your class.

7. Make a conjecture about how the length of the rubber band might affect the total distances. Would the equations be the same or different? Give examples to support your answer.
8. How would your graph be different if you measured from the floor up to the bottom of the rubber band? Explain your answer.

PRESENTING YOUR RESULTS



Write a report or make a poster to report your results.

- Include a table with your data.
- Include your answers to Exercises 1–4.
- Describe the conjectures that you made in Exercises 5–8 and your reasons for believing them to be true.
- Describe any patterns you found when you discussed results with others in your class.
- What advice would you give to someone else who is going to do this project?

EXTENDING THE PROJECT

- How does the thickness of the rubber band affect the distance it stretches? Do a second experiment with a thicker rubber band to find out.
- A grocery store scale operates in a similar way. When you put fruits or vegetables on a scale, the spring inside the scale stretches. The heavier the item, the larger the stretch. Can you think of other items that work in a similar way?

