Putting Time on the Line

Let's say that you were asked to design a ride for a playground or amusement park. The ride is supposed to be a car that travels down a cable. The question is: How does the height where the cable starts affect the time it takes to get to the bottom of the ride?

Materials:

- Plastic spool of thread
- Meter stick
- Watch with second hand
- String

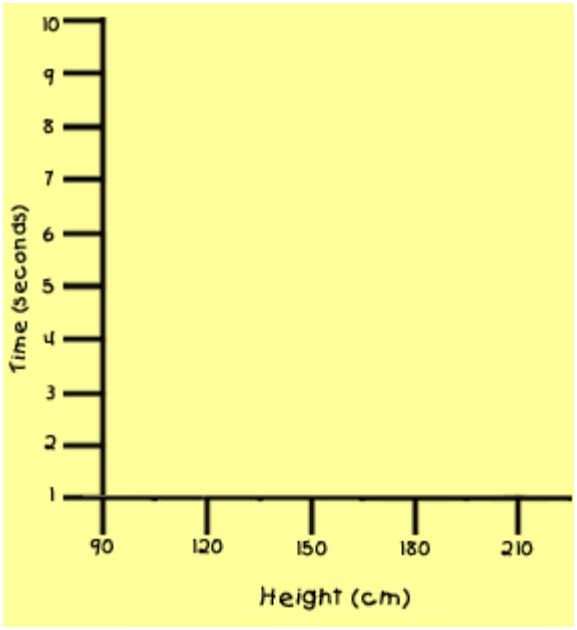
Procedures:

1. Make a chart like the one shown. Cut a piece of thread about 5 meters long. Tape or tie one end of the string to the bottom of a desk or chair leg. Put the other end of the thread through the center hole of the spool.

	1	2	3	4	5
Height (cm)					
Time (seconds)					

2. Pull the thread tight. Using a meter stick, find the lowest height you can hold the thread so that the spool will slide all the way from one end of the string to where it is tied at the other end. Measure this height and record it in your chart across from "height" and under "1" for height 1.
3. When your partner is ready to time the spool, say "GO" as you let the spool slide down the string. Find the time it takes for the spool to reach the bottom. Record the time in the chart across from "Time" and under "1" for time 1.

4. Raise the height 30 centimeters and record this new height for height 2. Time the spool again from this height and record the time in the chart.
5. Repeat step 4 until you have times for 5 different heights.
6. Let's graph it! Make a graph like the one shown. Use the information in the chart to make a graph of the results of your experiment. How does changing the height affect the time it takes for the spool to travel down the string?



Think about this ...

From your graph, is there any way to make a good guess about how long it would take the spool to go down the string if you raised the height another 30 centimeters?

Where's the Chemistry?

Your graph may look different from what you expected. If the spool goes faster when started from higher heights, you may have thought the line would go up to show the greater speed. But the graph is showing the time it takes the spool to slide down. So the greater speed, the less time it takes. Therefore as the height goes up, the time goes down.

To predict how long it would take the spool to slide down if you raised the height of the start another 30 centimeters, you could extend the line on the graph it a bit more, out to where height 6 would be. You could then look directly across and see what the time would be for that height.

The American Chemical Society develops materials for elementary school age children to spark their interest in science and teach developmentally appropriate chemistry concepts. The *Activities for Children* collection includes hands-on activities, articles, puzzles, and games on topics related to children's everyday experiences.

The collection can be used to supplement the science curriculum, celebrate National Chemistry Week, develop Chemists Celebrate Earth Day events, invite children to give science a try at a large event, or to explore just for fun at home.

Find more activities, articles, puzzles and games at www.acs.org/kids.

Safety Tips

This activity is intended for elementary school children under the direct supervision of an adult. The American Chemical Society cannot be responsible for any accidents or injuries that may result from conducting the activities without proper supervision, from not specifically following directions, or from ignoring the cautions contained in the text.

Always:

- Work with an adult.
- Read and follow all directions for the activity.
- Read all warning labels on all materials being used.
- Wear eye protection.
- Follow safety warnings or precautions, such as wearing gloves or tying back long hair.
- Use all materials carefully, following the directions given.
- Be sure to clean up and dispose of materials properly when you are finished with an activity.
- Wash your hands well after every activity.

Never eat or drink while conducting an experiment, and be careful to keep all of the materials used away from your mouth, nose, and eyes!

Never experiment on your own!

For more detailed information on safety go to www.acs.org/education and click on "Safety Guidelines".