

Graphing Calculator Lab

Slope and Rate of Change

In this activity, you will investigate the relationship between slope and rate of change.

SET UP the Lab

- Attach the force sensor to the graphing calculator. Place the sensor in a ring stand as shown.
- Make a small hole in the bottom of a paper cup. Straighten a paper clip and use it to create a handle to hang the cup on the force sensor. Place another cup on the floor below.
- Set the device to collect data 100 times at intervals of 0.1 second.

ACTIVITY

- Step 1** Hold your finger over the hole in the cup. Fill the cup with water.
- Step 2** Begin collecting data as you begin to allow the water to drain.
- Step 3** Make the hole in the cup larger. Then repeat Steps 1 and 2 for a second trial.



ANALYZE THE RESULTS

1. Use the calculator to create a graph of the data for Trial 1. The graph will show the weight of the cup y as a function of time x . Describe the graph.
2. Create the graph for Trial 2. Compare the steepness of the two graphs. Which has a greater slope?
3. What happens as the time increases?
4. Did the cup empty at a faster rate in Trial 1 or Trial 2? Explain.
5. Describe the relationship between slope and the rate at which the cup was emptied.
6. **MAKE A CONJECTURE** What would a graph look like if you emptied a cup using a hole half the size of the original hole? twice the size of the second hole? Explain.
7. Water is emptied at a constant rate from containers shaped like the ones shown below. Draw a graph of the water level in each of the containers as a function of time.

a.



b.



c.

