# Slopes and Cents

OBJECTIVES • Collect weight versus number data for a collection of identical pennies.

 • Model the weight versus number data using a linear equation.

 • Interpret the slope and intercept values from the linear model.

During this activity, the Force Sensor will be used to determine the weight of the pennies placed in the cup. The sensor must be positioned as shown in Figure 1 and should remain level always.



1. Use a pencil to poke small holes on opposite sides of the coffee cup near the top rim. Thread a piece of string through the holes, and then tie the ends of the string together to hang the cup.
2. Suspend the cup from the hook on the end of the Force Sensor.
3. Separate your pennies into four stacks of eight pennies each. As you do this, confirm that all pennies are dated after 1982.
4. Set the range switch on the Force Sensor to 10 N. Connect the Force Sensor to the data collection interface. Connect the interface to the TI-Nspire handheld or computer.
5. Set up DataQuest for data collection.

a. Choose New Experiment from the Experiment menu.

b. Choose Collection Mode ► Events with Entry from the Experiment menu.

c. Enter Pennies as the Name and leave the Units field blank. Select OK.

1. In this experiment, you only want to measure the weight of the pennies, and not of the cup and string. To account for the weight of the cup and string, you need to zero the Force Sensor. a. Hang the empty cup from the Force Sensor using the string. b. Wait until the cup stops swinging so that the reading is stable. Choose Set Up Sensors ► Zero from the Experiment menu. This will set the current weight reading to zero and ignore the weight of the cup.
2. You are now ready to collect data.

a. Click the Start button to prepare to collect data.

b. Wait until the cup stops swinging so that the reading is stable. Click the Keep button.

c. Enter 0, for the number of pennies now in the cup. Select OK to store this data pair.

d. Place eight pennies in the cup and allow the cup to stop swinging.

e. Click the Keep button to record the weight of eight pennies.

f. Enter 8, which is the number of pennies in the cup. Select OK to store this data pair.

g. Continue with this procedure using 16, 24, and 32 pennies. In each step, enter the total number of pennies in the cup.

h. Stop data collection when you have finished collecting data. Making Cents of Math Real-World Math with Vernier 2 - 3

1. The screen shows a graph of weight versus number of pennies. The graph should appear linear. If you want to repeat data collection, repeat Step 7.

DATA TABLE

|  |  |
| --- | --- |
| Number of Pennies | Weight in Newtons |
| 0 |  |
| 8 |  |
| 16 |  |
| 24 |  |
| 32 |  |
| Model Equation |  |
| Regression Equation |  |

1. Use the Table tab and record values of your data points in the table above to create in a graph using your tools. Using the graph to answer the following:

1. Find the slope of the line passing through any two points in your table and record it.

2. What do the x-values in this problem represent?

 3. What do the y-values represent?

4.Using your equation predict the weight of 500 pennies.

5. How would using quarters instead of pennies affect the slope of the graph?

6. What would the slope of a graph made with quarters represent?

1. Repeat this experiment using quarters and verify your answers to questions 4 and 5.