

Experiment 16

Circles

Teaching Notes

In this experiment, the circumference of a circle is a linear function of its diameter. The diameter of the circle is the *independent variable*, and the circumference of the circle is the *dependent variable*. If this experiment is done as a class activity, each group of two students selects one object and measures its diameter and circumference.

Equipment

cloth tape measures, or ruler and string, 1 per group

The string should have no stretch to it.

scratch paper

scissors, 1 pair per group

round objects, such as cans and jar lids, 1 per group

graph paper, 1 sheet per student

Procedure

If the activity is done as a whole-class activity, have half the groups measure in centimeters, the other half in inches. Keep the two data points separate; at the end of the experiment you may want to compare their equations and graphs.

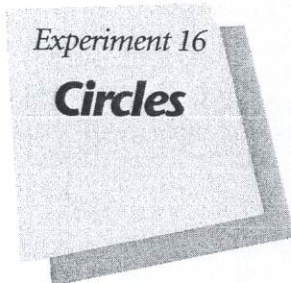
To find the diameter of the objects, have students trace around each object, cut out the circle, fold it exactly in half, and measure the length of the crease. They can measure circumference either by wrapping a cloth tape measure around the object, or by wrapping a string around the object and measuring the string.

Organizing and Analyzing Class Results

List the decimal equations for each of the groups. For each group, ask questions such as: Who used centimeters? Who used inches? Can you tell from the graphs? From the equations?

The line(s) drawn should have slope between 2.9 and 3.3. If any students find a non-zero intercept, discuss why this might have occurred. *Ask:* In theory, what's the circumference of a circle with diameter 0? Why did your data lead to a non-zero intercept?

At the end of this experiment, discuss the definition of π .



Name _____

Partner _____

Collect the Data

Draw a diagram of the experiment, indicating variables.

Describe the procedure for the experiment.

The independent variable, x , is _____ Units _____

The dependent variable, y , is _____ Units _____

Equipment (labels and measurements) _____

Data Collection

Independent Dependent

Points to Be Graphed

x y

Experiment 16

Circles

Name _____

Find the Equation

After plotting your data on graph paper, draw a straight line through two of your points. Choose the line that best fits your data. Circle the points on your graph and copy their coordinates below.

Your points: (____, ____) and (____, ____)

Use these points to find the equation of your line. Show your work.

Find the slope of the line.

Find the y -intercept of the line.

Write the equation of the line.

$$y = \frac{\quad}{\quad} x + \frac{\quad}{\quad}$$

rational form

$$y = \quad x + \quad$$

decimal form

Rewrite the decimal form of the equation, using the names of the variables instead of x and y .

$$\quad = \quad + \quad$$

Experiment 16

Circles

Name _____

Interpret the Data
Metric Measures

Write the decimal form of your equation here. $y = \text{_____} x + \text{_____}$

Use this equation to answer the first four questions. Show your work.

1. What is the circumference of a circle with a diameter of 33 cm?

2. What is the diameter of a circle with a circumference of 350 cm?

3. What is the diameter of a circle with a circumference of 93 cm?

4. According to your equation, what is the diameter of a circle with a circumference of 360 cm (10 cm more than the circle in Question 2)?

5. Measure the circumference of a tree. What is its diameter? _____

6. Otis measured large objects and used meters instead of centimeters for both variables. What effect would this have on the resulting equation and graph?

Experiment 16

Circles

Name _____

**Interpret the Data
Standard Measures**

Write the decimal form of your equation here. $y = \underline{\hspace{2cm}} x + \underline{\hspace{2cm}}$

Use this equation to answer the first four questions. Show your work.

1. What is the circumference of a circle with a diameter of 14 inches?

2. What is the diameter of a circle with a circumference of 150 inches?

3. What is the diameter of a circle with a circumference of 42 inches?

4. According to your equation, what is the diameter of a circle with a circumference of 160 inches (10 inches more than the circle in Question 2)?

5. Measure the circumference of a tree. What is its diameter? _____
6. Otis measured large objects and used feet instead of inches for both variables. What effect would this have on the resulting equation and graph?

