Predicting π

Math Concepts

- fractions
- circles
- decimals
- diameter
- linear measure
- circumference
- ratio
- similarity
- proportion

Materials

- TI-15 Explorer™
- **Predicting** π recording sheets
- rulers, meter sticks, string, compasses, calipers
- pencils

Overview

Students will use linear measurement and calculators to discover the existence of π, the constant ratio between the circumference and the diameter of a circle.

Introduction

It would be helpful to complete the **Ratios in Regular Polygons** activity on page 95 before beginning this activity.

1. Have students identify several circular objects in the classroom, on the school grounds, or at home.

   Note: You may wish to have students bring circular objects to class.

2. Have students select a tool to measure the circumference and diameter of each circle, and record these measurements on the recording sheet.

3. Have students use a compass to draw several different circles and record their circumferences and diameters on the recording sheet.

4. Have students look for patterns in their data and make conjectures about why the patterns might exist.

Predicting π *(continued)*

Collecting and Organizing Data

While students generate data for the circles, ask questions such as:

- How are all of the circles alike?
- How are you measuring the diameters?
- How are you measuring the circumferences?
- How are the measurements you are making with circles different from the measurements you made with the regular polygons (refer to **Ratios in Regular Polygons** on page 95)? How are they alike?
- Does it matter whether you measure in inches or centimeters? Why or why not? (see **Do Centimeters Make Me Taller?** on page 85).
- What patterns do you see?
- Why do you think those patterns are occurring?

How are you using the calculator to help you look for patterns?

How can you judge that what you see on your calculator is reasonable?

How can you use the calculator and the patterns you see to help you predict measurements of diameters or circumferences?

Analyzing Data and Drawing Conclusions

After students have made and compared several sets of measurements, have them discuss their results as a whole group. Ask questions such as:

- Is your data the same as everyone else's? Why or why not?
- What patterns do you see in your data?
- How are these patterns like the ones in the **Ratios in Regular Polygons** activity (page 95)? How are they different?
- How are the circumferences and the diameters of the circles related to each other?
- How is this relationship like the ones you found in the **Ratios in Regular Polygons** activity (page 95)?
- From the patterns in your data, what conclusions can you make about the number π, which represents the constant ratio between the circumference and diameter of a circle?

What operations or keys did you use on the calculator to help you find patterns in this activity? Why did you choose those operations or keys?

How did you determine whether your calculator results were reasonable?

Predicting π *(continued)*

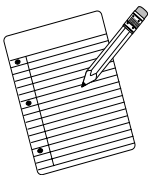
Analyzing Data and Drawing Conclusions (continued)

- Why do you think this ratio was given the name "Pi"?
- How can the knowledge of this constant ratio π be used?
- Do you think the distance around a tennis ball container is greater than, about the same as, or less than its height? Why?

Continuing the Investigation

Have students research the history of the development of the numerical value of π.

Name:



Predicting π

Recording Sheet

Collecting and Organizing Data

Object	Measure of Circumference (C)	Measure of Diameter (D)	Ratio of C to D	Ratio in Decimal Form

Analyzing Data and Drawing Conclusions

If I know the length of the diameter of a circle, I can find its circumference by:

If I know the length of the circumference of a circle, I can find the length of its diameter by:

Questions we thought of while we were doing this activity: