6691

Circles all Around

Introduction

This activity provides students an opportunity to explore the relationship between the diameter of a circle and its circumference.

Grades 6-8

NCTM Measurement Standards

- Apply appropriate techniques, tools, and formulas to determine measurements
- Solve problems involving scale factors, using ratio and proportion

Files/Materials Needed

Files: ***DiameterCircumference.act***
Materials: measuring tapes (customary and metric units), string (optional), variety of objects with a circular section (soda can, garbage can, top of stool, etc.), access to at least one object that it is difficult to measure either the circumference or diameter (such as a round building column or center circle on a basketball court)

PART 1 FIND MEASUREMENTS

1

a. Launch TI-Navigator™ on the computer and start the session.
b. Have each student log into NavNet on their calculator.

2

a. Load the ***DiameterCircumference.act.*** activity settings file in Activity Center and start the activity. This sets up four lists – **MDIA** (metric diameter), **MCIR** (metric circumference), **CDIA** (customary diameter), **CCIR** (customary circumference) – on each student calculator.
b. Have students work individually or in pairs to measure the diameter and circumference of several circular objects.
c. Tell students to record their measurements in the lists on their calculator and select **SEND** when they are finished measuring all the objects.
d. For later, have students write down on a piece of paper any objects where they could not find *both* the circumference and diameter.
e. After all of the students have turned in their data, send it back to them by clicking on **Configure** and **Existing activity lists**. By starting the activity again, students will receive the aggregated lists that were just created.

PART 2 DISCOVERING PI

3

In Activity Center, four plots are already set up and are defined as follows:

Exploring the Ratio Pi
Plot 1: Customary Diameter vs. Customary Circumference
Plot 2: Metric Diameter vs. Metric Circumference

Exploring the conversions between centimeters and inches
Plot 3: Metric Diameter vs. Customary Diameter
Plot 4: Metric Circumference vs. Customary Circumference

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a. Turn on **Plot 1** by clicking **Configure Plots** and checking **On** for **Plot 1**.
b. Talk about the graph. Display the graph and list, and have students estimate what can be done mathematically to get from diameter to circumference.
c. Have students use the graph to estimate the circumference or diameter of the objects they listed in Step 2d.

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d Ask students a variety of questions such as:
- *Why doesn't the plot make a perfectly straight line?*
- *If you were to apply a rule to the diameter to find the circumference, what would it be?*

e. Tell students to exit NavNet and use the calculator to divide **CCIR** by **CDIA** to find all of the ratios between the two lists. Have them store the results in L1 and find the mean of the list.

f. Ask students questions such as:
- *Why are we taking the average?*
- *Does the result look familiar?*
- *How does this change your rule for finding the circumference when you know the diameter?*

PART 3 WHAT HAPPENS IN A DIFFERENT MEASUREMENT SYSTEM?

5

a. Remind students that the data in **MCIR** and **MDIA** represents the metric measurements of the objects measured earlier in this activity.

b. Before turning on **Plot 2**, ask the students:
- *How is this plot going to be different than Plot 1?*
- *Do you think the ratio will still be π ? Why or why not?*

c. Turn off **Plot 1** and turn on **Plot 2**. Discuss the results.

d. Find the ratio of **MCIR** to **MDIA** to confirm that the ratio remains unchanged.

EXTENSION: CONVERTING CENTIMETERS TO INCHES

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Turn off the axis labels and use **Plot 3** and **Plot 4** to establish the scale factor from centimeters to inches (0.39) and from inches to centimeters (2.54).