Dimensions and Area

6687

Introduction

In this activity, students discover the relationship between a change in the dimensions of a rectangle and the change in the corresponding area.

Grades 6-8

NCTM Measurement Standards

- Understand measurable attributes of objects and the units, systems, and processes of measurement
- Understand relationships among units and convert from one unit to another within the same system

Files/Materials Needed

Rectangle.act

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 ***Rectangle.act*** activity settings file into Activity Center. This sets up Activity Center to display a grid with a rectangle superimposed on it.
b. Instruct students to determine the area of the rectangle in square units.
c. Start the activity and have students enter the number 1 under **RECT** and its corresponding area under **AREA**.

3

a. Pause the activity and click on the **Edit Window Settings** icon. Change **X Scale** and **Y Scale** to 2.
b. Resume the activity and ask students to once again determine the area of the same rectangle with different units.
c. Students should enter the number 2 under **RECT** and its corresponding area under **AREA**.

4

a. Pause the activity again and click on the **Edit Window Settings** icon. Change **X Scale** and **Y Scale** to 1.
b. Resume the activity and ask students to once again determine the area of the same rectangle with these new units.
c. Students should enter the number 3 under **RECT** and its corresponding area under **AREA**. Have students send their data for all three rectangles.

4

a. Stop the activity and click on the **List** tab to display student data.
b. Verify that students found Rectangle 1 to have an area of 24 square units, Rectangle 2 to have an area of 96 square units, and Rectangle 3 to have an area of 384 square units.
c. Using **Quick Poll** (with *Open Response*), ask students by what factor the area increased when the length of the measurement unit in the first rectangle was decreased by a factor of 2 to give the measurement unit for the second rectangle. They should respond that the number of square units increased by a factor of 4 (since 96 ÷ 24 = 4).
d. Using **Quick Poll** again, ask students by what factor the number of square units increased from the first rectangle to the third rectangle when the measurement unit was decreased by a factor of 4. They should realize that it changed by a factor of 16 (since 384 ÷ 24 = 16).

5

Elicit from students that, if the length of measure used to calculate the area of an object is reduced by a factor of *a*, then the corresponding area measured with this smaller unit of measure is increased by a factor of a^2. To make this point clear, ask students the following question:

- *A rug has an area of 15 square feet. What is the area of the rug measured in square inches?*

Students should realize that area in square inches is $15 \cdot 12^2 = 15 \cdot 144 = 2160$.

EXTENSION

6

The above activity can be reversed to show that an increase in the size of the measurement unit has a corresponding decrease in the area of the object being measured. For example, switching from square feet to square yards reduces the number of square units by a factor of 9 (since $3^2 = 9$).

For an additional challenge, ask students what they think will happen to the volume of an object when the measurement unit changes by a certain factor. (The volume changes by the cube of the factor by which each dimension changes.)