

Activity 5

Determining How Change in a Linear Dimension Affects Perimeter, Area and Volume

TEACHER NOTES

Topic Area: Measurement

NCTM Standard: Understand measurable attributes of objects and the units, systems, and processes of measurement.

Objective: The student will be able to utilize the Casio fx-9750G Plus calculator in the various activities included in this unit.

Introduction: The low-achieving math student is very confused when asked questions involving the following:

Describe how a change in the length of a rectangle affects its perimeter, area or volume. How does changing the length of the edge of a cube affect the volume of the cube? How does changing the length of the radius of a circle affect the circumference of the circle?

This unit will use the Casio fx-9750G Plus calculator to give the students a new method of solving these problems.

Problem : If the length of a cube is doubled, what happens to the volume of the cube?

Formulas for a cube:

$$SA = 6x^2$$

$$V = x^3$$

SA = surface area V = volume x = length of a side

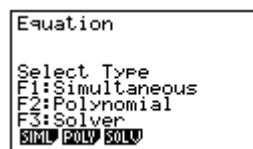
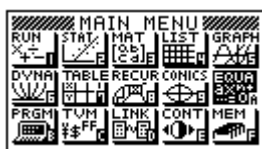
Calculator Notes for Activity 5

Objective

The student will be able to utilize the equation solver of the Casio fx-9750G Plus calculator in the activities included in this unit.

Steps for Solving Problems 1.

1. The method to solve the Problem is very similar to the method used in Activity 4. The only difference is that you will need to make up numbers to fill in for the length of the cube. When you are done, you will compare the answers by dividing. Start by highlighting the **EQUA** Menu and press **EXE**.

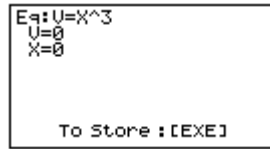


2. Press **F3** (Solver). If your screen has an equation entered, it must be deleted. To do this press **F2** (DEL), **F1** (YES) to get to the following screen.



3. Fill in the equation for the volume of a cube by pressing the **ALPHA** Key, the red **V** (which is above the 2), **SHIFT** Key, the decimal point

(which writes the = on the screen), **X,0,T** Key, the exponent key (^), **3**, and **EXE**.



4. Make up a number for the side of the cube (x). In this case let's use 5 for x, and press **EXE**. Highlight the V=0 by using the arrow keys. Press **F6** (SOLV).



5. The answer is on the second line, $V=125$. This means that when the radius is 5, the volume is 125. Since the Problem asked what happens to the volume when the length is doubled, we will double the length of the side and then compare the answers. To do this, press **F1** (REPT), change the volume (v) back to 0, and press EXE.



6. Since the problem wants the length to double, and the original length was 5, fill 10 in for x ($5 \times 2 = 10$), press **EXE**, use the arrow keys to highlight the V=0, and then press **F6**.



This means when the length of the side is 10, the volume is 1000.

7. To compare your answers, use the RUN Mode to take 1000 and divide by 125.

$1000 \div 125$	8
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This means that if the length of the side is doubled, the volume is multiplied by 8.

Name _____ Class _____ Date _____

Activity 5: Worksheet

Determining How Change in a Linear Dimension Affects Perimeter, Area and Volume

Determine the following changes:

1. If the length of a cube is doubled, what happens to the surface area of the cube?
2. If the base of a rectangle is doubled, what happens to the perimeter?
3. If the radius of a circle is doubled, what happens to the circumference?
4. If the radius of a circle is doubled, what happens to the area?
5. If the radius of a circle is tripled, what happens to the circumference?
6. If the radius of a circle is tripled, what happens to the area?
7. If the radius of a cone is doubled, what happens to the volume?
8. Could you predict the answer to the following problem? If the volume of a cube is 500, what will be the volume of the cube if the length of a side of the cube is doubled?
9. What happens to the surface area of a cube if the length of a side is halved?
10. If the radius of a sphere is multiplied by 4, what happens to the volume?

Solutions to Activity 5 Worksheet

1. It is multiplied by 4.
2. There is no relationship.
3. It is also doubled.
4. It is multiplied by 4.
5. It is also tripled.
6. It is multiplied by 9.
7. It is multiplied by 4.
8. 4000 (Since we found the volume to be multiplied by 8)
9. It is divided by 4.
10. It is multiplied by 64.