Topic 2 L.1: Understanding Squared and Cubed

Student Outcomes

* Students understand that a letter represents one number in an expression. When that number replaces the letter, the expression can be evaluated to one number.

Lesson Notes

Before this lesson, make it clear to students that just like is or three squared, is or units squared (also called square units).

Warm-Up

Example 1 (10 minutes)

Draw or project the square shown.

**  
Example 1

What is the length of one side of this square?

What is the formula for the area of a square?

What is the square’s area as a multiplication expression?

What is the square’s area?

We can count the units. However, look at this other square. Its side length is . That is just too many tiny units to draw. What expression can we build to find this square’s area?

What is the area of the square? Use a calculator if you need to.

* Teacher Notes:
  + A letter represents one number in an expression. That number was in our first square and in our second square. When that number replaces the letter, the expression can be evaluated to one number. In our first example, the expression was evaluated to be , and in the second example, the expression was evaluated to be .

Guided/Independent Practice

Work together to complete #1-2 Make clear to the students that these drawings are not to scale.

Exercise 1

1. Complete the table below for both squares. Note: These drawings are not to scale.

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

|  |  |  |
| --- | --- | --- |
| Length of One Side of the Square | Square’s Area Written as an Expression | Square’s Area Written as a Number |
|  |  |  |
|  |  |  |

Teacher Note: Make sure students have the units correctly recorded in each of the cells of the table. When units are not specified, keep the label “unit” or “square unit.”

Example 2

Teacher Notes

* + The formula is an efficient way to find the area of a rectangle without being required to count the area units in a rectangle.

What does the letter represent in this blue rectangle?

With a partner, answer the following question: Given that the second rectangle is divided into four equal parts, what number does the represent? How do you know?

We reasoned that each width of the congruent rectangles must be the same. Two lengths equals .

What is the total length of the second rectangle? How do you know?

*The length consists of segments that each has a length of ..*

If the two large rectangles are congruent (same shape & size) find the area of the rectangles.

1. Ask students to complete the table for both rectangles in their student materials. Using a calculator is appropriate.

|  |  |  |  |
| --- | --- | --- | --- |
| Length of Rectangle | Width of Rectangle | Rectangle’s Area Written as an Expression | Rectangle’s Area Written as a Number |
|  |  |  |  |
|  |  |  |  |

1. Note that both rectangular prisms are congruent.

Teacher Notes:

* 1. The formula is a quick way to determine the volume of right rectangular prisms.
  2. Take a look at the right rectangular prisms in your student materials.

What does the represent in the first diagram?

The length of the rectangular prism.

What does the represent in the first diagram?

The width of the rectangular prism.

What does the represent in the first diagram?

The height of the rectangular prism.

**Since we know the formula to find the volume is , what number can we substitute for the , *w,* and *h* in the formula?**

, *because the length of the second right rectangular prism is* .

, *because the width of the second right rectangular prism is* .

, *because the height of the second right rectangular prism is* .

Determine the volume of the second right rectangular prism by replacing the letters in the formula with their appropriate numbers.

1. Complete the table for both figures. Using a calculator is appropriate.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Length of Rectangular Prism | Width of Rectangular Prism | Height of Rectangular Prism | Rectangular Prism’s Volume Written as an Expression | Rectangular Prism’s Volume Written as a Number |
|  |  |  |  |  |
|  |  |  |  |  |

Lesson Summary

Expression: An *expression* is a numerical expression, or it is the result of replacing some (or all) of the numbers in a numerical expression with variables.

There are two ways to build expressions:

1. We can start out with a numerical expression, such as , and replace some of the numbers with letters to get .
2. We can build such expressions from scratch, as in , and note that if numbers were placed in the expression for the variables , , and , the result would be a numerical expression.

Homework

1. Replace the side length of this square with ., and find the area.

*The student should draw a square, label the side ., and calculate the area to be*

*.*

1. Complete the table for each of the given figures.

|  |  |  |  |
| --- | --- | --- | --- |
| Length of Rectangle | Width of Rectangle | Rectangle’s Area Written as an Expression | Rectangle’s Area Written as a Number |
|  |  |  |  |
|  |  |  |  |

1. Using the formula , find the volume of a right rectangular prism when the length of the prism is , the width is , and the height is .