

G3 Playlist: Finding area with the distributive property

Aligns with *CCSS.MATH.CONTENT.3.MD.C.7c*: Use tiling to show in a concrete case that the area of a rectangle with whole-number side lengths a and $b + c$ is the sum of $a \times b$ and $a \times c$. Use area models to represent the distributive property in mathematical reasoning.

Related Standards

- *CCSS.MATH.CONTENT.3.MD.C.7* Relate area to the operations of multiplication and addition. (This is the main standard under which this lesson falls).



Objectives

In this module, you will learn and practice the following skills:

- Apply the distributive property
- Solve for area
- Create an area model

Let's get started!

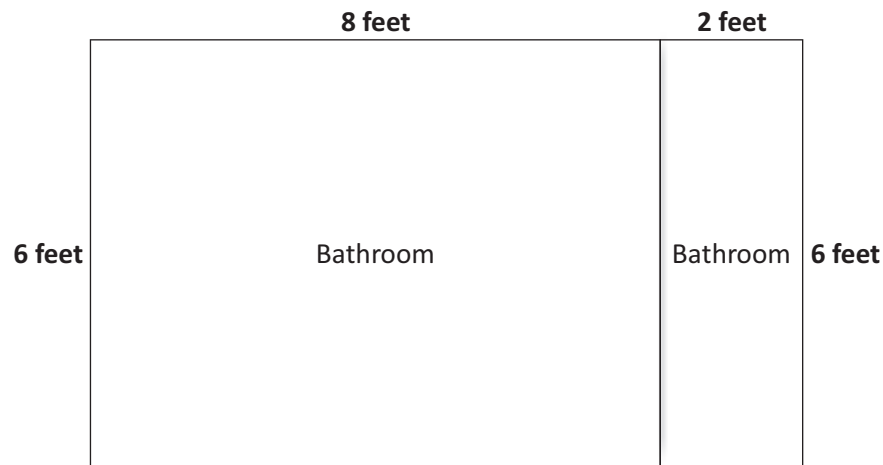
Key Terms

- **Area** is the space within a closed shape
- An **area model** uses a rectangle divided into rows and columns to demonstrate multiplication
- The **distributive property** tells us that a multiplication fact can be broken into the sum of two other multiplication facts
- **Tiling** a rectangle means covering the shape with smaller pieces so that there are no gaps or overlaps



Welcome

Area is the space within a closed shape. A large rectangular area can be divided into sections. Look at the below problem.



This is Mark's room. What is the area of the whole space?

Before we can solve this area problem, we must first understand the distributive property.

Watch!

For a quick overview of finding area, watch this video:

- <https://www.opened.com/video/area-of-a-rectangle-yourteacher-com-math-help/63187>

Focus: Distributive Property

The distributive property says that whenever we have a math problem such as $4(3+2)$, we can multiply both numbers inside the parenthesis by the number outside the parenthesis.

$$4(3+2)$$

First multiply 4×3 to get an answer of 12

$$4(3+2)$$

Then multiply 4×2 to get an answer of 8


Add the sums $12 + 8$ to get an answer of **20**



Let's look at a word problem.

Jenna wants to buy 3 books that cost 5 dollars each and 3 bookmarks that cost 2 dollars each. How much money will it cost to buy the books and book marks?

We can use $5 + 2$ to represent how much she would spend on one book and a bookmark. Since she is buying 3 sets of books and book marks, we must re-write the problem as $3(5+2)$ to show she is buying 3 sets of items that cost 5 dollars and 3 sets of items that cost 2 dollars.


$$3(5 + 2)$$

First multiply 3×5 to get an answer of 15


$$3(5 + 2)$$

Then multiply 3×2 to get an answer of 6

Add the sums $12 + 8$ to get an answer of **21**

Answers

The question asks us to find the area of Mark's room. You can use the distributive property to set up and solve the equation. Because area is equal to width times length, using the equation $6(8+2)$ gives us an area of 60 square feet.

Watch!

For a quick overview of finding area using the distributive property, watch this video:

- https://www.youtube.com/embed/iPCXN3P_JpY

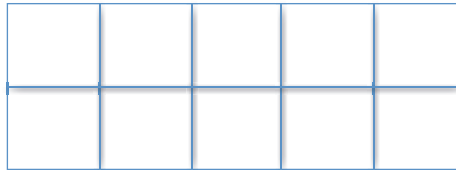
Now that you know how to use the distributive property, how can we apply it to an area problem?



Explore

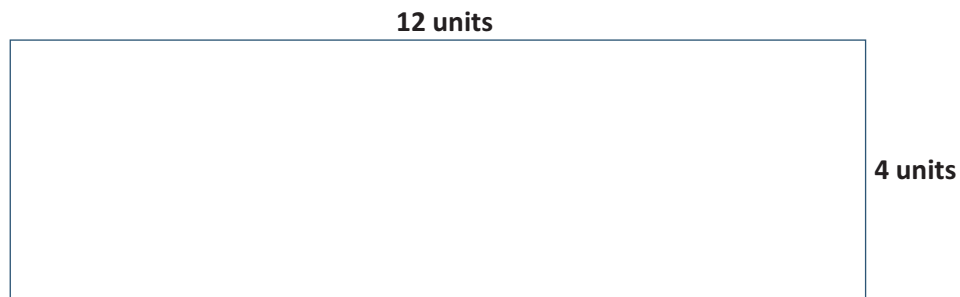
Tiling a rectangle means covering the shape with smaller pieces so that there are no gaps or overlaps. This is a strategy we can use to find **area**, or the space within a closed shape.

After tiling a rectangle, you can count the unit squares to find the area.

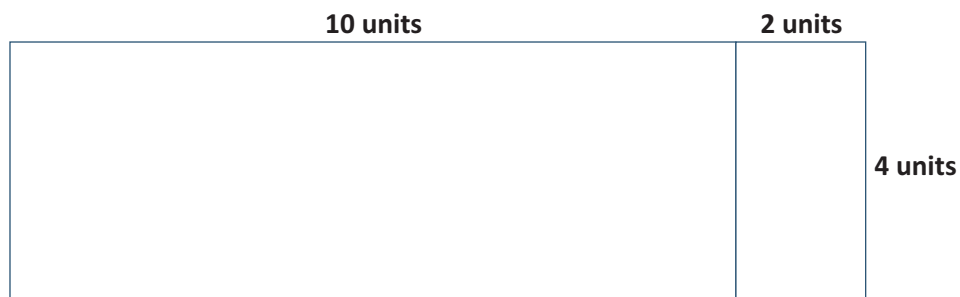


Counting the unit squares in this rectangle gives us an area of 10 square units

Sometimes rectangles are so big that tiling would take a long time. Let's look at a larger rectangle as an **area model**, which is a rectangle divided into rows and columns to demonstrate multiplication. This rectangle has a length of 12 units and a width of 4.



The goal of an area model is to make multiplication easier. To make an area model, break the rectangle's length into two more manageable parts:



The formula to find the area of a rectangle is $A = w/l$, or area is equal to the width times the length. Earlier in the lesson we learned about the **distributive property**, which tells us that a multiplication fact can be broken into the sum of two other multiplication facts. We can apply the distributive property to solve for the area of the whole rectangle. The area formula for this rectangle is $A = 4(10+2)$.

$$4(10 + 2)$$

First multiply 4×10 to get an answer of 40

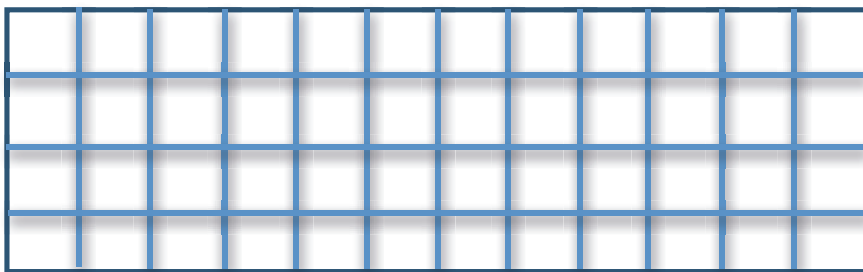
$$4(10 + 2)$$

Then multiply 4×2 to get an answer of 8

Add the sums $40 + 8$ to get an answer of **48**

The area is 48 square units.

Would we have gotten the same answer if we had tiled the rectangle? Let's look.



When tiling, all unit squares should be the same size as each other

Counting the tiles above shows an area of 48 square units, which is the same answer we reached by making an area model and applying the distributive property.

Watch!

For more information about area, watch these videos:

- <http://www.tvokids.com/videos/findingarea>

Practice!

You can practice finding area and using the distributive property by completing these activities:

- <https://www.ixl.com/math/grade-3/area-of-squares-and-rectangles-word-problems>
- <https://www.ixl.com/math/grade-3/multiply-using-the-distributive-property>
- <https://www.ixl.com/math/grade-3/create-figures-with-a-given-area>

