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## **Module 5 - Lesson 9:**

Organize, count, and represent a collection of square tiles.

**CCSS Standard – 5.NF.B.4.b**

**FLUENCY** (10-min)

**Counting on the Number Line by Centiliters and Liters**

Use the number line to count forward by 50 centiliters to 300 centiliters.

The first measurement you say is 0 centimeters? Ready?



Now count forward by 50 centiliters again. This time rename every 100 centiliters as a number of liters.

The first measurement you say is 0 liters. Ready?

Now count forward by 50 centiliters again. This time used mixed units, liters and centiliters, when possible.

The first measurement you say is 0 liters. Ready?

**FLUENCY** (10-min)

**Whiteboard Exchange: Multiply a Fraction by a Whole Number**



Write and complete the equation.

$$4 \times \frac{1}{3} = \underline{\hspace{2cm}}$$

$$3 \times \frac{2}{3} = \underline{\hspace{2cm}}$$

$$5 \times \frac{1}{4} = \underline{\hspace{2cm}}$$

$$7 \times \frac{3}{4} = \underline{\hspace{2cm}}$$

$$10 \times \frac{4}{5} = \underline{\hspace{2cm}}$$

$$9 \times \frac{5}{6} = \underline{\hspace{2cm}}$$

**LAUNCH** (5-min)

Reason about how to find the number of square tiles with fraction side lengths needed to cover a rectangular area.

The owner of the home wants to put tiles on the top of the island in the kitchen.

What information do we need before we can find how many tiles it will take to cover the top of the island?

- How big are the tiles?
- What is the length and width of the island? or
- What is the AREA of the island?

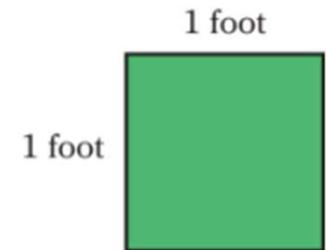
The island in the kitchen measures 3 feet by 7 feet.

Now do we have enough information to find how many tiles will cover the island?

*No! We still need to know the length and width of the tiles!*



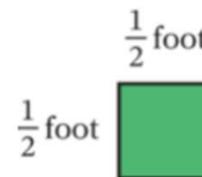
What if the owner used these tiles?



*AREA is  $3\text{ft} \times 7\text{ft} = 21 \text{ feet squared}$ . Using these tiles, they would need **21 tiles**.*

*$21 \div 1 = 21$*

What if the owner used these tiles?



**TURN & TALK:**

*How could you find the number of square tiles with sides lengths of  $\frac{1}{2}$  foot?*

*Today, we will use square tiles to tile a region and find its area.*

**LEARN** (40-min)

**Tile Rectangles**

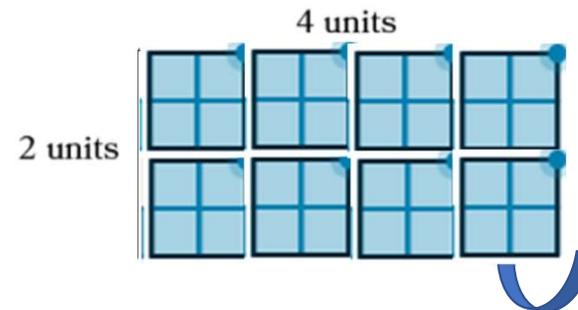
**LEARN book page 71.**

1. How many square tiles with side lengths of  $\frac{1}{2}$  unit are needed to cover the rectangle without gaps or overlaps?

**THINK-PAIR SHARE:**

How could we find the number of square tiles with side lengths of  $\frac{1}{2}$  unit?

- Draw in the lines to show 2 units by 4 units ("by" means multiplication, so 2 by 4 = 8)



Can we use what we have drawn so far to find many square tiles with side lengths of  $\frac{1}{2}$  unit we need to cover the rectangle?

If it takes 4 tiles to cover 1 unit square, or to make 1 square unit, what is the **AREA of EACH tile**?

$$1 \div 4 = \frac{1}{4}$$

Each tile has an area of  $\frac{1}{4}$  square unit.

$$A = L \times W$$

$$2 \times 4 = 8$$

$$8 \div \frac{1}{4} = 32 \text{ tiles}$$

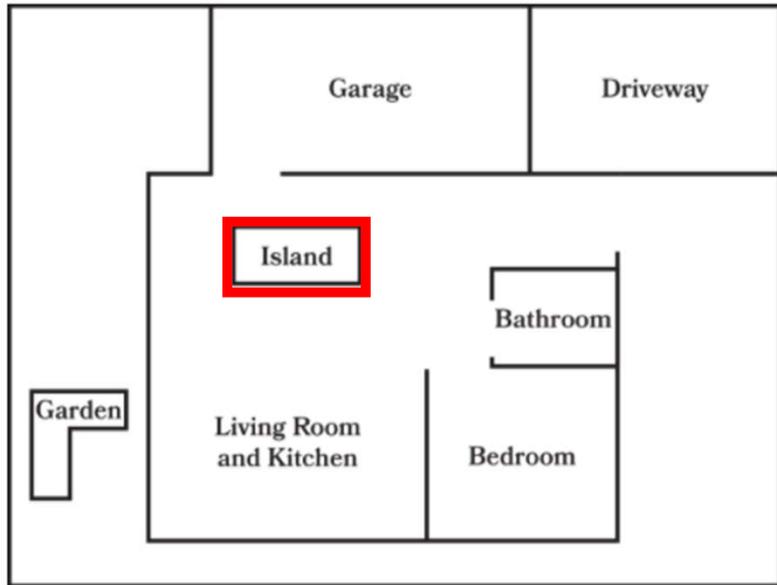
*No! The tiles above have a side length of 1 unit not a  $\frac{1}{2}$  unit.*

*4 squares with side lengths of  $\frac{1}{2}$  unit are needed to tile one unit square.*

How many square tiles with side lengths of  $\frac{1}{2}$  unit do you need to cover the rectangle?

**LEARN** (40-min)

Let's return to our Launch problem:



The island in the kitchen measures 3 feet by 7 feet.



**What do we know already?**

*The island measures 3 feet by 7 feet so the AREA is **21 square feet**.*

*It would take **21 one-foot tiles**, but the owner wants to use  $\frac{1}{2}$  foot tiles.*

*The owner will need **more than 21 tiles** when using  $\frac{1}{2}$  foot tiles because  $\frac{1}{2}$  foot tiles are smaller.*

*Each tile is  $\frac{1}{2}$  foot by  $\frac{1}{2}$  foot, so  $\frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$ . Each tile has an area of  $\frac{1}{4}$  square unit*

$$\frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$$

Each tile has an area of  $\frac{1}{4}$  square unit.

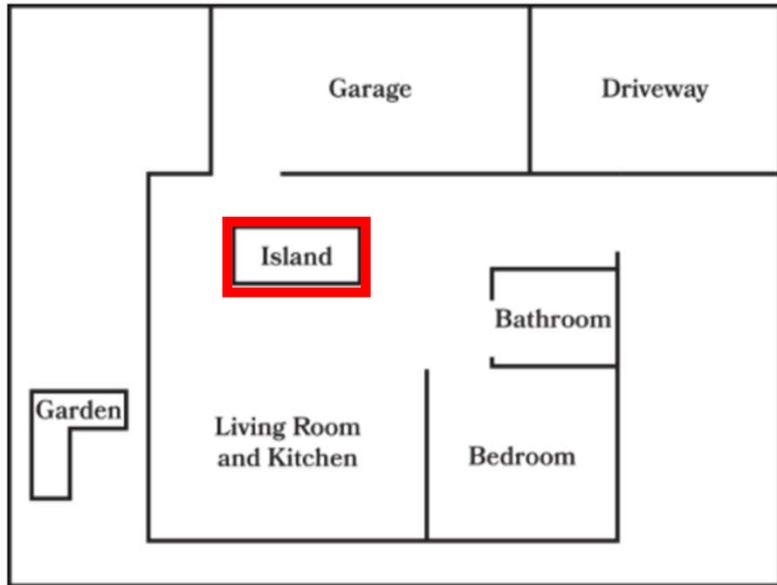
$$A = L \times W$$

$$3 \times 7 = 21$$

$$21 \div \frac{1}{4} = 84 \text{ tiles}$$

**LEARN** (40-min)

Let's return to our Launch problem:



The island in the kitchen measures 3 feet by 7 feet.

What is the owner wanted to use  $\frac{1}{3}$  foot tiles?

*The island measures 3 feet by 7 feet so the AREA is 21 square feet.*

*It would take 21 one-foot tiles, but the owner wants to use  $\frac{1}{2}$  foot tiles.*

*The owner will need **more than 21 tiles** when using  $\frac{1}{3}$  foot tiles because  **$\frac{1}{3}$  foot tiles are smaller.***

*Each tile is  $\frac{1}{3}$  foot by  $\frac{1}{3}$  foot, so  $\frac{1}{3} \times \frac{1}{3} = \frac{1}{9}$ . Each tile has an area of  $\frac{1}{9}$  square unit*

$$\frac{1}{3} \times \frac{1}{3} = \frac{1}{9}$$

Each tile has an area of  $\frac{1}{9}$  square unit.

$$A = L \times W$$
$$3 \times 7 = 21$$
$$21 \div \frac{1}{9} = 189 \text{ tiles}$$

**LEARN** (40-min)

**Organize, Count, and Record**

Use the Tiles Counting Collection on pages 67 & 69.  
Use the Recording Page on page 72 (LEARN book)

For this counting collection, I am partners with \_\_\_\_\_.

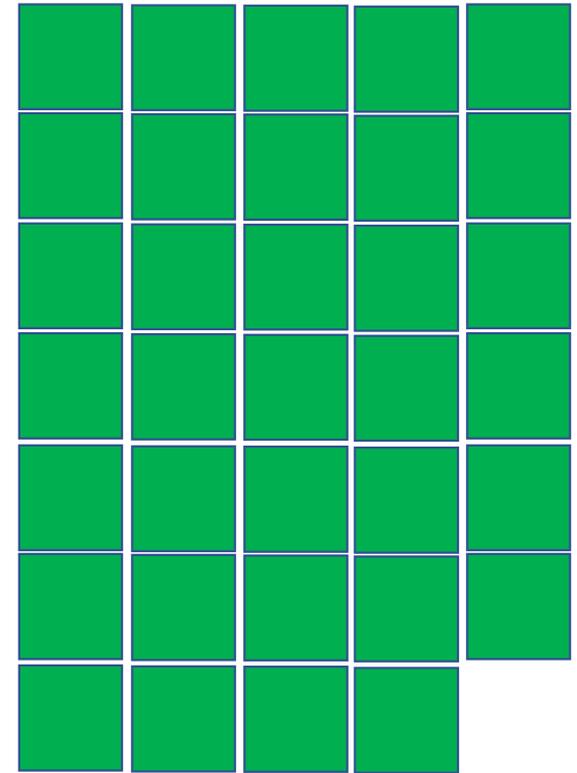
We are counting \_\_\_\_\_.

We think they cover a total area of \_\_\_\_\_.

This is how we organized and counted the collection:

We counted a total area of \_\_\_\_\_ altogether.

This is an equation that describes how we counted.



The side length of each tile is  $\frac{1}{2}$  unit

**TASK #1:**

Count to find the **total area** that can be covered by your collection using  $\frac{1}{2}$  unit tiles.

**LEARN** (40-min)

**Organize, Count, and Record**

**Grouping Strategy:**

If each tile has a side measure of  $\frac{1}{2}$  unit, it will take 4 tiles to make 1 unit.  
 $\frac{1}{2}$  by  $\frac{1}{2} = \frac{1}{4}$  area for each tile.

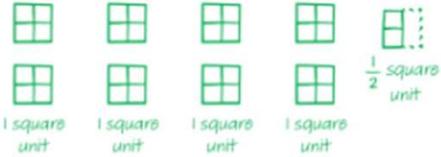
1 square unit

We are counting  $\frac{1}{2}$  unit by  $\frac{1}{2}$  unit tiles.

We think they cover a total area of \_\_\_\_\_.

This is how we organized and counted the collection:

1 square unit    1 square unit    1 square unit    1 square unit     $\frac{1}{2}$  square unit

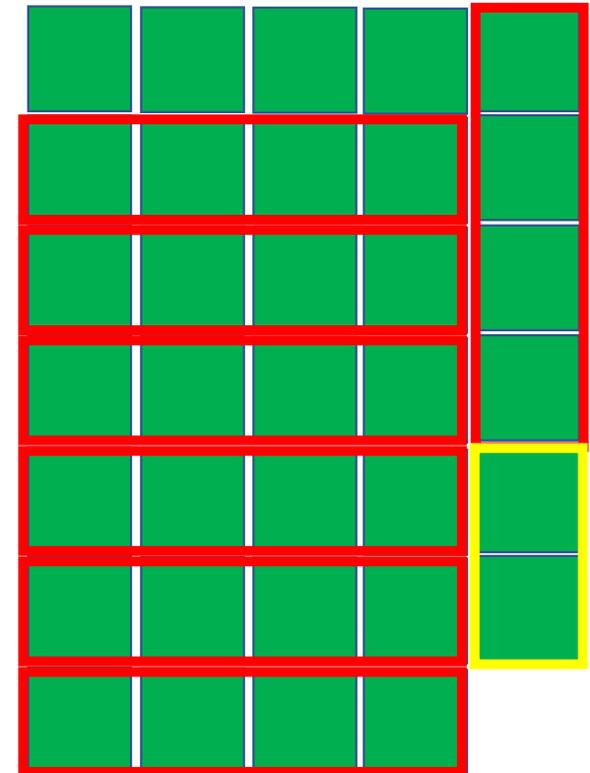


1 square unit    1 square unit    1 square unit    1 square unit

$8 \times 1 = 8$   
 $8 + \frac{1}{2} = 8\frac{1}{2}$   
Area:  $8\frac{1}{2}$  square units

We counted a total area of  $8\frac{1}{2}$  square units altogether.

This is an equation that describes how we counted.  **$8 \times 1 + \frac{1}{2} = 8\frac{1}{2}$**



That's 8 full square units and....  
 $\frac{1}{2}$  a square unit.

**LEARN** (40-min)

Organize, Count, and Record

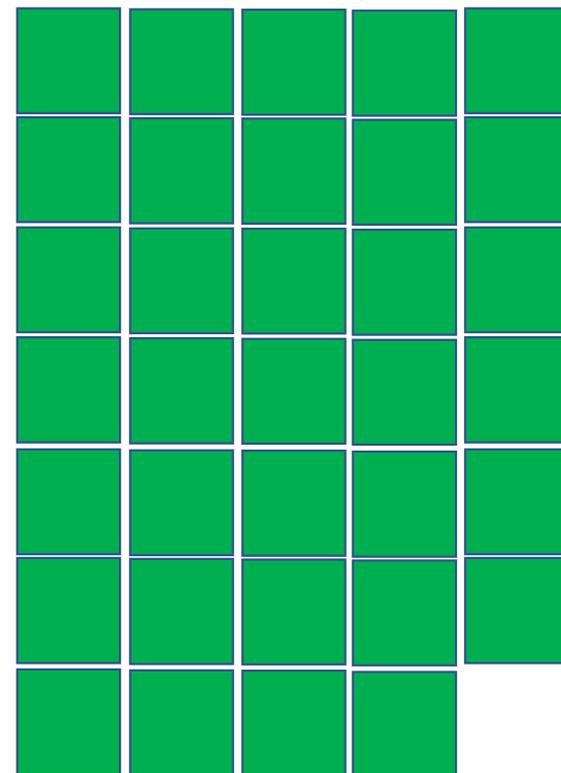
Another way of looking at it:

Each tile is  $\frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$

There are 34 tiles in all.

$$34 \times \frac{1}{4} = \frac{34}{4}$$

$$\frac{34}{4} = 8 \frac{2}{4} \text{ or } 8 \frac{1}{2} \text{ square units}$$



**LEARN** (40-min)

## Problem Set

LEARN book page 73.

$$\frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$$

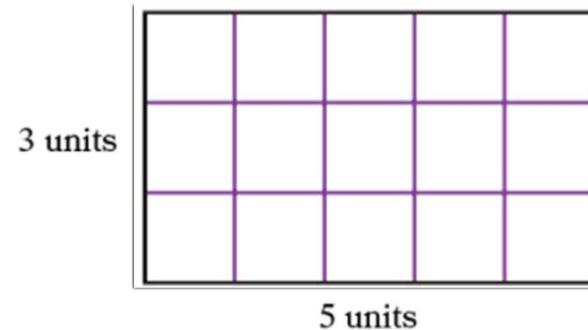
Each tile has an area of  $\frac{1}{4}$  square unit.

$$A = L \times W$$

$$3 \times 5 = 15$$

$$15 \div \frac{1}{4} = 60 \text{ tiles}$$

1. A rectangle with a length of 5 units and a width of 3 units is shown.



- a. Draw lines to partition the rectangle to show unit squares.
- b. **15** squares with side lengths of 1 unit are needed to cover the rectangle.
- c. How many square tiles with side lengths of  $\frac{1}{2}$  unit are needed to cover the rectangle?

**60 tiles**

**LEARN** (40-min)

**Problem Set**

LEARN book page 73.

$$\frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$$

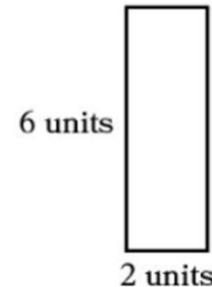
Each tile has an area of  $\frac{1}{4}$  square unit.

$$\frac{1}{3} \times \frac{1}{3} = \frac{1}{9}$$

Each tile has an area of  $\frac{1}{9}$  square unit.

$$\begin{aligned} A &= L \times W \\ 6 \times 2 &= 12 \\ 12 \div \frac{1}{9} &= 108 \text{ tiles} \end{aligned}$$

$$\begin{aligned} A &= L \times W \\ 6 \times 2 &= 12 \\ 12 \div \frac{1}{4} &= 48 \text{ tiles} \end{aligned}$$



2. It takes 48 square tiles with side lengths of  $\frac{1}{2}$  unit to cover the rectangle shown.

- a. Kayla says that it would take more than 48 square tiles with a side length of  $\frac{1}{3}$  unit to cover the rectangle. Do you agree? Explain.

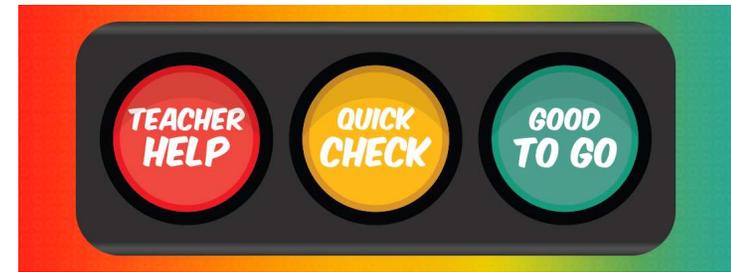
**Agree.  $\frac{1}{3}$  unit tiles are smaller than  $\frac{1}{2}$  unit tiles, so it will require more of them.**

- b. How many tiles does it take?

**108 tiles.**

**LAND** (10-min)

## Exit Ticket



9

Name \_\_\_\_\_

Date \_\_\_\_\_

1. What is the total area of 25 square tiles if each tile has side lengths of  $\frac{1}{3}$  unit?
  
  
  
  
  
  
  
  
  
  
2. A rectangle has side lengths of 3 feet and 5 feet. How many square tiles with side lengths of  $\frac{1}{6}$  foot would it take to cover the rectangle?

Exit Ticket – PAGE 75

**Small Group Time:**

Problem Set Pages 73 - 74

**Homework:**

Page 59 APPLY BOOK