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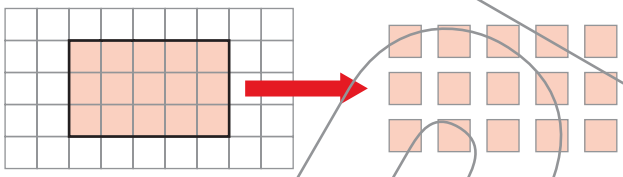
LESSON
31 Finding Area

MGSE3.MD.7a, 7b, 7c

PART 1 Introduction

A **plane figure** is a flat shape. **Area** is a measure of the space inside the figure. In Lesson 30, you learned to measure area by covering the plane figure with unit squares. For rectangles and squares, you can use another method as well. You can multiply the length by the width.

What is the area of the rectangle?



Count the unit squares that cover the rectangle. There are 15 in all. So the area is 15 square units.

Think of the unit squares in a rectangle as an array.

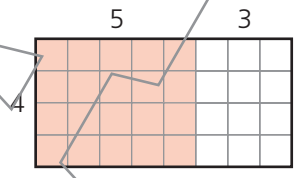
Now look again at the unit squares. There are 3 rows of 5 unit squares. Multiply:

$$3 \times 5 = 15$$

The area is 15 square units. Both methods give the same result.

Most of the time, you will not see the square units in a figure. You will only know the measurements. The **distributive property** can help you find the area.

Find the area of the large rectangle.



The length of the rectangle in units is 5 + 3. The width of the rectangle is 4 units. In order to find the area, you multiply the length by the width.

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$$4 \times (5 + 3) =$$

$$(4 \times 5) + (4 \times 3) = 20 + 12$$
$$= 32 \text{ square units}$$

The area is the sum of the areas of the two rectangles (shaded and not shaded).

The distributive property says that multiplying a number by a sum is the same as multiplying each number in the sum.

$$a \times (b + c) = (a \times b) + (a \times c)$$
$$4 \times (3 + 1) = (4 \times 3) + (4 \times 1)$$
$$4 \times 4 = 12 + 4$$
$$16 = 16$$

Think About It

What is something someone might need to know the area of in real life? Why?

_____

_____

_____

PART 2 Focused Instruction

You can use square tiles to help you understand area. Work with a partner.

➤ Cut a piece of paper so that you have a rectangle that measures 6 inches long and 5 inches wide.

What is the length of the rectangle? _____

Label the length on your rectangle.

What is the width of the rectangle? _____

Label the width on your rectangle.

Use your square tiles. Cover your rectangle with unit squares.

How many unit squares can you use to cover the rectangle? _____

What is the area of the rectangle? _____

How else can you find the area without using unit squares?

_____

Use the other method to find the area. Show your work.

Did you find the same area using both methods? _____

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Sometimes it helps to draw a picture. Use a picture to help you solve this problem.

➤ Samson is painting the roof of a birdhouse. The roof is 8 inches long and 7 inches wide. He has enough craft paint left to cover 50 square inches.

On a separate piece of paper, draw the roof of the birdhouse. Label the length and width.

Draw grid lines on the roof to divide it into equal squares. Make the side of each square 1 inch.

How many inches long is the roof? _____

How many inches wide is the roof? _____

How many squares did you draw on the roof? _____

What operation can you use to find the area? _____

Find the area using this operation.

_____

Did you get the same area as when you counted squares? _____

Use what you know about area to answer these questions.

1 Keaton's poster is 15 inches long and 10 inches wide. How many square-inch tiles could he cover it with? _____

2 Mariah drew a rectangle on the playground with chalk. It is 5 feet long and 4 feet wide. What is the area of the rectangle? _____

3 A rectangle is 2 meters wide and 5 + 3 meters long.

What is the area of the rectangle? _____

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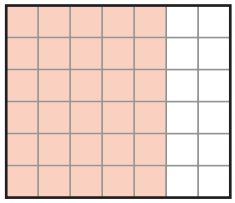
Solve the following problems.

1 Fill in the equation to show the area of the rectangle below.



Use the distributive property to solve.

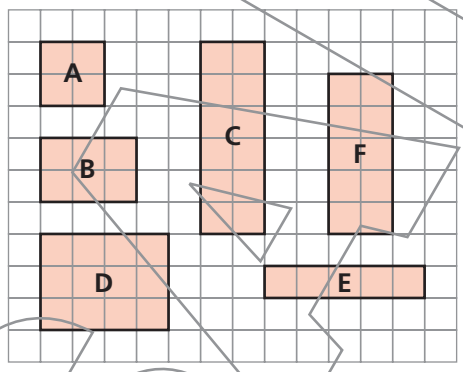
Answer _____ × (_____ + 2) = _____ square units

2 Alex has a rectangular office that is 7 feet wide and 9 feet long. He wants to cover the floor with carpet. What is the area of Alex's office floor? Show your work.

You can draw a picture to help you solve a problem.

Answer _____ square feet

3 Which two rectangles have the same area?



Figures can have the same area but not look the same.

Answer _____

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Solve the following problems.

1 Which expression can you use to find the area of the rectangle shown?

2 inches

8 inches

A 8×8

B $8 + 2$

C 8×2

D $8 + 8 + 2 + 2$

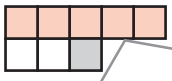
2 Draw a unit grid to find the area of the rectangle at the right. How does the area you found compare with the area found by multiplying? Explain.

8

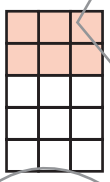
3

3 Which area model shows that $5 \times (2 + 1) = (5 \times 2) + (5 \times 1)$ is true?

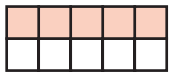
A



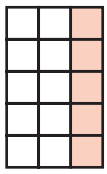
B



C



D



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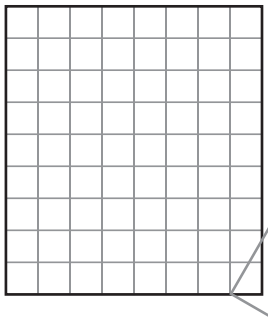
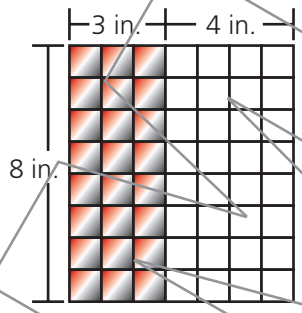
4 Archie wants to cover the top of his model table with colored paper. The top of the table is shown.



How many square centimeters of paper does Archie need if each square equals 1 square centimeter?

Answer _____ square centimeters

5 Ronit is covering a table with tiles to make the design shown.



Which expressions could be used to find the area, in square inches? Select the **two** correct answers.

A $(8 \times 3) + (8 \times 4)$

B $(8 + 3) \times (8 + 4)$

C $3 \times 4 \times 8$

D $8 \times (3 + 4)$

E $3 + 4 + 8$

F $8 + (3 \times 4)$

SAMPLE

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6 Celia is covering her kitchen floor with tiles that are each 1 square foot. The floor is in the shape of a rectangle that is 6 feet wide and 9 feet long. How many tiles does she need to cover the entire kitchen floor?

Answer _____ tiles

7 Sally built a puzzle using 42 square units. What are possible dimensions of the puzzle?

Answer _____

8 Alyssa wants to wallpaper one wall of her living room. The wall is 9 feet high and 18 feet long.

Part A How many square feet of wallpaper will Alyssa need to cover the wall? Show your work.

Answer _____

Part B The wallpaper Alyssa has chosen comes in rolls that are 3 feet wide and 24 feet long. How many rolls of wallpaper will Alyssa need to cover the wall? Explain.

_____

_____

_____

_____

_____

SAMPLE

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