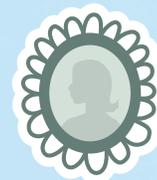Unit **2**

Area and Multiplication

Essential Questions

- How are equal groups, arrays, and area related?

- How is area related to multiplication?

☀ Unit Story:
Cheri's New Home
You can read the Unit Story with your student by visiting the Unit Story page on the Caregiver Hub.

🔍 Unit Investigation

Lesson 1 is the Unit Investigation. Students compare the sizes of different shapes to build curiosity and apply their own knowledge in a variety of ways. Use the **Caregiver Connection** to help students continue to explore the math they will see in the unit.

Caregiver Connection

Students may enjoy comparing the sizes of objects based on two dimensions at home, such as rugs, plates, magazines, or picture frames. You can ask:

- "How do you know which is the largest?"
- "Which shapes make comparisons more clear? When is it challenging to decide which object is the largest?"
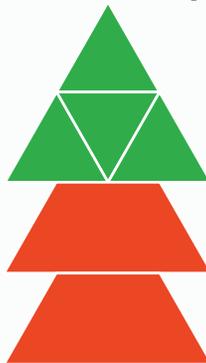
When comparing the **areas** of 2 or more shapes, using the same unit to cover each shape helps you determine which shape is the largest by comparing the number of units.
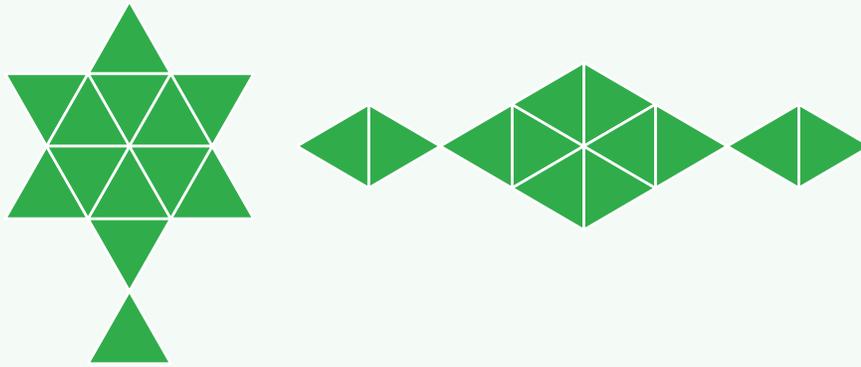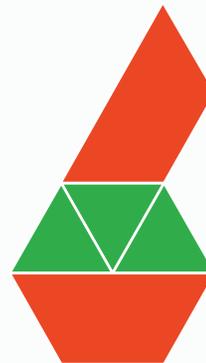
Try This

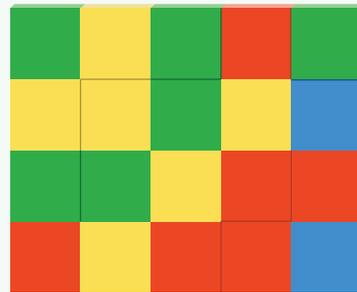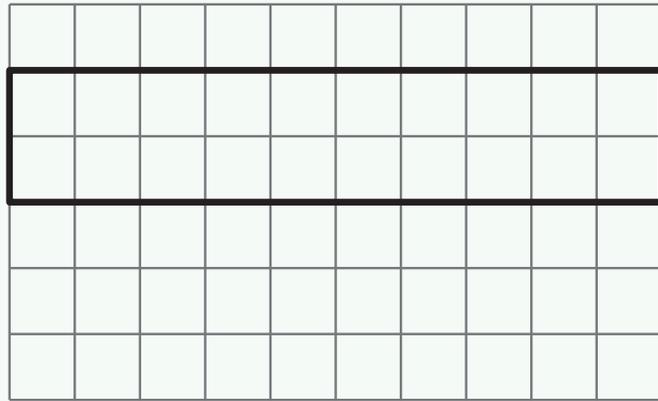1 Jada and Priya made these shapes using pattern blocks.

Jada's shape   **Priya's shape**

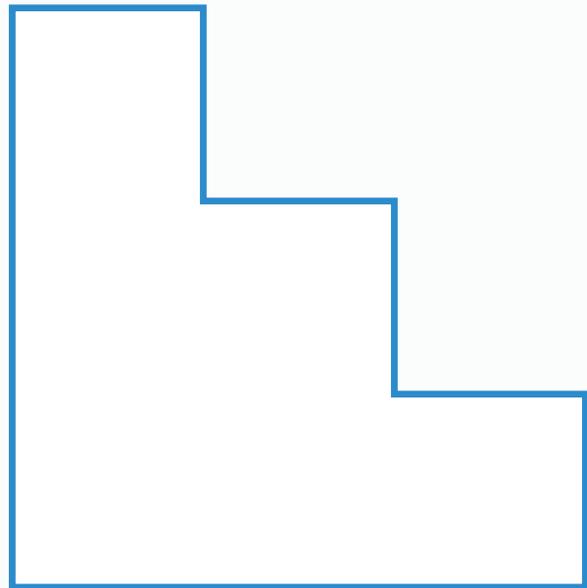Which shape has a larger area? Explain your thinking.

_____

_____

_____

Rectangles can have different lengths and widths and still have the same area. The area of a rectangle can be determined by counting the number of square units that fill the rectangle without gaps or overlaps.
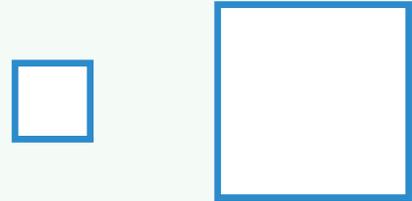
Try This

1 Use square tiles to determine the area of the figure. Explain your thinking.

There are different standard square units used to measure area, which are related to units of length. There are times when it might make more sense to use 1 unit over another, depending on the space being measured.

Some standard units of area:
- square centimeters
- square inches
- square feet
- square meters

Try This

1 Consider the 2 squares. One square is a square centimeter, and the other square is a square inch.

Which square is a square centimeter? Which square is a square inch? Explain your thinking.

A

B

_____

_____

_____

When a rectangle is filled with square units, its area can be determined using the same strategies used for counting the number of objects in arrays.
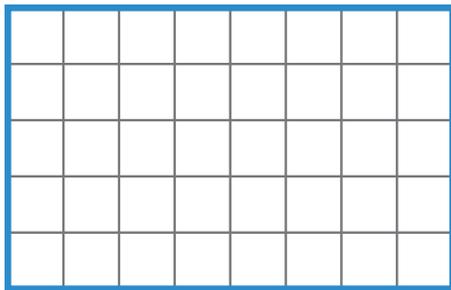

6
12
18
24
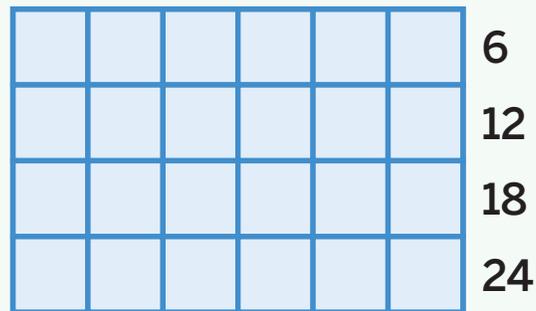
Try This

Determine the area of the rectangle.
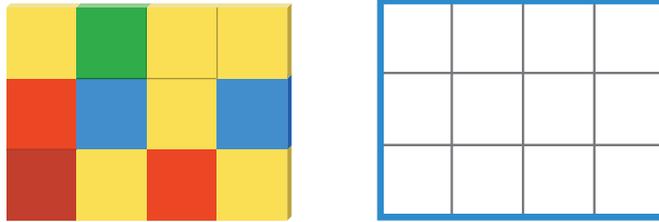
ⓘ **Show or explain your thinking.**

1

answer: _____

In this sub-unit . . .

- We thought about area as an attribute of two-dimensional shapes that describes the amount of space covered by a shape.

- We precisely compared the areas of shapes by covering them with common units, such as pattern blocks or square tiles, and then comparing the number of units.

- The area of a shape can be given as the number of squares that covers the shape without gaps or overlaps.

    🔥 *Math tip:* To determine the number of square tiles used to cover a rectangular space, you can count, skip count, or use multiplication.

- We defined **area** as the amount of space taken up or covered by a shape. It is measured in square units. There are different square units that can be used, depending on the size of the shape.
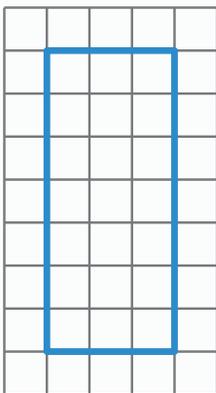
    Each ☐ is 1 square inch.
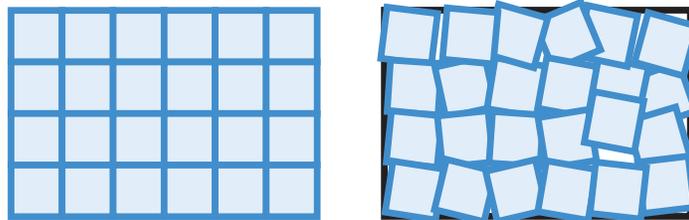
You can write an expression to represent the area of a rectangle. The factors describe the number of rows and the number of square units in each row, similar to the structure of arrays.
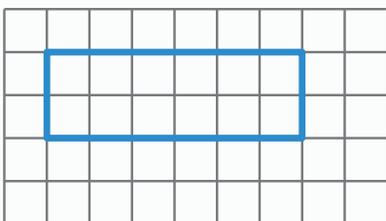

$$2 \times 7$$
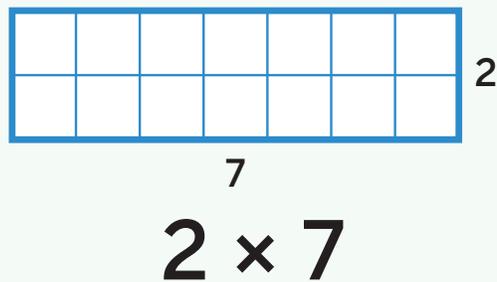
Try This

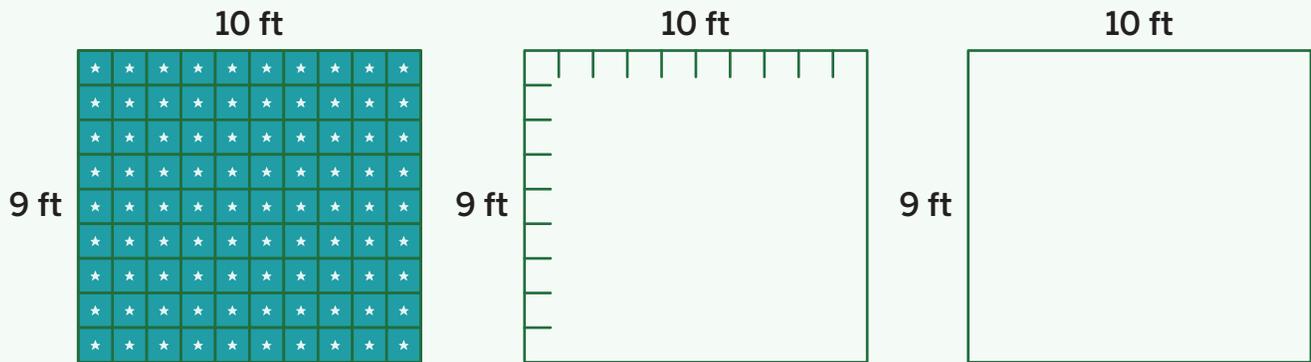**For Problems 1 and 2, write a multiplication expression that represents the area of the rectangle.**

1

_____

2

_____

The area of a rectangle can be determined by multiplying the 2 side lengths.

10 ft

9 ft

10 ft

9 ft

10 ft

9 ft

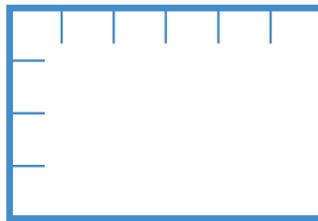$$9 \times 10 = 90$$

90 square feet

Try This

Determine the area of the rectangle.

💬 **Show your thinking.**
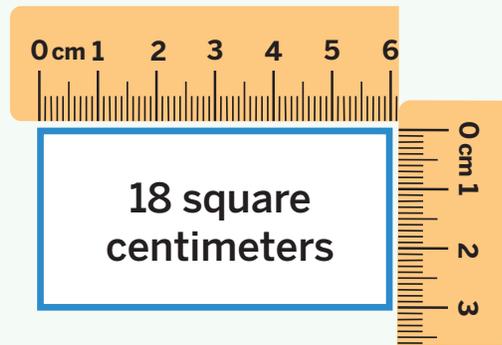
1 The space between 2 tick marks represents 1 centimeter.

expression: _____

area: _____

The areas of rectangular objects can be determined by measuring and multiplying the 2 side lengths.

Try This

1 Use a centimeter ruler to measure the side lengths of the rectangle. Then write an equation that represents the area of the rectangle.

One-step and two-step real-world area problems can be solved with 1 or more unknown measurements.

3 ft

3 ft | 24 square feet

$$3 \times ? = 24$$

Try This

1 Han has 40 carpet squares that are 1 foot on each side. He wants to use all of them to make a rectangular carpet for his room. For the carpet to fit in the room, the longest side cannot be more than 12 feet. What side lengths could Han's carpet have?
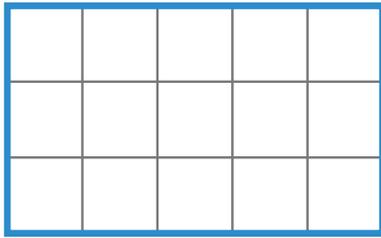
ⓘ **Show or explain your thinking.**

answer: _____

In this sub-unit . . .

- We continued to explore the areas of rectangles with gridded squares. The equal groups of unit squares in rows and columns are similar to arrays and can be related to multiplication.

3 rows of 5 squares = 3 × 5

- We considered the areas of rectangles without each unit square shown, such as those showing tick marks or labeled side lengths.

5 ft

3 ft
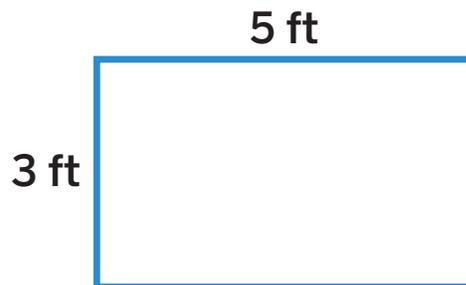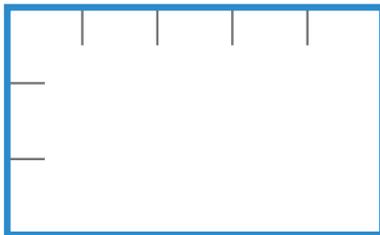
- We wrote expressions and equations to represent the areas of rectangles and solved problems involving area.

A wall that Cheri is painting is 3 feet wide and 5 feet long. What is the area of the wall?   *3 × 5 = 15*   *The area of the rectangle is 15 square feet.*

🔥 *Math tip:* The length of 1 side of a rectangle is a factor, and the length of the other side is the other factor. The area is the product.

The area of a figure composed of rectangles can be calculated by decomposing it into rectangles, determining the area of each rectangle, and adding the areas of the rectangles.

15 square units
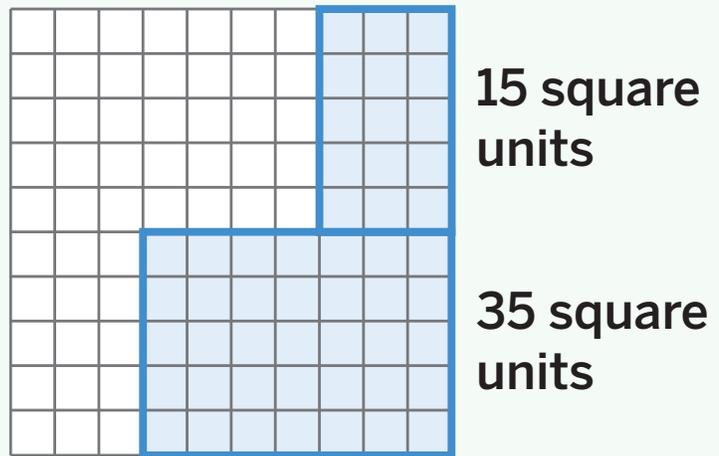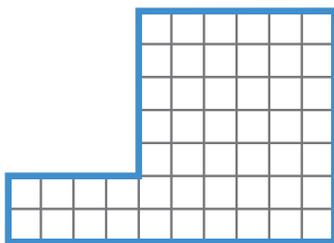
35 square units

15 + 35 = 50,
so 50 square units

Try This

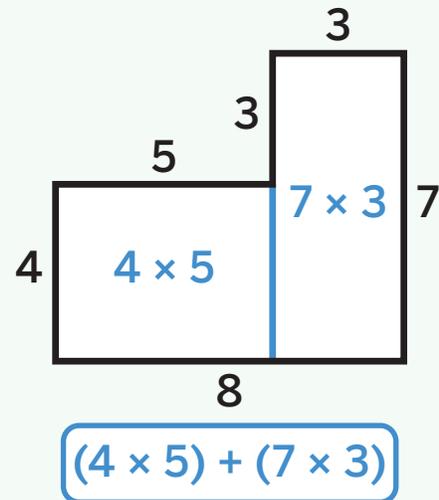Determine the area of the figure in square units.

ℹ Show or explain your thinking.

1

answer: _____

The area of a non-gridded figure can be calculated by decomposing it into rectangles, multiplying the side lengths to determine the area of each rectangle, and adding the areas of the rectangles.

$$3$$
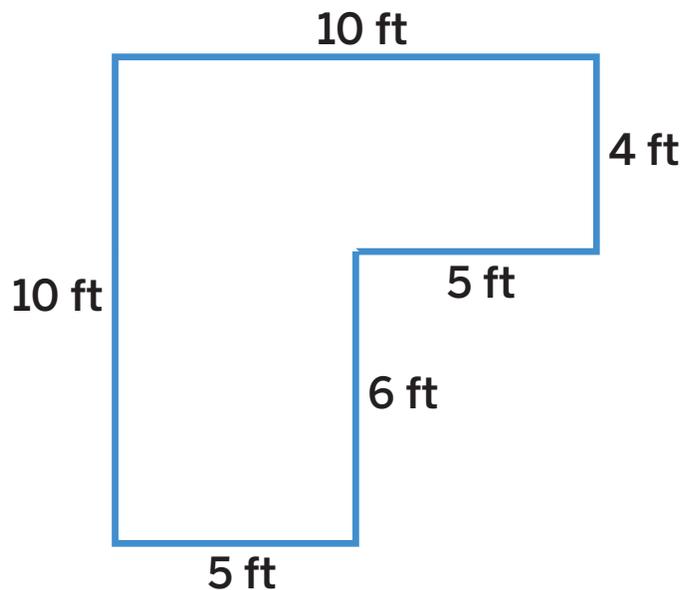$$3$$
$$5$$
$$7 \times 3 \quad 7$$
$$4 \quad 4 \times 5$$
$$8$$
$$(4 \times 5) + (7 \times 3)$$

Try This

Determine the area of the figure.

i **Show or explain your thinking.**

1

10 ft

4 ft

10 ft

5 ft

6 ft

5 ft
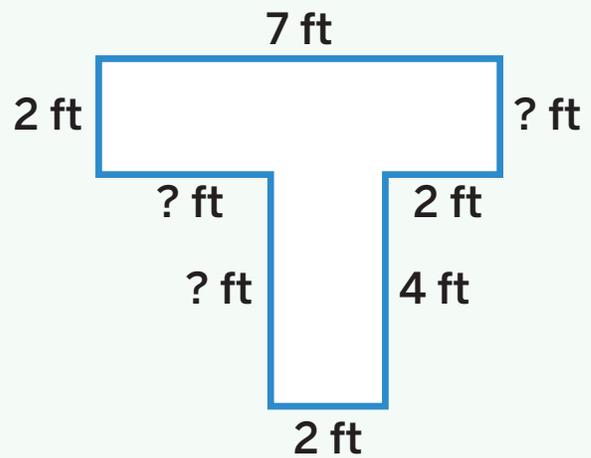
answer: _____

You can determine the area of a figure with an unknown side length by decomposing the figure into rectangles. Then you can use the structure of the figure to calculate the unknown side length.
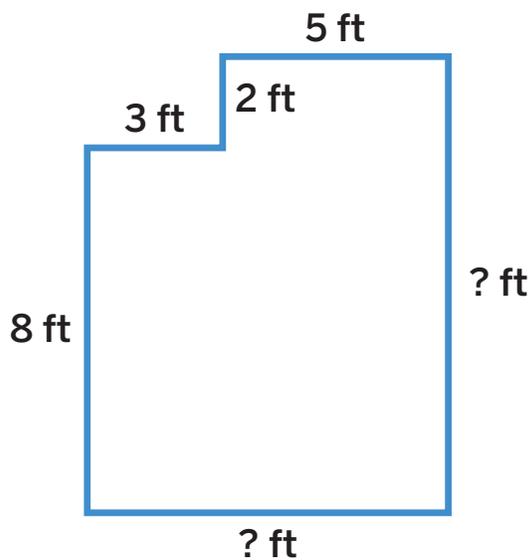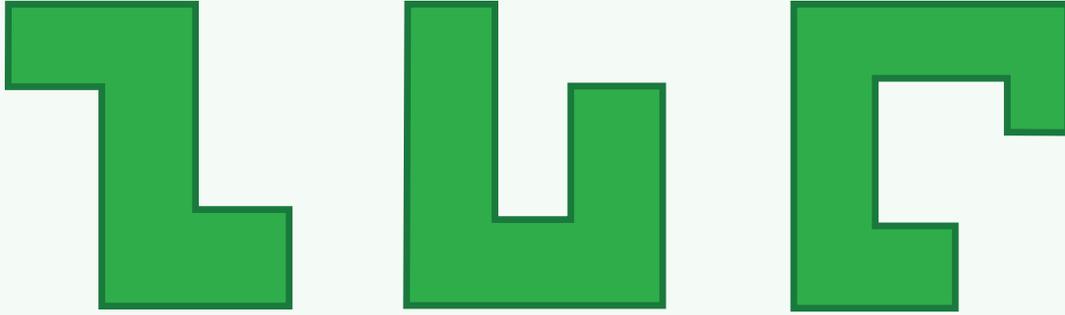

Try This

Determine the area of the figure.

> ℹ **Show or explain your thinking.**

1

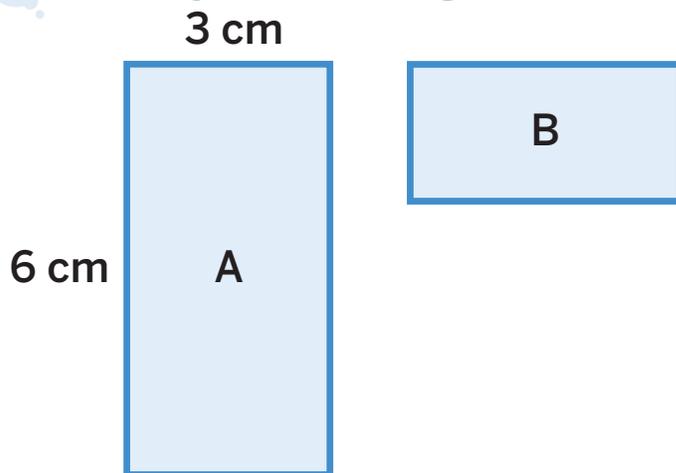answer: _____

Summary | Lesson 13

Area can be used to describe the size of many objects in the world. It can also be used to help design those objects. No matter the shape of the object, it is important to use square units when calculating its area.

Try This

1 Lin wants to combine Rectangles A and B into 1 figure that has a total area of 30 square centimeters. What could the dimensions of Rectangle B be?
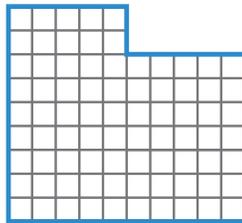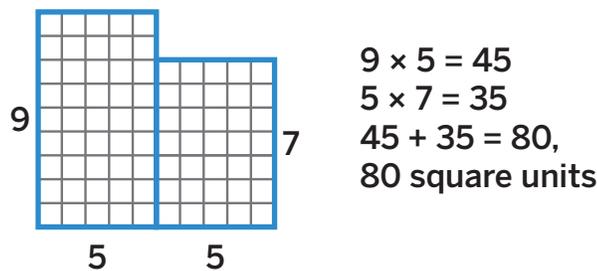
ℹ Show your thinking.

3 cm

B

6 cm   A

answer: _____

In this sub-unit . . .

- We determined the area of a figure by counting or skip counting the squares that cover the figure.

- We saw that figures could be decomposed into rectangles, and we calculated the areas of the figures.

$9 \times 5 = 45$
$5 \times 7 = 35$
$45 + 35 = 80,$
80 square units

🔥 *Math tip:* To determine the area of a figure made of rectangles, you calculate the areas of the rectangles inside the figure and add those areas.

- We used the structure of rectangles to determine unknown side lengths and then used those side lengths to calculate the area of the figure.
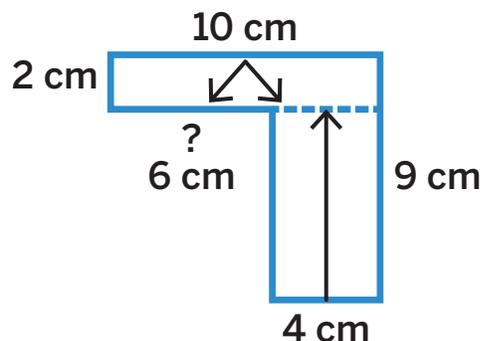
Lesson 2

1 Sample explanation: Jada's shape has a larger area. She used 2 trapezoids and 4 triangles, and Priya used 2 trapezoids and 3 triangles.

Lesson 3

1 Sample explanation: 6 square units; I fit 3 squares on the bottom, then 2 more, and then 1 on top. That is 6 total.

Lesson 4

1 Sample explanation: A is a square centimeter because it is smaller. B is a square inch because it is larger.

Lesson 5

1 Sample work: There are 5 rows of 8, so I skip counted by 5.

answer: 40 square units

Lesson 6

1 7 × 3 or 3 × 7

2 2 × 6 or 6 × 2

Lesson 7

1 Sample work:

1	2	3	4	5	6
2					
3					
4					

expression: 4 × 6 or 6 × 4
area: 24 square centimeters

Lesson 8

1 Sample equation: 3 × 8 = 24

Lesson 9

1 Sample work:
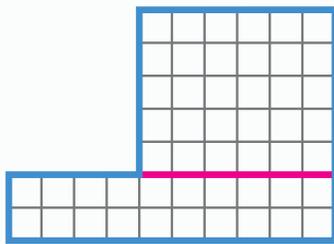5 feet and 8 feet because 5 × 8 = 40.
or
10 feet and 4 feet because 10 × 4 = 40.
 answer: 5 feet and 8 feet or 10 feet and 4 feet

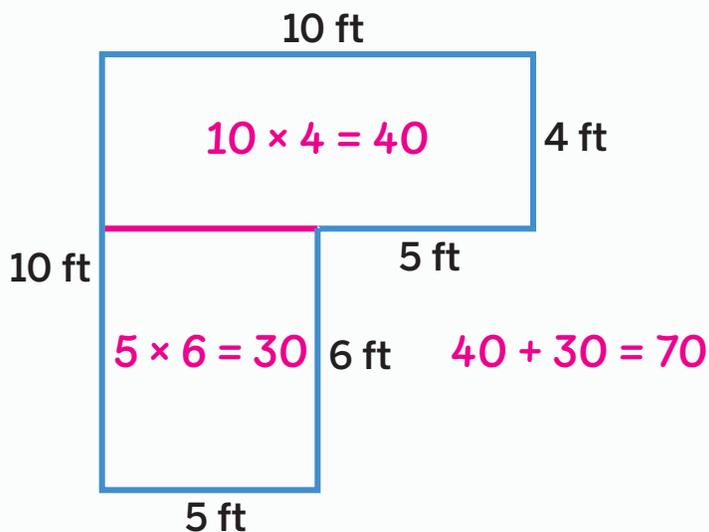## Lesson 10

1 Sample work:

I cut the figure into 2 rectangles. One has an area of 5 × 6, or 30 square units. The other has an area of 2 × 10, or 20 square units. The total area is 30 + 20, or 50 square units.
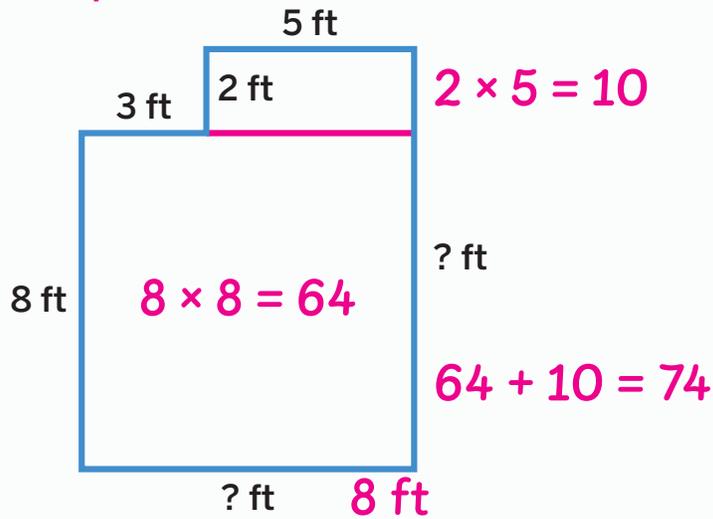
answer: 50 square units

Lesson 11

1 Sample work:

10 ft

10 × 4 = 40   4 ft

10 ft   5 ft

5 × 6 = 30   6 ft   40 + 30 = 70

5 ft

answer: 70 square feet

Lesson 12

1 **Sample work:**

5 ft

3 ft   2 ft

$2 \times 5 = 10$

8 ft $8 \times 8 = 64$

? ft

$64 + 10 = 74$

? ft   8 ft

answer: 74 square feet

Lesson 13

1 **Sample work:**

3 cm

4 cm

$3 \times 6 = 18$

B

3 cm

$30 - 18 = 12$

6 cm   A

$4 \times 3 = 12$
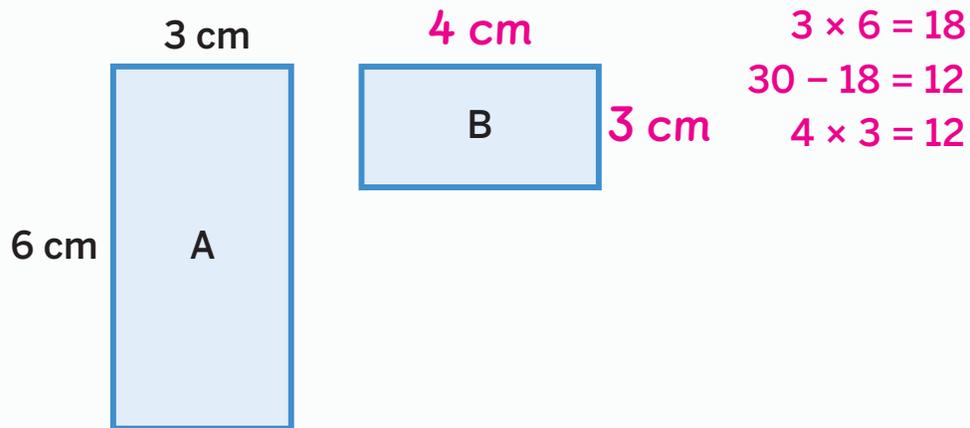
answer: 4 centimeters by 3 centimeters