



**THIRD SPACE  
LEARNING**

# Math Intervention Pack

Finding the missing side  
length

**Grade 4**

## How To Use This Resource

### 1. Title Slide

Use this slide to activate prior knowledge needed for lesson. Students should be encouraged to initially attempt the question presented independently.

### 2. Let's Learn

Use this slide to introduce the concept. Tutors should work with the student to explore the concept together, usually using diagrams to support understanding.

### 3. Follow Me + Your Turn

The tutor should work through the follow me slide, modeling the process and explaining their thinking out loud.

Students should use the your turn slide as an opportunity to work through a question similar to the follow me questions. They should apply the method modeled by the tutor in the follow me slide. Students should be encouraged to explain their thinking out loud.

### 4. You Do

Students should work through a range of questions that build in complexity.

Tutors can offer support but students should initially be encouraged to attempt these questions independently.

### 5. Go Further

Use this slide to allow students to apply their understanding to a more challenging question in an unfamiliar context.

### 6. Support for Slides

The support slide is used to support students during the lesson. In the tutor notes, there will be guidance as to when to use the support slide.

### 7. Check Your Understanding

Tutors should use this slide to assess the student's knowledge and whether or not they have mastered the concept within the lesson.

## Standard

**4.OA.4:** Apply the area and perimeter formulas for rectangles in real world and mathematical problems. For example, find the width of a rectangular room given the area of the flooring and the length, by viewing the area formula as a multiplication equation with an unknown factor.

## Key Mathematical Ideas

1. Given the area and the length of one side, find the area of the missing side
2. Use the area formula to solve unknown factor problems

## Overview

### Terminology

- **Area:** the size of a surface
- **Width:** the measure from one side to another.
- **Length:** the distances from end to end
- **Square unit:** the area of a square whose sides measure 1 unit used to measure area.
- **Inverse:** referring to operations; operations that are opposite of each other; for example, division is the inverse operation of multiplication and subtraction is the inverse operation of addition
- **Partial quotient:** a part of the quotient in division calculation, usually based on place value and distributive property
- **Missing factor:** the unknown factor when a product and one factor are known
- **Factor pair:** a pair of numbers that when multiplied give a product; for example 1 and 15, 3 and 5 are factor pairs for 15
- **Area model:** a method used with multi-digit multiplication that shows the total area as the sum of the area of its parts.

Sentence Stems

- \_\_\_\_cm x \_\_\_\_ cm = \_\_\_\_cm<sup>2</sup>
- The length of the missing side is \_\_\_\_\_.

Overview

Common Misconceptions

Common Misconceptions	Tutoring Strategies	Checks for Understanding
Students mix up area and perimeter.	Students may believe that they can only measure the length of a shape, and often will default to finding the perimeter because they can add up the outside measurement. You will need to ensure that students know that the area is the total space within the shape.	Is the question asking for you to find the area or the perimeter? How do you find the area?  How do you find the perimeter?



## Prior Learning

### Teaching prompts

- First, remind students of the equation for finding the area of a rectangle. This is written out in words in the yellow box, but you can write out a shorthand version for them to work with,  $A = L \times W$
- Remind them that the order doesn't matter for how they multiply the sides because of the Commutative Property of Multiplication, which states you can multiply two numbers in any order and still get the same product.
- Have them try the next one

### If stuck

- They will most likely need to write out the problem to solve it. They can use any strategy (e.g. partial products, number bonds, or you could even split the rectangle into two parts and use the area model to solve it).
- For example, the first rectangle's length could be partitioned into 20 and 8, and the student can solve  $20 \times 6$  and  $8 \times 6$  and add the products together.
- \*Note that in fourth grade, they have not learned the standard algorithm for multiplication; please stick to a strategy that they will already know

### Watch out for

- Students adding the sides instead of multiplying them
- Students not knowing any strategy for solving the multiplication equation

### Answers

- a) 168 square feet (both parts)
- b) 63 square meters (both parts)

## Let's Learn

### Teaching prompts

- First, remind them of the equation used to find the area of a rectangle.
- Draw attention to the fact that in this particular rectangle, you have the area and the length, but you are missing the width.
- Have students fill in the parts of the equation that they know; this should lead them to writing out a missing factor problem
- We can find the missing factor of the equation by using the inverse of multiplication, which is division
- The way we do this is we divide the area by the side length that we know to find the missing side

### If stuck

- Ask students to recall what they can multiply by 8 to get 56

### Watch out for

- Students who do not see how the inverse relates to the original equation
- Students who do not know how to fill in the parts of the equation that they know

### Answers

a)  $8\text{in} \times 7\text{in} = 56\text{ square inches}$

$$56\text{ square inches} \div 8\text{in} = 7\text{in}$$

b) 7 in

## Follow Me

### Modeling prompts

- First, write out an equation to solve for the missing side; remind students that they should think of the equation to solve for area and use the inverse to solve for the missing side
- Students should use the partial quotient method to solve for the missing side. This is the most efficient strategy they have learned to solve a 3-digit number divided by a 1-digit number up to this point; the standard algorithm for division will not be used until 6th grade
- Ask students to think of the multiple of 6 and 10 that would get close to 468; (a multiple of 10 because we want to think of multiples of 6 with zeros on the end of them) the closest one would be 420. If a student chooses 360, encourage them to think of a number that is even closer; this is a number they can use but it will take more steps to solve it
- Ask students what number they would multiply to 6 to get 420 and write that number on the side of the bracket as shown on the slide to the left
- Subtract 420 from 468; that gives you 48
- Ask students what they can multiply to 6 to get 48 and write the answer to the right of the bracket as shown
- Add the partial quotients;  $70 + 8 = 78$ ; write this at the bottom as shown
- The length of the missing side is 78 yd
- Use the Support Slide to show another strategy to solve by using the area model; you will find that the steps are pretty much the same but this could offer a visual to the partial quotient method that could help the student understand

### Answers

- a)  $468 \div 6 = ?$
- b) Follow the worked out example on the slide
- c) 78yd

## Your Turn

### If stuck

- Write out the equation for finding the area of a rectangle to help students work out the inverse equation
- Use the Support Slide to show another strategy to solve by using the area model; you will find that the steps are pretty much the same but this could offer a visual to the partial quotient method that could help the student understand
- Write out the multiples of 9 to help students figure out the closest multiple

### Questions

- What is the equation that will help us solve for the missing side?
- What multiple of 9 and 10 can we use to get close to 369?
- What do I multiply to 9 to get 360?
- What do I multiply to 9 to get 9?
- What is 40 plus 1?
- What is the length of the missing side?

### Watch out for

- Students not being able to come up with the inverse to the area equation
- Students not remembering the multiples of 9
- Students not understanding that they can use multiples of 9, multiplied by 10 to get closer to 3-digit dividends

### Answers

- a)  $369 \div 9 = ?$
- b) Follow the worked out example on the slide
- c) 41m

## You Do

### If stuck

- I have given examples on how to work out the partial quotients for each problem, however the steps may vary depending on which multiples the students use. They are usually encouraged to find the largest multiple they can think of, but that isn't a requirement with the partial quotient method; if they choose a smaller multiple, they will just have more steps. For part a, students really should not spend time counting by 3's to find a bigger multiple, they should really only use multiples that they have memorized.
- These two problems (especially part a, possibly for part b) students may get stuck on the fact that they may end up with 3 partial quotients, while the other examples so far should really only have 2. Encourage them to continue going through each step of the division problem until they get to a difference of 0.

### Questions

- What is the equation that will help us solve for the missing side?
- What multiple of 3 and 10 can we use to get close to 552?
- What multiple of 4 and 10 can we use to get close to 456?
- What do I multiply to 3 to get (Insert whatever multiple the student chooses)?
- What do I multiply to 4 to get (Insert whatever multiple the student chooses)?
- What is the length of the missing side?

### Watch out for

- Students not being able to come up with the inverse to the area equation
- Students not remembering the multiples of 3 or 4
- Students not understanding that they can use multiples of 3 and 4, multiplied by 10 to get closer to 3-digit dividends

### Answers

- a) 184cm
- b) 114ft

## Go Further

### If stuck

- This slide focuses on a slightly different skill where they will have to come up with all of the factors of 100
- Encourage students to think of money; one dollar is 100 cents. We have pennies that are 1 cent, nickels that are 5 cents, dimes that are 10 cents, and quarters that are 25 cents; even half dollars that are 50 cents. By asking them how many of each coin are in a dollar, you can get every factor pair.
- Factor pairs do not need to be found in order, but it may be helpful to work through them that way

### Questions

- How many pennies/nickels/dimes/quarters/half dollars are in a dollar?
- How do we know 100 is divisible by 2? 4? 5? 10? Why not 3?
- Which factor pair do you think would make the most sense for the side lengths of this particular rectangle? Why?

### Watch out for

- Students who do not remember what a factor pair is
- Students who may not remember divisibility rules

### Answers

1 x 100, 2 x 50, 4 x 25, 5 x 20 10 x 10

## Support for Slide(s): Follow me

### If stuck

- Refer to the model to help students understand; please note that the blank spaces on the purple and orange rectangle do not need to be filled in until after part b has been worked out
- Draw a number bond to help students see how we can partition 468 into smaller parts

### Questions

- How can we partition 468 into parts that are easily divided by 6?
- What multiplied by 6 is 420?
- What multiplied by 6 is 48?
- What is  $70 + 8$ ?
- What is the length of the missing side?

### Answers

- 1) No answer needed
- 2a)  $6\text{yd} \times 70\text{yd} = 420$  square yards;
- 2b)  $6\text{yd} \times 8\text{yd} = 48$  square yards
- 2c)  $70\text{yd} + 8\text{yd} = 78\text{yd}$

## Assessment question:

### Correct answers

- 67yd

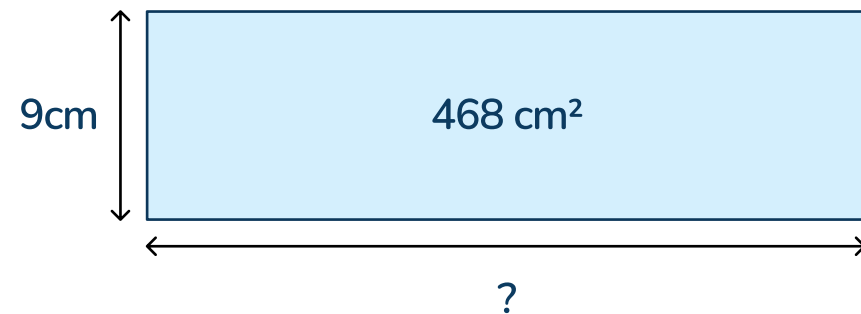
Today you will learn about

# Finding the missing side length



## Learning Goal

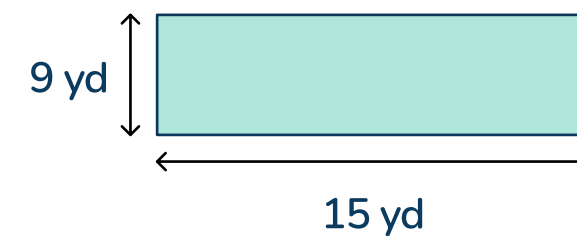
Find the missing side length of the rectangle below.



..... cm

## Prior Learning

Find the area of the rectangle below.



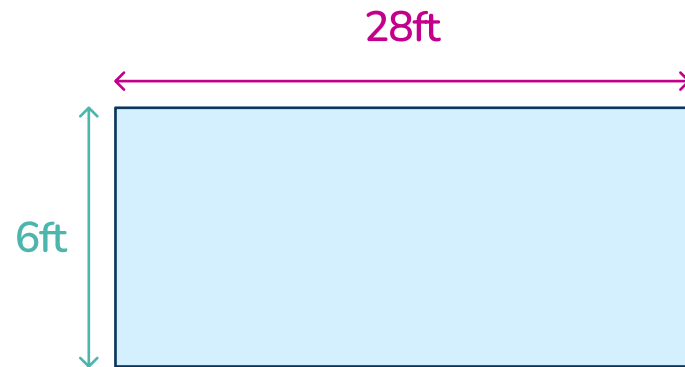
..... yd<sup>2</sup>



## Prior learning

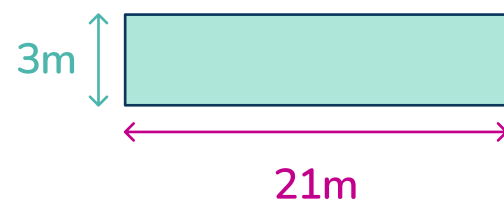
Before we can find the missing side length, we need to recall how to find the **area** of a rectangle.

- 1 Let's look at finding the area of the following rectangle.



The **area of a rectangle** can be found by **multiplying the length by the width**.

- 2 Now try this one.



a  $28\text{ft} \times 6\text{ft} = \dots\dots\dots \text{ft}^2$

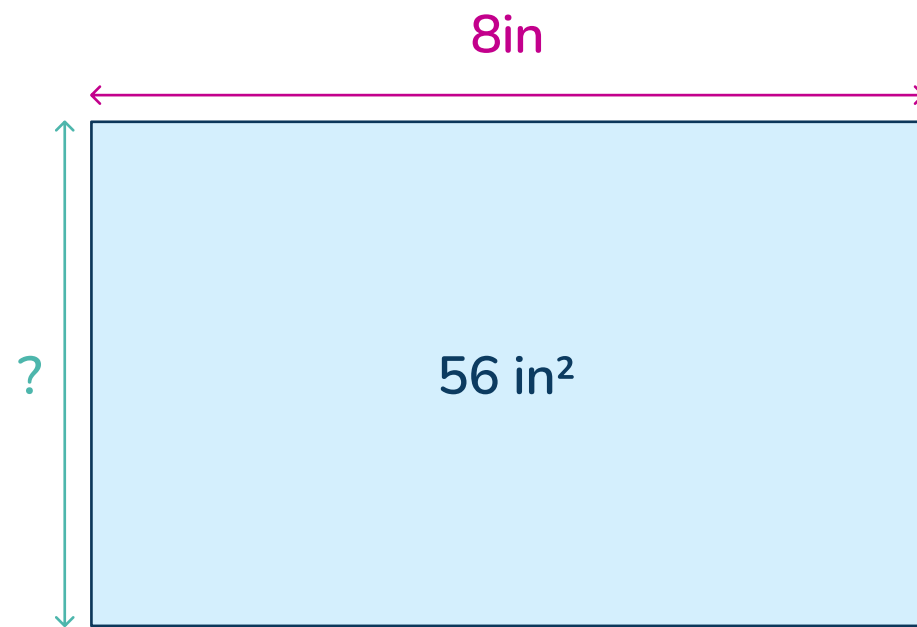
b  $6\text{ft} \times 28\text{ft} = \dots\dots\dots \text{ft}^2$

a  $\dots\dots\dots \text{m} \times \dots\dots\dots \text{m} = \dots\dots\dots \text{m}^2$

b  $\dots\dots\dots \text{m} \times \dots\dots\dots \text{m} = \dots\dots\dots \text{m}^2$

## Let's learn

When missing a side length of a rectangle, we can use the area formula and solve an unknown factor problem.



Area of a rectangle = **length** × **width**

a Let's fill in the parts of the area formula that we already know.

$$\text{..... in} \times \text{..... in} = \text{..... in}^2$$

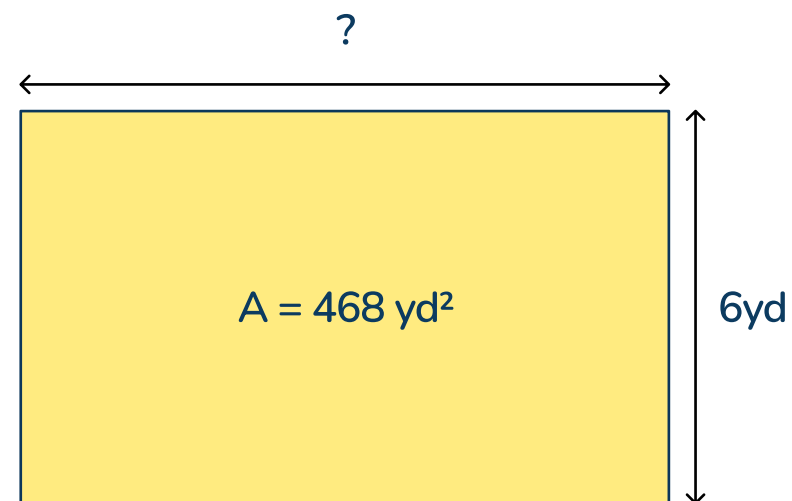
We can use the **inverse** to find the **missing factor**, or missing side.

$$\text{..... in}^2 \div \text{..... in} = \text{..... in}$$

b The length of the missing side is ..... in

# Follow me

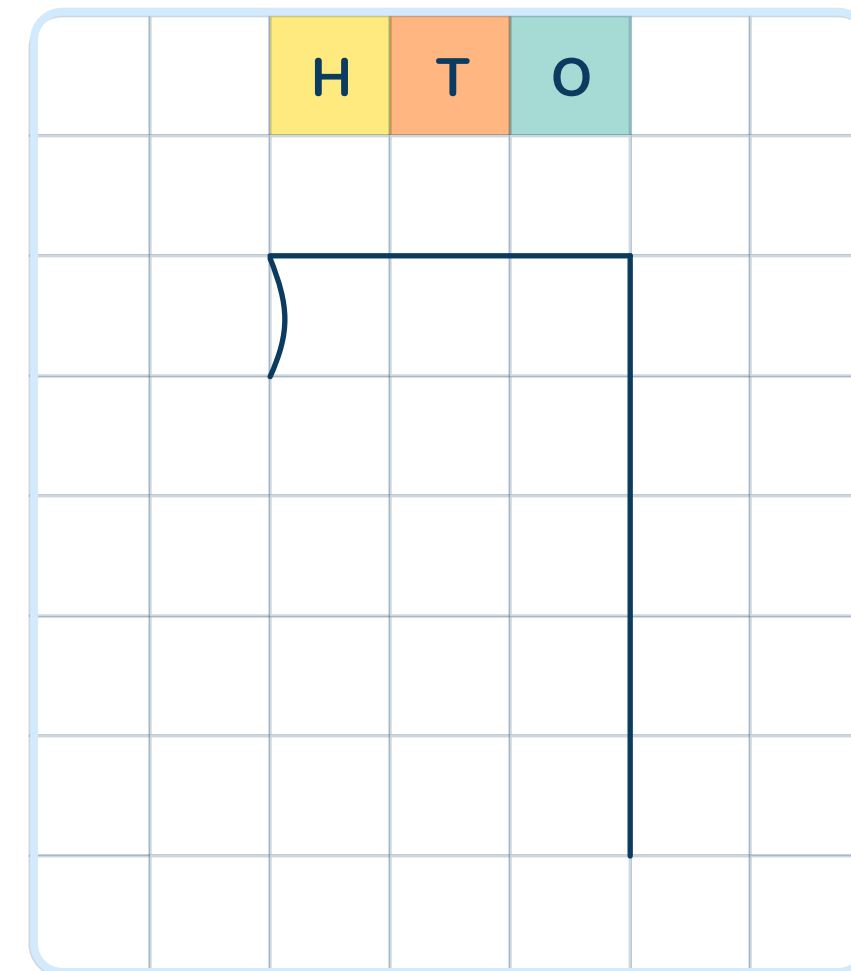
Let's take a look at this rectangle.



a Write an equation to solve for the missing side.

.....  $\times$  ..... = .....

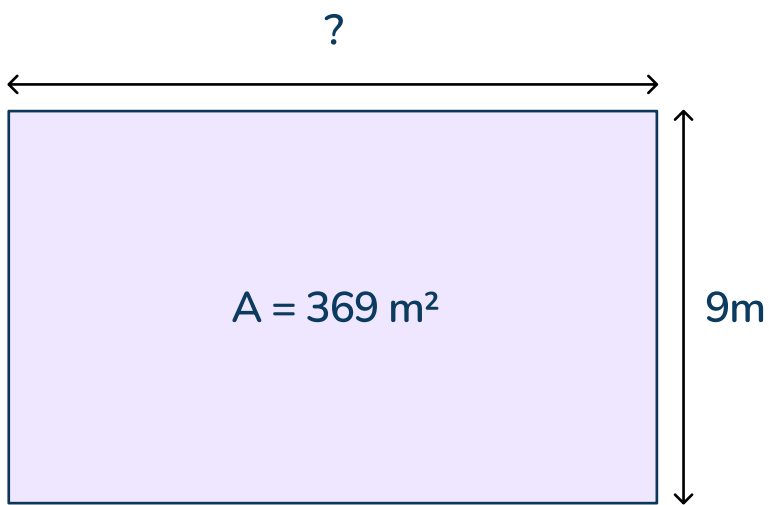
b Solve for the missing side using the **partial quotient** method.



c The length of the missing side is ..... yd.

Your turn

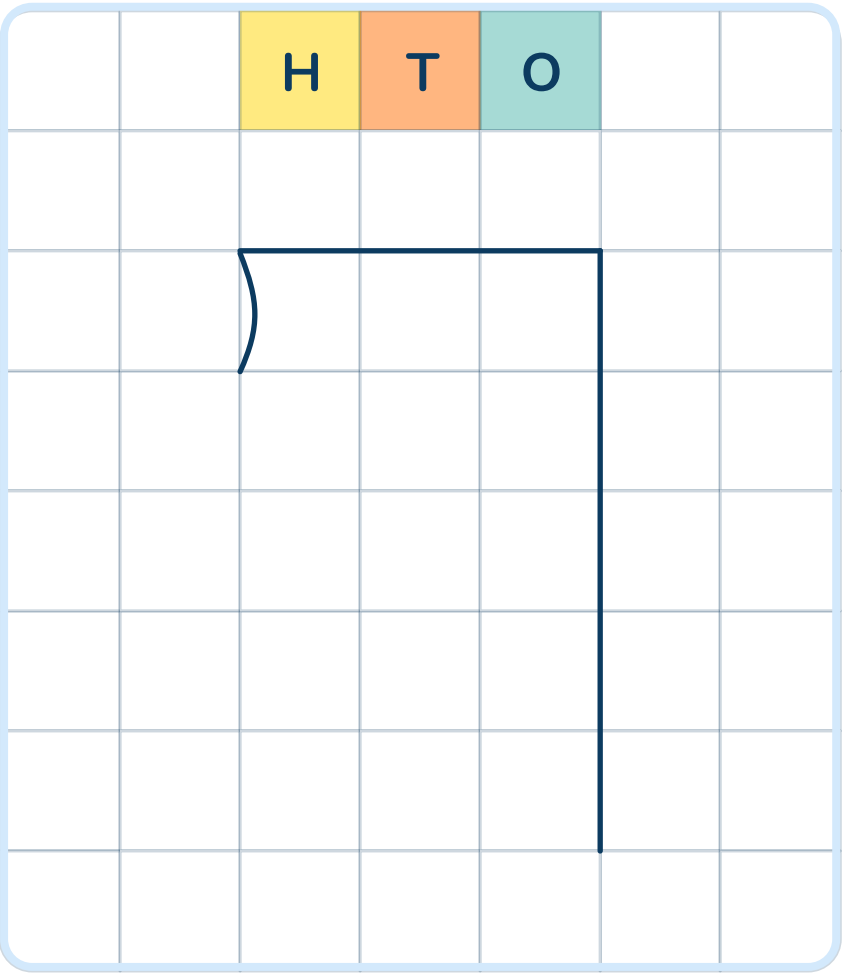
Solve for the missing side.



a Write an equation to solve for the missing side.

.....  $\times$  ..... = .....

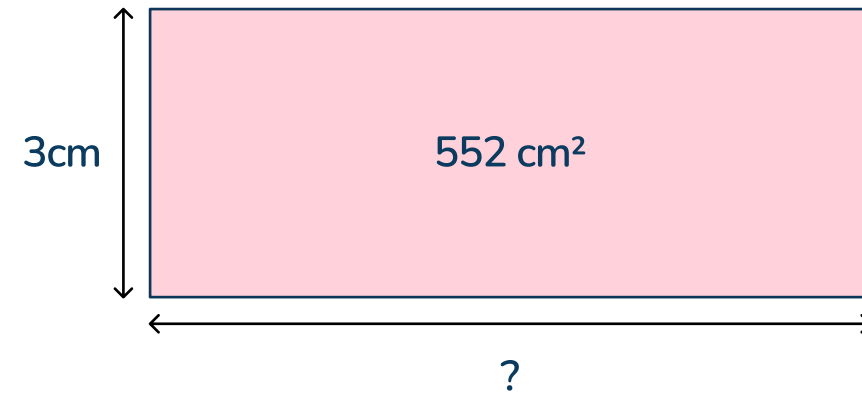
b Solve for the missing side using the **partial quotient** method.



c The length of the missing side is ..... m.

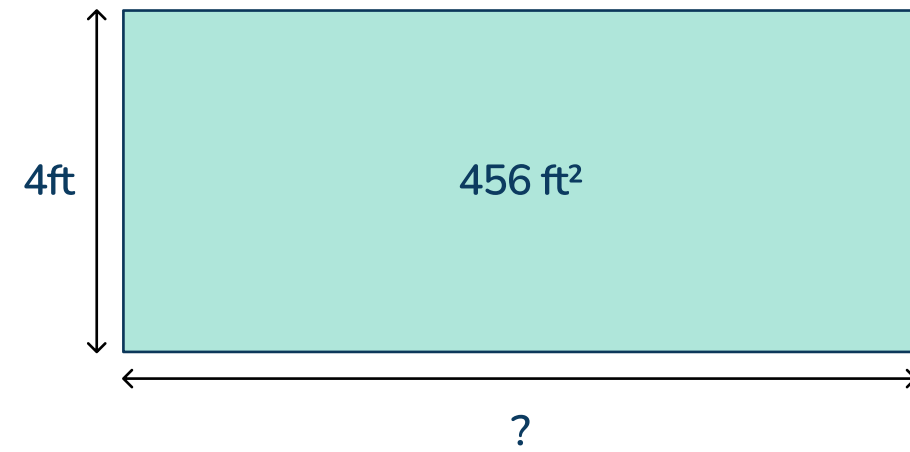
Solve for the missing sides.

a



..... cm

b

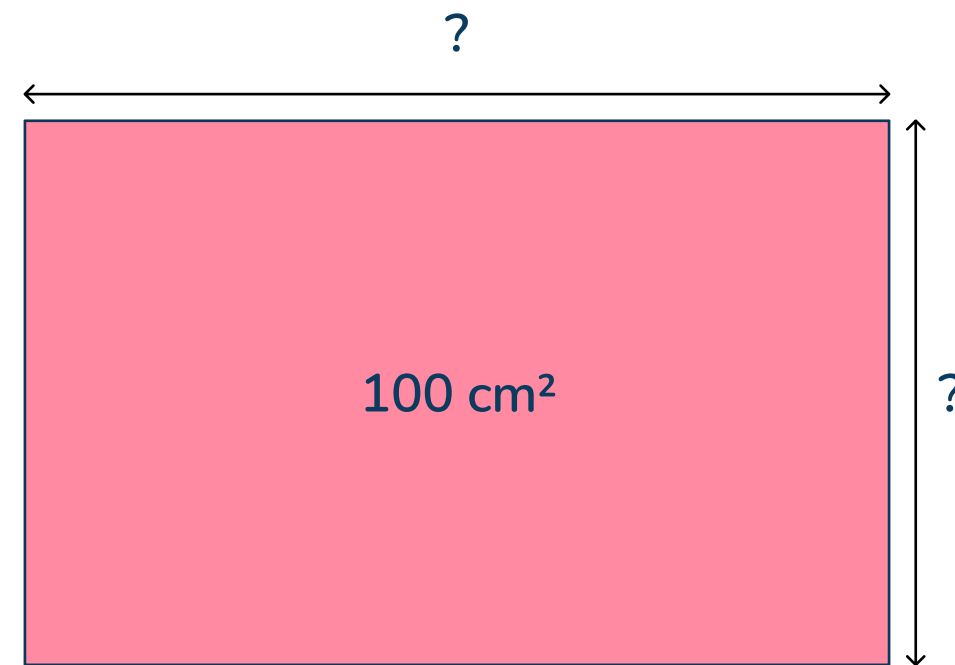


..... ft



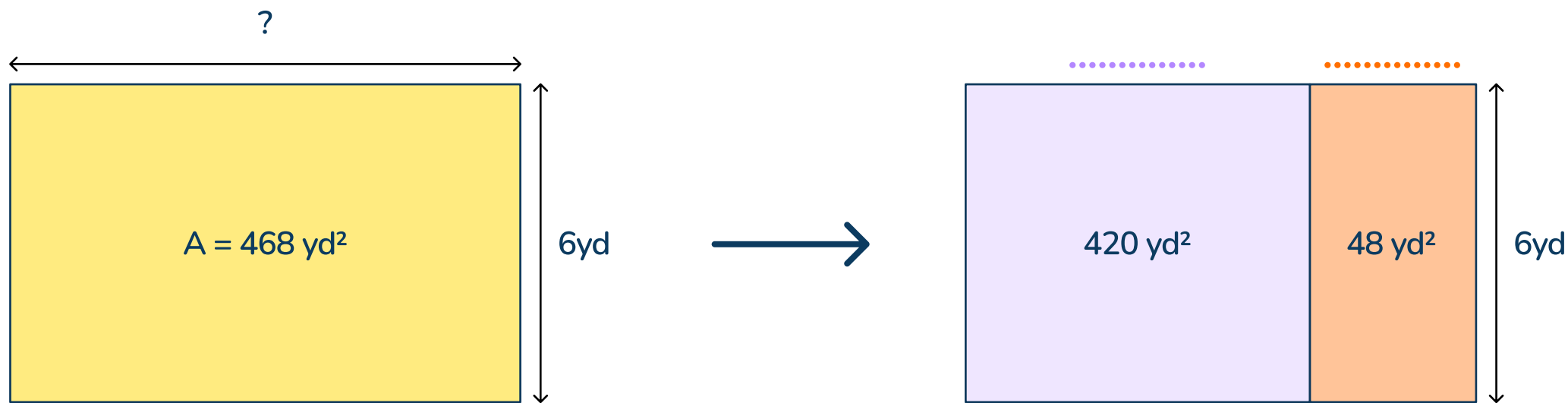
## Go further

Given the area of the following rectangle, list all the possible combinations of side lengths.



.....

We can use the **area model** to find the missing side.



1 Partition the total area into parts easily divided by 6 yards.

c Add the missing side lengths together.

2 Find the missing side to each part of the rectangle.

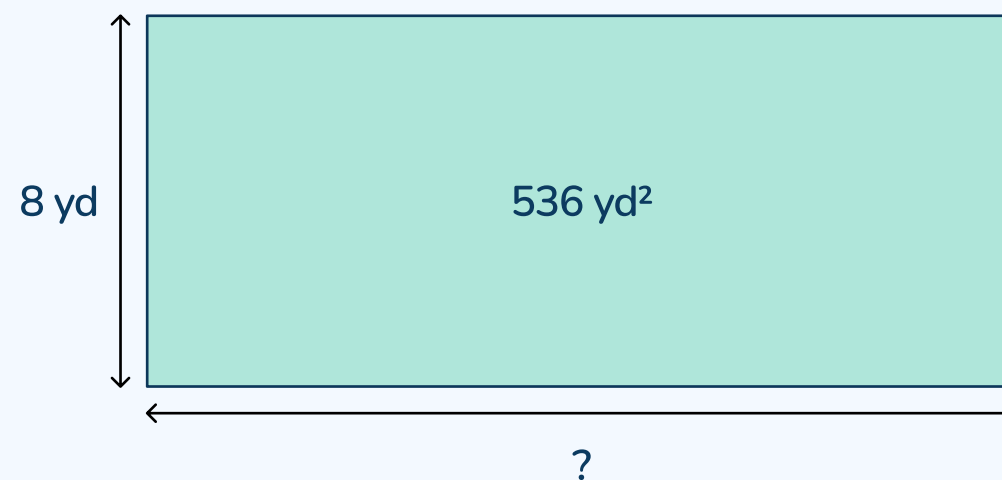
a  $6\text{yd} \times \text{.....} = 420 \text{ yd}^2$

b  $6\text{yd} \times \text{.....} = 48 \text{ yd}^2$

$\text{.....} + \text{.....} = \text{.....}$

## Check your understanding

Find the missing side of the following rectangle.



..... yd

Why do I need to try this question on my own first?

- To show your tutor what you understand
- To give you more practice
- To show your teacher how you are doing





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- ✓ Aligned to your state's standards
- ✓ Scaffolded learning to close gaps

“We just had our first session and it went great! The kids really liked it and felt like they were learning! One even said he finally felt like math was making sense.”



Michelle Craig, Instructional Coach,  
Sherwood Forest Elementary, Washington

## Speak to us

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