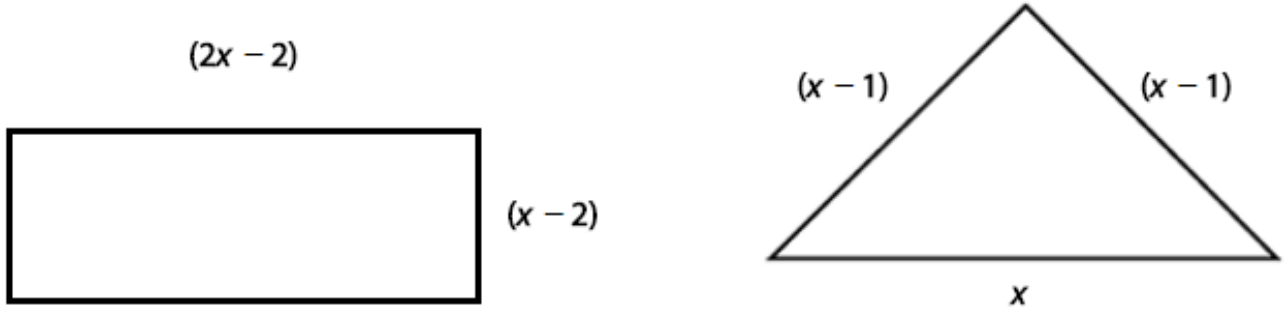

ADVICE
HELP
SUPPORT
TIPS
ASSISTANCE
GUIDANCE

1 Claire bought just enough fencing to enclose either a rectangular garden or a triangular garden, as shown. The two gardens have the same perimeter. How many feet of fencing did she buy?



The perimeter of the rectangle is the same as the perimeter of the triangle. Find the value of x and use it to find the perimeter of each figure.

$$
\begin{aligned}
2(2x-2)+2(x-2) &= (x-1)+(x-1)+(x) \\
4x-4+2x-4 &= x-1+x-1+x && \text{Distributive Property} \\
6x-8 &= 3x-2 && \text{Combine like terms} \\
6x-8-3x &= 3x-2-3x && \text{Subtraction Property of Equality} \\
3x-8 &= -2 \\
3x-8+8 &= -2+8 && \text{Addition Property of Equality} \\
3x &= 6 \\
\frac{3x}{3} &= \frac{6}{3} && \text{Division Property of Equality} \\
x &= 2
\end{aligned}
$$

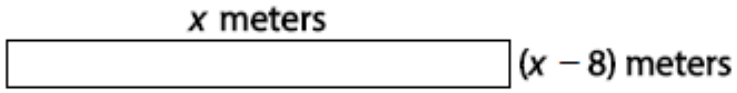
Check: Substitute the value 2 in the original equation.

$$
\begin{aligned}
2(2(2)-2)+2((2)-2) &= ((2)-1)+((2)-1)+((2)) \\
4 &= 4
\end{aligned}
$$

Claire bought 4 feet of fencing.

2 Write and solve an equation for the situation.

The perimeter of a parallelogram is 56 meters. The width of the parallelogram is 8 meters less than its length. Find the length and the width of the parallelogram.



The perimeter is equal to two times the length plus two times the width.

Let x be the length of the parallelogram. Then the width is $x - 8$. An equation is $2x + 2(x - 8) = 56$.

$$\begin{aligned} 2x + 2(x - 8) &= 56 \\ 2x + 2x - 16 &= 56 && \text{Distributive Property} \\ 4x - 16 &= 56 && \text{Combine like terms} \\ 4x - 16 + 16 &= 56 + 16 && \text{Addition Property of Equality} \\ 4x &= 72 \\ \frac{4x}{4} &= \frac{72}{4} && \text{Division Property of Equality} \\ x &= 18 \end{aligned}$$

The length of the parallelogram is 18 m, and the width is $18 - 8 = 10$ m.

$$\begin{aligned} 2(18) + 2((18) - 8) &= 36 + 36 - 16 \\ 36 + 36 - 16 &= 56 \end{aligned}$$

So, the answer makes sense.

3 Sammie bought just enough fencing to border either a rectangular plot or a square plot, as shown. The perimeters of the plots are the same. How many feet of fencing did she buy?

The perimeter is equal to two times the length plus two times the width.
The length of the rectangle is $(3x + 4)$ and the width is $(x - 1)$.
Since the second figure is a square the length and the width are $(x + 4)$.
Because the two perimeters are equal an equation is

$$2(3x + 4) + 2(x - 1) = 4(x + 4).$$

Now solve for x.

$$\begin{aligned} 6x + 8 + 2x - 2 &= 4x + 16 && \text{Distributive Property} \\ 8x + 6 &= 4x + 16 && \text{Combine like terms.} \\ 8x + 6 - 6 &= 4x + 16 - 6 && \text{Subtraction Property of Equality} \\ 8x &= 4x + 10 \\ 8x - 4x &= 4x + 10 - 4x && \text{Subtraction Property of Equality} \\ 4x &= 10 \\ \frac{4x}{4} &= \frac{10}{4} \\ x &= 2.5 \end{aligned}$$

Find the perimeter of each figure

$$\begin{aligned} 2(3(2.5) + 4) + 2((2.5) - 1) &= 26 \\ 4((2.5) + 4) &= 26 \end{aligned}$$

Sammie bought 26 feet of fencing.

4

Kevin and Brittany write an equation to represent the following relationship, and both students solve their equation. Who found the correct equation and solution? Why is the other person incorrect?

7 times the difference of a number and 20 is the same as half the sum of 8 more than 8 times a number.

Kevin:

$$7(x-20)=\frac{1}{2}(8x+8)$$
$$7x-140=4x+4$$
$$7x-140-4x=4x+4-4x$$
$$3x-140=4$$
$$3x-140+140=4+140$$
$$3x=144$$
$$\frac{3x}{3}=\frac{144}{3}$$
$$x=48$$

Brittany:

$$7(20-x)=\frac{1}{2}(8x+8)$$
$$140-7x=4x+4$$
$$140-7x-4x=4x+4-4x$$
$$140-3x=4$$
$$140-3x-140=4-140$$
$$-3x=-136$$
$$\frac{-3x}{-3}=\frac{-136}{-3}$$
$$x=45$$

Write and solve the equation to see who is correct.

The word is tells you that the relationship describes an equation.

On the left side the words times and difference tell you that the operations involved in the left side of the relationship are multiplication and subtraction.

What numerical information do you have for the left side? 7, and 20

Now write an equation for the left side of the equality.

$7 \times (x-20)$

On the right side the words sum and times tell you that the operations involved in the right side of the relationship are addition and multiplication.

What numerical information do you have for the right side? $\frac{1}{2}$, 8, and 8

Now write an equation for the right side of the equality.

$\frac{1}{2} \times (8x+8)$

Now set the left side equal to the right side.

$$7 \times (x-20) = \frac{1}{2} \times (8x+8)$$

or

$$7(x-20) = \frac{1}{2}(8x+8)$$

5 Write and solve an equation to solve the problem.

Lisa is 8 centimeters taller than her friend Ian. Ian is 12 centimeters taller than Jim. Every month, their heights increase by 2 centimeters. In 6 months, the sum of Ian's and Jim's heights will be 180 centimeters more than Lisa's height. How tall is Ian now? Let h be Ian's height today in centimeters.

Identify the important information.

Lisa is 8 cm taller than Ian.

Ian is 12 cm taller than Jim.

Every month, their heights increase by 2 centimeters. In 6 months, the sum of Ian's and Jim's heights will be 180 centimeters more than Lisa's height.

Set up a table and fill it in with the information given in the question. Let h be Ian's height today in centimeters.

	Height now	Height after 6 months
Lisa	$h + 8$	$(h + 8) + 12$
Ian	h	$h + 12$
Jim	$h - 12$	$(h - 12) + 12$

Write the new relationship in an equation using the heights after 6 months.

$$(h + 12) + (h - 12) + 12 = (h + 8) + 12 + 180 \quad \text{Solve for } h.$$

$$2h + 12 = h + 200 \quad \text{Combine like terms}$$

$$2h + 12 - h = h + 200 - h \quad \text{Subtraction Property of Equality}$$

$$h + 12 = 200$$

$$h + 12 - 12 = 200 - 12 \quad \text{Subtraction Property of Equality}$$

$$h = 188$$

Ian is 188 cm tall now.

6 Write an equation for the description.

Ten times the sum of half a number x and 6 is 9.

Identify the important information.

The first element of our description is the number 10.

$$10$$

The word times tells you that the first operation involved in the relationship is multiplication.

$$10 \times$$

Therefore, because the word times is before the word sum it implies the entire addition will be multiplied.

$$10 \times ( )$$

The sum is composed of $\frac{1}{2}x$ and 6.

$$10 \times \left(\frac{1}{2}x + 6 \right)$$

The word is tells you that the relationship describes an equation.

Therefore, the equation is,

$$10 \times \left(\frac{1}{2}x + 6 \right) = 9$$

7

Write an equation for the description.

Tanmayi wants to raise $180 for a school fundraiser. She has raised $140 so far. How much more does she need to reach her goal? Let m be how much more is needed.

Identify the important information.

How much does Tanmayi want to raise total? 180 dollars

How much does Tanmayi have so far? 140 dollars

What is the unknown quantity? How much more she needs to reach the total.

The word more tells you that the operation involved in the relationship is addition.

Use the information to write a model.

more needed to reach goal (dollars)	+	Amount raised so far (dollars)	=	Total needed for fundraiser(dollars)

Therefore, the equation is,

$$m + 140 = 180$$

8 Write an equation for the description.

Hector is visiting a cousin who lives 330 miles away. He has driven 65 miles. How many more miles does he need to drive to reach his cousin's home? Let d be how many miles left to reach his cousin's home.

Identify the important information.

How far away does Hector's cousin live? 330 miles

How many miles has Hector driven so far? 65 miles

What is the unknown quantity? How many more miles he needs to drive to reach his cousin's home

The word *more* tells you that the operation involved in the relationship is *addition*.

Use the information to write a model.

Miles left to go to reach his cousin's home	+	Miles driven so far	=	Total miles to his cousin's home

Therefore, the equation is,

$$d + 65 = 330$$

9

Write an equation for the description.

The length of a rectangle is twice its width. The perimeter of the rectangle is 125 feet.

Use the formula for perimeter, $P = 2(l) + 2(w)$.

Choose a name for the variable. In this case, use w for the width.

The length is 2 times the width. So, the length is 2w.

Now enter the values for the length and width into the formula with the perimeter equal to 125 feet.

$$2(2w) + 2(w) = 125$$
$$4w + 2w = 125$$

10

Solve.

$-20 - 4(x + 3) = 4x$

Solve for x.

$$\begin{aligned} -20 - 4x - 12 &= 4x && \text{Use the Distributive Property.} \\ -32 - 4x &= 4x && \text{Combine like terms.} \\ -32 - 4x + 4x &= 4x + 4x && \text{Use the Addition Property of Equality.} \\ -32 &= 8x && \text{Combine like terms.} \\ \frac{-32}{8} &= \frac{8x}{8} && \text{Use the Division Property of Equality.} \\ x &= -4 && \text{Simplify.} \end{aligned}$$