

Translating Sentences into Equations and Solving

Objective A: To translate a sentence into an equation and solve

An equation states that two mathematical expressions are equal. Therefore, to translate a sentence into an equation requires recognition of the words or phrases that mean “equals.” Some of these phrases are

equals	}	translate to "="
is		
is equal		
amounts		
represents		

Once the sentence is translated into an equation, the equation can be simplified to one of the form $variable = constant$ and the solution is found.

Example 1: Translate “three more than twice a number is seventeen” into an equation and solve.

Step 1: Assign a variable to the unknown quantity.

Let the unknown number = n

Step 2: Find two verbal expressions for the same value.

Three more than twice a number	is	seventeen
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Step 3: Write a mathematical expression for each verbal expression. Write the equals sign.

Three more than twice a number	is	seventeen
↓	↓	↓
3	+	2n
	=	17

Step 4: Solve the resulting equation.

$$\begin{aligned} 3 + 2n - 3 &= 17 - 3 \\ 2n &= 14 \\ \frac{2n}{2} &= \frac{14}{2} \\ n &= 7 \end{aligned}$$

* subtract 3 from both sides of the equation

* divide both sides of the equation by 2

The number is seven.

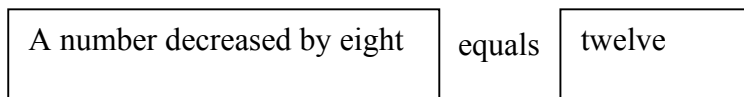
Example 2:

Translate “a number decreased by eight equals twelve” into an equation and solve.

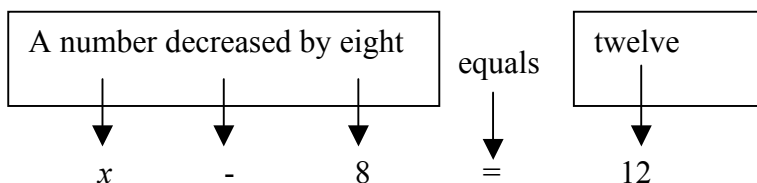
Step 1: Assign a variable to the unknown quantity.

Let the unknown number = x

Step 2: Find two verbal expressions for the same value.



Step 3: Write a mathematical expression for each verbal expression. Write the equals sign.



Step 4: Solve the equation

$$\begin{aligned} x - 8 &= 12 \\ x - 8 + 8 &= 12 + 8 \\ x &= 20 \end{aligned}$$

The number is twenty.

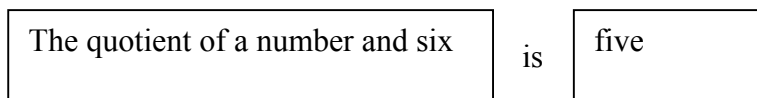
Example 3:

The quotient of a number and six is five. Find the number.

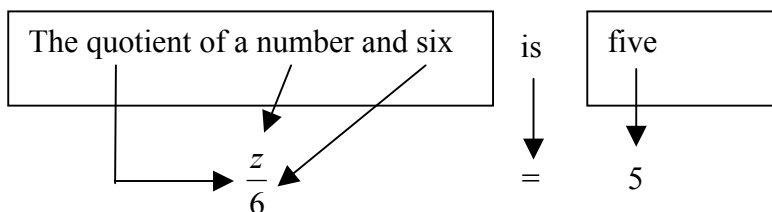
Step 1: Assign a variable to the unknown quantity.

Let the unknown number = z

Step 2: Find two verbal expressions for the same value.



Step 3: Write a mathematical expression for each verbal expression. Write the equals sign.



*use fractions when converting the word “quotient” into a mathematical equation

Step 4: Solve the equation.

$$\frac{z}{6} = 5$$

$$6 \times \frac{z}{6} = 6 \times 5 \quad \text{Multiply each side of the equation by our denominator of 6}$$

$$z = 30$$

The number is 30.

Example 4:

Eight decreased by twice a number is four.

Step 1: Assign a variable to the unknown quantity.

Let the unknown number = t

Step 2: Find two verbal expressions for the same value.

Eight decreased by twice a number	is	four
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Step 3: Write a mathematical expression for each verbal expression. Write the equals sign.

Eight decreased by twice a number	is	four
$8 - 2t$	$=$	4

Step 4: Solve the equation.

$$\begin{aligned}
 8 - 2t &= 4 \\
 8 - 8 - 2t &= 4 - 8 \\
 -2t &= -4 \\
 \frac{-2t}{-2} &= \frac{-4}{-2} \\
 t &= 2
 \end{aligned}$$

The number is 2.

Example 5:

Three less than the ratio of a number to seven is one. Find the number.

Step 1: Assign a variable to the unknown quantity.

Let the unknown number = x

Step 2: Find two verbal expressions for the same value.

Three less than the ratio of a number to seven	is	one
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Step 3: Write a mathematical expression for each verbal expression. Write the equals sign.

Three less than the ratio of a number to seven	is	one
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$$\frac{x}{7} - 3 = 1$$

Step 4: Solve the equation.

$$\frac{x}{7} - 3 = 1$$

$$\frac{x}{7} - 3 + 3 = 1 + 3$$

$$\frac{x}{7} = 4$$

$$7 \cdot \frac{x}{7} = 7 \cdot 4$$

$$x = 28$$

The number is 28.

Example 6:

The cost of a television with remote control is \$649. This amount is \$125 more than the cost without remote control. Find the cost of the television without remote control.

Strategy

To find the cost of the television without remote control, write and solve an equation using C to represent the cost of the television without remote control.

Solution

Step 1:

Let the cost of the TV without the remote = C

Step 2:

The cost of a television with remote control	Is	\$125 more than TV without remote
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Step 3:

The cost of a television with remote control	Is	\$125 more than TV without remote
649	$=$	$125 + C$

Step 4: Solve the equation

$$\begin{aligned}
 649 &= C + 125 \\
 649 - 125 &= C + 125 - 125 \\
 524 &= C
 \end{aligned}$$

The cost of the television without remote control is \$524.

Example 7:

By purchasing a fleet of cars, a company receives a discount of \$1972 on each car purchased. This amount is 8% of the regular price. Find the regular price.

Strategy

To find the regular price, write and solve an equation using P to represent the regular price of the car.

Solution

Step 1:

Let the regular price = P

Step 2:

The discount of \$1972 on each car purchased	is	8% of the regular price
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Step 3:

The discount of \$1972 on each car purchased	is	8% of the regular price
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$$1972 = 0.08 \cdot P$$

Step 4: Solve the equation.

$$1972 = 0.08 \cdot P$$

$$\frac{1972}{0.08} = \frac{P}{0.08}$$

$$24650 = P$$

The regular price is \$24,650.