

M6 6-1: Properties

Directions: Apply the property to complete the number sentence.

PROPERTY	KEY IDEA	Number Sentence
Commutative Property of Addition or Multiplication	Changing the <i>ORDER</i> of numbers when adding or multiplying	1. $3 + 2 + 1 =$ _____ 2. $5 \bullet 8 \bullet 7 =$ _____
Associative Property of Addition or Multiplication	Re <i>GROUPING</i> the numbers without changing the order	3. $(3 + 2) + 1 =$ _____ 4. $5 \bullet (8 \bullet 7) =$ _____
Identity Property of Addition or Multiplication	Keeping the value of the number the <i>SAME</i>	5. $3 + 0 =$ _____ 6. $5 \bullet 1 =$ _____
Inverse Property of Addition or Multiplication	<i>UNDOING</i> or <i>CANCELING</i> the number Doing the <i>OPPOSITE!</i>	7. $3 + -3 =$ _____ 8. $5 \bullet \frac{1}{5} =$ _____
Distributive Property	<i>Pass out a number to a grouping.</i> <i>Outside times the 1st, outside times the 2nd.</i>	9. $3(2 + 1) =$ _____ 10. $5(x + 2) =$ _____
Multiplicative Property of Zero	<i>MULTIPLYING BY ZERO</i>	11. $3 \bullet 0 =$ _____ 12. $x \bullet 8 \bullet 0 =$ _____

Properties Practice

Name the property for each.

1) $-2 + 2 = 0$	2) $2 \cdot \frac{1}{2} = 1$
3) $2 \cdot 0 = 0$	4) $(a + b) + c = a + (b + c)$
5) $\frac{2}{3} \cdot \frac{3}{2} = 1$	6) $0 + 6 = 6$
7) $2(x + 3) = 2x + 6$	8) $(2 + 1) + 0 = 2 + (1 + 0)$
9) $18 \cdot 1 = 18$	10) $3 + xy = 3 + yx$
11) $x + 4 = 4 + x$	12) $5(x + 2) = 5x + 10$

Answer the following questions true or false. Then justify your answer.

- | | | |
|--|---|---|
| 13) $2 + 0 = 2$ is an example of multiplicative property of zero | T | F |
| 14) $(3x + 4) = 6x + 8$ has parenthesis so it is an example of associative property. | T | F |
| 15) If $2 + 3 = 6$ then $3 + 2 = 6$ is an example of commutative property | T | F |
| 16) $3 \cdot 0 = 0$ illustrates multiplicative identity | T | F |
| 17) $5(2 + 6) = 10 + 30$ is an example of distributive property | T | F |
| 18) $8 \cdot 1 = 8$ is illustrates multiplicative identity | T | F |

Properties Practice

- 1) Four students simplified expressions and showed their work.

Renee's work	Jesse's work	Terri's work	Morgan's work
$5 + x(4 - 1) - 2$	$4(x + 2) + 5 \cdot (2 + 0)$	$(6 + 1) \cdot 1 + 3 \cdot 0 + x$	$(x + 4) + 6 \cdot (4 - 1)$
$5 + x \cdot 3 - 2$	$4(x + 2) + 5 \cdot 2$	$7 \cdot 1 + 3 \cdot 0 + x$	$(x + 4) + 6 \cdot 3$
$5 + 3x - 2$	$4x + 8 + 5 \cdot 2$	$7 + 3 \cdot 0 + x$	$(x + 4) + 18$
$3x + 5 - 2$	$4x + 8 + 10$	$7 + 0 + x$	$x + (4 + 18)$
$3x + 3$	$4x + 18$	$7 + x$	$x + 22$

Which student used the associative property of addition?

- 2) Four students were asked to simplify an expression.

Student 1	Student 2	Student 3	Student 4
$8(-6 + 0) \cdot 2$	$7 \cdot 4 + 0 - 2$	$9 + 0 \cdot 1 + 2$	$1 - 9 + 0 \cdot 2$
$8(0) \cdot 2$	$28 + 0 - 2$	$9 + 0 + 2$	$1 - 9 + 0$
$0 \cdot 2$	$28 - 2$	$0 + 2$	$-8 + 0$
0	26	2	0

Which student applied the additive identity property correctly?

- 3) Four students simplified expressions and showed their work.

Renee's work	Jesse's work	Terri's work	Morgan's work
$5 + x(4 - 1) - 2$	$4(x + 2) + 5 \cdot (2 + 0)$	$(6 + 1) \cdot 1 + 3 \cdot 0 + x$	$(x + 4) + 6 \cdot (4 - 1)$
$5 + x \cdot 3 - 2$	$4(x + 2) + 5 \cdot 2$	$7 \cdot 1 + 3 \cdot 0 + x$	$(x + 4) + 6 \cdot 3$
$5 + 3x - 2$	$4x + 8 + 5 \cdot 2$	$7 + 3 \cdot 0 + x$	$(x + 4) + 18$
$3x + 5 - 2$	$4x + 8 + 10$	$7 + 0 + x$	$x + (4 + 18)$
$3x + 3$	$4x + 18$	$7 + x$	$x + 22$

Which student used the commutative property of multiplication?

- 4) Four students simplified expressions and showed their work.

Renee's work	Jesse's work	Terri's work	Morgan's work
$5 + x(4 - 1) - 2$	$4(x + 2) + 5 \cdot (2 + 0)$	$(6 + 1) \cdot 1 + 3 \cdot 0 + x$	$(x + 4) + 6 \cdot (4 - 1)$
$5 + x \cdot 3 - 2$	$4(x + 2) + 5 \cdot 2$	$7 \cdot 1 + 3 \cdot 0 + x$	$(x + 4) + 6 \cdot 3$
$5 + 3x - 2$	$4x + 8 + 5 \cdot 2$	$7 + 3 \cdot 0 + x$	$(x + 4) + 18$
$3x + 5 - 2$	$4x + 8 + 10$	$7 + 0 + x$	$x + (4 + 18)$
$3x + 3$	$4x + 18$	$7 + x$	$x + 22$

Which student used the multiplicative identity property?

M6 6-2: Equations Vocabulary and Properties

Word	Definition	Example
Variable	A _____ used to represent one or more numbers in an expression, equation, or inequality.	
Term	A real number, a variable, or a _____ of real numbers and variables.	
Coefficient	The number that is _____ by the variable.	When a variable has no number in front the coefficient is automatically ____!
Constant	A term that does not contain a _____.	

Label the parts below:

$$x + 3y + 10$$

On your own, label the parts below

coefficient	term	variable	constant
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$$5x + 7$$

Equations Vocabulary

Not only can we determine the parts of a number sentence, we can determine if it is either an _____ or an _____.

Word	Definition	Example
Expression	A term or a _____ of terms and operators.	
Equation	A mathematical sentence stating that two _____ are equal	

Circle if the problem is an expression or an equation.

1) $2x+17=35$	Expression	Equation	6) $5x-13+72$	Expression	Equation
2) $10-4j=19$	Expression	Equation	7) $34x-5=9$	Expression	Equation
3) $4x-5x+7$	Expression	Equation	8) $17w=10$	Expression	Equation
4) $14x-15=75$	Expression	Equation	9) $3x+7$	Expression	Equation
5) $4j-5j-3$	Expression	Equation	10) $3y-2y+4$	Expression	Equation

On your own, label the parts below

coefficient term variable constant

$$15x - 9 = 14$$

Equations Vocabulary

Examples:

Create an algebraic expression with three terms and an invisible coefficient.	Create a numerical expression with 2 terms.
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Create an expression or equation following the directions for each problem below.

***Numerical – numbers only

Algebraic – letters and numbers***

1) Create a numerical expression with 3 terms	2) Create an algebraic expression with three terms
3) Create an equation with 3 terms	4) Create an equation that has 9 as a coefficient
5) Create an algebraic expression with the variable y	6) Create an equation with two constants and two variables
7) Create an equation with 4 as a coefficient and three terms	8) Create an algebraic expression with an invisible coefficient and a constant

Properties Practice

Solve the following properties problems.

1) Which property is shown in the following number sentence?

$$2x + (5 + 0) = 2x + 5$$

2) What is the additive inverse of $-\frac{4}{5}$?

3) Identify each number sentence that illustrates the commutative property of multiplication.

$2 + (3 \cdot 7) \cdot 10 = 2 + 3 \cdot (7 \cdot 10)$
$3 + 4 \cdot 6 = 3 + 6 \cdot 4$
$5 + 8 \cdot 0 = 5 + 0$
$2 \cdot (8 \cdot 7) + 1 = 2 \cdot (7 \cdot 8) + 1$

4) Identify each equation that represents the multiplicative property of zero.

$7 \cdot 0 = 0$	$7 \cdot 1 = 7$
$-3 + 3 = 0$	$-7 + 7 = 0$
$0 + 5 = 5$	$0 \cdot 3 = 0$

5) Which student correctly applied the additive identity property?

Student 1	Student 2	Student 3	Student 4
$8(-6 + 0) \cdot 2$	$7 \cdot 4 + 0 - 2$	$9 + 0 \cdot 1 - 2$	$1 - 9 + 0 \cdot 2$
$8(0) \cdot 2$	$28 + 0 - 2$	$9 + 0 - 2$	$1 - 9 + 0$
$0 \cdot 2$	$28 - 2$	$0 - 2$	$-8 + 0$
0	26	0	0

6) Name the property

$$8 + 3 + 2 \cdot 1 = 8 + 3 + 2$$

7) Which property is used in the following number sentence?

$$4(3 + n) = 4(3) + 4(n)$$

8) Which student correctly applied the multiplicative identity property?

Student 1	Student 2	Student 3	Student 4
$9 + 2 \cdot 1 - 0$	$2(9 + 4) \cdot 1$	$4 - 2(5 \cdot 1)$	$-3(7 + 2) \cdot 1$
$9 + 2 - 0$	$2 \cdot 13 \cdot 1$	$4 - 2(5)$	$-3(9) \cdot 1$
$11 - 0$	$26 \cdot 1$	$4 - 10$	$-27 \cdot 1$
11	26	-6	27

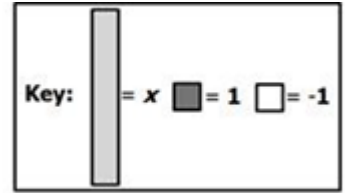
Equations Vocabulary Flashcards

Cut out on the dotted line and fold on the solid line to create cards.

A number that is multiplied by a variable	coefficient
A term or a combination of terms and operators	expression
Either a single number, a variable, or numbers and/or variables multiplied together	term
A mathematical sentence stating that two expressions are equal	equation
A symbol for an unknown value	variable
A number on its own	constant
A symbol (+, ×, −, or ÷) representing a mathematical operation	operator

M6 6-3: Modeling Equations and Equations Vocabulary

When _____ equations it is important to look at the _____.
 The _____ will tell you what the picture means.



Example 1:

What is the solution for the following models?



Example 2:

Modeling the equations using the key above.

$$4x = 12$$

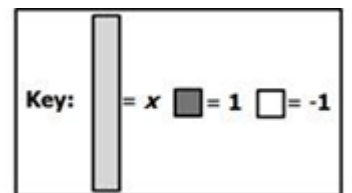
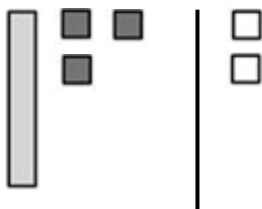


$$x + 5 = 11$$

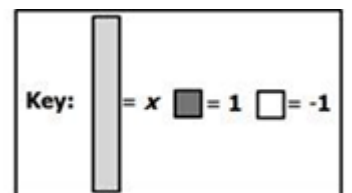


Solve or model the following equations.

1) What is the solution to the following model?



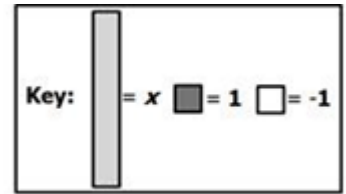
2) Model the equation $x - 2 = 6$



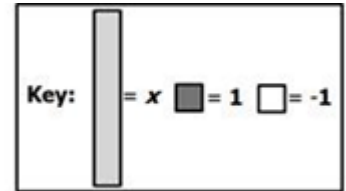
Modeling Equations Practice

Solve or model the following equations.

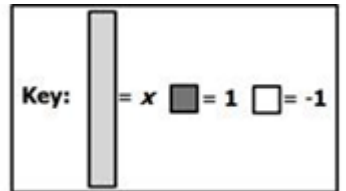
3) Model the equation $x + 4 = 7$



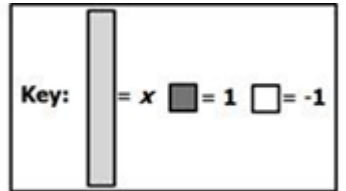
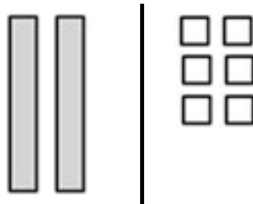
4) What is the solution to the following model



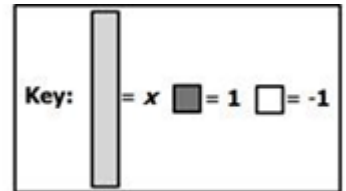
5) Model the equation $-10 + x = 12$



6) What is the solution to the following model?



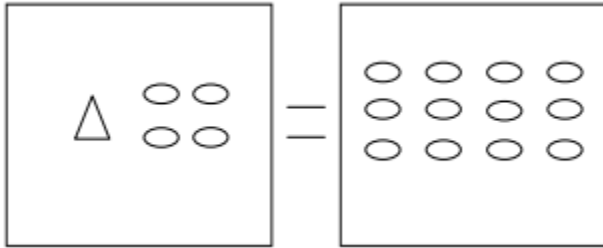
7) Model the equation $3x = -9$






Modeling Equations Practice




Solve or model the following equations.

8) What is the solution to the following model?

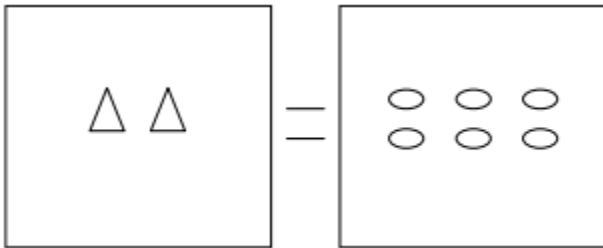





KEY		
 = x	 = 1	 = -1

9) Model the equation $x + 5 = 13$




KEY		
 = x	 = 1	 = -1

10) What is the solution to the following model?



KEY		
 = x	 = 1	 = -1




11) Model the equation $7x = 21$

KEY		
 = x	 = 1	 = -1

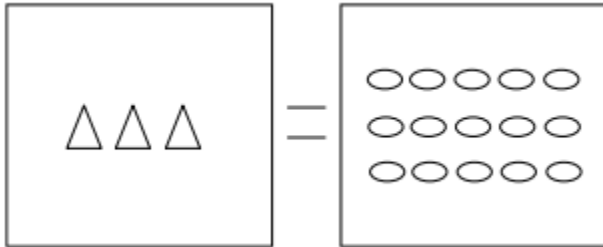
Modeling Equations Practice




Solve or model the following equations.

12) Model the equation $x + 2 = 8$




KEY		
 = x	 = 1	 = -1

13) What is the solution to the following model?

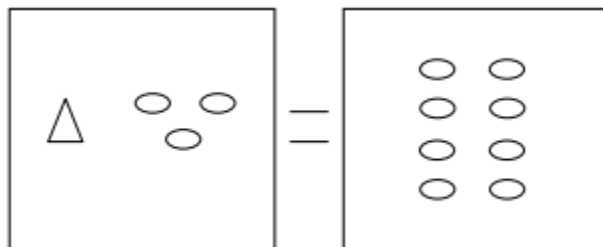





KEY		
 = x	 = 1	 = -1

14) Model the equation $5x = 30$

KEY		
 = x	 = 1	 = -1




15) What is the solution to the following model?



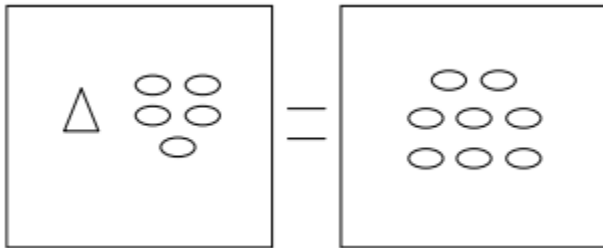
KEY		
 = x	 = 1	 = -1




Modeling Equations Practice

16) Model the equation $x + 6 = 9$

KEY		
	= x	
	= 1	
	= -1	

17) What is the solution to the following model?



KEY		
	= x	
	= 1	
	= -1	

Equations Vocabulary Practice

Create an expression or equation following the directions for each problem below.

18) Create a numerical expression with 3 terms

19) Create an equation with two constants and two variables

20) Create an equation with 3 terms

21) Create an equation that has 7 as a constant

M6 6-4: Solving 1-Step Equations and Properties

What is the goal of solving an equation?

In order to do this, we need to perform the inverse operation.

The inverse of Addition is _____

The inverse of Subtraction is _____

The inverse of Multiplication is _____

The inverse of Division is _____

Solving EXAMPLES:

1) $b + 14 = 27$	<u>Check</u>	2) $5 = w - 4$	<u>Check</u>
3) $7s = 56$	<u>Check</u>	4) $\frac{r}{6} = 3$	<u>Check</u>
5) $\frac{1}{2}c = 12$	<u>Check</u>	6) $6 = \frac{2}{3}w$	<u>Check</u>

Solving 1-Step Equations Practice

Solve and check.

1) $v - 10 = 9$

2) $\frac{x}{5} = 2$

3) $22 = 11k$

4) $x + 4 = 12$

5) $10 + h = 13$

6) $13m = 377$

7) $8 = p - 13$

8) $\frac{a}{29} = 5$

Solving Equations Dominoes

- 1) Remove this page from your binder.
- 2) Cut out the following domino pieces along the lines.
- 3) Place the dominoes in order on page 26.
- 4) Once they have been checked by your teacher glue them into place.

Start	$\frac{v}{8} = 2$	0	$3 + p = 8$
5	$\frac{1}{2}x = 4$	16	$21 = 7n$
3	$a + 11 = 20$	8	$6 = \frac{b}{18}$
108	$10n = 40$	9	$x - 7 = 13$
20	$16 = \frac{k}{11}$	4	$n - 16 = 9$
25	Finish	176	$15x = 0$

M6 6-5: Solving Equations and Properties

REMEMBER!!!

What is the goal of solving an equation?

In order to do this, we need to perform the inverse operation.

The inverse of Addition is _____

The inverse of Subtraction is _____

The inverse of Multiplication is _____

The inverse of Division is _____

Review. Don't forget a check step!

1) $9 + v = 10$

2) $\frac{x}{15} = 2$

3) $24 = \frac{1}{4}k$

4) $x - 4 = 12$

Solving Equations Practice

Solve the following problems. Don't forget to do a check step!

5) $10 + h = 13$

6) $10m = 300$

7) $5 = p - 13$

8) $\frac{a}{20} = 5$

9) $m + 4 = 12$

10) $\frac{1}{3}x = 5$

11) $14b = 56$

12) $\frac{v}{7} = 8$

Properties

- 1) Which of the following equations is an example of the associative property of addition?
- 2) Identify each number sentence that illustrates the additive identity property.

$2x^2 + 4x = 4x + 2x^2$
$(2x^2 + 4x) + 6 = 2x^2 + (4x + 6)$
$3(2x^2 + 4x) = 6x^2 + 12x$

$0 + 3 + 6 = 3 + 6$	$8 + (-8) - 4 = 0 - 4$
$3 + 7 + (-7) = 3 + 0$	$3 + 0 + 7 = 3 + 7$
$5 \cdot (4 + 0) = 5 \cdot 4$	$4 + 6 \cdot 0 = 4 + 0$

- 3) Identify each number sentence that illustrates the distributive property.

$4(3+1) = 4(3) + 4(1)$	$7 + 5(4+2) = 7 + 5(4) + 5(2)$
$(4 \cdot 7) \cdot 1 + 6 = 4 \cdot (7 \cdot 1) + 6$	$7(9-1) + 2 = 7(9) - 7(1) + 2$
$5(3+7 \cdot 0) = 5(3+0)$	$1(5+2) = 1(2+5)$

- 4) Identify each number sentence that illustrates the associative property of addition.

$(4 \cdot 7) \cdot 1 + 6 = 4 \cdot (7 \cdot 1) + 6$	$2 + 6 + 7 = 2 + 7 + 6$
$7 + (3+8) = (7+3) + 8$	$1 - (5+2) = 1 - (2+5)$
$(5 + (-1)) + 6 = 5 + ((-1) + 6)$	$(4+1) + 3 - 7 = 4 + (1+3) - 7$

- 5) Which property justifies this step?

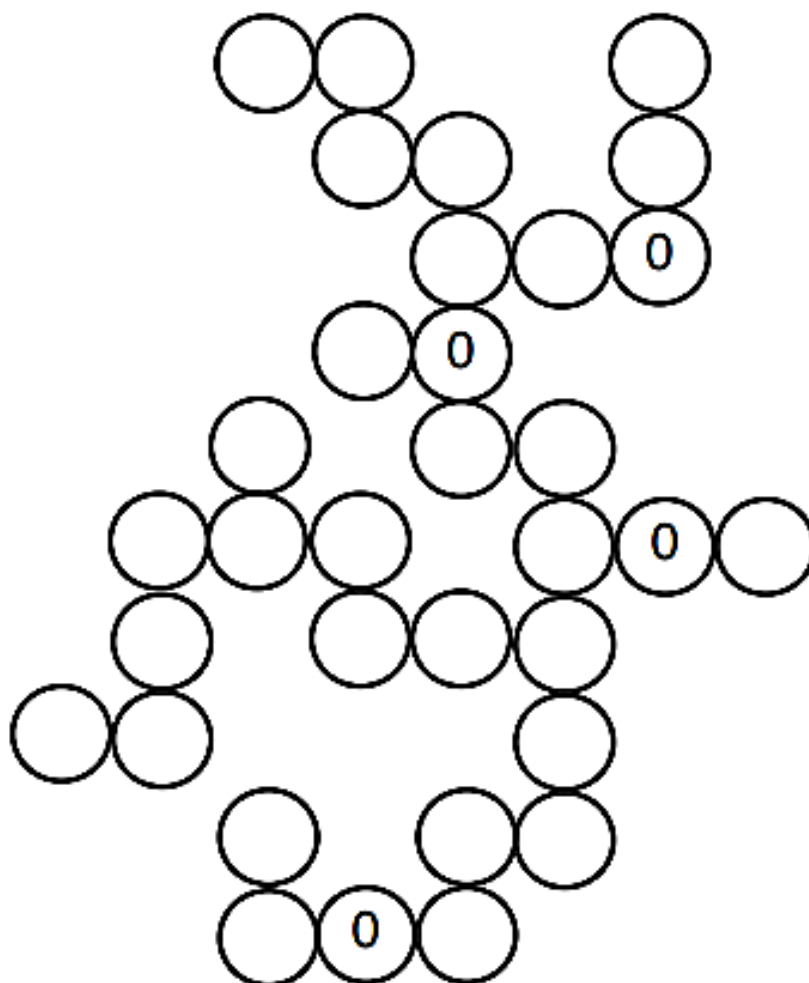
$$(4x + 2) + x = 27$$

$$(4x + x) + 2 = 27$$

Equations Puzzle

Solve the following problems, write the answers in the boxes. Then place the answers in the correct places to solve the puzzle. This puzzle is similar to a crossword puzzle.

$4x = 88$		$2 + x = 100$	
$70 \div x = 2$		$2600 \div x = 10$	
$30 = x - 9$		$4050 = 10x$	
$4 + x = 50$		$800 = x + 25$	
$25 = x \div 2$		$x - 80 = 700$	
$60 - x = 6$		$x \div 5 = 181$	
$112 = 2x$		$900 = x - 12$	
$67 \div x = 1$		$322 = x \div 3$	
$x \div 11 = 7$		$3 + x = 6710$	
$100 - x = 14$		$79550 - x = 1$	



M6 6-6: Proportions & Equations

A _____ states that two _____ are _____.

To prove if two ratios are equal we _____.

AKA: The butterfly method

** If the 2 ratios are equal they are considered a _____.

Examples:

Are the following true proportions? Yes or No and prove it!

1) $\frac{1}{2} = \frac{6}{12}$	2) $\frac{9}{12} = \frac{1}{4}$
3) $\frac{50}{10} = \frac{5}{2}$	4) $\frac{18}{3} = \frac{6}{1}$

You Try:

Are the following true proportions? Yes or No and prove it!

5) $\frac{3}{9} = \frac{5}{15}$	6) $\frac{5}{7} = \frac{80}{102}$
7) $\frac{8}{9} = \frac{72}{64}$	8) $\frac{1}{4} = \frac{25}{100}$
9) $\frac{2}{4} = \frac{8}{16}$	10) $\frac{4}{7} = \frac{12}{9}$

Proportions & Equations

We can also use proportions to find a _____.

To find the missing value follow these steps.

1) _____

2) _____

3) _____

Examples:

Solve for the missing value.

$$11) \frac{x}{24} = \frac{75}{120}$$

$$12) \frac{7}{n} = \frac{63}{108}$$

$$13) \frac{x}{9} = \frac{2}{3}$$

$$14) \frac{2}{9} = \frac{8}{x}$$

15) At the conference, there are 8 men for every 6 women. There are 64 men at the conference. How many women are there at the conference?

You Try:

Solve for the missing value.

$$16) \frac{x}{14} = \frac{5}{7}$$

$$17) \frac{9}{x} = \frac{3}{18}$$

$$18) \frac{x}{3} = \frac{30}{9}$$

$$19) \frac{8}{24} = \frac{2}{x}$$

Proportions & Equations

Are the following true proportions? Yes or No and prove it!

1) $\frac{15}{3} = \frac{12}{2}$	2) $\frac{3}{2} = \frac{18}{8}$
3) $\frac{4}{2} = \frac{20}{6}$	4) $\frac{3}{9} = \frac{2}{6}$
5) $\frac{4}{3} = \frac{8}{6}$	6) $\frac{12}{24} = \frac{3}{4}$

Solve for the missing value.

7) $\frac{12}{6} = \frac{x}{4}$	8) $\frac{n}{12} = \frac{6}{18}$
9) $\frac{51}{x} = \frac{17}{7}$	10) $\frac{3}{x} = \frac{5}{10}$
11) $\frac{10}{x} = \frac{8}{4}$	12) $\frac{x}{10} = \frac{10}{3}$

Proportions & Equations

Solve for the missing value.

<p>13) Jasmine bought 32 kiwi fruit for \$16. How many kiwi can Lisa buy if she has \$4?</p>	<p>14) If you can buy four bulbs of elephant garlic for \$8 then how many can you buy with \$32?</p>
<p>15) Fred bought 4 sodas for \$5. What was the cost of 1 soda?</p>	<p>16) One bunch of seedless black grapes costs \$2. How many bunches can you buy for \$20?</p>
<p>17) The money used in Jordan is called the Dinar. The exchange rate is \$3 to 2 Dinars. Find how many dollars you would receive if you exchanged 22 Dinars.</p>	<p>18) A 3-inch length by 9-inch width photo is enlarged so that the length of the new photo is 7 inches. Find the width of the new photo.</p>
<p>19) Gabriella bought three cantaloupes for \$7. How many cantaloupes can Shayna buy if she has \$21?</p>	<p>20) One package of blueberries costs \$3. How many packages of blueberries can you buy for \$9?</p>