2 - 1

Writing Equations

Translating Sentences

- Look for key words that you can use to change into numbers, variables and symbols

Example

1) Five times the number a squared is three times the sum of b and c.

2) A number b divided by three is six less than c.

Translating Equations

Example

1) $3m + 5 = 14$

2) $13 = 2 - 6t$

2 - 2

Solving Equations using Addition and Subtraction

Solving Equations

- To solve an equation, you need to find all values of the variable that make the equation a true statement.

- One way to do this is to isolate the variable by creating a single variable on one side of the equation and a numeric answer on the other side.

EXAMPLES

Solve the following equations.

1) $x + 15 = 21$

2) $x - 13 = -20$

3) $x + \frac{2}{3} = 3$

4) $x - \frac{1}{4} = \frac{4}{5}$

EXAMPLE

Read the statement below, then convert it into an equation. Solve the equation.

1) Twenty one subtracted from a number is negative eight.

2 - 3

Solving equations using Multiplication and Division

Solving with Multiplication or Division

If you do something to one side of the equation you MUST do the exact same thing to the other side.

- If the variable has a number attached to it (a coefficient), then the variable and number are being multiplied. To un-attach the number, you must divide the variable by the coefficient.

- If the variable has a number underneath it (a denominator), then the variable and number are being divided. To un-attach the number, you must multiply the variable by the denominator.

EXAMPLES

Solve the following equations.

1) $2x = 14$

2) $\frac{x}{3} = 8$

3) $\frac{2}{5}x = 6$

4) $-\frac{3}{4}x = \frac{1}{2}$

2 - 4

Multi-Step Equations

Solving Multi-Step Equations

- To solve a multi-step equation, you need to use all skills you developed in the earlier sections. (Add, Subtract, Multiply, Divide)

- The goal is to get all variables on one side and all numeric values on the other.

EXAMPLES

Solve the following equations.

1) $2x + 4 = 6$

2) $-3x - 5 = 10$

3) $\frac{x - 15}{9} = -6$

4) $\frac{1}{2}x - \frac{3}{4} = \frac{2}{3}$

2 - 5

Solving Equations with Variables on both sides

Variables on both sides

- Before moving variables or numeric values across the equal signs, make sure you simplify both sides completely (Distributive Property, Combine Like Terms, etc..)

- Move all variables to one side of the equal sign (does not matter which side) and move all numeric values to the other.

EXAMPLES

Solve all equations below.

1) $2x - 6 = 3x + 4$

2) $3(2x - 4) = 5(-x - 2)$

3) $2(2x - 3) - 3x = 6x - 7 + 4 - 5x$

4) $\frac{3}{8}x - \frac{1}{4} = \frac{1}{2}x - \frac{3}{4}$

2 - 6

Ratios and Proportions

<u>**Ratio**</u> - *the comparison of two numbers. Typically this comparison is written in fraction form.*

<u>**Proportion**</u> - *an equation where two ratios are set equal to each other.*

EXAMPLE

Determine if the two ratios are equal

$$\text{Is } \frac{3}{4} = \frac{15}{24} \text{ ?}$$

2 Methods (Find a Common Denominator or Use Cross Multiplication)

$$\frac{3}{4} = \frac{15}{24}$$

Common Denominator is 24

$$\frac{18}{24} = \frac{15}{24}$$

Numerators are not the same so the ratios are not equal

$$\frac{3}{4} = \frac{15}{24}$$

Cross Multiply

$$(3)(24) = (4)(15)$$

$$72 = 60$$

Values are not equal so the ratios are not equal

Solve the proportions

When solving, cross multiplying is quickest method

1) $\frac{x}{4} = \frac{7}{8}$

2) $\frac{1}{4} = \frac{x - 2}{-3}$

3) $\frac{x - 4}{3} = \frac{2x + 3}{5}$

2 - 7

Percent of Change

TERMINOLOGY

Percent Decrease - *the new value is less than the original value.*

Percent Increase - *the new value is great than the original value.*

FORMULA

$$\frac{\text{Change}}{\text{Original}} = \frac{\%}{100}$$

Change = new - original

Find the % increase or decrease

Original Price = $25
New Price = $28

Find the Discounted Price

Shirt = $30
Discount = 30%

2 - 8

Solving for a specific variable

Solving for a specific variable

Solving for a specific variable is no different than solving to find a solution. Whatever variable you are solving for, the goal is to isolate it using methods taught in earlier sections.

Remember, you can NOT combine terms that are not alike.

Example 1

Solve for y.

1) $3x + y = 4$

Example 2

Solve for x

2) $3x + y = 4$

Example 3

Solve for f.

3) $3a - 2b = 2fg + b$

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