

## 2.1 Solving Equations

### Need To Know



- Check a solution to an equation
- Understand Addition property of equality
- Understand Multiplication property of equality
- Use them to solve equations

## Equations

Definition – The \_\_\_\_\_ to an equation is the set of all numbers that can replace the variable and make the equation a true statement.

Examples:

Is 4 a solution to  $2x + 3 = 7$ ?    Is  $4/3$  a solution to  $8 = 3x + 4$ ?

# Equivalent Equations

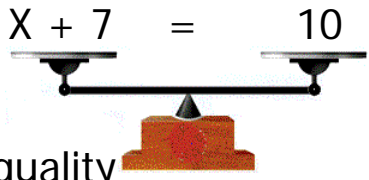
Definition – \_\_\_\_\_ are two or more equations with the same solution.

Example:  
 $x + 3 = 9$

**Observation:**

# Addition Property of Equality

Equations can be thought of as a balanced system.



Addition Property of Equality

In Words:



## Solve Equations

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Example:

$$x + 3 = 9$$

### Solving Equations

Goal:

▪

How:

- Make equivalent \_\_\_\_\_  
\_\_\_\_\_ all the  
operations associated with  
the unknown.
- Show your thinking by  
writing the algebra step  
on \_\_\_\_\_ sides of the  
equal sign.



## Solve Equations

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Solve for x

$$x - 4 = 12$$

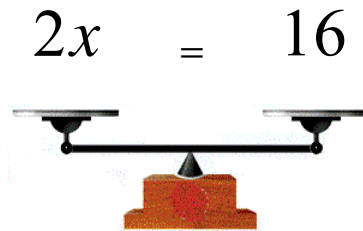
Solve for w

$$-3.5 + w = 8.2$$

Solve for b

$$b + \frac{2}{3} = -\frac{1}{6}$$

## Multi. Property of Equality



## Multi. Property of Equality

### Multiplication Property of Equality

In Words: If you multiply or divide the same **non-zero** number to both sides of the equation, the result is an equivalent equation.

Example: Solve each.

$$5x = -20$$

$$-3r = 27$$

$$-\frac{5x}{6} = 3$$

end



## 2.2 Solving Harder Equations

### Need To Know



- Solve equations that require both properties.
- Solve equations with like terms on both sides.
- Simplifying equations with fractions and decimals.



## Solve Equations - Review

Solve for x

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

Recall Solving Equations

- Goal:
  - Get the unknown by itself.
- How:
  - Make equivalent equations that undo all the operations associated with the unknown.
  - Show your thinking by writing the operations on BOTH sides of the equal sign.



## Solve Equations

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Solve for  $x$

$$7 + 1 = 2x - 6x$$

Solving Equations

(stated more simply)

- Goal:
  - Get  $x$  by itself.
  
- How:
  - Simplify
  - Whatever you do to one side do to the other side.



## Solve Multi-step Equations

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Solve for  $x$

$$4x + 3 = -13$$

The idea of solving

Equation diagram



## Solve Multi-step Equations

Solve

$$3x + 4 = -15$$

### Summarize Steps

- Simplify
- Use the add property on both sides
- Use the multiplication property to get x by itself
- Check your answer



## Solve Multi-step Equations

Solve

$$2(x - 3) + 3 = 9$$

### Steps to Solve

Simplify

- 1.
- 2.
- 3.

Use Add Property to

1. Get variable on one side
2. Get constant terms on the other side

Use Multiplication Property

1. Get unknown by itself

Check



## Solve Multi-step Equations

Solve for z:

$$5z + 6 = 3z - 6$$

### Steps to Solve

Simplify

- 1.
2. Clear parentheses
3. Clear like terms

Use Add Property to

1. Get variable on one side
2. Get constant terms on the other side

Use Multiplication Property

1. Get unknown by itself

Check



## Solve Multi-step Equations

Solve

$$7(x - 3) + 5 = 4(3x - 2) - 8$$

### Steps to Solve

Simplify

- 1.
2. Clear parentheses
3. Clear like terms

Use Add Property to

1. Get variable on one side
2. Get constant terms on the other side

Use Multiplication Property

1. Get unknown by itself

Check



## Solve Equations w/ Fractions

Solve for x:

$$\frac{1}{3}x + \frac{2}{5} = \frac{4}{15} + \frac{3}{5}x - \frac{2}{3}$$

### Steps to Solve

Simplify

- 1.
2. Clear parentheses
3. Clear like terms

Use Add Property to

1. Get variable on one side
2. Get constant terms on the other side

Use Multiplication Property

1. Get unknown by itself

Check



## Solve Equations w/ Decimals

Solve for z:

$$0.91 - 0.2z = 1.23 - 0.6z$$

### Steps to Solve

Simplify

1. Clear fractions
2. Clear parentheses
3. Clear like terms

Use Add Property to

1. Get variable on one side
2. Get constant terms on the other side

Use Multiplication Property

1. Get unknown by itself

Check

end

## 2.3 Formulas

### Need To Know



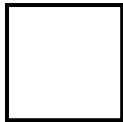
- Basic formulas
- Evaluating formulas
- Solving formulas

## Formulas to Memorize

■ Square

Area =

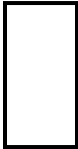
Perimeter =



■ Rectangle

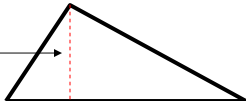
Area =

Perimeter =



■ Triangle

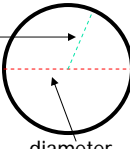
1. Area =
2. Perimeter =



height

■ Circle

1. Area =  $\pi r^2$
2. Circumference =  $2\pi r$



radius

diameter



## Evaluating Formulas

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The power rating  $P$ , in watts, of an electrical appliance is determined by  $P = V \cdot I$ , where  $I$  is the current, in amperes, and  $V$  is the voltage, measured in volts. If a kitchen requires 30 amps and there is 115 volts in the house, what is the wattage in the kitchen? (2.3 #2)



## Evaluating Formulas

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A farmer has 76 feet of fencing. He plans to make a pig pen that is 10 feet wide. How long will it be?



## Solving Formulas

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Sometimes formulas need to be rearranged.

We must solve for a different variable in the formula.

We use algebra to isolate that variable.

In other words, we undo all the operations associated with that variable to get it by itself.

Solve for a:  $c = a + b$

Solve for W:  $A = LW$



## Practice

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Solve  $I = Prt$ , for  $t$ . (You try it)



## Practice

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Solve  $P = 2W + 2L$  for  $L$ .



## Practice

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Solve  $S = rx + sx$ , for  $x$ .

Remember:

to collect like terms  
may mean factoring.



## Practice

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Solve  $H = \frac{a + y - k}{4}$ , for  $y$ .

Remember:

Clear fraction first by multiplying the LCM.

end



## 2.4 Percent

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### Need To Know

- Percentage Notation
- Percent Equations
- Percent Word Problems



# Percentage

Recall percent means \_\_\_\_\_.

Percent is a concept. It must be translated into a numerical value.

Percent Notation: n% means \_\_\_\_\_

Percent	Decimal	Fraction
50%	0.50	$\frac{1}{2}$
25%	0.25	$\frac{1}{4}$
140%	1.40	$\frac{140}{100} = \frac{7}{5}$

# Practice

Fill in the blanks

Percent	Decimal	Fraction
4.8%		
	9.2	
		$\frac{7}{25}$



## Solve Percent Equations

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What number is 75% of 40?

What percent of 20 is 14?      12% of what is 240?



## Percent Translation

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Definition – A \_\_\_\_\_ is a pseudo sentence that describes the mathematics of a common situation.

Many percent problems follow this verbal model:

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## Percent Translation

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**Verbal model** "A percent of the whole is the part."

Example: This ice cream is 150 calories. 90 calories of it is fat calories which is 60%.

Percent =

The whole =

The part =

A percent of the whole is the part.



## Percent Word Problems

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If a serving of ice cream is 65 grams and the container says that each serving has 11 grams of sugar, what percent of the ice cream is sugar?



## Percent Word Problems

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A tax exempt charity was charged \$1205.45 for their new computer. The bill incorrectly added on 5% sales tax. How much should the charity have been charged. (Hint: 105%)



## 2.5 Problem Solving

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### Need To Know

- Guide lines to solve word problems
- How to become familiar with a problem
- Apply





## Guide Lines to Solve Problems

### Five Steps for Problems Solving

1. Familiarize myself with the problem.
2. Translate to mathematics (i.e. an equation).
3. Carry out the mathematics (i.e. solve).
4. Check your answer in the original problem.
5. State your answer clearly.



## Familiarize Yourself w/ Problem

1. Read and reread the problem, visualize it, read it aloud and understand key words.
2. List the given information and question(s) to be answered
3. \_\_\_\_\_  
\_\_\_\_\_ **(REQUIRED)**
4. Find more information, look up formulas or do research need to start.
5. Use the other **TOOLS**.



## Apply

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Subtracting 5 from twice a number is 11.  
Find the number.

### Steps

1. Familiarize
2. Translate
3. Carry out
4. Check
5. State answer

### Tools

1. Keywords
2. Drawing
3. Simpler problem
4. Tables/Patterns
5. Charts
6. Guess
7. Verbal Model



## Apply

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In Cranston, taxis charge \$4 plus 90¢  
per mile for an airport pick-up.  
How far can Ralph get for \$17.50?

### Steps

1. Familiarize
2. Translate
3. Carry out
4. Check
5. State answer

### Tools

1. Keywords
2. Drawing
3. Simpler problem
4. Tables/Patterns
5. Charts
6. Guess
7. Verbal Model



## Apply

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The perimeter of a triangle is 195 mm.  
If the lengths of the sides are consecutive odd integers, find the sides.

### Steps

1. Familiarize
2. Translate
3. Carry out
4. Check
5. State answer

### Tools

1. Keywords
2. Drawing
3. Simpler problem
4. Tables/Patterns
5. Charts
6. Guess
7. Verbal Model



## Apply

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Milton borrowed money from his friend at a rate of 10% simple interest. One year later he paid \$7194 to clear the loan.  
How much did he borrow?

### Steps

1. Familiarize
2. Translate
3. Carry out
4. Check
5. State answer

### Tools

1. Keywords
2. Drawing
3. Simpler problem
4. Tables/Patterns
5. Charts
6. Guess
7. Verbal Model

## 2.6 Linear Inequality

### Need To Know



- Idea of inequality
- Graphing inequalities
- Addition property of inequality
- Multiplication property of inequality
- Solving inequalities

## Equations vs. Inequalities

Equation =

$$x = 3$$

Solutions:

Graph:

Inequality  $<, \leq, >, \geq$

$$x < 3$$

Solutions:

Graph:



## Graphing Inequalities

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Graph each:

$$x > -2$$



$$a \geq -1$$



$$-4 \leq z < 1$$




## Solving Inequalities

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Solving inequalities is the same as solving equations except for one special situation.

### Addition Property of Equality

If  $A < B$ ,

Then \_\_\_\_\_

In words: Adding or subtracting the same thing to **both** sides of the inequality will keep the same solution set.



## Solving Inequalities

Solve:  $3x - 7 \geq 2x + 3$  and graph solution.



## Idea of Multiplying Inequalities

Consider multiplying both sides by a **positive**:

1)  $2 < 6$

2)  $-2 < 6$

3)  $-2 < -6$

Consider multiplying both sides by a **negative**:

1)  $2 < 6$

2)  $-2 < 6$

3)  $-2 < -6$

## Solving Inequalities

### Multiplication Property of Equality

- 1) If  $A < B$ ,  
Then  $AC < BC$  if  $C$  is \_\_\_\_\_.

Multiplying or dividing a **positive** to **both** sides of the inequality will keep the same solution set.

- 2) If  $A < B$ ,  
Then  $AC > BC$  if  $C$  is \_\_\_\_\_.

Multiplying or dividing a **negative** to **both** sides of the inequality requires \_\_\_\_\_ to keep the same solution set.

## Solving Inequalities

Solve and graph:

$$\frac{x}{4} \leq -2$$

Solve and graph:

$$-3a > 12$$





## Solving Inequalities

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Solve and graph:

$$-\frac{3}{4}y > 6$$



Solve and graph:

$$3x - 4 > 17$$




## Solving Inequalities

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Solve and graph:

$$2(3m - 1) + 5 \geq 8m - 7$$





## Solving Inequalities

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Solve and graph:

$$\frac{1}{3}y - \frac{1}{2} \leq \frac{5}{6} + \frac{1}{2}$$



end