

# Parent Newsletter

## Chapter 7: Equations and Inequalities

### Students will...

Write word sentences as equations.

Use addition or subtraction to solve equations.

Use substitution to check answers.

Use multiplication or division to solve equations.

Use substitution to check answers.

Identify independent and dependent variables.

Write equations in two variables.

Use tables and graphs to analyze the relationship between two variables.

Write word sentences as inequalities.

Use a number line to graph the solution set of inequalities.

Use inequalities to represent real-life situations.

Use addition or subtraction to solve inequalities.

Use a number line to graph the solution set of inequalities.

Use multiplication or division to solve inequalities.

Use a number line to graph the solution set of inequalities.

Solve real-life problems.

### Key Terms

An **equation** is a mathematical sentence that uses an equal sign,  $=$ , to show that two expressions are equal.

A **solution** of an equation is a value that makes the equation true.

**Inverse operations** “undo” each other, such as addition and subtraction or multiplication and division.

An **equation in two variables** represents two quantities that change in relationship to one another.

A **solution of an equation in two variables** is an ordered pair that makes the equation true.

The variable representing the quantity that can change freely in an equation in two variables is the **independent variable**.

The variable whose value depends on the independent variable in an equation in two variables is the **dependent variable**.

An **inequality** is a mathematical sentence that compares expressions.

A **solution of an inequality** is a value that makes the inequality true.

The set of all solutions of an inequality is called the **solution set**.

The **graph of an inequality** shows all the solutions of the inequality on a number line.

### Standards

#### Common Core:

**6.EE.5:** Understand solving an equation or inequality as a process of answering a question: which values from a specified set, if any, make the equation or inequality true? Use substitution to determine whether a given number in a specified set makes an equation or inequality true.

**6.EE.6:** Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set.

**6.EE.7:** Solve real-world and mathematical problems by writing and solving equations of the form  $x + p = q$  and  $px = q$  for cases in which  $p$ ,  $q$ , and  $x$  are all nonnegative rational numbers.

**6.EE.8:** Write an inequality of the form  $x > c$  or  $x < c$  to represent a constraint or condition in a real-world or mathematical problem. Recognize that inequalities of the form  $x > c$  or  $x < c$  have infinitely many solutions; represent solutions of such inequalities on number line diagrams.

**6.EE.9:** Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation.

### Key Ideas

#### Addition Property of Equality

When you add the same number to each side of an equation, the two sides remain equal.

#### Subtraction Property of Equality

When you subtract the same number from each side of an equation, the two sides remain equal.

#### Multiplication Property of Equality

When you multiply each side of an equation by the same nonzero number, the two sides remain equal.

#### Multiplicative Inverse Property

The product of a nonzero number  $n$  and its reciprocal,  $\frac{1}{n}$ , is 1.

#### Division Property of Equality

When you divide each side of an equation by the same nonzero number, the two sides remain equal.

#### Distance Formula

To find the distance traveled  $d$ , multiply the speed  $r$  by the time  $t$ .

$$d = rt$$



## Reference Tools

An **Example and Non-Example Chart** can be used to list examples and non-examples of a vocabulary word or term. Write examples of the word or term in the left column and non-examples in the right column. This type of organizer serves as a good tool for assessing knowledge of pairs of topics that have subtle but important differences, such as equations and inequalities.

### Equations

| Examples           | Non-Examples  |
|--------------------|---------------|
| $x = 5$            | 5             |
| $2a = 16$          | $2a$          |
| $x + 4 = 19$       | $x + 4$       |
| $5 = x + 3$        | $x + 3$       |
| $12 - 7 = 5$       | $12 - 7$      |
| $\frac{3}{4}y = 6$ | $\frac{3}{4}$ |

## Essential Questions

How does rewriting a word problem help you solve the word problem?

How can you use addition or subtraction to solve an equation?

How can you use multiplication or division to solve an equation?

How can you write an equation in two variables?

How can you use a number line to represent solutions of an inequality?

How can you use addition or subtraction to solve an inequality?

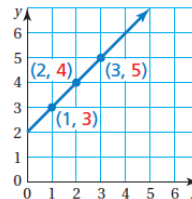
How can you use multiplication or division to solve an inequality?

## Key Ideas

### Tables, Graphs, and Equations

You can use tables and graphs to represent equations in two variables. The table and graph below represent the equation  $y = x + 2$ .

| Independent Variable, x | Dependent Variable, y | Ordered Pair, (x, y) |
|-------------------------|-----------------------|----------------------|
| 1                       | 3                     | (1, 3)               |
| 2                       | 4                     | (2, 4)               |
| 3                       | 5                     | (3, 5)               |



### Addition Property of Inequality

When you add the same number to each side of an inequality, the inequality remains true.

### Multiplication Property of Inequality

When you multiply each side of an inequality by the same *positive* number, the inequality remains true.

### Subtraction Property of Inequality

When you subtract the same number from each side of an inequality, the inequality remains true.

### Division Property of Inequality

When you divide each side of an inequality by the same *positive* number, the inequality remains true.

## Games

- Tic-Tac-Toe

This is available online in the *Game Closet* at [www.bigideasmath.com](http://www.bigideasmath.com).

## Quick Review

- When graphing an inequality on a number line, an open circle ( $\circ$ ) is used when a number is *not* a solution. A closed circle ( $\bullet$ ) is used when a number is a solution. An arrow to the left or right shows that the graph continues in that direction.
- Subtraction is not commutative so the order in which the terms are written does matter. *A number decreased by 4* is different from *4 decreased by a number*.
- Addition and subtraction and multiplication and division are inverse operations. The inverse operation must be done on both sides of the equation so that the two sides remain equal.

| Inequality Symbols |   |   |   |   |
|--------------------|---|---|---|---|
| Symbol             | $<$   | $>$   | $\leq$  | $\geq$  |
| Key Phrases        | <ul style="list-style-type: none"> <li>• is less than</li> <li>• is fewer than</li> </ul> | <ul style="list-style-type: none"> <li>• is greater than</li> <li>• is more than</li> </ul> | <ul style="list-style-type: none"> <li>• is less than or equal to</li> <li>• is at most</li> <li>• is no more than</li> </ul> | <ul style="list-style-type: none"> <li>• is greater than or equal to</li> <li>• is at least</li> <li>• is no less than</li> </ul> |

## What's the Point?

The ability to write and solve equations and inequalities is very useful in real life for events like making a household budget. Ask your student how they plan on spending their money next month. Then have them make a budget to show at least how much money they will need to earn to cover all the costs.

The STEM Videos available online show ways to use mathematics in real-life situations. The Chapter 7: Designing a CubeSat STEM Video is available online at [www.bigideasmath.com](http://www.bigideasmath.com).

