Section 7.1 Writing Equations in One Variable Notes

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Objective: Students will translate words and problems into algebraic equations.

Key Concepts & Vocabulary:

Equations: a mathematical sentence that uses an equal sign to show that two expressions are equal

Expressions	Equations
4 + 8	4 + 8 = 12
x + 5	x + 5 = 17

Look for key words and phrases to know where to place the equal sign!

Clues: *is* *the same as* *equals*

EXAMPLES:

Example 1.) Writing Equations

Write the word sentence as an equation.

1. The sum of a number n and 7 is 15. **n + 7 = 15**

2. A number y decreased by 4 is 3. **y – 4 = 3**

3. 12 times a number p equals 48. **12p = 48**

On Your Own:

1. 9 less than a number b equals 2 **b – 9 = 2**
2. the product of a number g and 5 is 30 **5g= 30**
3. A number k increased by 10 is the same as 24 **k + 10 = 24**
4. the quotient of a number q and 4 is 12 **q ÷ 4 = 12**

Example 2.)

Ten servers decorate 25 tables for a wedding. Each table is decorated as shown. Let c be the total number of white and purple candles. Which equation can be used to find c?

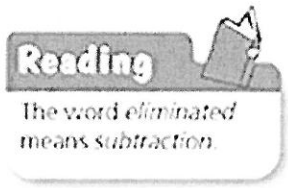
Words The total number of candles | is | the number of tables | times | the number of candles on each table.

Variable Let c be the total number of candles.

Equation $c = 25 \times (4 + 6)$

Example 3.)

After two rounds, 24 students are eliminated from a spelling bee. There are 96 students remaining. Write an equation you can use to find the number of students that started the spelling bee.



Words The number of students that started | minus | the number of students eliminated | is | the number of students remaining.

Variable Let s be the number of students that started.

Equation $s - 24 = 96$

∴ An equation is $s - 24 = 96$.

On Your Own:

5. You enter an elevator and go down 7 floors. You exit on the 10th floor. Write an equation you can use to find the floor where you entered the elevator.

x – 7 = 10

6. Together you and a friend have $52. Your friend has $28. Write an equation you can use to find how much money you have.

28 + x = 52

Section 7.2 Solving Equations Using Addition or Subtraction Notes
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Vocabulary:

1. **inverse operations** – operations that undo each other
2. **variable** – a letter that represents an unknown number
3. **solution**- a value for the variable that makes the equation true

Operation	Inverse Operation
Adding	Subtracting
Subtracting	Adding

***Goal for solving equations:** Get the variable alone on one side of the equation!

Steps for solving a one-step equation:

1. Use inverse operations to get the variable alone.
2. Check your solution using the original equation.

Checking Solutions:

Tell whether the given value is a solution of the equation.

1.) $p + 10 = 38$; $p = 18$

$18 + 10 = 28$, not 38
(18 is not a solution)

2.) $19 - g = 4$; $g = 15$

$19 - 15 = 4$
(yes, 15 is a solution)

Solving Equations:

1.)

$$x - 4 = 12$$
$$+4 \quad +4$$
$$x = 16$$

Check:

$16 - 4 = 12$

2.)

$$a + 5.5 = 17.3$$
$$-5.5 \quad -5.5$$
$$a = 11.8$$

Check:

$11.8 + 5.5 = 17.3$

3.) $f - 27.2 = 19.3$ $+27.2 \quad +27.2$ $f = 46.5$	Check: $46.5 - 27.2 = 19.3$
4.) $15.2 = x + 4.1$ $-4.1 \quad -4.1$ $11.1 = x$	Check: $11.1 + 4.1 = 15.2$
5.) $1.8 + x = 13.7$ $-1.8 \quad -1.8$ $X = 11.9$	Check: $1.8 + 11.9 = 13.7$

6.) You are shopping at the mall and decide to buy the pair of shoes shown for $59.95. After you buy the shoes, you have $5.50 left. Write and solve an equation to find how much money you had before you bought the shoes.

Define the variable: x = how much money you started with

Equation: $x - 59.95 = 5.50$

$X = \$65.45$

Section 7.3 Solving Equations Using Multiplication and Division Notes
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Vocabulary:

1. **inverse operations** - operations that undo each other
2. **variable** - a letter that represents an unknown number
3. **solution**- a value for the variable that makes the equation true

Operation	Inverse Operation
Multiplying	Dividing
Dividing	Multiplying

***Goal for solving equations:** Get the variable alone on one side of the equation!

Steps for solving a one-step equation:

1. Use inverse operations to get the variable alone.
2. Check your solution using the original equation.

Checking Solutions:

Tell whether the given value is a solution of the equation.

1.) $4y = 56;\ y = 14$

$4(14) = 56$

(yes, 14 is a solution)

2.) $\frac{y}{2} = 28; y = 14$

$\frac{14}{2} = 7, not\ 28$

(not a solution)

Solving Equations:

1.) $\frac{6w}{6} = \frac{75}{6}$ $W = 12.5$	Check: $6(12.5) = 75$
2.) $\frac{2}{7}x = 6$ $\frac{7}{2} \cdot \frac{2}{7}x = 6 \cdot \frac{7}{2}$ $X = 21$	Check: $\frac{2}{7} \cdot \frac{21}{1} = \frac{42}{7} = 6$

3.) $\frac{a}{8} = 12$ $8 \cdot \frac{a}{8} = 12 \cdot 8$ $a = 96$	Check: $\frac{96}{8} = 12$
4.) $8.8 = \frac{x}{5}$ $5 \cdot 8.8 = \frac{x}{5} \cdot 5$ $44 = x$	Check: $8.8 = \frac{44}{5}$
5.) $\frac{72}{4} = \frac{4x}{4}$ $x = 18$	Check: $72 = 4(18)$

6.) You and four friends buy tickets to a football game. The total cost is $70. Write and solve and equation to find the cost of each ticket.

Define the variable: x = the cost of each ticket

Equation: 5x = 70

x = $14 per ticket

Section 7.4 Writing Equations in Two Variables Notes

KEY VOCABULARY:

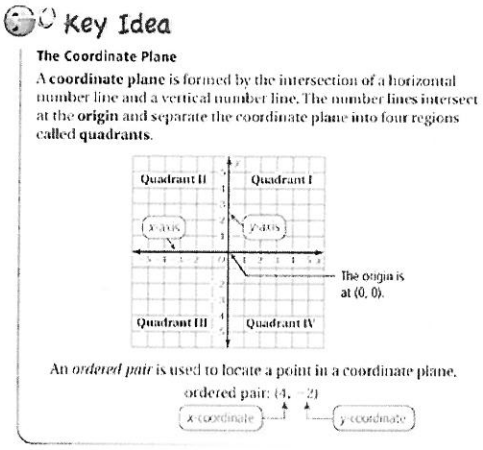
A **solution** of an **equation in two variables** is an **ordered pair** that makes the equation true.

An **independent variable** is the quantity that you can **change (or choose).**

A **dependent variable** is the value that **depends** on the independent variable

Remember Me?

An **ordered pair** is always written as **(x, y)**



Example 1:

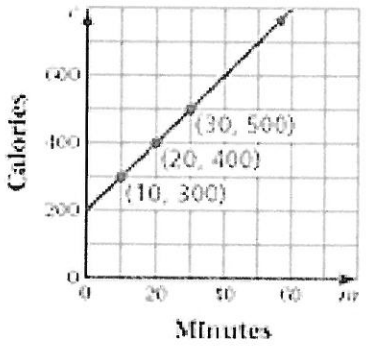
An athlete burns 200 calories weight lifting. The athlete then works out on an elliptical trainer and burns 10 calories for every minute. Fill in the table to find how many calories the athlete will burn after 10, 20 and 30 minutes.

What is the independent variable? **The minutes** (you choose how many minutes you exercise)

What is the dependent variable? **Calories** (the amount depends on the minutes)

Minutes, m	c = 200 + 10m	Calories, c	Ordered Pair (m,c)
10	c = 200 + 10(**10**)	300	(10, 300)
20	c = 200 + 10(**20**)	400	(20, 400)
30	c = 200 + 10(**30**)	500	(30, 500)

Now, graph the equation by plotting the ordered pairs.

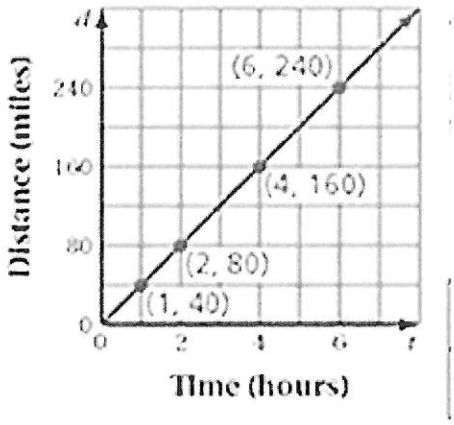


Example 2:
A train averages 40 miles per hour between two cities. Use a graph to show the relationships between the time and the distance traveled.

Independent Variable **TIME** Dependent Variable **DISTANCE**

Fill in the table:

Time (hours), t	d =40t	Distance (miles), d	Ordered pair, (t, d)
1	d = 40(1)	40	(1, 40)
2	d = 40(2)	80	(2, 80)
4	d = 40(4)	160	(3, 160)



Identifying Solutions:
Tell whether the ordered pair is a solution of the equation.

3.) y = 2x; (3, 6)

6 = 2(3)
6 = 6 (is a solution)

4.) y = 4x – 3; (4, 12)

12 = 4(4) - 3
12 ≠ 13 (not a solution)

5.) You have $25 and are saving $10 each week. The equation y = 10x + 25 gives the amount y (in dollars) in your savings account after x weeks. How much is in your savings account after 8 weeks?

Y = 10(8) + 25
Y = 80 + 25
Y = $105

Section 7.5 Graphing and Writing Inequalities Notes TEACHER

Vocabulary:

1. inequality – a mathematical sentence that compares expressions. (contains >, <, ≥, ≤)
2. solution of an inequality – any value that makes the inequality true

Symbol	How to Read It	Circle's Appearance
>	greater than	open (not a solution)
<	less than	open (not a solution)
≥	greater than or equal to	closed (is a solution)
≤	less than or equal to	closed (is a solution)

Tell whether 3 is a solution of the inequality. Explain why or why not.

1.) $b + 4 < 6$

$3 + 4 < 6$

7 is not less than 6

(not a solution)

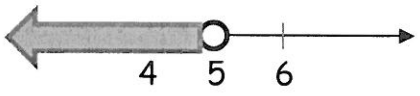
2.) $9 - x \geq 6$

$9 - 3 \geq 6$

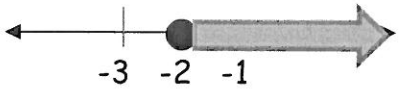
(yes, 6 is equal to 6)

Graph the solutions of each inequality.

3.) $x < 5$



4.) $c \geq -2$

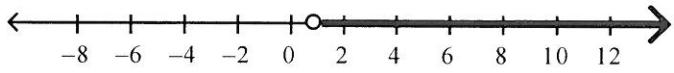


Write an inequality for each graph.

5.)

$x \leq 12$

6.)



$x > 1$

Write an inequality for each statement.

7.) To qualify for the race, your time cannot be over 62 seconds.

$r \leq 62$ seconds

8.) The car ride to the park will take at least 30 minutes.

$c \geq 30$ minutes

Section 7.6 Solving One-Step Inequalities with Adding & Subtracting Notes
TEACHER

Objective: Students will write and solve one-step inequalities using addition or subtraction.

Steps for solving one-step inequalities:

1. Solve for the variable the same way you solve an equation (get the variable alone on one side of the inequality).
2. Rewrite your solution so that the variable is on the left side of the inequality.

Examples:

Solve each inequality. Then, graph your solution.

1.) $x + 4.2 < 13.6$

$x < 9.4$

2.) $w - 82 \geq 129$

$w \geq 211$

3.) $\frac{1}{3} + h > \frac{5}{6}$

$h > \frac{1}{2}$

4.) $5.4 < x + 1.2$

$4.2 < x$

5.) The school record for the most points scored in a football season is 85. Larry has 42 points so far this season. How many more points does he need to break the record?

$42 + p > 85$

$p > 43$ points

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Section 7.7 Solving Inequalities with Multiplication & Division Notes Student Notes

Objective: Students will write and solve one-step inequalities using multiplication or division.

Steps for solving one-step inequalities:

1. Solve for the variable the same way you solve an equation (get the variable alone on one side of the inequality).
2. Rewrite your solution so that the variable is on the left side of the inequality.

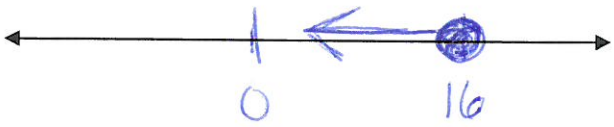
Examples:

Solve each inequality. Then, graph your solution.

1.) $4x \leq 64$

$\frac{4}{4} \quad \frac{4}{4}$

$x \leq 16$

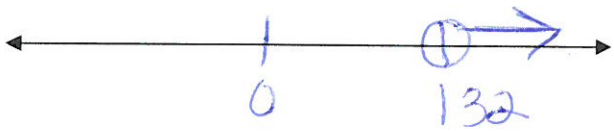


2.) $\frac{g}{6} > 22$

$\cdot 6 \quad \cdot 6$

$g > 132$

$22 \times 6 = 132$

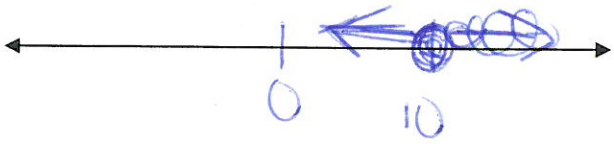


3.) $\frac{3}{5}h \leq 6$

$\div 3/5 \quad \div 3/5$

$h \leq 10$

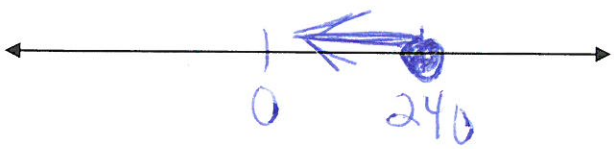
$\frac{6}{1} \div \frac{3}{5} = \frac{6}{1} \times \frac{5}{3} = \frac{30}{3} = 10$



4.) $30 \geq \frac{x}{8}$

$\cdot 8 \quad \cdot 8$

$240 \geq x$



5.) A thrill ride at an amusement park holds a maximum of 12 people per ride. Write and solve an inequality to find the least number of rides needed for 15,000 people.

$\frac{12r}{12} \geq \frac{15{,}000}{12}$

$r \geq 1{,}250$