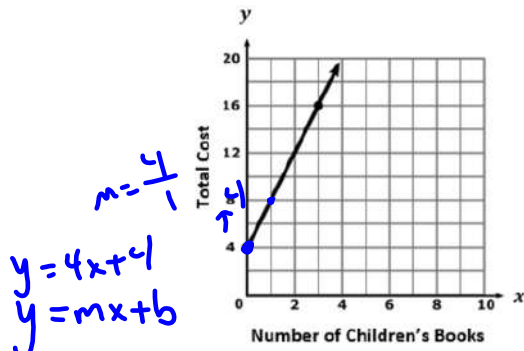


Day 1 Prebells

1) The graph represents the total cost of children's books from a website.



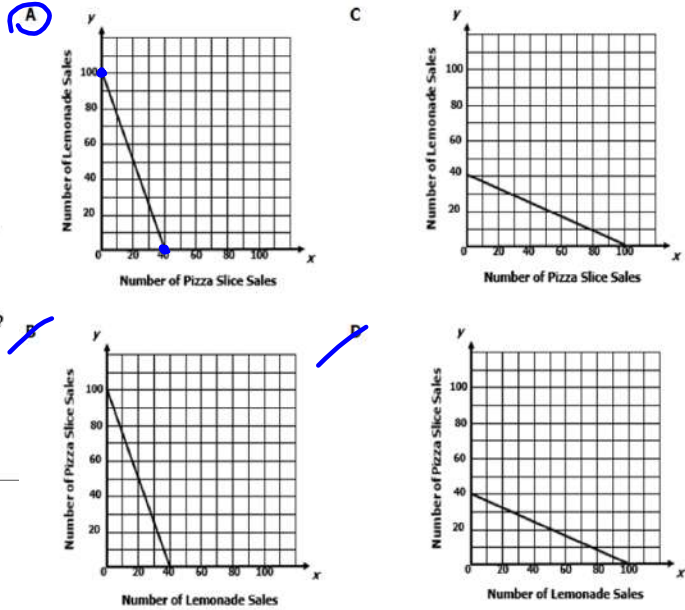
Which equation represents the cost, y , of buying x children's books?

- A $y = -4x + 4$
- B $y = -3x + 4$
- C $y = 3x + 4$
- D $y = 4x + 4$

A concession stand sells pizza slices and lemonade.

- 2)
- Each pizza slice costs \$2.50.
- Each lemonade costs \$1.00.
- The total sales for one day is \$100.

Which graph represents the relationship between the number of pizza slice sales, x , and the number of lemonade sales, y , for that day?



Aug 25-9:59 AM

Day 2:

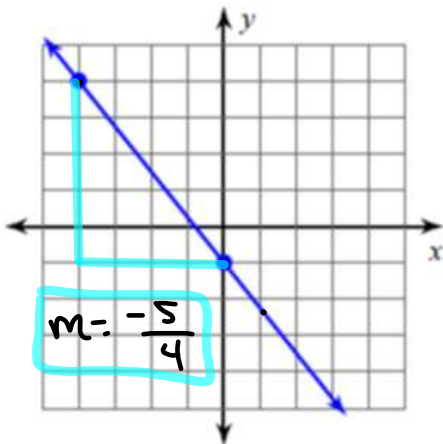
1) Solve $2x + 1 = 7$

$$\begin{aligned} 2x + 1 &= 7 \\ -1 & \\ \hline 2x &= 6 \\ \frac{2x}{2} &= \frac{6}{2} \\ x &= 3 \end{aligned}$$

2) Solve $3(w - 4) = 15$

$$\begin{aligned} 3(w - 4) &= 15 \\ 3w - 12 &= 15 \\ +12 &+12 \\ \hline 3w &= 27 \\ \frac{3w}{3} &= \frac{27}{3} \\ w &= 9 \end{aligned}$$

3) Find the rate of change from $x = -4$ to $x = 0$



4) Find the rate of change from $x = 1$ to $x = 3$

x	y
0	1
1	2
2	5
3	10

Handwritten notes: $(1, 2)$, $(3, 10)$

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{10 - 2}{3 - 1} = \frac{8}{2} = 4$$

Aug 25-7:19 PM

Day 3:

1) Solve $(n + 3)(n - 1) = 0$

$$\begin{array}{l} n+3=0 \quad n-1=0 \\ -3 \quad -3 \quad +1 \quad +1 \\ \hline \boxed{n=-3} \quad \boxed{n=1} \end{array}$$

2) Solve $2(x + 3) + 5x + 1 = 7(x + 1)$

$$2x + 6 + 5x + 1 = 7x + 7$$

$$7x + 7 = 7x + 7$$

$$7 = 7 \quad \checkmark$$

infinite solutions

Aug 25-7:19 PM

Day 4:

1) Solve and graph $-5x < 25$

$$\frac{-5x}{-5} > \frac{25}{-5}$$

$$\boxed{x > -5}$$



2) Solve and Graph $2(n + 3) \geq 8$

$$2n + 6 \geq 8$$

$$\frac{2n}{2} \geq \frac{2}{2}$$

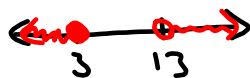
$$\boxed{n \geq 1}$$



$$2n + 1 \leq 7 \quad \text{or} \quad n - 5 > 8$$

$$\frac{2n}{2} \leq \frac{6}{2}$$

$$\boxed{n \leq 3} \quad \text{OR} \quad \boxed{n > 13}$$



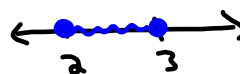
$$7 \leq 3x + 1 \leq 10$$

$$\frac{6}{3} \leq \frac{3x}{3} \leq \frac{9}{3}$$

$$2 \leq x \leq 3$$

$$2 \leq x$$

$$x \leq 3$$



$< > \circ$
 $\leq \geq \bullet$

Aug 25-7:20 PM

Day 5:

1) Write in slope intercept form: $x - 3y = 12$

$y = mx + b$

$-3y = -x + 12$

$y = \frac{1}{3}x - 4$

$m = \frac{1}{3}$

$b = -4$

$(0, -4)$

2) Solve and graph $|2x + 1| \leq 7$

$-7 \leq 2x + 1 \leq 7$

$-8 \leq 2x \leq 6$

$-4 \leq x \leq 3$

3) The homecoming committee buys fresh flowers to place on the tables for the homecoming dance. A local florist charges \$9.00 for each flower arrangement and a \$50.00 delivery fee. If the budget for flowers is \$400, which inequality represents the number of flower arrangements, f , that the homecoming committee can buy?

A $f \leq 44$

B $f \leq 43$

C $f \leq 39$

D $f \leq 38$

$9f + 50 = 400$

$-50 -50$

$9f = 350$

$f \leq 38.888$

$< \leq$ AND

$|x| = 3$

$x = 3$ $x = -3$

$|x| < 3$

$x < 3$ and $x > -3$

$-3 < x < 3$

$|x| \leq 5$

$-5 \leq x \leq 5$

$|n| > 3$

$n > 3$ OR $n < -3$

$|x| \geq 7$

$x \geq 7$ OR $x \leq -7$

$< \leq$ AND

$|x| < 5$

$-5 < x < 5$

$> \geq$ OR

$|x| > 5$

$x > 5$ OR $x < -5$

Aug 25-7:20 PM

Section 2: Equations and Inequalities

Section 2 - Topic 1

Equations: True or False?

Consider the statement $4 + 5 = 2 + 7$. This is a grammatically correct sentence.

Is the sentence true or false?

$4 \neq 11$

Consider the statement $1 + 3 = 8 + 6$. This statement is also a grammatically correct sentence.

Is the sentence true or false?

The previous statements are examples of *number sentences*.

- A number sentence is a statement of equality between two **numerical** expressions.
- A number sentence is said to be true if both numerical expressions are **equal**.
- If both numerical expressions don't equal the same number, we say the number sentence is **False**.
- True and false statements are called *truth values*.

Let's Practice!

1. Determine whether the following number sentences are true or false. Justify your answer.

a. $13 + 4 = 7 + 11$

b. $\frac{1}{2} + \frac{5}{8} = 1.4 - 0.275$

Try It!

2. Determine whether the following number sentences are true or false. Justify your answer.

a. $(83 \cdot 401) \cdot 638 = 401 \cdot (638 \cdot 83)$

b. $(6 + 4)^2 = 6^2 + 4^2$

$10^2 \neq 36 + 16$

$100 \neq 50$

FALSE

24

Section 2: Equations and Inequalities

ALGEBRA NATION

Aug 25-9:37 AM

A number sentence is an example of an algebraic equation.

- > An algebraic equation is a statement of equality between two expressions
- > Algebraic equations can be number sentences (when both expressions contain only numbers), but often they contain variables whose values have not been determined.

Consider the algebraic equation $4(x+2) = 4x + 8$.

Are the expressions on each side of the equal sign equivalent? Justify your answer.

yes distributive Property

What does this tell you about the numbers we can substitute for x ?

$\sqrt{d^2+4}$
 $d = \pm 2$

Let's Practice!

- Consider the algebraic equation $x + 3 = 9$.
 - What value can we substitute for x to make it a true number sentence?
6
 - How many values could we substitute for x and have a true number sentence?
one
- Consider the algebraic equation $x + 6 = x + 9$. What values could we substitute for x to make it a true number sentence?
No values that make this true
 $x+6 = x+9$
 $-x -x$
 $6 = 9$
No Solution

Try It!

- Complete the following sentences.
 - $d^2 = 4$ is true for 2 and -2
 - $2m = m + m$ is true for every value
 $2m = 2m$
 - $d + 67 = d + 68$ is true for no value for d
 $d - d$ $67 - 68$

Section 2: Equations and Inequalities 25

Aug 25-9:39 AM

BEAT THE TEST!

- Which of the following equations have the correct solution? Select all that apply.
 - $2x + 5 = 19; x = 7$
 - $3 + x + 2 - x = 16; x = 3$
 - $\frac{x+2}{5} = 2; x = 8$
 - $6 = 2x - 8; x = 7$
 - $14 = \frac{2}{3}x + 5; x = 18$

*B) $3 + x + 2 - x = 16$
 $5 = 16$
No Solution*

*A) $2x + 5 = 19$
 $-5 -5$
 $2x = 14$
 $\frac{2x}{2} = \frac{14}{2}$
 $x = 7$*

*C) $\frac{x+2}{5} = 2 \cdot 5$
 $x+2 = 10$
 $-2 -2$
 $x = 8$*

*D) $6 = 2x - 8$
 $+8 +8$
 $14 = 2x$
 $\frac{14}{2} = \frac{2x}{2}$
 $7 = x$*

*E) $14 = \frac{1}{3}x + 5$
 $-5 -5$
 $9 = \frac{1}{3}x$
 $27 = x$*

Section 2 - Topic 2
Identifying Properties When Solving Equations

The following equations are equivalent. Describe the operation that occurred in the second equation.

$3 + 5 = 8$ and $3 + 5 - 5 = 8 - 5$

$x - 3 = 7$ and $x - 3 + 3 = 7 + 3$

$2(4) = 8$ and $\frac{2(4)}{2} = \frac{8}{2}$

$\frac{x}{2} = 3$ and $2 \cdot \frac{x}{2} = 2 \cdot 3$

This brings us to some more properties that we can use to write equivalent equations.

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Section 2: Equations and Inequalities 26

Aug 25-9:39 AM

Properties of Equality

If x is a solution to an equation, then x will also be a solution to the new equation formed when the same number is added to each side of the original equation.

These are the *addition and subtraction properties of equality*.

- If $a = b$, then $a + c = b + c$ and $a - c = b - c$.
- Give examples of this property.

If x is a solution to an equation, x will also be a solution to the new equation formed when each side of the original equation is multiplied by the same number.


These are the *multiplication and division properties of equality*.

- If $a = b$, then $a \cdot c = b \cdot c$ and $\frac{a}{c} = \frac{b}{c}$.
- Give examples of this property.

Let's Practice!

1. The following equations are equivalent. Determine the property that was used to write the second equation.

- a. $x - 5 = 3x + 7$ and $x - 5 + 5 = 3x + 7 + 5$
- b. $x = 3x + 12$ and $x - 3x = 3x - 3x + 12$
- c. $-2x = 12$ and $\frac{-2x}{-2} = \frac{12}{-2}$



Section 2: Equations and Inequalities

27

Aug 25-9:40 AM

Try It!

2. The following pairs of equations are equivalent. Determine the property that was used to write the second equation.

- a. $2(x+4) = 14 - 6x$ and $2x + 8 = 14 - 6x$
- b. $2x + 8 = 14 - 6x$ and $2x + 8 + 6x = 14 - 6x + 6x$
- c. $2x + 8 + 6x = 14$ and $2x + 6x + 8 = 14$
- d. $8x + 8 = 14$ and $8x + 8 - 8 = 14 - 8$
- e. $8x = 6$ and $\frac{8x}{8} = \frac{6}{8}$

Handwritten solutions:

2. $2x + 7 = 13$
 -7
 $2x = 6$
 $\frac{2x}{2} = \frac{6}{2}$
 $x = 3$

5. $4(x+5) = 40$
 $4x + 20 = 40$
 -20
 $4x = 20$
 $\frac{4x}{4} = \frac{20}{4}$
 $x = 5$

7. $-\frac{8}{9}x - x = 19$
 $+\frac{8}{9}$
 $-\frac{x}{9} = 27$
 $\frac{-x}{9} = 27$
 $x = -27$


8. $2(x-8) + 7x = 9$
 $2x - 16 + 7x = 9$
 $2x + 7x - 16 = 9$
 $9x - 16 = 9$
 $+16$
 $9x = 25$
 $\frac{9x}{9} = \frac{25}{9}$
 $x = \frac{25}{9}$

BEAT THE TEST!


1. For each algebraic equation, select the property or properties that could be used to solve it.

Algebraic Equation	Addition or Subtraction Property of Equality	Multiplication or Division Property of Equality	Distributive Property	Commutative Property
1. $\frac{x}{2} = 5$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. $2x + 7 = 13$	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. $4x = 23$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. $x - 3 = -4$	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. $4(x + 5) = 40$	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. $10 + x = 79$	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. $-8 - x = 19$	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. $2(x - 8) + 7x = 9$	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

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Section 2: Equations and Inequalities



Aug 25-9:40 AM

Section 2 – Topic 3
Solving Equations

Sometimes you will be required to justify the steps to solve an equation. The following equation is solved for x . Use the properties to justify the reason for each step in the chart below.

Statements	Reasons
a. $5(x+3) - 2 = 2 - x + 9$	a. Given
b. $5x + 15 - 2 = 2 - x + 9$	b. Distributive Property
c. $5x + 15 - 2 = 2 + 9 - x$	c. Comm. Property of Addition
d. $5x + 13 = 11 - x$	d. Equivalent Equation
e. $5x + 13 - 13 = 11 - 13 - x$	e. Subtraction Property of Equality
f. $5x = -2 - x$	f. Equivalent Equation
g. $5x + x = -2 - x + x$	g. Addition Property of Equality
h. $6x = -2$	h. Equivalent Equation
i. $\frac{6x}{6} = \frac{-2}{6}$	i. Division Property of Equality
j. $x = -\frac{1}{3}$	j. Equivalent Equation

Other times, a word problem or situation may require you to write and solve an equation.

A class is raising funds to go ice skating at the Rink at Campus Martius in Detroit. The class plans to rent one bus. It costs \$150.00 to rent a school bus for the day, plus \$11.00 per student for admission to the rink, including skates.

What is the variable in this situation?
number of students

Write an expression to represent the amount of money the school needs to raise. **let x equal**

$150 + 11x$

The class raised \$500.00 for the trip. Write an equation to represent the number of students who can attend the trip.

$150 + 11x = 500$

Solve the equation to determine the number of students who can attend the trip.

$$\begin{array}{r} 150 + 11x = 500 \\ -150 \quad -150 \\ \hline 11x = 350 \\ \hline x \approx 31.8 \end{array}$$

31 students can attend trip

29

Aug 25-9:41 AM

Let's Practice!

1. Consider the equation $2x - 3(2x - 1) = 3 - 4x$. Solve the equation for x . For each step, identify the property used to write an equivalent equation.

$$\begin{array}{r} 2x - 6x + 3 = 3 - 4x \\ -4x + 3 = 3 - 4x \\ +4x \quad +4x \\ \hline 3 = 3 \end{array}$$

Infinite solutions

STUDY EDGE TIP Some equations, such as $2x = 2x$, have all real numbers as the solution. No matter what number we substitute for x , the equation will still be true.

Try It!

2. Consider the equation $3(4x + 1) = 3 + 12x - 5$. Solve the equation for x . For each step, identify the property used to convert the equation.

$$\begin{array}{r} 12x + 3 = 3 + 12x - 5 \\ 12x + 3 = 12x - 2 \\ -12x \quad -12x \\ \hline 3 = -2 \end{array}$$

No Solution

STUDY EDGE TIP Some equations, such as $2x + 5 = 2x - 1$, have no solution. There is no number that we could substitute for x that will make the equation true.

3. Brooklyn Technical High School surveyed its students about their favorite sports. The 487 students who listed soccer as their favorite sport represented 17 fewer students than three times the number of students who listed basketball as their favorite sport. Write and solve an equation to determine how many students listed basketball as their favorite sport.

let x represent # of students who listed basketball

$$\begin{array}{r} 3x - 17 = 487 \\ +17 \quad +17 \\ \hline 3x = 504 \\ \hline \frac{3x}{3} = \frac{504}{3} \\ \hline x = 168 \end{array}$$

168 students

30

Aug 25-9:41 AM

BEAT THE TEST!

1. The following equation is solved for x . Use the properties to justify the reason for each step in the chart below.

Statements	Reasons
a. $2(x + 5) - 3 = 15$	a. Given
b. $2x + 10 - 3 = 15$	b.
c. $2x + 7 = 15$	c. Equivalent Equation
d. $2x + 7 - 7 = 15 - 7$	d.
e. $2x = 8$	e. Equivalent Equation
f. $\frac{2x}{2} = \frac{8}{2}$	f.
g. $x = 4$	g. Equivalent Equation

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Section 2 - Topic 4

Solving Equations Using the Zero Product Property

If someone told you that the product of two numbers is 10, what could you say about the two numbers?

Factors of 10

If someone told you that the product of two numbers is zero, what could you say about the two numbers?

one or both #'s are 0.

This is the **zero product property**.

> If $ab = 0$, then either $a = 0$ or $b = 0$.

Describe how to use the zero product property to solve the equation $(x - 3)(x + 9) = 0$. Then, identify the solutions.

$$\begin{array}{l} x - 3 = 0 \quad x + 9 = 0 \\ +3 \quad +3 \quad -9 \quad -9 \\ \hline x = 3 \quad x = -9 \end{array}$$

Solution Set $\{-9, 3\}$

not $(-9, 3) \leftarrow \text{NO!}$

Aug 25-9:41 AM

Let's Practice!

1. Identify the solution(s) to $2x(x + 4)(x + 5) = 0$.

$$\begin{array}{l} \frac{2x}{2} = 0 \quad x + 4 = 0 \quad x + 5 = 0 \\ \frac{2x}{2} = 0 \quad -4 \quad -4 \quad -5 \quad -5 \\ \hline x = 0 \quad x = -4 \quad x = -5 \\ \hline \{-5, -4, 0\} \end{array}$$

2. Identify the solution(s) to $(2x - 5)(x + 11) = 0$.

$$\begin{array}{l} 2x - 5 = 0 \quad x + 11 = 0 \\ +5 \quad +5 \quad -11 \quad -11 \\ \hline 2x = 5 \quad x = -11 \\ \frac{2x}{2} = \frac{5}{2} \\ \hline x = \frac{5}{2} \\ \hline \{-11, \frac{5}{2}\} \end{array}$$

Aug 25-9:41 AM

Try It!

3. Michael was given the equation $(x + 7)(x - 11) = 0$ and asked to find the zero(s). His solution set was $\{-11, 7\}$. Explain whether you agree or disagree with Michael.

$$\begin{array}{l} x + 7 = 0 \quad x - 11 = 0 \\ -7 \quad -7 \quad +11 \quad +11 \\ \hline x = -7 \quad x = 11 \\ \hline \{-7, 11\} \end{array}$$

4. Identify the solution(s) to $2(y - 3) \cdot 6(-y - 3) = 0$.



BEAT THE TEST!

1. Use the values below to determine the solutions for each equation.

0	2	3	$\frac{4}{5}$
$\frac{2}{7}$	$-\frac{1}{2}$	$-\frac{3}{4}$	-14
6	0	$-\frac{1}{4}$	-2

1) $(2y + 1)(y + 14) = 0$ $-\frac{1}{2}$ -14

2) $(7n - 2)(5n - 4) = 0$ $\frac{2}{7}$ $\frac{4}{5}$

3) $(4x + 3)(x - 6) = 0$ $-\frac{3}{4}$ 6

4) $x(x + 2)(x - 3) = 0$ 0 -2 3

5) $t(4t + 1)(t - 2) = 0$ 0 $-\frac{1}{4}$ 2

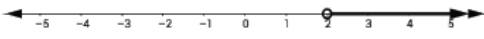
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$x=0$ $x+2=0$ $x-3=0$

Section 2 - Topic 5
Solving Inequalities - Part 1

< > ○
≤ ≥ ●

Let's start by reviewing how to graph inequalities.



> When the endpoint is a(n) open dot or circle, the number represented by the endpoint is not a part of the solution set.

Describe the numbers that are graphed in the example above.
 $x > 2$
#s graphed are greater than 2

Can you list all the numbers graphed in the example above? Explain your answer.
Infinite #s greater than 2

Write an inequality that represents the graph above.
 $x > 2$

Write the solution set that represents the graph above.
 $\{x | x > 2\}$

Section 2: Equations and Inequalities 33

Aug 25-9:42 AM

1. $(\sqrt{x})^2 = 4^2$
 $x = 16$

$x^{\frac{3}{2}} = \sqrt[2]{x^3}$
 $x^{\frac{1}{2}} = \sqrt{x^1}$

$x^{\frac{1}{3}} = \sqrt[3]{x^1}$
 $x^{\frac{2}{3}} = \sqrt[3]{x^2}$
 $x^{\frac{4}{5}} = \sqrt[5]{x^4}$

2. $(x^{\frac{1}{2}})^2 = 4^2$
 $x = 16$

3. $(x^{\frac{1}{3}})^3 = 5^3$
 $x = 125$

4. $((a+3)^{\frac{1}{2}})^2 = (10)^2$
 $a+3 = 100$
 $-3 \quad -3$
 $a = 97$

Aug 28-8:27 AM

Consider the following graph.

When the endpoint is a(n) closed dot or circle, the number represented by the endpoint is a part of the solution set.

Write an inequality that represents the graph above.

$x \geq 10$

Write the solution set that represents the graph above.

$\{x | x \geq 10\}$

Why is "or equal to" included in the solution set?

10 is included in solution

Just like there are properties of equality, there are also properties of inequality.

If $x > 5$, is $x + 1 > 5 + 1$? Substitute values for x to justify your answer.

Addition and Subtraction Property of Inequality

> If $a > b$, then $a + c > b + c$ and $a - c > b - c$ for any real number c .

Consider $(2x - 1) + 2 > x + 1$. Use the addition or subtraction property of inequality to solve for x .

$$2x - 1 + 2 > x + 1$$

$$2x + 1 > x + 1$$

$$-x \quad -x$$

$$x + 1 > 1$$

$$-1 \quad -1$$

$$x > 0$$

Let's Practice!

1. Consider the inequality $(4 + x) - 5 \geq 10$. Use the addition or subtraction property of inequality to solve for x . Express the solution in set notation and graphically on a number line.

$$4 + x - 5 \geq 10$$

$$x - 1 \geq 10$$

$$+1 \quad +1$$

$$x \geq 11$$

34

Section 2: Equations and Inequalities

Aug 25-9:42 AM

Try It!

2. Consider the inequality $4x + 8 < 1 + (2x - 5)$. Use the addition or subtraction property of inequality to solve for x . Express the solution in set notation and graphically on a number line.

$$4x + 8 < 2x - 4$$

$$-2x \quad -2x$$

$$2x + 8 < -4$$

$$-8 \quad -8$$

$$2x < -12$$

$$\frac{2x}{2} < \frac{-12}{2}$$

$$x < -6$$

$\{x | x < -6\}$

3. Peter deposited \$27 into his savings account, bringing the total to over \$234. Write and solve an inequality to represent the amount of money in Peter's account before the \$27 deposit.

$$x + 27 > 234$$

$$-27 \quad -27$$

$$x > 207$$

Peter had more than \$207 in account

$9 > 5$
 $-9 < -5$

Section 2 - Topic 6
Solving Inequalities - Part 2

Consider $x > 5$ and $2 \cdot x > 2 \cdot 5$. Identify a solution to the first inequality. Show that this solution also makes the second inequality true.

Consider $x > 5$ and $-2 \cdot x > -2 \cdot 5$. Identify a solution to the first inequality. Show that this solution makes the second inequality false.

How can we change the second inequality so that the solution makes it true?

Consider $-q > 5$. Use the addition and/or subtraction property of inequality to solve.

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Section 2: Equations and Inequalities

35

Aug 25-9:42 AM

less than $<$
 greater than $>$
 less than or equal to \leq
 greater than or equal to \geq
 at most \leq
 at least \geq
 maximum \leq
 minimum \geq

Aug 28-8:52 AM

Multiplication Property of Inequality

- $>$ If $a > b$, then for any positive real number k , $ak > bk$.
- $>$ If $a < b$, then for any positive real number k , $ak < bk$.
- $>$ If $a > b$, then for any negative real number k , $ak < bk$.
- $>$ If $a < b$, then for any negative real number k , $ak > bk$.

The same property is true when dealing with \leq or \geq .

Let's Practice!

1. Find the solution set of each inequality. Express the solution in set notation and graphically on a number line.

a. $-9y + 4 < 7y - 2$

$$\begin{aligned} +9y & +9y \\ -2y + 4 & < -2 \\ -4 & -4 \\ -2y & < -6 \\ \{y | y > 3\} & \\ -2y & > -6 \\ -2 & -2 \\ y & > 3 \end{aligned}$$

b. $\frac{m}{3} + 8 \leq 9$

$$\begin{aligned} -8 & -8 \\ \frac{m}{3} & \leq 1 \\ 3 \cdot \frac{m}{3} & \leq 1 \cdot 3 \\ m & \leq 3 \end{aligned}$$

2. At 5:00 PM in Atlanta, Georgia, Ethan noticed the temperature outside was 72°F. The temperature decreased at a steady rate of 2°F per hour. At what time was the temperature below 64°F?

let h be # of hrs since 5:00

$$\begin{aligned} 72 - 2h & < 64 \\ -72 & -72 \\ -2h & < -8 \\ -2h & > -8 \\ \frac{-2h}{-2} & > \frac{-8}{-2} \\ h & > 4 \end{aligned}$$

After 9:00

Aug 25-9:43 AM

Try It!

3. Find the solution set to the inequality. Express the solution in set notation and graphically on a number line.

a. $-6(x - 5) > 42$

$$-6x + 30 > 42$$

$$\begin{matrix} -30 & -30 \\ \hline -6x & > 12 \end{matrix}$$

$$\begin{matrix} -6x & > 12 \\ \hline -6 & < \frac{12}{-6} \end{matrix}$$

$$x < -2$$

$\{x | x < -2\}$

b. $4(x + 3) \geq 2(2x - 2)$

$$4x + 12 \geq 4x - 4$$

$$\begin{matrix} -4x & & -4x \\ \hline 12 & \geq & -4 \end{matrix}$$

$$12 \geq -4$$

ALL Real #'s
 \mathbb{R}

BEAT THE TEST!

1. Ulysses is spending his vacation in South Carolina. He rents a car and is offered two different payment options. He can either pay \$25.00 each day plus \$0.15 per mile (option A) or pay \$10.00 each day plus \$0.40 per mile (option B). Ulysses rents the car for one day.

Part A: Write an inequality representing the number of miles where option A will be the cheaper plan.

Option A: $25 + 0.15x$
Option B: $10 + 0.40x$

$$25 + 0.15x < 10 + 0.40x$$

Part B: How many miles will Ulysses have to drive for option A to be the cheaper option?

$$25 + 0.15x < 10 + 0.40x$$

$$\begin{matrix} -0.40x & & -0.40x \\ \hline 25 - 0.25x & < & 10 \end{matrix}$$

$$\begin{matrix} -25 & & -25 \\ \hline -0.25x & < & -15 \end{matrix}$$

$$\begin{matrix} -0.25x & < & -15 \\ \hline -0.25 & > & -0.25 \end{matrix}$$

$$x > 60$$

Section 2: Equations and Inequalities

37

Aug 25-9:43 AM

2. Stephanie has just been given a new job in the sales department of Frontier Electric Authority. She has two salary options. She can either receive a fixed salary of \$500.00 per week or a salary of \$200.00 per week plus a 5% commission on her weekly sales. The variable s represents Stephanie's weekly sales. Which solution set represents the dollar amount of sales that she must generate in a week in order for the option with commission to be the better choice?

A $\{s | s > \$300.00\}$
 B $\{s | s > \$700.00\}$
 C $\{s | s > \$3,000.00\}$
 D $\{s | s > \$6,000.00\}$

$$200 + 0.05s > 500$$

$$\begin{matrix} -200 & & -200 \\ \hline 0.05s & > & 300 \end{matrix}$$

$$\begin{matrix} 0.05s & > & 300 \\ \hline 0.05 & > & 0.05 \end{matrix}$$

$$s > 6000$$

Section 2 - Topic 7
Solving Compound Inequalities

Consider the following options.

Option A: You get to play NBA 2K after you clean your room and do the dishes.

Option B: You get to play NBA 2K after you clean your room or do the dishes.

What is the difference between Option A and B?

A \rightarrow Both
B \rightarrow only one

Circle the statements that are true.

$2 + 9 = 11$ and $10 < 5 + 6$

$4 + 5 = 9$ and $2 + 3 > 0$
 $9 \neq 9$ $5 > 0$

$0 > 4 - 6$ or $3 + 2 = 6$
 $0 > -2$ OR $5 = 6$

$15 - 20 > 0$ or $2.5 + 3.5 = 7$
 $-5 > 0$ OR $6 = 7$

Section 2: Equations and Inequalities

38

Aug 25-9:43 AM

These are called *compound equations or inequalities*.

- When the two statements in the previous sentences were joined by the word **AND**, the compound equation or inequality is true only if both statements are true.
- When the two statements in the previous sentences were joined by the word **OR**, the compound equation or inequality is true if at least one of the statements is true. Therefore, it is also considered true if both statements are true.

Let's graph $x < 6$ and $x > 1$.

This is the graphical solution to the compound inequality.

How many solutions does this inequality have?

Many times this is written as $1 < x < 6$. This notation denotes the conjunction "and."

We read this as "x is greater than one and less than six."

Let's Practice!

- Consider $x < 1$ or $x > 6$. Could we write the inequalities above as $1 > x > 6$? Explain your answer.

NO → AND
- Graph the solution set to each compound inequality on a number line.
 - $x < 2$ or $x > 5$
 - $x > 6$ or $x < 6$
 - $1 \leq -x \leq 7$

Handwritten notes for problem 2c: $\frac{1}{-1} \geq \frac{-x}{-1} \geq \frac{7}{-1}$ and $-1 \geq x \geq -7$

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Section 2: Equations and Inequalities

39

Aug 25-9:43 AM

STUDY EDGE TIP Be on the lookout for negative coefficients. When solving inequalities, you will need to reverse the inequality symbol when you multiply or divide by a negative value.

3. Write a compound inequality for the following graphs.

a. Compound inequality: $x < -2$ OR $x > 5$

b. Compound inequality: $-2 \leq x < 5$

Handwritten notes for problem 3b: $-2 \leq x$ and $x < 5$

Try It!

- Graph the solution set to each compound inequality on a number line.
 - $x < 1$ or $x > 8$
 - $x \geq 6$ or $x < 4$
 - $-6 \leq x \leq 4$


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Section 2: Equations and Inequalities


40

Aug 25-9:44 AM

5. Write a compound inequality for the following graphs.



a. Compound inequality: $x \leq 0$ or $x > 5$

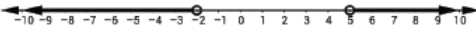


b. Compound inequality: $0 \leq x \leq 5$


BEAT THE TEST!

1. Use the terms and symbols in the table to write a compound inequality for each of the following graphs. You may only use each term once, but you do not have to use all of them.

$3x$	-14	-6	\geq	$-$	17	15	$<$
$7x$	$<$	2	or	\leq	$3x$	$+$	$>$



Compound Inequality:



Compound Inequality:


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Section 2: Equations and Inequalities 41

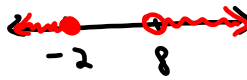
Aug 25-9:44 AM

Solve Compound Inequalities

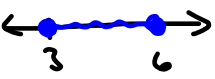
1. $\frac{3x}{3} < \frac{6}{3}$ or $2x + 1 \geq 11$
 $x < 2$ OR $\frac{2x}{2} \geq \frac{10}{2}$
 $x < 2$ OR $x \geq 5$




2. $-2n + 1 \geq 5$ or $x - 3 > 5$
 $-2n \geq 4$
 $\frac{-2n}{-2} \leq \frac{4}{-2}$
 $n \leq -2$ OR $x > 8$



3. $4 \leq x + 1 \leq 7$
 $3 \leq x \leq 6$



4. $-2 \leq 2x - 8 < 8$
 $0 \leq \frac{2x}{2} < \frac{10}{2}$
 $0 \leq x < 5$

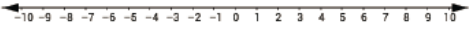


Sep 3-9:05 AM

P.42

Section 2 - Topic 8
Solving Absolute Value Equations and Inequalities

Absolute value represents the distance of a number from zero on a number line.



How far away is "9" from zero on the number line? **9 units**

This is written as $|9| = 9$.

How far away is "-9" from zero on the number line? **9 units**

This is written as $|-9| = 9$.

This is the **absolute value** of a number.

- > For any real numbers c and d , if $|c| = d$, then $c = d$ or $c = -d$.


For example, $|f| = 5$, so $f = 5$ or $f = -5$.

Consider $|c| < 5$.

Using our definition of absolute value, c represents all the numbers **less than** five units from zero on the number line.

What are some numbers that could be represented by c ?
3, 2, 1, 0, -1, π , $\frac{1}{2}$, -3, -4, 4.99, -4.99

Graph all the numbers represented by c on a number line.



What is the solution set for c ? **$-5 < c < 5$**

- > For any real numbers c and d , if $|c| < d$, then $-d < c < d$.
- > For any real numbers c and d , if $|c| \leq d$, then $-d \leq c \leq d$.

42

Section 2: Equations and Inequalities

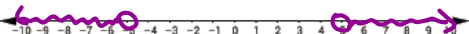
Aug 25-9:44 AM

Consider $|c| > 5$.

Using our definition of absolute value, c represents all the numbers **greater than** five units from zero on the number line.

What are some numbers that could be represented by c ?
-6, 6, -8, 8, -10, 10, 12, 12

Graph all the numbers represented by c on a number line.



What is the solution set for c ? **$c > 5$ OR $c < -5$**


- > For any real numbers c and d , if $|c| > d$, then $c > d$ or $c < -d$.
- > For any real numbers c and d , if $|c| \geq d$, then $c \geq d$ or $c \leq -d$.

$|x| < \leq$ AND $|x| < \frac{1}{2} \leq$

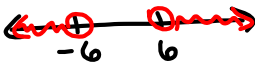
Let's Practice!

1. Solve each absolute value inequality and graph the solution set.

a. $|n + 5| < 7$
 $-7 < n + 5 < 7$
 $-5 \quad -5 \quad -5$
 $-12 < n < 2$



b. $|a| + 3 > 9$
 $-3 - 3$
 $|a| > 6$
 $a > 6$ OR $a < -6$



$|x| < 3$
 $-3 < x < 3$

$|x| < 5$
 $-5 < x < 5$

$|x| \leq 9$
 $-9 \leq x \leq 9$

43

Section 2: Equations and Inequalities

Aug 25-9:44 AM

2. Tammy purchased a pH meter to measure the acidity of her freshwater aquarium. The ideal pH level for a freshwater aquarium is between 6.5 and 7.5 inclusive.

a. Graph an inequality that represents the possible pH levels needed for Tammy's aquarium.

b. Define the variable and write an absolute value inequality that represents the possible pH levels needed for Tammy's aquarium.

$|x| \geq$ OR
 $|x| \leq$ AND

Try It!

3. Solve each equation or inequality and graph the solution set.

a. $|p + 7| = -13$
 no solution

b. $2|x| - 4 < 14$
 $\frac{2|x| - 4 < 14}{+4 +4}$
 $\frac{2|x| < 18}{2}$
 $|x| < 9$
 $-9 < x < 9$

c. $|2m + 4| \geq 12$
 $2m + 4 \geq 12$ OR $2m + 4 \leq -12$
 $\frac{2m + 4 \geq 12}{-4 -4}$ OR $\frac{2m + 4 \leq -12}{-4 -4}$
 $\frac{2m \geq 8}{2}$ OR $\frac{2m \leq -16}{2}$
 $m \geq 4$ OR $m \leq -8$

44

Section 2: Equations and Inequalities

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Aug 25-9:45 AM

Solve.

1. $|x| = 5$
 $x = 5$ $x = -5$

2. $|x + 3| = 7$
 $x + 3 = 7$ $x + 3 = -7$
 $\frac{x + 3 = 7}{-3 -3}$ $\frac{x + 3 = -7}{-3 -3}$
 $x = 4$ $x = -10$

3. $3|x| + 5 = 17$
 $\frac{3|x| + 5 = 17}{-5 -5}$
 $\frac{3|x| = 12}{3}$
 $|x| = 4$
 $x = 4$ $x = -4$

4. $|m + 3| > 7$
 $m + 3 > 7$ OR $m + 3 < -7$
 $\frac{m + 3 > 7}{-3 -3}$ OR $\frac{m + 3 < -7}{-3 -3}$
 $m > 4$ OR $m < -10$

5. $|m + 3| \leq 7$
 $-7 \leq m + 3 \leq 7$
 $\frac{-7 \leq m + 3 \leq 7}{-3 -3 -3}$
 $-10 \leq m \leq 4$

6. $|x + 4| - 3 = 9$
 $\frac{|x + 4| - 3 = 9}{+3 +3}$
 $|x + 4| = 12$
 $x + 4 = 12$ $x + 4 = -12$
 $\frac{x + 4 = 12}{-4 -4}$ $\frac{x + 4 = -12}{-4 -4}$
 $x = 8$ $x = -16$

Sep 4-9:16 AM

4. Baseball fans often leave a baseball game if their team is ahead or behind by five runs or more. Toronto Blue Jays fans follow this pattern, and the Blue Jays have scored eight runs in a particular game.
- Graph an inequality that represents the possible runs, r , scored by the opposing team if Toronto fans are leaving the game.
 - Write an absolute value inequality that represents the possible runs, r , scored by the opposing team if Toronto fans are leaving the game.

BEAT THE TEST!

1. Match the following absolute value equations and inequalities to the graph that represents their solution set.

	A. $ x = 2$
	B. $ x \geq 2$
	C. $ x \leq 2$
	D. $ x + 3 \leq 5$
	E. $ x + 3 \geq 5$
	F. $ x + 3 = 5$

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Aug 25-9:45 AM

Solve each of the following:

<p>1. $x - 3 = 4$</p> <p>$x - 3 = 4$ $x - 3 = -4$ $+3$ $+3$ $x = 7$ $x = -1$</p>	<p>2. $3x = -11$</p>
<p>3. $x + 1 - 4 = 5$</p>	<p>4. $2 x + 3 = 15$</p>
<p>5. $n + 1 \geq 3$</p> <p>$n + 1 \geq 3$ OR $n + 1 \leq -3$ -1 -1 $n \geq 2$ OR $n \leq -4$</p>	<p>6. $2x < 10$</p> <p>$-10 < 2x < 10$ $\frac{-10}{2} < \frac{2x}{2} < \frac{10}{2}$ $-5 < x < 5$</p>
<p>7. Graph your answer from #5</p>	<p>8. Graph your answer from #6</p>

Sep 6-8:42 AM

Section 2 - Topic 9
Rearranging Formulas

Solve each equation for x .

$2x + 4 = 12$
 $-4 -4$
 $2x = 8$
 $\frac{2x}{2} = \frac{8}{2}$
 $x = 4$

$2x + y = z$
 $-y -y$
 $2x = z - y$
 $\frac{2x}{2} = \frac{z - y}{2}$
 $x = \frac{z - y}{2}$

Did we use different properties when we solved the two equations? **NO**

Consider the formula for the perimeter of a rectangle:
 $P = 2L + 2w$
 $P = 2L + 2w$

Sometimes, we might need the formula solved for length.

$$P = 2L + 2w$$

$$-2w \quad -2w$$

$$P - 2w = 2L$$

$$\frac{P - 2w}{2} = \frac{2L}{2}$$

$$\frac{P - 2w}{2} = L$$

STUDY TIP

When solving for a variable, be sure to circle that variable.

46 Section 2: Equations and Inequalities

Let's Practice!

1. Consider the equation $rx - sx + y = z$; solve for x .

$$rx - sx = z - y$$

$$x(r - s) = z - y$$

$$\frac{x(r - s)}{r - s} = \frac{z - y}{r - s}$$

$$x = \frac{z - y}{r - s}$$

Try It!

2. Consider the equation $8c + 6j = 5p$; solve for c .

$ax + b = c$ solve for x
 $-b \quad -b$
 $ax = c - b$
 $\frac{ax}{a} = \frac{c - b}{a}$
 $x = \frac{c - b}{a}$

Aug 25-9:45 AM

BEAT THE TEST!

1. Isaiah planted a seedling in his garden and recorded its height every week. The equation shown can be used to estimate the height, h , of the seedling after w weeks since he planted the seedling.

$$h = \frac{3}{4}w + \frac{9}{4}$$

Solve the formula for w , the number of weeks since he planted the seedling.

2. Under the Brannock device method, shoe size and foot length for women are related by the formula $S = 3F - 21$, where S represents the shoe size and F represents the length of the foot in inches. Solve the formula for F .

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47 Section 2: Equations and Inequalities

Aug 25-9:45 AM

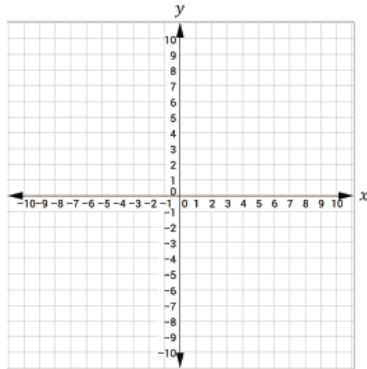
Section 2 – Topic 10
Solution Sets to Equations with Two Variables

Consider $x + 2 = 5$. What is the only possible value of x that makes the equation a true statement?

Now consider $x + y = 5$. What are some solutions for x and y that would make the equation true?

Possible solutions can be listed as **ordered pairs**.

Graph each of the ordered pairs from the previous problem on the graph below.



What do you notice about the points you graphed?

How many solutions are there to the equation $x + y = 5$?

Let's Practice!

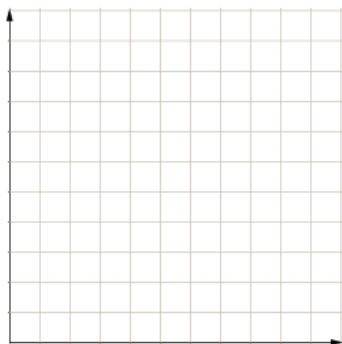
1. Taylor has 10 songs on her phone's playlist. The playlist features songs from her two favorite artists, Beyoncé and Pharrell.
 - a. Create an equation using two variables to represent this situation.
 - b. List at least three solutions to the equation that you created.
 - c. Does this equation have infinitely many solutions? Why or why not?

Aug 25-9:46 AM



In this case, our solutions must be natural numbers. This is called a **discrete function**. Notice that the solutions follow a linear pattern. However, they do not form a line.

- d. Create a graph that represents the solution set to your equation.

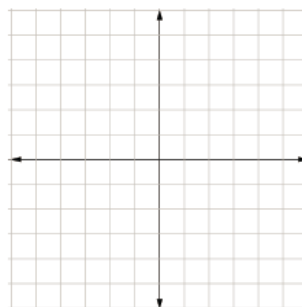


- e. Why are there only positive values on this graph?



Try It!

2. The sum of two numbers is 15.
 - a. Create an equation using two variables to represent this situation.
 - b. List at least three possible solutions.
 - c. How many solutions are there to this equation?
 - d. Create a visual representation of all the possible solutions on the graph.

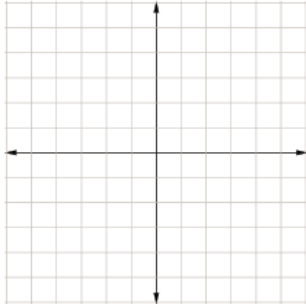


Aug 25-9:46 AM



In this case, we have a *continuous function*. Notice the solutions are rational numbers and they form a line.

3. What if we changed the problem to say the sum of two integers is 15?
- Create an equation using two variables to represent this situation.
 - Is this function discrete or continuous? Explain your answer.
 - Represent the solution on the graph below.



50

Section 2: Equations and Inequalities

BEAT THE TEST!

1. Elizabeth's tablet has a combined total of 20 apps and movies. Let x represent the number of apps and y represent the number of movies. Which of the following could represent the number of apps and movies on Elizabeth's tablet? Select all that apply.

- $x + y = 20$
- 7 apps and 14 movies
- $x - y = 20$
- $y = -x + 20$
- 8 apps and 12 movies
- $xy = 20$

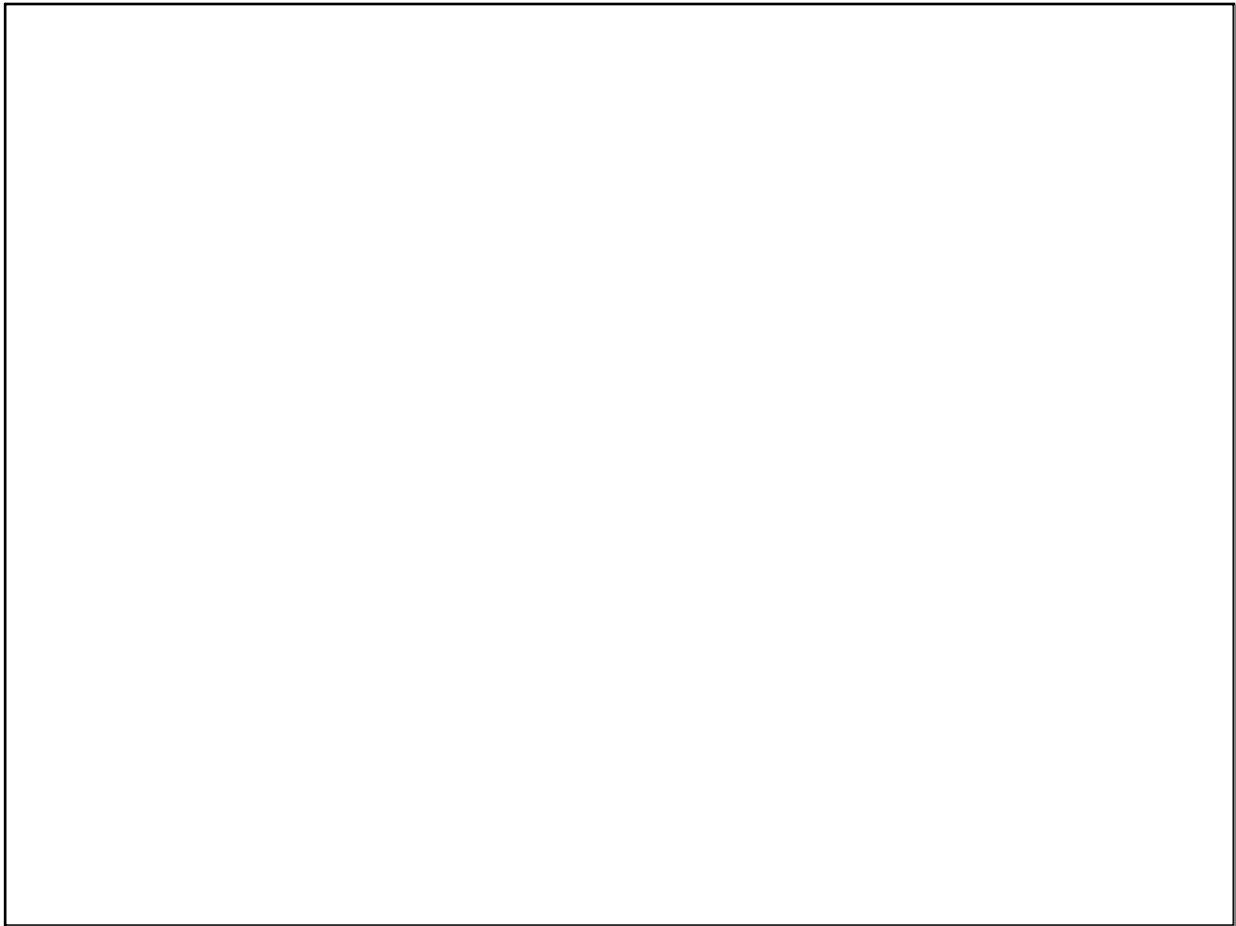


Test Yourself!
Practice Tool

Great job! You have reached the end of this section. Now it's time to try the "Test Yourself! Practice Tool," where you can practice all the skills and concepts you learned in this section. Log in to Algebra Nation and try out the "Test Yourself! Practice Tool" so you can see how well you know these topics!



Aug 25-9:46 AM



Aug 25-9:58 AM