

LITTLE ROCK CHRISTIAN ACADEMY

Summer Assignment: Honors Algebra II

Faculty: Mrs. Heather Tarpley

Name _____

Chapter 1 is an entire no-calculator chapter. As you work through each assignment, please do not use a calculator. Do every problem and show all work. Each section will count as a 10-point homework completion grade. That means you can earn up to 70 points toward your homework grade for the 1st semester of next school year.

The entire summer assignment is due on the first day of school, August 18th. This is a half day with short class periods. You will check your work on the first full day of class and then you will take a quiz over these concepts on the second full day of class. You will not be able to use a calculator on that quiz.

What if you need help?

You may use Khan Academy or YouTube as a resource. You may also want to check out the videos Mr. Anderson (LRCA math teacher) has created to correlate directly with our Algebra II curriculum. You can search for them at youtube.com/user/AlgebraAnderson/videos. Scroll past all the Geometry videos to find the Algebra videos listed in reverse order by section number.

Since sections 1-4 and 1-6 have been difficult for students in the past, I have embedded links to short instructional videos at the top of those sections. I strongly urge you to watch the videos and understand these concepts deeply.

1-1 Practice

Expressions and Formulas

Evaluate each expression.

2. $4(12 - 4^2)$

4. $12 - [20 - 2(6^2 \div 3 \times 2^2)]$

6. $(-2)^3 - (3)(8) + (5)(10)$

8. $[4(5 - 3) - 2(4 - 8)] \div 16$

10. $\frac{1}{4}[-5 + 5(-3)]$

12. $\frac{(-8)^2}{5 - 9} - (-1)^2 + 4(-9)$

Evaluate each expression if $a = \frac{3}{4}$, $b = -8$, $c = -2$, $d = 3$, and $g = \frac{1}{3}$.

14. $(c + d)b$

16. $\frac{d(b - c)}{ac}$

18. $ac^3 - b^2dg$

20. $\frac{ac^4}{d} - \frac{c}{g^2}$

22. $2ab^2 - (d^3 - c)$

NOTE: Word problems on back

23. TEMPERATURE The formula $F = \frac{9}{5}C + 32$ gives the temperature in degrees Fahrenheit for a given temperature in degrees Celsius. What is the temperature in degrees Fahrenheit when the temperature is -40 degrees Celsius?

24. PHYSICS The formula $h = 120t - 16t^2$ gives the height h in feet of an object t seconds after it is shot upward from Earth's surface with an initial velocity of 120 feet per second. What will the height of the object be after 6 seconds?

25. AGRICULTURE Faith owns an organic apple orchard. From her experience the last few seasons, she has developed the formula $P = 20x - 0.01x^2 - 240$ to predict her profit P in dollars this season if her trees produce x bushels of apples. What is Faith's predicted profit this season if her orchard produces 300 bushels of apples?

1-2 Study Guide and Intervention

Properties of Real Numbers

Real Numbers All real numbers can be classified as either rational or irrational. The set of rational numbers includes several subsets: natural numbers, whole numbers, and integers.

R	real numbers	{all rationals and irrationals}
Q	rational numbers	{all numbers that CAN be represented in the form $\frac{m}{n}$, where m and n are integers and n is not equal to 0}
I	irrational numbers	{all numbers that CANNOT be represented in the form $\frac{m}{n}$, where m and n are integers and n is not equal to 0. Irrational numbers are nonterminating, nonrepeating decimals}
Z	integers	{..., -3, -2, -1, 0, 1, 2, 3, ...}
W	whole numbers	{0, 1, 2, 3, 4, 5, 6, 7, 8, ...}
N	natural numbers	{1, 2, 3, 4, 5, 6, 7, 8, 9, ...}

Example: Simplify each expression, and then name ALL the sets of numbers to which each number belongs.

a. $-\frac{11}{3}$ rationals (Q), reals (R)

b. $\sqrt{25}$

$\sqrt{25} = 5$ naturals (N), wholes (W), integers (Z), rationals (Q), reals (R)

Exercises

Simplify each expression, if possible, and then name ALL the sets of numbers to which each number belongs. You may use letters (R, Q, Z, etc.) in place of words.

1. $\frac{6}{7}$ 2. $-\sqrt{81}$ 3. 0 4. 192.0005

5. 73 6. $34\frac{1}{2}$ 7. $\frac{\sqrt{36}}{9}$ 8. 26.1

9. π 10. $\frac{15}{3}$ 11. $-4.\overline{17}$

12. $\frac{\sqrt{25}}{2}$ 13. -1 14. $\sqrt{42}$

15. -11.2 16. $-\frac{8}{13}$ 17. $\frac{\sqrt{5}}{2}$

18. $33.\overline{3}$ 19. 894,000 20. -0.02

1-2 Study Guide and Intervention *(continued)*

Properties of Real Numbers

Properties of Real Numbers

Real Number Properties		
	For any real numbers a , b , and c	
Property	Addition	Multiplication
Commutative	$a + b = b + a$	$a \cdot b = b \cdot a$
Associative	$(a + b) + c = a + (b + c)$	$(a \cdot b) \cdot c = a \cdot (b \cdot c)$
Identity	$a + 0 = a = 0 + a$	$a \cdot 1 = a = 1 \cdot a$
Inverse	$a + (-a) = 0 = (-a) + a$	$a \cdot \frac{1}{a} = 1 = \frac{1}{a} \cdot a, a \neq 0.$
Closure	$a + b$ is a real number.	$a \cdot b$ is a real number.
Distributive	$a(b + c) = ab + ac$ and $(b + c)a = ba + ca$	

Example: Simplify $9x + 3y + 12y - 0.9x$.

$$\begin{aligned}
 9x + 3y + 12y - 0.9x &= 9x + (-0.9x) + 3y + 12y \\
 &= (9 + (-0.9))x + (3 + 12)y \\
 &= 8.1x + 15y
 \end{aligned}$$

Commutative Property (+)
Distributive Property
Simplify.

Exercises

Simplify each expression. Show each step and name the property that justifies each step of your process.

1. $8(3a - b) + 4(2b - a)$

3. $\frac{1}{5}(4j + 2k - 6j + 3k)$

5. $12\left(\frac{a}{3} - \frac{b}{4}\right)$

7. $4(20 - 4p) - \frac{3}{4}(4 - 16p)$

9. $1.2(7x - 5y) - (10y - 4.3x)$

11. $2.5(12m - 8.5p)$

13. $4(10g + 80h) - 20(10h - 5g)$

15. $(7y - 2.1x)3 + 2(3.5x - 6y)$

17. $14(j - 2k) - 3(4j - 7k)$

1-3 Study Guide and Intervention

Solving Equations

Verbal Expressions and Algebraic Expressions The chart suggests some ways to help you translate word expressions into algebraic expressions. Any letter can be used to represent a number that is not known.

Word Expression	Operation
and, plus, sum, increased by, more than	addition
minus, difference, decreased by, less than	subtraction
times, product, of (as in $\frac{1}{2}$ of a number)	multiplication
divided by, quotient	division

Example 1: Write an algebraic expression to represent 18 less than the quotient of a number and 3.

$$\frac{n}{3} - 18$$

Example 2: Write a verbal sentence to represent $6(n - 2) = 14$.

Six times the difference of a number and two is equal to 14.

Exercises

Write an algebraic expression to represent each verbal expression.

- the sum of six times a number and 25
- 7 less than fifteen times a number
- the sum of 100 and four times a number
- four times the square of a number increased by five times the same number

Write a verbal sentence to represent each equation.

9. $3n - 35 = 79$

10. $2(n^3 + 3n^2) = 4n$

11. $\frac{5n}{n+3} = n - 8$

1-3 Study Guide and Intervention *(continued)*

Solving Equations

Properties of Equality To solve equations, we can use properties of equality.

Addition and Subtraction Properties of Equality	For any real numbers a , b , and c , if $a = b$, then $a + c = b + c$ and $a - c = b - c$.
Multiplication and Division Properties of Equality	For any real numbers a , b , and c , if $a = b$, then $a \cdot c = b \cdot c$ and, if $c \neq 0$, $\frac{a}{c} = \frac{b}{c}$.

Example 1: Solve $10 - 8x = 50$.

$$\begin{array}{ll}
 10 - 8x = 50 & \text{Original equation} \\
 10 - 8x - 10 = 50 - 10 & \text{Subtract 10 from both sides.} \\
 -8x = 40 & \text{Simplify.} \\
 x = -5 & \text{Divide both sides by } -8.
 \end{array}$$

Example 2: Solve $4x + 5y = 100$ for y .

$$\begin{array}{ll}
 4x + 5y = 100 & \text{Original equation} \\
 4x + 5y - 4x = 100 - 4x & \text{Subtract } 4x \text{ from both sides.} \\
 5y = 100 - 4x & \text{Simplify.} \\
 y = \frac{1}{5}(100 - 4x) & \text{Divide both sides by 5.} \\
 y = 20 - \frac{4}{5}x & \text{Apply the distributive property.}
 \end{array}$$

Exercises

Solve each equation. Check your solution.

1. $3s = 45$

5. $7 - \frac{1}{2}x = 3$

9. $5(4 - k) = -10k$

13. $4n + 20 = 53 - 2n$

Solve each equation or formula for the specified variable.

17. $\frac{s}{2t} = 10$, for t

19. $\frac{3pq}{r} = 12$, for p

21. $\frac{d}{2} + \frac{f}{4} = 6$, for f

22. $3(2j - k) = 108$, for j

24. $\frac{m}{n} + 5m = 20$, for m

25. $4x - 3y = 10$, for y

Chapter 1 Mid-Chapter Test

 (Lessons 1-1 through 1-3)

Part I

For Questions 1–5, write the letter for your answer in the blank at the right.

1. Evaluate $\frac{xy - xz}{yz}$ if $x = 12$, $y = 3$, and $z = 2$.

A 10

B $\frac{1}{2}$

C 3

D 2

1. _____

2. Name the sets of numbers to which -7 belongs.

F integers, rationals

G integers, rationals, reals

H whole numbers, integers, reals

J integers, reals

2. _____

3. Name the property illustrated by $-ab + ab = 0$.

A Additive Inverse

C Multiplicative Inverse

B Additive Identity

D Multiplicative Identity

3. _____

4. Solve $6(x - 5) = x + 5$.

F 2

G 0

H 7

J 5

4. _____

5. Simplify $\frac{1}{2}(8y - 10z) - (3y + z)$.

A $y - 6z$

B $7y - 2z$

C $y - 4z$

D $y - 13z$

5. _____

Part II

6. Write an algebraic expression to represent the verbal expression *the difference of three times a number x and 7*.

6. _____

7. Given the formula $C = \frac{5(F - 32)}{9}$, find the value of C if F is 68.

7. _____

8. Define a variable, write an equation, and solve the problem. Adults' tickets to a play cost \$5 and students' tickets cost \$2. If 295 tickets were sold and a total of \$950 was collected, how many students' tickets were sold?

8. _____

9. Evaluate $k + np^2$ if $k = 0.5$, $n = -3$, and $p = -2$.

9. _____

10. Solve $h = \frac{-b}{2a}$ for b .

10. _____

11. Evaluate $1.2 + (3x + 2y)x$ if $x = 4$ and $y = -4$.

11. _____

1-4 Study Guide and Intervention

Solving Absolute Value Equations

Absolute Value Expressions The **absolute value** of a number is its distance from 0 on a number line. The symbol $|x|$ is used to represent the absolute value of a number x .

Absolute Value	<ul style="list-style-type: none"> • Words For any real number a, if a is positive or zero, the absolute value of a is a. If a is negative, the absolute value of a is the opposite of a. • Symbols For any real number a, $a = a$, if $a \geq 0$, and $a = -a$, if $a < 0$.
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Example 1: Evaluate $|-4| - |-2x|$ if $x = 6$.

$$\begin{aligned}
 |-4| - |-2x| &= |-4| - |-2 \cdot 6| \\
 &= |-4| - |-12| \\
 &= 4 - 12 \\
 &= -8
 \end{aligned}$$

Example 2: Evaluate $|2x - 3y|$ if $x = -4$ and $y = 3$.

$$\begin{aligned}
 |2x - 3y| &= |2(-4) - 3(3)| \\
 &= |-8 - 9| \\
 &= |-17| \\
 &= 17
 \end{aligned}$$

Exercises

Evaluate each expression if $w = -4$, $x = 2$, $y = \frac{1}{2}$, and $z = -6$.

1. $|2x - 8|$

5. $|x| - |y| - |z|$

9. $|z| - 3|5yz|$

13. $|6y + z| + |yz|$

17. $|2x - y| + 5y$

21. $\frac{1}{2}|5z + 8w|$

1-4 Study Guide and Intervention *(continued)*

WATCH THIS VIDEO BEFORE DOING THESE PROBLEMS: <https://youtu.be/v0bxPKkYwfU>

Absolute Value Equations Use the definition of absolute value to solve equations containing absolute value expressions.

For any real numbers a and b , where $b \geq 0$, if $|a| = b$ then $a = b$ or $a = -b$.

Always check your answers by substituting them into the original equation. Sometimes computed solutions are not actual solutions.

Example: Solve $|2x - 3| = 17$.

Check your solutions.

Case 1 $a = b$

$$2x - 3 = 17$$

$$2x - 3 + 3 = 17 + 3$$

$$2x = 20$$

$$x = 10$$

CHECK $|2x - 3| = 17$

$$|2(10) - 3| \stackrel{?}{=} 17$$

$$|20 - 3| \stackrel{?}{=} 17$$

$$|17| \stackrel{?}{=} 17$$

$$17 = 17 \checkmark$$

Case 2 $a = -b$

$$2x - 3 = -17$$

$$2x - 3 + 3 = -17 + 3$$

$$2x = -14$$

$$x = -7$$

CHECK $|2x - 3| = 17$

$$|2(-7) - 3| \stackrel{?}{=} 17$$

$$|-14 - 3| \stackrel{?}{=} 17$$

$$|-17| \stackrel{?}{=} 17$$

$$17 = 17 \checkmark$$

There are two solutions, 10 and -7 .

Exercises

Solve each equation. Check your solutions.

1. $|x + 15| = 37$

3. $|x - 5| = 45$

5. $|5b + 9| + 16 = 2$

7. $5n + 24 = |8 - 3n|$

9. $\frac{1}{3}|4p - 11| = p + 4$

11. $\left|\frac{1}{3}x + 3\right| = -1$

13. $5f - |3f + 4| = 20$

15. $\frac{1}{2}|6 - 2x| = 3x + 1$

1-5 Study Guide and Intervention

Solving Inequalities

One-Step Inequalities The following properties can be used to solve inequalities.

Addition and Subtraction Properties for Inequalities	Multiplication and Division Properties for Inequalities
For any real numbers a , b , and c : If $a < b$, then $a + c < b + c$ and $a - c < b - c$. If $a > b$, then $a + c > b + c$ and $a - c > b - c$.	For any real numbers a , b , and c , with $c \neq 0$: If c is positive and $a < b$, then $ac < bc$ and $\frac{a}{c} < \frac{b}{c}$. If c is positive and $a > b$, then $ac > bc$ and $\frac{a}{c} > \frac{b}{c}$. If c is negative and $a < b$, then $ac > bc$ and $\frac{a}{c} > \frac{b}{c}$. If c is negative and $a > b$, then $ac < bc$ and $\frac{a}{c} < \frac{b}{c}$.

These properties are also true for \leq and \geq .

Example 1: Solve $2x + 4 > 36$.

Graph the solution set on a number line.

$$2x + 4 - 4 > 36 - 4$$

$$2x > 32$$

$$x > 16$$

The solution set is $\{x \mid x > 16\}$.



Example 2: Solve $17 - 3w \geq 35$.

Graph the solution set on a number line.

$$17 - 3w \geq 35$$

$$17 - 3w - 17 \geq 35 - 17$$

$$-3w \geq 18$$

$$w \leq -6$$

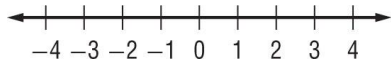
The solution set is $\{w \mid w \leq -6\}$.



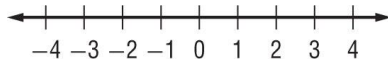
Exercises

Solve each inequality. Then graph the solution set on a number line.

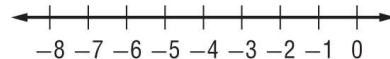
1. $7(7a - 9) \leq 84$



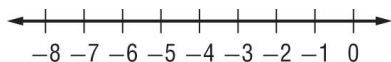
2. $3(9z + 4) > 35z - 4$



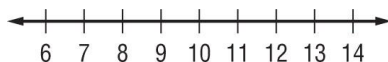
3. $5(12 - 3n) < 165$



4. $18 - 4k < 2(k + 21)$



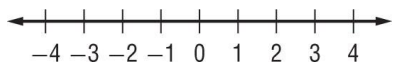
5. $4(b - 7) + 6 < 22$



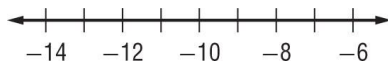
6. $2 + 3(m + 5) \geq 4(m + 3)$



7. $4x - 2 > -7(4x - 2)$



8. $\frac{1}{3}(2y - 3) > y + 2$



9. $2.5d + 15 \leq 75$



1-5 Study Guide and Intervention *(continued)*

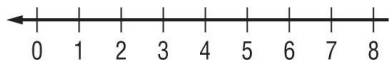
Solving Inequalities

Multi-Step Inequalities An inequality is a statement that involves placing the inequality sign between two expressions. To solve the inequality, you need to find the set of all values of the variable that makes the inequality true.

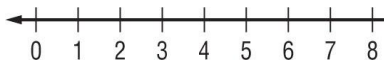
Exercises

Solve each inequality. Then graph the solution set on a number line.

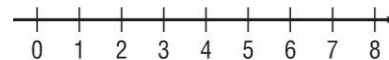
1. $c \geq \frac{c+4}{3}$



2. $r + 7 < 3(2r - 6)$



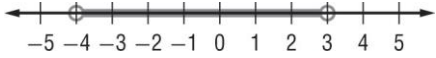
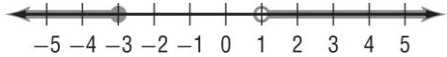
3. $3h < \frac{2h+26}{5}$



1-6 Study Guide and Intervention

Solving Compound and Absolute Value Inequalities

Compound Inequalities A compound inequality consists of two inequalities joined by the word *and* or the word *or*. To solve a compound inequality, you must solve each part separately.

And Compound Inequalities	The graph is the intersection of solution sets of two inequalities.	Example: $x > -4$ and $x < 3$ 
Or Compound Inequalities	The graph is the union of solution sets of two inequalities.	Example: $x \leq -3$ or $x > 1$ 

Example 1: Solve $-3 \leq 2x + 5 \leq 19$.

Graph the solution set on a number line.

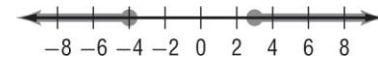
$$\begin{array}{rcl} -3 \leq 2x + 5 & \text{and} & 2x + 5 \leq 19 \\ -8 \leq 2x & & 2x \leq 14 \\ -4 \leq x & & x \leq 7 \\ -4 \leq x \leq 7 \end{array}$$



Example 2: Solve $3y - 2 \geq 7$ or $2y - 1 \leq -9$.

Graph the solution set on a number line.

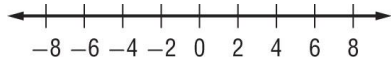
$$\begin{array}{rcl} 3y - 2 \geq 7 & \text{or} & 2y - 1 \leq -9 \\ 3y \geq 9 & \text{or} & 2y \leq -8 \\ y \geq 3 & \text{or} & y \leq -4 \end{array}$$



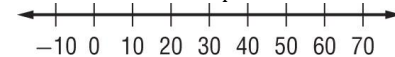
Exercises

Solve each inequality. Graph the solution set on a number line.

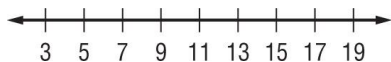
1. $-10 < 3x + 2 \leq 14$



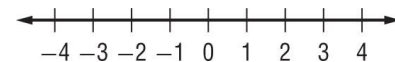
2. $3a + 8 < 23$ or $\frac{1}{4}a - 6 > 7$



3. $18 < 4x - 10 < 50$



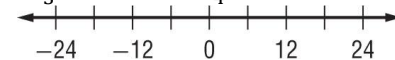
4. $5k + 2 < -13$ or $8k - 1 > 19$



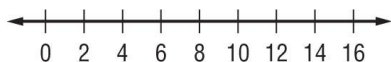
5. $100 \leq 5y - 45 \leq 225$



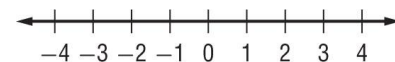
6. $\frac{2}{3}b - 2 > 10$ or $\frac{3}{4}b + 5 < -4$



7. $22 < 6w - 2 < 82$



8. $4d - 1 > -9$ or $2d + 5 < 11$



1-6 Study Guide and Intervention *(continued)*

WATCH THIS VIDEO BEFORE DOING THESE PROBLEMS: <https://youtu.be/ZJvOGkykJ44>

Absolute Value Inequalities Use the definition of absolute value to rewrite an absolute value inequality as a compound inequality.

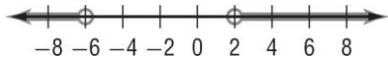
For all real numbers a and b , $b > 0$, the following statements are true.

1. If $|a| < b$, then $-b < a < b$.
2. If $|a| > b$, then $a > b$ or $a < -b$.

These statements are also true for \leq and \geq , respectively.

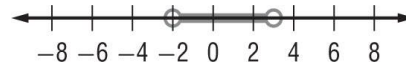
Example 1: Solve $|x + 2| > 4$. Graph the solution set on a number line.

By statement 2 above, if $|x + 2| > 4$, then $x + 2 > 4$ or $x + 2 < -4$. Subtracting 2 from both sides of each inequality gives $x > 2$ or $x < -6$.



Example 2: Solve $|2x - 1| < 5$. Graph the solution set on a number line.

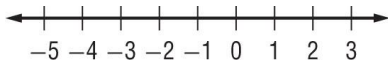
By statement 1 above, if $|2x - 1| < 5$, then $-5 < 2x - 1 < 5$. Adding 1 to all three parts of the inequality gives $-4 < 2x < 6$. Dividing by 2 gives $-2 < x < 3$.



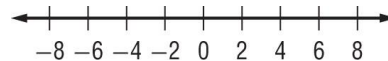
Exercises

Solve each inequality. Graph the solution set on a number line.

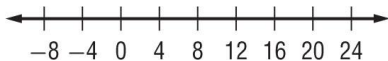
1. $|3x + 4| < 8$



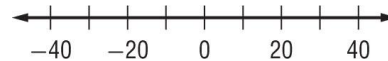
2. $|4k| + 1 > 27$



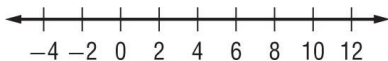
3. $\left|\frac{c}{2} - 3\right| \leq 5$



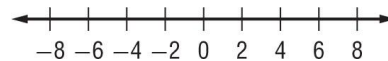
4. $|a + 9| \geq 30$



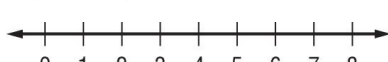
5. $|2f - 11| > 9$



6. $|5w + 2| < 28$



7. $|10 - 2k| < 2$



8. $\left|\frac{x}{2} - 5\right| + 2 > 10$

