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Office Hours: 10:00 am – 2:00 pm

KIPP NASHVILLE COLLEGIATE HIGH SCHOOL

Algebra 1

Learning Packet Overview
This learning packet will provide students the opportunity to review content they have previously learned in class; none of the content covered here should be new or unfamiliar to students. This packet should be completed over two weeks, from 3/23 to 4/3. Approximately 30 minutes should be spent working each day. The work is broken up into days to make time management easier, but if students prefer to jump around the packet and complete it out of order, that is fine! Students should use scratch paper and a calculator to solve the problems. If students encounter difficulty, we encourage them to use their notes from class as a resource, to review videos of the specific topic on Khan Academy, or to text their teachers at the numbers provided above.

Google Classroom
In order to make distance learning easier, we have set up a google classroom to share resources, information, and these learning packets digitally. To join our algebra classroom: 1. Go to *classroom.google.com* 2. Sign into your KIPP email account 3. Click the + button in the top right corner to "Join Class" 4. Type in our class code: **curtdgg**

Necessary Materials	
• Pencil • Calculator	• Scratch paper if needed • Access to google classroom

How students will be successful in Algebra	How caregivers can help students be successful
Students will be successful if: • They are annotating each question • They use their notes from class to review topics as necessary • They show work (#NOBLANKS) for every single problem • They look up specific topics on Khan academy, utilize resources on google classroom, or reach out to their teachers if they are struggling to answer questions	Caregivers can help students be successful by: • Checking that students are showing work for each problem and circling the final answer • Asking students to teach you how to answer the problem! This will ensure mastery. • If students are "stuck" direct them to their notes, Khan Academy, google classroom, or their teacher's phone number at the top of this page • Contacting teachers directly if students need help accessing the content or need encouragement

Algebra 1 Distance Learning Week 1
Factoring/Graphing Review

Unit #/Lesson #	Unit 6 Lessons 1-5		
Expected dates	3/23 – 3/27	**Time per Day**	~30 minutes
Ms. Jones	(774) 270-4215	**Ms. Riley**	(407) 674-9429

Aim(s):

Students will be able to…

- Identify patterns formed by the multiplication of special pairs of binomials
- Add, subtract, and multiply polynomials
- Factor special types of quadratic expressions by applying patterns
- Review graphing skills from semester 1

Key point(s):

- A *polynomial* is an expression consisting of variables raised to non-negative integer exponents and coefficients. Operations within polynomial expressions are limited to addition, subtraction, and multiplication (expressions that require dividing by a variable or expression are categorized as rational expressions).
- The *degree* of a polynomial is the value of the highest exponent within the expression. *Standard form* of a polynomial expression gives the terms from highest to lowest powered exponent.
- *Like terms* are those that contain the same variables raised to the same exponents.
- A *quadratic* expression is an expression of the form $ax^2 + bx + c$ where a, b and c are real numbers and $a \neq 0$.
- To factor a quadratic expression where $a \neq 1$:
  (1) If possible, factor out a GCF
  (2) Find the value of $a \cdot c$
  (3) Find the factors of $a \cdot c$ that add to b
  (4) Split the linear term using the factors from step #3
  (5) Factor by grouping: factor the GCF out of the first two terms and the GCF out of the last two terms (the second factor in both cases should be the same)
  (6) Complete the grouping by writing the final factorization

Potential misconception(s):

- Failing to follow the order of operations
- Students may forget to simplify as much as possible before attempting to factor
- Students might inaccurately multiply polynomials. When in doubt, use the box method or draw lines used when learning the distributive method.
- Students might struggle to identify the GCF of an expression when that GCF contains both coefficients and variables. Think of factors for coefficients or constants separate from the factors of variables.

Name: ______________________________ Date: ______________

Monday: Factoring Review **Algebra 1**

If you are unable to complete this week's problems:
First, refresh your memory by browsing the videos answer doing practice problems at: **tinyurl.com/U6AlgReview**

Still having trouble? Contact Ms. Jones by phone at (774) 270-4217, Ms. Riley by phone at (407) 674-9429, or by email at mjones@kippnashville.org and vriley@kippnashville.org

1. Which expression is equivalent to $(3x - 5y)^2$?
   a. $9x^2 - 25y^2$
   b. $9x^2 + 25y^2$
   c. $9x^2 - 30xy - 25y^2$
   d. $9x^2 - 15xy + 25y^2$
   e. $9x^2 - 30xy + 25y^2$

2. The expression $25x^2 - 9$ is equivalent to…
   a. $(5x - 3)^2$
   b. $(5x - 3)(5x + 3)$
   c. $(12.5x - 4.5)^2$
   d. $(12.5x - 4.5)(12.5x + 4.5)$

3. Find the **area** of a rectangular garden with side lengths of $4x + 11$ and $2x + 5$.

4. Find the **perimeter** of a rectangular garden with side lengths of $4x + 11$ and $2x + 5$.

5. Write the following expression in simplest factored form: $(4x - 5)(x + 2) + x$
   a. $2(2x^2 + 2x - 5)$
   b. $4x^2 + 3x - 10$
   c. $4(x^2 + x - 6)$
   d. $4x^2 - 7x$

Name: ______________________________ **Date:** ______________

Tuesday: Factoring Review — Algebra 1

1. Which of the following represents the factored form of $x^2 - 12x + 32$?

   a. $(x - 12)(x + 32)$
   b. $(x - 6)(x - 6)$
   c. $(x + 4)(x - 8)$
   d. $(x - 16)(x + 2)$
   e. $(x - 4)(x - 8)$

2. If the product of $(x + 5)(x + r) = x^2 + 12x + s$, what is the value of s?

   a. 7
   b. 12
   c. 35
   d. 60
   e. It's impossible to determine.

3. If the area of a rectangle is $n^2 - 4n - 21$, which of the following could be the length of one of the sides in terms of n?

   a. $n + 7$
   b. $n - 12$
   c. $n + 12$
   d. $n - 7$
   e. $n - 3$

4. Factor each of the following completely. THIS IS NOT MULTIPLE CHOICE.

   a. $n^2 + 8n + 16$

   b. $2g^2 + 4g + 2$

   c. $m^2 - 5m + 25$

5. Which of the following is the factored form of $8x^2 + 6x + 1$

   a. $(4x + 1)(2x + 1)$
   b. $(8x + 1)(x + 1)$
   c. $(4x + 3)(2x + 2)$
   d. $2(2x + 1)(2x + 3)$

Name: ______________________________ **Date:** ______________

Wednesday: Factoring Review — Algebra 1

1. Which of the following is a factor of $3x^2 - 2x - 8$?
   a. $3x + 4$
   b. $3x - 1$
   c. $2x + 1$
   d. $x - 4$

2. Factor the following expression:

$$\boldsymbol{4x^2 + 16x - 20}$$

3. Factor the following expression:

$$\boldsymbol{x^2 + 10x + 25}$$

4. Factor the following expression:

$$\boldsymbol{3x^2 - 24x + 48}$$

5. Factor the following expression:

$$\boldsymbol{\frac{1}{2}m^2 + \frac{5}{2}m + 3}$$

6. Factor the following expression:

$$\boldsymbol{5x^2 - 5}$$

7. If the area of a rectangle is $w^2 - 8w - 9$, which of the following could be a side length of the rectangle?

a. $w - 8$
b. $w + 8$
c. $w - 1$
d. $w + 1$
e. $w + 9$

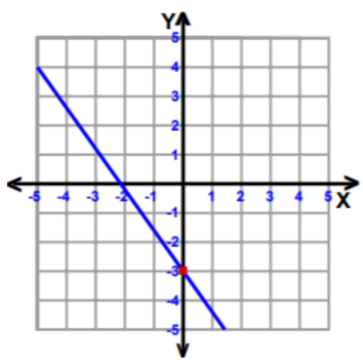
Name: ______________________________ Date: ______________

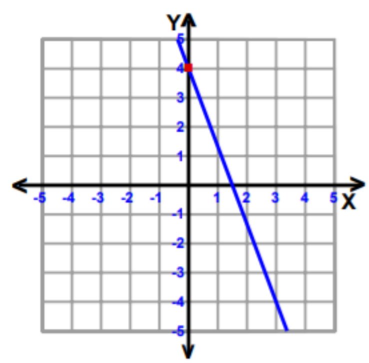
Thursday: Graphing Review — Algebra 1

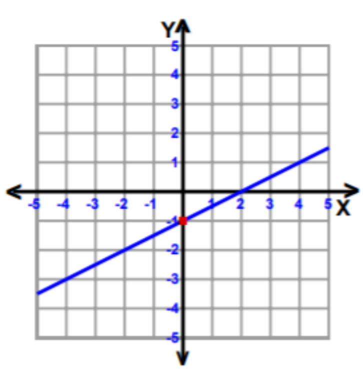
Forms for the Equation of a Line		
Slope-Intercept	$y = mx + b$	m is the slope b is the y-intercept
Point-Slope	$y - y_1 = m(x - x_1)$	m is the slope (x_1, y_1) is a point on the line
Standard Form	$ax + by = c$	a is positive
Intercept Form	$\frac{x}{a} + \frac{y}{b} = 1$	a is the x-intercept b is the y-intercept
Vertical	$x = a$	Vertical line with a as the x-intercept
Horizontal	$y = b$	Horizontal line with b as the y-intercept

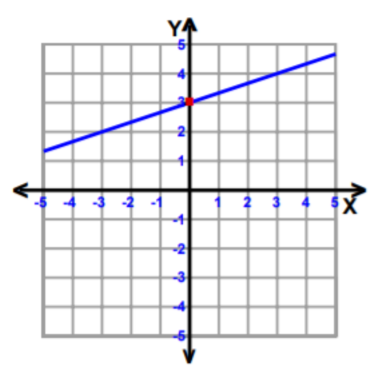
Use this table and your notes to refresh your memory of graphs of linear equations! You will need to know this information to answer the problems for Thursday and Friday.

Directions: Write the equation of the line next to each graph below. For all graphs, write BOTH the slope-intercept and point-slope forms.





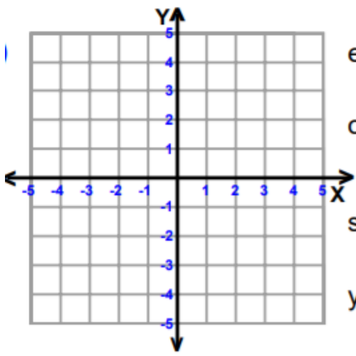




Name: ______________________________ **Date:** ______________

Friday: Graphing Review **Algebra 1**

1.For the two graphs below, fill in the equation and the slope and sketch the graph on the coordinate plane.

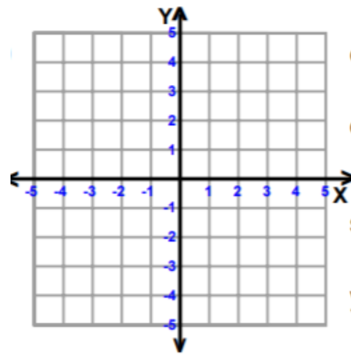


equation ____________

ordered pair = (3,3)

slope (m) = ______

y-intercept = 1



equation ____________

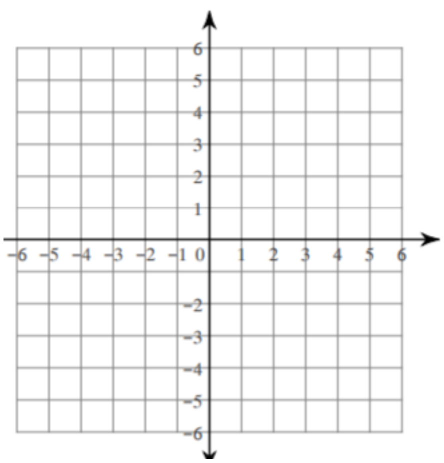
ordered pair = (-2,0)

slope (m) = ______

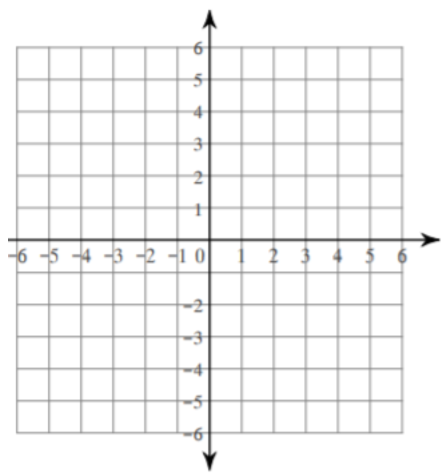
y-intercept = 3

2. Sketch the lines of the following graphs on the coordinate planes below.

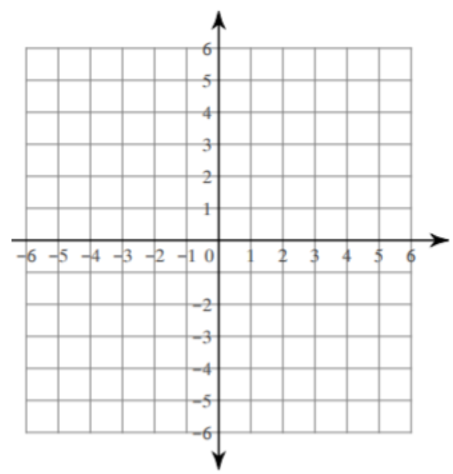
$y = \frac{3}{5}x - 4$



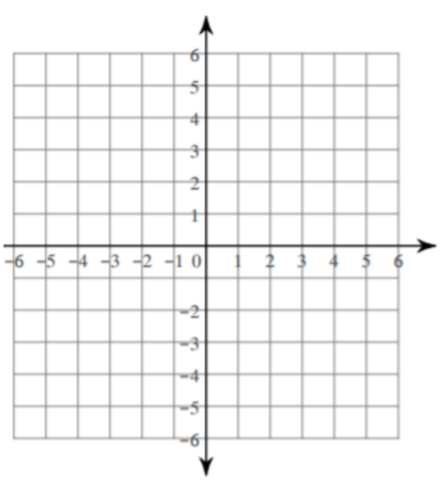
$y = \frac{1}{4}x + 1$



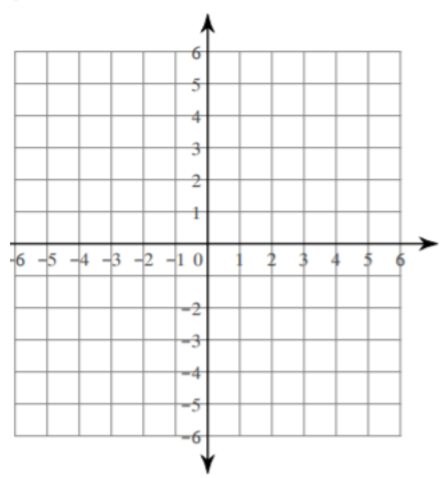
$y = -4$



$y = -\frac{1}{3}x - 2$



$y = 2x$



Algebra 1 Distance Learning Week 2
Quadratics/Radicals Review

KIPP NASHVILLE COLLEGIATE HIGH SCHOOL

Unit #/Lesson #	Unit 6 Lessons 6-12		
Expected dates	3/30 – 4/3	**Time per Day**	~30 minutes
Ms. Jones	(774) 270-4215	**Ms. Riley**	(407) 674-9429

Aim(s):

Students will be able to…
- Given a quadratic equation, solve the equation by applying the zero-product property and factoring
- Simplify and approximate radicals

Key point(s):

- A *polynomial* is an expression consisting of variables raised to non-negative integer exponents and coefficients. Operations within polynomial expressions are limited to addition, subtraction, and multiplication (expressions that require dividing by a variable or expression are categorized as rational expressions).
- A *quadratic* expression is an expression of the form $ax^2 + bx + c$ where a, b and c are real numbers and $a \neq 0$.
- The *zero-product property* states that if the product of two factors is zero, then one or both of the factors must be equal to zero (if $a \cdot b = 0$, then either $a = 0$, $b = 0$, or both a and b are equal to 0).
- We can use the zero-product property to solve quadratic equations:

(1) Manipulate the equation so that all terms are on one side of the equation and the other side of the equation is zero.
(2) Factor the quadratic expression using a GCF, pattern, or by splitting the linear term.
(3) Set each linear factor equal to zero and solve the resulting equations.

Solving quadratic equations by completing the square requires:
- Correct identification of the constant value that makes one side of the equation a perfect square trinomial
- Creation of an equivalent perfect square trinomial equation using the addition or subtraction property of equality
- Correct factorization of the perfect square trinomial
- Application of inverse operations to solve the resulting equation

Potential misconception(s):

- Don't forget to set the equation equal to zero to solve!
- Students may stop after they are done factoring and think they have completed the problem. If the question asks for the solutions/roots/zeros of the quadratic, be sure to identify those.
- The inverse operation for "square" is square root ($\sqrt{x^2} = x$).
- When you use a square root to solve an equation, it results in two solutions, one positive and one negative. We denote this with the mathematical symbol $\pm$ (read "plus or minus).
- There any many ways to solve some quadratic equations. Do not rely too heavily on quadratic formula—try factoring and inverse operations as well!

- Quadratic Formula: the values of a, b, and c are substituted into the Quadratic Formula, $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$.

Name: ______________________________ **Date:** ______________

Monday: Quadratics Review

Algebra 1

1.

If you are unable to complete this week's problems:
First, refresh your memory by browsing the videos answer doing practice problems at: **tinyurl.com/U6Quadratics and tinyurl.com/U6Radicals**

Still having trouble? Contact Ms. Jones by phone at (774) 270-4217, Ms. Riley by phone at (407) 674-9429, or by email at mjones@kippnashville.org and vriley@kippnashville.org

1. Which of the following represents roots of the quadratic $x^2 - 12x + 32$?
   a. 4 and 8
   b. -4 and -8
   c. 6 and 2
   d. -6 and -2
2. Find the **sum** of the solutions to the equation $2x^2 + 5x = 3$.
3. How many solutions are there to the equation $x(x-2)(x+2) = 0$? Explain your answer.
4. Factor completely, then identify the roots of the quadratic: $2d^2 + 10d - 28$
5. Which of the following is a factor of $3x^3 - 2x^2 - x$? Select all that apply.
   a. $3x - 1$
   b. x
   c. $x - 1$
   d. $x - 3$
   e. $x + 1$
6. The zeros of $f(x) = 5x^2 - 10x - 75$ are…
   a. -5 and -3
   b. -3 and 5
   c. -5 and 3
   d. 5 and 3

Name: ______________________________ **Date:** ______________

Tuesday: Quadratics Review **Algebra 1**

1. What are the solutions of the function: $f(x) = x^2 - 8x + 16$?

2. What is the **sum** of the solutions of $10x^2 + x = 2$? (Your answer will be a fraction)

3. Which of the following expressions is in simplest factored form and equivalent to $5x^2 - 4x^2(2x - 10) - 2x^3 - 10x$?

   a. $-10x^3 + 45x^2 - 10x$
   b. $-10(x^3 + 45x^2 + x)$
   c. $-10(x^3 - 45x^2 - x)$
   d. $-5(2x^3 - 9x^2 + 2)$
   e. $-5(-2x^3 + 9x^2 - 2)$

4. The solutions of the equation $x^2 - 7x = 8$ are…

   a. 4 and 3
   b. -4 and -3
   c. 8 and 1
   d. 8 and -1
   e. -8 and 1

5. Which of the following is a factored form of the expression $6x^2 + 28x - 10$?

   A. $3(x + 5)(x - 2)$
   B. $2(x + 5)(3x - 1)$
   C. $2(x - 5)(3x + 1)$
   D. $3(x - 5)(2x - 1)$

Name: ______________________________ **Date:** ______________

Wednesday: Quadratics Review | Algebra 1

$$ax^2 + bx + c = 0$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Calcworkshop.com

The **Quadratic Formula**, seen to the left, is one way of finding the roots or solutions of a quadratic equation. Use this formula to answer today's questions.

1. Which expression below, when simplified, will give the solutions to $-12n - 1 = 6n^2$?

   A) $\frac{1 \pm \sqrt{1 + 288}}{-24}$

   B) $\frac{-12 \pm \sqrt{144 + 24}}{12}$

   C) $\frac{-6 \pm \sqrt{36 + 4}}{2}$

   D) $\frac{-12 \pm \sqrt{-144 + 24}}{12}$

   E) $\frac{12 \pm \sqrt{144 - 24}}{12}$

2. Solve using the quadratic formula **on a separate piece of paper.**

   a. $2 + 4x = 3x^2 - 3$

   b. $2x^2 - 3 = 5x$

3. Which of the following are solutions to $x^2 + 6x = 16$? Select <u>all</u> that apply.

A. -8
B. -4
C. 2
D. 4
E. 8

4. Which of the following shows the solution set of the quadratic equation $3x^2 = -2 - 6x$?

a. $x = \frac{-6 \pm \sqrt{8}}{3}$
b. $x = \frac{-3 \pm 4\sqrt{2}}{3}$
c. $x = \frac{-3 \pm 2\sqrt{4}}{3}$
d. $x = \frac{-3 \pm \sqrt{3}}{3}$

Name: ______________________________ **Date:** ______________

Thursday: Quadratics Review | Algebra 1

Now we know three ways to find the solution to a quadratic equation:

1. Factoring then split and solve (Tuesday)
2. Completing the Square, then Inverse Operations
3. Quadratic Formula (Wednesday)

As you solve the questions for today, you may use whichever method you find is most efficient.

1. What is the solution of the equation below?

$$(4x + 20)^2 - 80 = 40$$

2. Solve the following equation by completing the square: $x^2 - 5x + 7 = 12$

3. Solve the quadratic equation below by factoring **<u>and</u>** by completing the square:

$$\frac{1}{4}x^2 - x = 3$$

4. What is the solution of the equation: $4x^2 - 16 = 0$

5. What is the solution of the equation: $24x^2 - 12 = 0$

6. Solve the following by completing the square: $x^2 - 12x + 11 = 0$

Name: ______________________________ **Date:** ______________

Friday: Radicals Review *NO CALCULATOR* — Algebra 1

To Simplify a Radical…	To Estimate a Radical…
1. Identify the largest perfect square factor of the radicand. ○ If the radicand does not have any perfect square factors, then it cannot be simplified. ○ It is possible to simplify without finding the **largest** perfect square factor, but the simplification might require two steps (ex. $\sqrt{48} = 2\sqrt{12} = 4\sqrt{13}$) 2. Write the radicand as the product of a perfect square factor and another integer. 3. Use the fact that $\sqrt{ab} = \sqrt{a} \cdot \sqrt{b}$ to rewrite the expression, using the perfect square as a. Take the square root of a to write the expression as a coefficient times a radical.	1. If the radicand is a perfect square, then the result is rational. Take the square root of the radicand; this will be the exact value of the expression. 2. If the radicand is not a perfect square, then the result is irrational but will lie between two consecutive integers: If necessary, rewrite the radical so it has a coefficient of 1 (ex. write $2\sqrt{3}$ as $\sqrt{4} \cdot \sqrt{3} = \sqrt{12}$). Identify two integers that are the perfect squares closest in value to the radicand (one greater than the radicand and one less than the radicand). Find the square root of each of these integers (the result should be two consecutive integers). The value of the square root is between these two integers.

1. Simplify the following radicals:

$\sqrt{24}$	$\sqrt{243}$	$\sqrt{300}$
$\sqrt{128}$	$\sqrt{1{,}500}$	$\sqrt{18}$

2. Which of the following is equivalent to $5\sqrt{80}$?
   A) 40
   B) 100
   C) $25\sqrt{4}$
   D) $20\sqrt{5}$
   E) None of the above

3. Given $f(x) = \sqrt{x+3} - 13$, what is $f(46)$?
   A. -8
   B. -6
   C. 6
   D. 2
   E. 9

5. $\sqrt{78}$ lies between which pair of consecutive integers?
   A) 5 and 6
   B) 6 and 7
   C) 7 and 8
   D) 8 and 9
   E)

6. Which whole number is closest to $\sqrt{40}$?

   A) 4
   B) 5
   C) 6
   D) 7