What students need to know for...   NAME _____
ALGEBRA II 2016-2017

This is a **MANDATORY** assignment that will be **GRADED**. It is due the first day of the course. Your teacher will determine how it will be counted (i.e. homework, quiz, etc.)

Students expecting to take Algebra II at Cambridge Rindge & Latin School should demonstrate the ability to...

General:
o Keep an organized notebook
o Be a good note taker
o Complete homework every night
o Be active learners
     Ask questions and participate in class
     Seek help outside of class if needed
o Work with others
o Work with and without a calculator

Specific Math Skills
o Use basic operations with integers using Order of operations
o Work with fractions (estimating values and simplifying)
o Evaluate algebraic expressions using substitution
o Work with and simplify square roots
o Work with algebraic expressions
     Identify like terms
     Add/subtract like terms
     Multiply/divide polynomials using the distributive property
o Solve equations in one variable
     One-step/Two-step/multi-step
o Have knowledge of the number line and the Cartesian coordinate plane
     Plotting points
     Knowledge of points in relation to the quadrants
o Graph and solve inequalities in one variable
o Graph linear equations
     Slope intercept form: $y = mx + b$
     Standard form: $Ax + By = C$
     Point-slope form: $y - y_1 = m(x - x_1)$
o Graph quadratic equations
     Standard form: $y = ax^2+bx+c$
o Identify functions using multiple representations table/equations/graphically
o Work with exponents and radicals
o Work with polynomials
     add/subtract/multiply (Distributive Property and FOIL)
o Factor polynomials including quadratics

Review Problems:

*NOTE: Show all of your work. Your teacher may count this as a quiz grade, a homework grade, or they may give a quiz on this material at the beginning of the year. Don't forget to use the reference sheet on page 2. **You should "Google" the topic if you are unsure how to complete the examples. Khanacademy.org has some good instructional videos.** Good luck!

<div align="right">- The CRLS Math Department</div>

Procedural Checklist / Reference Sheet:

Number Sense & Operations

Finding Percent of
1. Change the percent to a decimal
2. Multiply the total amount by the decimal

Changing Fractions to Decimals
1. Divide the numerator by the denominator
2. Round to the nearest hundredth if needed

Changing Fractions to Percent
1. Divide the numerator by the denominator
2. Round to the nearest hundredth
3. Drop the decimal point
4. Add a percent sign

Solving Multi-Step Operations -- PEMDAS
1. Complete all computation inside the parenthesis, brackets, or absolute value
2. Carry out all exponents
3. Do multiplication or division, from left to right
4. Do addition or subtraction, from left to right

Distribution
1. Multiply the # or variable outside the parenthesis by each term inside the parenthesis
2. Check the signs (+/-)

Multiplying Exponents vs. Dividing Exponents
1. Add exponents | Subtract exponents
2. Multiply integers | Divide integers

Solving with Absolute Value
1. Set up two equations
2. One with a positive answer
3. One with a negative answer-switch the sign
4. Solve each equation

Multiplying by a Fraction
1. Multiply the numerator by all values
2. Divide this product by the denominator

Estimating the value of a Radical ($\sqrt{}$)
1. For a square root, find the closest square number.
2. Estimate the value (higher/lower)
3. If it's a cube root, find the closest cube number
4. Estimate this value.

Mulitplying Binomials
1. Use **FOIL** -- first, outside, inside, last
2. Use box method & combine like terms

Patterns, Relations, and Algebra

Solving Equations for One Variable
1. Distribute
2. Combine Like Terms
3. Get all the variables on the left side (+/-)
4. Get all number values on the right side (+/-)
5. Divide both sides by the coefficient
6. Remember, whatever you do to one side, you must do to the other

Using Proportional Relationships
1. Determine the Part to Whole relationship
2. Write a ratio for the KNOWN part to whole
3. Determine the second ratio -- given/missing information
4. Set up a proportion with X representing missing value in the UNKNOWN ratio

Properties of Proportions
1. If $\frac{a}{b} = \frac{c}{d}$, then ad = bc
2. product of the means = product of the extremes Cross multiply to solve for missing variable

Ratios used in Proportional Relationships
1. Part / Whole
2. Percent (%) / 100
3. # of degrees / 360
4. sample / total population
5. Part:Part

Solving Systems of Equations w/ Substitution
1) +/- the x term, move to the right side
2) ÷ by the coefficient of y (÷ by # with y)
3) Set the expressions equal to each other & solve for x.
4) Substitute x & solve for y.
5) Write solution as a coordinate pair (x , y).

Using the Equation of a Line/Slope(m)

$$y = mx + b \qquad\qquad m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$y - y_1 = m(x - x_1)$$

Graphing: Begin with b, and move with m
Parallel Slopes: $m_1 = m_2$
Perpendicular slopes: $m_1 \cdot m_2 = -1$, $m_1 = \dfrac{1}{-m_2}$

Be sure to carefully read each example & review information provided BEFORE you work on each section. Don't forget to refer to the procedural checklist/reference sheet on page 2, for assistance…

Part 1: Vocabulary
Match each definition or example with the appropriate vocabulary term.

coefficient	*constant*	*denominator*	*difference*	*Distributive property*
like terms	*Linear- Standard form*	*numerator*	*product*	*quadratic*
quotient	*slope*	*Slope-intercept form*	*sum*	*x-intercept* *y-intercept*

1.) _____ the bottom number in a fraction

2.) _____ an amount obtained by addition

3.) _____ $y = mx + b$

4.) _____ $Ax + By = C$

5.) _____ an amount obtained by multiplication

6.) _____ the point where a graph crosses the *y*-axis

7.) _____ the point where a graph crosses the *x*-axis

8.) _____ an amount obtained by division

9.) _____ $4(2x - 9) = 8x - 36$

10.) _____ the top number in a fraction

11.) _____ an amount obtained by subtraction

12.) _____ the number being multiplied by a variable (the number in front of the variable)

13.) _____ a term that has no variable factor (it is just a number)

14.) _____ terms with exactly the same variable

15.) _____ the ratio of a line's vertical change to its horizontal change

16.) _____ a function where the graph forms a parabola

Part 2: Comparing Numbers

Examples: $-8 > -20$

$$\frac{2}{3} < \frac{4}{3}$$

Fill in the blank with the inequality symbol $>$ or $<$. Refer to a number line if necessary.

1.) $\sqrt{10}$ _____ $\sqrt{7}$

2.) $-\frac{1}{4}$ _____ $-\frac{1}{2}$

3.) -5.2 _____ $-5\frac{1}{2}$

4.) $6\sqrt{3}$ _____ $3\sqrt{6}$

Part 3: Evaluating Variable Expressions
Evaluate means to find the value of, or simplify. Substitute the given values and solve.

1.) $15 - x + y$, if $x = 9$ and $y = 11$

2.) $(6c + 2b) - 11$, if $a = 8$, $b = 5$, and $c = 3$.

(4)

Part 4: Solving Linear Equations
To solve an equation you get the variable alone by using **opposite operations**. Once you get your solution, you can check it, by plugging in to the original equation and seeing if it makes it true.

    Example: Solve *6x = -4(-x + 5)*, then check the solution.

$6x = -4(-x + 5)$	
$6x = 4x + 20$	*Simplify by distributing*
$\underline{-4x \quad -4x}$	*Use opposite operations-subtract 4x to get the x's on the same*
$2x = 20$	*side of the equation*
$\mathbf{x = 10}$	*Use opposite operations-divide by 2 to isolate x*

Solve and CHECK the following equations.

1.) $5w + 1 = -19 + 3$ 　　　　　　　　　　　　　　2.) $(3x + 3) - (x + 7) = -18$

3.) $6(y + 3) = 24$ 　　　　　　　　　　　　　　　　4.) $4p - 5 + 2p = 7 + 5p + 2$
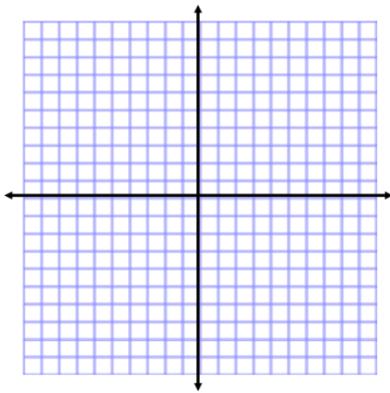
Part 5: Graphing Linear Functions

Slope-intercept Form: plot the y-intercept, then use the slope to plot more points & complete the line.

Standard Form: Find the *x*-intercept by substituting 0 for *y* & solve for *x*. To find the *y*-intercept, substitute 0 for *x* & solve for *y*.
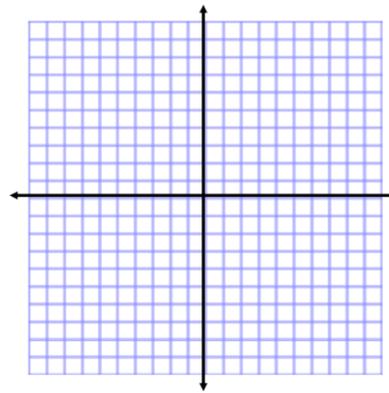
Point-Slope Form: identify the (x_1, y_1), plot the point, & use the slope to complete the line.
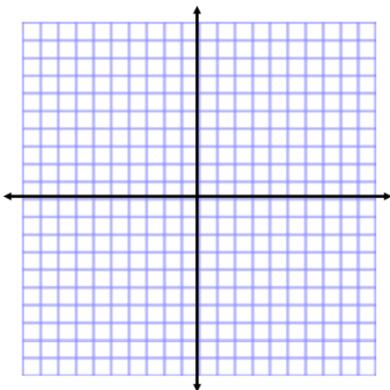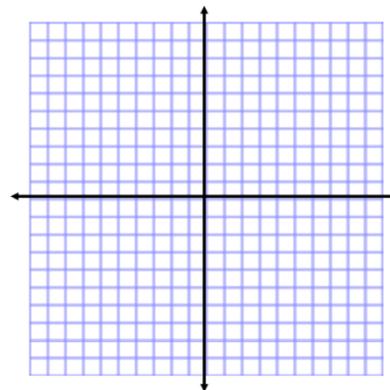
Graph the following.

1.) $y = 2x - 4$

2.) $y = -x$

3.) $3x + 4y = -12$

4.) $y - 3 = \frac{1}{2}(x + 4)$

(6)

Part 6: Factoring Quadratic Functions

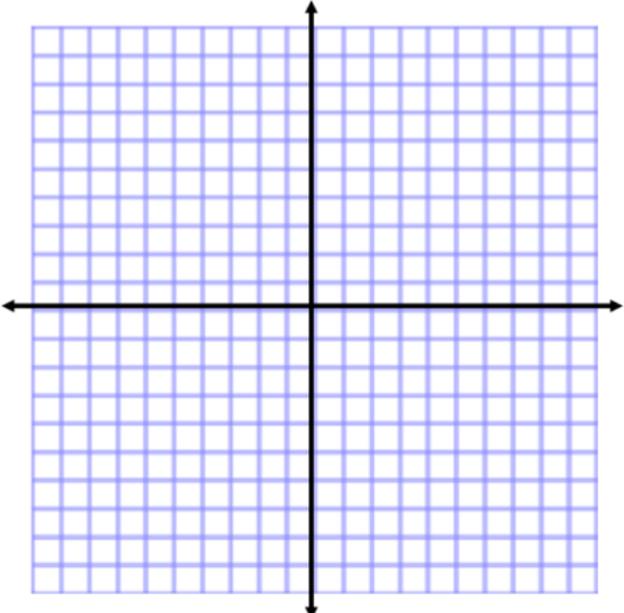Factor each quadratic function below into the product of two binomials.

1. $y = x^2 + 7x + 12$

2. $y = x^2 - 2x - 15$

3. $y = 2x^2 + 4x - 16$

4. $y = 4x^2 - 4x - 3$

Part 7: Graphing Quadratic Functions

Your graph should show <u>5 points</u>

Function 1: $y = x^2 - 2x - 3$

	Your work:
1. Identify the y-intercept	
2. Use the formula $x = -\dfrac{b}{2a}$ to find the Axis of Symmetry	
3. Identify the vertex	
4. Factor to find both x-intercepts	
5. Reflect the y-intercept over the Axis of Symmetry	
6. Graph the function, make sure to label all points and the Axis of Symmetry	

Function 2: $y = -x^2 - 2x + 8$

	Your work:
1. Identify the y-intercept	
2. Use the formula $x = -\dfrac{b}{2a}$ to find the Axis of Symmetry	
3. Identify the vertex	
4. Factor to find both x-intercepts	
5. Reflect the y-intercept over the Axis of Symmetry	
6. Graph the function, make sure to label all points and the Axis of Symmetry	

(9)

Part 8: Exponents and Radicals

Properties of Exponents:

Simplify completely:

1.) $(w^2k^3p^5)^2$

2.) $(-3x^5)(2xy^4)$

4.) $\left(\dfrac{4a^3}{2m}\right)^4$

5.) $\dfrac{20r^3t^7}{5t^5}$

Simplest Radical Form:
-No perfect square factors under the radical sign
-No fractions under the radical sign
-No radicals in the denominator
***Do NOT write as a decimal!!!

Example: Write $\sqrt{27}$ in simplest radical form.

$\sqrt{27}$

$\sqrt{9}\sqrt{3}$ Factor to find the largest perfect square; rewrite as a product $(9\cdot3 = 27)$.

$3\sqrt{3}$ Simplify the perfect square.

Write in simplest radical form.

1.) $\sqrt{24}$

2.) $3\sqrt{50}$

3.) $\sqrt{162}$

4.) $4\sqrt{200}$

Part 9: Simplifying Polynomials
- You can only add/subtract like terms
- Refer to properties of exponents for multiplication
- Standard Form: write terms in descending order by degree (exponent)

Simplify each of the following. Write your answers in standard form.

1.) $(4x^2 + 2x + 5) + (7x^2 - 5x + 2)$

2.) $(9a^2 - 5a - 4) - (-6a^2 + 12a + 3)$

3.) $8b(3b + 7)$

4.) $(p + 2)(-5p + 4)$