Upper St. Clair High School Summer Assignment	
Course: Honors Geometry	
Assignment Title:	Summer Algebra Packet
Due Date:	First Day of School (8/19)
Purpose of the assignment:	☑ Review foundational material, concepts, or skills ☐ Build interest ☑ Provide a diagnostic measuring tool to help guide student differentiation & instruction ☑ Establish a supportive class culture & environment ☑ Expose students to required material, concepts, skills, and/or texts that will be referenced throughout the academic year
Resources needed to complete assignment:	☐ Textbook assigned by school ☐ Book(s) supplied by student ☑ Packet provided by teacher (please visit the Interactive Program of Studies) ☑ Other supplies: Khan Academy (optional as needed)
Estimated time for Completion:	Students may average an estimated 6-8 hours hours to complete the assignment, but we encourage students to spend time on this assignment over several weeks.
Impact on Semester 1 Grade	Graded: ☑ Yes ☐ No Teacher Note: There will be a quiz based on the skills in this packet.

Khan Academy: www.khanacademy.org

Khan academy is a free online resource that provides mathematical tutorial videos and guided practice problems. If you find any problems or topics in the summer packet difficult, then you should refer to khan academy for help. I have listed below the titles to different sections from khan academy that would be helpful in order to complete any topic with in the summer packet. You can use your USC student email account to log into the site since it is a "Google Account." Once logged into the site you need to click the "practice" tab in the top left hand corner of the site in order to find and use the practice sections listed below.

Complete each of these units in Khan Academy until it says you are "practiced".

Systems of Equations:
Solutions to systems of equations
Systems of equations with simple elimination
Systems of equations with substitution
Systems of equations with elimination
Systems of equations
Systems of equations word problems
Understanding systems of equations word problems

Slope Intercept form
Simplifying radicals

Factoring:
Factoring linear binomials
Factoring difference of squares 1
Factoring polynomials 1
Factoring difference of squares 2
Factoring polynomials 2
Solving quadratics by factoring
Factoring difference of squares 3
Factoring polynomials with two variables
Factoring polynomials by grouping
Solving quadratics by factoring 2

Simplifying Radicals

Simplest Radical Form

Sometimes it is convenient to leave square roots in radical form instead of using a calculator to find approximations (decimal values). Look for perfect squares (i.e., 4, 9, 16, 25, 36, 49, ...) as **factors** of the number that is inside the radical sign (**radicand**) and take the square root of any perfect square factor. Multiply the root of the perfect square times the reduced radical. When there is an existing value that multiplies the radical, multiply any root(s) times that value.

For example:

$\sqrt{9}=3$ $\qquad$ $5\sqrt{9}=5\cdot 3=15$

$\sqrt{18}=\sqrt{9\cdot 2}=\sqrt{9}\cdot\sqrt{2}=3\sqrt{2}$ $\qquad$ $3\sqrt{98}=3\sqrt{49\cdot 2}=3\cdot 7\sqrt{2}=21\sqrt{2}$

$\sqrt{80}=\sqrt{16\cdot 5}=\sqrt{16}\cdot\sqrt{5}=4\sqrt{5}$ $\qquad$ $\sqrt{45}+4\sqrt{20}=\sqrt{9\cdot 5}+4\sqrt{4\cdot 5}=3\sqrt{5}+4\cdot 2\sqrt{5}=11\sqrt{5}$

When there are no more perfect square factors inside the radical sign, the product of the whole number (or fraction) and the remaining radical is said to be in **SIMPLE RADICAL FORM.**

Rationalize the Denominator

Simple radical form does not allow radicals in the denominator of a fraction. If there is a radical in the denominator, **RATIONALIZE THE DENOMINATOR** by multiplying the numerator and denominator of the fraction by the radical in the original denominator. Then simplify the remaining fraction. Examples:

$$\frac{2}{\sqrt{2}}=\frac{2}{\sqrt{2}}\cdot\frac{\sqrt{2}}{\sqrt{2}}=\frac{2\sqrt{2}}{2}=\sqrt{2} \qquad \frac{4\sqrt{5}}{\sqrt{6}}=\frac{4\sqrt{5}}{\sqrt{6}}\cdot\frac{\sqrt{6}}{\sqrt{6}}=\frac{4\sqrt{30}}{6}=\frac{2\sqrt{30}}{3}$$

In the first example, $\sqrt{2}\cdot\sqrt{2}=\sqrt{4}=2$ and $\frac{2}{2}=1$. In the second example, $\sqrt{6}\cdot\sqrt{6}=\sqrt{36}=6$ and $\frac{4}{6}=\frac{2}{3}$.

Simplest Radical Form

Write each expression in simplest radical form.

1) $\sqrt{48}$

2) $\sqrt{75}$

3) $\sqrt{12}$

4) $\sqrt{16}$

5) $\sqrt{36}$

6) $\sqrt{64}$

7) $\sqrt{125}$

8) $\sqrt{20}$

9) $\sqrt{18}$

10) $\sqrt{32}$

11) $\sqrt{50}$

12) $\sqrt{27}$

Rationalizing the Denominator

Simplify.

1) $\frac{\sqrt{4}}{\sqrt{14}}$

2) $\frac{\sqrt{4}}{4\sqrt{5}}$

3) $\frac{5}{2\sqrt{5}}$

4) $\frac{\sqrt{7}}{\sqrt{8}}$

5) $\frac{\sqrt{5}}{\sqrt{3}}$

6) $\frac{\sqrt{5}}{7\sqrt{15}}$

7) $\frac{3}{5\sqrt{8}}$

8) $\frac{\sqrt{3}}{\sqrt{6}}$

9) $\frac{8}{4\sqrt{5}}$

10) $\frac{\sqrt{9}}{8\sqrt{18}}$

11) $\frac{4}{\sqrt{2}}$

12) $\frac{\sqrt{48}}{\sqrt{42}}$

13) $\frac{8\sqrt{3}}{6\sqrt{6}}$

14) $\frac{6\sqrt{5}}{\sqrt{3}}$

15) $\frac{4\sqrt{36}}{4\sqrt{30}}$

Solving Systems of Equation Using Elimination

The **elimination** method can be used to solve a system of linear equations. By adding or subtracting the two linear equations in a way that eliminates one of the variables, a single variable equation is left. Also see the textbook, pages 250, 252, 254, and 264.

Example 1

Solve: $\begin{aligned} x + 2y &= 16 \\ x + y &= 2 \end{aligned}$

First decide whether to add or subtract the equations. Remember that the addition or subtraction should eliminate one variable. In the system above, the x in each equation is positive, so we need to subtract, that is, change all the signs of the terms in the second equation.

$$\begin{aligned} x + 2y &= 16 \\ -(x + y &= 2) \end{aligned} \Rightarrow \begin{aligned} x + 2y &= 16 \\ -x - y &= -2 \end{aligned} \Rightarrow y = 14$$

Substitute the solution for y into either of the original equations to solve for the other variable, x.

$$x + 2(14) = 16 \Rightarrow x = -12$$

Check your solution (-12, 14) in the second equation. You could also use the first equation to check your solution.

$$-12 + 14 = 2 \Rightarrow 2 = 2\surd$$

Example 2

Solve: $\begin{aligned} 2x + 3y &= 10 \\ 3x - 4y &= -2 \end{aligned}$

Sometimes the equations need to be adjusted by multiplication before they can be added or subtracted to eliminate a variable. Multiply one or both equations to set them up for elimination.

Multiply the first equation by 3:

$$3(2x + 3y) = 10(3) \Rightarrow 6x + 9y = 30$$

Multiply the second equation by -2:

$$-2(3x - 4y) = -2 \cdot (-2) \Rightarrow -6x + 8y = 4$$

Decide whether to add or subtract the equations to eliminate one variable. Since the x-terms are additive opposites, add these equations.

$$\begin{aligned} 6x + 9y &= 30 \\ -6x + 8y &= 4 \\ \hline 17y &= 34 \end{aligned} \quad \text{so } y = 2.$$

Substitute the solution for y into either of the original equations to solve for the other variable.

$$2x + 3(2) = 10 \Rightarrow 2x = 4 \Rightarrow x = 2\surd$$

Check the solution (2, 2) in the second equation.

$$3(2) - 4(2) = -2 \Rightarrow 6 - 8 = -2 \Rightarrow -2 = -2$$

Solving Systems of Equations Using Elimination

Solve each system by elimination.

1) $-4x - 2y = -12$
$4x + 8y = -24$

2) $4x + 8y = 20$
$-4x + 2y = -30$

3) $x - y = 11$
$2x + y = 19$

4) $-6x + 5y = 1$
$6x + 4y = -10$

5) $-2x - 9y = -25$
$-4x - 9y = -23$

6) $8x + y = -16$
$-3x + y = -5$

7) $-6x + 6y = 6$
$-6x + 3y = -12$

8) $7x + 2y = 24$
$8x + 2y = 30$

9) $5x + y = 9$
$10x - 7y = -18$

10) $-4x + 9y = 9$
$x - 3y = -6$

11) $-3x + 7y = -16$
$-9x + 5y = 16$

12) $-7x + y = -19$
$-2x + 3y = -19$

13) $16x - 10y = 10$
$-8x - 6y = 6$

14) $8x + 14y = 4$
$-6x - 7y = -10$

15) $-4x - 15y = -17$
$-x + 5y = -13$

16) $-x - 7y = 14$
$-4x - 14y = 28$

17) $-7x - 8y = 9$
$-4x + 9y = -22$

18) $5x + 4y = -30$
$3x - 9y = -18$

19) $-4x - 2y = 14$
$-10x + 7y = -25$

20) $3x - 2y = 2$
$5x - 5y = 10$

Definitions:

- **Slope:** of a line tells how fast y changes for each unit of change in x.
- **Linear equation in two variables:** is an equation that can be written as

$$ax + by = c$$

where a, b, and c are real numbers and a and b cannot both be zero.

Important Formulas:

- **Slope formula:** The slope of the line through the points (x_1, y_1) and (x_2, y_2) is given by

$$\boxed{m = \frac{y_1 - y_2}{x_1 - x_2} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{\text{change in } y}{\text{change in } x} = \frac{\text{rise}}{\text{run}}}$$

Note that it does not matter if you start with y_1 or y_2. However, you must start with its corresponding x in the denominator.

- **Slope-intercept form:** The slope-intercept form of an equation with slope m and $y-$intercept b is given by

$$\boxed{y = mx + b.}$$

- **Point-slope formula:** The equation of the line with slope m and passing through (x_1, y_1) can be found using

$$\boxed{y - y_1 = m(x - x_1).}$$

Common Mistakes to Avoid:

- When identifying the slope and $y-$intercept using the slope-intercept form, remember to divide each term by the coefficient on y. The slope and $y-$intercept can only be identified once you have isolated y.
- Remember that the change in y is in the numerator of the slope formula. DO NOT place it in the denominator.

PROBLEMS

1. Identify the slope and the y–intercept of each line.

(a) $3x - 2y = 6$

$$3x - 2y = 6$$
$$-2y = -3x + 6$$
$$y = \frac{3}{2}x - 3$$

$$\boxed{m = \frac{3}{2}}$$

$$\boxed{y\text{ – intercept} = (0, -3)}$$

(b) $5x + 10y = -3$

$$5x + 10y = -3$$
$$10y = -5x - 3$$
$$y = -\frac{5}{10}x - \frac{3}{10}$$
$$y = -\frac{1}{2}x - \frac{3}{10}$$

$$\boxed{m = -\frac{1}{2}}$$

$$\boxed{y\text{ – intercept} = \left(0, -\frac{3}{10}\right)}$$

2. Find the slope of the line passing through $(-1, 3)$ and $(5, -2)$.

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$
$$m = \frac{-2 - 3}{5 - (-1)}$$
$$m = -\frac{5}{6}$$

$$\boxed{m = -\frac{5}{6}}$$

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3. Find the slope of the line passing through $(-9, 2)$ and $(-5, 5)$.

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$
$$m = \frac{5 - 2}{-5 - (-9)}$$
$$m = \frac{3}{4}$$

$$\boxed{m = \frac{3}{4}}$$

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4. Find the equation of the line with slope $m = -3$ and passes through $(5, -2)$.

$$y - y_1 = m(x - x_1)$$
$$y - (-2) = -3(x - 5)$$
$$y + 2 = -3x + 15$$
$$y = -3x + 13$$

$$\boxed{y = -3x + 13}$$

5. Find the equation of the line with $m = \frac{3}{4}$ and passing through $(-1,2)$.

$$y - y_1 = m(x - x_1)$$
$$y - 2 = \frac{3}{4}(x - (-1))$$
$$y - 2 = \frac{3}{4}x + \frac{3}{4}$$
$$y = \frac{3}{4}x + \frac{11}{4}$$

$$\boxed{y = \frac{3}{4}x + \frac{11}{4}}$$

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6. Find the equation of the line passing through $(-2,3)$ and $(4,-5)$.

NOTE: First, we must find the slope of the line.

$$m = \frac{-5-3}{4-(-2)} = \frac{-8}{6} = \frac{-4}{3}$$

$$y - y_1 = m(x - x_1)$$
$$y - 3 = -\frac{4}{3}(x - (-2))$$
$$y - 3 = -\frac{4}{3}x - \frac{8}{3}$$
$$y = \frac{4}{3} + \frac{1}{3}$$

$$\boxed{y = \frac{4}{3}x + \frac{1}{3}}$$

7. Find the equation of the line passing through $(-7,2)$ and has a y–intercept at 3.

NOTE: First, we must find the slope of the line. Remember that a y–intercept at 3 translates to the ordered pair $(0,3)$.

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{2-3}{-7-0} = \frac{-1}{-7} = \frac{1}{7}$$

$$y = mx + b$$
$$y = \frac{1}{7}x + 3$$

$$\boxed{y = \frac{1}{7}x + 3}$$

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8. Find the equation of the line which has an x–intercept at -2 and a y–intercept at 4.

NOTE: This means that the line passes through $(-2,0)$ and $(0,4)$.

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{4-0}{0-(-2)} = \frac{4}{2} = 2$$

$$y = mx + b$$
$$y = 2x + 4$$

$$\boxed{y = 2x + 4}$$

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9. Find the equation of the line passing through $(-7,2)$ and has an x–intercept at 3.

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{2-0}{-7-3} = \frac{2}{-10} = -\frac{1}{5}$$

$$y - 0 = -\frac{1}{5}(x - 3)$$
$$y = -\frac{1}{5}x + \frac{3}{5}$$

$$\boxed{y = -\frac{1}{5}x + \frac{3}{5}}$$

Finding the Slope of a Line

Find the slope of the line through each pair of points.

1) $(19, -16), (-7, -15)$

2) $(1, -19), (-2, -7)$

3) $(-4, 7), (-6, -4)$

4) $(20, 8), (9, 16)$

Write the equation of the line in slope-intercept form and then identify the slope and y-intercept.

1) $3x - 2y = -16$

2) $13x - 11y = -12$

3) $9x - 7y = -7$

4) $x - 3y = 6$

Algebra 1 CSL Writing Equations of Lines Name_____

Writing Equations of Lines Review for Quiz

Period____

A. Write the slope-intercept form of the equation of each line given the slope and y-intercept.

1) Slope = 5, y-intercept = –3

2) Slope = $-\frac{1}{3}$, y-intercept = 5

3) Slope = 0, y-intercept = 2

4) Slope = –1, y-intercept = 5

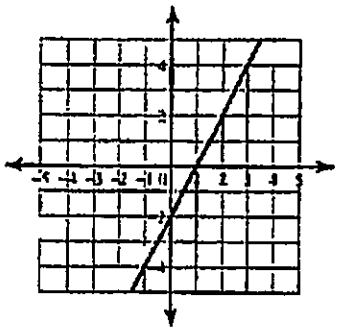
B. Write the point-slope form of the equation of the line through the given point with the given slope.

5) through: (5, 3), slope = $\frac{4}{5}$

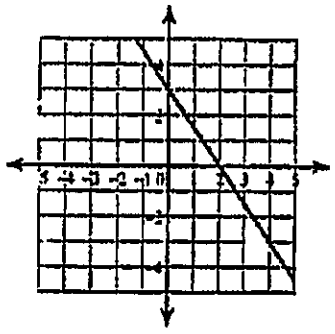
6) through: (–3, –2), slope = $-\frac{2}{3}$

C. Write the slope-intercept form of the equation of each line.

7)



8)



D. Write the point-slope form of the equation of the line through the given points.

9) through: (–5, –5) and (1, –3)

10) through: (4, 3) and (1, 2)

E. Write the point-slope form of the equation of the line described.

11) through: (–5, –1), parallel to $y = x + 5$

12) through: (4, –5), parallel to $y = -\frac{5}{2}x + 5$

13) through: (–3, 0), perp. to $y = -\frac{3}{5}x - 2$

14) through: (4, –3), perp. to $y = -\frac{5}{2}x - 1$

F. Write the slope-intercept form of the equation of each line.

15) $y-5=-10(x-4)$

16) $y+3=\frac{5}{3}(x+3)$

K. Write the slope-intercept form of the equation of the line through the given point with the given slope.

17) through: $(4,-4)$, slope $=2$

18) through: $(5,-1)$, slope $=\frac{2}{7}$

19) through: $(0,2)$, slope $=0$

20) through: $(-5,1)$, slope = undefined

L. Write the slope-intercept form of the equation of the line through the given points.

21) through: $(3,-3)$ and $(4,0)$

22) through: $(3,5)$ and $(0,1)$

HORIZONTAL & VERTICAL LINES: Write the equation of the line through the given points.

23) through: $(-3,4)$ and $(1,4)$

24) through: $(2,4)$ and $(2,3)$

HORIZONTAL & VERTICAL LINES: Write the equation of the line.

25) through: $(-3,3)$, parallel to $y=0$

26) through: $(-4,0)$, parallel to $x=0$

27) through: $(5,-2)$, perp. to $x=0$

28) through: $(-1,1)$, perp. to $y=-5$

Factoring Summary

Before factoring any polynomial, write the polynomial in descending order of one of the variables. Then note how many terms there are, and proceed by using one or more of the following techniques.

1. ALWAYS Factor out the Greatest Common Factor (GCF) first. Look for this in <u>every</u> problem. This includes factoring out the negative sign if it precedes the leading term.
   Example: $-x^2+6x-3 = -1(x^2-6x+3)$
   Example: $4x^3y^5 - 8x^2y^3 = 4x^2y^3(xy^2 - 2)$ where $4x^2y^3$ was the GCF.

2. If there are <u>FOUR TERMS</u>, try to factor by grouping (GR). Group two terms at a time, and factor out the greatest common factor from each group.
   Example:

$x^3+6x^2-2x-12=$	*group the first two terms, then the last two terms*
$x^2(x+6)-2(x+6)=$	*factor the $(x+6)$ out of both terms*
$(x+6)(x^2-2)$	*this is the factored answer*

3. If there are <u>TWO TERMS</u>, look for one of these patterns:
   a. The difference of squares (DOS) factors into conjugate binomials (*conjugate means terms are separated by a plus sign in one binomial and a minus sign in the other binomial*):
   $a^2-b^2=(a-b)(a+b)$
   Example: $9x^4-64y^2=(3x^2-8y)(3x^2+8y)$
   Note: a variable is a perfect square if the exponent is even

   b. The sum of squares does not factor: a^2+b^2 is prime (doesn't factor)
   Example: $9x^4 + 64y^2$ does not factor because it is the SUM of squares

   c. The sum of cubes (SOC) or difference of cubes (DOC) factors by these patterns: (each type contains a binomial times a trinomial)
   $a^3+b^3=(a+b)(a^2-ab+b^2)$
   Example: $(8x^3+27)=(2x+3)(4x^2-6x+9)$

   $a^3-b^3=(a-b)(a^2+ab+b^2)$
   Example: $(64x^6-125y^3)=(4x^2-5y)(16x^4+20x^2y+25y^2)$
   Note: a variable is a perfect cube if the exponent is a multiple of three

4. If there are **THREE TERMS**, look for these patterns:
   a. Quadratic trinomials of the form ax^2+bx+c *where* $a=1$ (QT $a=1$) factor into the product of two binomials (double bubble) where the factors of c must add to b.
      Example: $x^2-4x-12=(x-6)(x+2)$

   b. Quadratic trinomials of the form ax^2+bx+c *where* $a\neq 1$ (QT $a\neq 1$) eventually factor into the product of two binomials (double bubble), but you must first find the factors of ac that add to b, rewrite the original replacing b with these factors of ac, then factor by grouping to finally get to the double bubble.
      Example:
      $9x^2+15x+4$ $\quad ac=(9)(4)=36$
      factors of 36 *that add to* 15: 12 *and* 3
      $9x^2+12x$ $+3x+4=$ *rewrite* $15x$ *as* $12x+3x$, *then factor by grouping*
      $3x(x+4)+1(x+4)=$
      $(x+4)(3x+1)$

   c. Quadratic square trinomials (QST) of the form ax^2+bx+c may factor into the square of a binomial. Look for the pattern where two of the terms are perfect squares, and the remaining term is twice the product of the square root of the squares:
      $a^2\pm 2ab+b^2=(a\pm b)^2$
      Example: $16x^2-40x+25=(4x-5)^2$
      Note the pattern: Square root of $16x^2$ is $4x$. Square root of *25* is *5*.
      Twice the product of the square roots: $2(4x)(5)=40x$, which is the middle term

5. Factor all expressions completely. Sometimes, you will need to use two or three types of factoring in a single problem.
   Example: $-2x^4+32$

   $-2x^4+32=$ *factor out the GCF of* -2
   $-2(x^4-16)=$ *factor the difference of squares*
   $-2(x^2-4)(x^2+4)=$ *factor the remaining difference of squares*
   $-2(x-2)(x+2)(x^2+4)$ (*remember that the sum of squares is prime*)

FACTORING A QUADRATIC TRINOMIAL BY GROUPING

Another method for factoring these kinds of quadratic trinomials is called factoring by grouping. Factoring by grouping can be a bit more tedious, and is often not worth the trouble if you can find the correct factors by some quick trial and error. However, it works quite well when the factors are not immediately obvious, such as when you have a very large number of candidate factors. When this happens, the trial and error method becomes very tedious

Factoring by grouping is best demonstrated with a few examples.

Example:

Given:	$5x^2 + 11x + 2$
Find the product *ac*:	$(5)(2) = 10$
Think of two factors of 10 that add up to 11:	1 and 10
Write the $11x$ as the sum of $1x$ and $10x$:	$5x^2 + 1x + 10x + 2$
Group the two pairs of terms:	$(5x^2 + 1x) + (10x + 2)$
Remove common factors from each group:	$x(5x + 1) + 2(5x + 1)$
Notice that the two quantities in parentheses are now identical. That means we can factor out a common factor of $(5x + 1)$:	$(5x + 1)(x + 2)$

Example:

Given:	$4x^2 + 7x - 15$
Find the product *ac*:	$(4)(-15) = -60$
Think of two factors of -60 that add up to 7:	-5 and 12
Write the $7x$ as the sum of $-5x$ and $12x$:	$4x^2 - 5x + 12x - 15$
Group the two pairs of terms:	$(4x^2 - 5x) + (12x - 15)$
Remove common factors from each group:	$x(4x - 5) + 3(4x - 5)$
Notice that the two quantities in parentheses are now identical. That means we can factor out a common factor of $(4x - 5)$:	$(4x - 5)(x + 3)$

The Procedure

Given a general quadratic trinomial

$ax^2 + bx + c$

1. Find the product ac.

2. Find two numbers h and k such that

$hk = ac$

(h and k are factors of the product of the coefficient of x^2 and the constant term)

AND

$h + k = b$

(h and k add to give the coefficient of x)

3. Rewrite the quadratic as

$ax^2 + hx + kx + c$

4. Group the two pairs of terms that have common factors and simplify.

$(ax^2 + hx) + (kx + c)$

$x(ax + h) + (kx + c)$

(note: because of the way you chose h and k, you will be able to factor a constant out of the second parentheses, leaving you with two identical expressions in parentheses as in the examples).

- Remember that this won't work for all quadratic trinomials, because not all quadratic trinomials can be factored into products of binomials with integer coefficients. If you have a non-factorable trinomial, you will not be able to do step 2 above.

NAME _____ CLASS _____ DATE _____



Practice Masters Level A

9.5 Common Factors

Factor each polynomial by finding the GCF.

1. $3x - 12$ _____
2. $8x^2 - 4x$ _____
3. $5x^2 - 5x - 20$ _____
4. $q^4 - q^3$ _____
5. $9x^2 + 36x + 15$ _____
6. $12s^2 - 6s + 8$ _____
7. $100 - 20d^3 + 10d$ _____
8. $7b^4 + 7b^2$ _____
9. $16t^2 + 32t$ _____
10. $60c^3 - 45c^2 + 15c$ _____
11. $2x^4 - x^3 + 5x^2$ _____
12. $24s^6 - 15s^3 + 9s^2$ _____

Write each polynomial as the product of two binomials.

13. $y(y + 2) + 3(y + 2)$ _____
14. $7(w + 6) - x(w + 6)$ _____
15. $(r + 15)t + (r + 15)3$ _____
16. $k(k + 5) - 8(k + 5)$ _____
17. $2x(x - 3) - 5(x - 3)$ _____
18. $11(s - 9) - 3t(s - 9)$ _____
19. $(6 + d)5 - e(6 + d)$ _____
20. $4(p + 9) - t^2(p + 9)$ _____
21. $a(b + 2) - c(b + 2)$ _____
22. $4(m + 3) - n(m + 3)$ _____
23. $2f(3 - g) - 5(3 - g)$ _____
24. $4x(x + 7) - 5(x + 7)$ _____

Factor by grouping.

25. $3a + ax + 3b + bx$ _____
26. $xy - y + 3x - 3$ _____
27. $cd - 3c + 2d - 6$ _____
28. $x^2 + 5x + 3x + 15$ _____
29. $ax + 3x + ay + 3y$ _____
30. $x^2 - 5x - 2x + 10$ _____
31. $y^3 + 5y + 5y + 25$ _____
32. $8x^2 - 6x - 12x + 9$ _____
33. $7t^2 - 21t + 8rt - 24r$ _____
34. $4m + 12 + 3m + 9$ _____

Solving Quadratics Instructions

A.) Solving Quadratics using the Quadratic Formula.

Quadratic Formula:
For $ax^2+bx+c=0$,
$$x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$$

Ex: *Solve:* $x^2+2x-8=0$

By factoring (this equation is factorable):	By Quadratic Formula: $a=1,\ b=2,\ c=-8$
$x^2+2x-8=0$	$x^2+2x-8=0$
$(x+4)(x-2)=0$	$x=\frac{-2\pm\sqrt{2^2-4(1)(-8)}}{2(1)}$
$x=-4;\quad x=2$	$=\frac{-2\pm\sqrt{4+32}}{2}=\frac{-2\pm\sqrt{36}}{2}$
	$=\frac{-2\pm6}{2}$
	$x=-4;\quad x=2$

B.) Solving Quadratics by Factoring.

Solve $x^2+5x+6=0$.

So the first thing I have to do is factor:

$$x^2+5x+6=(x+2)(x+3)$$

Set this equal to zero:

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

Solve each factor:

$$x+2=0 \text{ or } x+3=0$$
$$x=-2 \text{ or } x=-3$$

The solution to $x^2+5x+6=0$ is $x=-3,-2$

NAME _____ CLASS _____ DATE _____



Practice Masters Level A

9.8 Solving Equations by Factoring

Identify the zeros of each function.

1. $y = (x - 3)(x - 4)$ _____
2. $y = (x + 7)(x + 2)$ _____
3. $y = (x + 4)(x - 6)$ _____
4. $y = (x - 8)(x + 1)$ _____
5. $y = (x - 10)(x - 7)$ _____
6. $y = (x - 9)(x + 5)$ _____
7. $y = x(x + 8)$ _____
8. $y = (x + 11)(x - 12)$ _____
9. $y = (x - 2)(x + 2)$ _____
10. $y = (x - 15)(x - 15)$ _____
11. $y = (2x - 1)(x + 3)$ _____
12. $y = x(4x - 3)$ _____

Solve by factoring.

13. $x^2 - 6x = 0$ _____
14. $x^2 + 12x = 0$ _____
15. $3x^2 - 12x = 0$ _____
16. $-6x^2 - 36x = 0$ _____
17. $x^2 + 9x + 20 = 0$ _____
18. $x^2 - 7x + 12 = 0$ _____
19. $x^2 + 8x + 16 = 0$ _____
20. $x^2 - 4x + 4 = 0$ _____
21. $x^2 + 3x + 2 = 0$ _____
22. $x^2 - 6x + 5 = 0$ _____
23. $x^2 - 11x + 28 = 0$ _____
24. $x^2 - 3x - 10 = 0$ _____
25. $x^2 - 5x - 36 = 0$ _____
26. $x^2 - 2x - 15 = 0$ _____
27. $x^2 - 9x + 18 = 0$ _____
28. $x^2 - 3x - 40 = 0$ _____
29. $6x^2 + x - 2 = 0$ _____
30. $3x^2 - 2x - 1 = 0$ _____
31. $2x^2 + 19x + 24 = 0$ _____
32. $10s^2 - 26s + 12 = 0$ _____
33. $x^2 - 10x - 75 = 0$ _____
34. $4s^2 + 5s - 6 = 0$ _____
35. $3x^2 - 4x + 1 = 0$ _____
36. $2x^2 + 3x + 1 = 0$ _____
37. $2x^2 - x - 1 = 0$ _____
38. $3x^2 + 5x - 12 = 0$ _____