

ENTERING GEOMETRY

Welcome to *Geometry*!! In preparation for the upcoming year it is important that you fully understand the following concepts from Algebra. You can expect to be challenged this year. *Geometry* requires more complex reasoning and involved application than Algebra. Prepare to work in class as well as at home. Prepare to never give up. Prepare to give your best. Prepare to expand your thinking. ☺

You may find the following websites useful when reviewing last year's objectives:

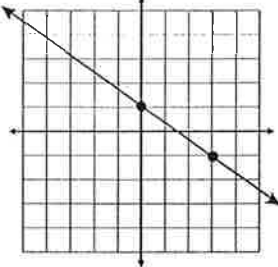
<https://www.khanacademy.org/math/geometry>

<http://www.math.com/homeworkhelp/Geometry.html>

<https://www.mathsisfun.com/geometry/>

<http://www.mathplanet.com/>

Formulas You "Gots to Know!"

Formula	Notes	Examples
<p>Slope-Intercept Form</p> <div style="border: 1px solid black; height: 50px; width: 200px; margin: 10px auto;"></div>	<p>Used to identify the equation of a _____.</p> <p>$m =$ _____</p> <p>$b =$ _____</p>	<p>Identify the equation:</p> 
<p>Standard Form (of a Linear Equation)</p> <div style="border: 1px solid black; height: 50px; width: 200px; margin: 10px auto;"></div>	<p>Also used to identify the equation of a _____.</p> <p>*Be able to convert to $y = mx + b$ in order to best match the equation to the graph.</p>	<p>Convert to slope-intercept:</p> <ol style="list-style-type: none"> 1) $x - y = 1$ 2) $x + 3y = 21$ 3) $2x - 5y = 20$
<p>Slope Formula</p> <div style="border: 1px solid black; height: 80px; width: 200px; margin: 10px auto;"></div>	<p>Used to find the slope between two ordered pairs:</p> <p>(x_1, y_1) and (x_2, y_2)</p> <p>*A zero "underneath" means _____.</p> <p>*A zero in the top means _____.</p>	<p>Find the slope between:</p> <ol style="list-style-type: none"> 1) $(-2, 5)$ and $(6, -1)$ 2) $(9, -4)$ and $(9, 2)$ 3) $(-7, -3)$ and $(0, -3)$

Point-slope
Formula

Used to find the equation of a line given the _____ (m) and a _____ (x_1, y_1) on the line.

***If Given Two Points**

Find the *slope*, then use the *point-slope formula* with either points to write the equation.

Write the linear equation given:

1) $(-4, 7)$; slope = -1

2) $(3, 8)$ and $(-9, 4)$

Standard Form
(of a Quadratic Equation)

Use _____ to find the *axis of symmetry* and *vertex*.

Set equation equal to _____ and use *factoring* or the *quadratic formula* to find roots!

Find the vertex and roots of the following:

1) $y = (x - 4)^2 - 1$

Name: _____

Algebra Review

The Real Number System

THE REAL NUMBERS (\mathbb{R}): _____

IRRATIONAL NUMBERS (\mathbb{P}): _____

RATIONAL NUMBERS (\mathbb{Q}): _____

INTEGERS (\mathbb{Z}): _____

WHOLE NUMBERS (\mathbb{W}): _____

NATURAL NUMBERS (\mathbb{N}): _____

Name all sets to which each number belongs:

1. $\frac{2}{3}$ _____

2. 13 _____

3. 0 _____

4. $-\sqrt{50}$ _____

5. $-\frac{28}{7}$ _____

6. π _____

Properties

COMMUTATIVE:

- _____
- _____

ASSOCIATIVE:

- _____
- _____

IDENTITY:

- _____
- _____

INVERSE:

- _____
- _____

ZERO PRODUCT:

- _____
- _____

DISTRIBUTIVE:

- _____
- _____

REFLEXIVE:

- _____
- _____

SYMMETRIC:

- _____
- _____

TRANSITIVE:

- _____
- _____

Identify the following properties:

1. $5x + 1 = 1 + 5x$

5. If $2^5 = 32$ and $32 = 8 \cdot 4$, then $2^5 = 8 \cdot 4$

2. $17 = 17$

6. $8k + 0 = 8k$

3. $10y^2 \cdot 0 = 0$

7. If $-2x = 20$, then $20 = -2x$

4. $-3(x + 8) = -3x - 24$

8. $\frac{4}{9} \cdot \frac{9}{4} = 1$

CLOSURE: Answer yes or no. If no, give a counterexample.

- Are natural numbers closed under subtraction? _____
- Are integers closed under addition? _____
- Are irrational numbers closed under division? _____
- Are whole numbers closed under multiplication? _____

Square Roots & Cube Roots

1. $\sqrt{25}$	2. $\sqrt{144}$	3. $\sqrt{64}$	4. $\sqrt{\frac{16}{49}}$
5. $\sqrt[3]{27}$	6. $\sqrt[3]{216}$	7. $\sqrt[3]{8}$	8. $\sqrt[3]{1000}$

Evaluating Expressions (Numerical & Algebraic)

1. $2^3 \cdot (9 - 2) + \frac{12}{4} - -5 $	2. $8 - [12 \div (\sqrt{49} - 1)] + 1$
--	--

3. $\frac{5^3 - 42 \div 6}{\sqrt[3]{8}}$	4. $w^2 - 5xy$ if $x = -3, w = -2$ and $y = 1$
5. $\frac{7c^2 + 5}{4a - b}$ if $a = 1, b = -5$ and $c = -4$	6. $2 y - x^2$ if $x = 6$ and $y = -3$

Translating Equations & Inequalities

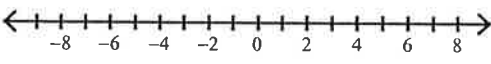
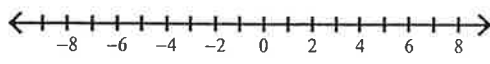
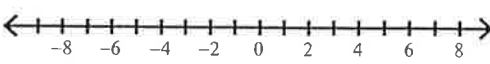
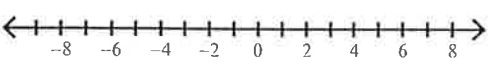
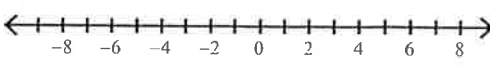
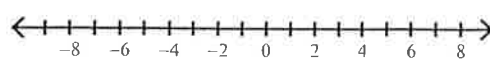
1. The quotient of twice a number and 7 is 20.	2. Five less than the product of a number and 3 is 14.
3. Seven times the difference of x and 4 is -10.	4. The product of a number and four increased by one is at least 7.

Equations

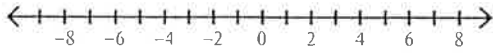
1. $18 = 3 - 3a$	2. $4 - \frac{1}{2}n = -12$
3. $\frac{3}{4}x + 17 = 23$	4. $9y - 4(y + 1) = 31$
5. $-6(w - 4) + 8w = 2(w + 9)$	6. $3m - (7m + 12) = 2(m - 3)$

7. $2x - 2(4x - 3) = 6 - 6x$	8. $\frac{7}{x-8} = \frac{3}{x}$
9. Given $A = \frac{1}{2}bh$, solve for h	10. Given $K = \frac{mv^2}{2}$, solve for m

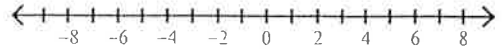
Inequalities

<p>1. $11x + 13 \geq -20$</p> 	<p>2. $-2x + 6 > 3x - 34$</p> 
<p>3. $3x - 7(x + 3) \geq -13$</p> 	<p>4. $4 - 8x < 2(5 - 3x)$</p> 
<p>5. $x + 7 \leq 2$ or $x + 5 \geq 3$</p> 	<p>6. $3x + 5 < -16$ or $-5x - 8 \leq -13$</p> 

7. $-2 \leq 3x - 2 < 10$



8. $3 < 2x + 1 < 13$



Using Algebra to Solve Word Problems

1. Max is making a rectangular garden that is 5 feet less than twice its width. If the perimeter of the garden is 80 feet, what will be its dimensions?

2. Amie published her first book. She was given \$20,000 and an additional \$0.15 for each copy of the book that sold. Her earnings, d , in dollars, from the publication of the book are given by $d = 20,000 + 0.15n$ where n is the number of copies sold. During the first year, Amie earned \$22,100 from the publication and sale of her book. How many copies of her book were sold?

Relations & Functions

Domain: _____

Range: _____

A relation is a function if it doesn't have any repeating _____ - _____

or passes the _____ !

1.

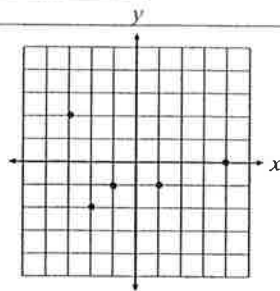
x	-1	2	5	-1
y	7	3	0	2

D = _____

R = _____

Function? _____

2.

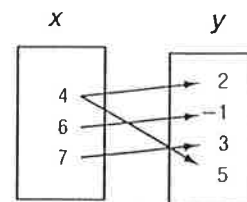


D = _____

R = _____

Function? _____

3.

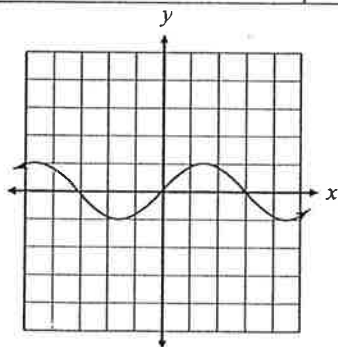


D = _____

R = _____

Function? _____

4.

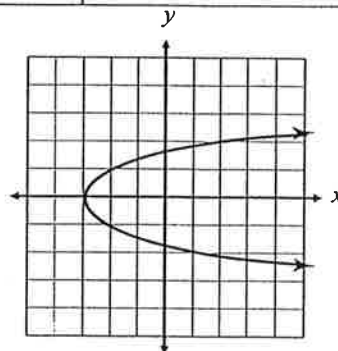


D = _____

R = _____

Function? _____

5.



D = _____

R = _____

Function? _____

Function Notation & Evaluating Functions

1. If $f(x) = -x - 7$, find $f(5)$

2. If $f(x) = x^2 - 2x + 11$, find $f(-2)$

3. If $f(x) = 2x^2 - x$, find $f(-4) - f(9)$

4. If $f(x) = \frac{2}{3}x + 1$, find $f(-6)$

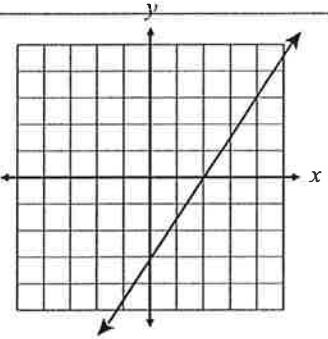
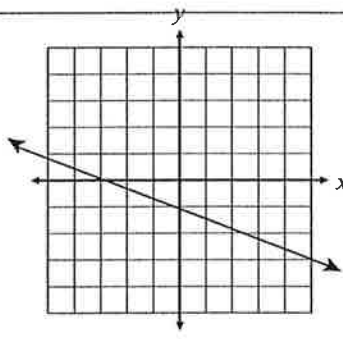
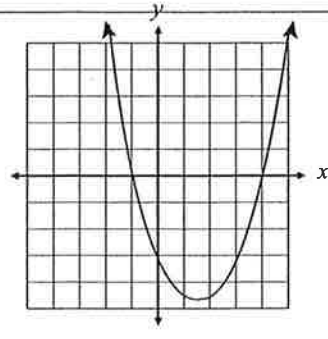
5. Find the range of the function $f(x) = -x^2 + 4x$ if the domain is $\{-2, 0, 1\}$

6. Find the range of the function $f(x) = \frac{1}{3}x - 5$, if the domain is $\{-3, 0, 6\}$

Zeros of Functions

The zeros of a function are where it passes through the _____ - _____.

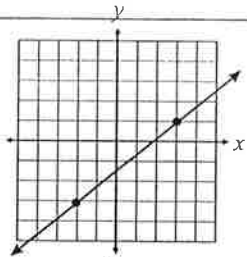
To find zeros, set the equation equal to _____, and solve!

<p>1.</p> 	<p>2.</p> 	<p>3.</p> 
<p>4. $f(x) = 2x + 2$</p>	<p>5. $f(x) = \frac{2}{5}x - 4$</p>	<p>6. $f(x) = x^2 + 3x - 40$</p>
<p>7. $f(x) = 2x^2 - 72$</p>	<p>8. $f(x) = x^2 - 10x + 25$</p>	<p>9. $f(x) = 5x^2 + 5x - 30$</p>

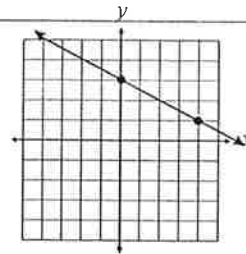
Slope

There are _____ types of slope. Sketch them below:

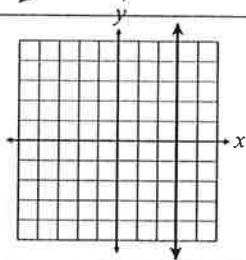
1. Find the slope:



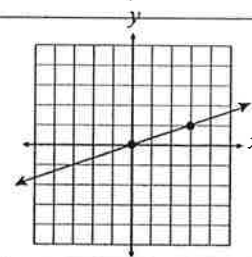
2. Find the slope:



3. Find the slope:



4. Find the slope:



The Slope-Formula

When given two points (x_1, y_1) and (x_2, y_2) and asked to find the slope, use the formula:

1. $(-12, -1)$ and $(-3, -4)$

2. $(-11, 7)$ and $(-11, -2)$

3. $(9, -3)$ and $(11, -7)$

24. $(12, 11)$ and $(-9, 11)$

Slope-Intercept Form

Slope Intercept Form:

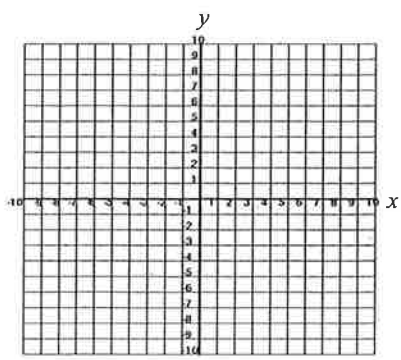
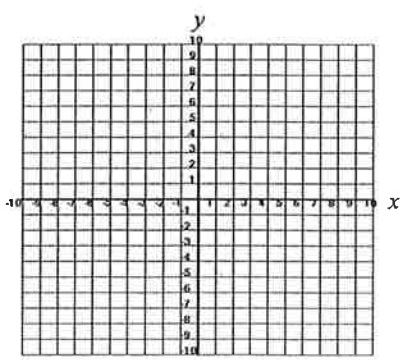
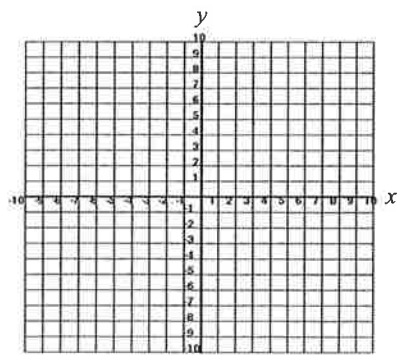
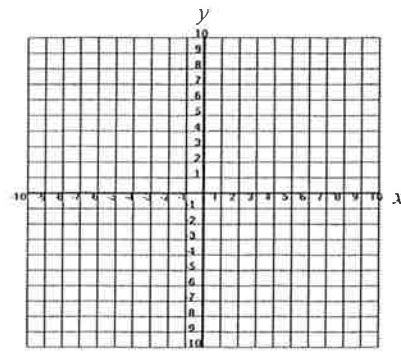
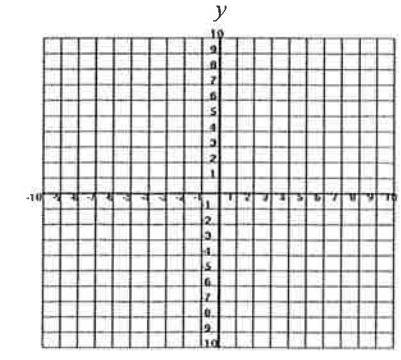
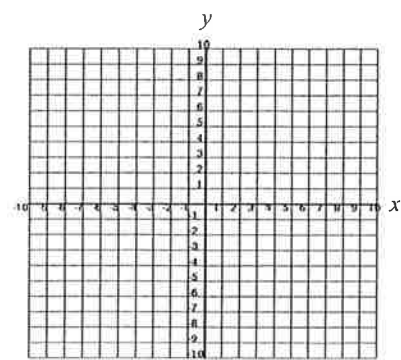
1. Write a linear equation with a slope of -1 and a y -intercept of 4 .

2. Write a linear equation with a slope of $\frac{3}{4}$ and a y -intercept of -5

Standard Form

Standard Form:	
<p>1. $x - y = 3$</p> <p>x-intercept= _____ y-intercept = _____</p> <p>Slope-Intercept Form: _____</p>	<p>2. $2x + 5y = 20$</p> <p>x-intercept= _____ y-intercept = _____</p> <p>Slope-Intercept Form: _____</p>
<p>3. $4x + y = 8$</p> <p>x-intercept= _____ y-intercept = _____</p> <p>Slope-Intercept Form: _____</p>	<p>4. $x - 3y = 6$</p> <p>x-intercept= _____ y-intercept = _____</p> <p>Slope-Intercept Form: _____</p>

Graphing Linear Equations (Always use $y = mx + b$ form!)

<p>1. $y = -3x + 7$</p> 	<p>2. $y = 4x$</p> 	<p>3. $3x - 2y = -6$</p> 
<p>4. $x + 2y = 4$</p> 	<p>5. $x = -7$</p> 	<p>6. $y = 1$</p> 

Writing Linear Equations - Given a Point & Slope

When given a point (x_1, y_1) and the slope, m , use the formula:

1. $(2, 7)$; slope = 3

2. $(1, 4)$; slope = -1

3. $(4, -2)$; slope = $-\frac{1}{2}$

4. $(6, -1)$; slope = $\frac{2}{3}$

Writing Linear Equations - Given Two Points

When given two ordered pairs (x_1, y_1) and (x_2, y_2) , use the slope formula followed by point-slope formula:



1. $(-1, 1)$ and $(-3, -7)$

2. $(0, 3)$ and $(5, 1)$

3. $(-2, -3)$ and $(1, 2)$

4. $(4, 1)$ and $(-6, -4)$

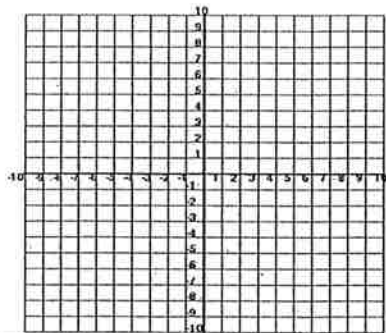
Systems of Equations

1. What is a system of equations? _____

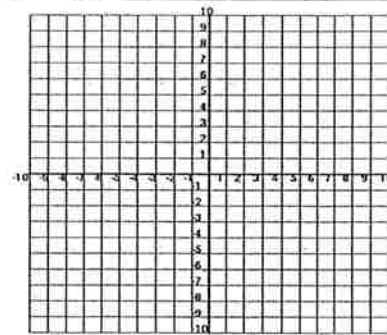
2. The possible solutions are _____

Solving Systems of Equations By Graphing

1. $y = -3x + 2$
 $y = x - 6$



2. $2x + y = 1$
 $x - 2y = 18$



Solving Systems of Equations Algebraically

WHEN SOLVING BY ELIMINATION, EQUATIONS MUST BE "LINED-UP".

1. $x + y = -4$
 $x - y = 2$

2. $x + y = 4$
 $2x - 5y = 15$

3. $4x + 3y = -1$
 $5x + 4y = 1$

4. $y = 4x + 2$
 $y = x - 1$

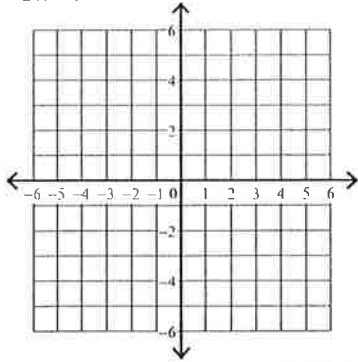
5. $x = 2y - 3$ $2x - 3y = -5$	6. $2x + 3y = 4$ $y = 5x - 27$
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Word Problems

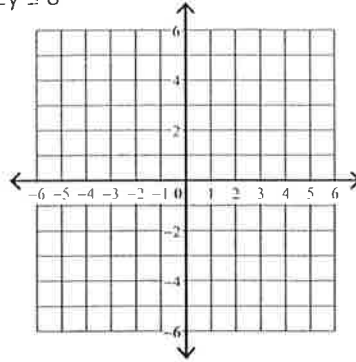
1. Erin bought 4 jars of jelly and 6 jars of peanut butter for \$19.32. Adam bought 3 jars of jelly and 5 jars of peanut butter for \$15.67. Find the cost of each.
2. Reserved seats for the football game cost \$4.00 each and general admission tickets for \$3.00 each. After the game was over, it was found that 1787 total tickets were sold and \$5792 was made. Find the number of each sold.
3. Nicole has a collection of 29 nickels and dimes worth \$2.30. How many of each does she have?

Graphing Linear Inequalities

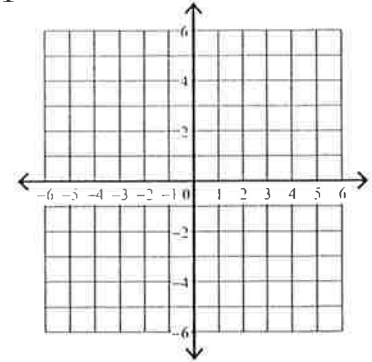
1. $y > -3x - 1$



2. $x - 2y \leq 8$

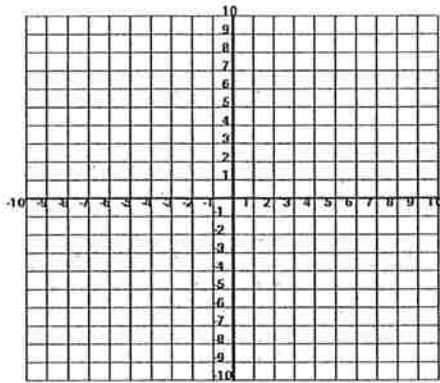


3. $y < 1$

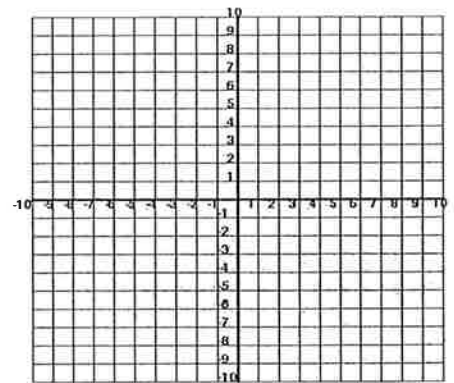


Systems of Linear Inequalities

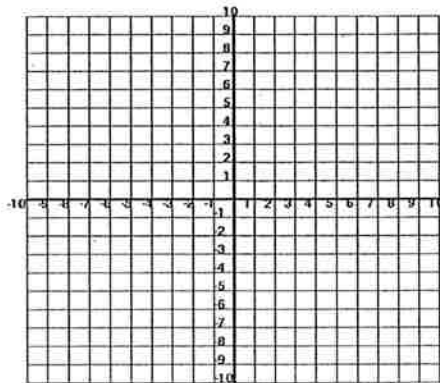
1. $x + y > -1$
 $x - y > 8$



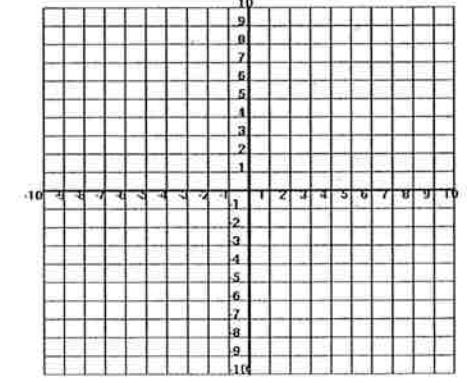
2. $-x + 3y \leq 21$
 $y \geq -x + 4$



3. $4x + y \geq 4$
 $3x - 2y > 14$



4. $4x - 5y \geq -35$
 $x \geq -3$



Exponent Rules

PRODUCT RULE $x^a \cdot x^b =$	POWER RULE $(x^a)^b =$	QUOTIENT RULE $\frac{x^a}{x^b} =$	NEGATIVE EXPONENT RULE $x^{-a} =$
1. $v^4 \cdot 7v^3 \cdot 5v$	2. $(3x^2y^2)^3$	3. $(-2a^6bc^3)^2 \cdot -5ab^2$	
4. $(-2y^4) \cdot (xy^3)^2 - 13x^2y^{10}$	5. $\frac{a^6b^7c^2}{a^5b^4c^2}$	6. $\frac{(-3x^6)^2}{5x^3 \cdot 3x^3}$	
7. $\left(\frac{4x^4y^2}{6xy}\right)^2$	8. $\frac{-9n^8}{27n^{10}}$	9. $\frac{a^{12}b^{-3}}{(ab)^{-4}}$	

Simplifying Polynomials

1. $(5 + 2x^3 + x - 3x^2) + (4x^3 + 11 - 6x + 7x^2)$	2. $(2x^2 + 3x + 2) - (x^2 - 4x - 1)$	3. $3a^2b^3(2a^2 - 7ab + b^2)$
4. $(x + 4)(x + 9)$	5. $(2a + 5b)(a - 3b)$	6. $(x + 8)(x - 8)$
7. $(2y - 1)^2$	8. $\frac{18a^3b + 12a^2b^2 - 6ab}{6ab}$	9. $\frac{-24x^4 + 48x^3 - 8x^2}{8x^3}$

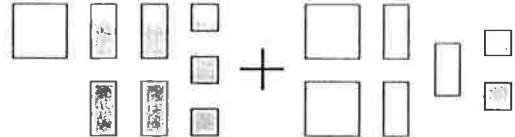
10. The length of a rectangular classroom floor is 19 feet less than twice the width. Write an expression to represent the area of the floor.

11. Consider the following models:

$$\square = x^2 \quad \text{rectangle} = x \quad \square = 1$$

$$\text{shaded square} = -x^2 \quad \text{shaded rectangle} = -x \quad \text{shaded square} = -1$$

Write a polynomial to represent the following:



Simplifying Non-Perfect square Roots

List the first 10 perfect square numbers:

1. $\sqrt{24}$

2. $\sqrt{162}$

3. $\sqrt{80}$

4. $\sqrt{112}$

Simplifying Non-Perfect cube Roots

List the first 10 perfect cube numbers:

1. $\sqrt[3]{40}$

2. $\sqrt[3]{54}$

3. $\sqrt[3]{297}$

4. $\sqrt[3]{192}$

Monomial Square Roots

1. $\sqrt{x^2}$	2. $\sqrt{9k^4}$	3. $\sqrt{y^5}$
4. $\sqrt{18m^3}$	5. $\sqrt{36x}$	6. $\sqrt{28ab^2}$
7. $\sqrt{81x^2y^2z}$	8. $\sqrt{108a^2b^3c^6}$	9. $\sqrt{72mn^8p^5}$

Factoring

GCF	DIFFERENCE OF SQUARES	BASIC TRINOMIAL	SLIP & SLIDE TRINOMIAL
Polynomials that can't be factored at all are called _____!			

1. $21c - 12$	2. $x^2y + 8x$	3. $75a^2b^3c - 30ab^2$
4. $4m^2 - 81n^2$	5. $12x^2 - 12$	6. $27b - 75b^3$
7. $p^2 - 13p + 30$	8. $n^3 - 4n^2 - 60n$	9. $5w^2 - 15w - 20$
10. $3x^2 + 10x + 3$	11. $12c^2 + 5c - 2$	12. $2x^2 - 5x + 4$

Dividing Polynomials by a Binomial

1. $\frac{x^2 - 12x + 20}{x - 10}$	2. $\frac{y^2 - y - 56}{y + 7}$	3. $(x^2 - 1) \div (x + 1)$
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Graphing Quadratic Equations

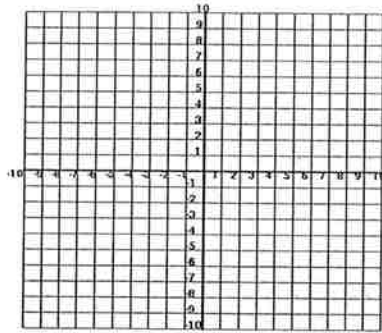
STANDARD FORM OF A QUADRATIC EQUATION:

FORMULA FOR THE AXIS OF SYMMETRY:

WHEN GRAPHED, A QUADRATIC EQUATION CREATES A _____.

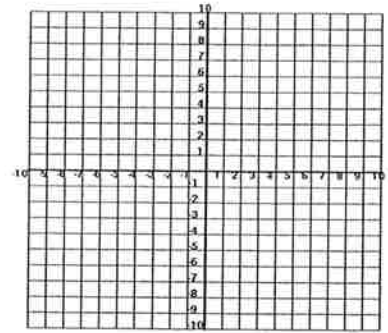
1. $y = -x^2 + 6x - 13$

x	y



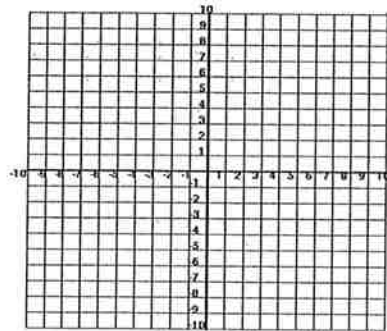
2. $y = x^2 - 9$

x	y



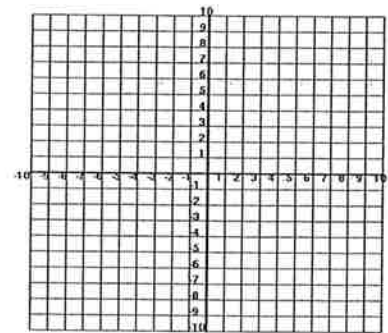
3. $y = (x - 5)(x + 1)$

x	y



4. $y = (x - 2)^2$

x	y



Solving Quadratic Equations

The solutions to a quadratic equation are the point(s) at which the parabola intersects the _____.

To solve a quadratic equation, use one of the following methods:

- Factoring
- Quadratic Formula

1. $x^2 + 8x = 0$

2. $4x^2 = 10x$

3. $x^2 + 5x = 6$	4. $x^2 = 18x - 81$
11. $2x^2 + 5 = 77$	6. $3x^2 + 9x - 30 = 0$
7. $6x^2 - x = 2$	8. $4x^2 + 1 = 50$
9. $(x + 1)(x - 4) = 6$	10. $\frac{2}{3}x^2 - 14 = 136$

Quadratic Equation Word Problems

- The length of a rectangle is 4 inches less than twice its width. If the area of the rectangle is 70 square inches, what are its dimensions?
- The stress distribution on a structure is given by $s = 2x^2 + 4x - 30$ where s is stress in pounds per square inch and x is the distance in feet from a reference point. At what distance is the stress equal to 0?

3. The number of seconds to complete a chemical reaction was determined to be given by the equation $s = 250 - 5t - t^2$ where s is the number of seconds and t is the temperature in degrees Celsius at which the reaction occurred. If a chemical reaction was complete in 200 seconds, what was the temperature at which the reaction occurred?

4. A toy rocket is launched from a platform that is 48 feet high. The rocket's height above the ground is modeled by the equation $h = -16t^2 + 32t + 48$.

a) What is the maximum height of the rocket?

b) What is the rocket's height at 2 seconds?

c) How long will it take the rocket to reach the ground?

