Name:	Date:
Start Time :	End Time :
Multiplying Polynomials 5	(WS#A10436)

Polynomials are expressions that consist of two or more monomials. Polynomials can be multiplied together using the distributive property. The box method (see below) can be used to complete the multiplication. Remember when multiplying two monomials, multiply the coefficients together and add the exponents of "like" variables.

Example 1: [Distributive Method]

$(2x^3 - x^2 + 4x - 1)(-x^2 - 5x^3 + 7)$

Step 1: Multiply the first monomial in the polynomial by each term in the polynomial $(2x^3 \bullet -x^2)(-x^2 \bullet -x^2)(4x \bullet -x^2)(-1 \bullet -x^2)$

Step 2: Multiply the second monomial in the polynomial by each term in the polynomial $(2x^3 \bullet -5x^3)(-x^2 \bullet -5x^3)(4x \bullet -5x^3)(-1 \bullet -5x^3)$

Step 3: Multiply the third monomial in the polynomial by each term in the polynomial $(2x^3 \bullet 7)(-x^2 \bullet 7)(4x \bullet 7)(-1 \bullet 7)$

Step 4: Add *like* terms $-\underline{2x^5} + \underline{x^4} - \underline{4x^3} + \underline{x^2} - 10x^6 + \underline{5x^5} - \underline{20x^4} + \underline{5x^3} + \underline{14x^3} - \underline{7x^2} + 28x - 7$

Step 5: Rewrite in descending order $-10x^6 + 3x^5 - 19x^4 + 15x^3 - 6x^2 + 28x - 7$

Example 2: [Box Method]

Step 1: Separate all terms and rewrite above each box

	$2x^3$	$-x^2$	$4x$	-1
$-x^2$	$-2x^5$	x^4	$-4x^3$	x^2
$-5x^3$	$-10x^6$	$5x^5$	$-20x^4$	$5x^3$
7	$14x^3$	$-7x^2$	$28x$	-7

Step 2: Combine *like* terms

Step 3: Rewrite in descending order $-10x^6 + 3x^5 - 19x^4 + 15x^3 - 6x^2 + 28x - 7$

Directions: Multiply the polynomials together and write the answer in descending order, if needed.

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

2.) $(7 - 3a)(-12a^4 - a^2 + 10a)$

3.) $(-6j - 2)(-2j^2 + 7j + 20)$

4.) $(-12 - 5d^3)(-2d^3 + d^2 + 10d + 7)$

5.) $(-x^2 + 3x + 1)(-x^3 + 4x^2 - 6x)$

6.) $(-5c + 3c^3)(-c^4 + 10c^3 - 7c + 1)$

7.) $(t^2 - 8t - 3)(-t + 2t^3 - 4t^2)$

8.) $(b - 3b^2 + 9b^3)(2b^3 - 2b - 6)$

9.) $(-2x^3 - 10x^2 - 3x)(-5x^2 - 6x + 1)$

10.) $(-0.25z^4 - 0.5z^3 + 0.75z)(4z^3 - 20z + 24)$

Name: Date:

Start Time : End Time :

Factor by grouping (WS#A10535)

Factoring by grouping is useful when you have a four-term polynomial. First, find the greatest common factor of the first and second terms and factor it out. Then find the greatest common factor of the third and fourth terms and factor it out. If you are left with the same binomial after both steps, factor it out and get the product of two binomials. Warning: If you don't have the same binomial, you cannot proceed further!

Example: Factor $x^3 - 3x^2 + 8x - 24$ by grouping.

When you need to factor a four-term cubic polynomial, try factoring by grouping. First, find the GCF of the first two terms and pull it out: $x^3 - 3x^2 = x^2(x - 3)$.

Next, find the GCF of the last two terms and pull it out: $8x - 24 = +8(x - 3)$. So our entire polynomial now looks like this: $x^2(x - 3) + 8(x - 3)$. Because $(x - 3)$ is a common factor of the two terms we've created, we'll factor it out: $(x - 3)(x^2 + 8)$.

The binomial $x^2 + 8$ doesn't factor any further, so we're done! As you've come to expect, $(x^2 + 8)(x - 3)$ would also be correct.

1. Factor $x^3 + 5x^2 + 4x + 20$ by grouping.

2. Factor $x^3 + 3x^2 - 7x - 21$ by grouping.

3. Factor $x^3 - 4x^2 + 9x - 36$ by grouping.

4. Factor $x^3 - 2x^2 - 3x + 6$ by grouping.

5. Factor $x^3 + 5x^2 - 5x - 25$ by grouping.

6. Factor $x^3 + 9x^2 + x + 9$ by grouping.

7. Factor $x^3 - 3x^2 - 13x + 39$ by grouping.

8. Factor $x^3 - x^2 + 7x - 7$ by grouping.

9. Factor $x^3 - 10x^2 + 2x - 20$ by grouping.

10. Factor $x^3 + x^2 - 8x - 8$ by grouping.

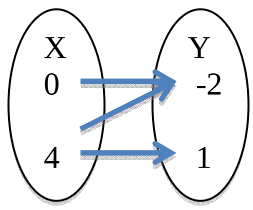
Name: Date:

Start Time : End Time :

Identifying Functions 2 (WS#A10806)

A relation is any ordered pair. A function is a type of relation that is defined as a set of values such that each "x" has only **one** "y" value. More than one "x" may share the same "y", for example (8, 1) and (-6, 1), and in this case, the relation would still be a function. If one "x" has more than one "y" value, for example, (5, 0) and (5, 6), then the relation is not a function.

Example 1: Mapping Format:



This is NOT a function, 4 has two y values.

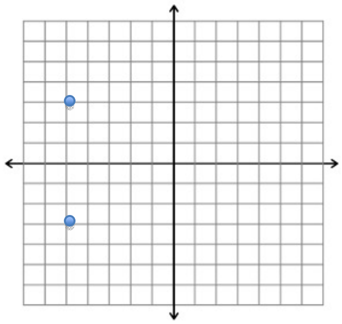
Example 2: Table Format

x	y
-5	-2
8	-1
-9	5

This is a function, each x has only one y value.

Directions: Determine if the relation is a function. If it is not a function, state the reason.

1.)



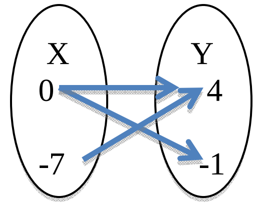
2.) (-4, 4), (-1, 2), (8, 2)

3.) (5, 1), (-5, 3)

4.)

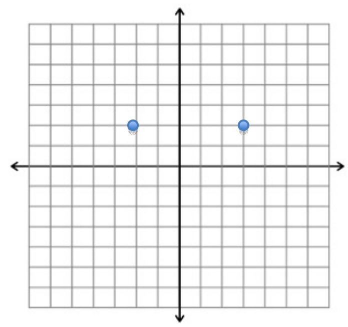
x	y
-8	-1
10	-1
4	-1

5.)



6.) {(-6, 7), (-5, 1), (-6, -2)}

7.)

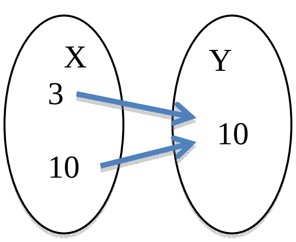


8.)

x	y
.5	.5
3	-.5
-.5	-6

9.) {(4, -3), (-2, -8), (-8, -6), (-3, 4)}

10.)



11.)

x	y
1	-7
2	14
2	-5
1	3

Name:	Date:
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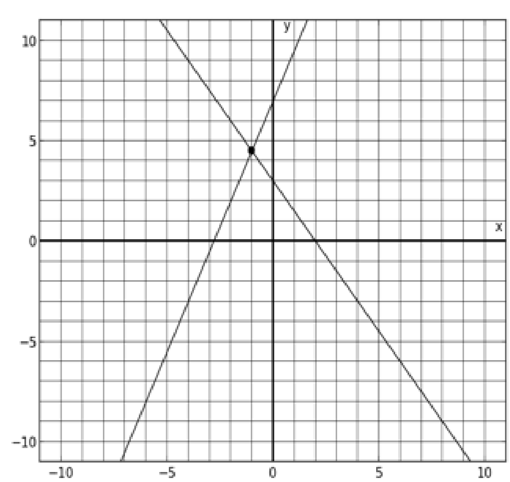
Graphing Systems of Linear Equations #5	(WS#A10905)

System of Linear Equations:
A *system of linear equations* – or *simultaneous linear equations* – is a set of more than one linear equation in the same variables. A *solution* to a system of linear equations is the set of values for all variables for which all equations in the system are true. To be specific, for a system of two linear equations in the variables x, y, a solution would be the combination of a value for x and a value for y for which both equations are true. In graphical terms, this would be the intersection point of the lines represented by the equations – where the x-coordinate for both equations is the same, and the y-coordinate for both equations is the same.

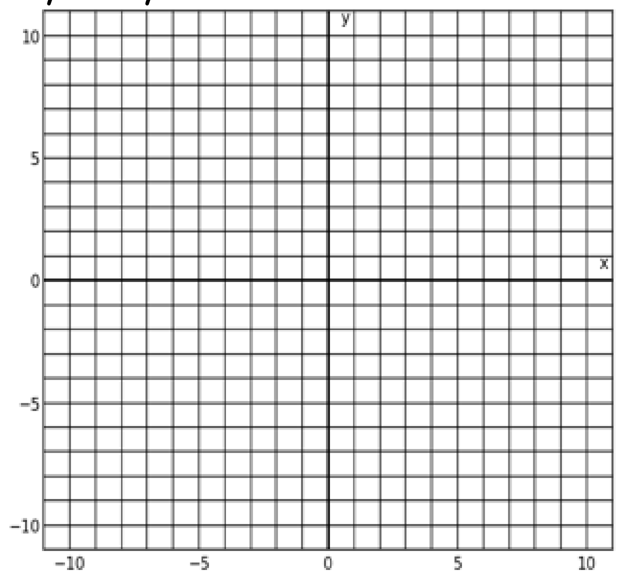
As an example, what is the solution to the following system of linear equations?
$-4x + 9y + 14 = -9x + 11y$ $9x - 6 = 12x + 2y - 12$
First, put the equations into y-intercept form to make them easier to graph.
$y = 4.5x + 7$ $y = -1.5x + 3$
Graph the lines represented by the equations. Do the graphs intersect? If so, the coordinates of the intersection is the solution to the system. If the lines do not intersect – if they are parallel – there is no solution. If the lines come out to be the same line, then both equations in the system are the same equation, and there are infinitely many solutions.

So, for this system, the solution is
$x = -1$
$y = 4.5$

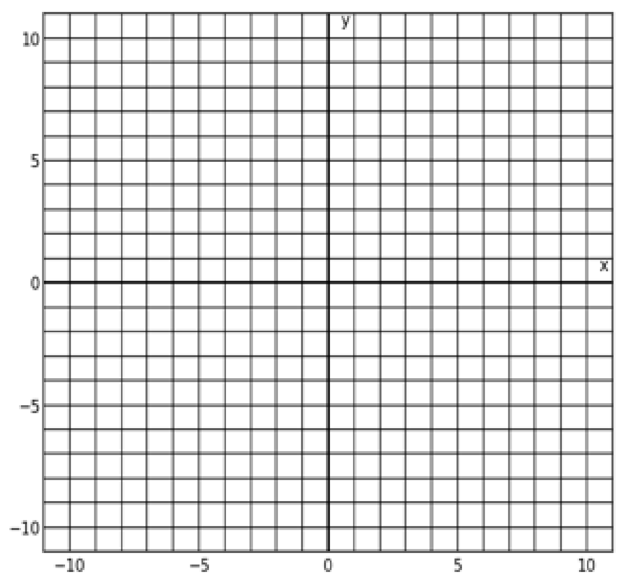


For each system of linear equations, find the solution, indicate that there is no solution, or indicate that there are infinitely many solutions.

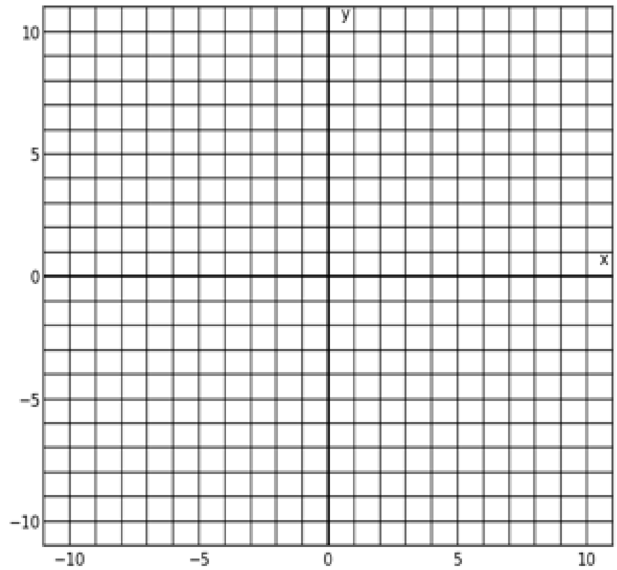
1.
$9x + 8y + 4 = 14x - 2y - 1$
$1.5x + 33y + 8 = 11.5x + 13y - 12$



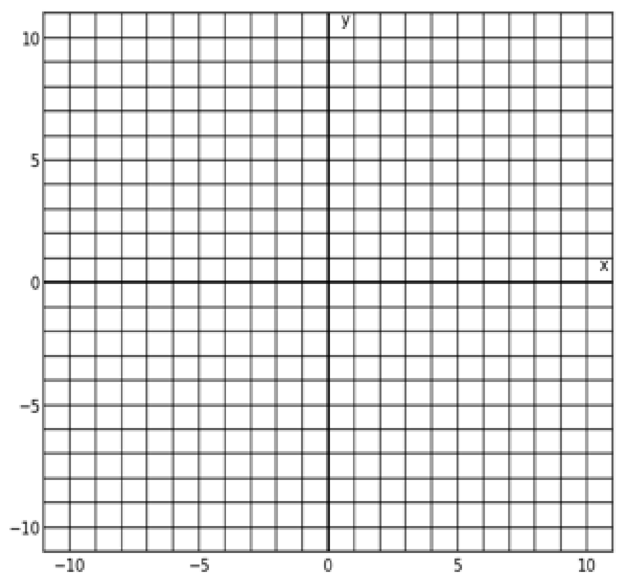
2.
$6x + 6 = 2x + 5y - 4$
$3x + 3 = x + 2.5y - 2$



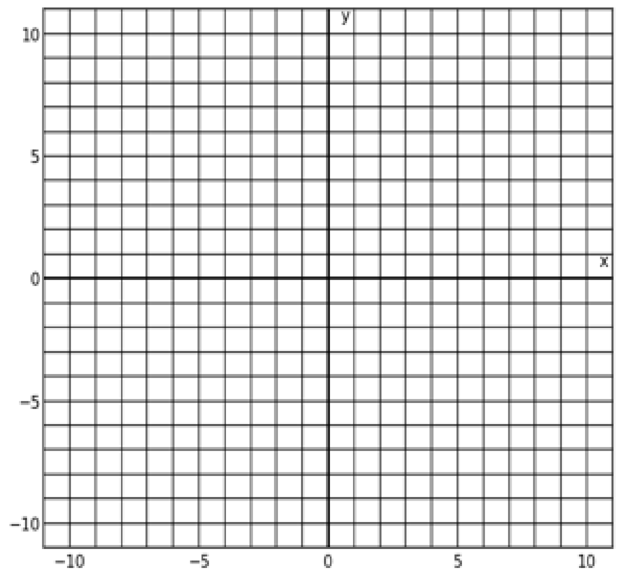
3.
$2x + 11y - 9 = 13x - 9$
$2.5x + 11y - 9 = 13.5x + 2$



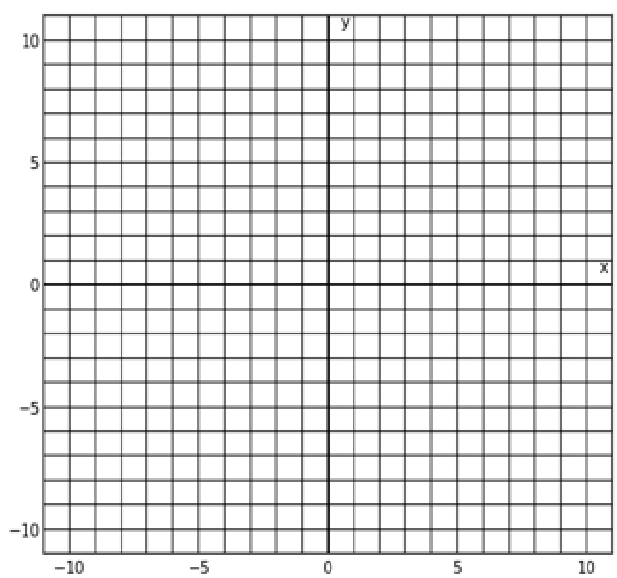
4.
$4x - 4y = 0$
$-x - 26y + 1 = -21x - 6y - 9$



5.
-9x + 8y - 14 = -13x + 7y - 10
-15x + 5y + 2 = -31x + 1y + 2



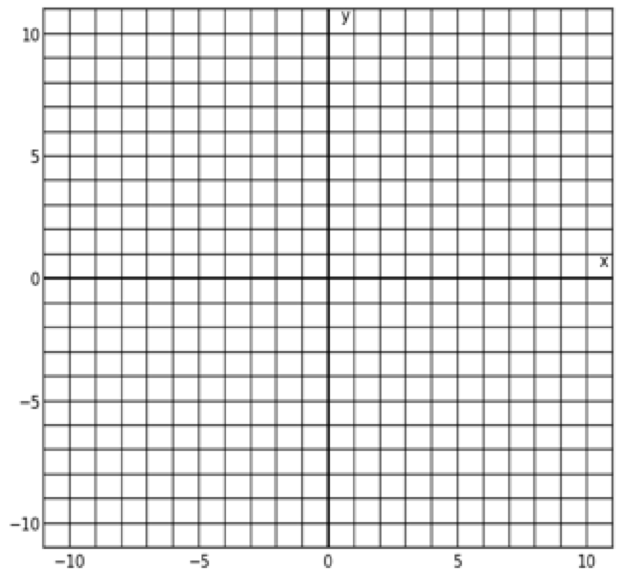
6.
-7x - 4y - 3 = x - 6y + 6
2x + 3 = -4x - 12y + 3



7.

$-9x - 9 = -12x + y - 4$

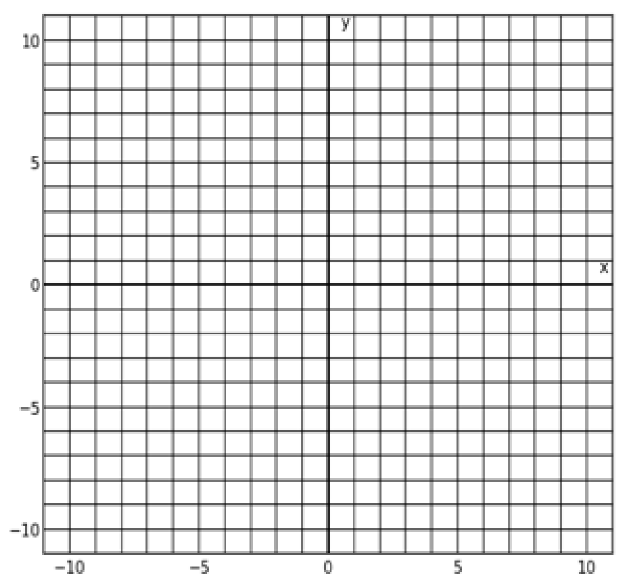
$2.5x + y - 12 = 8.5x - y - 15$



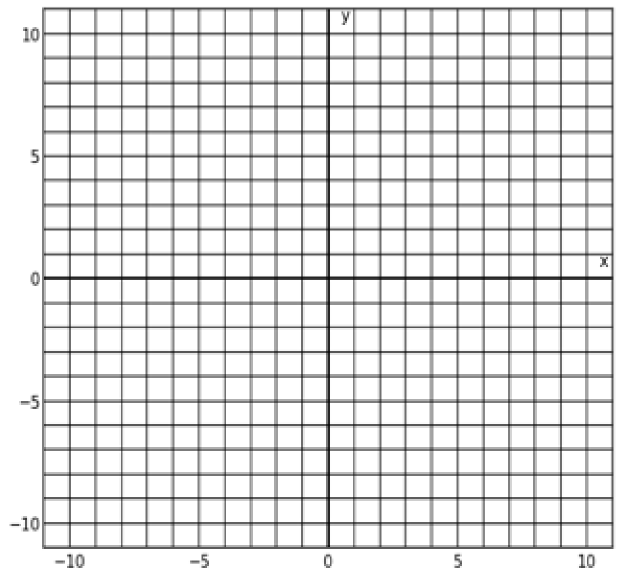
8.

$11x - 14y = 7x - 10y - 8$

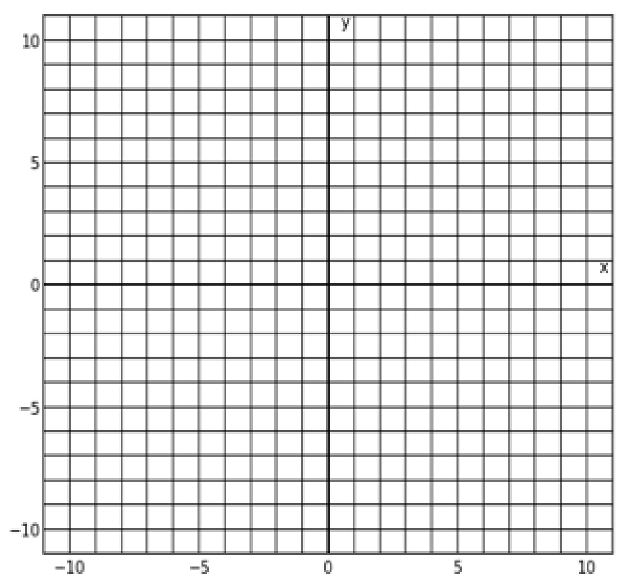
$7x - 3y - 7 = -5x - 11y - 11$



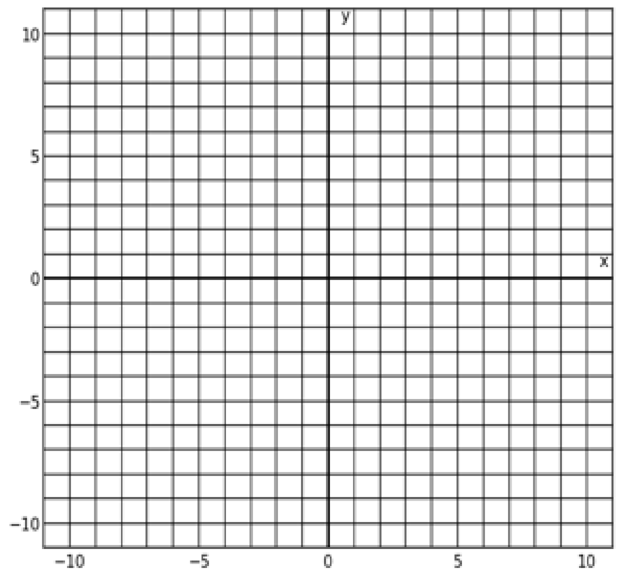
9.
$-8y = 6x - 7y + 6$
$3.5x - 0.5y - 9 = 9.5x + 0.5y - 14$



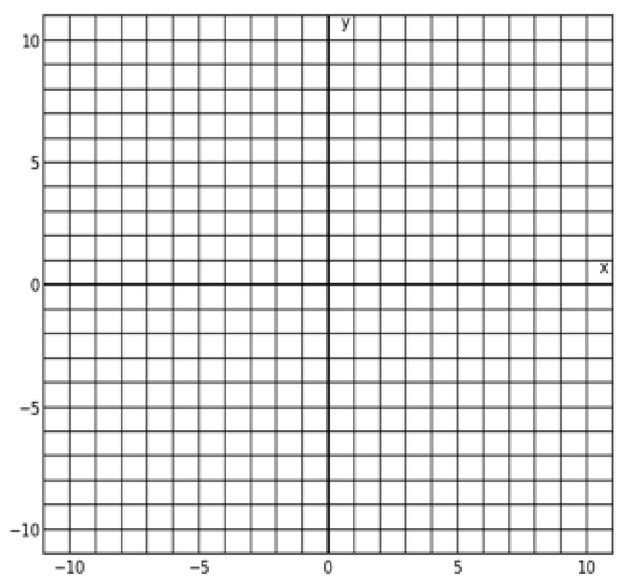
10.
$13x + 12y + 13 = 6x + 14y + 5$
$7x + 3y + 9 = 14x + 5y + 13$



11.
$-10x + 5y - 6 = -2x + 9y - 12$
$33.5x + 59y + 10 = -30.5x + 27y - 6$



12.
$y + 5 = -9x - 5y + 11$
$70.5x - 25.5y - 13 = 142.5x + 22.5y - 13$



Name: Date:

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Choosing the Best Method to Solve a Quadratic (WS#A11121)

Definition: If given a quadratic formula, solving it can be accomplished through a number of methods. In order to pick the best method, consider these cases:

- Use perfect squares for a two-term expression where both terms can be easily square rooted.
- Use the square root property for other two term expressions.
- Complete the square when your b term can be easily divided and squared.
- Use the quadratic formula in any instance.

Example: Solve the following equation using any method.

$$x^2 + 8x + 10 = 0$$

Step 1: Determine which method to use. Since it is a three term expression, perfect squares and square root cannot be used. Use completing the square or quadratic.

Step 2: If completing the square is used.
$x^2 + 8x = -10$
$x^2 + 8x + 16 = 6$
$(x + 4)^2 = 6$
$x = -4 \pm \sqrt{(6)}$

Step 3: If quadratic is used.
$a = 1, b = 8, c = 10$
$x = [-8 \pm \sqrt{(8^2 - 4(1)(10))}] / 2(1)$
$x = -4 \pm \sqrt{(6)}$

Solve the equation using any method.

1. $9x^2 - 25 = 0$

2. $8x^2 - 7 = 0$

3. $-10x^2 + x + 3 = 0$

4. $-8x^2 - 9x + 3 = 0$

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

6. $-10x^2 + 5x + 1 = 0$

7. $x^2 + 5x - 4 = 0$

8. $-2x^2 - 4x + 10 = 0$

9. $8x^2 - 12x + 1 = 0$

10. $0.25x^2 - 2 = 0$

Algebra 1 (Grade 8 / Grade 9 High School Math) Curriculum Overview

School Supplement

1. Algebraic Expressions and Real Numbers

Solution sets of open sentences from given replacement sets;
The real number line;
Translate a word statement to an equation;
Simplify and evaluate expressions containing exponents;

2. Algebraic Postulates (Axioms) Theorems and Proofs

Learn how to write detailed algebraic proofs for theorems and postulates;
Provide detailed explanation for each step in the algebraic proof;

3. Variables in Inequalities

Graph solution sets of equations & inequalities;
Solve combined inequalities using more than one properties;
Solve and graph inequalities involving absolute values and a solution set;

4. Polynomials

Identify polynomials, binomials, trinomials etc
Simplify polynomials
Multiply polynomial by a monomial
Multiply any two polynomials
Find the product of the sum and the difference of two terms

5. Factoring Polynomials

Factor the greatest common monomial factor from a polynomial
Factor a trinomial
factor perfect square trinomials
Factor a polynomial by grouping the terms
Solve polynomial equations by factoring

6. Rational Expressions

Undefined rational expression
Find LCD of 2 or more rational expressions
Divide polynomials
Solve rational equations with extraneous solutions
Solve work and motion problems using rational

7. Linear Equations and Linear Inequalities

Graph linear equations
Find the slope of a line
Use the slope-intercept form to graph a linear equation
Determine the equation of a line

8. Relations, Functions and Variation

Determine domain and range of a relation
Vertical line test for functions
Identify linear and constant function
Evaluate composite functions
Variation

9. Systems of Linear Equations (Simultaneous Equations) and Inequalities

Solve simultaneous equations by graphing, substitution, addition/subtraction, multiplication/division
Use simultaneous equations to solve

10. Radicals, Exponents and Exponential Functions

Product/Quotient property of square roots
Irrational square roots
Sum/difference/product/quotient of radicals
Radical equations
Exponential growth/ decay functions

11. Quadratic Equations and Functions

Solve quadratic equations by different methods;
Choosing best method to solve a quadratic eq
Graph quadratic functions
Use graphs of quadratic functions to

12. Statistics, Probability and Right Triangle Relationships

Compute range, variance and standard deviation;
Independent, dependent, mutually exclusive and inclusive events;
Compute sine, cosine and tangent ratios

School Supplement