

# SUMMER PACKET

## PREPARING FOR ALGEBRA 2



## SUFFIELD PUBLIC SCHOOLS

Supply List	Video/ App Resources	Pre-Requisites
<ul style="list-style-type: none"> <li>• Pencils</li> <li>• Colored Pencils</li> <li>• Graph Paper</li> <li>• Graphing Calculator (TI 84 – Preferred))</li> </ul>	<ul style="list-style-type: none"> <li>• <a href="https://www.khanacademy.org/">https://www.khanacademy.org/</a></li> <li>• <a href="https://mathantics.com/">https://mathantics.com/</a></li> <li>• <a href="https://webmath.com/">https://webmath.com/</a></li> <li>• <a href="https://www.mathplanet.com/">https://www.mathplanet.com/</a></li> <li>• <a href="http://www.math.com/">http://www.math.com/</a></li> <li>• <a href="https://www.ixl.com/math/algebra-1">https://www.ixl.com/math/algebra-1</a></li> <li>• <a href="https://www.wyzant.com">https://www.wyzant.com</a></li> <li>• <a href="https://purplemath.com">https://purplemath.com</a></li> </ul>	<ul style="list-style-type: none"> <li>• Adding and Subtracting Polynomials</li> <li>• Simplifying Algebraic Expressions using Properties of exponents.</li> <li>• Solving Linear Equations</li> <li>• Graphing Linear Functions</li> <li>• Writing Equations of Lines</li> <li>• Solving and Graphing Systems of Linear Equations</li> <li>• Solving and Graphing Absolute Value Equations</li> <li>• Factoring</li> <li>• Solving Quadratic Equations</li> <li>• Graphing Quadratic Functions</li> </ul>

To Any student entering Algebra 2 in the fall –

To ensure your success in Algebra 2, you need to be proficient in the foundational skills and concepts that you have learned over the course of Algebra 1 as this will enable you to easily grasp the new concepts that will be covered, and apply them to solve mathematical and real-life problems. We highly recommend that you take time to review and solidify your knowledge of these topics over the course of the summer.

Attached is a summer packet which has practice problems for several of the major topics that you have studied in Algebra 1. There are also links to on-line tutorials for these topics. Please take the time to work through the packet and use the resources that are provided for review when you do not remember how to solve a problem. You can certainly use other on-line resources that you can find for help, or ask relatives and/or friends for help. Please – remember this is an opportunity for you to review and make sure **you** are ready for Algebra 2. Please make sure **you** understand and know how to do the problems on your own.

Learning Mathematics is like building a house; if your foundation is weak, you can't build high, and if there are gaps or floors that are not complete, the next floor is nearly impossible to build. **Our wish and hope for all our math students is not just to get by, but to excel in mathematics, and to ultimately enjoy and appreciate the beauty and power of mathematics** – a subject we love and hope we can get you excited to continue learning. We are providing you with resources to do as much preparation and solidification of the basic skills needed to engage with the course material fluently and confidently.

We wish you a happy summer, and hope you return in the fall with high expectations for yourself, the willingness to ask questions and reach out for help when you are struggling, and with the confidence that you can be successful.

## A. Simplifying Polynomial Expressions

Objectives: The Student will be able to –

- Apply the appropriate arithmetic operations and algebraic properties needed to simplify an algebraic expression.
- Simplify polynomial expressions using addition and subtraction

Simplify:

1.  $8x - 9y + 16x + 12y$

2.  $14y + 22 - 15y^2 + 23y$

3.  $5n - (3 - 4n)$

4.  $-2(11x - 3)$

5.  $3(8z - 4w) + 2(10z - 6w)$

6.  $5(3x - 4) - 2(4x - 6)$

Simplifying Polynomials:

<https://www.youtube.com/watch?v=ZvL9aDGNHqA>

<https://www.khanacademy.org/math/algebra-home/alg-polynomials/alg-introduction-to-polynomials/v/simplify-a-polynomial>

<https://www.youtube.com/watch?v=ZvL9aDGNHqA>

## B. Solving Linear Equations

Objectives: The Student will be able to –

- Solve one and two step equations.
- Solve equations with variables on both sides.
- Solve Multi-step equations that need to be simplified first
- Solve Literal Equations for a specific variable.

Solve each equation. You must show all work.

1.  $5x - 2 = 33$

2.  $140 = 4x + 36$

3.  $8(3x - 4) = 196$

4.  $45x - 720 + 15x = 60$

5.  $132 = 4(12x - 9)$

6.  $154 + 7x - 68 = 198$

7.  $-5(3x - 8) + 6x = -131$

8.  $-7x - 10 = 18 + 3x$

9.  $12x + 8 - 15 = -2(3x - 82)$

10.  $-(12x - 6) = 2x - 14$

Solving Linear Equations (One Step):

<https://www.khanacademy.org/math/algebra-home/alg-basic-eq-ineq/alg-old-school-equations/v/algebra-linear-equations-1>

Solving Linear Equations (Two Step):

<https://www.khanacademy.org/math/algebra-home/alg-basic-eq-ineq/alg-old-school-equations/v/algebra-linear-equations-2>

Solving Linear Equations (Multi - Step):

<https://www.khanacademy.org/math/algebra-home/alg-basic-eq-ineq/alg-old-school-equations/v/algebra-linear-equations-3>

<https://www.khanacademy.org/math/algebra-home/alg-basic-eq-ineq/alg-old-school-equations/v/algebra-linear-equations-4>

Solve the Literal Equations for the indicated variable.

11.  $Y + M = Z$ , for  $M$

12.  $2x - 3y = 9$ , for  $y$

13.  $2xy + w = 10$ , for  $x$

14.  $4x + y - 5h = 10y + k$ , for  $x$

Solving Literal Equations:

<https://www.khanacademy.org/math/algebra-home/alg-basic-eq-ineq/alg-old-school-equations/v/solving-for-a-variable>

<https://www.youtube.com/watch?v=ggSfw2gmMsg>

## C. Solving Absolute Value Equations

Objectives: The Student will be able to –

- Solve absolute value equations.

1.  $|2x| = 12$

2.  $|3x + 4| = 8$

3.  $2|3x - 2| + 5 = 15$

4.  $|5x + 2| = -7$

Solving Absolute Value Equations:

<https://www.youtube.com/watch?v=cHbzQVd7Y>

<https://www.khanacademy.org/math/algebra-home/alg-absolute-value/alg-absolute-value-equations/v/absolute-value-equations>

## D. Properties of Exponents

Objectives: The Student will be able to –

- Simplify expressions using the properties of exponents

Simplify each expression. Express answers with positive exponents.

1.  $x^5 \cdot x \cdot x^2 =$

2.  $\frac{m^{15}}{m^3} =$

3.  $(k^4)^5 =$

4.  $y^0 =$

5.  $(p^4n^2) \cdot (p^7n^5) =$

6.  $\frac{45y^3z^{10}}{5y^3z} =$

7.  $(4h^5k^3) \cdot (15h^3k^2) =$

8.  $\frac{12a^4b^6}{36ab^2c} =$

9.  $(3m^2y)^3 =$

10.  $(3x^4y^2)^2 \cdot (2x^3y^5m^3)^2 =$

11.  $4x^2(3x^5y^2)^0 =$

Properties of Exponents:

<https://www.youtube.com/watch?v=tePk4uUBrsU>

<https://www.youtube.com/watch?v=etMK3xViMAc>

<https://www.khanacademy.org/math/cc-eighth-grade-math/cc-8th-numbers-operations/cc-8th-exponent-properties/v/exponent-properties-involving-products>

## E. Slopes of Lines & Equations of Lines

Objectives: The Student will be able to –

- Identify and calculate the slope of a line.
- Write the equation of a line in Point-Slope Form.
- Write the equation of a line in Slope-Intercept Form.
- Write the equation of a line in Standard Form.
- Write the equations of parallel and perpendicular lines.

Calculate the Slopes of the lines with following pairs of points.

1.  $(-1,4)$  and  $(1,-2)$

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

3.  $(2,5)$  and  $(5,10)$

4.  $(2,-5)$  and  $(-4,-5)$

5.  $(3,-2)$  and  $(3,7)$

Slopes:

<https://www.khanacademy.org/math/algebra/x2f8bb11595b61c86:linear-equations-graphs/x2f8bb11595b61c86:slope/v/slope-of-a-line-2>

[https://www.youtube.com/watch?v=Id\\_UqMLAXzY](https://www.youtube.com/watch?v=Id_UqMLAXzY)



Write the equation of the lines with given slope and a point on the line.

Write the equations of the lines in:

(a) Point - Slope Form.

(b) Slope - Intercept Form

(c) Standard Form

1. Slope =  $-3$       Point :  $(2,3)$

2. Slope =  $5$       Point :  $(-2,4)$

3. Slope =  $\frac{2}{3}$       Point :  $(3,-5)$

Write the equation of the lines through the given points on the line.

Write the equations of the lines in:

(a) Point - Slope Form.

(b) Slope - Intercept Form

(c) Standard Form

1. Points :  $(2,-3)$  and :  $(5,-12)$

2. Points :  $(-4,-5)$  and :  $(2,19)$

3. Points :  $(5,-1)$  and :  $(10,2)$

Equations of Lines:

<https://www.youtube.com/watch?v=lzqTD0JWwhY>

<https://www.youtube.com/watch?v=xlzDjC11udE>

<https://www.youtube.com/watch?v=4u7MZvFqFJo>

4. Rewrite the equation into Slope-Intercept Form :  $8x - 2y = 24$ .  
Identify the slope and y-intercept.
5. Rewrite the equation into Slope-Intercept Form :  $3x + 5y = 30$ .  
Identify the slope and y-intercept.
6. Write the equation of the line through the point  $(3, 8)$   
and parallel to the line  $6x + 3y = 30$ .
7. Write the equation of the line through the point  $(-4, 5)$   
and perpendicular to the line  $3x - 9y = 18$ .

Equations of Parallel and Perpendicular Lines:

<https://www.youtube.com/watch?v=LTb2-LE7StE>

<https://www.khanacademy.org/math/geometry/hs-geo-analytic-geometry/hs-geo-parallel-perpendicular-eq/v/perpendicular-lines-2>

## F. Graphing Linear Functions

Objectives: The Student will be able to –

- Graph lines given in Slope – Intercept form.
- Graph lines given in Point – Slope form.
- Graph lines given in Standard Form.
- Identify the equation of a line from its graph.

Graphing Linear Functions:

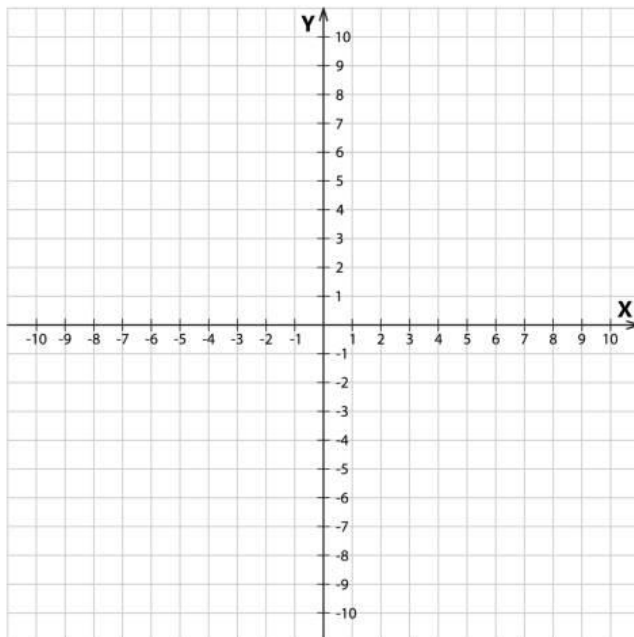
<https://www.youtube.com/watch?v=zihUOJgDkv0>

<https://www.khanacademy.org/math/in-in-grade-9-ncert/xfd53e0255cd302f8:linear-equations-in-two-variables/xfd53e0255cd302f8:graph-of-a-linear-equation-in-two-variables/v/graphs-of-linear-equations>

[https://www.youtube.com/watch?v=UgtMbCl4G\\_I](https://www.youtube.com/watch?v=UgtMbCl4G_I)

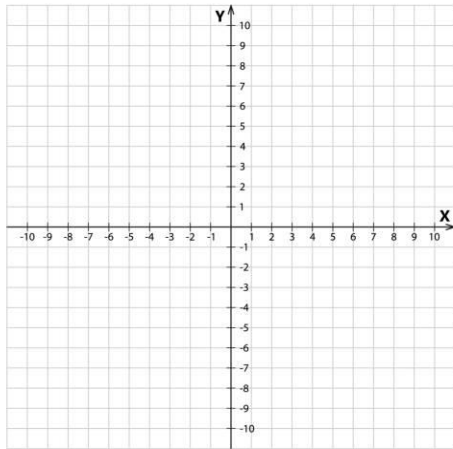
1. Graph the line :  $y = 2x + 5$

Slope = \_\_\_\_\_ Y-intercept = \_\_\_\_\_



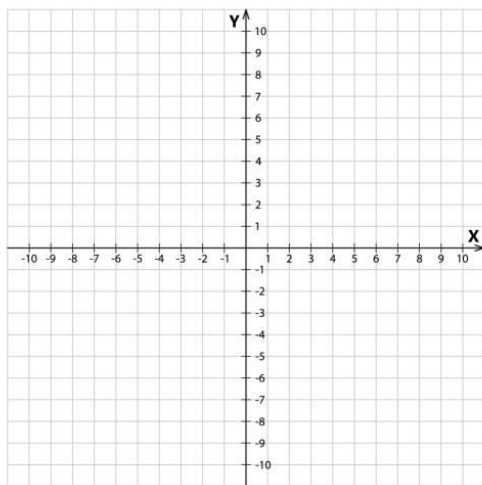
2. Graph the line :  $y = \frac{1}{2}x - 3$

Slope = \_\_\_\_\_ Y-intercept = \_\_\_\_\_



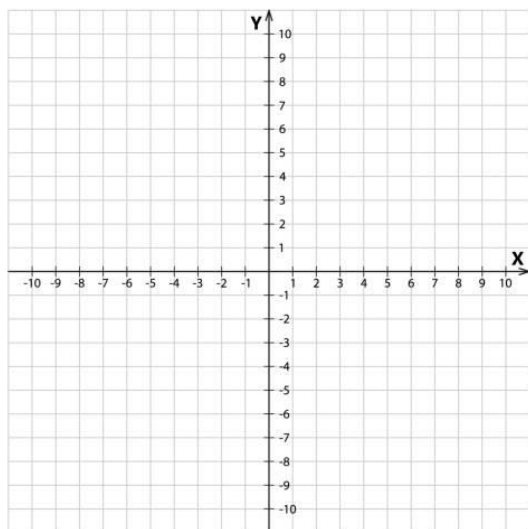
3. Graph the line :  $y = -\frac{2}{5}x + 4$

Slope = \_\_\_\_\_ Y-intercept = \_\_\_\_\_



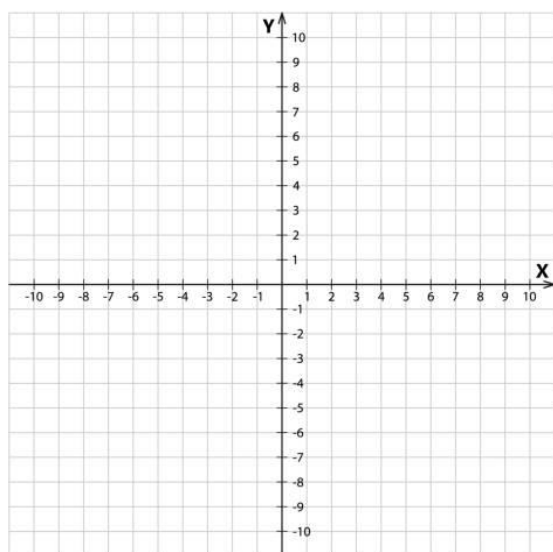
4. Graph the line :  $y = -3x$

Slope = \_\_\_\_\_ Y-intercept = \_\_\_\_\_



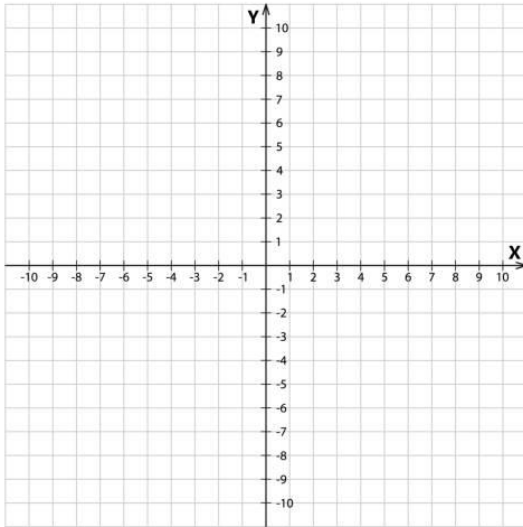
5. Graph the line :  $3x + y = 3$

X-intercept = \_\_\_\_\_ Y-intercept = \_\_\_\_\_



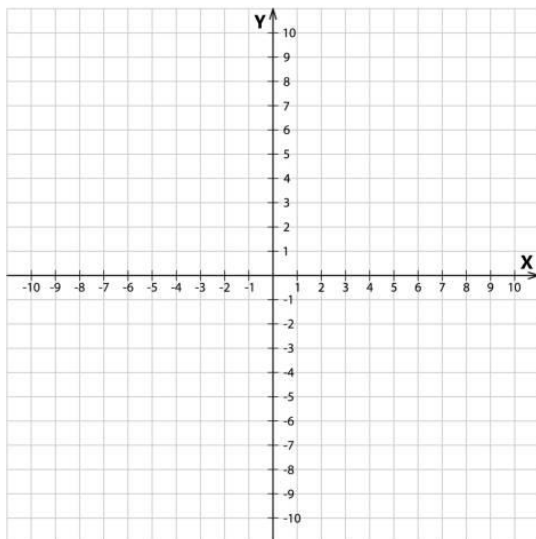
6. Graph the line :  $5x - 2y = 10$

X-intercept = \_\_\_\_\_ Y-intercept = \_\_\_\_\_



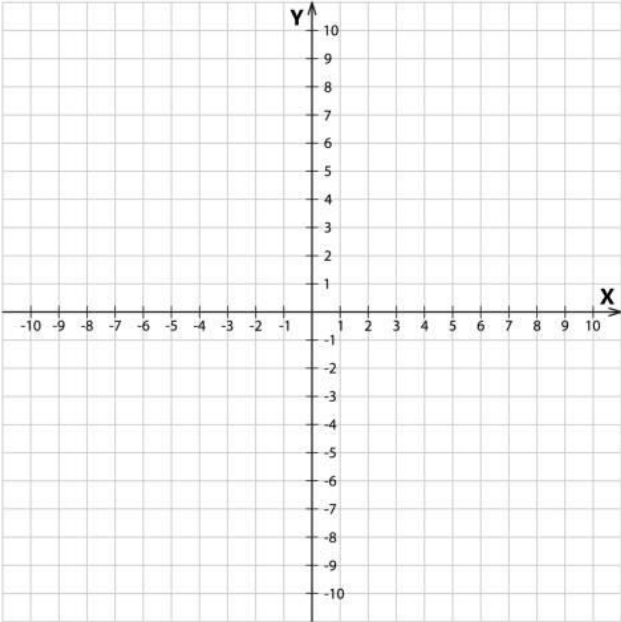
7. Graph the line :  $-2x + 6y = 12$

X-intercept = \_\_\_\_\_ Y-intercept = \_\_\_\_\_



8. Graph the line :  $x = -4$

X-intercept = \_\_\_\_\_ Y-intercept = \_\_\_\_\_



## G. Graph Inequalities in two variables

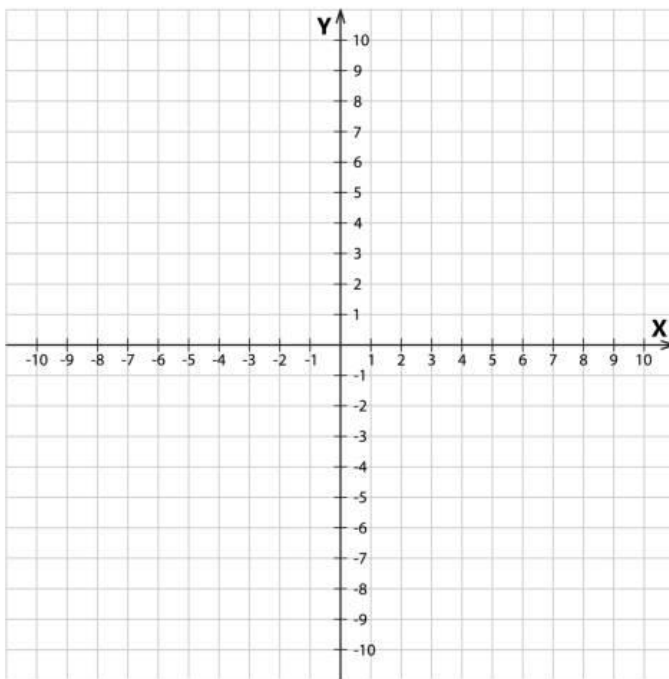
Objectives: The Student will be able to –

- Graph inequalities in two variables

Graphing Inequalities in two variables:

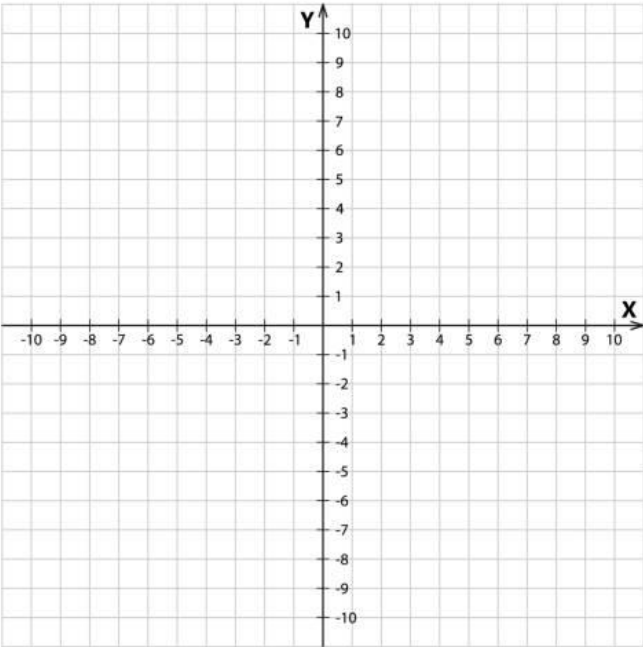
<https://www.khanacademy.org/math/algebra/x2f8bb11595b61c86:inequalities-systems-graphs/x2f8bb11595b61c86:graphing-two-variable-inequalities/v/graphing-linear-inequalities-in-two-variables-example-2>

1. Graph the inequality:  $2x + 3y < 12$

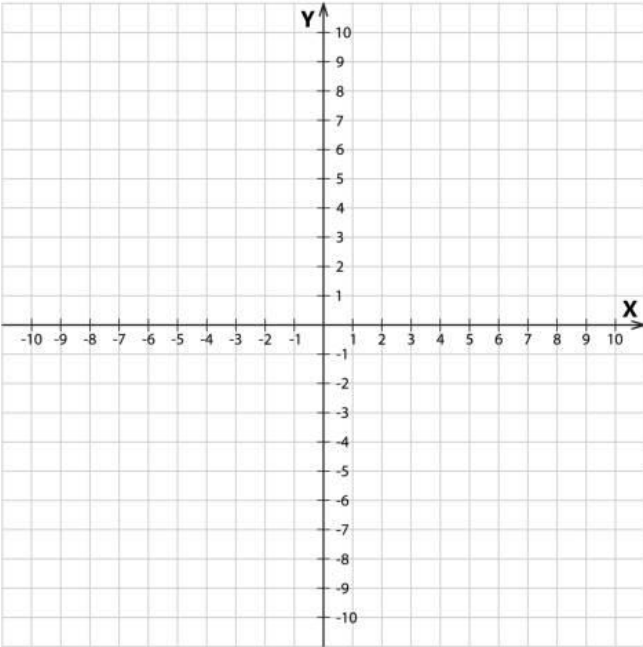




2. Graph the inequality :  $3x + 5y \geq 30$



3. Graph the inequality :  $4x - 3y < 24$



## H. Solving Systems of Equations

Objectives: The Student will be able to –

- Solve systems of linear equations by graphing
- Solve systems of linear equations by elimination
- Solve systems of linear equations by substitution

Solving Systems by graphing:

<https://www.khanacademy.org/math/cc-eighth-grade-math/cc-8th-systems-topic/cc-8th-systems-graphically/v/solving-linear-systems-by-graphing>

<https://www.youtube.com/watch?v=Pd4hwS8qHms>

Solving Systems by Elimination:

<https://www.khanacademy.org/math/algebra-home/alg-system-of-equations/alg-equivalent-systems-of-equations/v/solving-systems-of-equations-by-elimination>

<https://www.youtube.com/watch?v=HL2fDIOMLJO>

Solving Systems by Substitution:

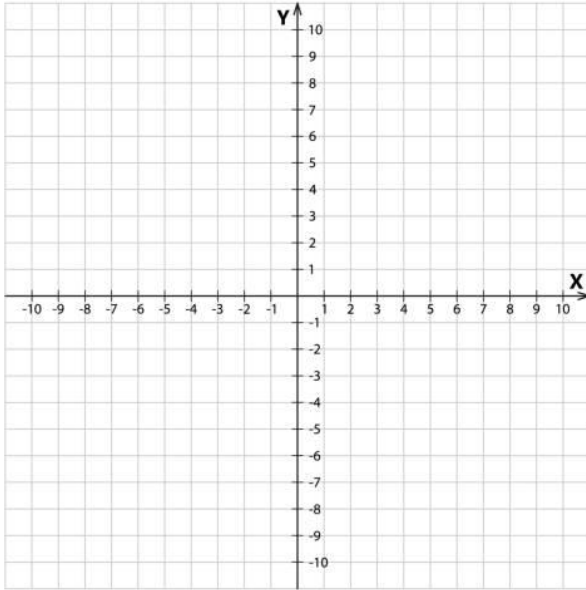
<https://www.khanacademy.org/math/algebra-home/alg-system-of-equations/alg-solving-systems-of-equations-with-substitution/v/solving-linear-systems-by-substitution>

<https://www.youtube.com/watch?v=cbIHUeq3bkE>

1. Solve the system of equations by graphing:

$$x + y = 6$$

$$2x - 2y = -8$$



2. Solve the system of linear equations by elimination:

$$3x + 2y = -2$$

$$4x - 3y = 20$$

3. Solve the system of linear equations by substitution:

$$5x - 3y = 2$$

$$y = 3x + 6$$

# I. Solve Quadratic Equations

Objectives: The Student will be able to –

- Solve quadratic equations by using square roots.
- Solve quadratic equations by factoring.
- Solve quadratic equations by using the Quadratic Formula

## Solve by using Square Roots:

1.  $3x^2 = 9$

2.  $2x^2 - 9 = 15$

3.  $(2x - 5)^2 - 5 = 31$

Solving Quadratic Equations by Square Roots:

<https://www.khanacademy.org/math/algebra/x2f8bb11595b61c86:quadratic-functions-equations/x2f8bb11595b61c86:untitled-1082/v/simple-quadratic-equation>

## Solve by Factoring:

1.  $x^2 - 25 = 0$

2.  $x^2 - 8x + 15 = 0$

3.  $x^2 + 11x + 30 = 0$

4.  $x^2 - 3x - 40 = 0$

5.  $x^2 + 5x - 24 = 0$

6.  $3x^2 + 12x - 36 = 0$

7.  $6x^2 + x - 12 = 0$

8.  $x^2 + 9x - 12 = 3x + 4$

Solving Quadratic Equations by Factoring:

<https://www.khanacademy.org/math/algebra/x2f8bb11595b61c86:quadratic-functions-equations/x2f8bb11595b61c86:quadratics-solve-factoring/v/example-1-solving-a-quadratic-equation-by-factoring>

<https://www.youtube.com/watch?v=qeByhTF8WEw>

<https://www.youtube.com/watch?v=zc2CpyRtjvY>

Solve by using the Quadratic Formula:

1.  $2x^2 + 6x + 3 = 0$

2.  $3x^2 - 2x + 2 = 7$

3.  $5x^2 - 4x + 2 = 4x^2 - 6x + 8$

Solving Quadratic Equations using the Quadratic Formula:

<https://www.khanacademy.org/math/algebra/x2f8bb11595b61c86:quadratic-functions-equations/x2f8bb11595b61c86:quadratic-formula-a1/v/using-the-quadratic-formula>

<https://www.youtube.com/watch?v=IINAJI36-10>

## J. Graphing Quadratic Functions

Objectives: The Student will be able to –

- Graph quadratic functions given in vertex form.
- Graph quadratic functions given in standard form.
- Graph quadratic functions given in intercept form.
- Identify the intercepts of a quadratic function.
- Identify the vertex of a quadratic function
- Identify the axis of symmetry of a quadratic function
- Determine the concavity of a quadratic function.

Graphing Quadratic Functions:

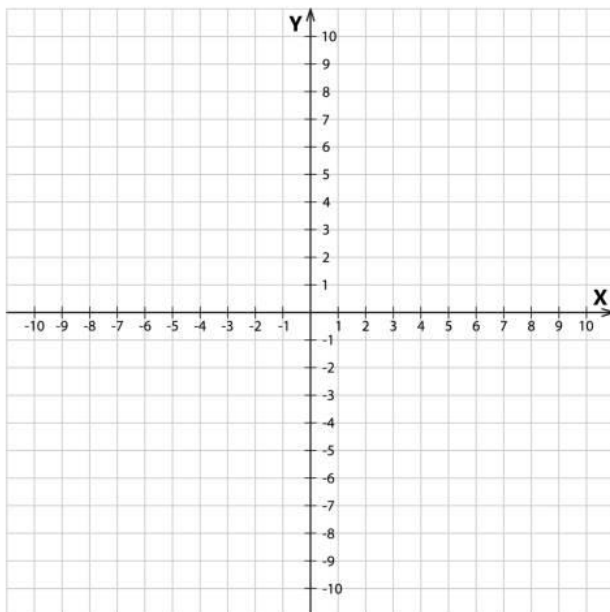
[https://www.youtube.com/watch?v=Hq2Up\\_1lh5E](https://www.youtube.com/watch?v=Hq2Up_1lh5E)

[https://www.youtube.com/watch?v=OHH7fX\\_M8Ns](https://www.youtube.com/watch?v=OHH7fX_M8Ns)

<https://www.youtube.com/watch?v=y99INRqLjBA>

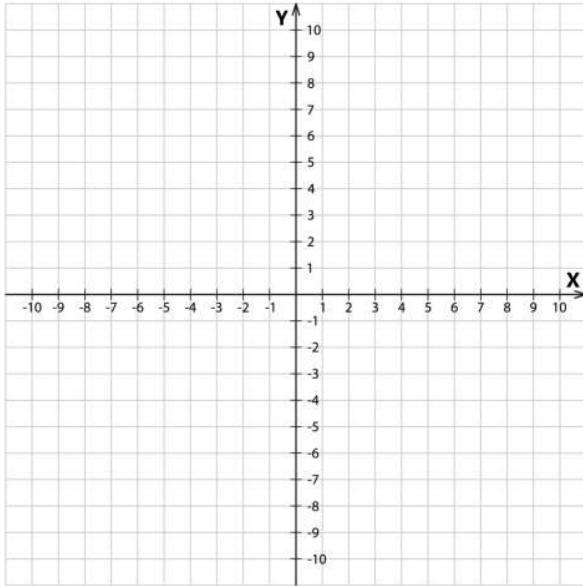
1. Graph :  $f(x) = (x - 2)^2 - 9$

Identify all key points : Intercepts, Vertex, Axis of Symmetry.



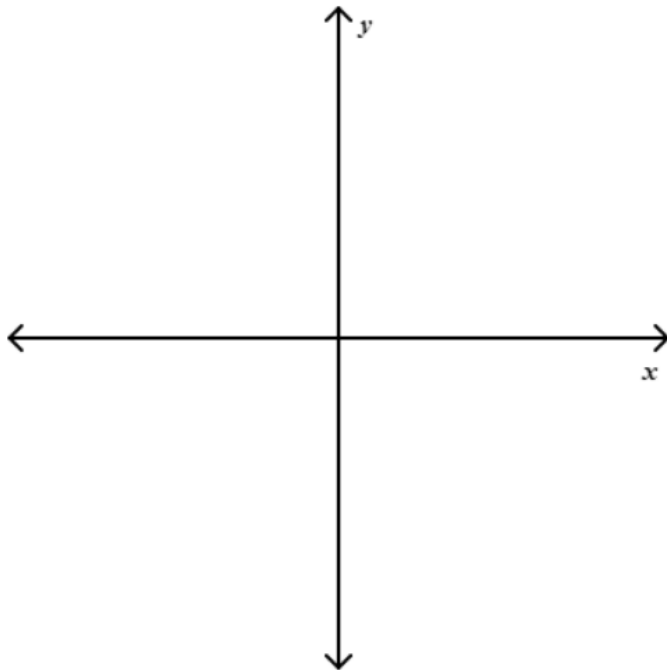
2. Graph:  $f(x) = -2(x-1)^2 + 8$

Identify all key points : Intercepts, Vertex, Axis of Symmetry.



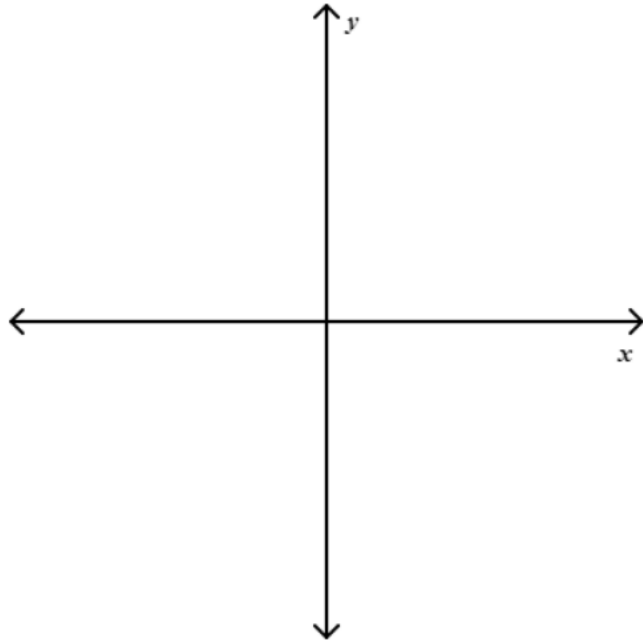
3. Graph:  $f(x) = 2(x-4)^2 - 24$

Identify all key points : Intercepts, Vertex, Axis of Symmetry.



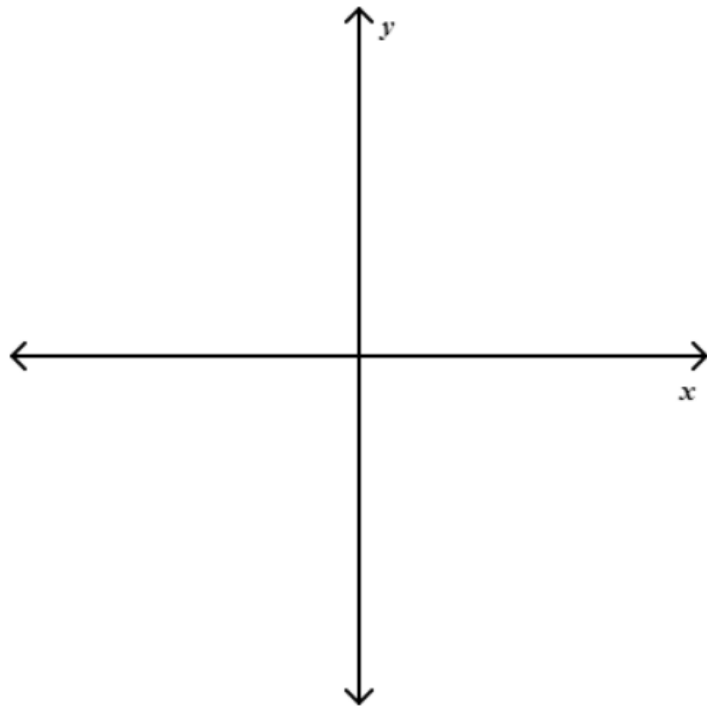
4. Graph:  $f(x) = -3(x-3)^2 + 24$

Identify all key points : Intercepts, Vertex, Axis of Symmetry.



5. Graph:  $f(x) = x^2 + 6x - 3$

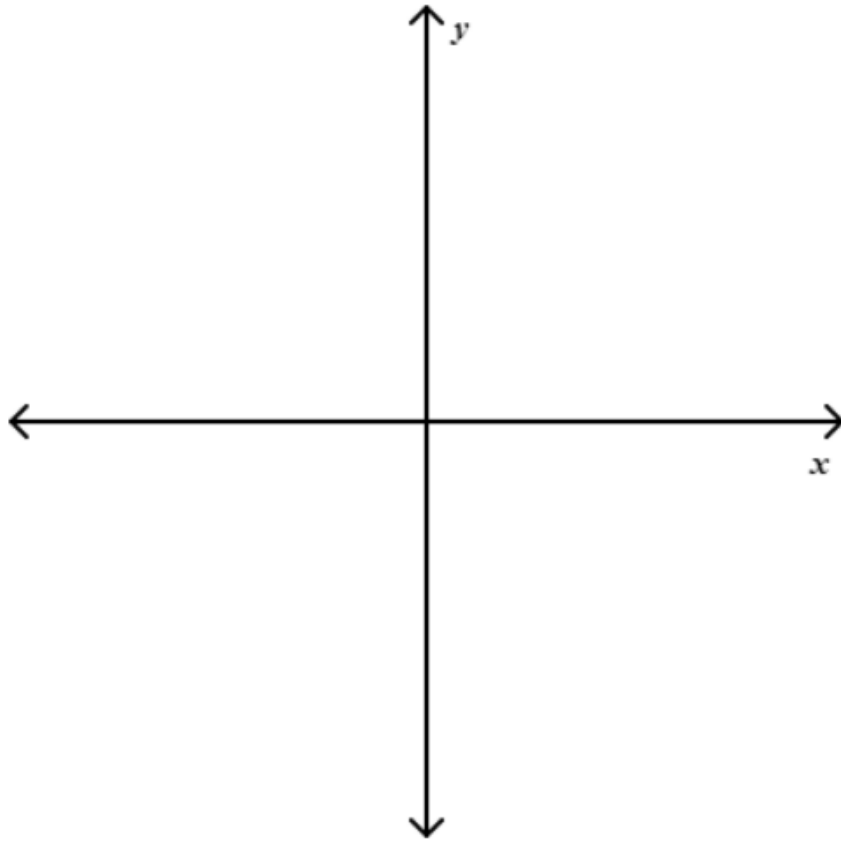
Identify all key points : Intercepts, Vertex, Axis of Symmetry.





6. Graph:  $f(x) = -2x^2 - 4x + 6$

Identify all key points : Intercepts, Vertex, Axis of Symmetry.



## K. Graphing Absolute Value Functions

Objectives: The Student will be able to –

- Graph absolute value functions.
- Identify the intercepts of an absolute value function.
- Identify the vertex of an absolute value function
- Identify the axis of symmetry of an absolute value function
- Determine the concavity of an absolute value function.

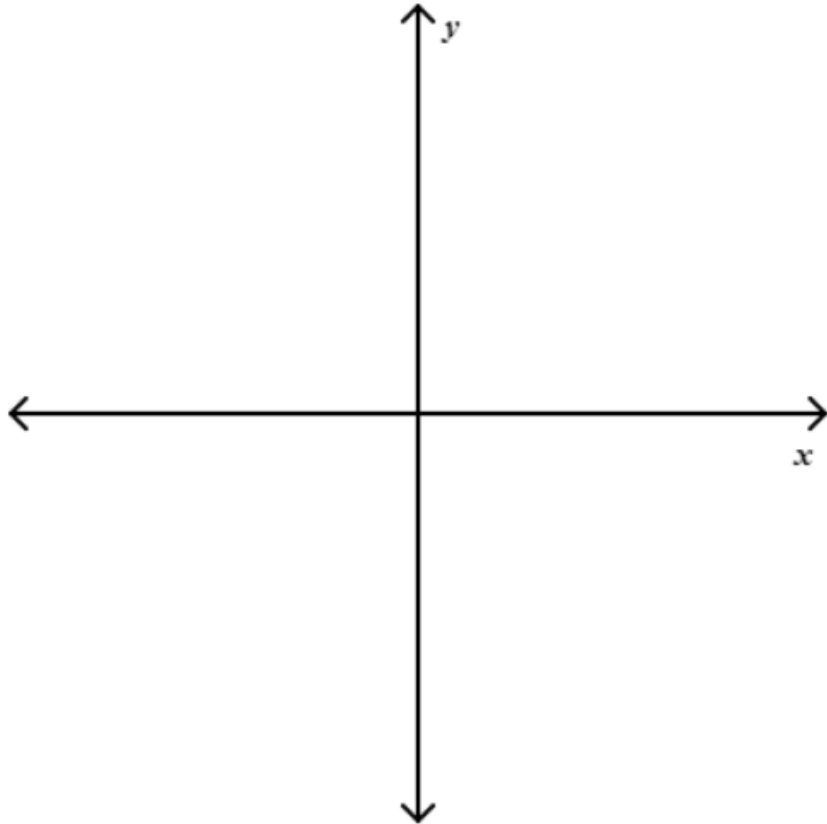
Graphing Absolute Value Functions:

<https://www.khanacademy.org/math/algebra/x2f8bb11595b61c86:absolute-value-piecewise-functions/x2f8bb11595b61c86:graphs-of-absolute-value-functions/v/graphing-absolute-value-functions>

<https://www.youtube.com/watch?v=ld4UD98yHio>

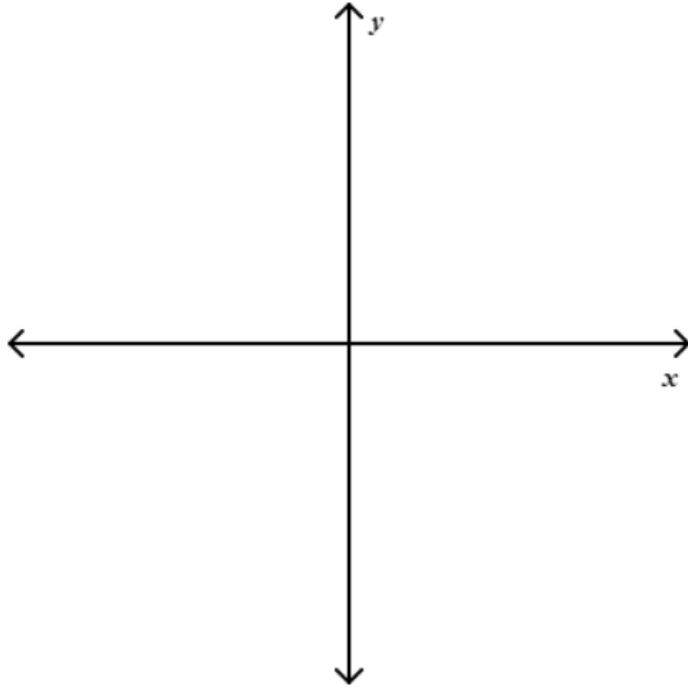
1. Graph:  $f(x) = 3|x| - 12$

Identify all key points: Intercepts, Vertex, Axis of Symmetry



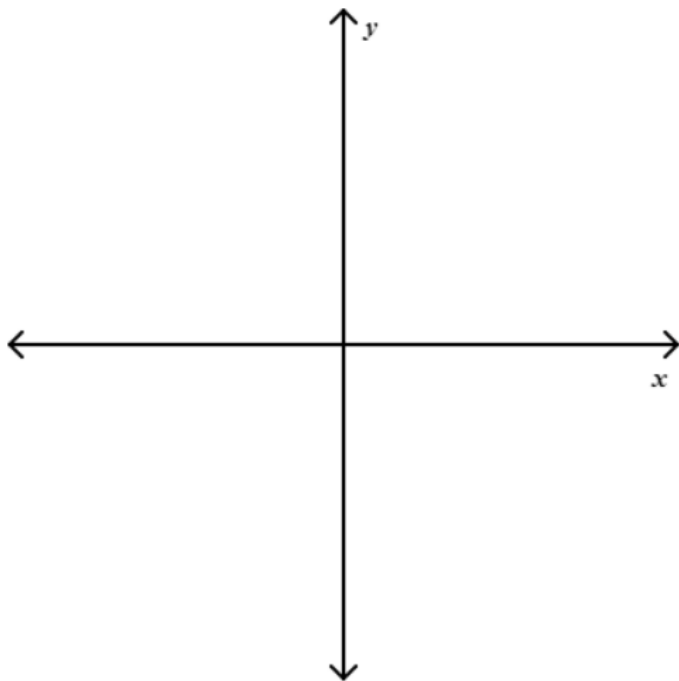
2. Graph:  $f(x) = |x + 6| - 4$

Identify all key points: Intercepts, Vertex, Axis of Symmetry



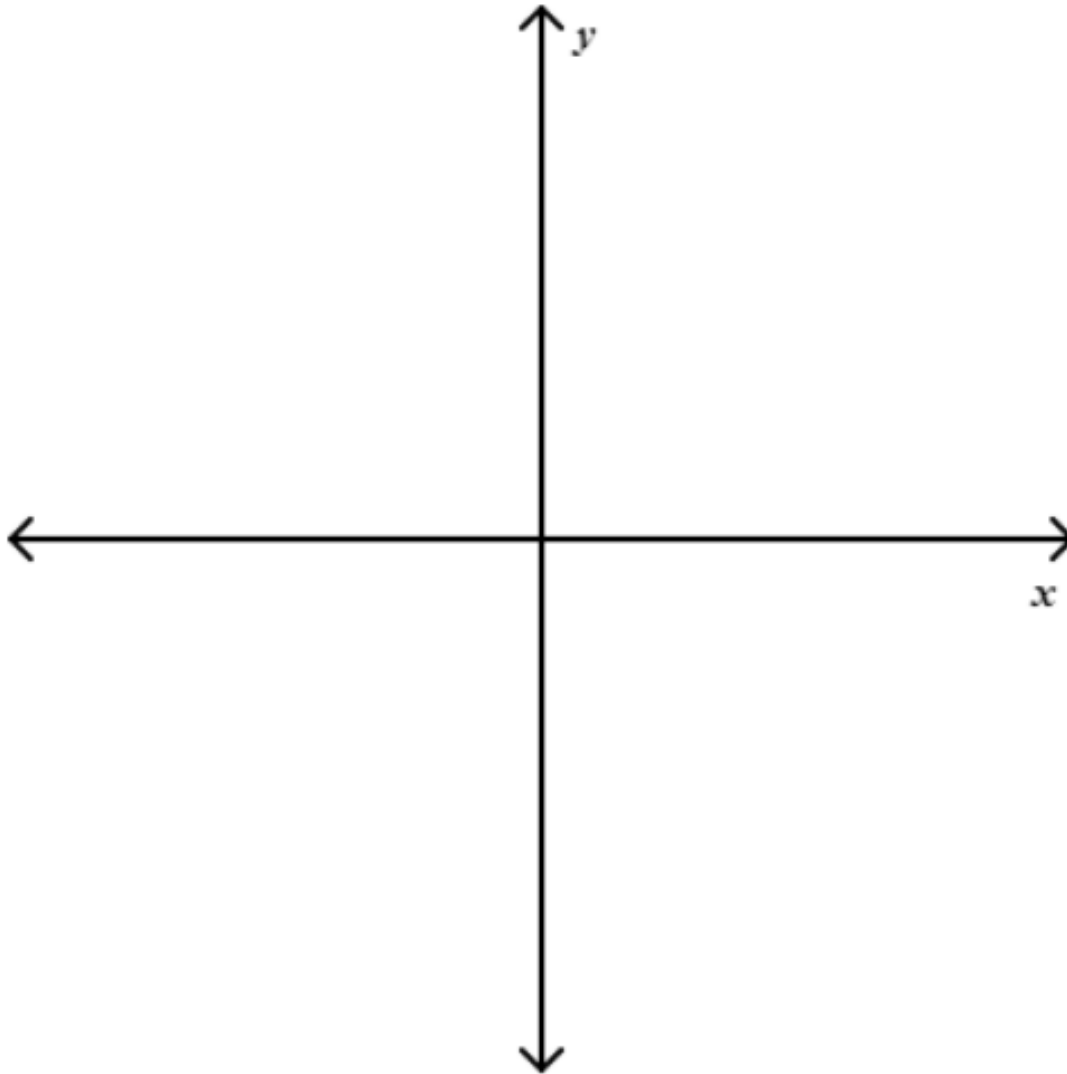
3. Graph:  $f(x) = -2|x - 3| + 16$

Identify all key points: Intercepts, Vertex, Axis of Symmetry



4. Graph:  $f(x) = -3|x+10|+15$

Identify all key points: Intercepts, Vertex, Axis of Symmetry



## L. Skill Fluency

Objectives: The Student will be able to –

- Find factors of numbers.
- Find the Greatest Common Factor (GCF) of numbers.
- Add and Subtract Integers.
- Multiply and Divide Integers.
- Simplify Square Roots

### Finding Factors and Common Factors:

1. Find all the factors of 48.
2. Find all the factors of 80.
3. Find the greatest common factor (GCF) of 24 and 64.
4. Find the greatest common factor (GCF) of 48 and 160.

Greatest Common Factor:

<https://www.khanacademy.org/math/cc-sixth-grade-math/cc-6th-expressions-and-variables/cc-6th-gcf/v/greatest-common-divisor>

<https://www.youtube.com/watch?v=uE9O8N5JYB4>

## Performing Operations with Signed Numbers:

1. Add:  $2 + (-8) =$

2.  $(-5) + (-9) =$

3. Subtract:  $7 - (-9) =$

4. Subtract:  $-3 - (-12) =$

5. Multiply:  $4 \cdot (-8) =$

6. Multiply:  $(-5) \cdot (-9) =$

7. Divide:  $-20 \div (-4) =$

8. Divide:  $\frac{24}{-6} =$

Operations with Integers:

<https://www.khanacademy.org/math/cc-seventh-grade-math/cc-7th-negative-numbers-add-and-subtract/cc-7th-sub-neg-intro/v/adding-and-subtracting-negative-number-examples>

<https://www.khanacademy.org/math/arithmetic-home/negative-numbers/mult-divide-negatives/v/multiplying-and-dividing-negative-numbers>

<https://www.youtube.com/watch?v=7mxq8rkMdlM>

## Simplify the square Roots:

1. Simplify:  $\sqrt{36}$

2. Simplify:  $\sqrt{8}$

3. Simplify:  $\sqrt{20}$

4. Simplify:  $\sqrt{48}$

Simplifying Square Roots

<https://www.khanacademy.org/math/algebra/x2f8bb11595b61c86:rational-exponents-radicals/x2f8bb11595b61c86:simplifying-square-roots/v/simplifying-square-roots-1>

[https://www.youtube.com/watch?v=8UIXSvqH\\_Vs](https://www.youtube.com/watch?v=8UIXSvqH_Vs)

