

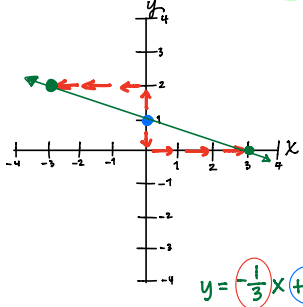
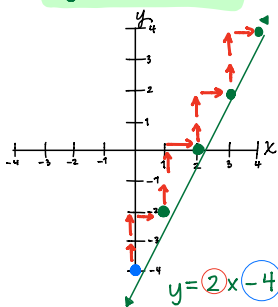
<p>Adding & Subtracting positive and negative numbers</p> <p>SAME SIGN ADD</p> <p>DIFFERENT SIGN SUBTRACT</p>	<p>$5 + 3$ same sign add = 8</p> <p>$-5 - 3$ same sign add = -8</p> <p>$-5 + (-3)$ same sign add = -8</p> <p>$-5 + 3$ different sign subtract = -2 (the sign on the bigger number = sign of answer)</p>	<p>$5 - (-3)$ same sign add = 8 $5 + +3$ same sign add, equals positive 8</p> <p>$5 - 3$ different sign subtract = 2 (the sign on the bigger number = sign of answer)</p> <p>$-5 - (-3)$ different sign subtract = -2 $-5 + +3$ diff sign subtract, larger number (-), ans (-)</p> <p>$5 + -3$ different sign subtract = 2 (the sign on the bigger number = sign of answer)</p>
<p>Multiplying & Dividing positive and negative numbers</p> <p>SAME SIGN POSITIVE +</p> <p>DIFFERENT SIGN NEGATIVE -</p>	<p>6×7 same sign + = $+42$</p> <p>-6×-7 same sign + = $+42$</p> <p>6×-7 different sign - = -42</p> <p>-7×6 different sign - = -42</p>	<p>$42 \div 7$ same sign + = $+6$</p> <p>$-42 \div -7$ same sign + = $+6$</p> <p>$42 \div -7$ different sign - = -6</p> <p>$42 \div -6$ different sign - = -7</p>
<p>[Absolute Value]</p> <p>DISTANCE from ZERO ALWAYS POSITIVE +++</p> <p>$8 = +8$ $125 = +125$ $-8 = +8$ $-125 = +125$ $- 8 = -8$ $- 125 = -125$ $- -8 = -8$ $- -125 = -125$</p> <p><i>The only possible negative outcome is if it is out in FRONT of the absolute value</i></p>	<p>Distributive Property</p> <p>Distribute (or multiply) the term outside the parentheses times EACH TERM INSIDE THE PARENTHESES.</p> <p>$5(x + 1) = 5 \cdot x + 5 \cdot 1 = 5x + 5$</p> <p>$y(2y - 3) = y \cdot 2y + y \cdot (-3) = 2y^2 - 3y$</p> <p>$12(a^2 + 5b) = 12 \cdot a^2 + 12 \cdot 5b = 12a^2 + 60b$</p>	<p>Order of Operations</p> <p>PEMDAS</p> <p>Please (Parentheses) Excuse (Exponents) My (Multiplication) Dear (Division) Aunt (Addition) Sally (Subtraction)</p> <p><i>Multiplication and Division are done left to right.</i></p> <p><i>Addition and Subtraction are done left to right.</i></p>
<p>Evaluate Algebraic Expressions</p> <p>Plug in the given variables, solve!</p> <p>Evaluate $x^2 - 5y$ for $x = 2$ and $y = -1$ $x^2 - 5y = (2)^2 - 5(-1) = 4 - (-5) = 9$</p> <p>Evaluate $3x^2 + 2y$ for $x = 5$ and $y = -4$ $3x^2 + 2y = 3(5)^2 + 2(-4) = 75 - 8 = 67$</p>	<p>Adding and Subtracting Variables</p> <p>Only add and subtract LIKE TERMS</p> <p>Examples of "like terms":</p> <p>$4x, -10x, 100x, -3x$ "like term" x $4ab, -10ab, 100ab, -3ab$ ab $4y, -10y, 100y, -3y$ y $4x^2, -10x^2, 100x^2, -3x^2$ x^2</p>	<p>$4x - 10x = -6x$</p> <p>$4x - 10y = \text{NOT POSSIBLE}$</p> <p>$4ab + 100ab = 104ab$</p> <p>$4y - 10y + 100y = 94y$</p> <p>$4x^2 + 100x = \text{NOT POSSIBLE}$</p> <p>$4x^2 - 3x^2 = 1x^2$</p>
<p>Slope $m = \text{slope}$</p> <p>$m = \frac{y_2 - y_1}{x_2 - x_1}$</p> <p>Slope-Intercept Form $b = \text{y-intercept}$</p> <p>$y = mx + b$ $(x_1, y_1) (x_2, y_2)$</p> <p>Point-Slope Form = given points</p> <p>$y - y_1 = m(x - x_1)$</p>	<p>Multiplying and Dividing Variables</p> <p>UNlike terms can be multiplied and divided. Multiply and divide whole numbers separate of the variable.</p> <p>ADD exponents when multiplying SUBTRACT exponents when ÷</p> <p>@CuteCalculus</p>	<p>$2x \cdot 3x^2 = 2 \cdot 3 \cdot x^{1+2} = 6x^3$</p> <p>$5y^4 \cdot 6x^2y^3 = 5 \cdot 6 \cdot x^2 \cdot y^{4+3} = 30x^2y^7$</p> <p>$4a^3 \div a^2 = 4a^{3-2} = 4a^1$</p> <p>$8x^5 \div 2x^3 = 4x^{5-3} = 4x^2$</p> <p>$18x^2y^3 \div 3y = 6x^2y^{3-1} = 6x^2y^2$</p>
<p>Simplifying Fractions</p> <p>Find a number that can be divided evenly in both numerator and denominator. Keep doing this until you can no longer divide, that's when it is simplified.</p> <p>$\frac{10}{25} \div 5 = \frac{2}{5}$ $\frac{6}{8} \div 2 = \frac{3}{4}$ $\frac{8}{24} \div 8 = \frac{1}{3}$</p>	<p>Multiplying Fractions</p> <p>Multiply top • top, bottom • bottom.</p> <p>$\frac{5}{6} \times \frac{4}{7} = \frac{20}{42} \div 2 = \frac{10}{21}$</p> <p>$\frac{2}{9} \times \frac{3}{8} = \frac{6}{72} \div 6 = \frac{1}{12}$</p>	<p>Dividing Fractions</p> <p>Flip the second fraction and multiply.</p> <p>$\frac{6}{7} \div \frac{3}{5} = \frac{6}{7} \times \frac{5}{3} = \frac{30}{21} \div 3 = \frac{10}{7} = 1 \frac{3}{7}$</p> <p>$\frac{8}{9} \div \frac{4}{7} = \frac{8}{9} \times \frac{7}{4} = \frac{56}{36} \div 4 = \frac{14}{9} = 1 \frac{5}{9}$</p>
<p>Exponents</p> <p>ADD exponents, → multiplying SUBTRACT exponents → dividing</p> <p>$(-2)^3 = (-2) \cdot (-2) \cdot (-2) = -8$</p> <p>$8x^2 \cdot 3x^5 = 8 \cdot 3 \cdot x^{2+5} = 24x^7$</p> <p>$\frac{12a^5}{3a^2} = 4a^{5-2} = 4a^3$</p>	<p>Exponents Raised to Exponents</p> <p>MULTIPLY exponents when raised to another exponent.</p> <p>$(4x^3)^2 = 4^2 \cdot x^{3 \cdot 2} = 16x^6$</p> <p>$(8y^5)^3 = 8^3 \cdot y^{5 \cdot 3} = 512y^{15}$</p>	<p>NEGATIVE Exponents</p> <p>If a term has a negative exponent and is in the numerator, move it to the denominator to become positive. If the term with the negative exponent is in the denominator, move it to the numerator to become positive.</p> <p>$x^{-2} = \frac{1}{x^2}$ $y^{-3} = \frac{1}{y^3}$ $\frac{1}{a^{-5}} = a^5$</p> <p>$(-2a^3)^{-2} = \frac{1}{(-2a^3)^2} = \frac{1}{(-2)^2 \cdot a^{3 \cdot 2}} = \frac{1}{4a^6}$</p>

When solving equations, WHATEVER YOU DO ON ONE SIDE OF THE EQUATION, YOU MUST DO ON THE OTHER!

$y = 2x - 4$

Graphing

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



- Step 1, plot **y-int** = -4
- Step 2, **m=2 (rise 2, run 1)**
- Step 3, plot **at least 3 points**
- Step 4, draw the line

- Step 1, plot **y-int** = 1
- Step 2, **m=-1/3 (fall 1, run 3)**
- Step 3, plot **at least 3 points**
- Step 4, draw the line

Using slope intercept

$y = mx + b$

Write the equation of a line with a **slope of 3** and **y-intercept of -1**.

$m = 3$
 $b = -1$
 $y = mx + b$
 $y = 3x - 1$

Using point slope

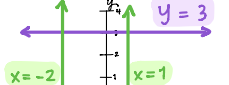
$y - y_1 = m(x - x_1)$

Write the equation of a line passing through the **point (-3, 7)** with a **slope of 2**.

$m = 2$
 $x_1 = -3$
 $y_1 = 7$
 $y - 7 = 2(x + 3)$

Graphing Horizontal and Vertical Lines

y = number is a **HORIZONTAL LINE** going through the given y-value. This is when the **slope is ZERO**, therefore there is no x value.



x = number is a **VERTICAL LINE** going through the given x-value. This is when the **slope is UNDEFINED** or **DOES NOT EXIST**.



Solving Equations

Goal to get x by itself!

$x + 5 = 6$
 $x + 5 = 6$
 $-5 \quad -5$
 $x = 1$

Subtract 5 from both sides.

$8x = 32$
 $\frac{8x}{8} = \frac{32}{8}$
 $x = 4$

Divide 8 from both sides.

$x - 12 = -3$
 $x - 12 = -3$
 $+12 \quad +12$
 $x = 9$

Add 12 to both sides.

$\frac{3}{5}x = 9$
 $\frac{5}{3} \cdot \frac{3}{5}x = 9 \cdot \frac{5}{3}$
 $x = \frac{45}{3} = 15$

Multiply by reciprocal (5/3) on both sides.

$4x + 3(2x + 5) = 7x + 9$
 $4x + 3(2x + 5) = 7x + 9$

$4x + 6x + 15 = 7x + 9$
 $10x + 15 = 7x + 9$
 $-7x \quad -7x$
 $3x + 15 = 9$
 $-15 \quad -15$
 $3x = -6$
 $\frac{3x}{3} = \frac{-6}{3}$
 $x = -2$

1. **Distribute 3**
2. **Combine like terms**
3. **Subtract 7x**
4. **Subtract 15**
5. **Divide by 3**

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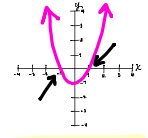
Finding x-intercept

Is where **y = 0**, solve.

$2x + 6y = 12$
 $2x + 6(0) = 12$
 $2x = 12$
 $x = 6$
 $(6, 0)$

x = the **solution** to the quadratic equation. These are also called the "**zeros**", "**x-intercepts**", "**where the function crosses the x-axis**", "**the value of the function when y = 0.**"

Quadratic Formula



$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

$x = -1, x = 1$

Inequalities

$x + 3 < 5$
 $x + 3 < 5$
 $-3 \quad -3$
 $x < 2$

Subtract 3 from both sides.

$-5x > -20$
 $-5x > -20$
 $\div -5 \quad \div -5$
 $x < 4$

Divide by -5 on both sides.

$-5 \leq 7 - 3x < 25$
 $-5 \leq 7 - 3x < 25$
 $-7 \quad -7$

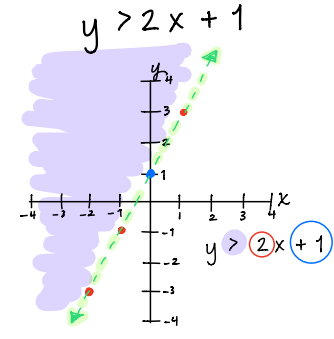
$-12 \leq -3x < 18$
 $-3 \quad -3$

$4 \geq x > -6$
 $-6 < x \leq 4$

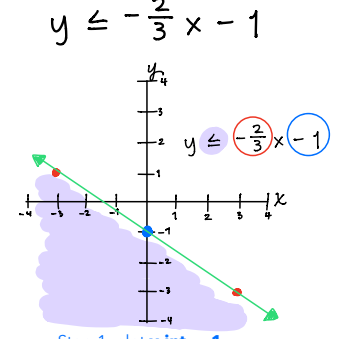
< > ≤ ≥
SYMBOL SWITCHES DIRECTION when multiplying or dividing by a negative number!

Always write answer from least to greatest

Graphing Inequalities



- Step 1, plot **y-int** = 1
- Step 2, **m=2 (rise 2, run 1)**
- Step 3, **dotted line** --- for >
- Step 4, **shade above** for >



- Step 1, plot **y-int** = -1
- Step 2, **m= -2/3 (fall 2, run 3)**
- Step 3, **solid line** for ≤
- Step 4, **shade below** for ≤

Absolute Value Equations

Absolute value is the distance from zero, it is always positive so you must account for the possibility that the number inside the absolute value could have been negative and therefore get **two possible answers**.

$|x| = 6$
 $x = 6 \quad x = -6$

$|x + 1| = 8$
 $x + 1 = 8 \quad x + 1 = -8$
 $x = 7 \quad x = -9$

Once the absolute value is isolated, write **TWO equations**, one written as **is** and the other **= to negative**

$3|2x + 6| - 7 = 5$
 $3|2x + 6| = 12$
 $|2x + 6| = 4$
 $2x + 6 = 4 \quad 2x + 6 = -4$
 $\frac{2x}{2} = \frac{-2}{2} \quad \frac{2x}{2} = \frac{-10}{2}$
 $x = -1 \quad x = -5$

Midpoint Formula

Midpoint = average of the two points.

$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$

Parallel lines =

ARE EQUAL = THE SAME!

$y = 3x + 8$ and $y = 3x - 1$
 $y = -1/4x - 5$ and $y = -1/4x$
 $y = -x + 7$ and $y = -x - 9$
 $y = 5x$ and $y = 5x + 2$

Distance Formula

d = distance between two points.

$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

Perpendicular lines

Opposite sign, flipped fraction

$y = 3x + 8$ and $y = -1/3x - 1$
 $y = -1/4x - 5$ and $y = 4x$
 $y = -x + 7$ and $y = x - 9$
 $y = 5x$ and $y = -1/5x + 2$