Algebra 1 Study Guide

SOLVE SIMPLE EQUATIONS

Use inverse operations

$+$ $-$

$\times$ $\div$

VARIABLE ON BOTH SIDES

Combine like terms.

Variables on one side, constants on the other.

Not true = No solution

$4v = 4v + 2$

True = Infinitely many

$2x + 3 = 2x + 3$

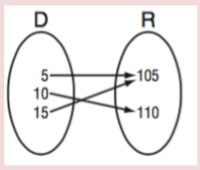
FUNCTIONS AND RELATIONS

Relation: any set of ordered pairs

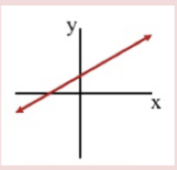
Function: a type of relation where there is exactly one output for every input. For every x there is exactly one y.

D	I	X	R	O	Y
Domain	Input	X-Coordinate	Range	Output	Y-Coordinate

Function



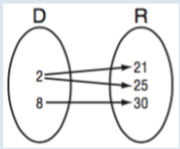
x	y
−3	0
−1	−1
0	0
2	−2
3	4



Graph

Remember, vertical line test.

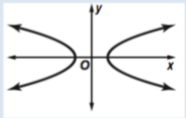
Not a Function



Mapping

X	-2	0	-2	7	-8
Y	6	8	20	4	8

Table

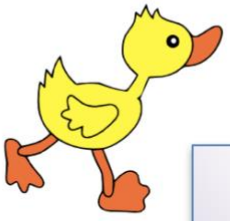


Function Notation: $f(x)$ f of x takes the place of y.

Evaluate a function: $f(x) = x^2 + 2$ for $f(3) = 3^2 + 2 = 11$

LINEAR EQUATIONS

If it walks like a duck and talks like a duck, it's probably a . . .



Linear equations form a line. Lines are written in slope intercept form.
If an equation looks like slope intercept form, it's probably linear.

Linear	Not Linear
$y = 5x - 3$	$7a + 4b^2 = -8$
$x = 9$	$y = \sqrt{x + 5}$
$y = \frac{1}{2}x$	$x + xy = 1$
$6s = -3t - 15$	$y = \frac{1}{x}$

Lines that are not linear. . . No exponent greater than 1, no square root, no variable multiplied by a variable, no variable in the denominator.

Linear Equations form a straight line.
All points on the line are solutions to the equation.

Slope = m ↘ ↙ y-intercept = b

Slope Intercept form is **y = mx + b**

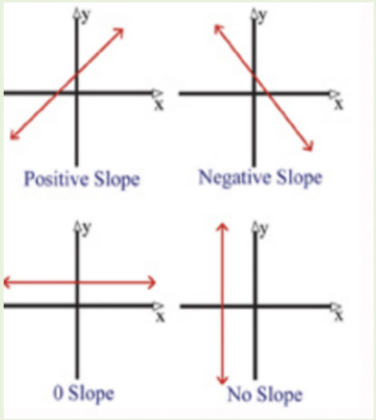
Slope = $\frac{\text{rise}}{\text{run}}$ $\frac{y_2 - y_1}{x_2 - x_1}$ $\frac{\text{change in y}}{\text{change in x}}$

Point-Slope Form = $y - y_1 = m(x - x_1)$

(x_1, y_1) is your point. m = slope

Ordered Pair (x, y)

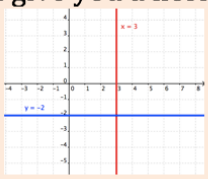
To graph a line, graph y-intercept first, then slope from that point.



x-intercept Point where the line crosses the x-axis.
You get a (#, 0). Plug a zero in for y, solve for x.

y–intercept Point where the line crosses the y-axis.
You get a (0, #). Plug a zero in for x, solve for y.

x = will give you a vertical line.
y = will give you a horizontal line.



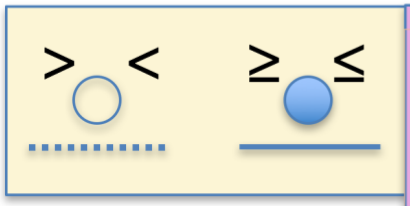
Y am I sitting in math class when I'd rather be laying down sleeping?

STANDARD FORM

$Ax + By = C$

Used to find x and y intercept.

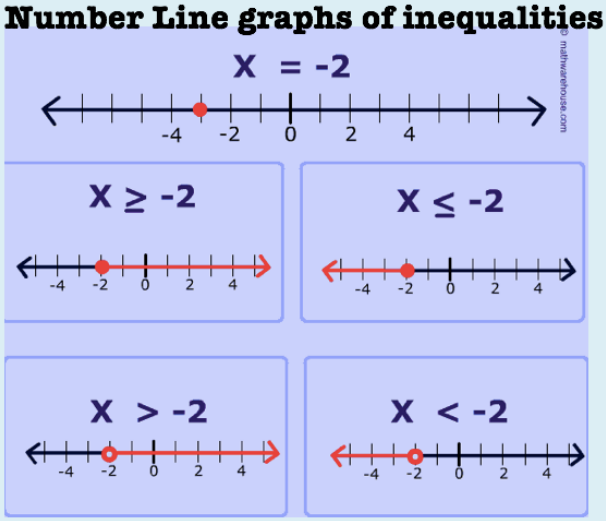
INEQUALITIES



Greater than or **less than** use an open circle on a number line and a dotted line on a coordinate plane.
Greater than or equal to or **less than or equal to** use a closed circle on a number line or a solid line on a graph.

If a point lies on a - - - - (dotted line), it is not included in the solution.
If a point line on a _____(solid line), the point is part of the solution.
The solutions are found in the shaded region.

Number Line graphs of inequalities . . .



*Flip inequality sign when you multiply or divide by a negative number.

*For true statements, –5 < 0 The solution is *all real numbers.*

*For false statements, 3 ≤ – 2, there is *no solution.*

COMPOUND INEQUALITIES

Be sure to graph smaller number on left side of number line, and larger number on right side of number line.

To format an AND solution . . . . . .
SMALLER # < VARIABLE < LARGER #

$3<X<5$

always use < or ≤

AND

Graph is an intersection

$-3<-2x+1\leq 9$

split into . . .

$-3 < -2x+1$ $\quad -2x+1 \leq 9$

$-1 \quad -1 \quad -1 \quad -1$

$-4 < -2x \quad -2x \leq 8$

$2 > x \quad x \geq -4$

OR

Graph goes in 2 directions

$3x - 5 < -8$ or $2x - 1 > 5$

$+5 \quad +5 \quad +1 \quad +1$

$3x < -3 \quad 2x > 6$

$x < -1 \quad x > 3$

ABSOLUTE VALUE

Absolute Value is ALWAYS positive. Remember. . |-3| = 3 and |3| = 3 so, |3 + x| = – 5 has no solution.
Absolute Value cannot equal a negative number.
We **ALWAYS** set up 2 equations to solve Absolute Value.

$|4x - 5| = 8$ $\quad$ $|4x - 5| = -8$

$+5 \quad +5$ $\quad$ $+5 \quad +5$

$4x = 13$ $\quad$ $4x = -3$

$x = \frac{13}{4}$ $\quad$ $x = -\frac{3}{4}$

GOAL: Isolate the absolute value
Set up 2 equations.

ABSOLULTE VALUE AND INEQUALITIES

|absolute value| cannot be < 0 Absolute Value is **always positive**.
To solve absolute value inequalities, *set up 2 equations, one stays same, then flip inequality sign and make negative.*
|x| < 2 so solve |x| < 2 and |x| > –2
To determine where to shade, plug in the point to the equation. If it is true, shade where point is. If it is false, shade the other half of the graph. Remember to use solid and dotted lines.

ABSOLUTE DEVIATION

$$|x - given\ value| =$$

TRANSFORMATIONS

$$y = -a|x - h| + k$$

Reflection in x-axis

opposite

same

VERTICAL SHRINK
VERTICAL STRETCH
SLOPE

Order of Operations

Parenthesis
Exponents
Multiply, Divide — Left to right
Add, Subtract — Left to right

Rewriting Equations . . .

Solve for b. A = ½bh Multiply by 2 to get fraction away from variable. So, 2A = bh. Divide by h on both sides. $b = \frac{2A}{h}$

THESE ARE YOUR **LITERAL EQUATIONS**, KNOW HOW TO MANIPULATE