LINEAR EQUATIONS

Slope-Intercept Form	Standard Form	Point-Slope Form
$y=mx+b$	$Ax+By=C$ A must be positive A, B, & C are integers	$y-y_1=m(x-x_1)$
$m=\text{slope}$ $(0,b)=y\text{-intercept}$ $\left(\frac{-b}{m},0\right)=x\text{-intercept}$	$\frac{-A}{B}=\text{slope}$ $\left(0,\frac{C}{B}\right)=y\text{-intercept}$ $\left(\frac{C}{A},0\right)=x\text{-intercept}$	$m=\text{slope}$ $(x_1,y_1)=\text{point on the line}$

EXAMPLES OF THE EXACT SAME LINE IN ALL 3 FORMS

$y=-2x-1$	$2x+y=-1$	$y-5=-2(x+3)$
-2 is $m=\text{slope}$ -1 is b, so $(0,-1)=y\text{-int.}$	The coefficient of x is NOT equal to the slope.	-2 is $m=\text{slope}$ $(-3,5)$ is $(x_1,y_1)=\text{point}$

How to find intercepts…

x-intercept $(x,0)$ Set $y=0$ and solve for x.
y-intercept $(0,y)$ Set $x=0$ and solve for y.

How to find the slope from two points…

(x_1,y_1) & (x_2,y_2) $\quad m=\frac{y_2-y_1}{x_2-x_1}$

$\|$ Parallel Lines have equal slopes.

Example: 5 & 5, 0 & 0, -2 & $-\frac{4}{2}$, undefined & undefined

$\perp$ Perpendicular Lines have negative reciprocal slopes (opposite sign & flipped).

Examples: $\frac{3}{8}$ & $-\frac{8}{3}$, -4 & $\frac{1}{4}$, 1 & -1, 0 & undefined

Helpful YouTube videos:
https://www.youtube.com/watch?v=xGmef7IFc5w
https://www.youtube.com/watch?v=MfkMsY7I6qw

GRAPHING LINEAR EQUATIONS

Method #1 – Plotting Points from a T-Table

Let's graph $2x+y=5$.

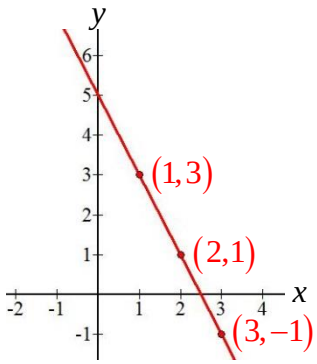
For this method, we will create a t-table and pick three numbers to substitute for x. Once we plug those into our equation, we will get values back for y. Then, we can plot those points and draw the line that passes through them.

x	y
1	3
2	1
3	-1

For $x=1$:
$2x+y=5$
$2(1)+y=5$
$2+y=5$
$-2 \quad -2$
$y=3$

For $x=2$:
$2x+y=5$
$2(2)+y=5$
$4+y=5$
$-4 \quad -4$
$y=1$

For $x=3$:
$2x+y=5$
$2(3)+y=5$
$6+y=5$
$-6 \quad -6$
$y=-1$



Method #2 – Plotting Intercepts

Let's graph $3x-2y=12$.

For this method, we will find the x and y intercepts. Then we will plot those points on the graph and draw the line that passes through them.

x-intercept:
(Set $y=0$ & solve)

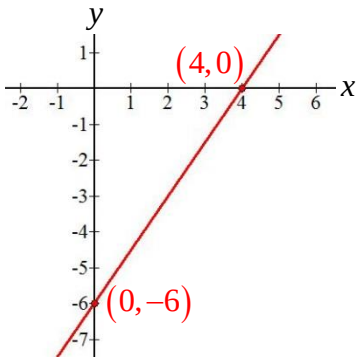
$3x-2y=12$
$3x-2(0)=12$
$3x-0=12$
$\frac{3x}{3}=\frac{12}{3}$
$x=4$

So the x-int. is $(4,0)$.

y-intercept:
(Set $x=0$ & solve)

$3x-2y=12$
$3(0)-2y=12$
$0-2y=12$
$\frac{-2y}{-2}=\frac{12}{-2}$
$y=-6$

So the y-int. is $(0,-6)$.



Method #3 – Plotting the y-Intercept and Applying the Slope to Plot Additional Points

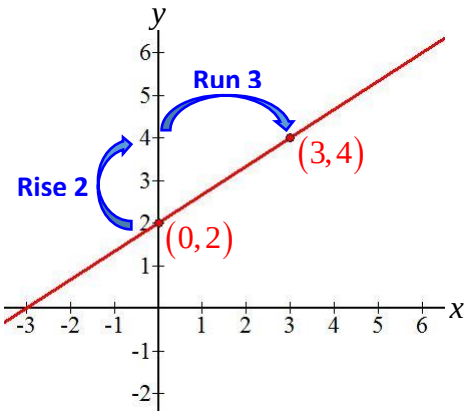
Let's graph $y=\frac{2}{3}x+2$.

Notice that this equation is written in slope-intercept form.

That means it is easy to pick out the slope and the y-intercept (see other side). We see that $m=\frac{2}{3}$ and the y-int. is $(0,2)$. For this method, we first plot the y-int.

Then, we will apply rise over run for the slope.

We will rise 2 (that means move up 2 units, since 2 is positive) and run 3 (that means move right 3 units, since 3 is positive).



Helpful YouTube videos:
https://www.youtube.com/watch?v=2UrcUfBizyw, https://www.youtube.com/watch?v=6m642-2D3V4
https://www.youtube.com/watch?v=uk7gS3cZVp4