From RR9

Note Title 2/5/2015

1) $3x - 4y = 24$

$x = -2$: $3(-2) - 4y = 24$

$-6 \quad -4y = 24$

$+6 \qquad +6$

$-4y = 30$

$\frac{-4y}{-4} = \frac{30}{-4}$

$y = -\frac{15}{2} = -7\frac{1}{2}$

$(-2, -7\frac{1}{2})$

$y = 0$: $3x - 4(0) = 24$

$3x - 0 = 24$

$3x = 24$

$\frac{3x}{3} = \frac{24}{3}$

$x = 8$

$(8, 0)$

$3x - 4y = 24$

$x = 5$: $3(5) - 4y = 24$

$15 - 4y = 24$

$-15 \qquad -15$

$-4y = 9$

$\frac{-4y}{-4} = \frac{9}{-4}$

$y = -\frac{9}{4} = -2\frac{1}{4}$

$(5, -2\frac{1}{4})$

$3x - 4y = 24$

$y = 4$: $3x - 4(4) = 24$

$3x - 16 = 24$

$+16 \qquad +16$

$3x = 40$

$\frac{3x}{3} = \frac{40}{3}$

$x = 13\frac{1}{3}$

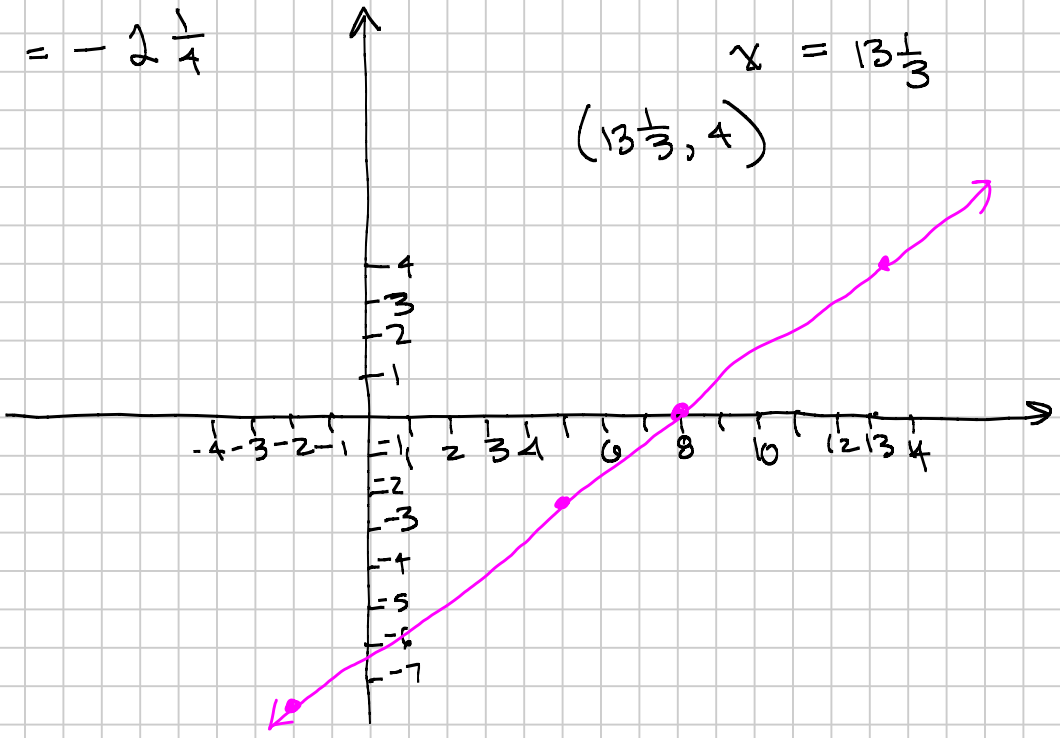
$(13\frac{1}{3}, 4)$

$(5, -2\frac{1}{4})$

$(13\frac{1}{3}, 4)$

$(8, 0)$

$(-2, -7\frac{1}{2})$



(2) $x + y = 9$

$x = 3$: $3 + y = 9$, $-3 \quad -3$, $y = 6$

$(3, 6)$

$x = 4$: $4 + y = 9$, $-4 \quad -4$, $y = 5$

$(4, 5)$

$x = -5$: $x + y = 9$, $-5 + y = 9$, $+5 \quad +5$, $y = 14$

$(-5, 14)$

$y = -7$: $x + y = 9$, $x - 7 = 9$, $+7 \quad +7$, $x = 16$

$(16, -7)$

$y = -1$: $x - 1 = 9$, $+1 \quad +1$, $x = 10$

$(10, -1)$

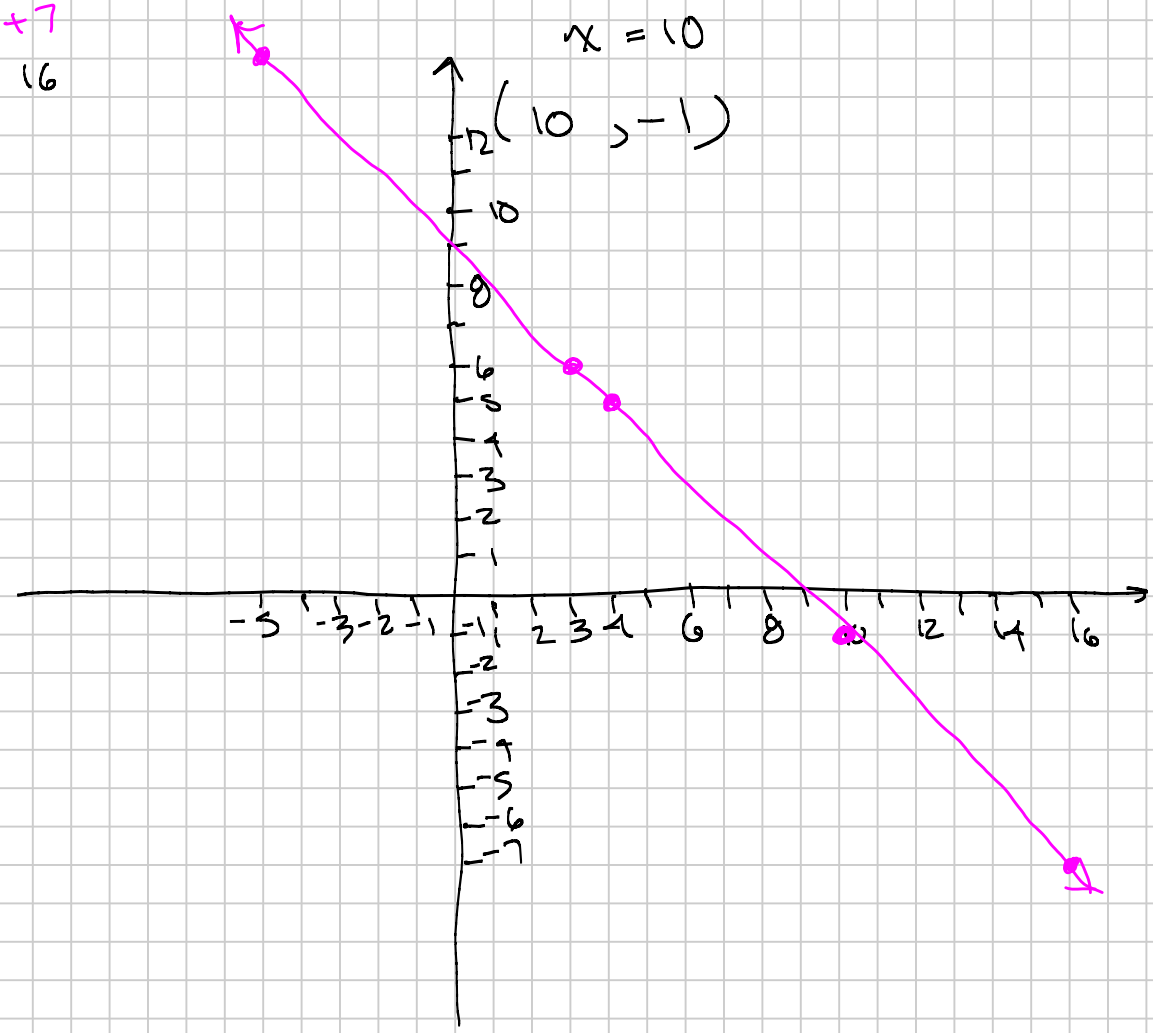
$(16, -7)$

$(10, -1)$

$(3, 6)$

$(4, 5)$

$(-5, 14)$

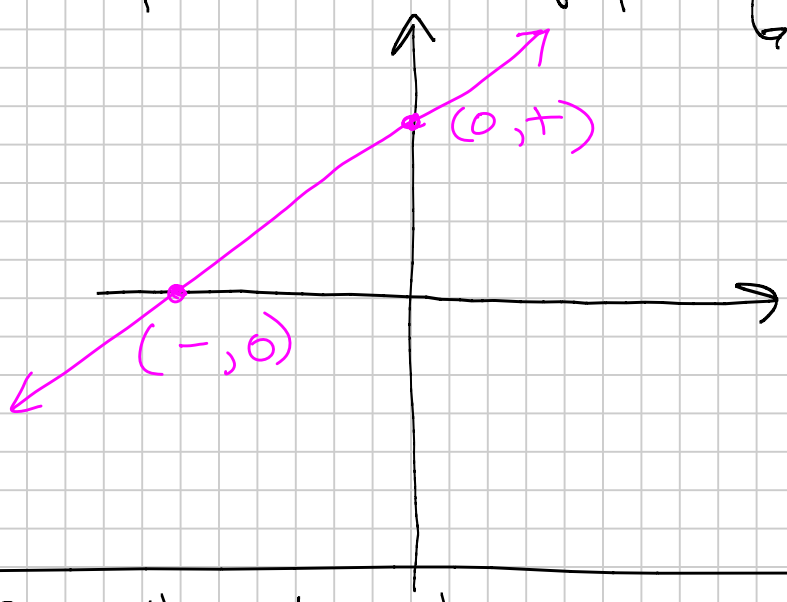


3.2: Graphing Linear Equations (cont'd)

Intercepts:

x-intercept: a point where the graph intersects the x-axis.
Has the form $(a,0)$ or just a.

y-intercept: a point where the graph intersects the y-axis.
Has the form $(0,b)$ or just b.



How to find the intercepts:

* To find the x-intercept, set $y=0$ and solve for x.
* To find the y-intercept, set $x=0$ and solve for y.

3.2.6

Ex: Find the intercepts and graph the line.

$$4x - y = 20$$

Find the x-intercept:

Set $y = 0$:

$$4x - 0 = 20$$
$$4x = 20$$
$$\frac{4x}{4} = \frac{20}{4}$$
$$x = 5$$

$(5, 0)$

Find the y-intercept:

Set $x = 0$:

$$4(0) - y = 20$$
$$0 - y = 20$$
$$-y = 20$$
$$\frac{-y}{-1} = \frac{20}{-1}$$
$$y = -20$$

$(0, -20)$

Find an extra point:

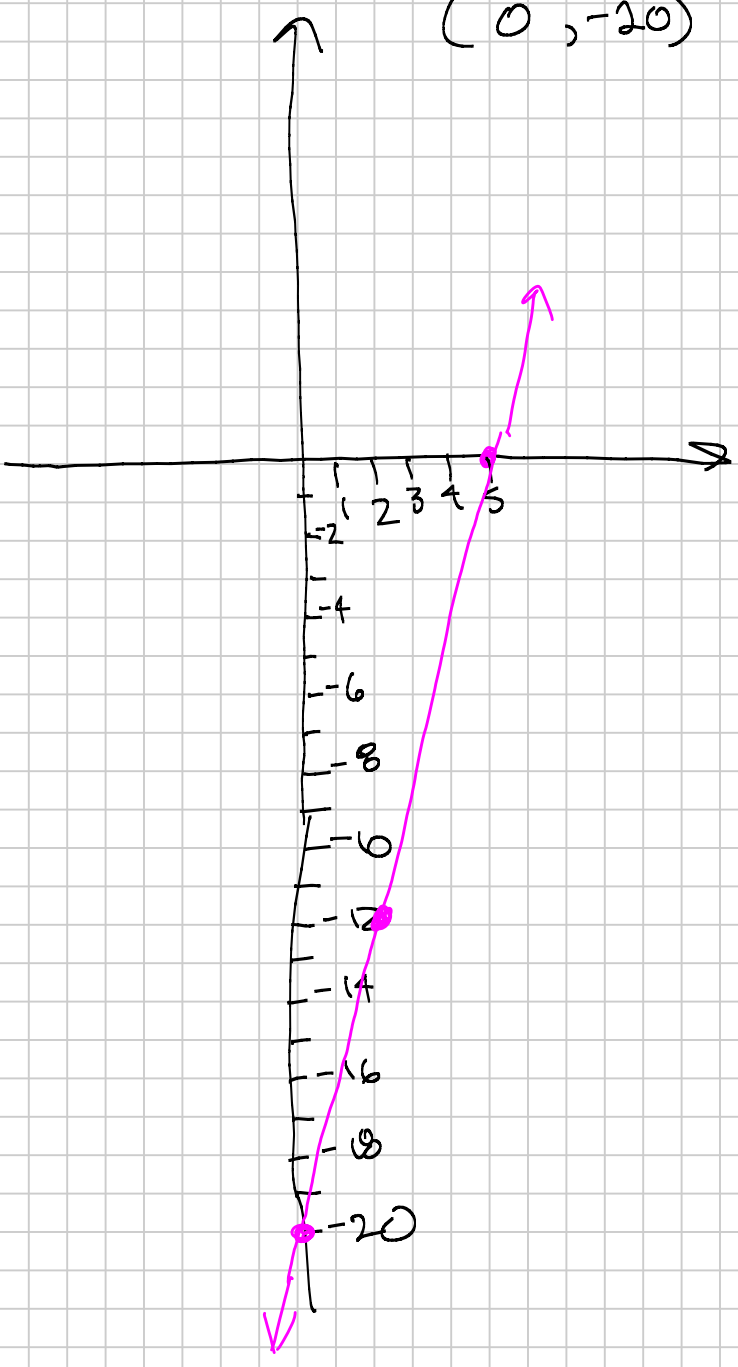
$x = 2$

$$4x - y = 20$$
$$4(2) - y = 20$$
$$8 - y = 20$$
$$-8 \quad -8$$
$$-y = 12$$
$$\frac{-y}{-1} = \frac{12}{-1}$$
$$y = -12$$

$(2, -12)$

$(0, -20)$

$(5, 0)$



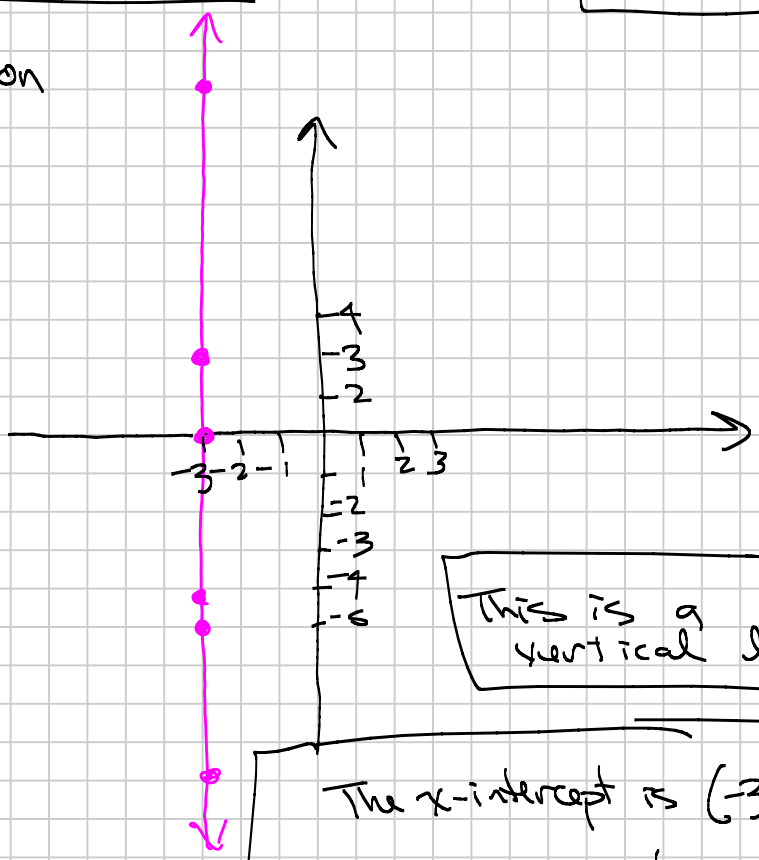
Horizontal and Vertical Lines

3.2.6

Ex: Graph the equation

$$x = -3$$

$(-3, 0)$
$(-3, 9)$
$(-3, 2)$
$(-3, -5)$
$(-3, -9)$
$(-3, -4\frac{1}{3})$



This is a vertical line

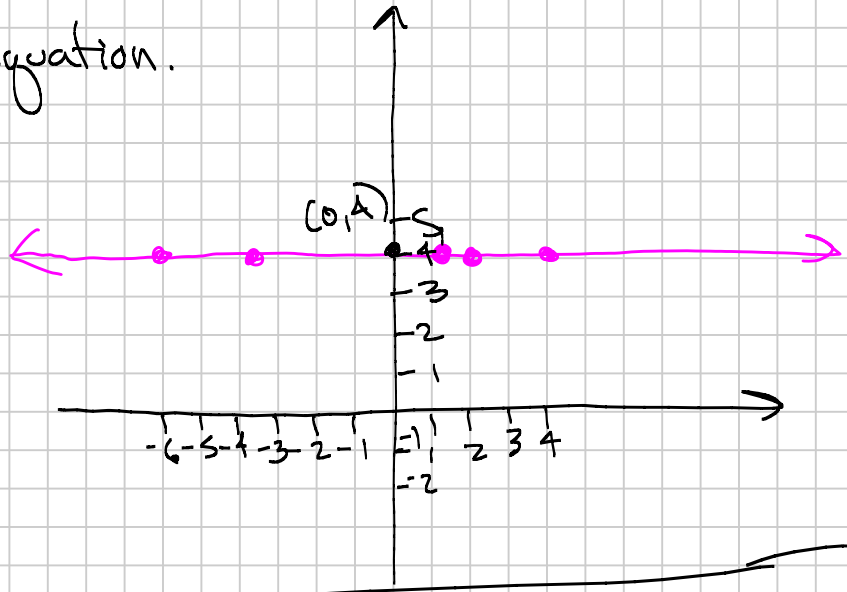
The x-intercept is $(-3, 0)$ or just -3.

There is no y-intercept

Ex: Graph the equation.

$$y = 4$$

$(1, 4)$
$(2, 4)$
$(-3\frac{3}{4}, 4)$
$(4, 4)$
$(-6, 4)$



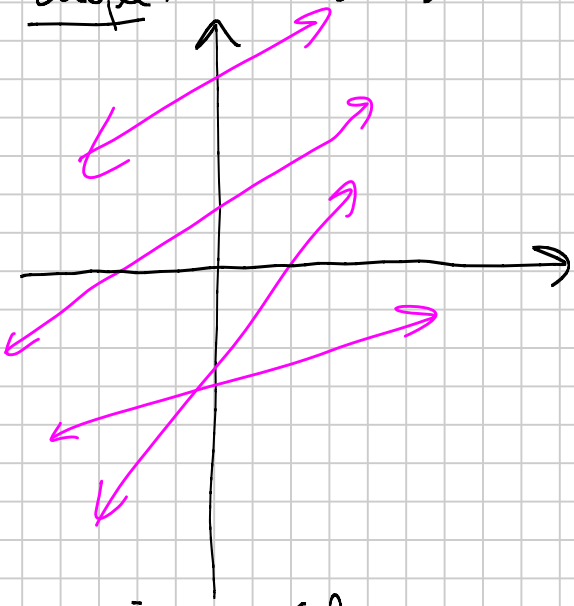
This is a horizontal line.

There is no x-intercept.

The y-intercept is $(0, 4)$ or just 4.

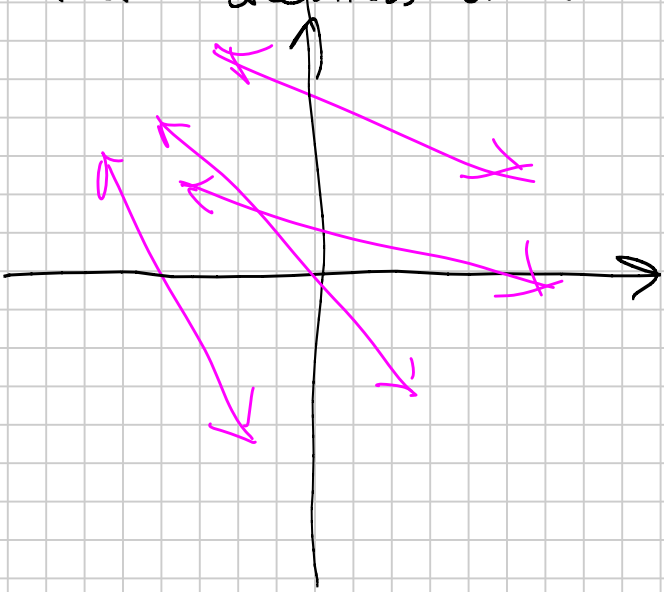
3.3: Slope of a Line

Slope: measures the direction and steepness of a line.



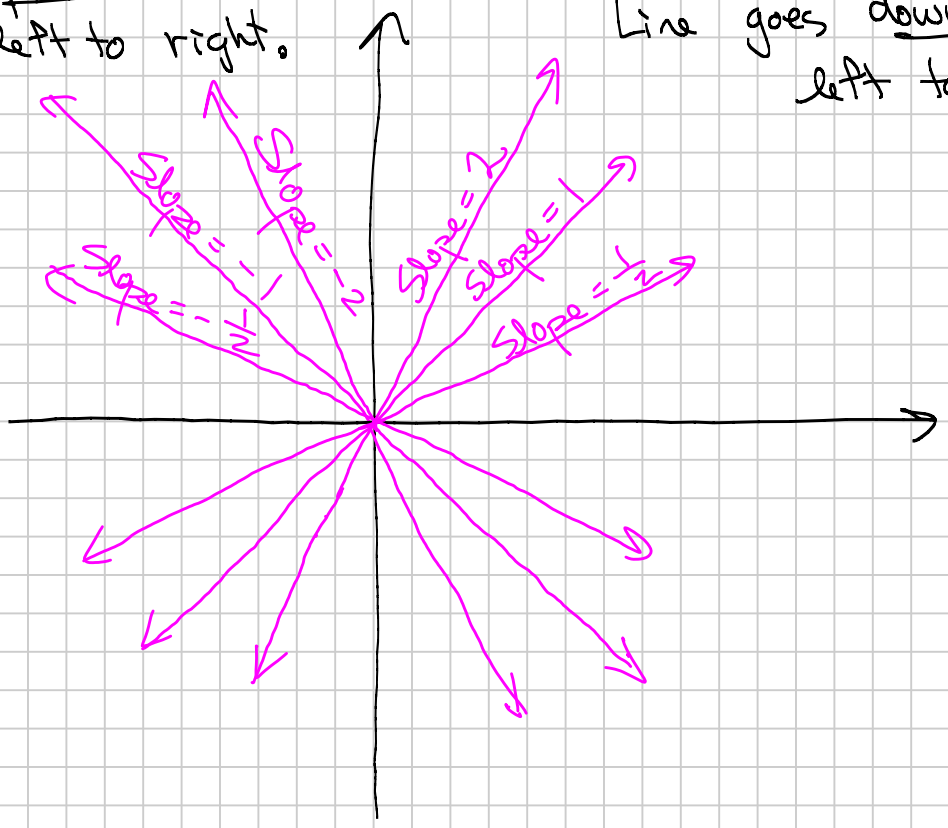
Positive Slopes

Line goes uphill from left to right.



Negative Slopes

Line goes downhill from left to right.



For positive slopes, larger slope $\Rightarrow$ closer to vertical (steeper)

For negative slopes, note that $-2 < -1$

3.3.2

Definition: The slope of a line is $m = \frac{y_2 - y_1}{x_2 - x_1}$, where (x_1, y_1) and (x_2, y_2) are any points on the line.

$$\text{Slope} = \frac{\text{vertical change}}{\text{horizontal change}} = \frac{\text{"Rise"}}{\text{Run}}$$

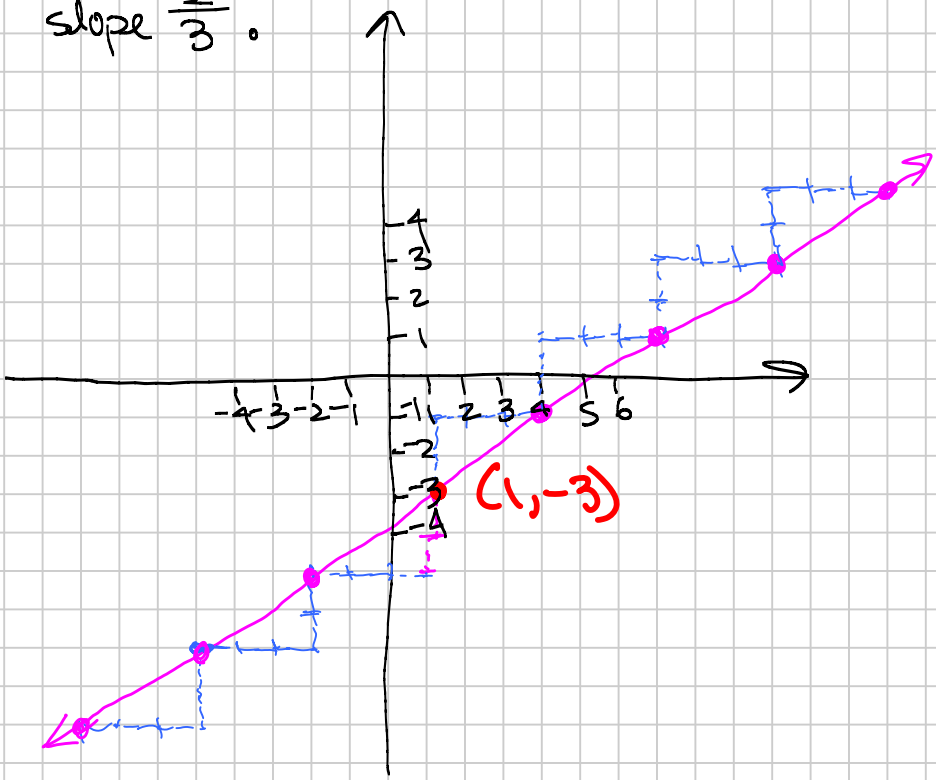
Ex: Graph the line that passes through the point $(1, -3)$ and has slope $\frac{2}{3}$.

Slope: $m = +\frac{2}{3}$

$\frac{\text{Rise}}{\text{Run}} = \frac{2}{3}$

Rise = vertical change = 2

Run = horizontal change = 3



Ex: Graph the line that passes through $(-1, -2)$ and has slope -3.

Slope: $m = -3 = -\frac{3}{1}$

Rise = vertical change: 3

Run = horizontal change: 1