1.1 Tables & Graphs of Linear Equations

linear equation - an equation that graphs as a straight line
- the degree of its variable(s) will be 1

Example 1: Are the following linear? Why or why not?

a) $y = x^2 + 3$
not linear
degree = 2

b) $4x + 2y = -8$
linear
degree = 1

c) $y = \frac{1}{x}$
not linear
÷ by variable

Example 2: Determine whether each table represents a linear relationship between x and y. If the relationship is linear, write the ordered pair that would appear next in the table.

a)

x	y
1	5
2	2
3	-1
4	-4

+1, +1, +1; -3, -3, -3

5, -7
linear

b)

x	y
3	8
7	9
11	10
15	11

+4, +4, +4; +1, +1, +1

19, 12
linear

c)

x	y
6	12
7	14
8	17
9	21

+1, +1, +1; +2, +3, +4

not linear

1.2 Slopes and Intercepts

SLOPE

$$m = \frac{\text{rise}}{\text{run}} \quad \text{or} \quad m = \frac{y_2 - y_1}{x_2 - x_1} \qquad \frac{\Delta y}{\Delta x}$$

Example 3: Find the slope of the line containing the points (3,5) and (-2,-6).

$x_1\ y_1 \qquad x_2\ y_2$

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-6-5}{-2-3} = \frac{-11}{-5} \qquad m = \frac{11}{5}$$

x-intercept – where the graph of a linear equation crosses the x-axis
– to find, set y = 0 and solve for x

y-intercept – where the graph of a linear equation crosses the y-axis
– to find, set x = 0 and solve for y

Example 4: Use intercepts to graph the equation $3x + 6y = -18$.

x-int

$3x + 6(0) = -18$

$\frac{3x}{3} = \frac{-18}{3}$

$x = -6$

$(-6, 0)$

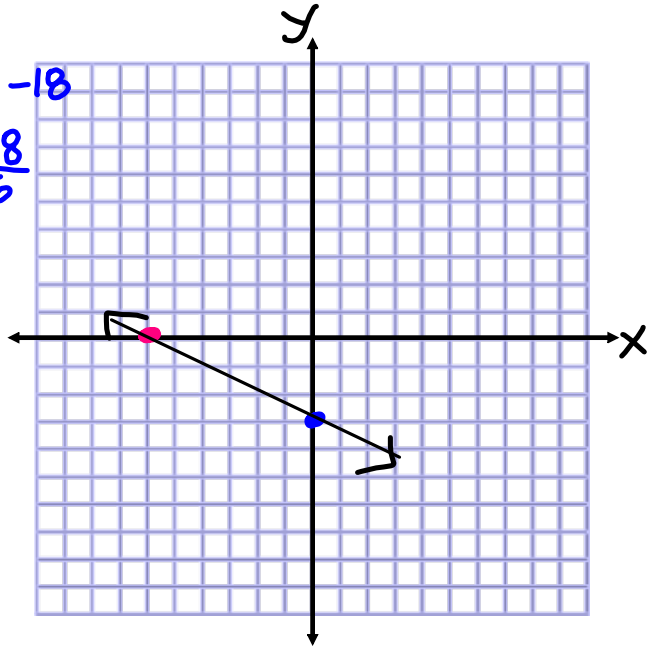
y-int

$3(0) + 6y = -18$

$\frac{6y}{6} = \frac{-18}{6}$

$y = -3$

$(0, -3)$



Example 5: Use intercepts to graph the equation $5x - 4y = 8$.

x-int

$5x - 4(0) = 8$

$\frac{5x}{5} = \frac{8}{5}$

$x = \frac{8}{5}$

$(\frac{8}{5}, 0)$

$(1\frac{3}{5}, 0)$

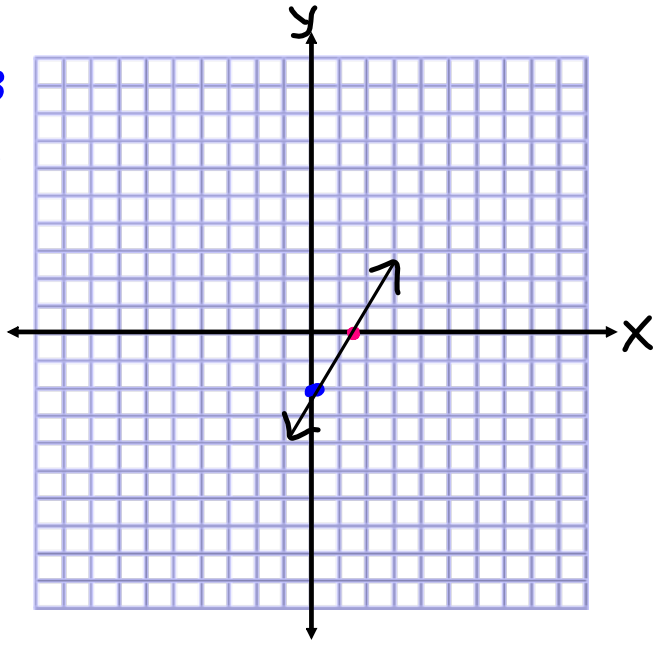
y-int

$5(0) - 4y = 8$

$\frac{-4y}{-4} = \frac{8}{-4}$

$y = -2$

$(0, -2)$



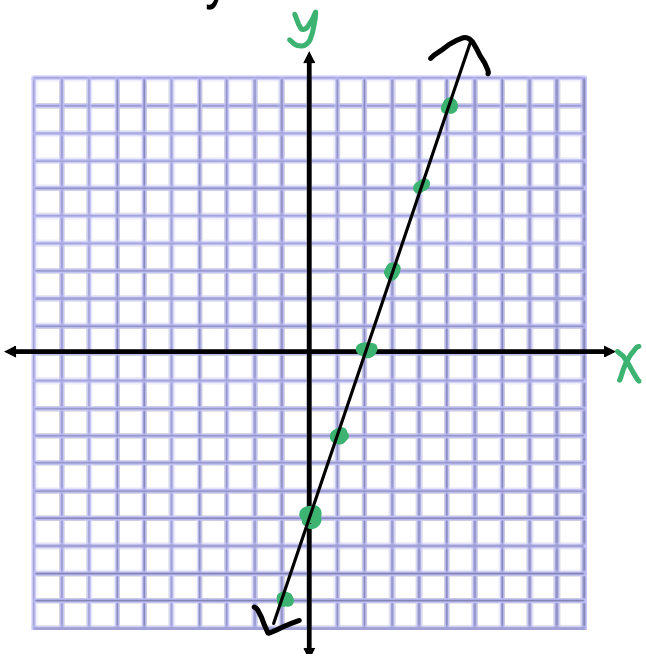
slope-intercept form: $y = mx + b$ where
m = slope & b = y-intercept
start

Example 6: Use the slope and y-intercept to graph the equation -3x + y = -6.

$-3x + y = -6$
$+3x \quad +3x$
$y = 3x - 6$

$m = \frac{3}{1}$ rise / run

y-int = -6

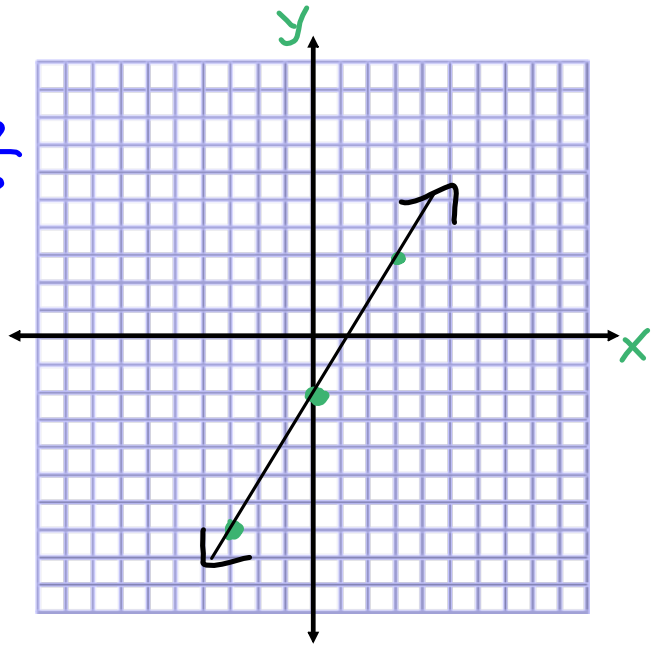


Example 7: Use the slope and y-intercept to graph the equation 5x - 3y = 6.

$5x - 3y = 6$
$-5x \quad -5x$
$\frac{-3y}{-3} = \frac{-5x}{-3} + \frac{6}{-3}$
$y = \frac{5}{3}x - 2$

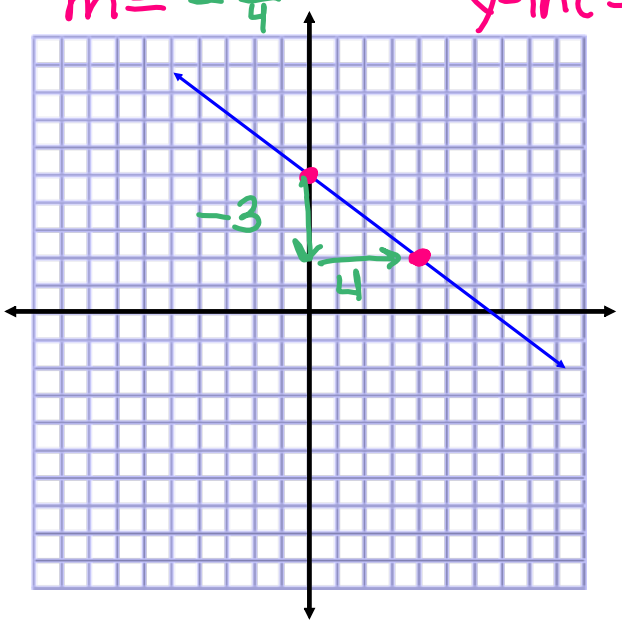
$m = \frac{5}{3}$ rise / run

y-int = -2



Example 8: Write the equation in slope-intercept form of the line graphed.

$m = -\frac{3}{4}$ y-int = 5



$y = -\frac{3}{4}x + 5$

standard form of a linear equation

- Ax + By = C, where A, B, & C are not fractions or decimals, and A & B are not both 0

Example 9: Rewrite each equation in standard form.

a) $y = -2x + 8$

$+2x \quad +2x$

$2x + y = 8$

Find common denom.

b) $\frac{1}{2}x - \frac{3}{4}y = -3$

$4\left(\frac{1}{2}x - \frac{3}{4}y\right) = 4(-3)$

$4 \cdot \frac{1}{2}x - 4 \cdot \frac{3}{4}y = 4(-3)$

$2x - 3y = -12$

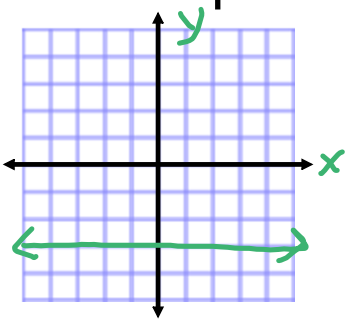
horizontal lines – have a slope of 0
– in the form of y = #

vertical lines – have an undefined slope
– in the form of x = #

Example 10: Graph each equation.

a) y = -3

hor.



b) x = 4

vert.