

MATH 020 Support 4: Graphs of Linear Equations

Linear Equation in Two Variables

$$Ax + By = C \quad \text{Standard Form of a Line}$$

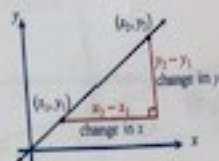
$$y = mx + b \quad \text{Slope-Intercept Form}$$

The Slope of a Line

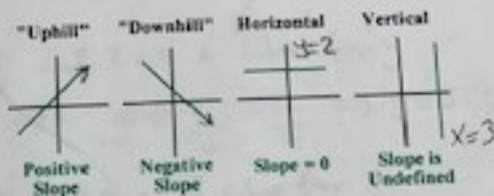
$$\text{slope} = \frac{\text{vertical change}}{\text{horizontal change}} = \frac{\text{rise}}{\text{run}}$$

The slope of a line passing through two points (x_1, y_1) and (x_2, y_2) is

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$



- The slope of a horizontal line: $m = 0$
- The slope of a vertical line: $m = \text{undefined}$

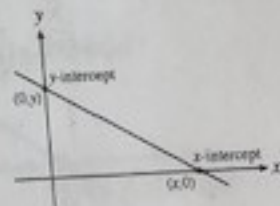


Intercepts

The x-intercept is the point where the graph intersects the x-axis. The y-intercept is the point where the graph intersects the y-axis.

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

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



$y = -2x + 8$
To find x-intercept, let $y = 0$, $0 = -2x + 8 \Rightarrow 2x = 8 \Rightarrow x = 4$ (4, 0) x-int
To find y-intercept, let $x = 0$, $y = -2(0) + 8 \Rightarrow y = 8$ (0, 8) y-int

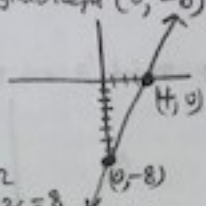
Problems

Find the slope and y-intercept of the line and then graph

1. $y = 2x - 8$ slope = 2

$2(0) - 8 = 0 - 8$
y-intercept $(0, -8)$

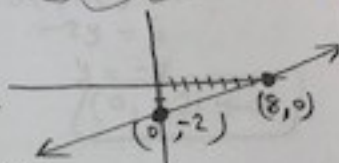
To find x-intercept let $y = 0$
& solve for x
 $0 = 2x - 8$
 $8 = 2x \Rightarrow x = 4$



2. $y = \frac{1}{4}x - 2$ slope = $\frac{1}{4}$

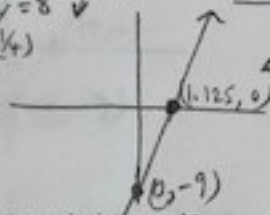
y-intercept = $(0, -2)$
 $0 = \frac{1}{4}x - 2$

$\frac{1}{4}x = 2$
 $x = 2 \cdot 4 = 8$
 $(8, 0)$



3. $y = 8x - 9$

No y-intercept
4. $x = -3$
slope = undefined
x-intercept $(-3, 0)$
5. $y = 7$
No x-intercept
slope = 0
y-intercept $(0, 7)$



Graph the equation by first finding the x and y intercepts.

6. $3x + 4y = 12$

To find y-intercept let $x = 0$ & solve for y

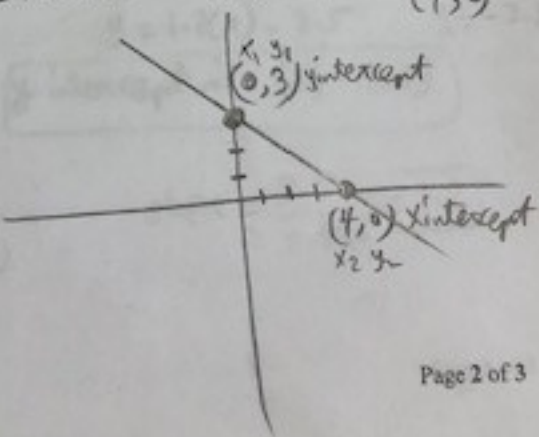
$3(0) + 4y = 12 \Rightarrow \frac{4y}{4} = \frac{12}{4} \Rightarrow y = 3$; y-intercept $(0, 3)$

To find x-intercept, let $y = 0$, & solve for x

$3x + 4(0) = 12 \Rightarrow 3x = 12 \Rightarrow x = 4$ x-intercept $(4, 0)$

$\frac{\text{Rise}}{\text{Run}} = \frac{-3}{4}$

$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{0 - 3}{4 - 0} = \frac{-3}{4}$

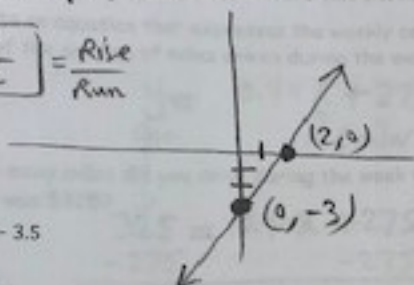


7. $3x - 2y = 6$

To find x-intercept, let $y=0$ & solve for x $3x - 2(0) = 6$
 So, x-intercept = (2, 0) $3x = 6 \quad x = 2$

To find y-intercept, let $x=0$ & solve for y

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



$3(0) - 2y = 6$
 $-2y = 6$

$y = -3$
(0, -3) y-int

8. $y = 1.2x - 3.5$

To find x-intercept, let $y=0$ & solve for x

$0 = 1.2x - 3.5$

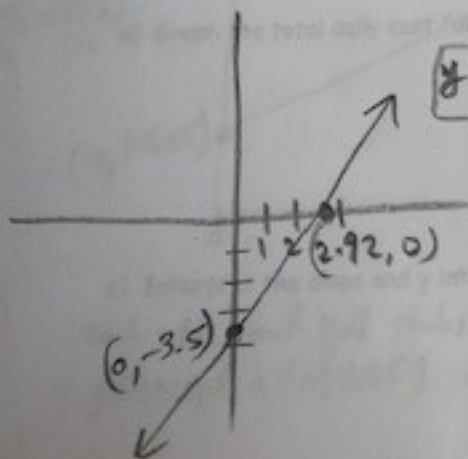
$3.5 = 1.2x \Rightarrow x = \frac{3.5}{1.2} \approx 2.92$

x-intercept is (2.92, 0)

To find y-intercept let $x=0$ & solve for y

$y = 1.2(0) - 3.5 \quad y = -3.5$

y-intercept is (0, -3.5)



slope = $\frac{3.5}{2.92} \approx 1.2$