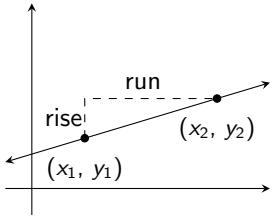
Equations of Lines in the Coordinate Plane

Today I Can

1. Graph and write linear equations.

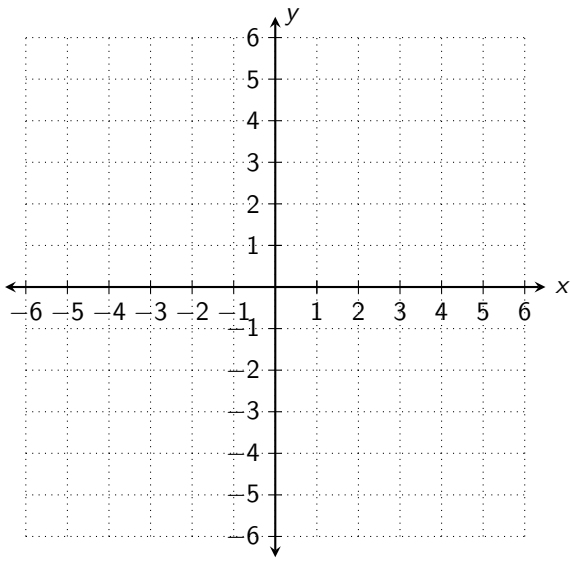
Slope

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

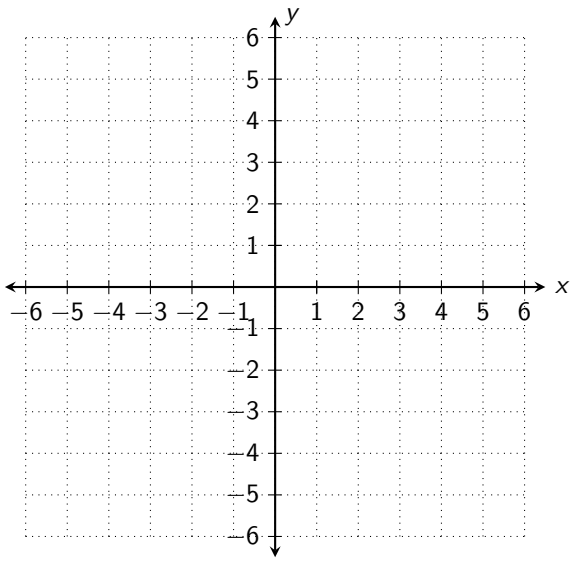


Example 1. What is the slope of the line that goes through the following pairs of points?

(a) $(-1, 2)$ and $(4, -2)$

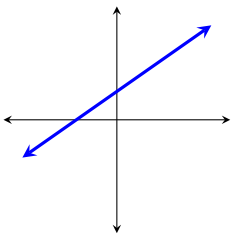


(b) $(4, 0)$ and $(4, -2)$

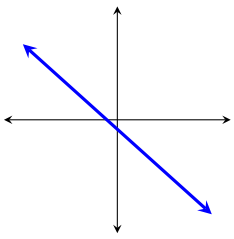


Types of Slopes

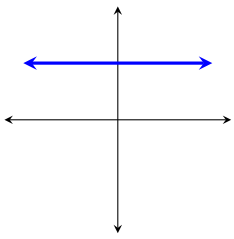
Positive Slope



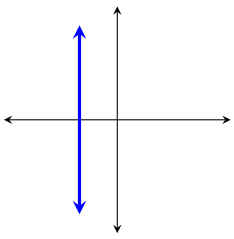
Negative Slope



Zero Slope



Undefined Slope



Forms of Linear Equations

Slope-Intercept Form

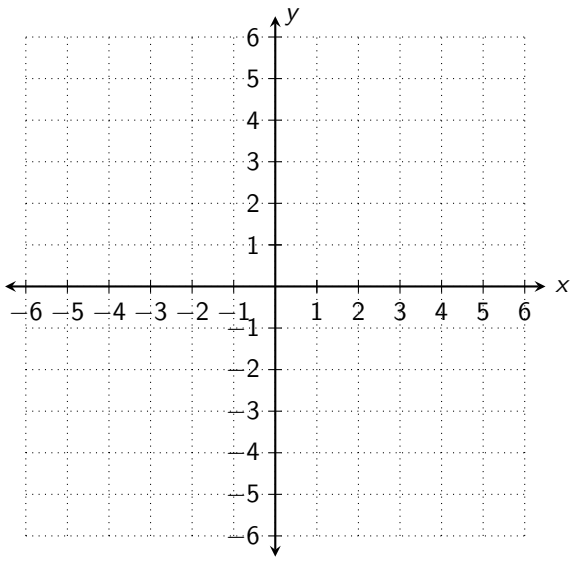
- $y = mx + b$
  - Slope is m
  - y-intercept is b

Point-Slope Form

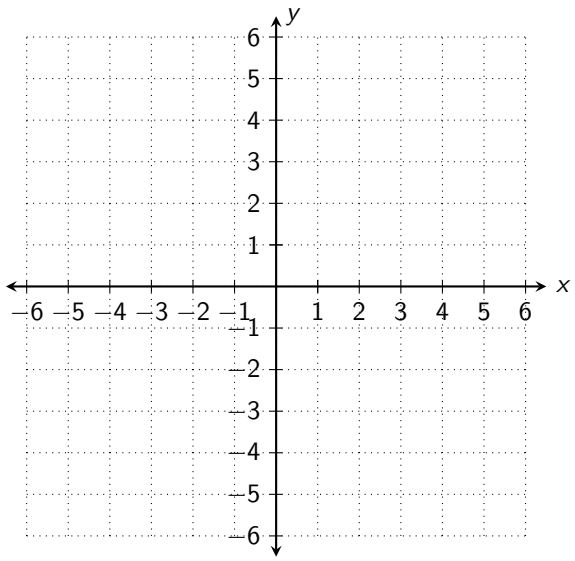
- $y - y_1 = m(x - x_1)$
  - Slope is m
  - Point on the graph with coordinates (x_1, y_1)

Example 2. Graph each of the following.

(a) $y = \frac{2}{3}x + 1$



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



You can write the equation of a line when you know its slope and at least one point on the line.

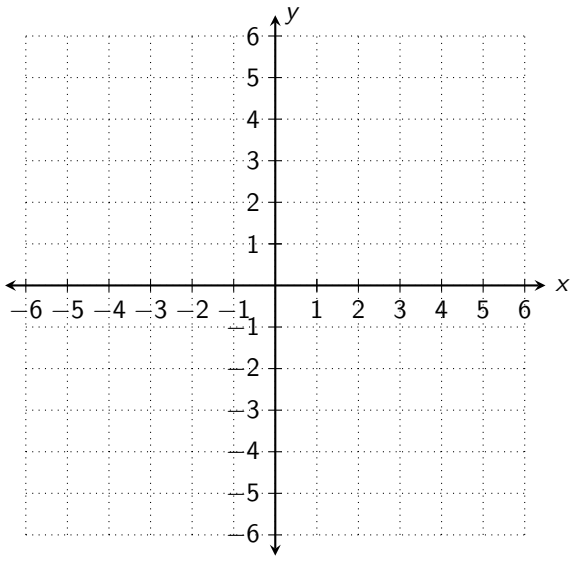
Example 3. Write the equation of the line with each condition.

(a) What is an equation of the line with slope 3 and y-intercept -5?

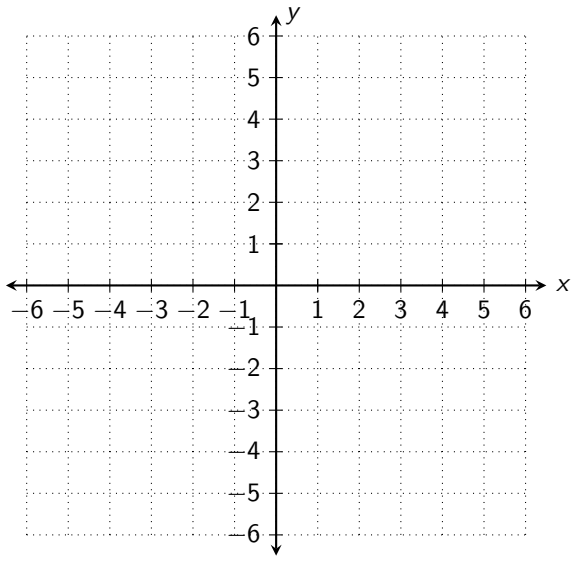
(b) What is an equation of the line through $(-1, 5)$ with slope 2?

Example 4. Write the equation of the line that goes through each pair of points.

(a) $(-2, -1)$ and $(3, 5)$



(b) $(0, 3)$ and $(2, 1)$



Example 5. What are the equations of the horizontal and vertical lines through $(2, 4)$?