

Section 1.3 Notes

Linear Functions, Slope, and Applications

1 Introduction

Standard Form of a Line

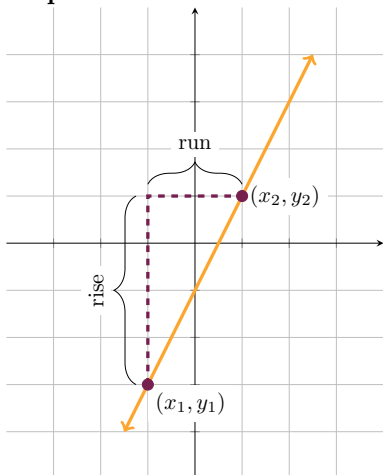
- A *linear equation* has the form

$$Ax + By = C$$

where at least one of A or B is not zero.

- This is called the *standard form* of a linear equation.
- The graph of a linear equation is a straight line.

Slope



- The *slope* of a line is the “slantedness” of that line.
- The slope is represented by the variable m , and it's given by:

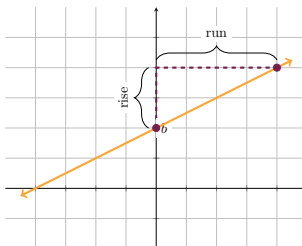
$$m = \frac{\text{rise}}{\text{run}} = \frac{y_2 - y_1}{x_2 - x_1}$$

Slope-Intercept Form

- Most lines (except vertical lines) can be written into *slope-intercept* form:

$$y = mx + b$$

- m is the slope of the line ($\frac{\text{rise}}{\text{run}}$)
- b is the y -intercept of the line

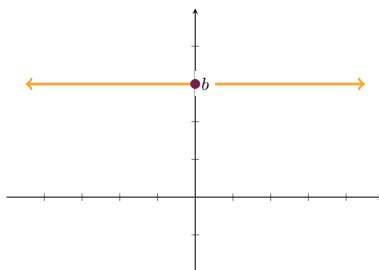


Horizontal Lines

- Horizontal lines have the equation:

$$y = b$$

- Horizontal lines have a slope of zero ($m = 0$).

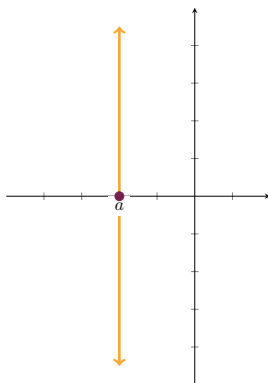


Vertical Lines

- Vertical lines have the equation:

$$x = a$$

- Vertical lines don't have a slope/their slope is undefined.



Examples

- Find the slope of the line containing the points $(2, -1)$ and $(3, -5)$.

$$-4$$

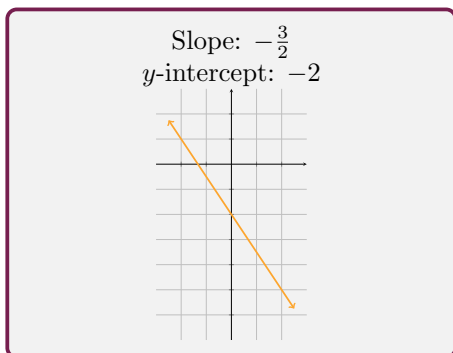
- Find the slope of the linear function $f(x)$ if $f(-1) = 6$ and $f(5) = 4$.

$$-\frac{1}{3}$$

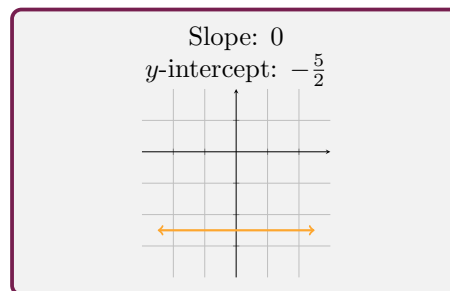
- Find the slope of the line containing the points (b^2, b^4) and $(b^2 + y, (b^2 + y)^2)$.

$$2b^2 + y$$

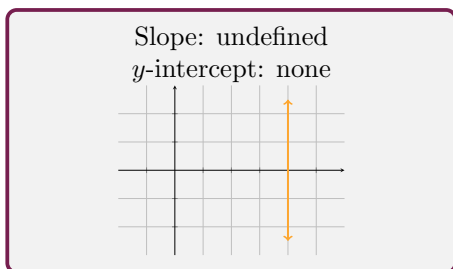
4. Find the slope (if it exists), y -intercept (if it exists), and graph the line $-3x - 2y = 4$.



5. Find the slope (if it exists), y -intercept (if it exists), and graph the line $y = -\frac{5}{2}$.



6. Find the slope (if it exists), y -intercept (if it exists), and graph the line $x = 4$.



2 Applications

Example

Superior Cable Television charges a \$95 installation fee and \$125 per month for the Star plan. Write an equation that can be used to determine the total cost, $C(t)$, for t months of the Star plan. Then find the total cost for 18 months of service.

$$C(t) = 125t + 95$$

\$2345 for 18 months of service.