8.4 The Slope of a Line

Goal: Find and interpret slopes of lines.

Vocabulary

Slope:

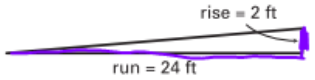
Rise:

Run:

Example 1 *Finding Slope*

A building's access ramp has a rise of 2 feet and a run of 24 feet. Find its slope.

$$\text{slope} = \frac{\text{rise}}{\text{run}} = \frac{2}{24} = \frac{1}{12}$$

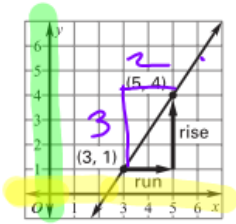


Answer: The access ramp has a slope of $\frac{1}{12}$.

Slope of a Line

Given two points on a nonvertical line, you can find the slope m of the line using this formula.

$$m = \frac{\text{rise}}{\text{run}} = \frac{\text{difference of } y\text{-coordinates}}{\text{difference of } x\text{-coordinates}}$$



Example $m = \frac{4-1}{5-3} = \frac{3}{2}$

(5, 4) x_2 y_2 (3, 1) x_1 y_1

Slope: $\frac{y_2 - y_1}{x_2 - x_1}$

Example 2 ***Finding Positive and Negative Slope***

Find the slope of the line shown.

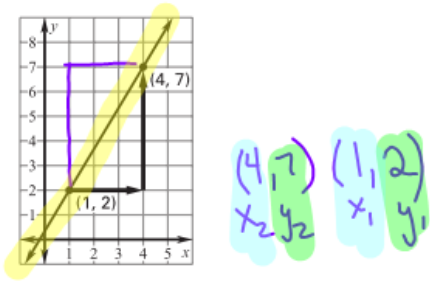
When you calculate a slope, be sure to use the *x*- and *y*-coordiantes of the two points in the same order.

a. $m = \frac{\text{rise}}{\text{run}}$

$= \frac{\text{difference of } y\text{-coordinates}}{\text{difference of } x\text{-coordinates}}$

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

$= \frac{7-2}{4-1} = \frac{5}{3}$



(4, 7) x_2 y_2 (1, 2) x_1 y_1

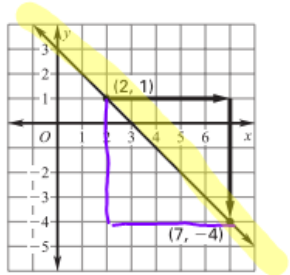
Answer: The slope is $\frac{5}{3}$.

b. $m = \frac{\text{rise}}{\text{run}} = \frac{-5}{5} = -1$

$= \frac{\text{difference of } y\text{-coordinates}}{\text{difference of } x\text{-coordinates}}$

$=$ ☐

$=$ ☐ $=$ ☐



Answer: The slope is ☐.

✔ ***Checkpoint*** **Find the slope of the line through the given points.**

1. (2, −2), (0, 4)	**2.** (7, 5), (3, 2)	**3.** (−2, 4), (6, 2)

Example 3 ***Zero and Undefined Slope***

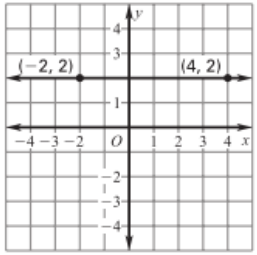
Find the slope of the line shown.

a. $m = \frac{\text{rise}}{\text{run}}$

$= \frac{\text{difference of } y\text{-coordinates}}{\text{difference of } x\text{-coordinates}}$

$= \frac{\square}{\square}$

$= \frac{\square}{\square} = \square$



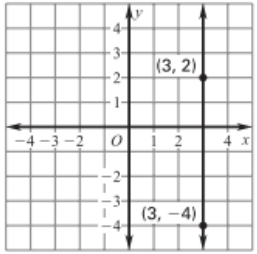
Answer: The slope is $\square$.

b. $m = \frac{\text{rise}}{\text{run}}$

$= \frac{\text{difference of } y\text{-coordinates}}{\text{difference of } x\text{-coordinates}}$

$= \frac{\square}{\square}$

$= \square$



Answer: The slope is $\square$.

Checkpoint **Find the slope of the line through the given points. Tell whether the slope is *positive*, *negative*, *zero*, or *undefined*.**

4. (3, −1), (3, 5)	**5.** (−2, 5), (3, 4)	**6.** (1, −1), (7, −1)