5-1 Reteaching

Rate of Change and Slope

The rate of the vertical change to the horizontal change between two points on a line is called the slope of the line.

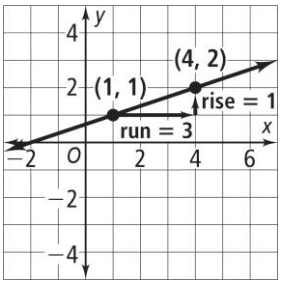
$$\textbf{slope} = \frac{\text{vertical change}}{\text{horizontal change}} = \frac{\text{rise}}{\text{run}}$$

There are two special cases for slopes.

- A horizontal line has a slope of 0.
- A vertical line has an undefined slope.

Problem

What is the slope of the line?



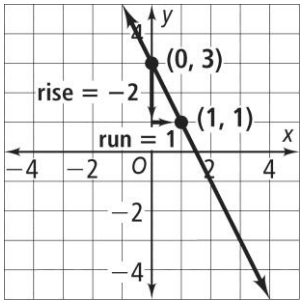
$$\text{slope} = \frac{\text{vertical change}}{\text{horizontal change}} = \frac{\text{rise}}{\text{run}}$$
$$= \frac{1}{3}$$

The slope of the line is $\frac{1}{3}$.

In general, a line that slants upward from left to right has a positive slope.

Problem

What is the slope of the line?



$$\text{slope} = \frac{\text{vertical change}}{\text{horizontal change}} = \frac{\text{rise}}{\text{run}}$$
$$= \frac{-2}{1}$$
$$= -2$$

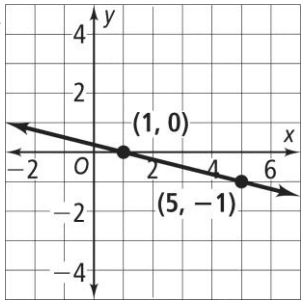
The slope of the line is −2.

In general, a line that slants downward from left to right has a negative slope.

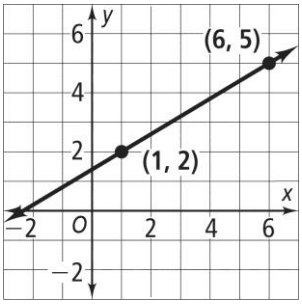
Exercises

Find the slope of each line.

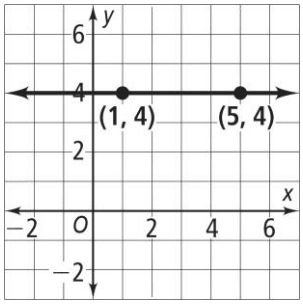
1.



2.



3.



Suppose one point on a line has the coordinates (x_1, y_1) and another point on the same line has the coordinates (x_2, y_2). You can use the following formula to find the slope of the line.

$$\textbf{slope} = \frac{\text{rise}}{\text{run}} = \frac{y_2 - y_1}{x_2 - x_1}, \text{ where } x_2 - x_1 \neq 0$$

Problem

What is the slope of the line through $R(2, 5)$ and $S(-1, 7)$?

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

$$= \frac{7 - 5}{-1 - 2} \quad \text{Let } y_2 = 7 \text{ and } y_1 = 5. \quad \text{Let } x_2 = -1 \text{ and } x_1 = 2.$$

$$= \frac{2}{-3} = -\frac{2}{3}$$

Exercises

Find the slope of the line that passes through each pair of points.

4. (0, 0), (4, 5)

5. (2, 4), (7, 8)

6. (–2, 0), (–3, 2)

7. (–2, –3), (1, 1)

8. (1, 4), (2, –3)

9. (3, 2), (–5, 3)