

5-1 Slope (Pages 256–262)

Definition of Slope	The steepness of a line in the coordinate plane is called its slope . It is defined as the ratio of the rise , or vertical change in y , to the run , or horizontal change in x , as you move from one point to the other.
Determining Slope Given Two Points	Given the coordinates of two points, (x_1, y_1) and (x_2, y_2) , on a line, the slope m of the line can be found as follows. $m = \frac{y_2 - y_1}{x_2 - x_1}, \text{ where } x_1 \neq x_2$

Examples

a. What is the slope of the line that passes through $(4, -6)$ and $(-2, 3)$?

Let $x_1 = 4, y_1 = -6, x_2 = -2,$ and $y_2 = 3.$

$$m = \frac{y_2 - y_1}{x_2 - x_1} \quad \text{Slope formula}$$

$$m = \frac{3 - (-6)}{-2 - 4} \quad \text{Substitute.}$$

$$m = \frac{9}{-6} \text{ or } -\frac{3}{2} \quad \text{Simplify.}$$

b. Find the value of r so that the line through $(r, 4)$ and $(0, 5)$ has a slope of -2 .

$$-2 = \frac{5 - 4}{0 - r} \quad \text{Slope formula with } m = -2, \text{ and } (x_1, y_1) = (r, 4), \text{ and } (x_2, y_2) = (0, 5)$$

$$\frac{-2}{1} = \frac{1}{-r}$$

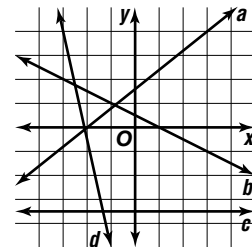
$$2r = 1 \quad \text{Find the cross products.}$$

$$r = \frac{1}{2} \quad \text{Solve for } r.$$

Practice

Determine the slope of each line using the graph at the right.

- line a
- line b
- line c
- line d



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

- $(9, 3), (7, 6)$
- $(-3, -2), (9, -5)$
- $(\frac{1}{3}, -1\frac{1}{3}), (2\frac{1}{3}, \frac{1}{3})$

Determine the value of r so the line that passes through each pair of points has the given slope.

- $(3, r), (5, -9), m = \frac{9}{2}$
- $(0, -8), (r, 0), m = -\frac{2}{5}$
- $(5, -4), (6, r), m = 2$

11. Construction Ann is building a wheelchair ramp with a 7% incline from her entryway into her sunken living room. The height of the ramp needs to be 21 cm. What will be the length of the ramp?

12. Standardized Test Practice What is the slope of the line that passes through $(1, -3)$ and $(-2, 6)$?

- A** -3 **B** -1 **C** 1 **D** 3

Answers: 1. $\frac{5}{4}$ 2. $-\frac{1}{4}$ 3. 0 4. $-\frac{9}{9}$ 5. $-\frac{2}{3}$ 6. $-\frac{1}{3}$ 7. $-\frac{4}{1}$ 8. $\frac{6}{5}$ 9. -18 10. -20 11. 300 cm or 3 m 12. A