

Lesson 2

Slope

The slope m of a line passing through points (x_1, y_1) and (x_2, y_2) is the ratio of the difference in the y -coordinates to the corresponding difference in the x -coordinates. As an equation, the slope is given by

$$m = \frac{y_2 - y_1}{x_2 - x_1}, \text{ where } x_1 \neq x_2$$

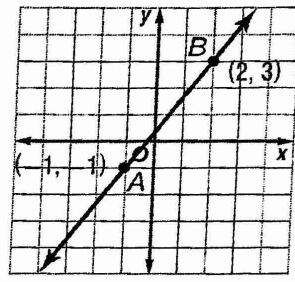
Example 1

Find the slope of the line that passes through $A(-1, -1)$ and $B(2, 3)$.

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

$$m = \frac{3 - (-1)}{2 - (-1)} \quad \begin{matrix} (x_1, y_1) = (-1, -1), \\ (x_2, y_2) = (2, 3) \end{matrix}$$

$$m = \frac{4}{3} \quad \text{Simplify.}$$



Check When going from left to right, the graph of the line slants upward. This is correct for a positive slope.

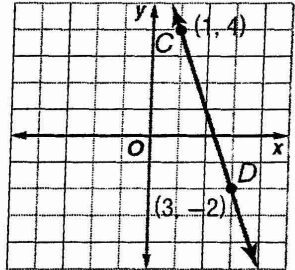
Example 2

Find the slope of the line that passes through $C(1, 4)$ and $D(3, -2)$.

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

$$m = \frac{-2 - 4}{3 - 1} \quad \begin{matrix} (x_1, y_1) = (1, 4), \\ (x_2, y_2) = (3, -2) \end{matrix}$$

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



Check When going from left to right, the graph of the line slants downward. This is correct for a negative slope.

Now Try Exercises:

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

1. $A(0, 1), B(3, 4)$

$$\frac{4-1}{3-0} = \frac{3}{3} = \boxed{1}$$

2. $C(1, -2), D(3, 2)$

$$\frac{2 - (-2)}{3 - 1} = \frac{4}{2} = \boxed{2}$$

3. $E(4, -4), F(2, 2)$

$$\frac{2 - (-4)}{2 - 4} = \frac{6}{-2} = \boxed{-3}$$

4. $G(3, 1), H(6, 3)$

$$\frac{3-1}{6-3} = \frac{2}{3} = \boxed{\frac{2}{3}}$$

5. $I(4, 3), J(2, 4)$

$$\frac{4-3}{2-4} = \frac{1}{-2} = \boxed{-\frac{1}{2}}$$

6. $K(-4, 4), L(5, 4)$

$$\frac{4-4}{5-(-4)} = \frac{0}{9} = \boxed{0}$$

Lesson 2 Skills Practice

Slope

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

1. A(-2, -4), B(2, 4)

$$\frac{4 - (-4)}{2 - (-2)} = \frac{8}{4} = \boxed{2}$$

2. C(0, 2), D(-2, 0)

$$\frac{0 - 2}{-2 - 0} = \frac{-2}{-2} = \boxed{1}$$

3. E(3, 4), F(4, -2)

$$\frac{-2 - 4}{4 - 3} = \frac{-6}{1} = \boxed{-6}$$

4. G(-3, -1), H(-2, -2)

$$\frac{-2 - (-1)}{-2 - (-3)} = \frac{-1}{1} = \boxed{-1}$$

5. I(0, 6), J(-1, 1)

$$\frac{1 - 6}{-1 - 0} = \frac{-5}{-1} = \boxed{5}$$

6. K(0, -2), L(2, 4)

$$\frac{4 - (-2)}{2 - 0} = \frac{6}{2} = \boxed{3}$$

7. O(1, -3), P(2, 5)

$$\frac{5 - (-3)}{2 - 1} = \frac{8}{1} = \boxed{8}$$

8. Q(1, 0), R(3, 0)

$$\frac{0 - 0}{3 - 1} = \frac{0}{2} = \boxed{0}$$

9. S(0, 4), T(1, 0)

$$\frac{0 - 4}{1 - 0} = \frac{-4}{1} = \boxed{-4}$$

10. U(1, 3), V(1, 5)

$$\frac{5 - 3}{1 - 1} = \frac{2}{0} = \boxed{\text{undefined}}$$

11. W(2, -2), X(-1, 1)

$$\frac{1 - (-2)}{-1 - 2} = \frac{3}{-3} = \boxed{-1}$$

12. Y(-5, 0), Z(-2, -4)

$$\frac{-4 - 0}{-2 - (-5)} = \frac{-4}{3} = \boxed{\frac{-4}{3}}$$

13. A(2, -1), B(-4, -4)

$$\frac{-4 - (-1)}{-4 - 2} = \frac{-3}{-6} = \boxed{\frac{1}{2}}$$

14. C(-2, 2), D(-4, 2)

$$\frac{2 - 2}{-4 - (-2)} = \frac{0}{-2} = \boxed{0}$$

15. E(-1, -4), F(-3, 0)

$$\frac{0 - (-4)}{-3 - (-1)} = \frac{4}{-2} = \boxed{-2}$$

16. G(7, 4), H(2, 0)

$$\frac{0 - 4}{2 - 7} = \frac{-4}{-5} = \boxed{\frac{4}{5}}$$

17. K(2, -2), L(2, -3)

$$\frac{-3 - (-2)}{2 - 2} = \frac{-1}{0} = \boxed{\text{undefined}}$$

18. M(-1, -1), N(-4, -5)

$$\frac{-5 - (-1)}{-4 - (-1)} = \frac{-4}{-3} = \boxed{\frac{4}{3}}$$

19. O(5, -3), P(-3, 4)

$$\frac{4 - (-3)}{-3 - 5} = \frac{7}{-8} = \boxed{\frac{7}{-8}}$$

20. Q(-1, -3), R(1, 2)

$$\frac{2 - (-3)}{1 - (-1)} = \frac{5}{2} = \boxed{\frac{5}{2}}$$

21. W(3, 25), X(1, 1)

$$\frac{1 - 25}{1 - 3} = \frac{-24}{-2} = \boxed{12}$$

22. Y(2, 2), Z(-5, -4)

$$\frac{-4 - 2}{-5 - 2} = \frac{-6}{-7} = \boxed{\frac{6}{7}}$$

23. C(0, -2), D(3, -2)

$$\frac{-2 - (-2)}{3 - 0} = \frac{0}{3} = \boxed{0}$$

24. G(-3, 5), H(-3, 2)

$$\frac{2 - 5}{-3 - (-3)} = \frac{-3}{0} = \boxed{\text{undefined}}$$