

Study Guide

Integration: Algebra Slopes of Lines

To find the slope of a line containing two points with coordinates (x_1, y_1) and (x_2, y_2) , use the following formula.

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

The slope of a vertical line, where $x_1 = x_2$, is undefined.

Two lines have the same slope if and only if they are parallel and nonvertical.

Two nonvertical lines are perpendicular if and only if the product of their slopes is -1 .

Example: Find the slope of the line ℓ passing through $A(2, -5)$ and $B(-1, 3)$. State the slope of a line parallel to ℓ . Then state the slope of a line perpendicular to ℓ .

Let $(x_1, y_1) = (2, -5)$ and $(x_2, y_2) = (-1, 3)$.

$$\text{Then } m = \frac{3 - (-5)}{-1 - 2} = -\frac{8}{3}.$$

Any line in the coordinate plane parallel to ℓ has slope $-\frac{8}{3}$.

Since $-\frac{8}{3} \cdot \frac{3}{8} = -1$, the slope of a line perpendicular to the line ℓ is $\frac{3}{8}$.

Find the slope of the line passing through the given points.

1. $C(-2, -4), D(8, 12)$ 2. $J(-4, 6), K(3, -10)$ 3. $P(0, 12), R(12, 0)$

4. $S(15, -15), T(-15, 0)$ 5. $F(21, 12), G(-6, -4)$ 6. $L(7, 0), M(-17, 10)$

Find the slope of the line parallel to the line passing through each pair of points. Then state the slope of the line perpendicular to the line passing through each pair of points.

7. $I(9, -3), J(6, -10)$ 8. $G(-8, -12), H(4, -1)$ 9. $M(5, -2), T(9, -6)$