

3-3 Study Guide and Intervention

Slopes of Lines

Slope of a Line The slope m of a line containing two points with coordinates (x_1, y_1) and (x_2, y_2) is given by the formula $m = \frac{y_2 - y_1}{x_2 - x_1}$, where $x_1 \neq x_2$.

Example

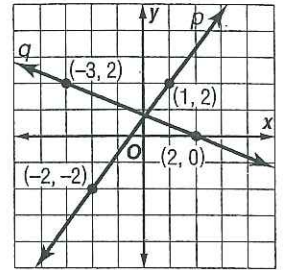
Find the slope of each line.

For line p , let (x_1, y_1) be $(1, 2)$ and (x_2, y_2) be $(-2, -2)$.

$$\begin{aligned} m &= \frac{y_2 - y_1}{x_2 - x_1} \\ &= \frac{-2 - 2}{-2 - 1} \text{ or } \frac{4}{3} \end{aligned}$$

For line q , let (x_1, y_1) be $(2, 0)$ and (x_2, y_2) be $(-3, 2)$.

$$\begin{aligned} m &= \frac{y_2 - y_1}{x_2 - x_1} \\ &= \frac{2 - 0}{-3 - 2} \text{ or } -\frac{2}{5} \end{aligned}$$



Exercises

Determine the slope of the line that contains the given points.

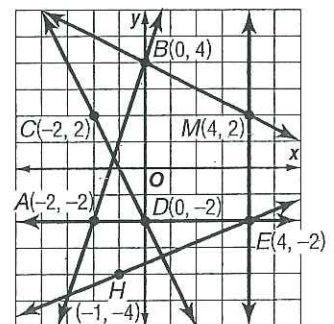
1. $J(0, 0), K(-2, 8)$

2. $R(-2, -3), S(3, -5)$

Find the slope of each line.

7. \overleftrightarrow{AB}

8. \overleftrightarrow{CD}



3-3

Study Guide and Intervention *(continued)*

Slopes of Lines

Parallel and Perpendicular Lines If you examine the slopes of pairs of parallel lines and the slopes of pairs of perpendicular lines, where neither line in each pair is vertical, you will discover the following properties.

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

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

Example 1

Find the slope of a line parallel to the line containing $A(-3, 4)$ and $B(2, 5)$.

Find the slope of \overline{AB} . Use $(-3, 4)$ for (x_1, y_1) and use $(2, 5)$ for (x_2, y_2) .

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

$$= \frac{5 - 4}{2 - (-3)} \text{ or } \frac{1}{5}$$

The slope of any line parallel to \overline{AB} must be $\frac{1}{5}$.

Example 2

Find the slope of a line perpendicular to \overline{PQ} for $P(-2, -4)$ and $Q(4, 3)$.

Find the slope of \overline{PQ} . Use $(-2, -4)$ for (x_1, y_1) and use $(4, 3)$ for (x_2, y_2) .

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

$$= \frac{3 - (-4)}{4 - (-2)} \text{ or } \frac{7}{6}$$

Since $\frac{7}{6} \cdot \left(-\frac{6}{7}\right) = -1$, the slope of any line perpendicular to \overline{PQ} must be $-\frac{6}{7}$.

Exercises

Determine whether \overline{MN} and \overline{RS} are parallel, perpendicular, or neither.

1. $M(0, 3), N(2, 4), R(2, 1), S(8, 4)$

2. $M(-1, 3), N(0, 5), R(2, 1), S(6, -1)$

Find the slope of \overline{MN} and the slope of any line perpendicular to \overline{MN} .

7. $M(2, -4), N(-2, -1)$

8. $M(1, 3), N(-1, 5)$

3-3 Practice

Slopes of Lines

Determine the slope of the line that contains the given points.

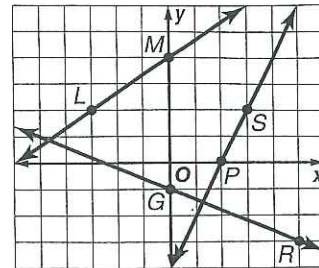
1. $B(-4, 4), R(0, 2)$

Find the slope of each line.

3. \overline{LM}

5. a line parallel to \overline{GR}

6. a line perpendicular to \overline{PS}

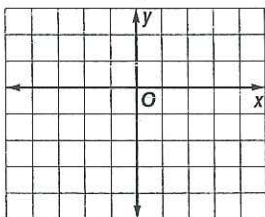


Determine whether \overline{KM} and \overline{ST} are parallel, perpendicular, or neither.

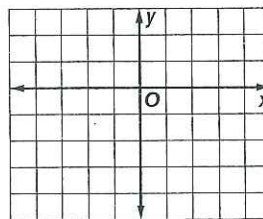
7. $K(-1, -8), M(1, 6), S(-2, -6), T(2, 10)$

Graph the line that satisfies each condition.

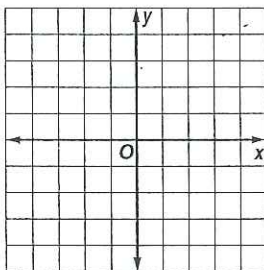
11. slope = $-\frac{1}{2}$, contains $U(2, -2)$



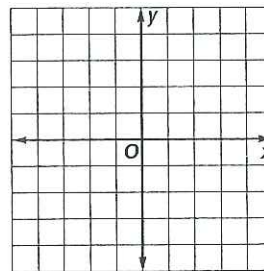
12. slope = $\frac{4}{3}$, contains $P(-3, -3)$



13. contains $B(-4, 2)$, parallel to \overline{FG} with $F(0, -3)$ and $G(4, -2)$



14. contains $Z(-3, 0)$, perpendicular to \overline{EK} with $E(-2, 4)$ and $K(2, -2)$



15. **PROFITS** After Take Two began renting DVDs at their video store, business soared. Between 2000 and 2003, profits increased at an average rate of \$12,000 per year. Total profits in 2003 were \$46,000. If profits continue to increase at the same rate, what will the total profit be in 2009?