

Geometry Notes Section 3-5

Slopes of Lines

Oct 23

The slope of a line describes how steep the line is. You can find the slope by writing the ratio of the rise to the run.

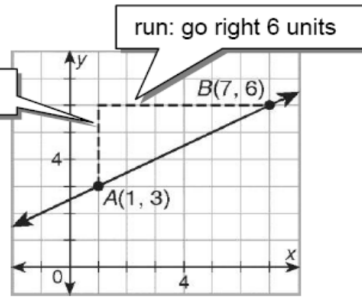
$$\text{slope} = \frac{\text{rise}}{\text{run}} = \frac{3}{6} = \frac{1}{2}$$

You can use a formula to calculate the slope m of the line through points (x_1, y_1) and (x_2, y_2) .

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

Change in y-values

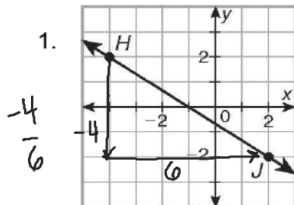
Change in x-values



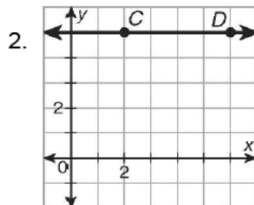
To find the slope of \overline{AB} using the formula, substitute $(1, 3)$ for (x_1, y_1) and $(7, 6)$ for (x_2, y_2) .

$$\text{Slope formula } m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{6 - 3}{7 - 1} = \frac{3}{6} = \frac{1}{2}$$

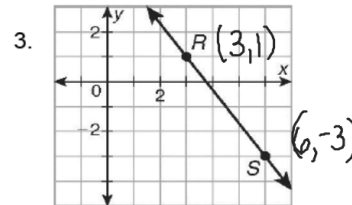
Use the slope formula to determine the slope of each line.



$$\begin{aligned} H(-4, 2) \\ J(2, -2) \\ \text{slope} = \frac{2 - (-2)}{-4 - (2)} \\ = \frac{4}{-6} = -\frac{2}{3} \end{aligned}$$



$$\begin{aligned} C(2, 5) \\ D(6, 5) \\ \text{slope} = \frac{5 - 5}{2 - 6} \\ = \frac{0}{-4} = 0 \end{aligned}$$

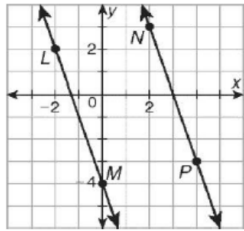


$$\frac{1 - (-3)}{3 - 6} = \frac{4}{-3}$$

Summary: Slope of a Line			
Positive Slope	Negative Slope	Zero Slope	Undefined Slope
		horizontal 	vertical lines

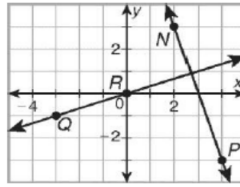
$$\frac{\text{rise} = \#}{\text{run} = 0} \rightarrow \text{undefined } \#$$

Slopes of Parallel and Perpendicular Lines



slope of $\overline{LM} = -3$
slope of $\overline{NP} = -3$

Parallel lines have the same slope.



slope of $\overline{NP} = -3$
slope of $\overline{QR} = \frac{1}{3}$

product of slopes:

$$-3\left(\frac{1}{3}\right) = -1$$

Perpendicular lines have slopes that are *opposite reciprocals*. The product of the slopes is -1 .

Use slopes to determine whether each pair of distinct lines is parallel, perpendicular, or neither.

5. slope of $\overline{BC} = -\frac{5}{3}$

6. slope of $\overline{EF} = -\frac{3}{4}$

7. slope of $\overline{WX} = \frac{1}{2}$ *neither*

slope of $\overline{ST} = \frac{3}{5}$

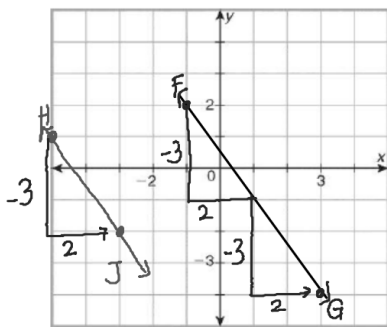
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slope of $\overline{CD} = -\frac{3}{4}$

parallel

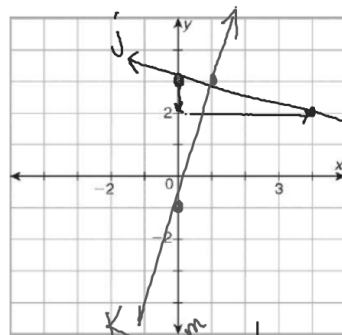
slope of $\overline{YZ} = -\frac{1}{2}$

Graph each pair of lines. Use slopes to determine whether the lines are parallel, perpendicular, or neither.



8. \overline{FG} and \overline{HJ} for $F(-1, 2)$, $G(3, -4)$, $H(-5, 1)$, and $J(-3, -2)$

parallel



slope-intercept form
 $y = mx + b$
↓ slope (0, b)
↓ y-int.

9. line $j : y = \frac{-1}{4}x + 3$ (0, 3)

line $k : y = 4x - 1$ (0, -1)

perpendicular