

3.5 & 3.6 – Slope, Parallel, and Perpendicular Lines

$$\text{rise} \downarrow = \frac{\Delta y}{\Delta x}$$

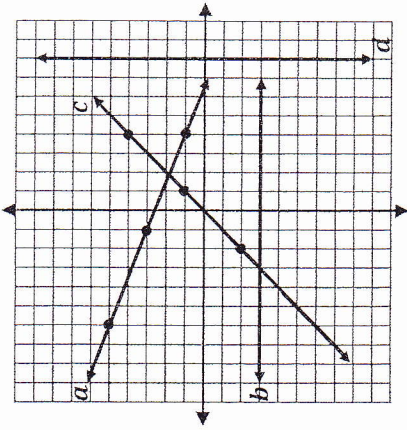
$$\text{run} \leftrightarrow$$

Slope of line a: $-\frac{2}{5}$

Slope of line b: 0

Slope of line c: $+\frac{3}{3} = 1$

Slope of line d: Undefined
U.N.D



• Slope is represented by the letter "m".

SLOPE FORMULA

Given two points (x_1, y_1) and (x_2, y_2)

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

Find the slope of the line through the points:

1. $(-2, 3)$ and $(4, 8)$

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

2. $(7, -6)$ and $(-5, 2)$

$$m = \frac{-6-2}{7-(-5)} = \frac{-8}{12} = \frac{-2}{3}$$

3. $(1, 2)$ and $(5, 2)$

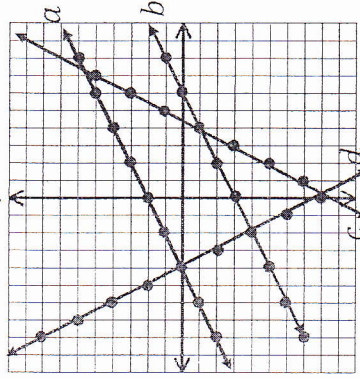
$$m = \frac{2-2}{5-1} = \frac{0}{4} = 0$$

4. $(2, 1)$ and $(2, 5)$

$$m = \frac{1-5}{2-2} = \frac{-4}{0}$$

U.N.D

Find the slope of each line.



Slope of line a: $\frac{1}{2}$

Slope of line b: $\frac{1}{2}$

Slope of line c: 2

Slope of line d: -2

Compare the lines.

- a & b have the same slope & look //.
- a & d look \perp .

Lines that are parallel have slopes that are equal.

Lines that are perpendicular have slopes that are

opposite reciprocals.

Fill in the chart.

Given the slope	A slope parallel	A slope perpendicular
$\frac{2}{3}$	$\frac{2}{3}$	$-\frac{3}{2}$
-4	-4	$\frac{1}{4}$
$\frac{1}{-4}$	$-\frac{1}{4}$	4
2	2	$-\frac{1}{2}$

Determine if the given lines are parallel, perpendicular or neither.

5. $y = -\frac{1}{2}x + 4$ 6. $y = 3x + 7$ 7. $y = \frac{x}{7} - 6$

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

$m = 3$

$m = \frac{1}{7}$

$y = 2x - 8$

$y = -3x + 2$

$y = \frac{1}{7}x$

$m = 2$

$m = -3$

$m = \frac{1}{7}$

\perp

Neither

\parallel

8. $-4x + y = 5$

$y = 4x + 5$

$x + 4y = 4$

$4y = -x + 4$

$y = -\frac{1}{4}x + 1$

9. $-5x + y = 3$

$y = 5x + 3$

$5x + y = 8$

$y = -5x + 8$

10. $3y = x - 12$

$y = \frac{1}{3}x - 4$

$3y = x + 6$

$y = \frac{1}{3}x + 2$

\perp

Neither

\parallel

Write the equation of a line given the following:

11. slope = 3; y-intercept = -2

• Use slope-intercept form.

$y = \underline{m}x + \underline{b}$ * Plug in for m & b.

$y = 3x - 2$

12. $(-3, 4)$ & $(5, -7)$

• Use point-slope form.

$y - \underline{y}_1 = \underline{m}(x - \underline{x}_1)$ * Plug in for m, x_1 , & y_1 .

$y - 4 = \frac{-11}{8}(x + 3)$ $m = \frac{-7 - 4}{5 - (-3)} = \frac{-11}{8}$

OR

$y + 7 = -\frac{11}{8}(x - 5)$

To change from point-slope to slope-intercept form:

$y - 4 = 2(x + 3)$

$y - 4 = 2x + 6$

$y = 2x + 10$