

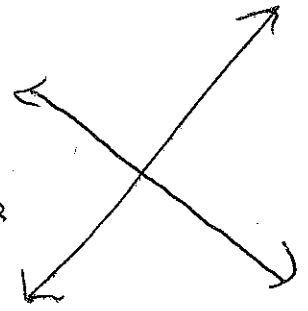
Perpendicular Lines

Perpendicular lines have slopes that are ^(negative) opposite reciprocals.

Opposite = different signs (positive or negative)

Reciprocals = flip the fraction (To make an integer a fraction, put a number over 1)

Def: Perpendicular lines will intersect each other at a 90 degree angle.



Example 1:

$y = -2x + 1 \rightarrow \text{Slope} = \frac{-2}{1}$ 1) opposite 2) reciprocals
 $y = \frac{1}{2}x - 3 \rightarrow \text{Slope} = \frac{1}{2}$

Since the slopes of both these lines are opposite reciprocals, then these two lines are perpendicular.

Example 2:

Symbol: \perp

d. Given $y = 10x$, write a linear equation that is perpendicular to the given line.

$m = 10$ perpendicular slope $\perp m = -\frac{1}{10}$
 Perpendicular line = $y = -\frac{1}{10}x$

e. Given $y = -\frac{1}{2}x - 4$, write a linear equation that is perpendicular to the given line.

$m = -\frac{1}{2}$ perpendicular slope $\perp m = 2$ $\frac{2}{1} = 2$
 Perpendicular line = $y = 2x$

f. Given $y = -3x + 9$, write a linear equation that is perpendicular to the given line.

$m = -3$ perpendicular slope $\perp m = \frac{1}{3}$
 Perpendicular line = $y = \frac{1}{3}x$

Example 3:

Math 2 sets of equations that are perpendicular to one another: (Hint: solve for y to see the slope.)

Line A. $y = 2x + 2$

Line B. $y = \frac{1}{3}x + 1$

Line C. $2y + x = -8$

Line D. $y + 3x = 4$

$\frac{2y}{2} = \frac{-x-8}{2}$
 $y = -\frac{1}{2}x - 4$

$y = -3x + 4$

Slope for A = 2

Slope for B = $\frac{1}{3}$

Slope for C = $-\frac{1}{2}$

Slope for D = -3

Lines A and C are perpendicular because their slopes are 2 and $-\frac{1}{2}$.

Lines B and D are perpendicular because their slopes are $\frac{1}{3}$ and -3.

Notes: Parallel & Perpendicular Lines

Parallel Lines

Parallel lines have the same slope but different y-intercepts.
 Parallel lines will never intersect with each other.

$y = mx + b$

Example 1:

$y = 2x + 1 \rightarrow$ Slope = 2

$y = 2x - 3 \rightarrow$ Slope = 2

2 \neq different y-intercept

Since both lines have a slope of 2, then these two lines are parallel.

Example 2:

- a. Given $y = 10x$, write a linear equation that is parallel to the given line.

Parallel line \equiv $y = 10x + 2$

- b. Given $y = 5x - 4$, write a linear equation that is parallel to the given line.

Parallel line \equiv $y = 5x - 2$

- c. Given $y = -3x + 9$, write a linear equation that is parallel to the given line.

Parallel line \equiv $y = -3x - 10$

Example 3:

match

Match 2 sets of equations that are parallel to one another: (Hint: solve for y to see the slope.)

Line A. $y = -2x + 2$

Line B. $y = \frac{1}{2}x - 2$

Line C. $4y + 4 = 2x$

Line D. $4x + 2y = -8$

$\frac{4y}{4} = \frac{2x - 4}{4}$

$\frac{2y}{2} = \frac{-4x - 8}{2}$

$y = \frac{1}{2}x - 1$

$y = -2x - 4$

Slope for A = -2

Slope for B = $\frac{1}{2}$

Slope for C = $\frac{1}{2}$

Slope for D = -2

Lines A and D are parallel because they both have a slope of -2.

Lines B and C are parallel because they both have a slope of $\frac{1}{2}$.