

Parallel and Perpendicular Slopes (and general form too)

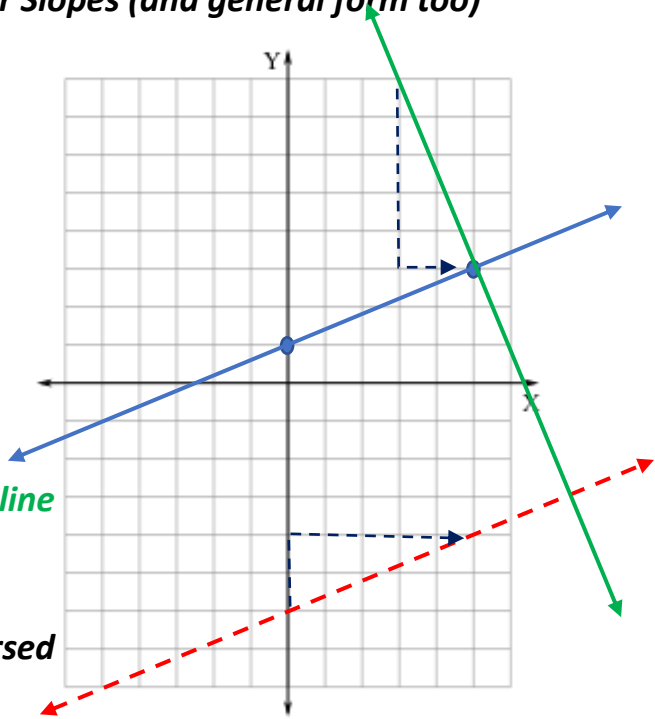
The line $y = \frac{2}{5}x + 1$ is shown on the axis

The dotted line is parallel to this line...
(what do you notice?)

Parallel lines have the same slope

The green line is perpendicular to the given line
Perpendicular = 90°

Slope is negative and $\downarrow 5 \rightarrow 2$ which is reversed
From the original slope of $\frac{2}{5}$



Perpendicular lines have slopes that are 'negative reciprocals'

Original slope	Parallel slope	Perpendicular slope
$\frac{2}{3}$	$\frac{2}{3}$	$-\frac{3}{2}$
$-\frac{4}{5}$	$-\frac{4}{5}$	$\frac{5}{4}$
$\frac{3}{3}$	$\frac{3}{3}$	$-\frac{1}{3}$
0	0	$\frac{-1}{0}$ undefined



1) Determine the relationships

a) between the lines AB and PQ

A(9, 6) B(-4,5)

P(6, 9) Q (7, -4)

$$m = \frac{5-6}{-4-9} \text{ or } m = \frac{-1}{-13}$$

$$m = \frac{-4-9}{7-6} \text{ or } m = \frac{-13}{1}$$

$$\frac{1}{13} \rightarrow \frac{-13}{1}$$

Negative reciprocal lines perpendicular

b) line thru E(6,4) and F(5, 7) and $18x + 6y = 11$

$$m = \frac{7-4}{5-6} \text{ or } m = \frac{3}{-1}$$

$$6y = -18x + 11$$

$$y = -3x + \frac{11}{3}$$

same slope \rightarrow parallel

c) $y = 6x - 19$ and $5x - 30y - 60 = 0$

$$-30y = -5x + 60 \quad \rightarrow \quad y = \frac{-5x}{-30} + \frac{60}{-30} \quad \text{or} \quad y = \frac{1}{6}x - 2 \quad 6 \rightarrow \frac{1}{6} \quad \text{Neither}$$

2) Solve for k

a) $m_1 = \frac{5}{k}$ and $m_2 = \frac{8}{7}$ lines are parallel

$$\frac{5}{k} = \frac{8}{7} \quad 35 = 8k \quad k = \frac{35}{8}$$

b) $m_1 = \frac{9}{k}$ and $m_2 = \frac{7}{4}$ lines are perpendicular

If perpendicular then $\frac{9}{k} = \frac{-4}{7} \quad 63 = -4k \quad k = \frac{-63}{4}$

General form of a line $Ax + By + C = 0$

To be in general form 3 main rules exist

- 1) must = 0 2) $A > 0$ 3) A, B, C are NOT fractions

Change the following to general form

a) $y = \frac{5}{6}x - 7$

Step 1: blast with a 6 $6y = 5x - 42$

Step 2: keep A positive Answer: $0 = 5x - 6y - 42$

b) $y - 9 = \frac{-3}{5}(x + 4)$

Step 1: cross multiply the 5, dive bomb the -3 $5y - 45 = -3x - 12$

Step 2: Make A positive Answer: $3x + 5y - 33 = 0$

General form is just a way to write a clean equation

The other forms are always better for graphing and equation writing.

Another form is 'Standard form' of a line $Ax + By = C$ (great for finding intercepts)