

Warm Up Questions

1. If the slope of a line passing through $(5, 3)$ and $(2k, k)$ is $1/3$, find k .
2. If the slope of a line passing through $(3, 4 - k)$ and $(5, 0)$ is -1 , find k .

1. If the slope of a line passing through
1st x_1, y_1 and 2nd x_2, y_2 is $m =$
 $(5, 3)$ and $(2k, k)$ is $1/3$, find k .

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$
$$\frac{1}{3} = \frac{k - 3}{2k - 5}$$
$$3(k - 3) = 1(2k - 5)$$
$$3k - 9 = 2k - 5$$
$$3k - 2k = -5 + 9$$
$$k = 4$$

2. If the slope of a line passing through

1st x_1, y_1 $(3, 4 - k)$ and 2nd x_2, y_2 $(5, 0)$ is $m = -\frac{1}{1}$, find k .

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

$$-\frac{1}{1} = \frac{0 - (4 - k)}{5 - 3}$$

$$-\frac{1}{1} = \frac{0 - 4 + k}{2}$$

~~$$-\frac{1}{1} = \frac{(-4 + k)^2}{2}$$~~

$$\begin{aligned} 1(-4 + k) &= -2 \\ -4 + k &= -2 + 4 \\ k &= 2 \end{aligned}$$



Parallel & Perpendicular Lines

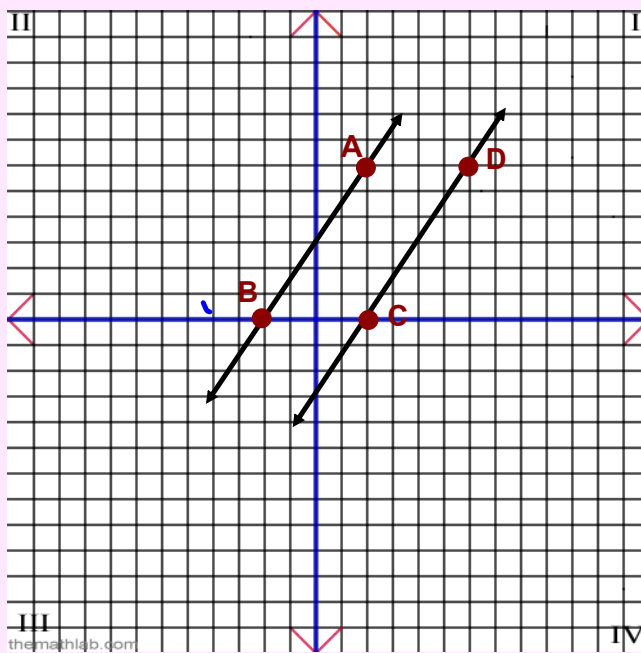




Parallel Lines

Parallel Lines are two lines that are always the same distance apart, and that never intersect.

Parallel Lines



Calculate the slope of segments AB & CD

<u>1st</u>	<u>x_1, y_1</u>	<u>2nd</u>	<u>x_2, y_2</u>	<u>1st</u>	<u>x_1, y_1</u>	<u>2nd</u>	<u>x_2, y_2</u>
	$(-2, 0)$		$(2, 6)$		$(2, 0)$		$(6, 6)$
AB	$= \frac{y_2 - y_1}{x_2 - x_1}$			CD	$= \frac{y_2 - y_1}{x_2 - x_1}$		
	$m = \frac{6 - 0}{2 - -2}$				$m = \frac{6 - 0}{6 - 2}$		
	$m = \frac{6}{4}$				$m = \frac{6}{4}$		
	$m = \frac{3}{2}$				$m = \frac{3}{2}$		

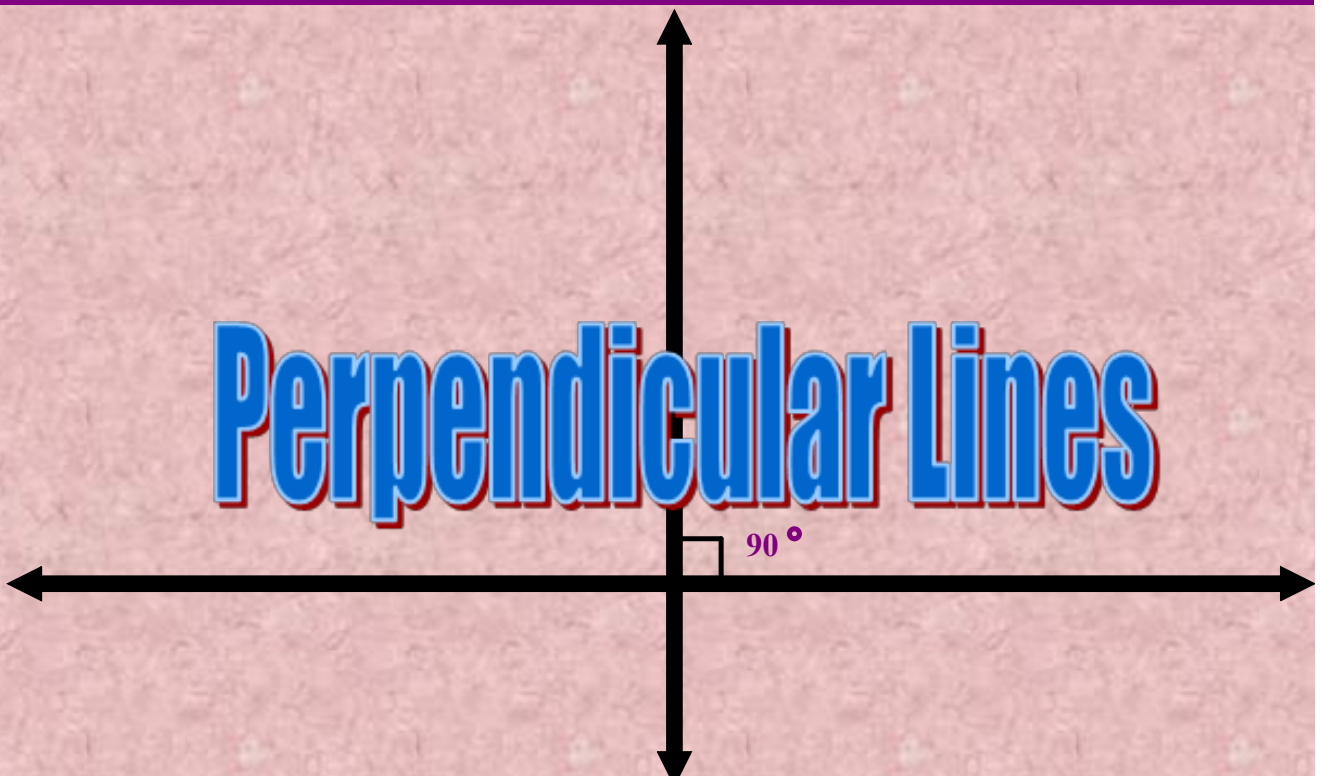
What Do You Notice?

Parallel Slopes are Equal

Slope of AB = Slope of CD, therefore

\overleftrightarrow{AB} is parallel to \overleftrightarrow{CD}

Perpendicular Lines

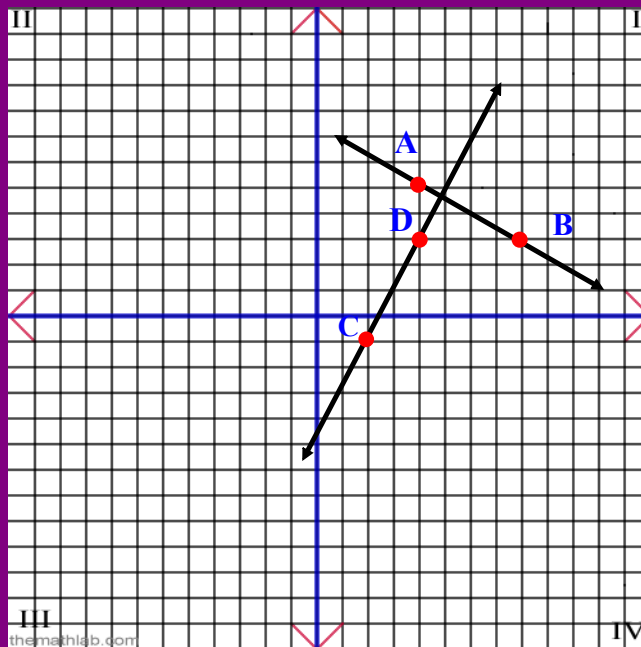


Perpendicular Lines are two lines that intersect to form a 90° angle. (Right Angle)

1
2
3
4
5
6
7
8
9
10
11
12

Lines

Calculate the slope of
AB & DC



$$\begin{array}{l}
 \text{AB } 1^{\text{st}} (4, 5) \quad 2^{\text{nd}} (8, 3) \\
 m = \frac{y_2 - y_1}{x_2 - x_1} \\
 m = \frac{3 - 5}{8 - 4} \\
 m = \frac{-2}{4} = \left(-\frac{1}{2}\right) \\
 \text{CD } 1^{\text{st}} (2, -1) \quad 2^{\text{nd}} (4, 3) \\
 m = \frac{3 - (-1)}{4 - 2} \\
 m = \frac{4}{2} = \left(\frac{2}{1}\right)
 \end{array}$$

What Do You Notice?

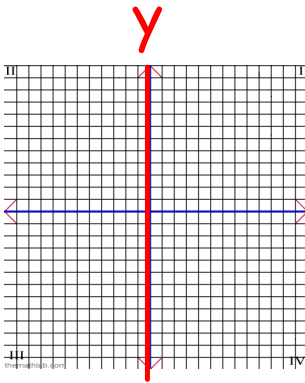
Therefore if the slopes of two lines are

OPPOSITE RECIPROCALLS

we can say the lines are perpendicular

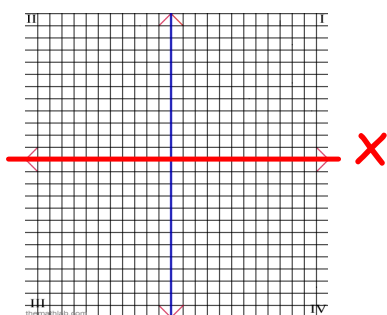
Therefore AB is perpendicular to DC

What is the slope of the y-axis?



Undefined or $\frac{1}{0}$

What is the slope of the x-axis?

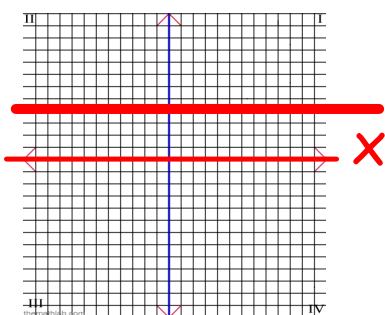


0

or

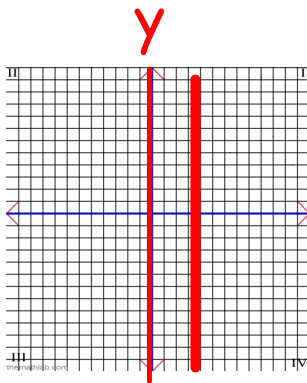
$\frac{0}{1}$

What is the slope parallel to the x-axis?



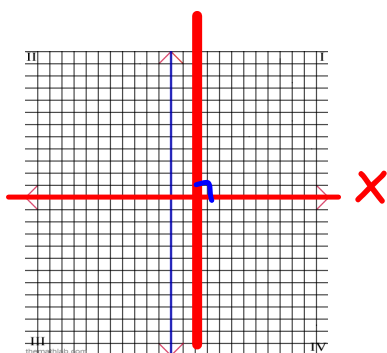
0 or $\frac{0}{1}$

What is the slope parallel to the y-axis?



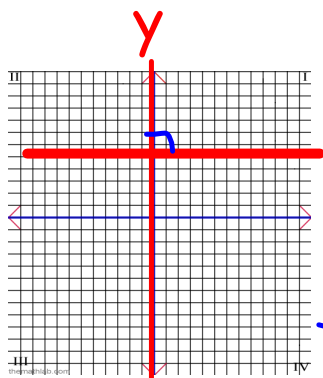
Undefined or $\frac{1}{0}$

What is the slope perpendicular to the x-axis?



$\frac{1}{0}$ or Undefined

What is the slope perpendicular to the y-axis?



$\frac{0}{1}$ or 0

What is the slope perpendicular to the
line segment (x_1, y_1) and (x_2, y_2)
 $(2, 5)$ and $(5, -3)$

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$
$$m = \frac{-3 - 5}{5 - 2}$$
$$m = \frac{-8}{+3}$$

Perp. $+\frac{3}{8}$

What is the slope **parallel** to the line segment
with an x-int of 6 and a y-int of 5

$$\begin{matrix} (x_1, y_1) \\ (6, 0) \end{matrix}$$

$$\begin{matrix} (x_2, y_2) \\ (0, 5) \end{matrix}$$

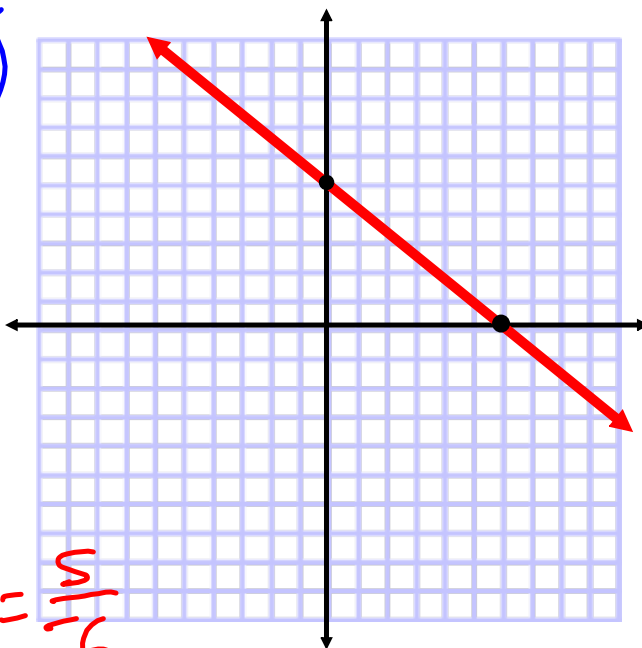
$$\begin{matrix} x_1, y_1 & x_2, y_2 \\ (6, 0) & (0, 5) \end{matrix}$$

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

$$m = \frac{5 - 0}{0 - 6}$$

$$m = \frac{5}{-6}$$

Parallel (Same) = $\frac{5}{-6}$



What is the slope **parallel** to the line segment
with an x-int of -3 and a y-int of -2

(x, y)

x-int = -3 (y=0)
 (x_1, y_1)
 $(-3, 0)$

y-int = -2 (x=0)
 (x_2, y_2)
 $(0, -2)$

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$
$$m = \frac{-2 - 0}{0 - (-3)}$$

$$m = \frac{-2}{3}$$

Parallel
(same) = $-\frac{2}{3}$

7. $(1, 2k)$ $(-3k, 4)$ Undefined Slope.

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

$$m = \frac{1}{0}$$

$$\frac{1}{0} = \frac{4 - 2k}{-3k - 1}$$

$$|(-3k - 1)| = 0$$

$$-3k - 1 = 0$$

$$\frac{-3k}{-3} = \frac{1}{-3}$$

$$k = \frac{1}{-3}$$

A line passes through points
 $(4k, 2k)$ and $(-2, 5)$.

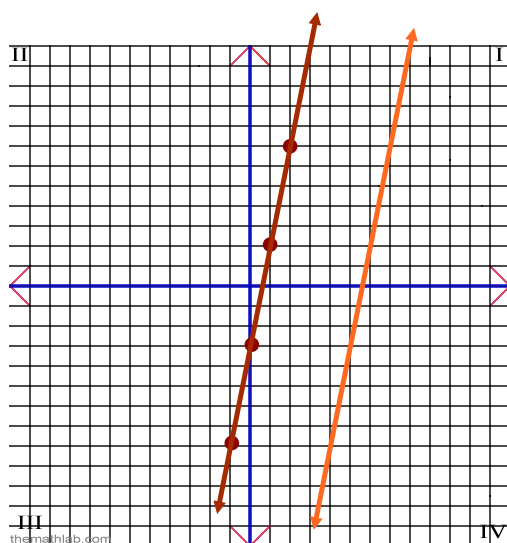
If the slope is perpendicular
 to $-\frac{3}{4}$, find k .

$$\begin{matrix} x_1 & y_1 & & x_2 & y_2 \\ (4k, 2k) & & (-2, 5) & & \end{matrix} \quad m = +\frac{4}{3}$$

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

$$\frac{4}{3} = \frac{5 - 2k}{-2 - 4k} \downarrow$$

State the slope parallel to $y = 5x - 3$.



State the slope perpendicular to $y = \frac{4}{5}x - 3$

State the slope parallel to $y = -8x + 7$

State the slope perpendicular to $y = -\frac{2}{3}x - 4$

State the slope perpendicular to $y = -2x + 8$

Determine whether or not the following figure is a rectangle.

