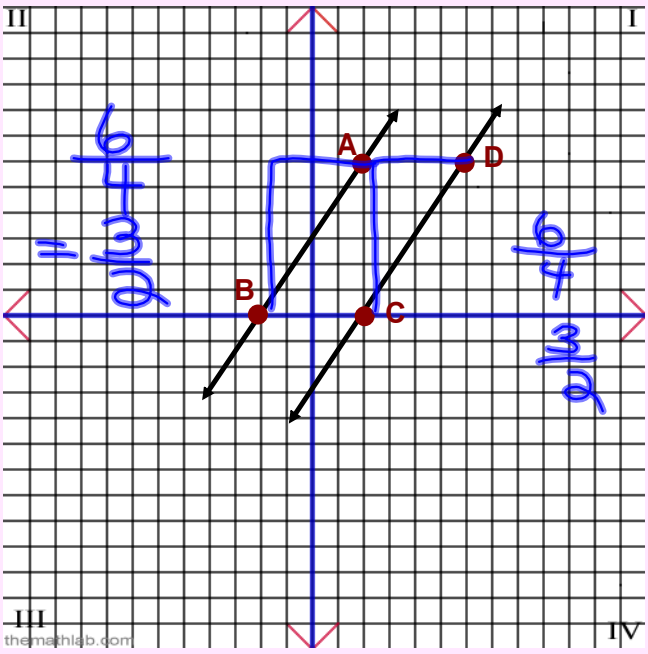
Parallel & Perpendicular Lines

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

1st (x_1, y_1) 2nd (x_2, y_2) | 1st (x_1, y_1) 2nd (x_2, y_2)

$(-2, 0)$ $(2, 6)$ | $(2, 0)$ $(6, 6)$

$AB = \frac{y_2 - y_1}{x_2 - x_1}$ $CD = \frac{y_2 - y_1}{x_2 - x_1}$

$AB = \frac{6-0}{2+2} = \frac{6}{4} = \frac{3}{2}$ $CD = \frac{6-0}{6-2} = \frac{6}{4} = \frac{3}{2}$

What Do You Notice?

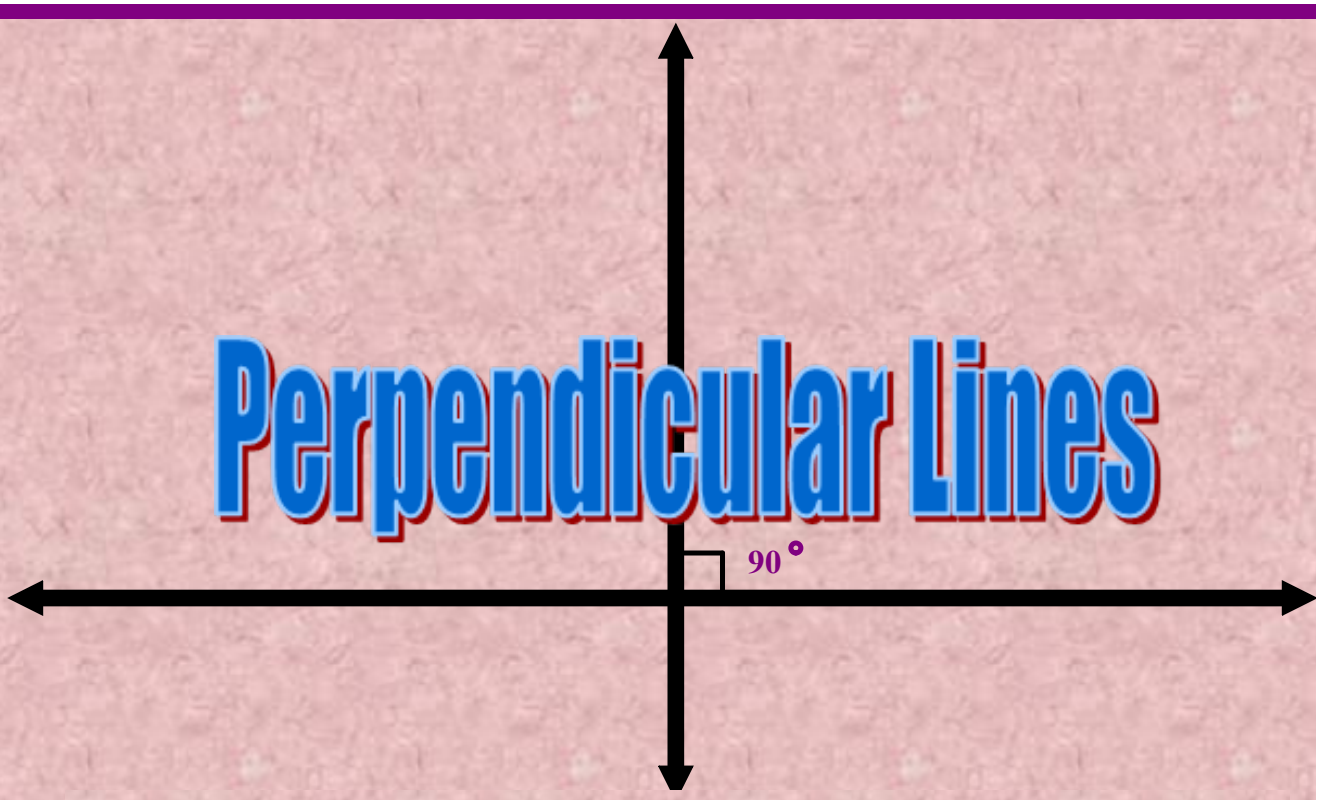
Parallel Slopes are Equal

Slope of AB = Slope of CD, therefore

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

same

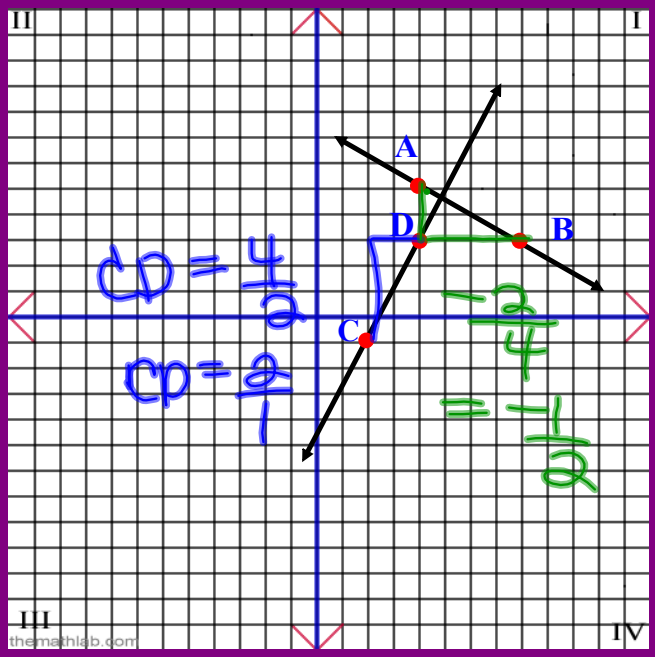
Perpendicular Lines



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

Perpendicular Lines

Calculate the slope of AB & DC



$CD = \frac{4}{2}$

$CD = \frac{2}{1}$

$-\frac{2}{4} = -\frac{1}{2}$

AB 1st (4, 5) 2nd (8, 3)

$x_1\ y_1 \quad x_2\ y_2$

$\frac{3-5}{8-4} = -\frac{2}{4} = -\frac{1}{2}$

CD 1st (2, -1) 2nd (4, 3)

$x_1\ y_1 \quad x_2\ y_2$

$\frac{3+1}{4-2} = \frac{4}{2} = \frac{2}{1}$

What Do You Notice?

Therefore if the slopes of two lines are

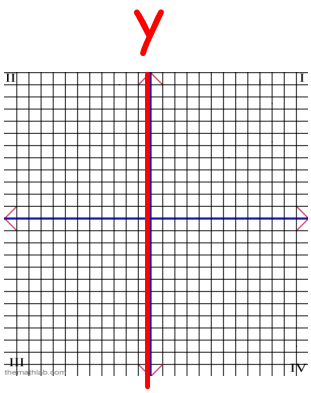
OPPOSITE RECIPROCALS

we can say the lines are perpendicular

$\frac{2}{3} \leftrightarrow -\frac{3}{2}$

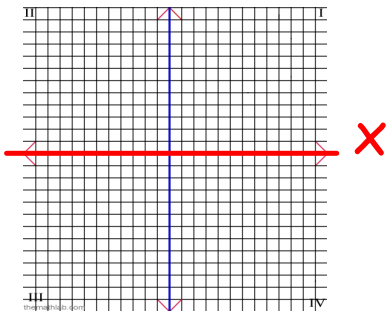
Therefore AB is perpendicular to DC

What is the slope of the y-axis?



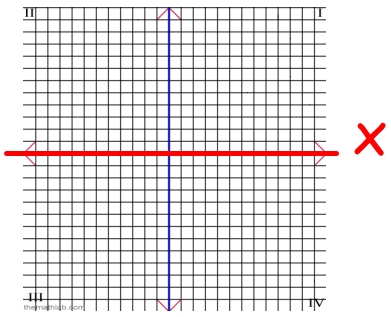
Undefined or $\frac{1}{0}$

What is the slope of the x-axis?



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

What is the slope ~~parallel~~ Same to the x -axis?

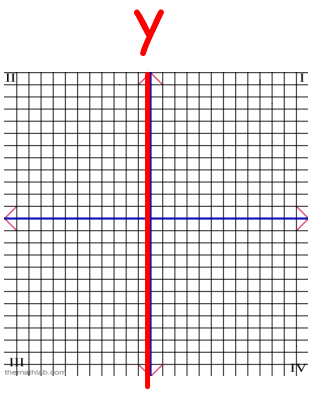


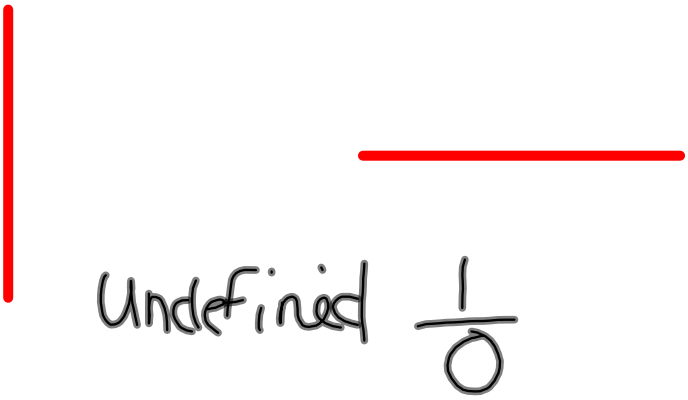
x

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

What is the slope parallel to the y-axis?

same

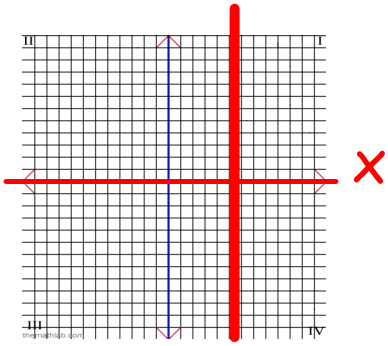




Undefined $\frac{1}{0}$

What is the slope <u>perpendicular</u> to the x -axis?

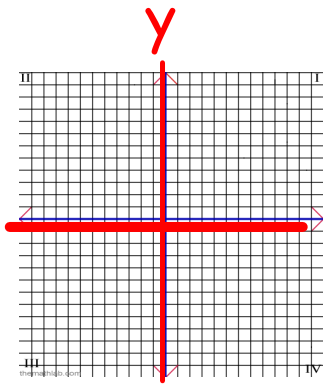
opp rec.



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

What is the slope perpendicular to the y-axis?

opp rec.

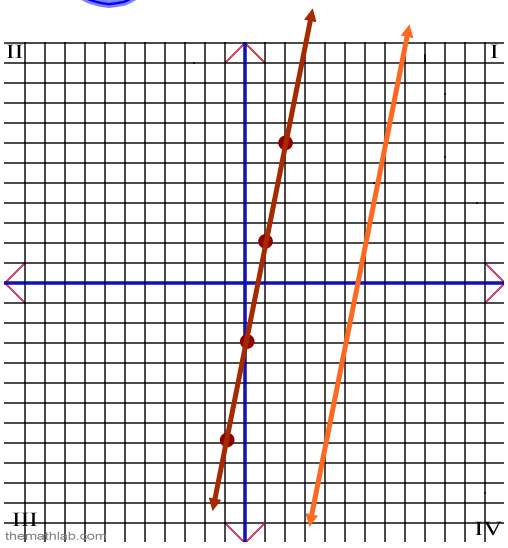


0 or $\frac{0}{1}$

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

Same $y = mx + b$

$= 5$



State the slope perpendicular to $y = 4/5x - 3$

Opp rec $m = 4/5$

$= -\frac{5}{4}$

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

Same

$m = -8$

$= -8$

State the slope perpendicular to $y = -2/3x - 4$

$m = -2/3$

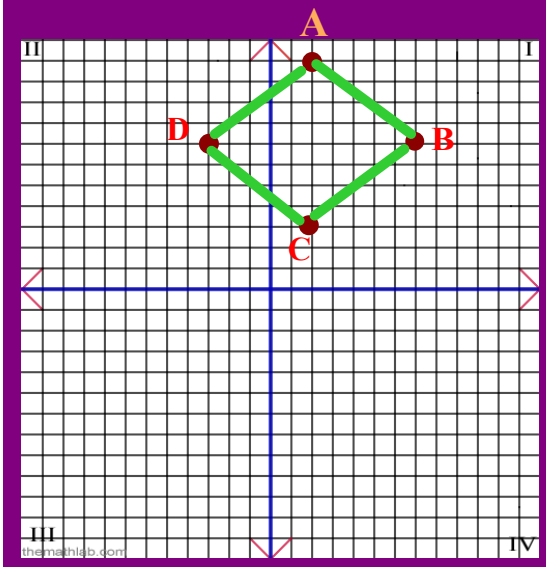
opp rec.

$= +\frac{3}{2}$

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

opp rec.

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

$= \frac{1}{2}$

Determine whether or not the following figure is a rectangle.