Slope of a Line

Postulate 1-1-1 on Page 7 says

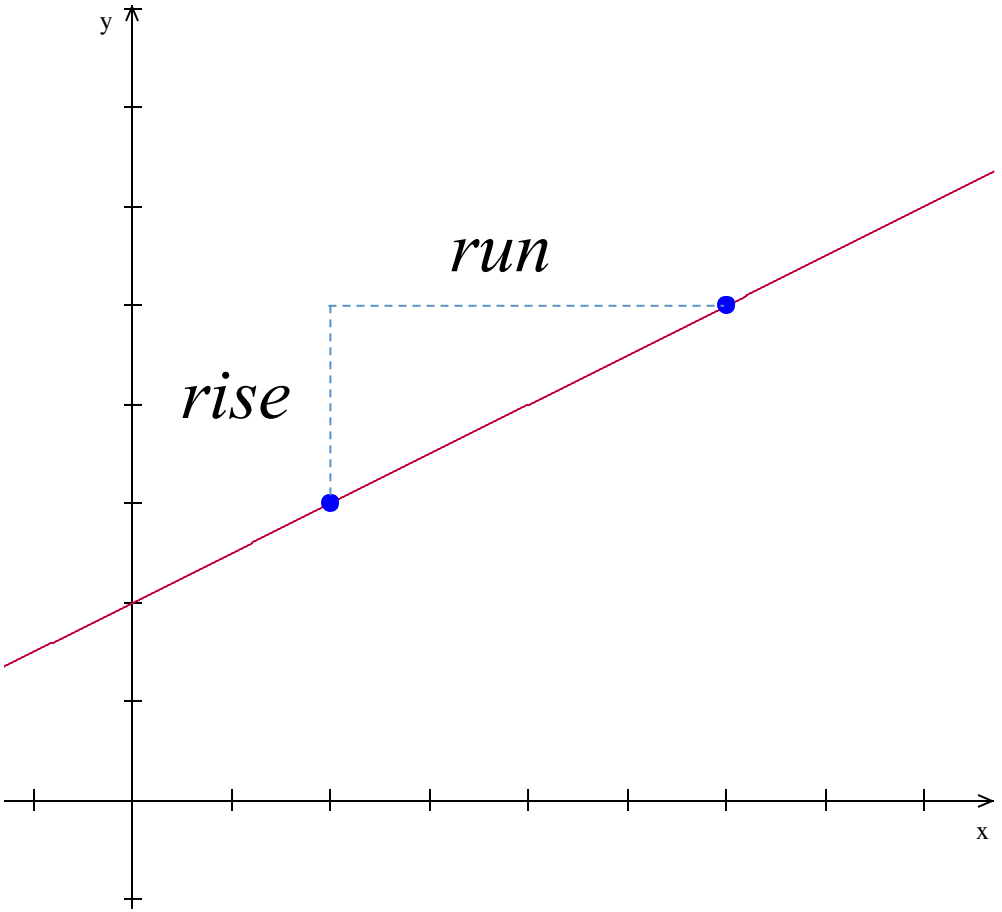
Through two points you can only draw one line

Each line has it's own *slope* which is a real number that describes its steepness

The slope of any line is found by dividing the difference in y by the difference in x

In Algebra we call it the

$$\frac{rise}{run}$$



Postulate 1-1-1 on Page 7 says

Through two points you can only draw one line

So here are two points: $(-1,0)$ $(0,1)$

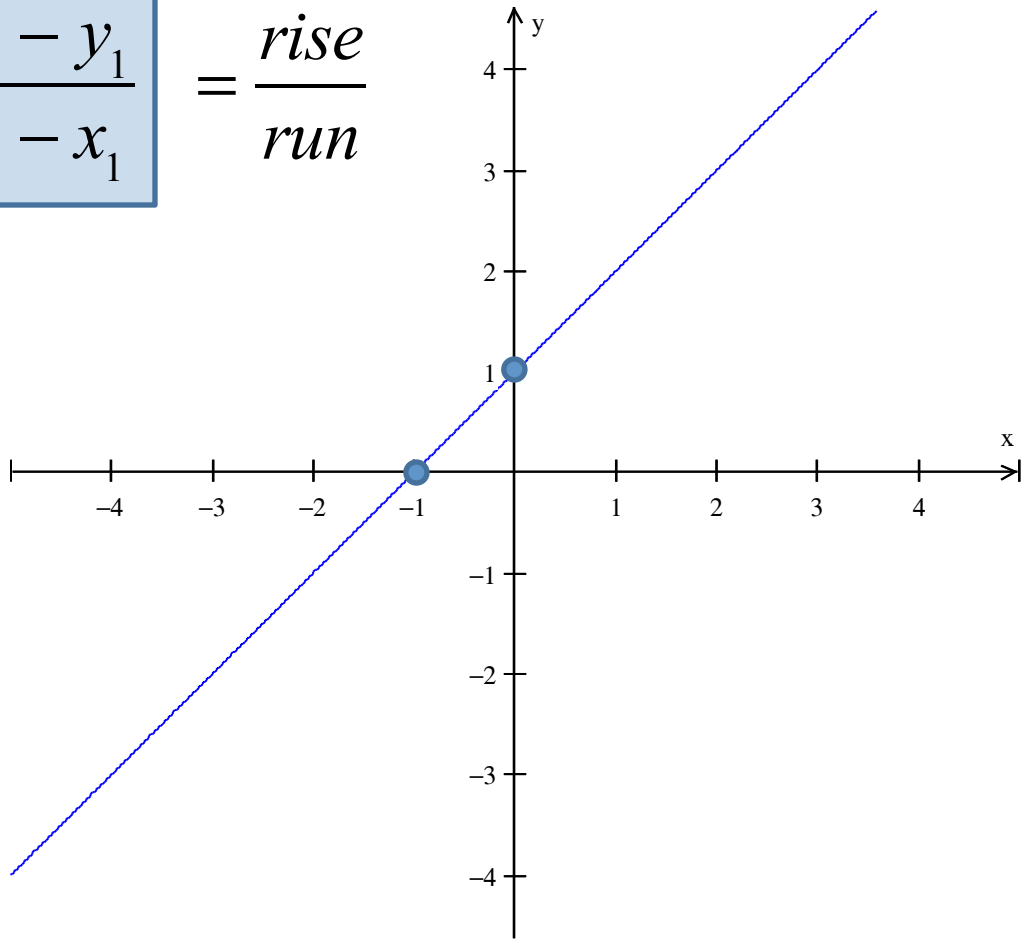
The slope m is defined as $m = \dfrac{y_2 - y_1}{x_2 - x_1} = \dfrac{rise}{run}$

(x_1, y_1) and (x_2, y_2)

can be *any* two points on the line

$$m = \frac{1-0}{0-(-1)} = 1$$

So the slope of this line is 1



Postulate 1-1-1 on Page 7 says

Through two points you can only draw one line

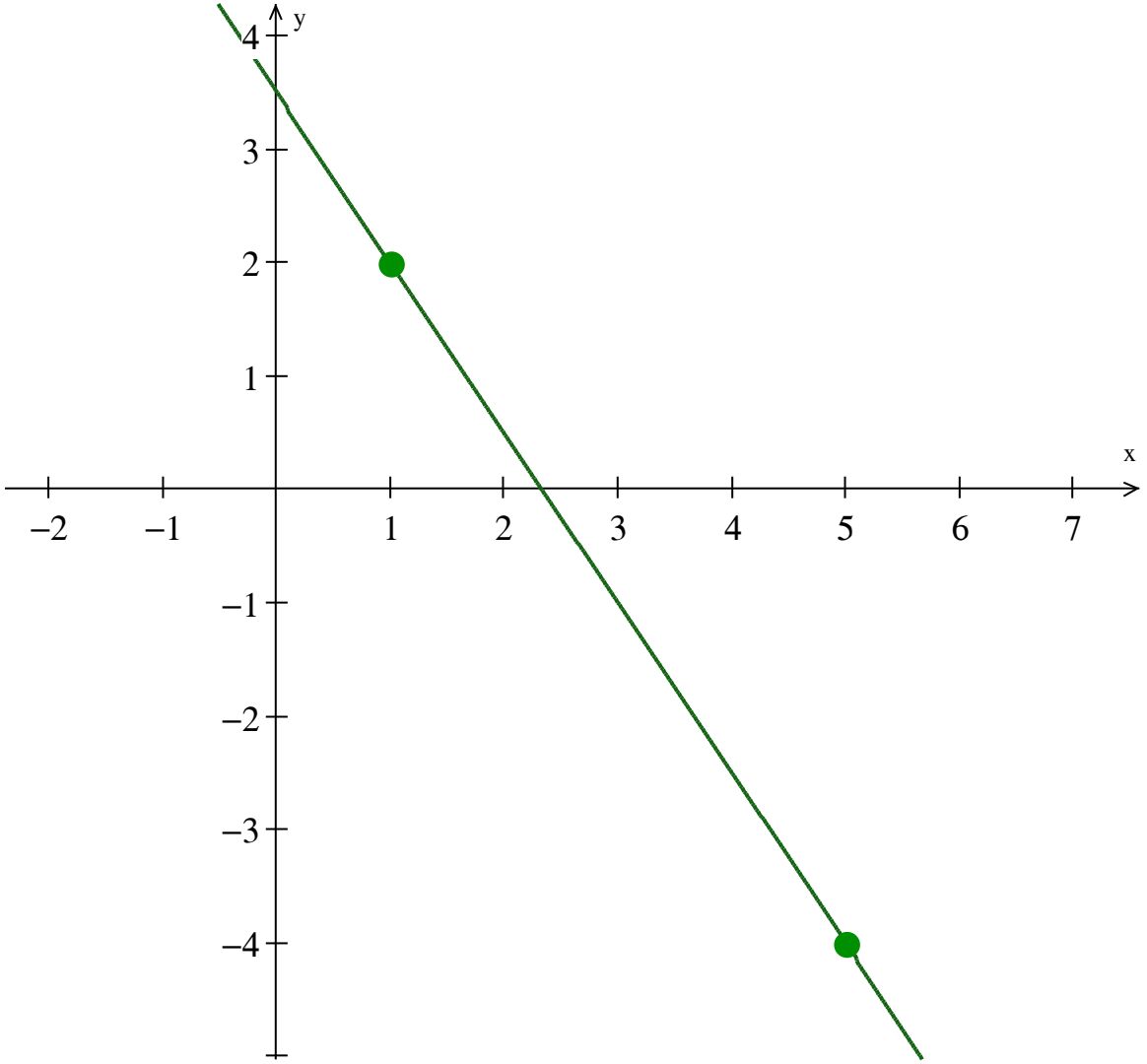
So here are two points:

(1, 2) and (5, – 4).

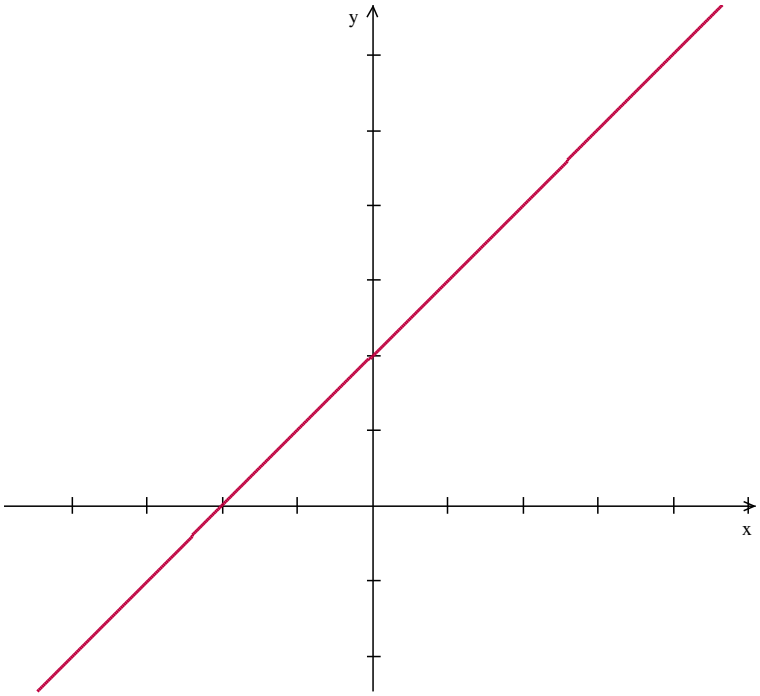
$$m = \frac{2+4}{1-5} = -\frac{3}{2}$$

Notice that here the slope is

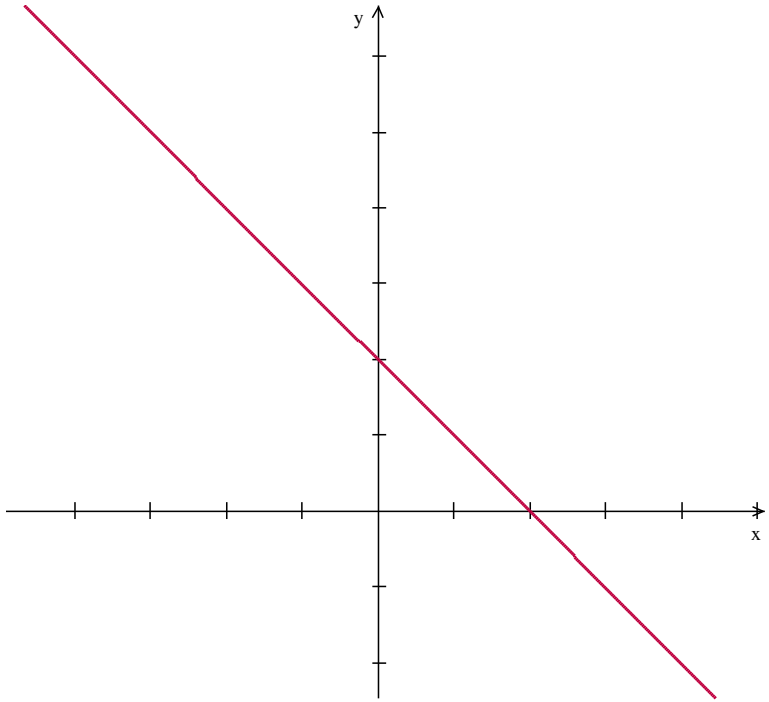
negative



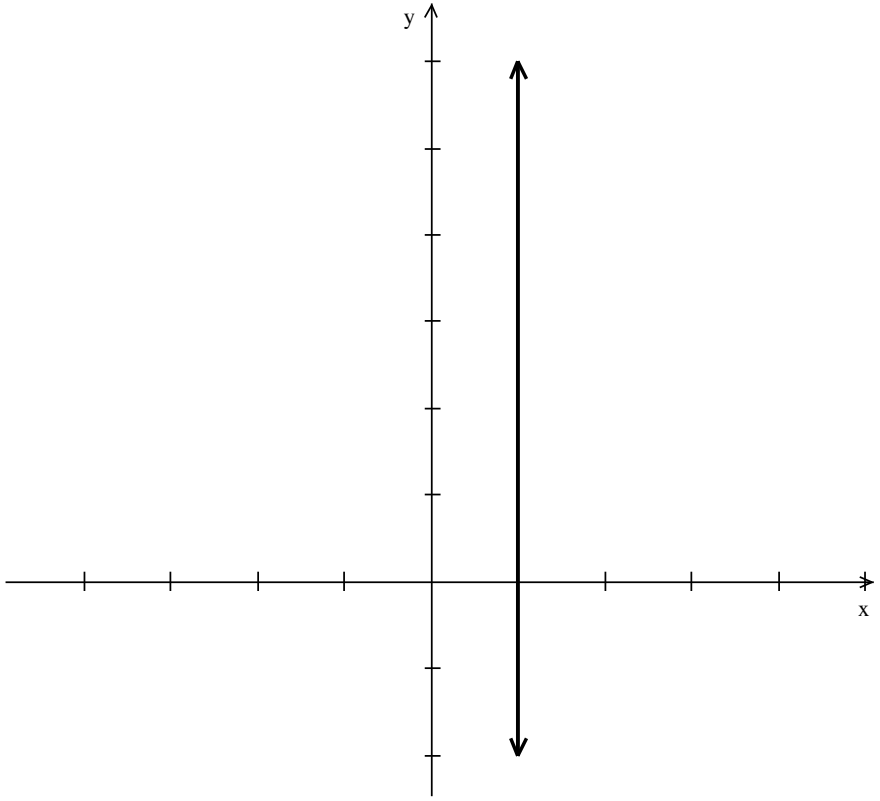
positive



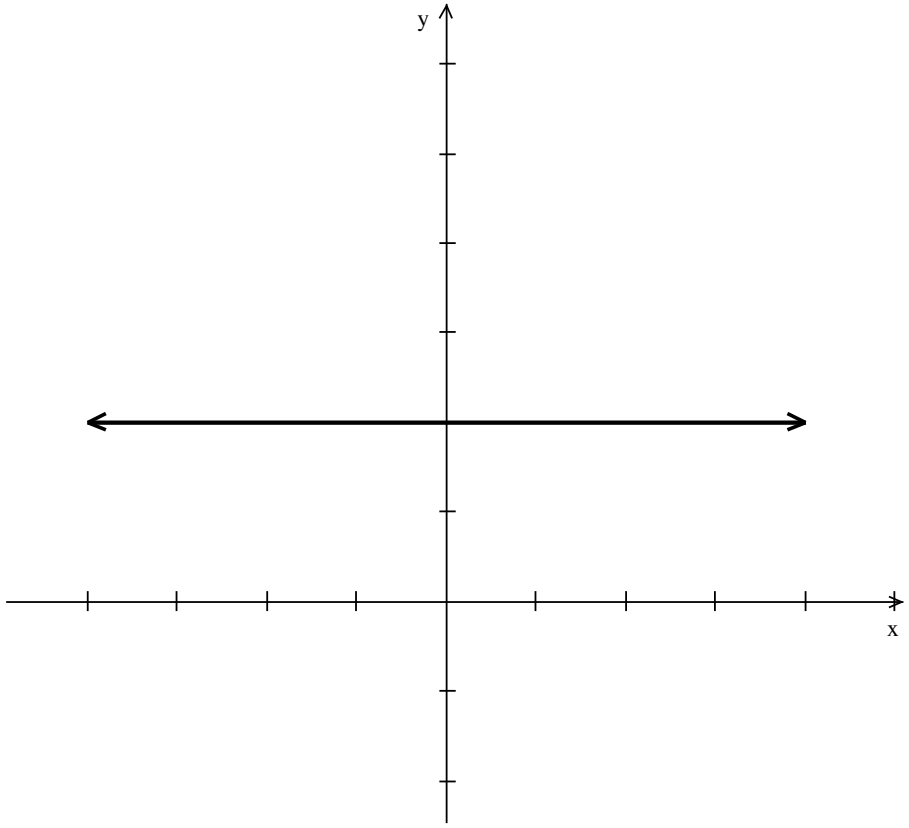
negative



Undefined slope



Zero slope



Find the slope of a line that passes through the points (1, 2) and (5, – 4).

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

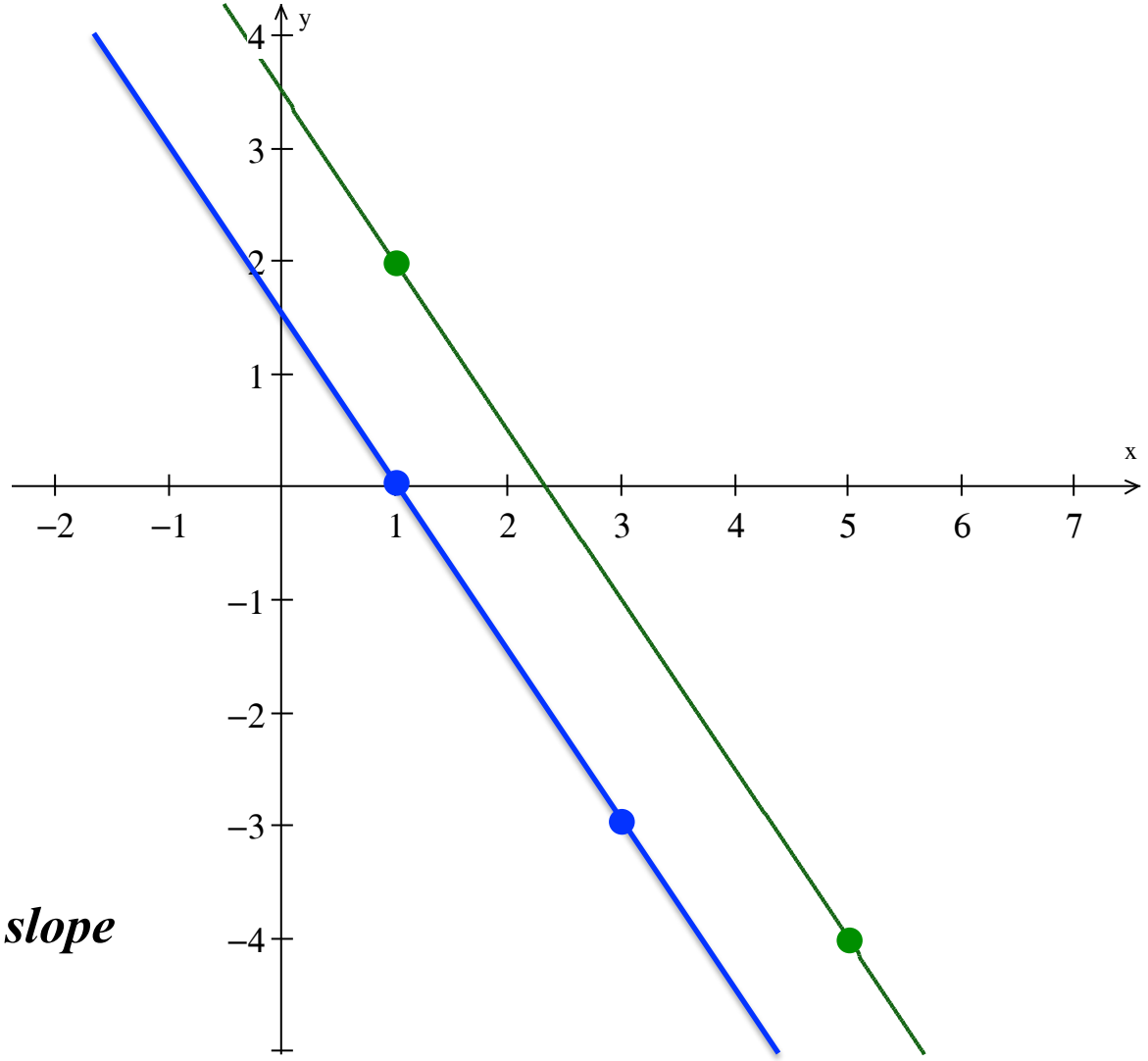
Here's another line through the points (1, 0) and (3, –3)

Find the slope of this line

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

Notice anything about these two lines?

Parallel Lines have the same slope



Write an equation (any form) of a line that passes through the points (1, 2) and (5, – 4).

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

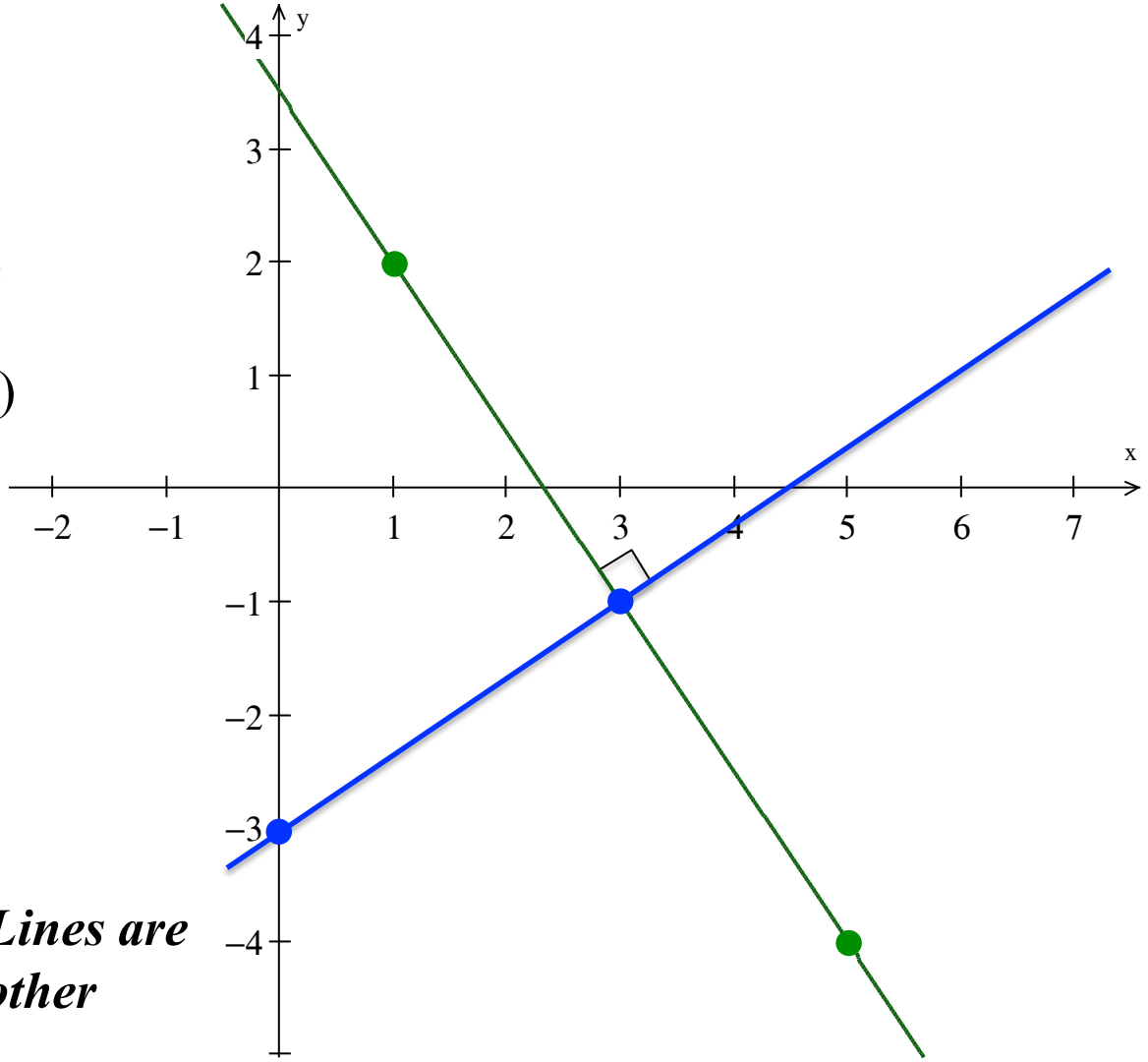
Here's another line through the point (0, –3) and intersecting the other line at the point (3,–1)

Find the slope of this line

$$\frac{2}{3}$$

Notice anything about these two lines and their slopes?

The slopes of Perpendicular Lines are negative reciprocals of each other



Parallel Lines Theorem

In a coordinate plane, two non-vertical lines are parallel *iff* they have the same slope

Perpendicular Lines Theorem

In a coordinate plane, two non-vertical lines are perpendicular *iff* the product of their slopes is –1

Vertical and horizontal lines are perpendicular

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Wait. What does *iff* mean?

If and only if

So this also means that

In a coordinate plane, if two non-vertical lines are parallel then they have the same slope

In a coordinate plane, if two non-vertical lines have the same slope then they are parallel

In a coordinate plane, if two non-vertical lines are perpendicular then the product of their slopes is –1

In a coordinate plane, if the product of the slopes of two non-vertical lines is –1 then the lines are perpendicular