

Section 3.2: The Slope of a Line

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Section 3.2 The Slope of a Line

Learning Objectives:

- Find the slope of a line from its graph.

Section 3.2 The Slope of a Line

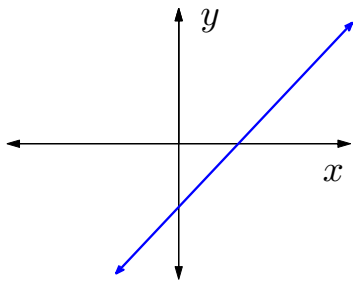
Learning Objectives:

- Find the slope of a line from its graph.
- Find the slope of a line given two points on the line.

Definition

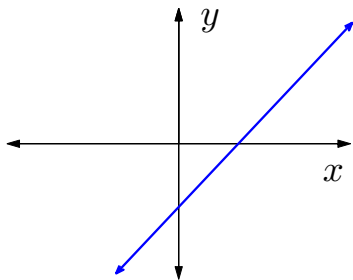
The slope of a line is a measure of the steepness of the line.

A line that rises from left to right has positive slope.

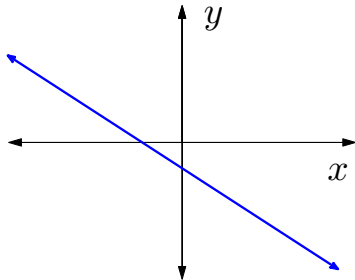


Positive Slope

A line that falls from left to right has negative slope.

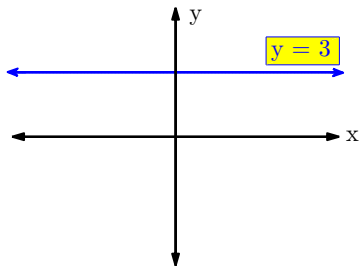


Positive Slope



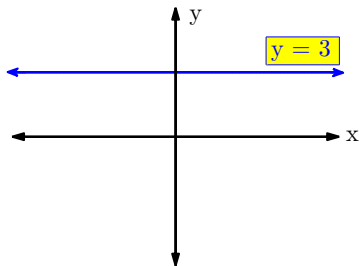
Negative Slope

Horizontal lines have zero slope

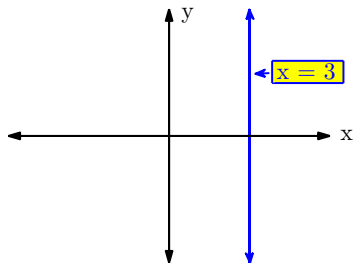


graph of $x = 3$

Horizontal lines have zero slope,
and vertical lines have no slope.



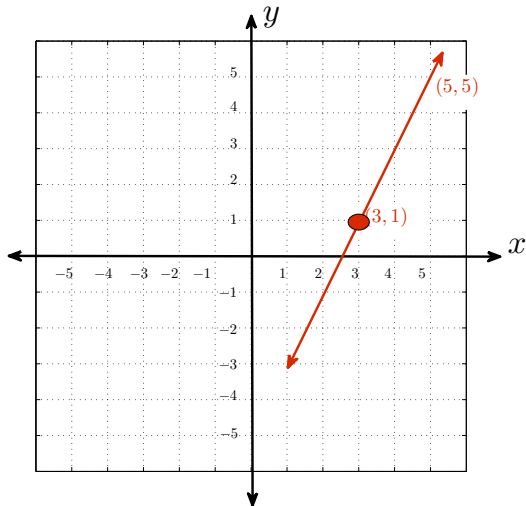
graph of $x = 3$



graph of $y = 3$

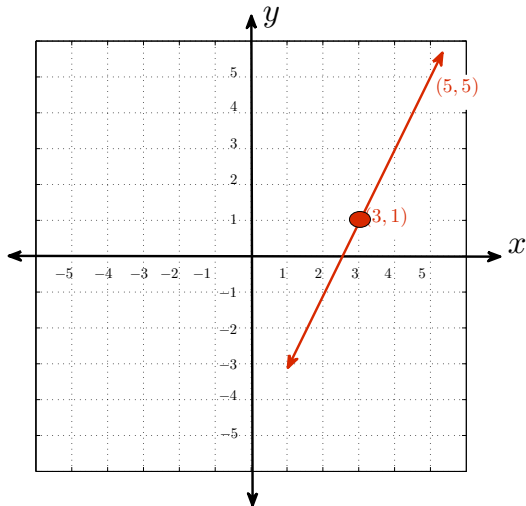
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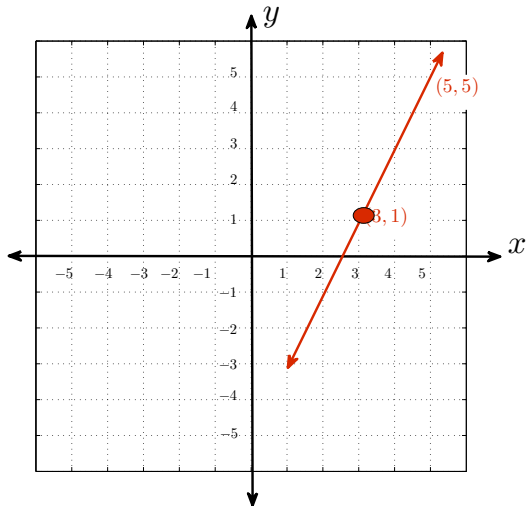
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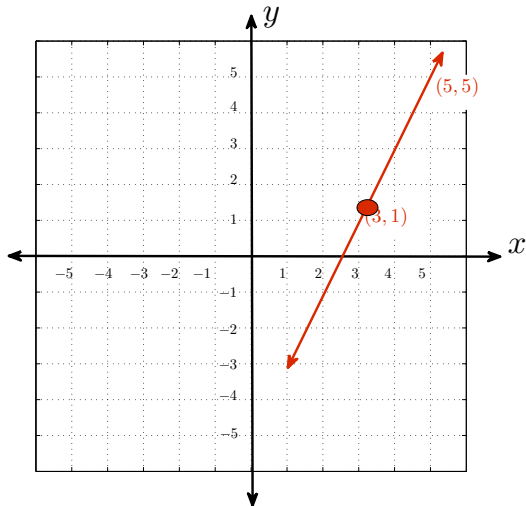
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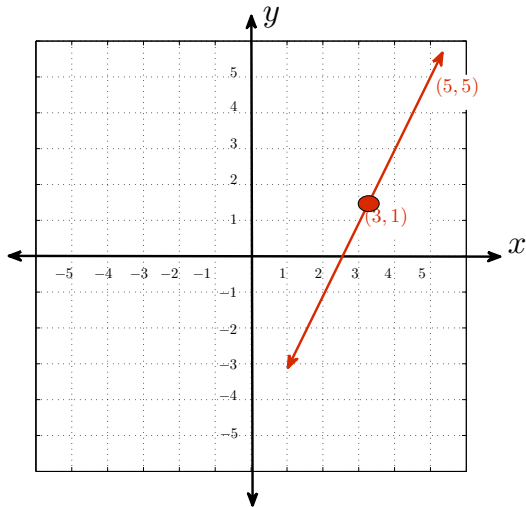
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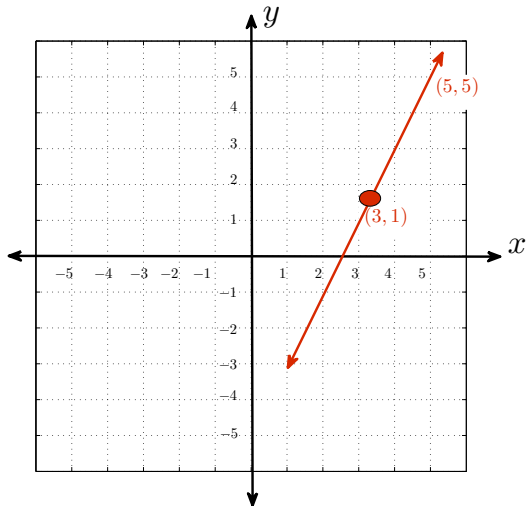
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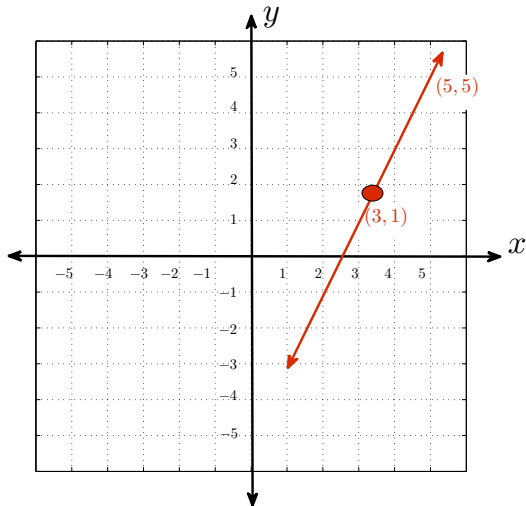
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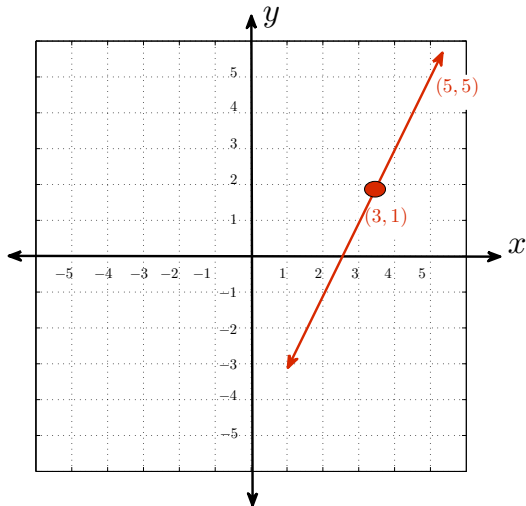
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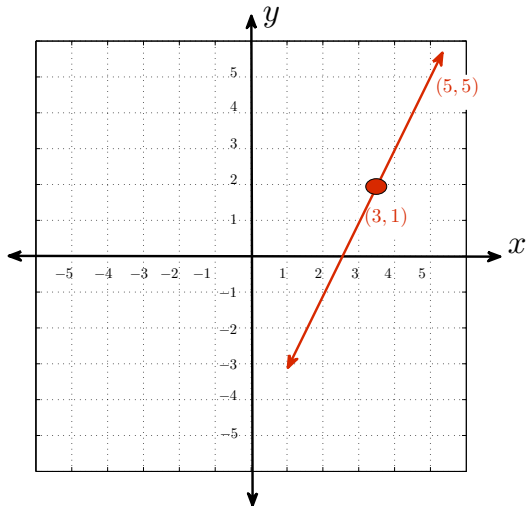
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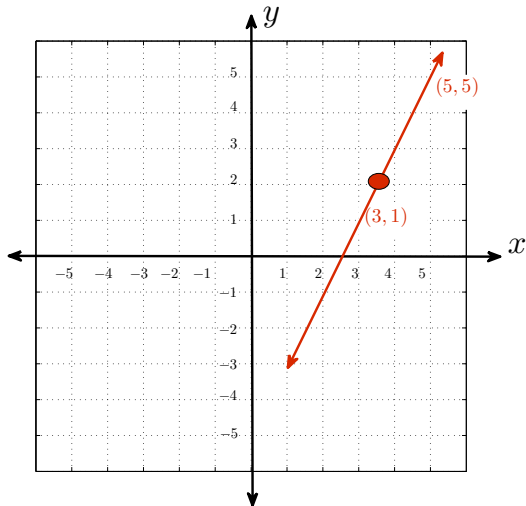
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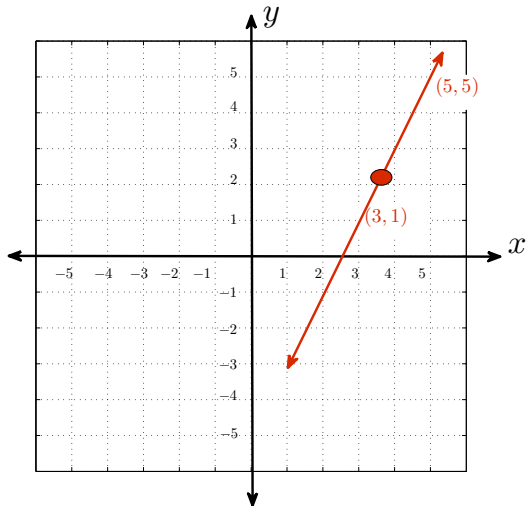
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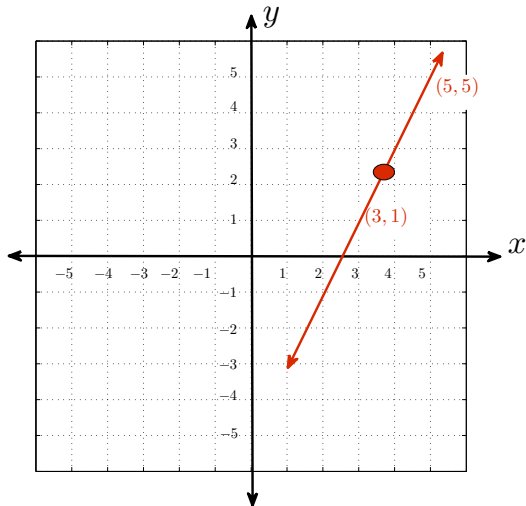
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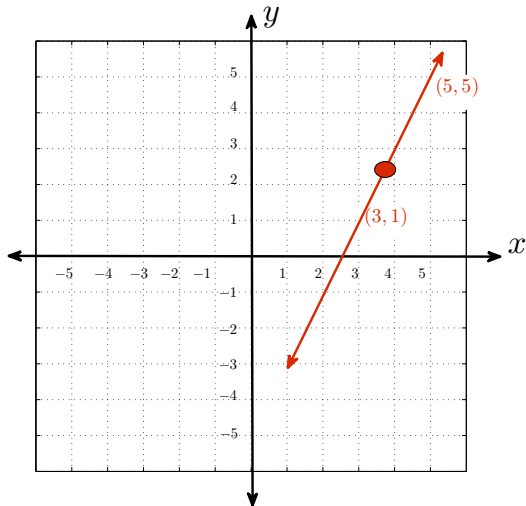
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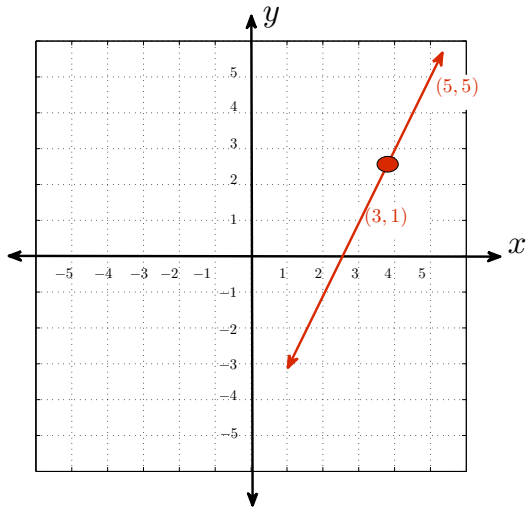
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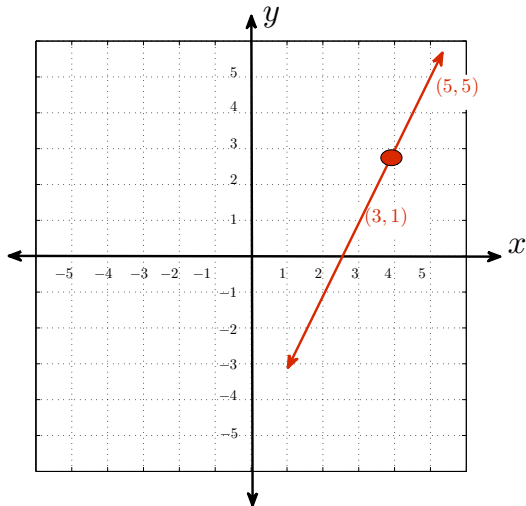
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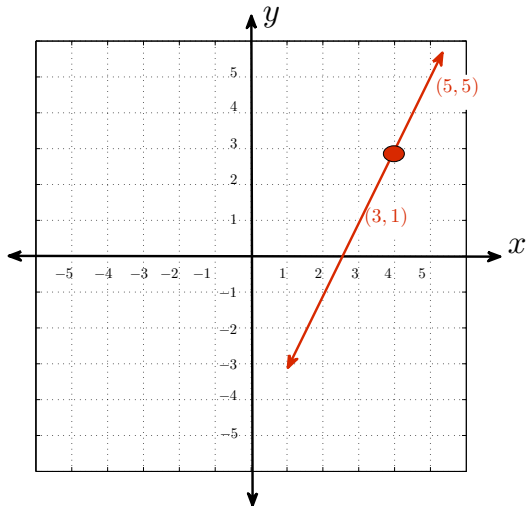
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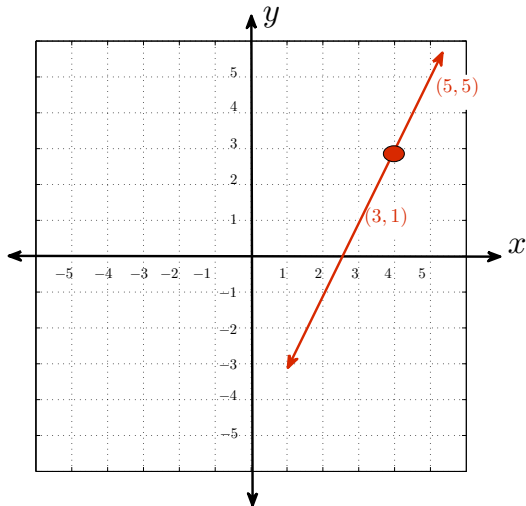
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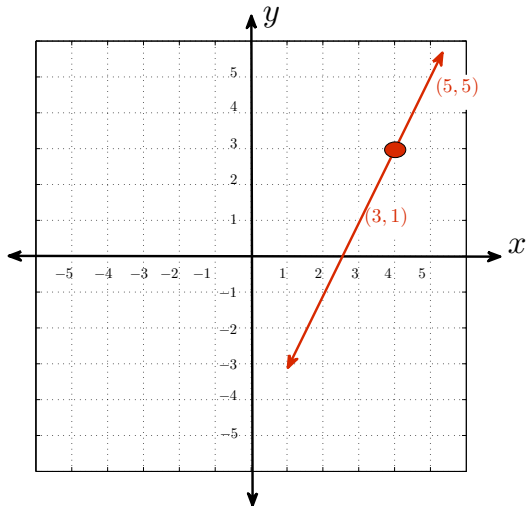
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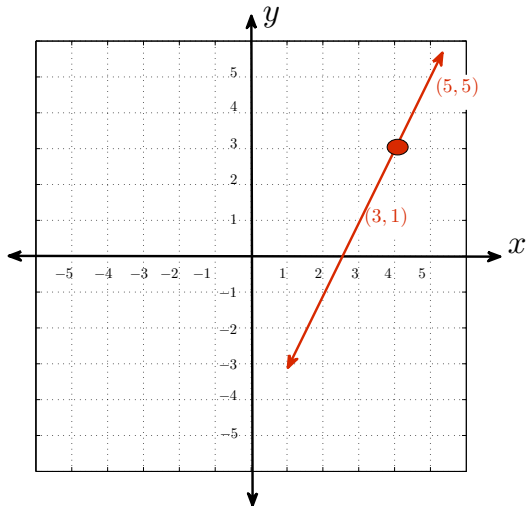
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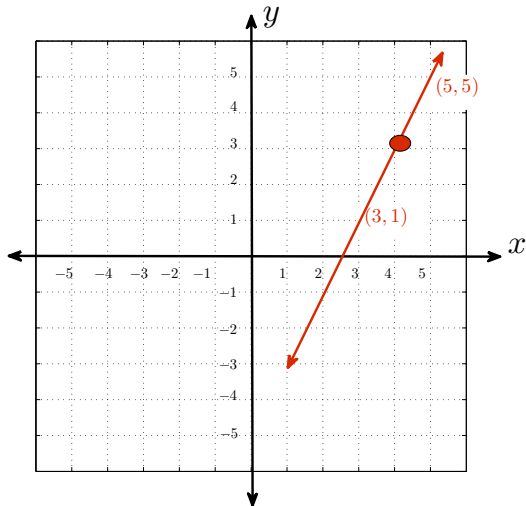
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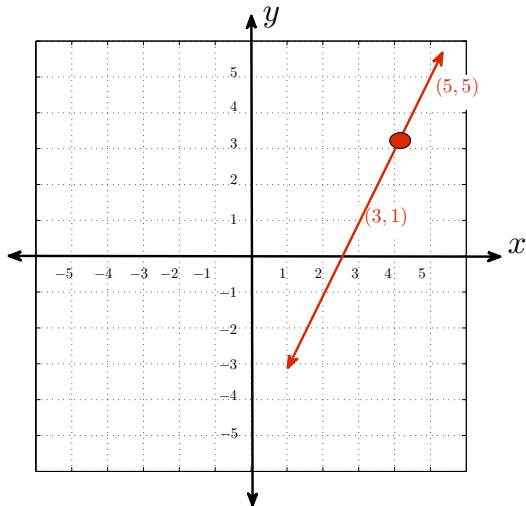
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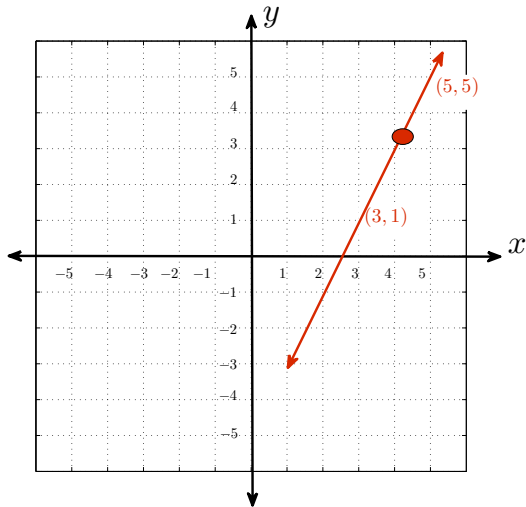
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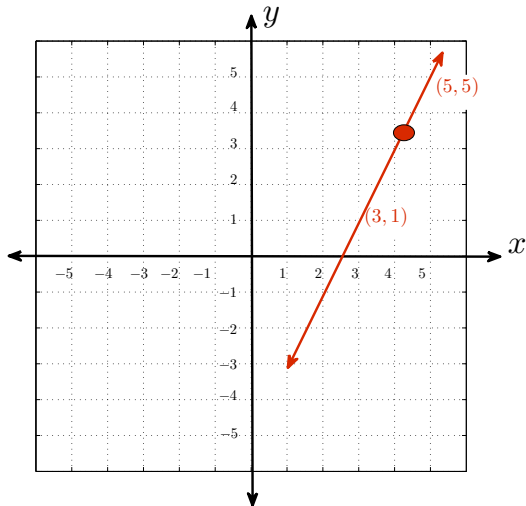
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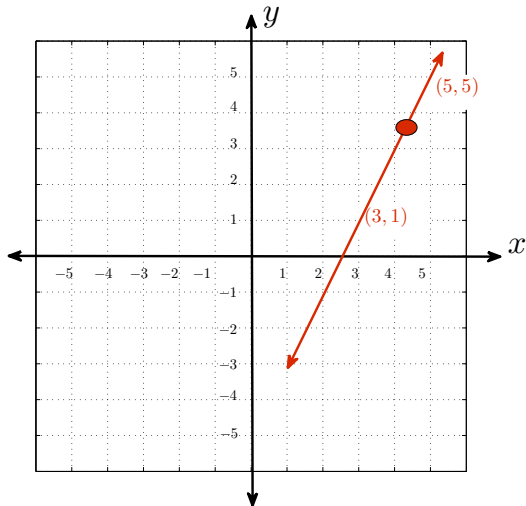
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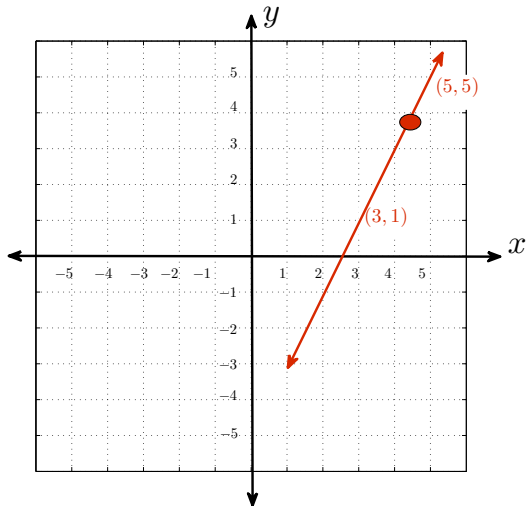
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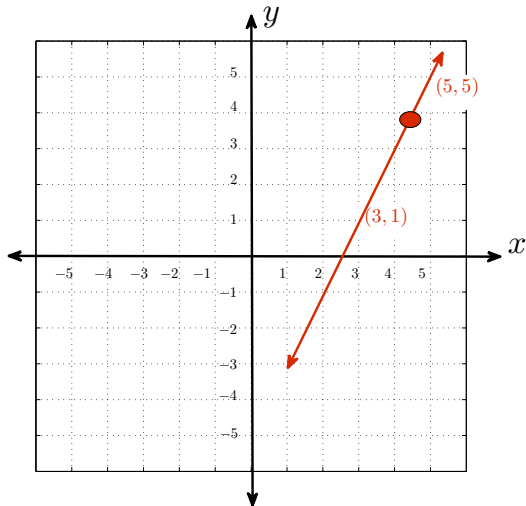
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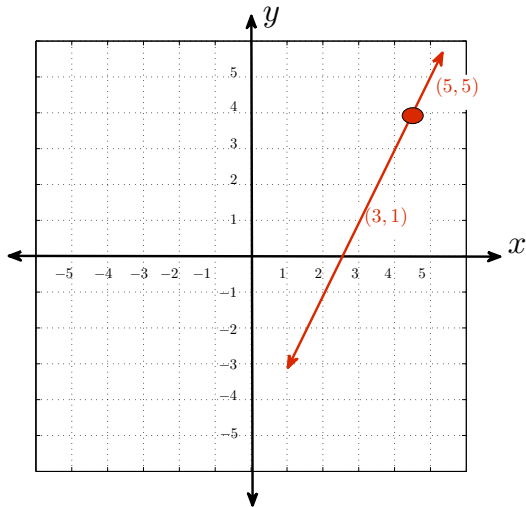
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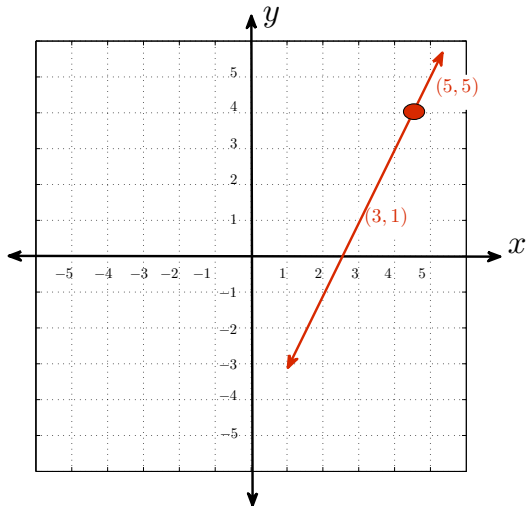
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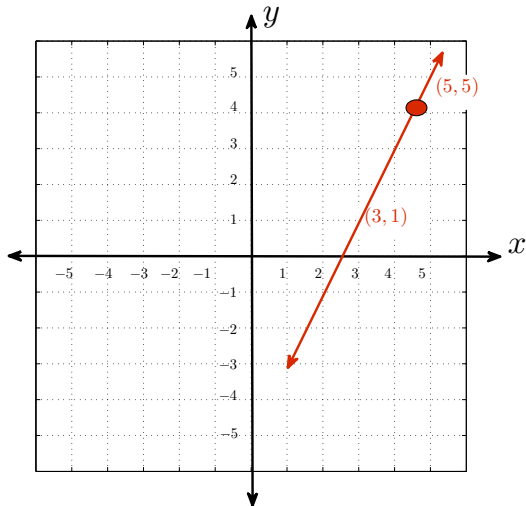
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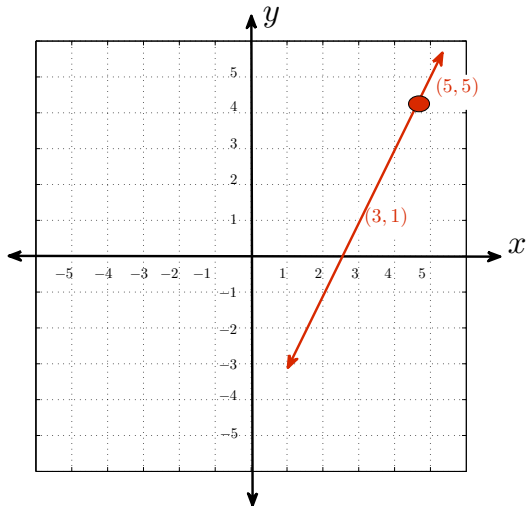
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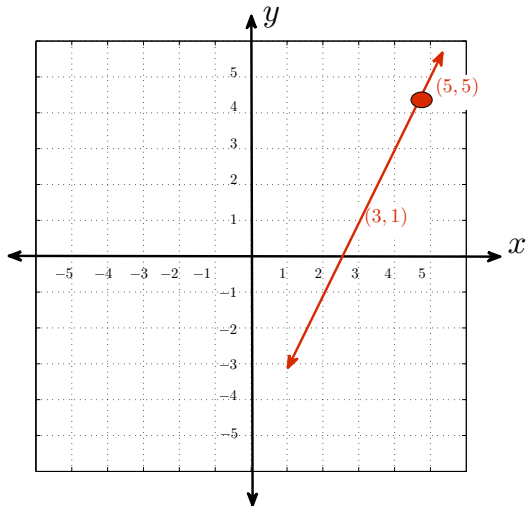
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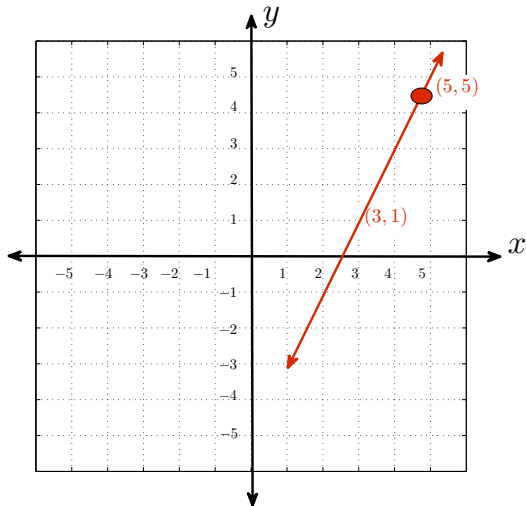
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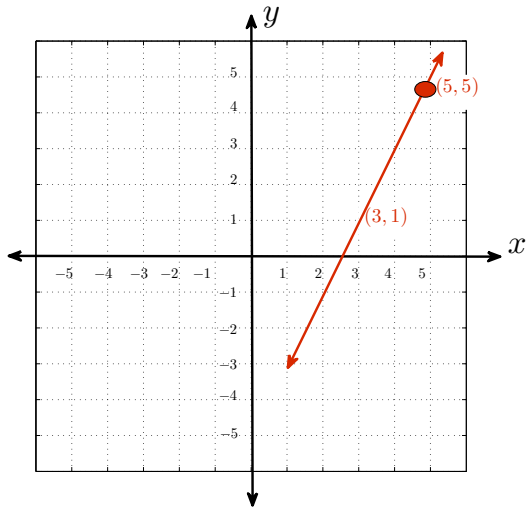
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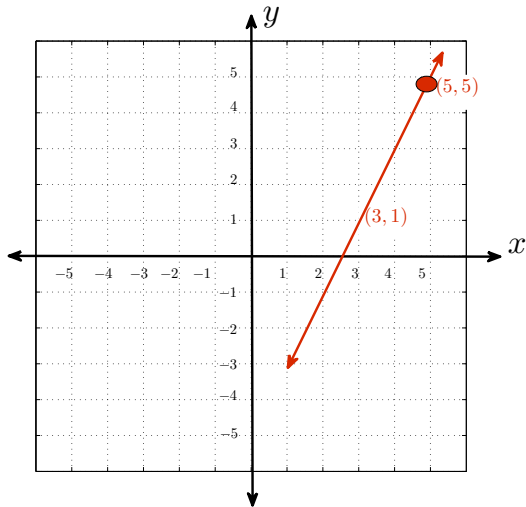
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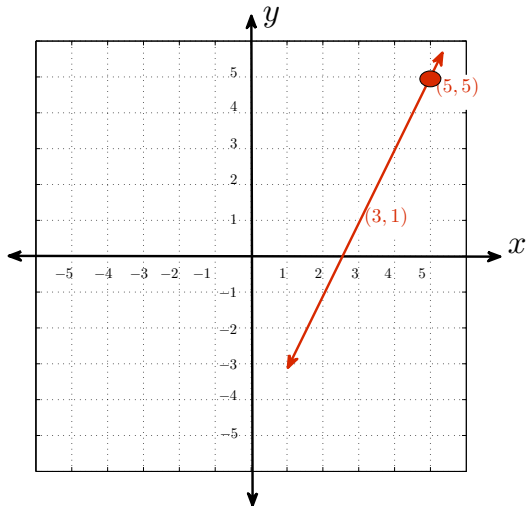
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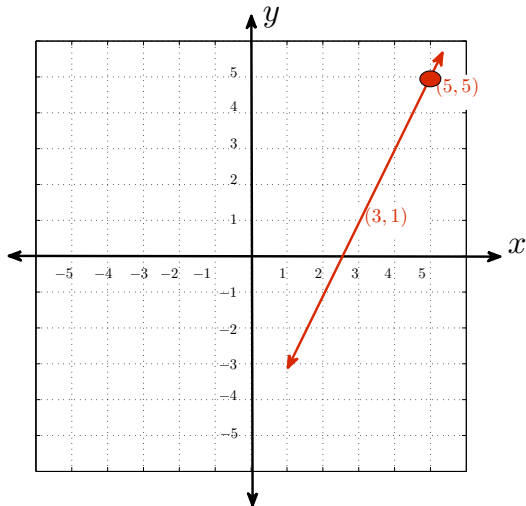
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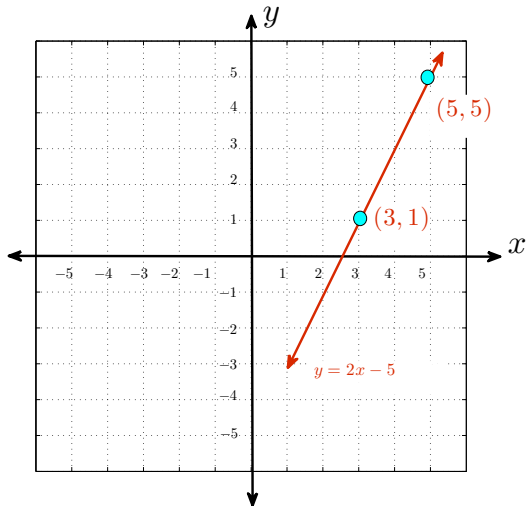
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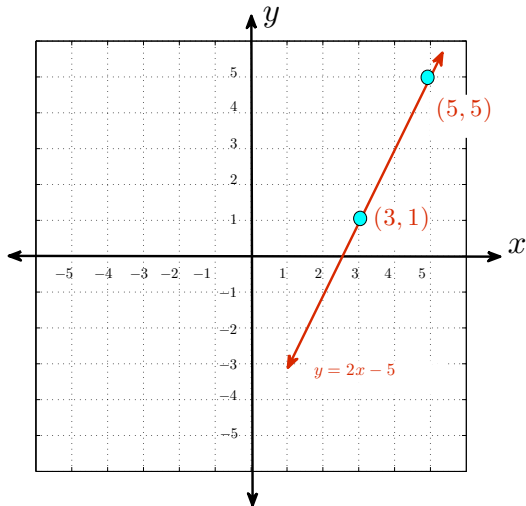
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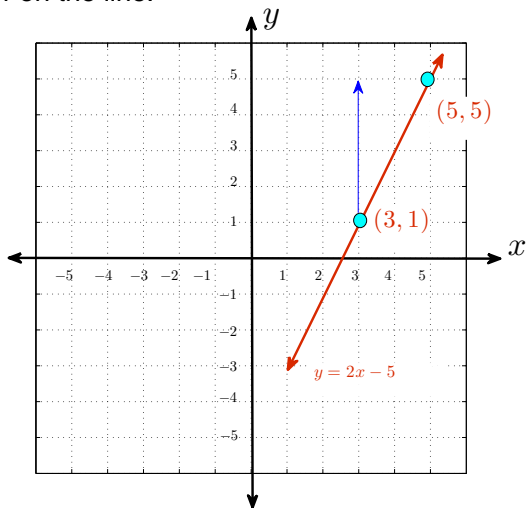
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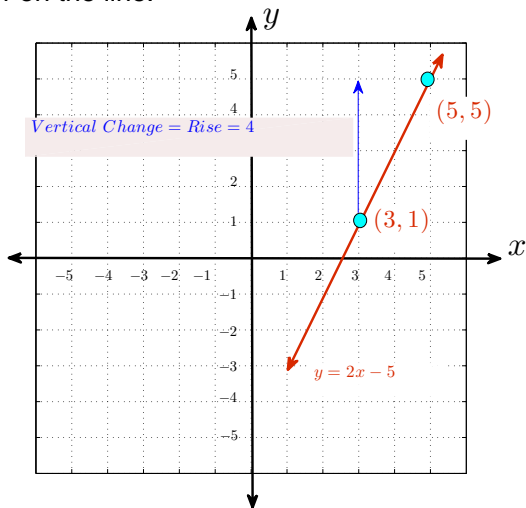
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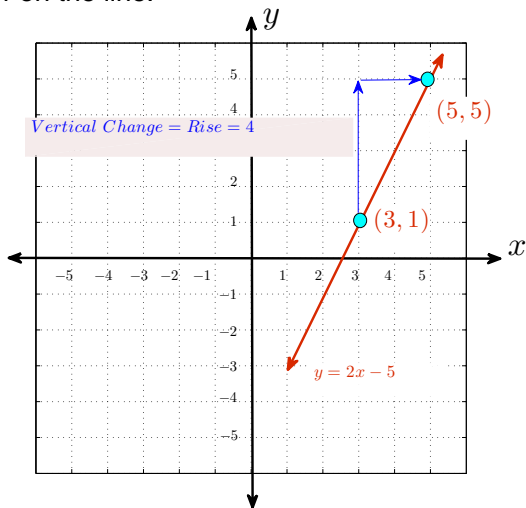
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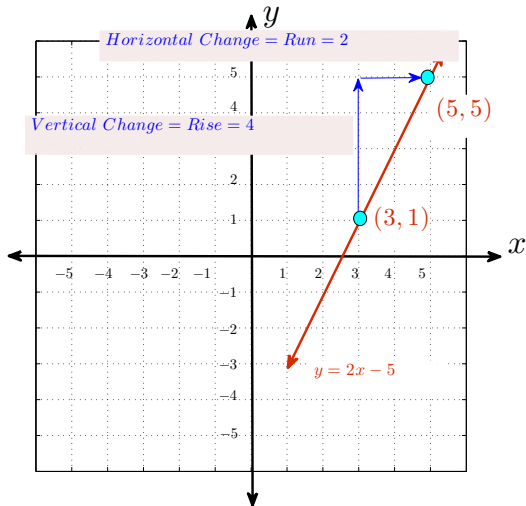
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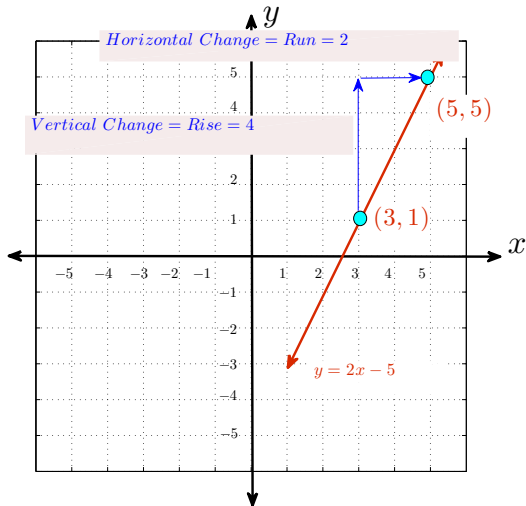
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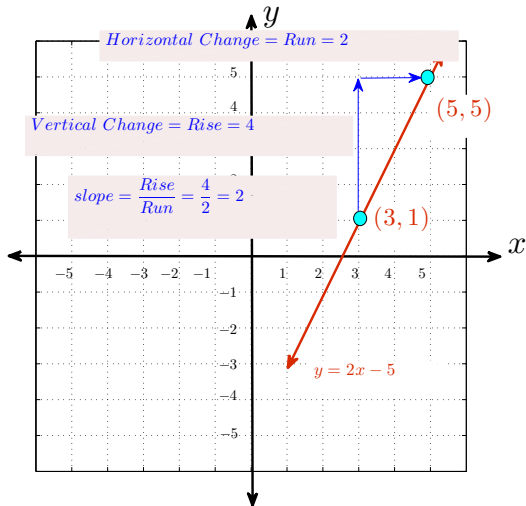
Section 3.2 The Slope of a Line

$$\text{slope} = \frac{\text{Rise}}{\text{Run}} = \frac{4}{2} = 2$$



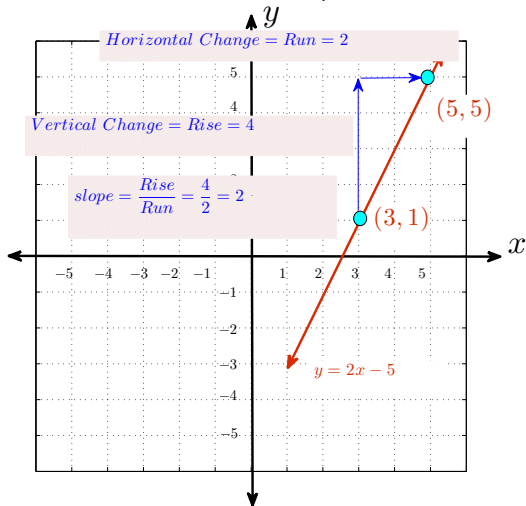
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Notice that the vertical change is measured by subtracting the y-coordinates of the two points, $5 - 1 = 4$.

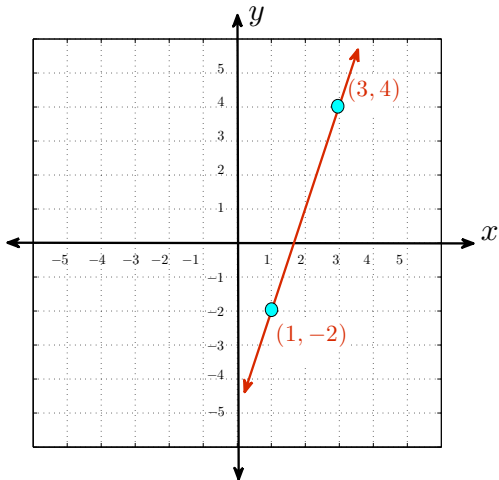


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Notice that the vertical change is measured by subtracting the y-coordinates of the two points, $5 - 1 = 4$. The horizontal change is the difference between the x-coordinates, $5 - 3 = 2$.

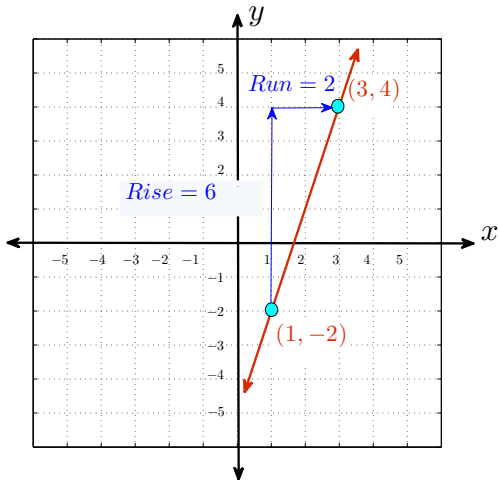


Ex. Find the slope of a line through $(3, 4)$ and $(1, -2)$.



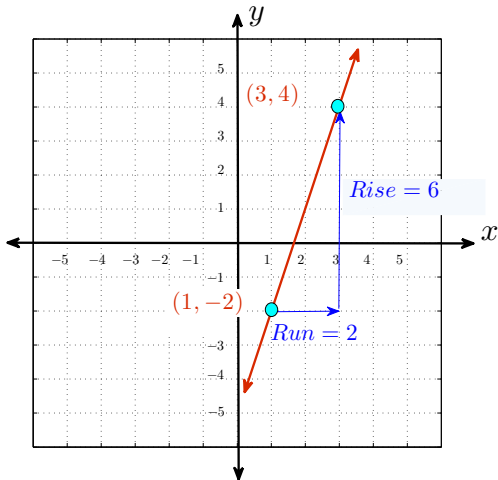
Ex. Find the slope of a line through $(3, 4)$ and $(1, -2)$.

$$\text{slope} = \frac{\text{Rise}}{\text{Run}} = \frac{6}{2} = 3$$



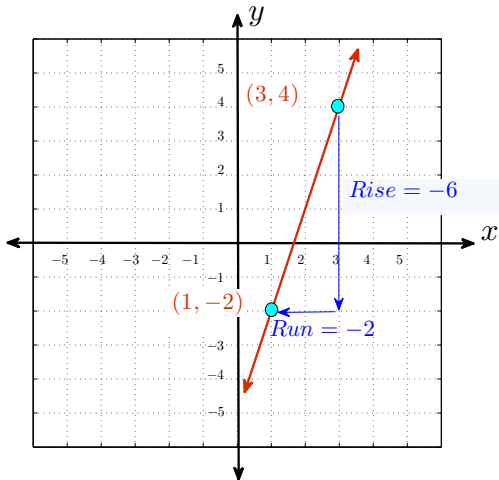
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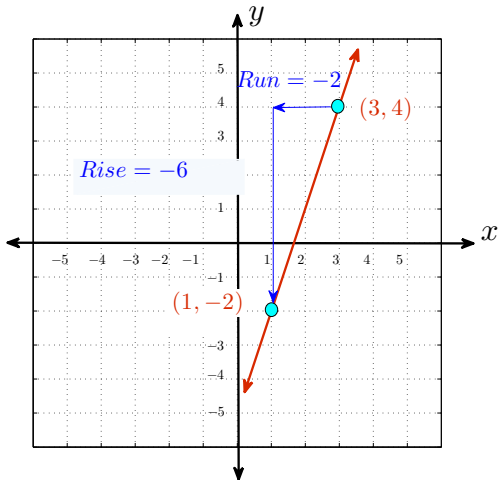
Ex. Find the slope of a line through $(3, 4)$ and $(1, -2)$.

$$\text{slope} = \frac{\text{Rise}}{\text{Run}} = \frac{-6}{-2} = 3$$

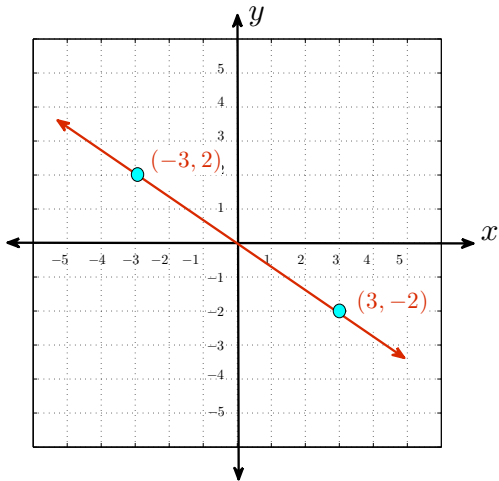


Ex. Find the slope of a line through $(3, 4)$ and $(1, -2)$.

$$\text{slope} = \frac{\text{Rise}}{\text{Run}} = \frac{-6}{-2} = 3$$

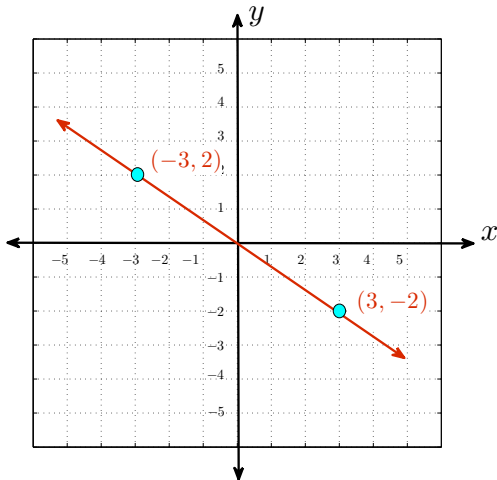


Ex. Find the slope of a line through $(-3, 2)$ and $(3, -2)$.



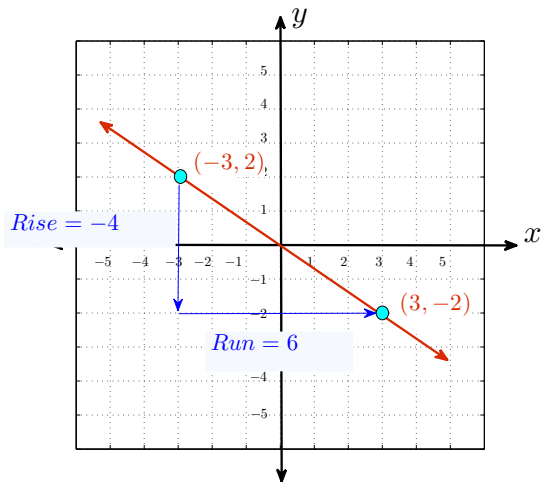
Ex. Find the slope of a line through $(-3, 2)$ and $(3, -2)$.

We expect a negative slope for the solution because the graph of the line falls from left to right.



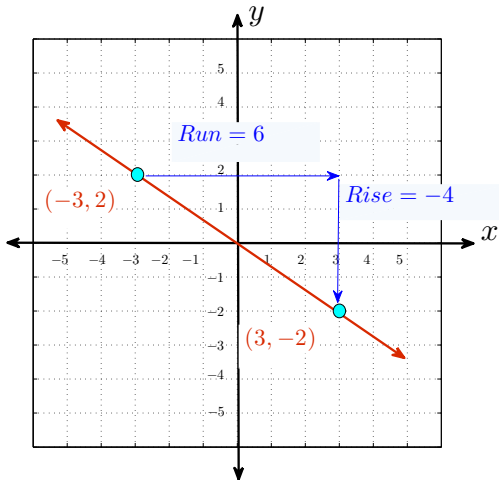
Ex. Find the slope of a line through $(-3, 2)$ and $(3, -2)$.

$$\text{slope} = \frac{\text{Rise}}{\text{Run}} = \frac{-4}{6} = \frac{2 \cdot (-2)}{2 \cdot 3} = \frac{\cancel{2} \cdot (-2)}{\cancel{2} \cdot 3} = -\frac{2}{3}$$



Ex. Find the slope of a line through $(-3, 2)$ and $(3, -2)$.

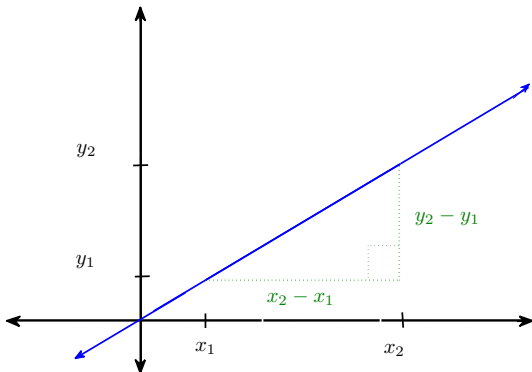
$$\text{slope} = \frac{\text{Rise}}{\text{Run}} = \frac{-4}{6} = \frac{2 \cdot (-2)}{2 \cdot 3} = \frac{\cancel{2} \cdot (-2)}{\cancel{2} \cdot 3} = -\frac{2}{3}$$



Definition

Let (x_1, y_1) and (x_2, y_2) be any two points on the rectangular coordinate plane. The **SLOPE** of a line which passes through the points (x_1, y_1) and (x_2, y_2) is m , where m is given by the formula:

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



Classroom Examples: Take the next three minutes to work these 2 problems.

Use the slope formula, $m = \frac{(y_2 - y_1)}{(x_2 - x_1)}$, to find the slope of a line containing the given points.

- $(7, -4)$ and $(4, 2)$
- $(2, -3)$ and $(-1, -3)$

Theorem

If line L_1 has slope m_1 and line L_2 has slope m_2 , then

L_1 is parallel to L_2 if and only if $m_1 = m_2$

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If line L_1 has slope m_1 and line L_2 has slope m_2 , then

L_1 is perpendicular to L_2 if and only if $m_1 \cdot m_2 = -1$ (or $m_1 = -\frac{1}{m_2}$)

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