Describing Graphs of Linear Equations Using the Slope and Intercepts

Jonathan R. Bacolod

Sauyo High School

How to Describe a Graph Using the Slope?

Value/Sign of m	**Trend of Graph**

How to Describe a Graph Using the Slope?

Value/Sign of m	**Trend of Graph**
Positive	

How to Describe a Graph Using the Slope?

Value/Sign of m	**Trend of Graph**
Positive	Rises from left to right

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Positive	Rises from left to right
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How to Describe a Graph Using the Slope when the Equation is Given?

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2. Describe the graph using the slope.

Example 1

Determine the slope of the linear equation $y = 2x - 5$ and describe the graph.

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Since the slope is positive,
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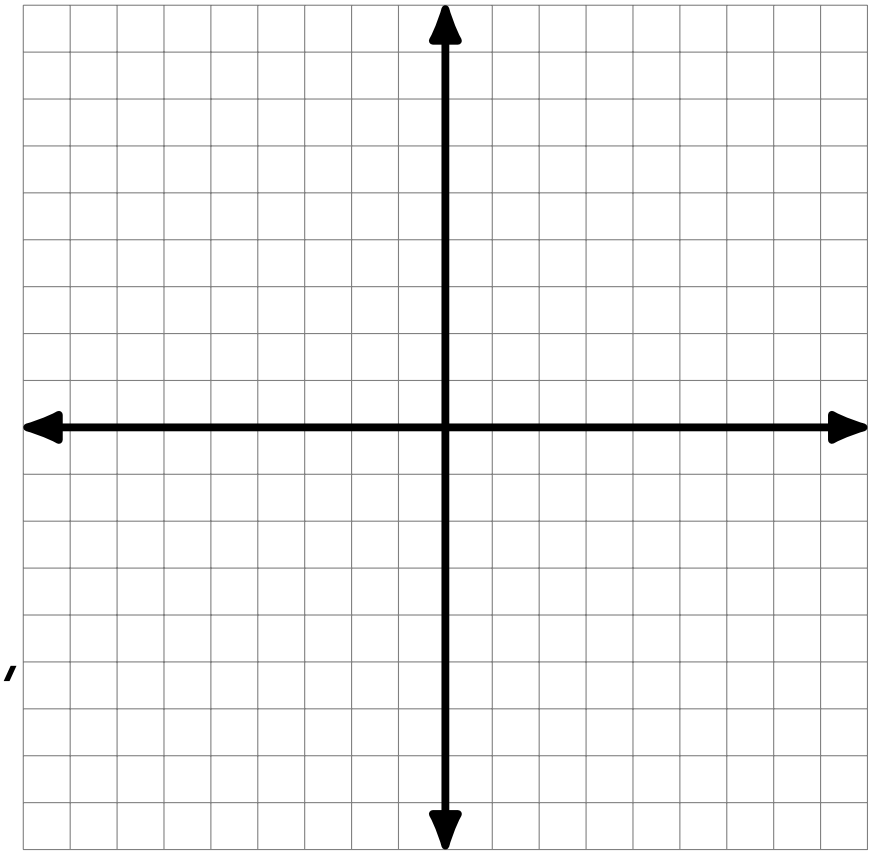

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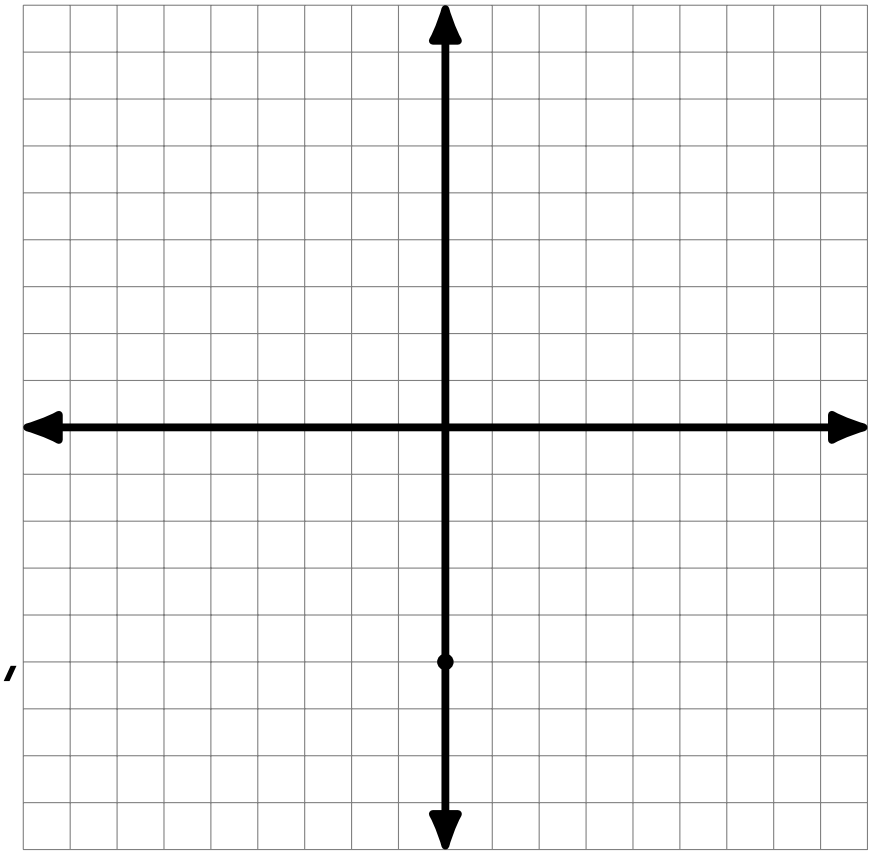

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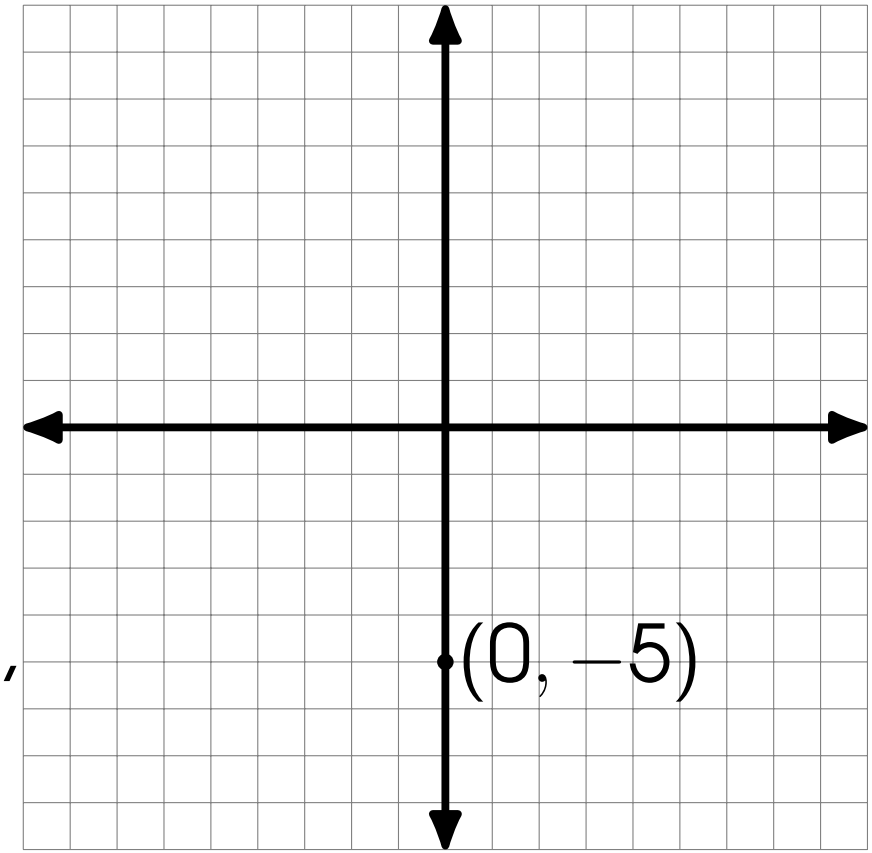

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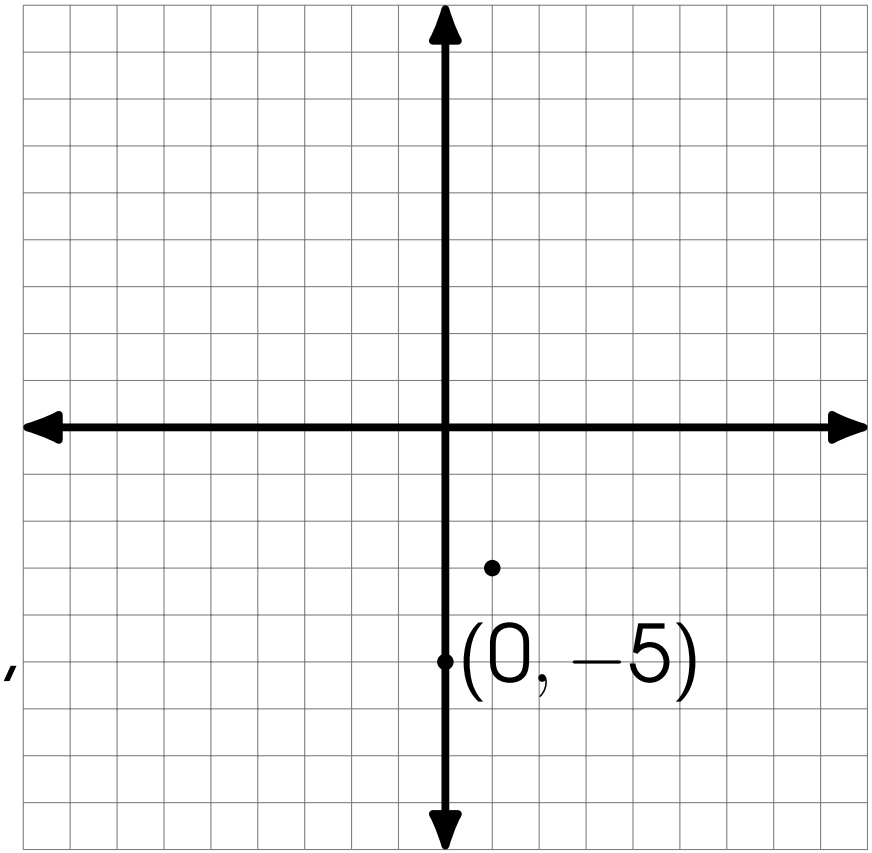

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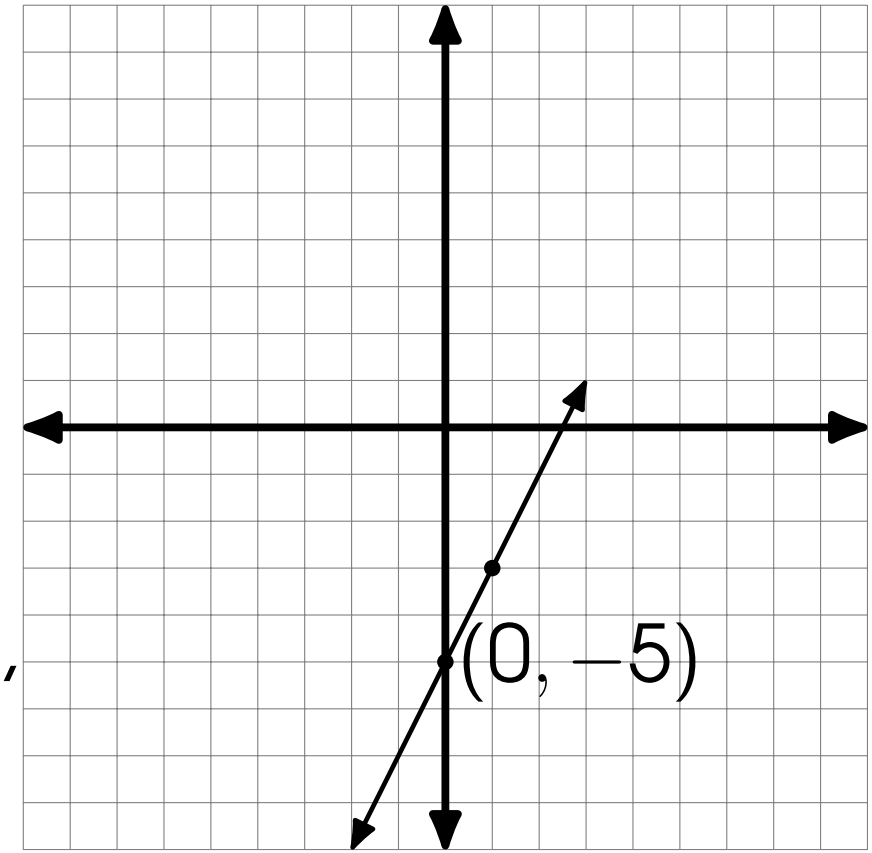

Example 2

Determine the slope of the linear equation $4x + 2y = 6$ and describe the graph.

How to Describe a Graph Using the Slope when the Equation is Given?

1. Change the equation to the form $y = mx + b$. m is the slope and b is the y-intercept.

Example 2

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$\therefore$ the slope is -2 and
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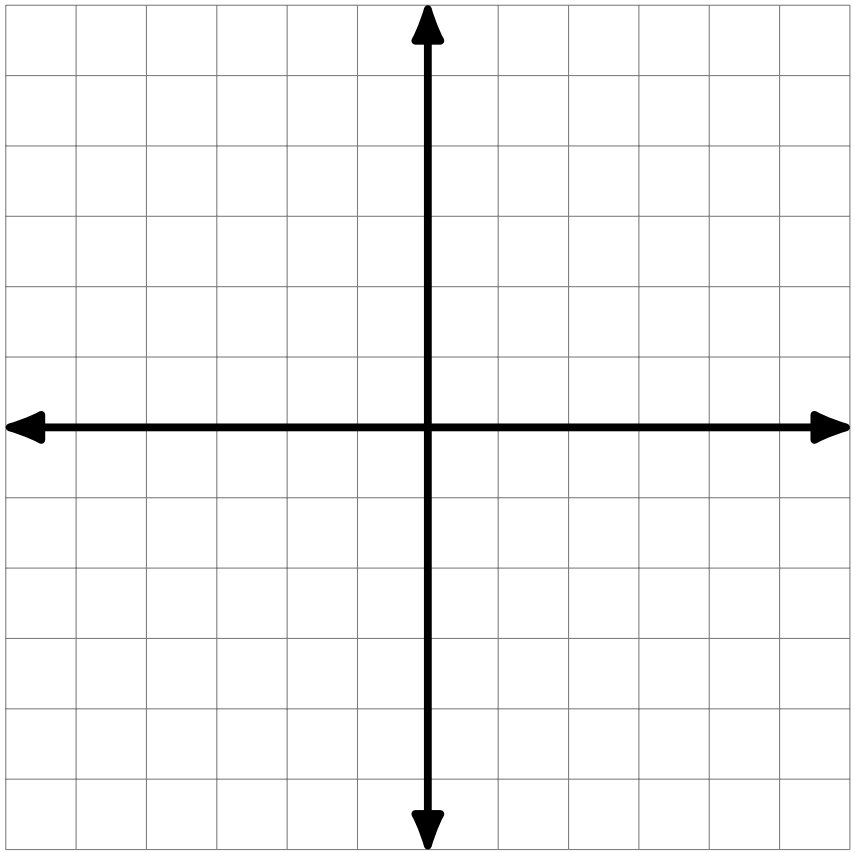

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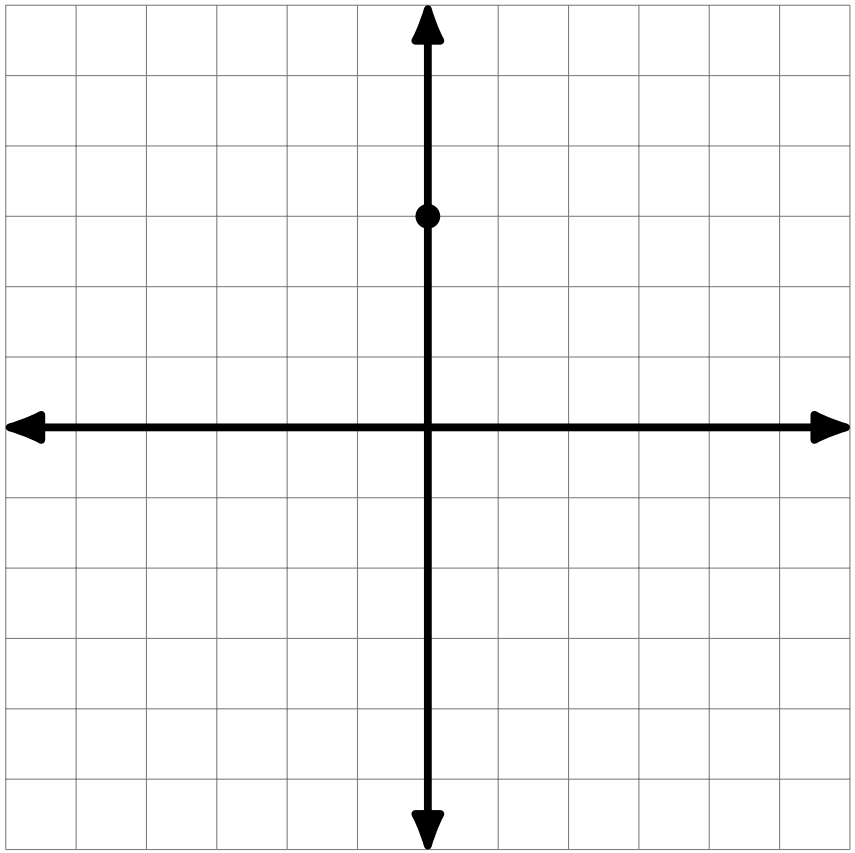

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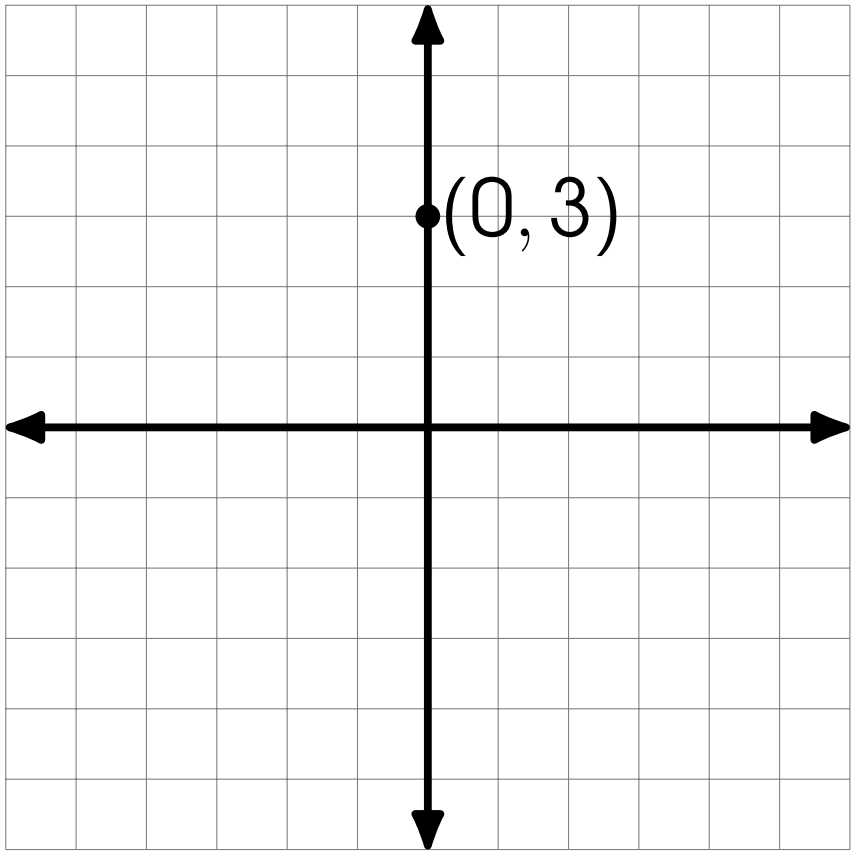

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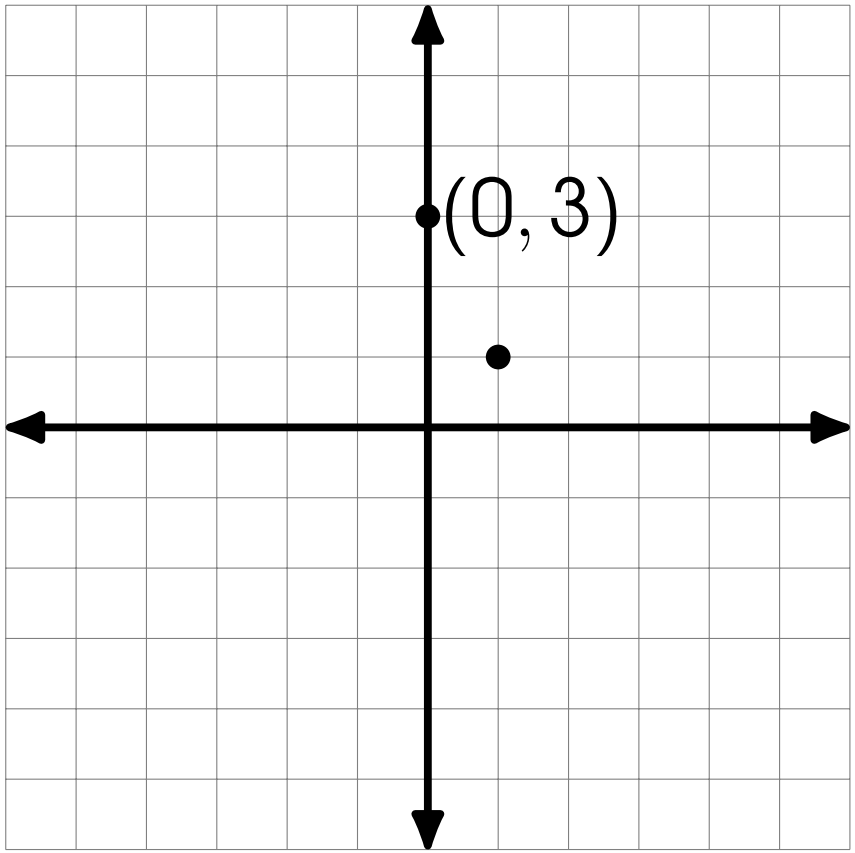

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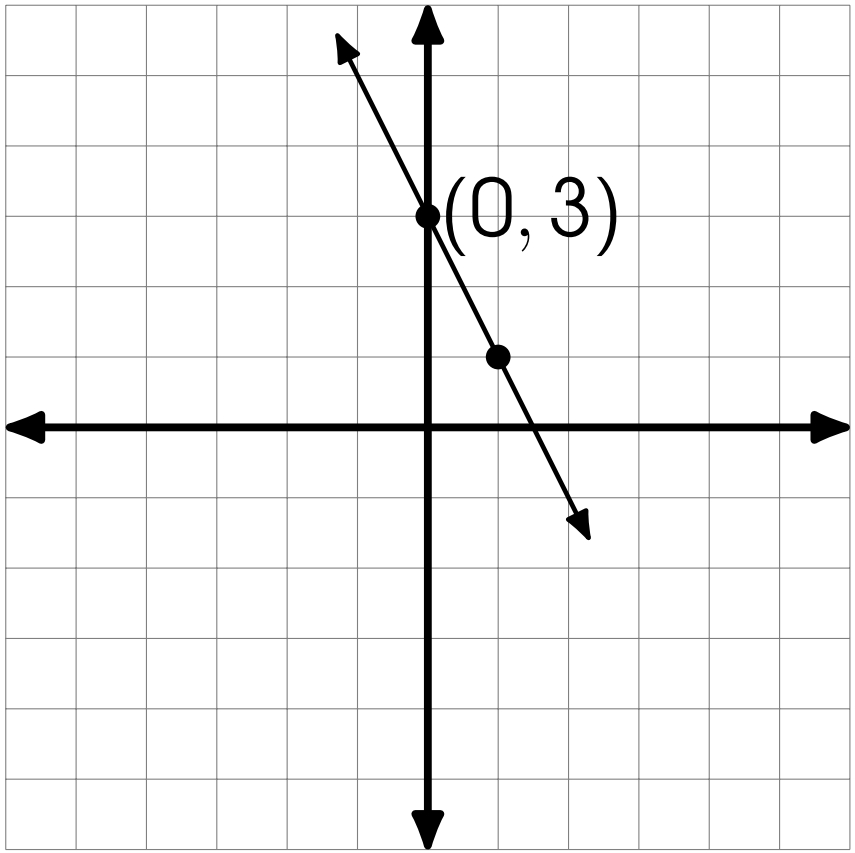

Example 3

Determine the slope of the linear equation $-3y - 9 = 0$ and describe the graph.

How to Describe a Graph Using the Slope when the Equation is Given?

1. Change the equation to the form $y = mx + b$. m is the slope and b is the y-intercept.

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1. Change the equation to the form $y = mx + b$. m is the slope and b is the y-intercept.
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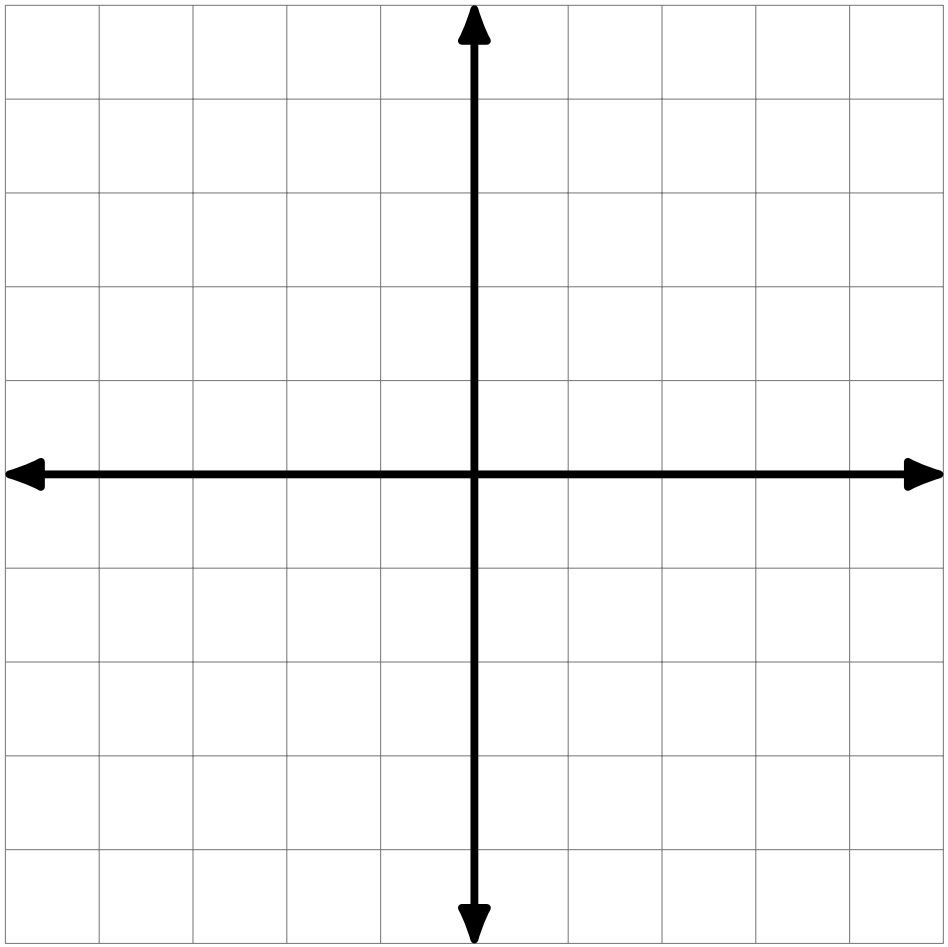

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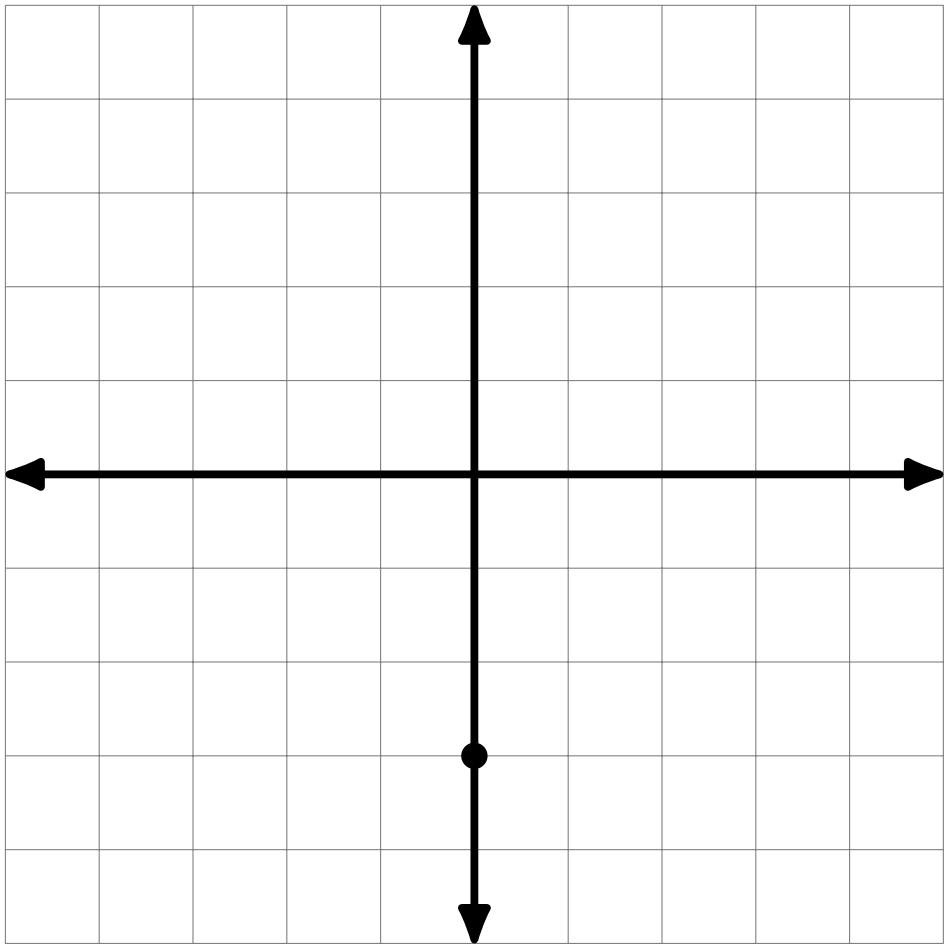

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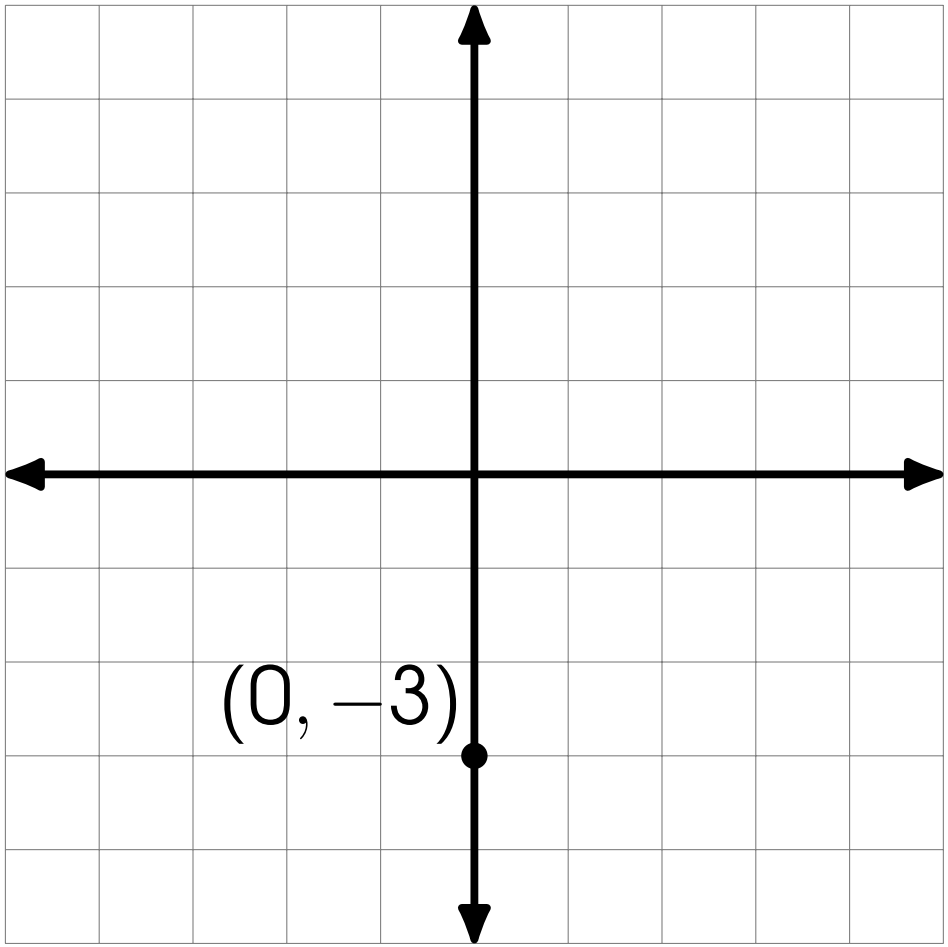

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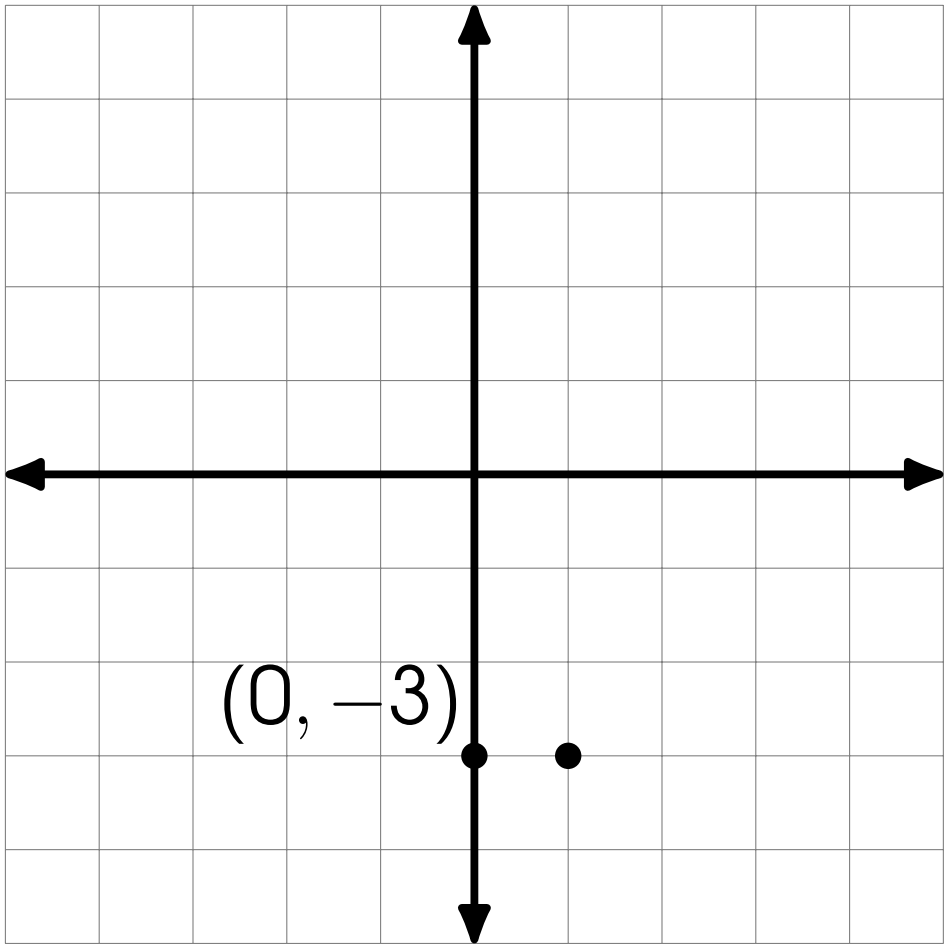

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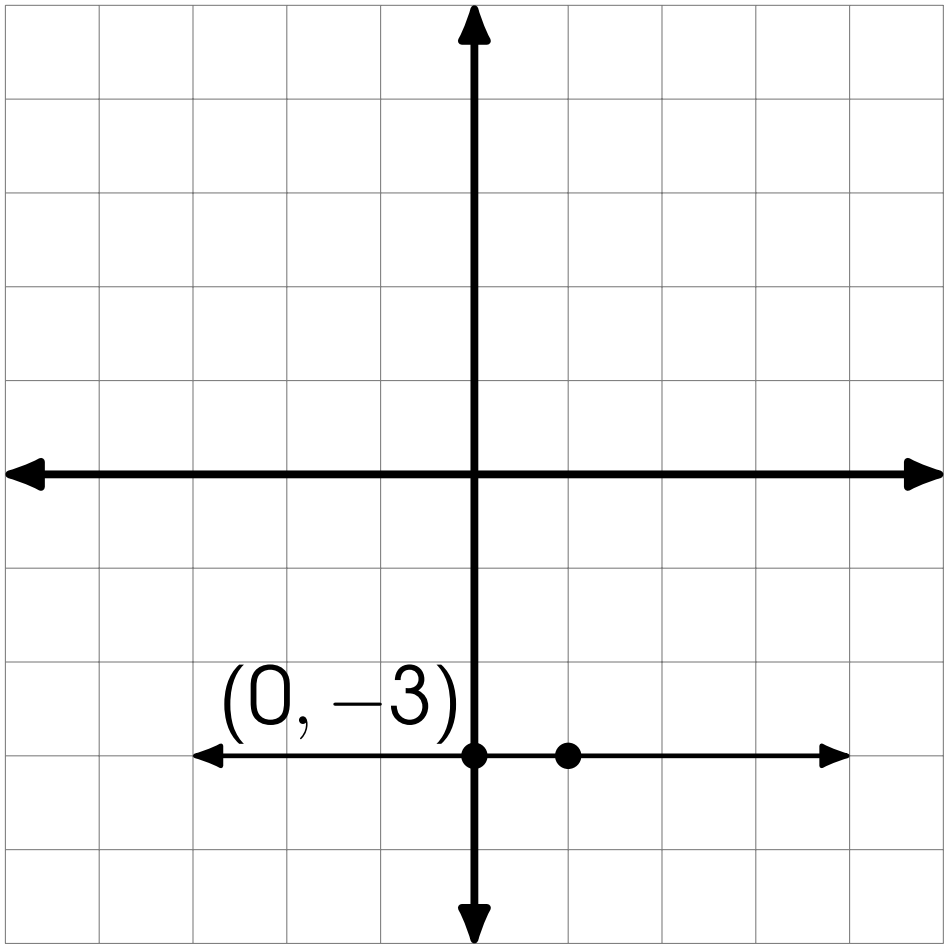

Example 4

Determine the slope of the linear equation $x = 4$ and describe the graph.

How to Describe a Graph Using the Slope when the Equation is Given?

1. Change the equation to the form $y = mx + b$. m is the slope and b is the y-intercept.

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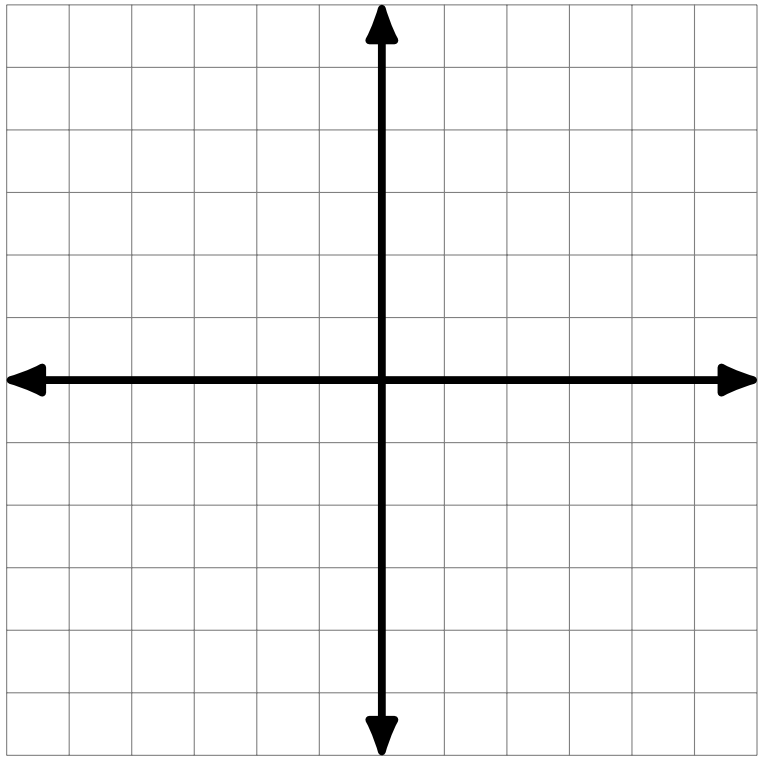

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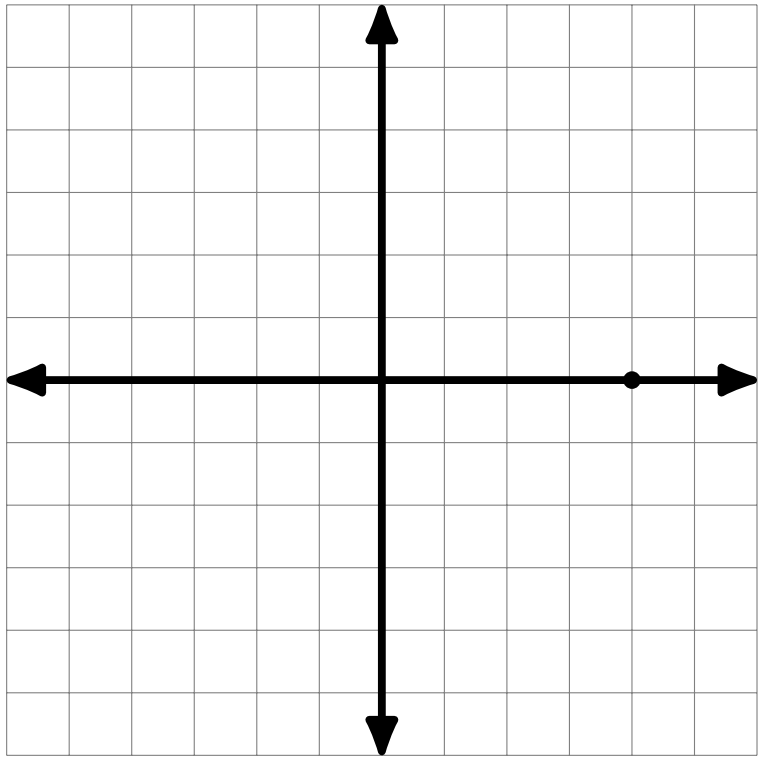

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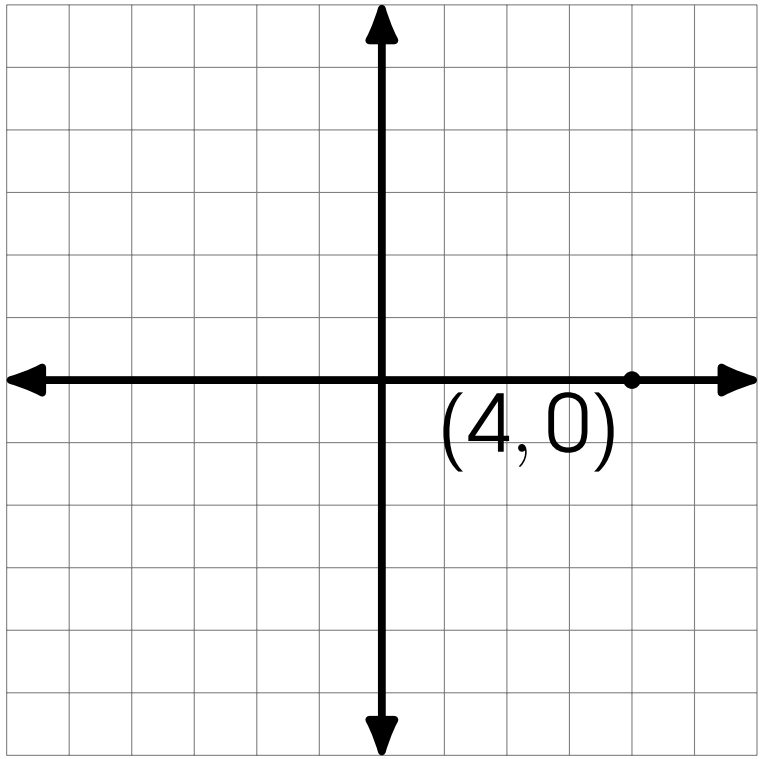

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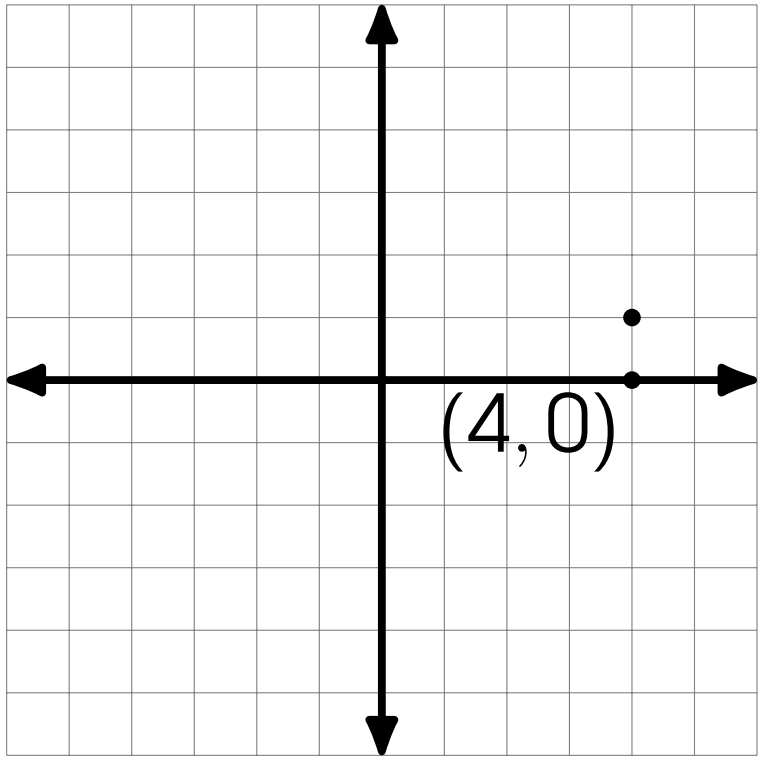

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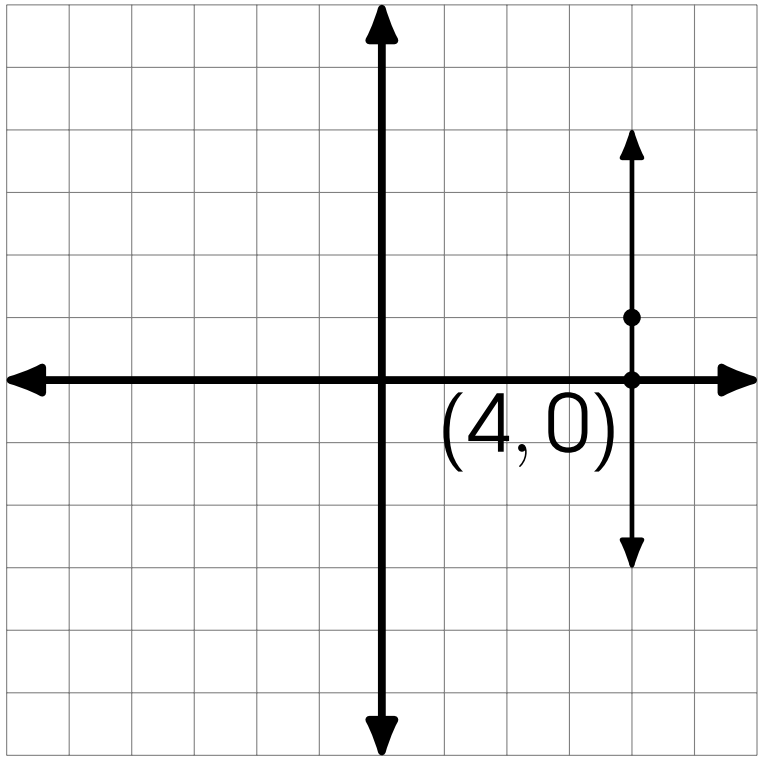

How to Describe a Graph Using the Intercepts?

Signs/Values of a and b	**Trend of Graph**

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Same signs	Falls from left to right
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Signs/Values of a and b	**Trend of Graph**
Same signs	Falls from left to right
Different signs	Rises from left to right
$a =$ undefined, $b \in \mathbb{R}$	Horizontal line

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How to Describe a Graph Using the Intercepts when the Equation is Given?

1. Let $y = 0$ and solve for x to get the x-intercept a.

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1. Let $y = 0$ and solve for x to get the x-intercept a.
2. Let $x = 0$ and solve for y to get the y-intercept b.
3. Describe the graph using the intercepts.

Example 1

Determine the intercepts of the linear equation $y = 2x - 6$ and describe the graph.

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1. Let $y = 0$ and solve for x to get the x-intercept a.

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$$\frac{-2x}{-2} = \frac{-6}{-2}$$

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$$x = 3 \quad \text{Simplification}$$

$\therefore$ the x-intercept a is 3.

How to Describe a Graph Using the Intercepts when the Equation is Given?

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$$y = 2(0) - 6 \quad \text{Substitution}$$

$$y = 0 - 6$$

Example 1

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$$y = -6 \quad \text{Simplification}$$

$\therefore$ the y-intercept b is -6.

How to Describe a Graph Using the Intercepts when the Equation is Given?

1. Let $y = 0$ and solve for x to get the x-intercept a.
2. Let $x = 0$ and solve for y to get the y-intercept b.
3. Describe the graph using the intercepts.

Example 1

$y = 2x - 6$
The x-intercept a is 3 and
the y-intercept b is -6.

Example 1

$y = 2x - 6$
The x-intercept a is 3 and
the y-intercept b is -6.

Since the intercepts have
different signs, the graph
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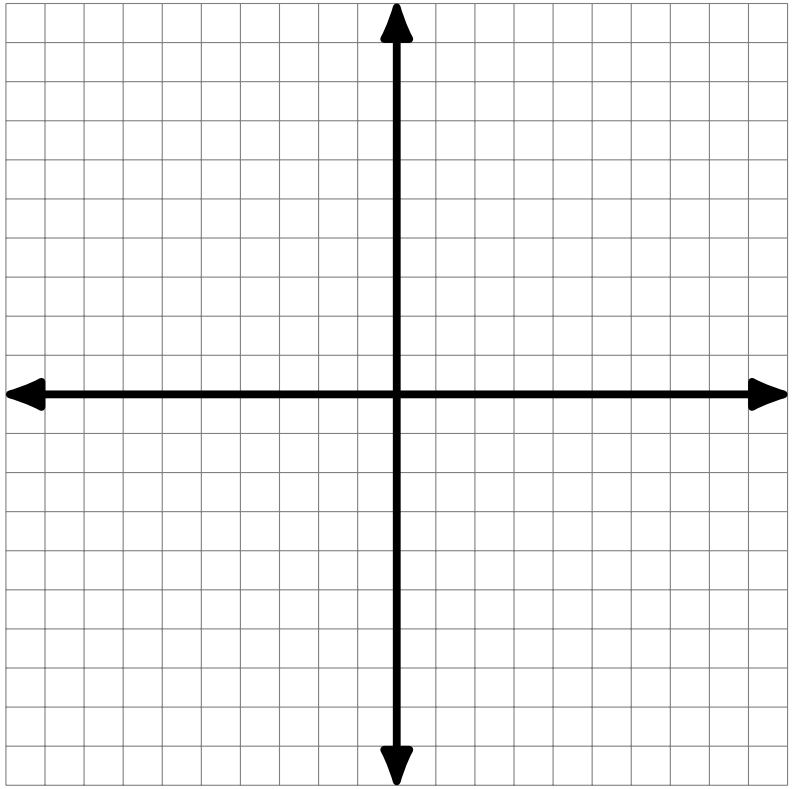
$y = 2x - 6$
The x-intercept a is 3 and the y-intercept b is -6.

Since the intercepts have different signs, the graph rises from left to right.



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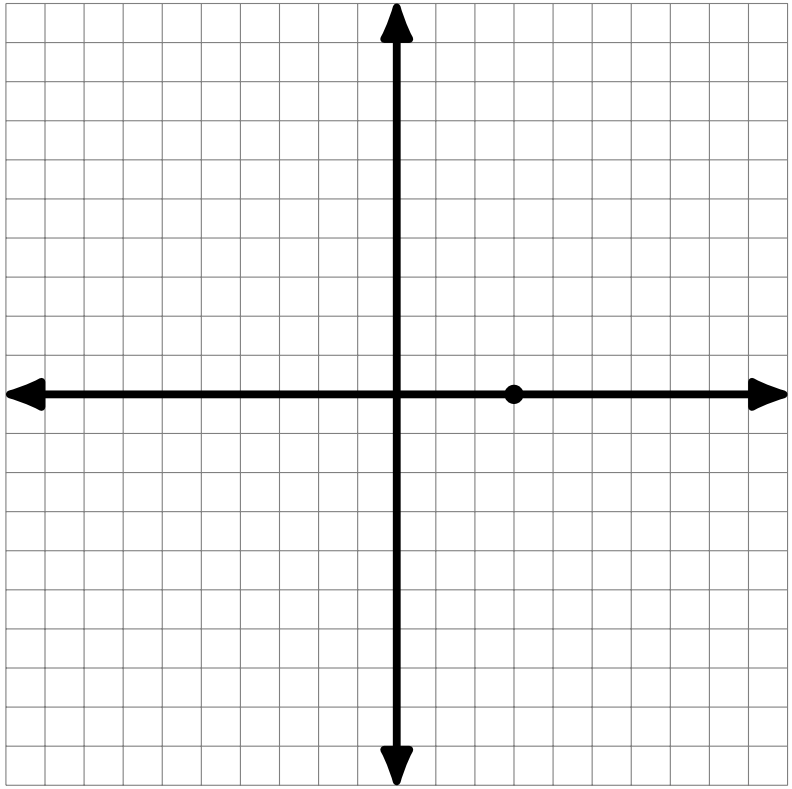

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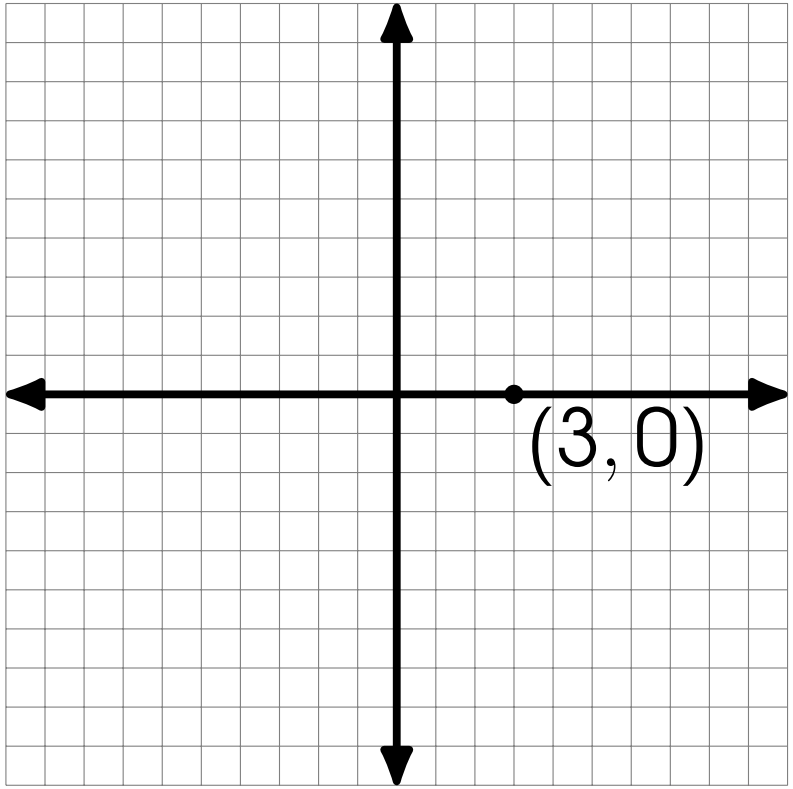

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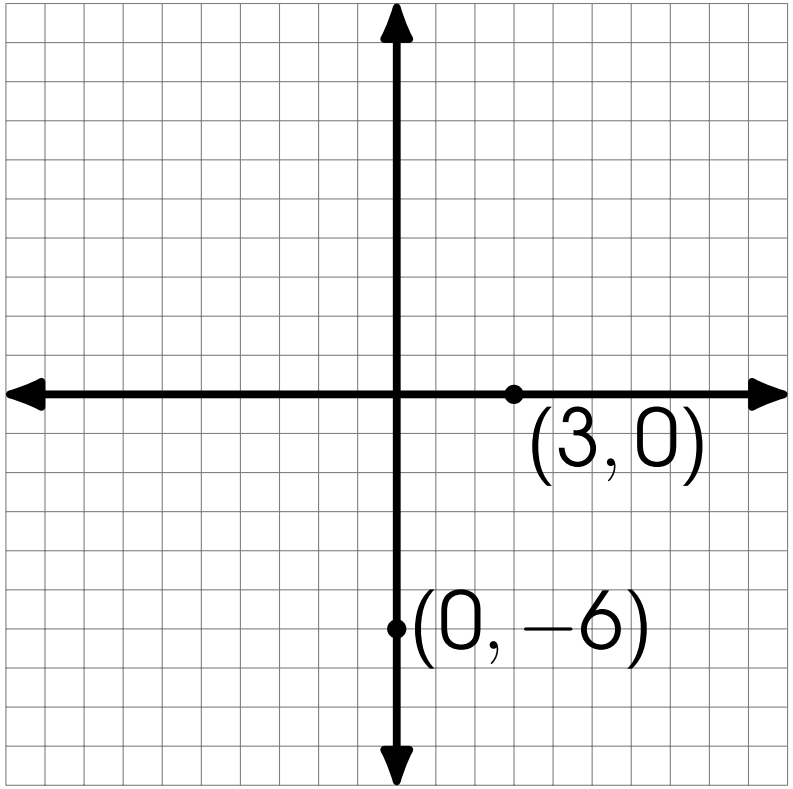

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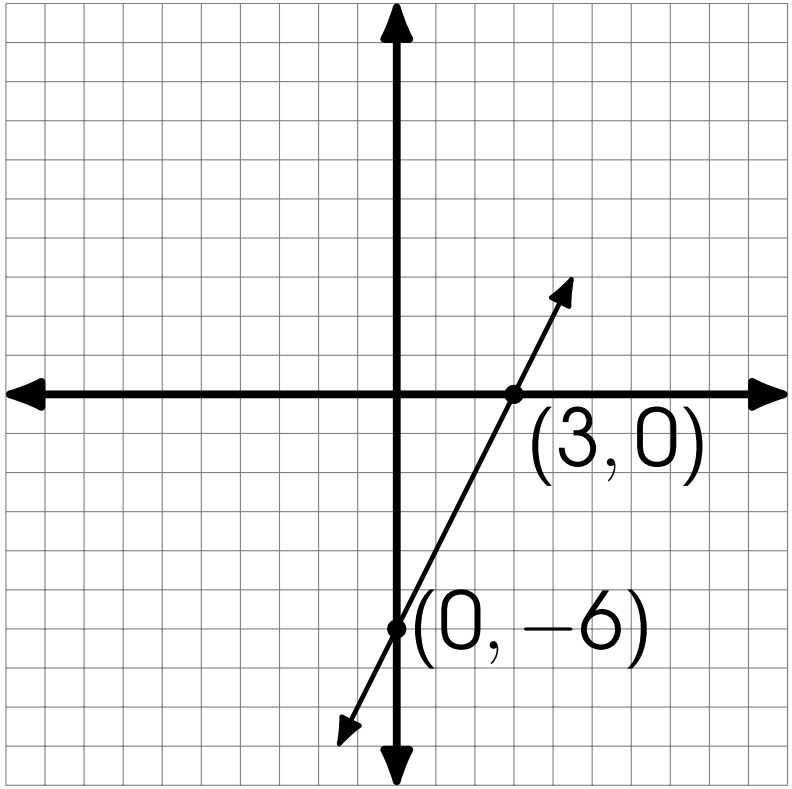

Example 2

Determine the intercepts of the linear equation $4x + 2y = 8$ and describe the graph.

How to Describe a Graph Using the Intercepts when the Equation is Given?

1. Let $y = 0$ and solve for x to get the x-intercept a.

Example 2

Let $y = 0$:

$4x + 2y = 8$

Example 2

Let $y = 0$:

$$4x + 2y = 8$$

$$4x + 2(0) = 8$$

Example 2

Let $y = 0$:

$4x + 2y = 8$

$4x + 2(0) = 8$ Substitution

Example 2

Let $y = 0$:

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$$4x + 0 = 8 \quad \text{Simplification}$$

$$\frac{4x}{4} = \frac{8}{4}$$

Example 2

Let $y = 0$:

$$4x + 2y = 8$$

$$4x + 2(0) = 8 \quad \text{Substitution}$$

$$4x + 0 = 8 \quad \text{Simplification}$$

$$\frac{4x}{4} = \frac{8}{4} \quad \text{Division Property}$$

Example 2

Let $y = 0$:

$4x + 2y = 8$

$4x + 2(0) = 8$ Substitution

$4x + 0 = 8$ Simplification

$\frac{4x}{4} = \frac{8}{4}$ Division Property

$x = 2$

Example 2

Let $y = 0$:

$4x + 2y = 8$

$4x + 2(0) = 8$ Substitution

$4x + 0 = 8$ Simplification

$\frac{4x}{4} = \frac{8}{4}$ Division Property

$x = 2$ Simplification

$\therefore$ the x-intercept a is 2.

How to Describe a Graph Using the Intercepts when the Equation is Given?

1. Let $y = 0$ and solve for x to get the x-intercept a.
2. Let $x = 0$ and solve for y to get the y-intercept b.

Example 2

Let $x = 0$:

$4x + 2y = 8$

Example 2

Let $x = 0$:

$$4x + 2y = 8$$

$$4(0) + 2y = 8$$

Example 2

Let $x = 0$:

$4x + 2y = 8$

$4(0) + 2y = 8$ Substitution

Example 2

Let $x = 0$:

$$4x + 2y = 8$$

$$4(0) + 2y = 8 \quad \text{Substitution}$$

$$0 + 2y = 8$$

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$$4(0) + 2y = 8 \quad \text{Substitution}$$

$$0 + 2y = 8 \quad \text{Simplification}$$

$$\frac{2y}{2} = \frac{8}{2}$$

Example 2

Let $x = 0$:

$4x + 2y = 8$

$4(0) + 2y = 8$ Substitution

$0 + 2y = 8$ Simplification

$\frac{2y}{2} = \frac{8}{2}$ Division Property

Example 2

Let $x = 0$:

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$y = 4$

Example 2

Let $x = 0$:

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$$4(0) + 2y = 8 \quad \text{Substitution}$$

$$0 + 2y = 8 \quad \text{Simplification}$$

$$\frac{2y}{2} = \frac{8}{2} \quad \text{Division Property}$$

$$y = 4 \quad \text{Simplification}$$

$\therefore$ the y-intercept b is 4.

How to Describe a Graph Using the Intercepts when the Equation is Given?

1. Let $y = 0$ and solve for x to get the x-intercept a.
2. Let $x = 0$ and solve for y to get the y-intercept b.
3. Describe the graph using the intercepts.

Example 2

$4x + 2y = 8$
The x-intercept a is 2 and
the y-intercept b is 4.

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Since the intercepts have
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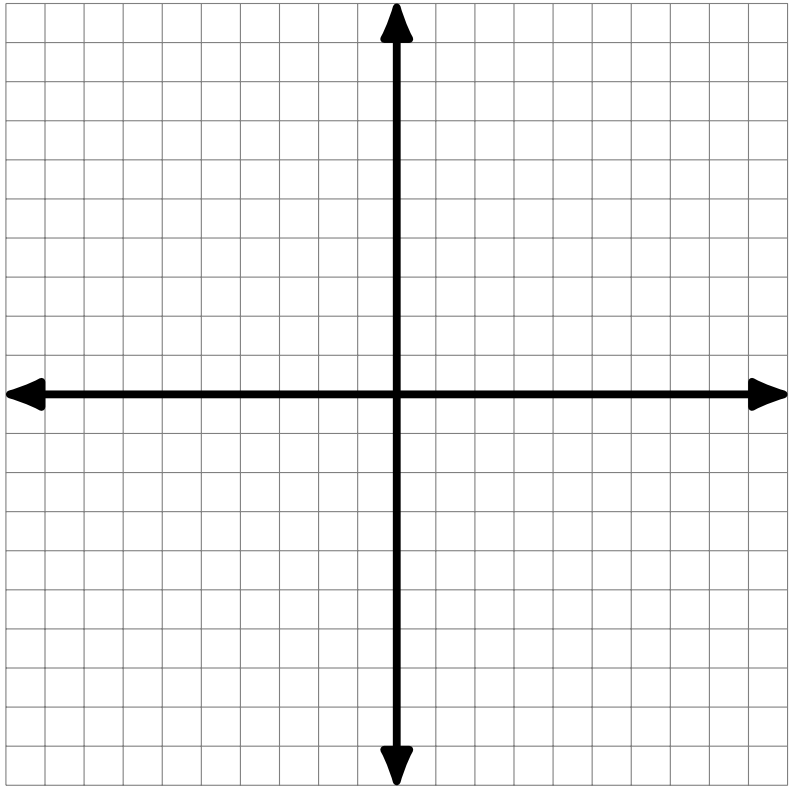

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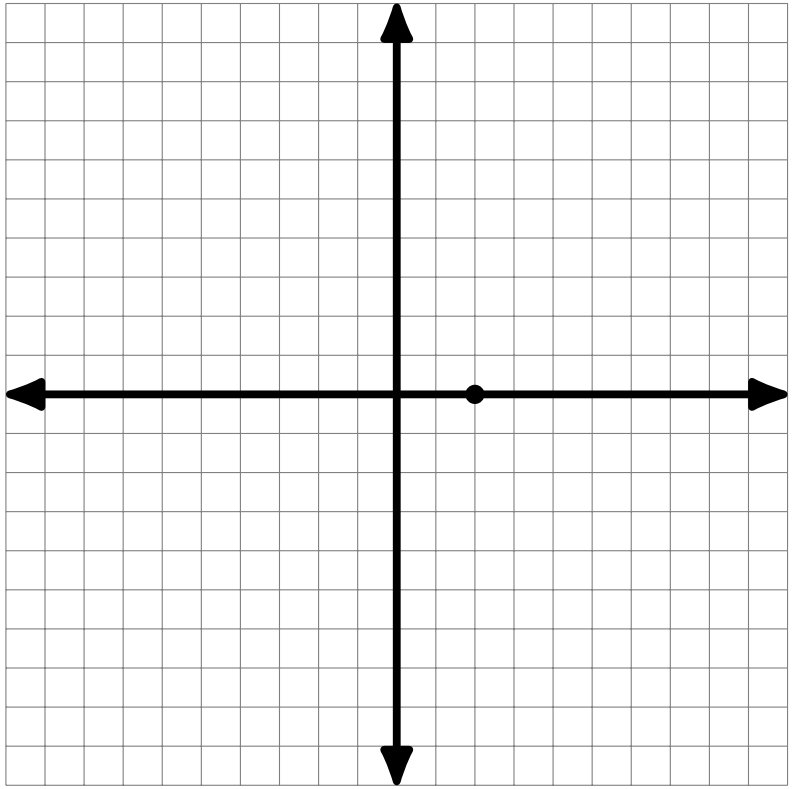

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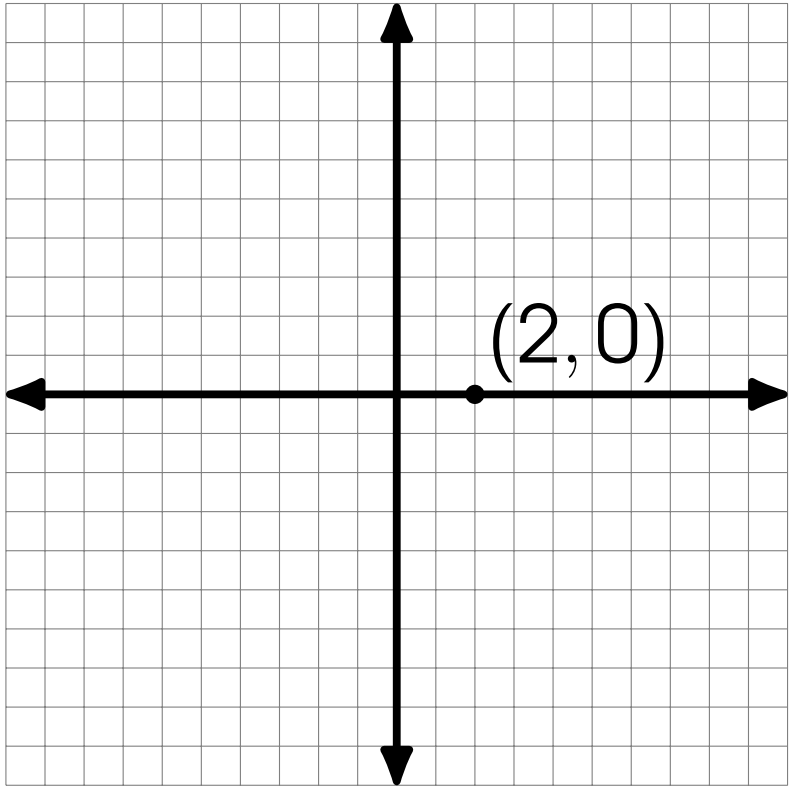

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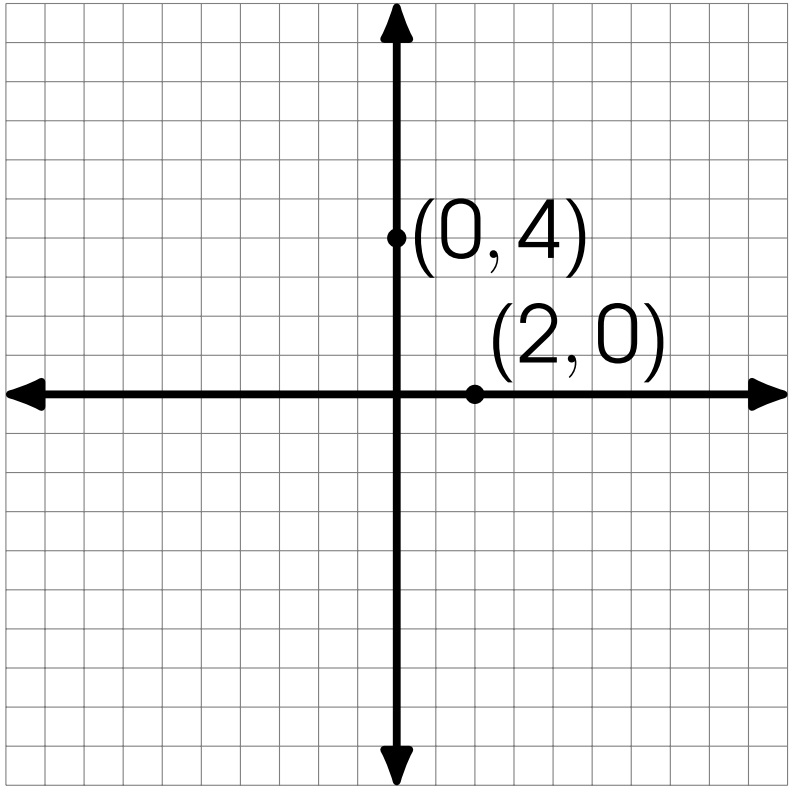

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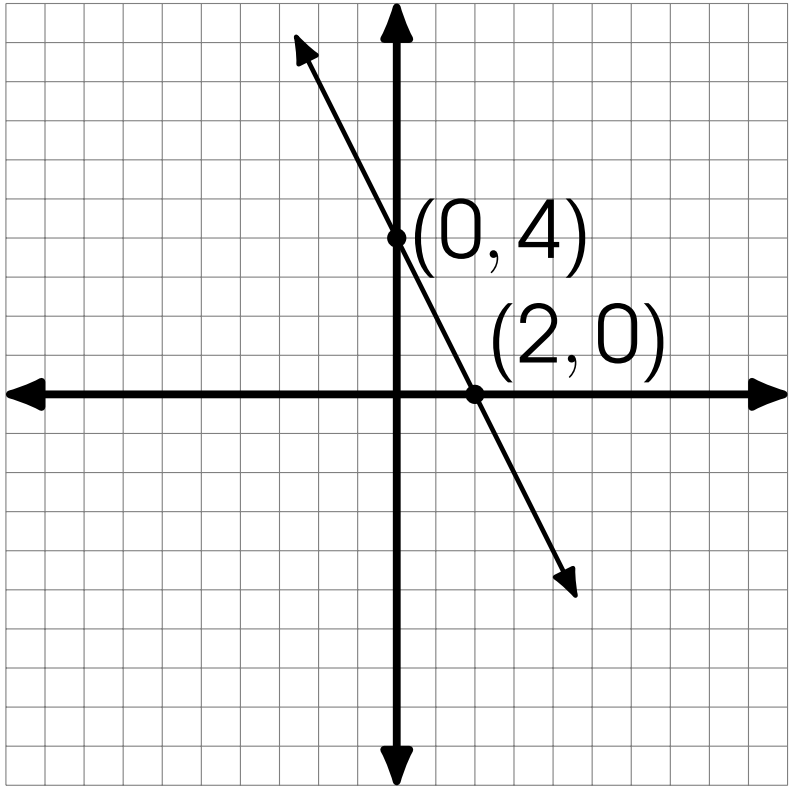

Example 3

Determine the intercepts of the linear equation $-3y - 9 = 0$ and describe the graph.

How to Describe a Graph Using the Intercepts when the Equation is Given?

1. Let $y = 0$ and solve for x to get the x-intercept a.

Example 3

Let $y = 0$:

$$-3y - 9 = 0$$

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Example 3

Let $y = 0$:

$-3y - 9 = 0$

$-3(0) - 9 = 0$ Substitution

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$$-3(0) - 9 = 0 \quad \text{Substitution}$$

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Let $y = 0$:

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Let $y = 0$:

$$-3y - 9 = 0$$

$$-3(0) - 9 = 0 \quad \text{Substitution}$$

$$0 - 9 = 0 \quad \text{Simplification}$$

$$-9 \neq 0$$

Example 3

Let $y = 0$:

$$-3y - 9 = 0$$

$$-3(0) - 9 = 0 \quad \text{Substitution}$$

$$0 - 9 = 0 \quad \text{Simplification}$$

$$-9 \neq 0 \quad \text{Simplification}$$

$\therefore$ the x-intercept a is undefined.

How to Describe a Graph Using the Intercepts when the Equation is Given?

1. Let $y = 0$ and solve for x to get the x-intercept a.
2. Let $x = 0$ and solve for y to get the y-intercept b.

Example 3

Let $x = 0$:

$$-3y - 9 = 0$$

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$$-3y - 9 = 0$$

$$-3y = 9$$

Example 3

Let $x = 0$:

$-3y - 9 = 0$

$-3y = 9$ Addition Property

Example 3

Let $x = 0$:

$$-3y - 9 = 0$$

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$$\frac{-3y}{-3} = \frac{9}{-3}$$

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Example 3

Let $x = 0$:

$$-3y - 9 = 0$$

$$-3y = 9 \qquad \text{Addition Property}$$

$$\frac{-3y}{-3} = \frac{9}{-3} \qquad \text{Division Property}$$

$$y = -3$$

Example 3

Let $x = 0$:

$$-3y - 9 = 0$$

$$-3y = 9 \qquad \text{Addition Property}$$

$$\frac{-3y}{-3} = \frac{9}{-3} \qquad \text{Division Property}$$

$$y = -3 \qquad \text{Simplification}$$

$\therefore$ the y-intercept b is -3.

How to Describe a Graph Using the Intercepts when the Equation is Given?

1. Let $y = 0$ and solve for x to get the x-intercept a.
2. Let $x = 0$ and solve for y to get the y-intercept b.
3. Describe the graph using the intercepts.

Example 3

$-3y - 9 = 0$
The x-intercept a is
undefined and
the y-intercept b is -3.

Example 3

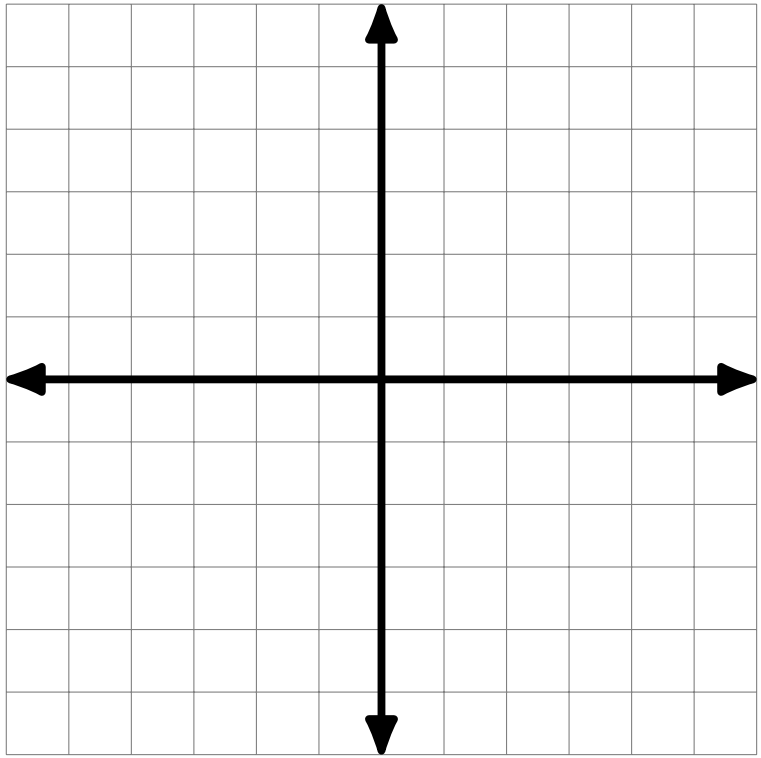
$-3y - 9 = 0$
The x-intercept a is
undefined and
the y-intercept b is -3.

Since the x-intercept is
undefined and the
y-intercept is a
real number,
the graph is a
horizontal line.

Example 3

$-3y - 9 = 0$
The x-intercept a is undefined and the y-intercept b is -3.

Since the x-intercept is undefined and the y-intercept is a real number, the graph is a horizontal line.



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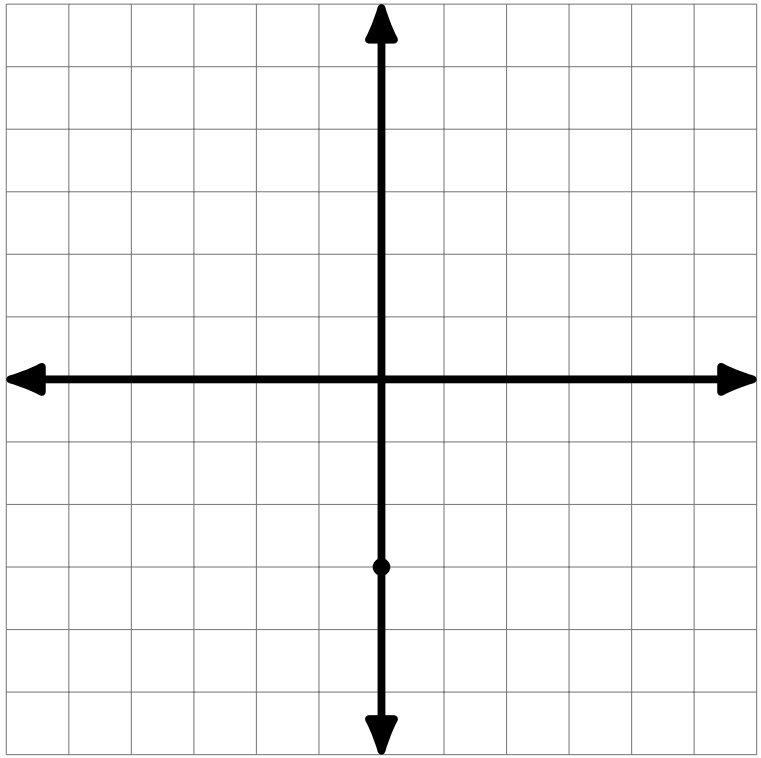
Since the x-intercept is undefined and the y-intercept is a real number, the graph is a horizontal line.



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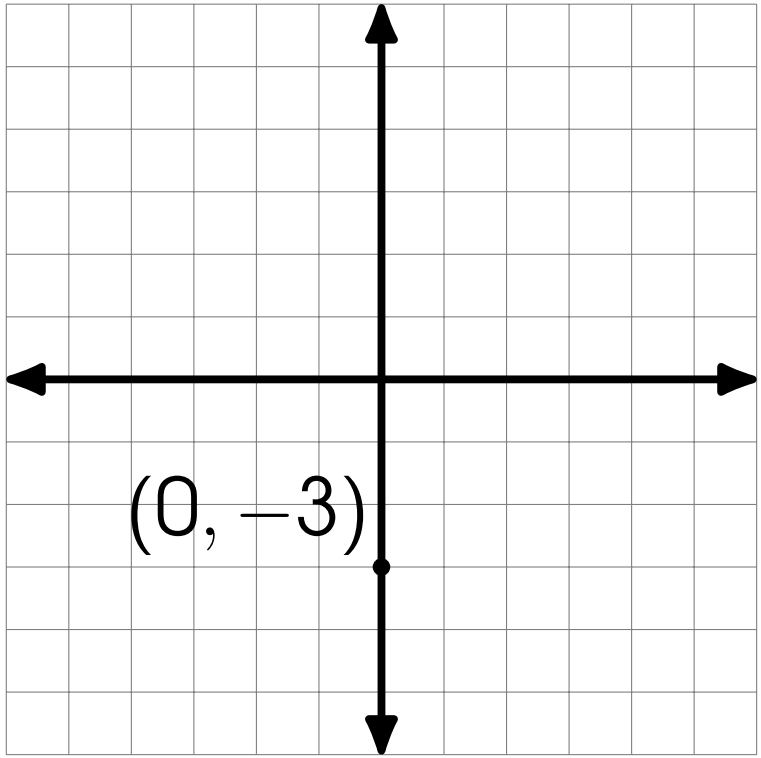

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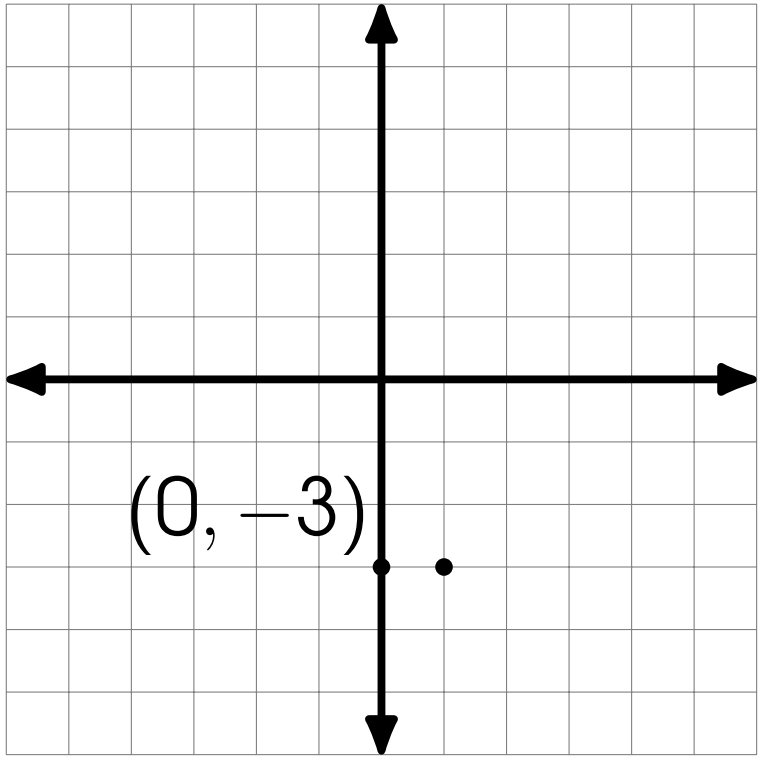

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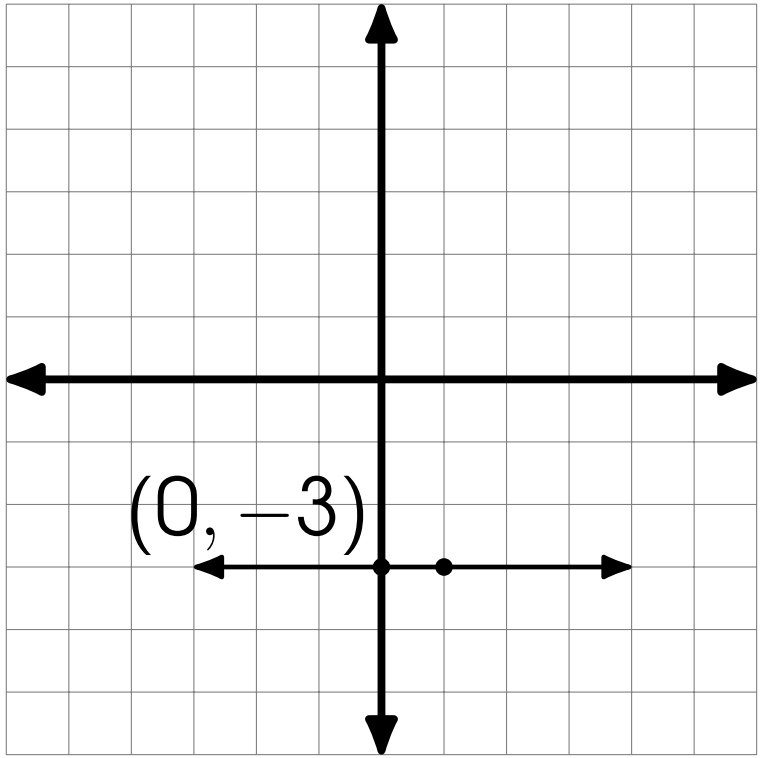


Example 4

Determine the intercepts of the linear equation $x = 4$ and describe the graph.

How to Describe a Graph Using the Intercepts when the Equation is Given?

1. Let $y = 0$ and solve for x to get the x-intercept a.

Example 4

Let $y = 0$:

$x = 4$

$\therefore$ the x-intercept a is 4.

How to Describe a Graph Using the Intercepts when the Equation is Given?

1. Let $y = 0$ and solve for x to get the x-intercept a.
2. Let $x = 0$ and solve for y to get the y-intercept b.

Example 4

Let $x = 0$:

$x = 4$

Example 4

Let $x = 0$:

$x = 4$

$0 \neq 4$

Example 4

Let $x = 0$:

$x = 4$

$0 \neq 4$ Substitution

$\therefore$ the y-intercept b is undefined.

How to Describe a Graph Using the Intercepts when the Equation is Given?

1. Let $y = 0$ and solve for x to get the x-intercept a.
2. Let $x = 0$ and solve for y to get the y-intercept b.
3. Describe the graph using the intercepts.

Example 4

$x = 4$
The x-intercept a is 4
and the y-intercept b
is undefined.

Example 4

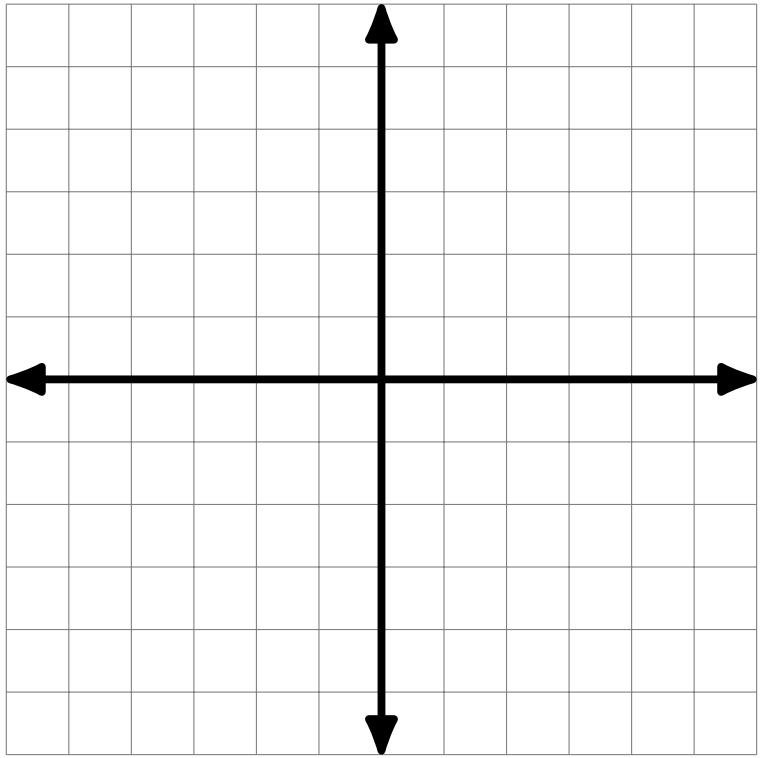
$x = 4$
The x-intercept a is 4
and the y-intercept b
is undefined.

Since the x-intercept is
a real number and the
y-intercept is undefined,
the graph is a
vertical line.

Example 4

$x = 4$
The x-intercept a is 4 and the y-intercept b is undefined.

Since the x-intercept is a real number and the y-intercept is undefined, the graph is a vertical line.



Example 4

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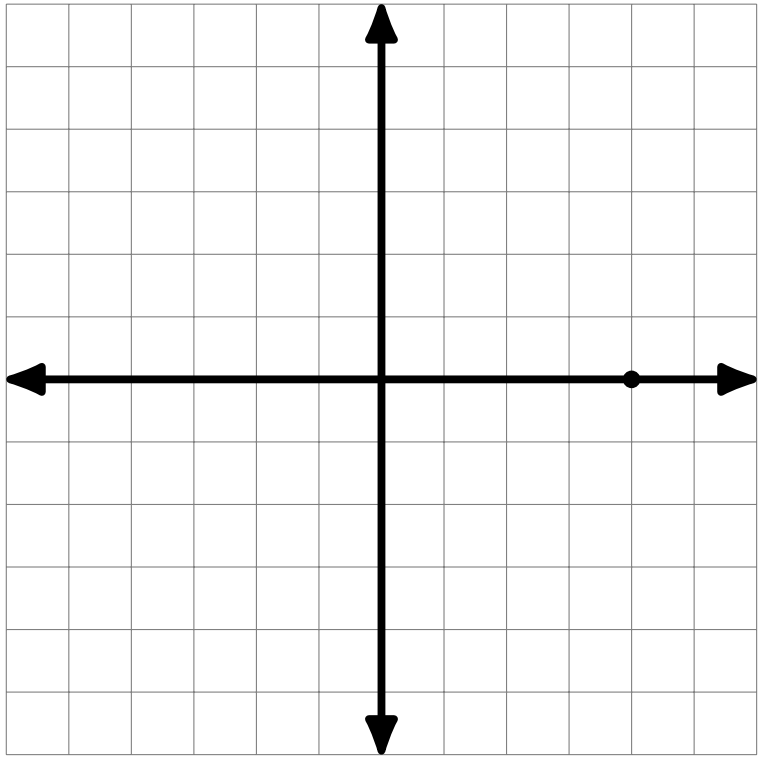
The x-intercept a is 4 and the y-intercept b is undefined.

Since the x-intercept is a real number and the y-intercept is undefined, the graph is a vertical line.



Example 4

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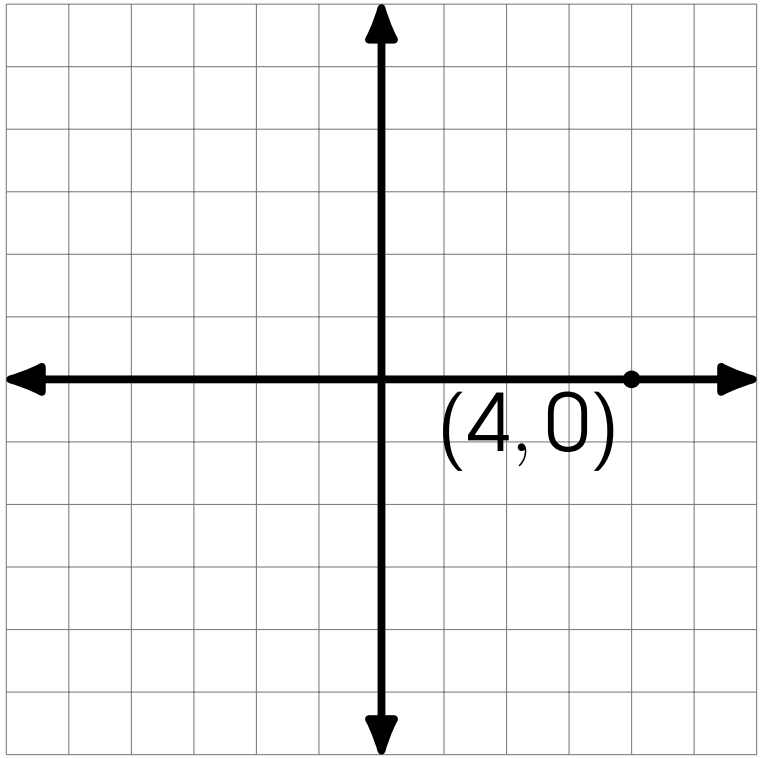
The x-intercept a is 4 and the y-intercept b is undefined.

Since the x-intercept is a real number and the y-intercept is undefined, the graph is a vertical line.



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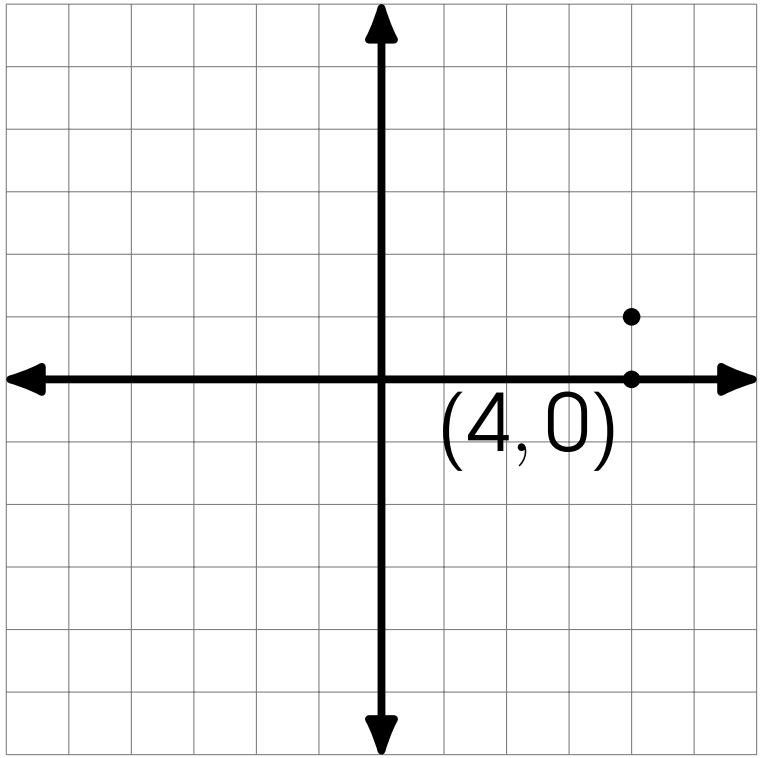

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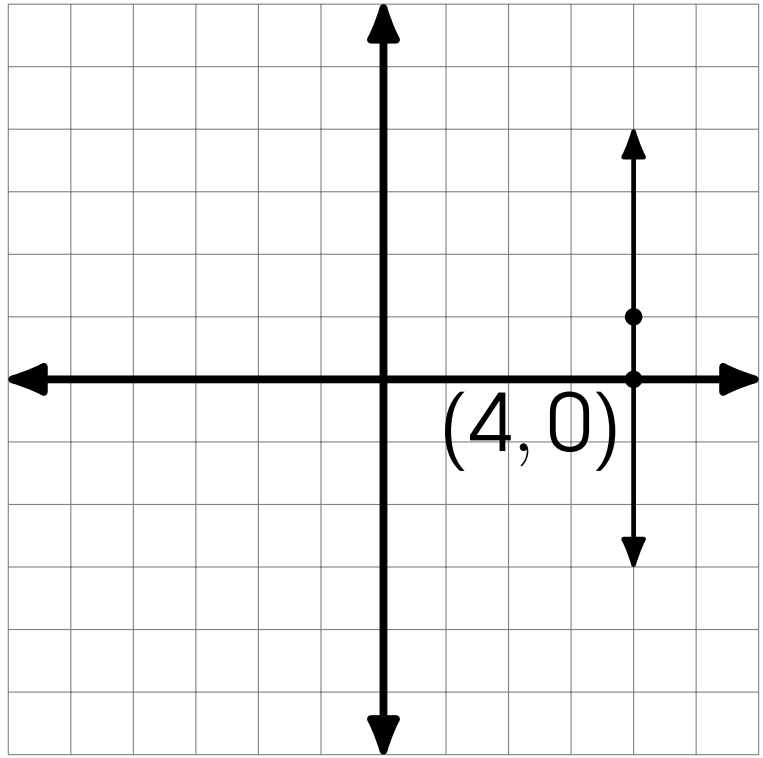

How to Describe a Graph Using the Slope?

Value/Sign of m	**Trend of Graph**

How to Describe a Graph Using the Slope?

Value/Sign of m	**Trend of Graph**
Positive	

How to Describe a Graph Using the Slope?

Value/Sign of m	**Trend of Graph**
Positive	Rises from left to right

How to Describe a Graph Using the Slope?

Value/Sign of m	**Trend of Graph**
Positive	Rises from left to right
Negative	

How to Describe a Graph Using the Slope?

Value/Sign of m	**Trend of Graph**
Positive	Rises from left to right
Negative	Falls from left to right

How to Describe a Graph Using the Slope?

Value/Sign of m	**Trend of Graph**
Positive	Rises from left to right
Negative	Falls from left to right
Zero	

How to Describe a Graph Using the Slope?

Value/Sign of m	**Trend of Graph**
Positive	Rises from left to right
Negative	Falls from left to right
Zero	Horizontal line

How to Describe a Graph Using the Slope?

Value/Sign of m	**Trend of Graph**
Positive	Rises from left to right
Negative	Falls from left to right
Zero	Horizontal line
Undefined	

How to Describe a Graph Using the Slope?

Value/Sign of m	**Trend of Graph**
Positive	Rises from left to right
Negative	Falls from left to right
Zero	Horizontal line
Undefined	Vertical line

How to Describe a Graph Using the Intercepts?

Signs/Values of a and b	**Trend of Graph**

How to Describe a Graph Using the Intercepts?

Signs/Values of a and b	**Trend of Graph**
Same signs	

How to Describe a Graph Using the Intercepts?

Signs/Values of a and b	**Trend of Graph**
Same signs	Falls from left to right

How to Describe a Graph Using the Intercepts?

Signs/Values of a and b	**Trend of Graph**
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How to Describe a Graph Using the Intercepts?

Signs/Values of a and b	**Trend of Graph**
Same signs	Falls from left to right
Different signs	Rises from left to right

How to Describe a Graph Using the Intercepts?

Signs/Values of a and b	**Trend of Graph**
Same signs	Falls from left to right
Different signs	Rises from left to right
$a =$ undefined, $b \in \mathbb{R}$	

How to Describe a Graph Using the Intercepts?

Signs/Values of a and b	**Trend of Graph**
Same signs	Falls from left to right
Different signs	Rises from left to right
$a =$ undefined, $b \in \mathbb{R}$	Horizontal line

How to Describe a Graph Using the Intercepts?

Signs/Values of a and b	**Trend of Graph**
Same signs	Falls from left to right
Different signs	Rises from left to right
$a =$ undefined, $b \in \mathbb{R}$	Horizontal line
$a \in \mathbb{R}$, $b =$ undefined	

How to Describe a Graph Using the Intercepts?

Signs/Values of a and b	**Trend of Graph**
Same signs	Falls from left to right
Different signs	Rises from left to right
$a =$ undefined, $b \in \mathbb{R}$	Horizontal line
$a \in \mathbb{R}$, $b =$ undefined	Vertical line

Thank you for watching.