Math 10 Lecture Videos

Section 3.4: The Slope-Intercept Form of the Equation of a Line

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OBJECTIVES:

1. Find a line's slope and y-intercept of a line from its equations.
2. Graph lines in slope-intercept form.
3. Use slope and y-intercept to graph Ax + By = C.

Objective 1: Find a line's slope and y-intercept of a line from its equations.

Slope-Intercept Form of the Equation Line

$y = mx + b$ with slope m and y-intercept b

Example 1:

Find the slope and y-intercept given the linear equation below:

y = 2x - 7

$y = 2x - 7$

$y = 2x + (-7)$

The slope is 2.

The y-intercept is -7.

Objective 1: Compute a Line's Slope

Example 2: Give the slope and y-intercept for a line whose Equation is **3x – 5y = 7**.

Hint: *Solve for y so as to have the equation in slope-intercept form.*

$$3x - 5y = 7$$

$3x - 3x - 5y = -3x + 7$ Subtract $3x$ from both sides.

$-5y = -3x + 7$ Simplify.

$\frac{-5y}{-5} = \frac{-3x + 7}{-5}$ Divide *both* sides by -5.

$y = \frac{3}{5}x - \frac{7}{5}$ Simplify.

Slope: $\frac{3}{5}$

Y-Intercept: $-\frac{7}{5}$

Objective 2:
Graph Lines in Slope-Intercept Form.

Graphing y = mx + b Using the Slope and *y*-Intercept
1. Plot the point containing the *y*-intercept on the *y*-axis. This is the point (0,*b*).
2. Obtain a second point using the slope, *m*. Write *m* as a fraction, and use rise over run, starting at the point on the *y*-axis, to plot this point.
3. Use a straightedge to draw a line through the two points. Draw arrowheads at the ends of the line to show that the line continues indefinitely in both directions.

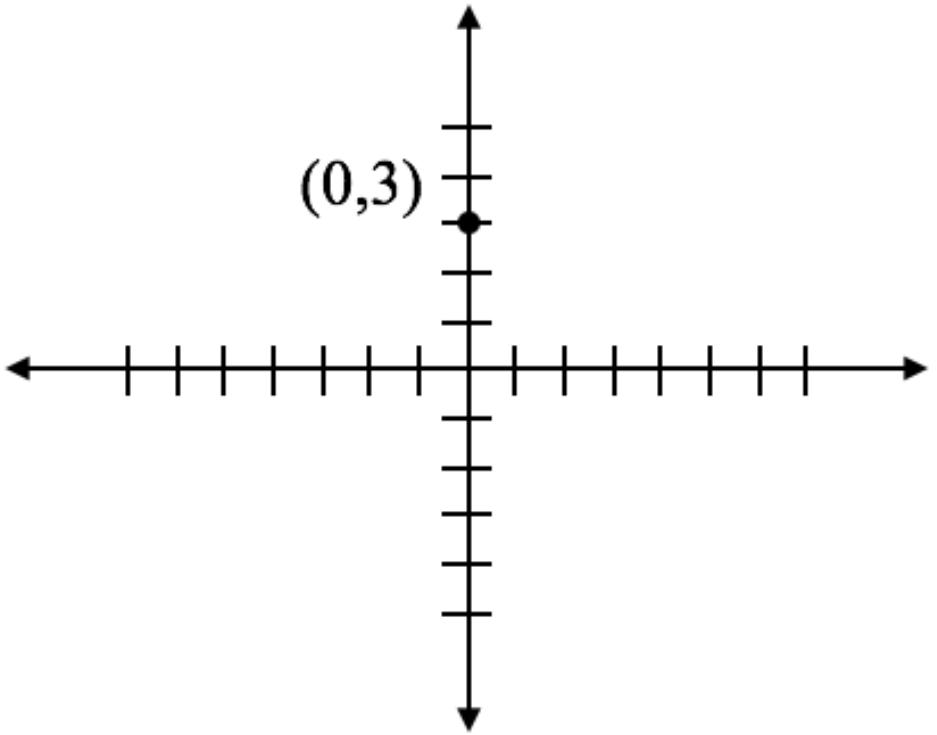
Objective 2:
Graph Lines in Slope-Intercept Form.

Example: Graph the line whose equation is **y = 2x + 3.**

Slope = 2

Y-Intercept = 3

1. Plot the pot containing the y-intercept on the y-axis. The *y*-intercept is 3. We plot the point (0,3).



Objective 2:
Graph Lines in Slope-Intercept Form.

Example: Graph the line whose equation is **y = 2x + 3.**

2. Obtain a second point using the slope, *m*. Write *m* as a fraction, and use rise over run, starting at the point containing the *y*-intercept, to plot this point.

We express the slope, 2, as a fraction. $m = \frac{2}{1} = \frac{\text{Rise}}{\text{Run}}$

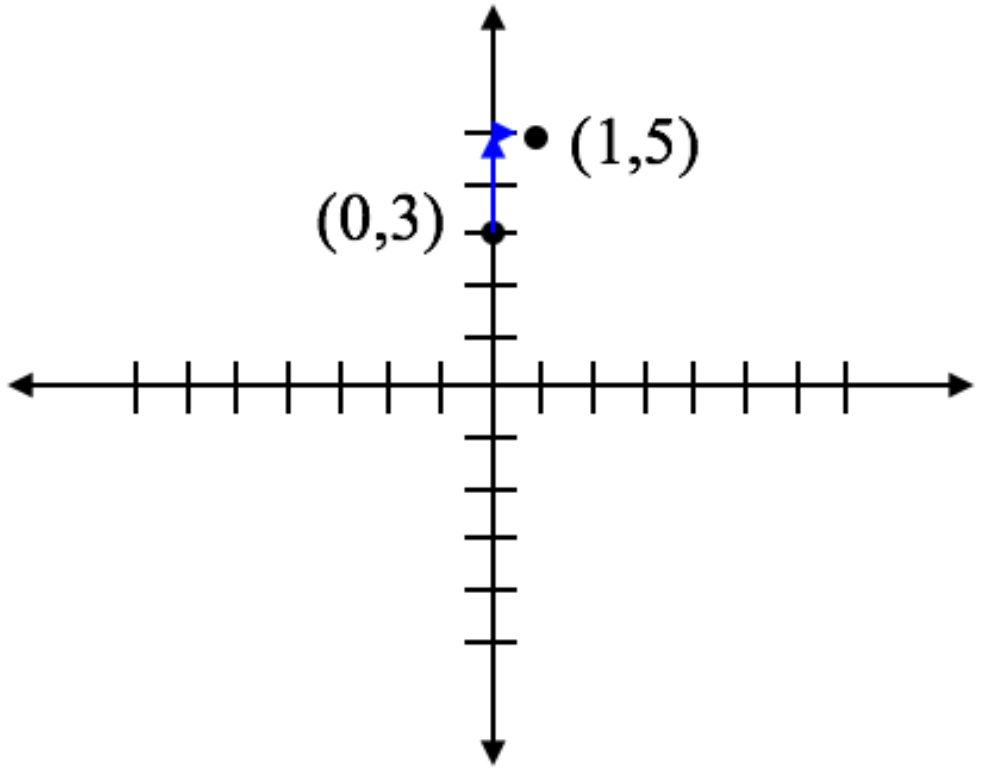
Objective 2:
Graph Lines in Slope-Intercept Form.

Example: Graph the line whose equation is **y = 2x + 3.**

We plot the second point on the line by starting at (0, 3), the first point.

Based on the slope, we move 2 units up (the rise) and 1 unit to the right (the run).

This puts us at a second point on the line, (1,5), shown on the graph.

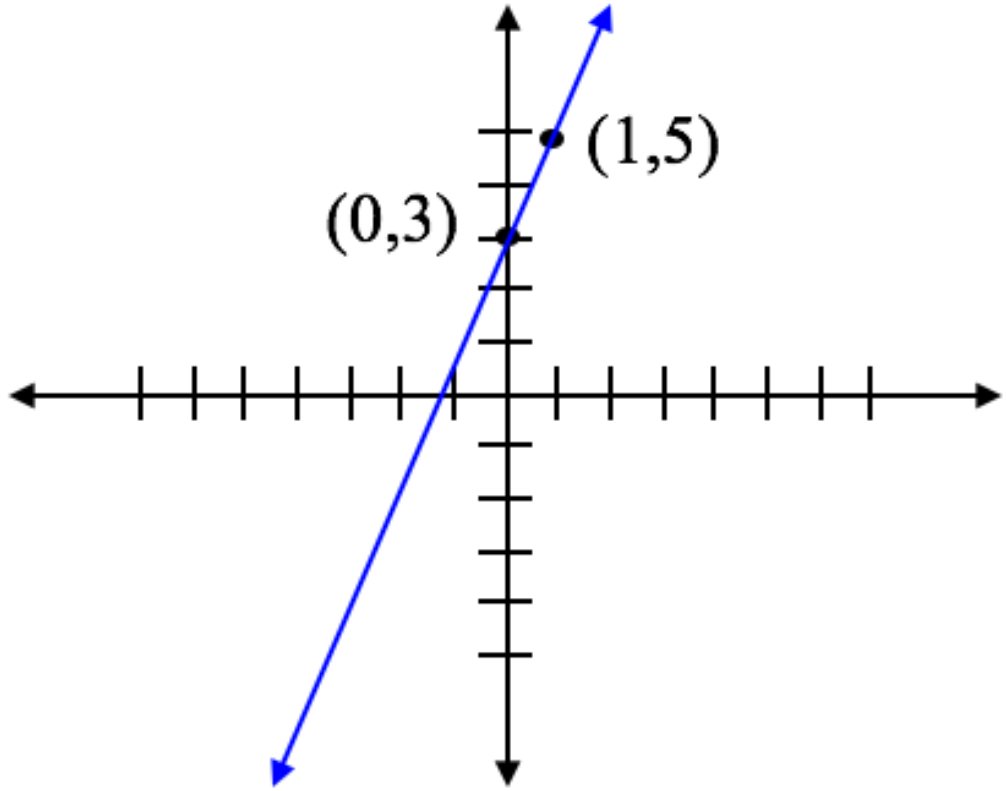


Objective 2:
Graph Lines in Slope-Intercept Form.

Example: Graph the line whose equation is **y = 2x + 3.**

3. Use a straightedge to draw a line through the two points.

The graph of y = 2x + 3 is show below.



Objective 3: Use slope and y-intercept to graph Ax + By = C.

1. Begin by solving Ax + By = C for *y*, which puts the equation in slope-intercept form.
2. Then use the three-step procedure to graph the equation:

Graphing y = mx + b Using the Slope and *y*-Intercept	
1.	Plot the point containing the *y*-intercept on the *y*-axis. This is the point (0,*b*).
2.	Obtain a second point using the slope, *m*. Write *m* as a fraction, and use rise over run, starting at the point on the *y*-axis, to plot this point.
3.	Use a straightedge to draw a line through the two points. Draw arrowheads at the ends of the line to show that the line continues indefinitely in both directions.

Objective 3: Use slope and y-intercept to graph Ax + By = C.

Example 1: Graph **3x + 4y = 0** by using slope and y-intercept.

1. Solve for y.

$$3x + 4y = 0$$

$$4y = -3x$$

$$y = \frac{-3}{4}x$$

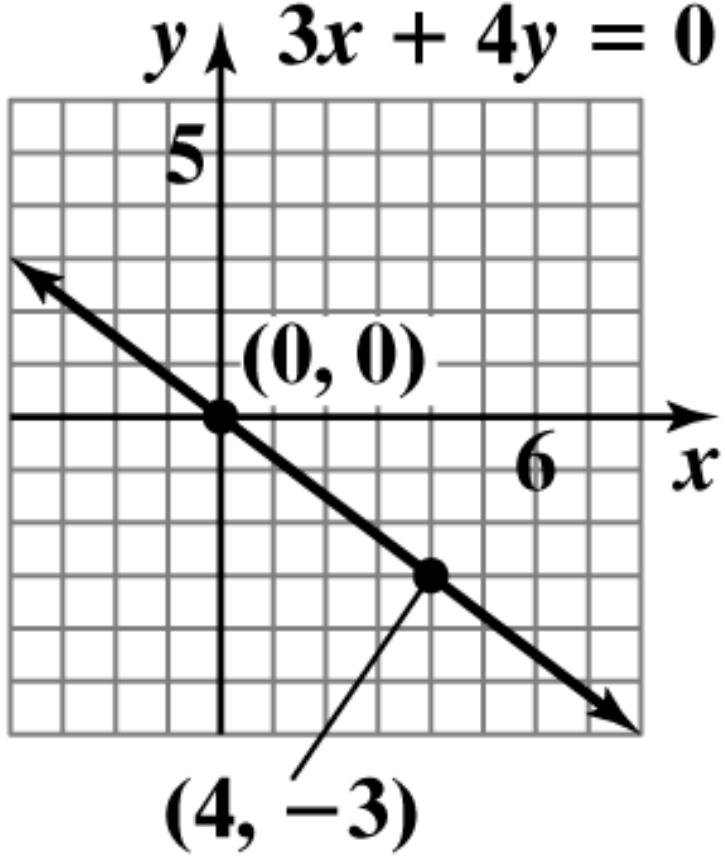
Slope: -3/4

Y-Intercept: 0, plot point is (0,0)

Objective 3: Use slope and y-intercept to graph Ax + By = C.

Example 1: Graph **3x + 4y = 0** by using slope and y-intercept.

2. Find another point by going down 3 units and to the right 4 units. Then draw a line through the two points.



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