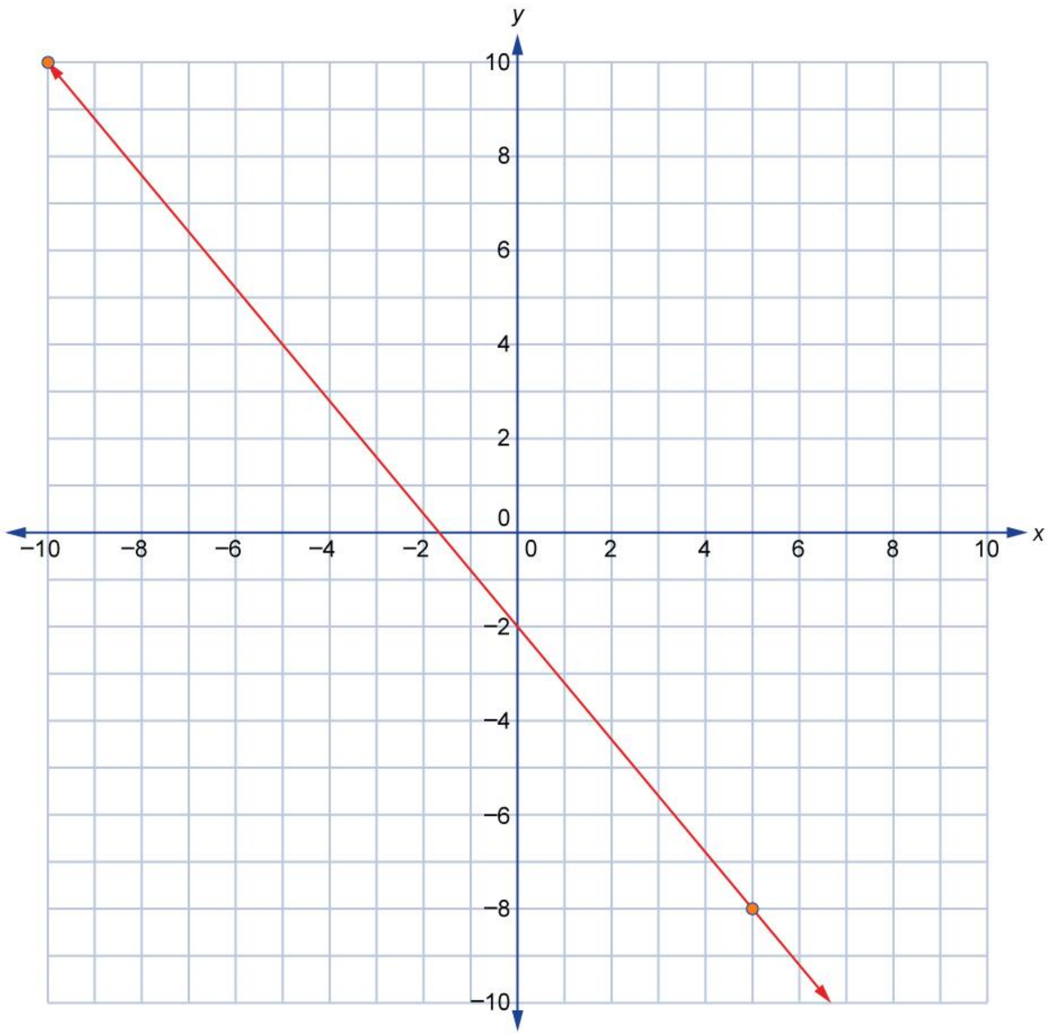
Module 6 Lesson 2

Math Lab: Exploring Lines Possible Solutions

1. This is the graph.The line passes through the points (–10, 10) and (5, –8).



The student’s completed chart should look like the following.

Property	Without Using a Graph	Using a Graph Only
slope	Use the slope formula: $m = \frac{y_2 - y_1}{x_2 - x_1}$ $= \frac{-8-10}{5- \;\; -10}$ $= \frac{-18}{15}$ $= -\frac{6}{5}$	Count the rise and run between the two points on the graph: $\frac{\text{rise}}{\text{run}} = \frac{18}{15} = \frac{6}{5}$ Since the line falls to the right, the slope is negative. The slope is $-\frac{6}{5}$.
***y*-intercept**	Apply the slope formula to the points (5, –8) and (0, *y*): $m = \frac{y_2 - y_1}{x_2 - x_1}$ $-\frac{6}{5} = \frac{y- \;\; -8}{0-5}$ $\frac{6}{-5} = \frac{y+8}{-5}$ $6 = y+8$ The denominators are equal. $y = -2$	Look on the graph where the line intersects the *y*-axis. The *y*-intercept is (0, –2).
***x*-intercept**	Apply the slope formula to the points (5, –8) and (*x*, 0): $m = \frac{y_2 - y_1}{x_2 - x_1}$ $-\frac{6}{5} = \frac{0- \;\; -8}{x-5}$ $\frac{6}{-5} = \frac{8}{x-5}$ $6 \;\; x-5 \; = 8 \;\; -5$ $6x - 30 = -40$ $6x = -10$ $\frac{6x}{6} = \frac{-10}{6}$ $x = -\frac{5}{3}$	Look on the graph where the line intersects the *x*-axis. Since the line does not intersect the *x*-axis at integral coordinates, you would have to estimate the value of the *x*-intercept. The *x*-intercept is approximately (–1.7, 0).

equation in slope-intercept form	Use the slope and *y*-intercept that was previously determined: $y = -\frac{6}{5}x - 2$	Use the slope and the *y*-intercept previously determined: $y = -\frac{6}{5}x - 2$
domain	The slope shows that this is a diagonal line. The domain of all diagonal lines is $x \in R$.	The domain is shown as $x \in R$.
range	The slope shows that this is a diagonal line. The domain of all diagonal lines is $y \in R$.	The domain is shown as $y \in R$.

2. Almost every property of the line is easier to determine using a graphical approach. The exception in this case is the *x*-intercept because it does not occur at integral coordinates.

3. If the graph involved plotting points with decimal or fraction coordinates, then the graphical approach would be less effective. In fact, any situation that would require the estimation of a point or slope using the graphical approach would be inferior to the exact calculations afforded by the algebraic approach.

4. With an algebraic approach, you can obtain exact values, whereas the graphical approach may only provide an estimate. The algebraic approach does not rely on a precisely drawn graph. Also, the algebraic approach can handle any number, large or small, rational or integral.