Building Concepts: Moving From Proportional Relationships to Linear Equations

Student Activity

Name _____

Class _____

In these activities, you will explore relationships of the form $y = mx$ and eventually $y = mx + b$. After completing the activities, discuss and/or present your findings to the rest of the class.

Activity 1 [Page 1.3]

1. Can you do it?

   a. **Reset** and **Edit** the slope so that the equation is $y = \frac{-2}{5}x$.

      Can you find locations for A, B, C, and D so that:

      the numerators and denominators of the A to B fraction and the C to D fraction are all different integers.

      AND

      the numerator of the A to B fraction has the opposite sign of the numerator of the C to D fraction and the denominator of the A to B fraction has the opposite sign of the denominator of the C to D denominator?

   b. Can you **Edit** the slope so that the numerators of both the A to B and C to D fractions are always the same, no matter where you place the points? If so, what would the line look like?

   c. Can you **Edit** the slope so that the denominators of both the A to B and C to D fractions are always the same, no matter where you place the points?

2. Suppose you had the graph of a line that passes through the origin (0, 0) but you do not have the equation of the line.

   a. If the point $(8, -6)$ is also on your line, could you figure out what equation it must have? Explain why or why not.

   b. Is there a point on this line where the *y*-coordinate is 1,000,000? If so, then find the *x*-coordinate of the point, or explain why there is no such point.

Activity 2 **[Page 2.2]**

1. Find an equation for each of the following lines. If possible, find the point where each line crosses the *y*-axis and where each line crosses the *x*-axis. Use the TNS activity to check your answers.

   a. The line that contains the point $(-2, 5)$ and slope $\frac{3}{2}$.

b. The line that that goes through $(-2, 5)$ and $(3, -6)$.

c. The horizontal line that lies two units below the *x*-axis**.**

Activity 3 [Page 2.3]

1. A line passes through the point $(4, -3)$ and has slope $m = -\frac{3}{2}$.

   a. What is the point-slope form of the equation for this line using the given point and slope? Create a line using the TNS activity that passes through this point with this slope to check your answer. What are the coordinates of the *x*-intercept and *y*-intercept of this line?

b. Tayeen notices that if you use the *x*-intercept of this line as the point in the point-slope form, then you will just get the *x*-intercept form. Use the TNS activity to verify her claim. She wonders if that would always be true for any line. What do you think? Explain your reasoning.

c. Tayeen wonders if you used the *y*-intercept as your point in the point-slope form, would the equation be the same as the *y*-intercept form. Use the TNS activity to investigate. What do you think? Explain your reasoning**.**

d. Monique says that in all three of these forms of the equation for a line, it is easy to see what the slope of the line is. Do you agree?