Student Activity Name_____

Date_____

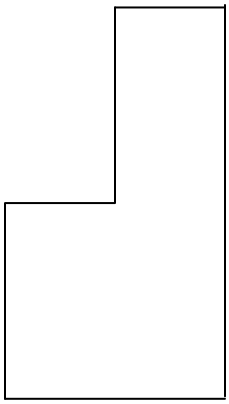
Slope: One Step at a Time (Day 1)

Objective: In this activity, you will explore the concept of slope by exploring the steepness of different staircases and graphing these on the TI-73 calculator.

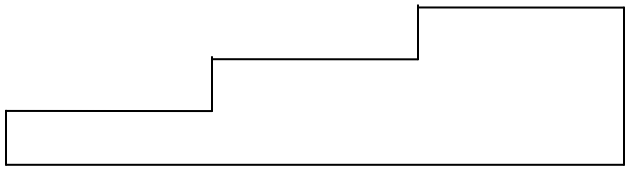
To build staircases that are easy to climb, carpenters take into consideration the vertical distance and the horizontal distance (tread) of each step.

Figure1

Step A



Step B



1. Which staircase would be steeper to climb? Explain why?

_____

_____

_____

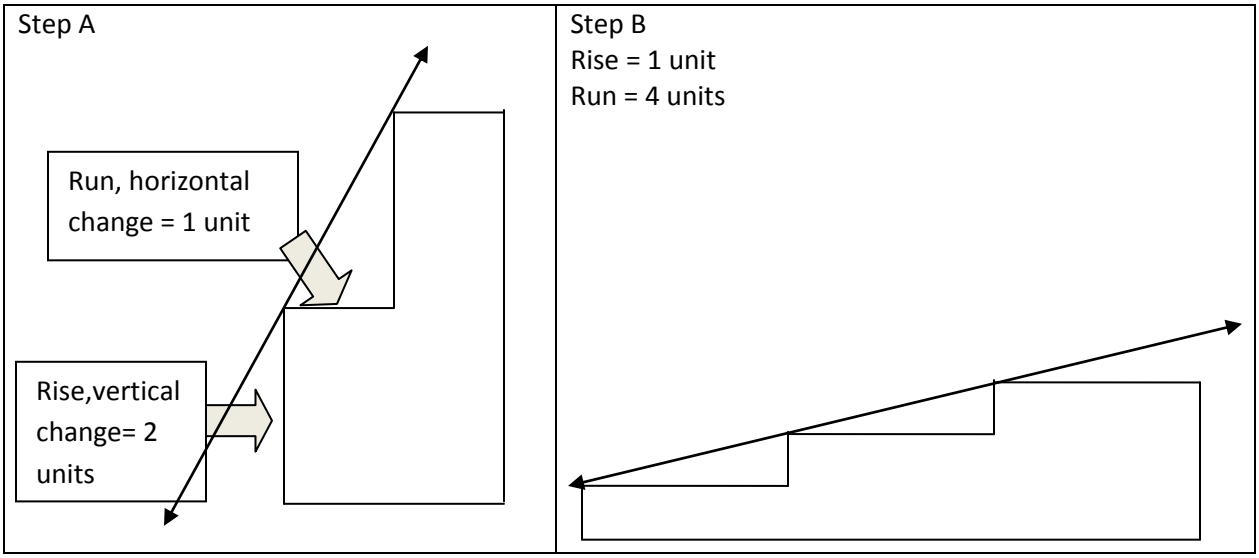
2. Measure the vertical distance and horizontal distance of a step on 2 different staircases before class tomorrow. In the table, enter the lengths in inches to the nearest one-fourth inch

Staircase	Vertical Distance	Horizontal Distance
1		
2		

Slope: One Step at a Time (Day 2)

To build staircases that are easy to climb, carpenters take into consideration the vertical distance and the horizontal distance (tread) of each step. The ratio of the rise to the run provides a measure of the steepness of the staircase. See Figure 2.

Figure 2



For Step A the ratio of the rise to the run is 2/1 or 2.

For Step B the ratio of the rise to the run is 1/4 or .25

3. What do you notice about the ratios for Step A and Step B in relation to the steepness of the stairs?

Answers may include:

4. Using your TI-73 Explorer Calculator, determine the ratio of the rise to the run for each of the staircases you brought measurements for.

   Staircase 1:

   Staircase 2:

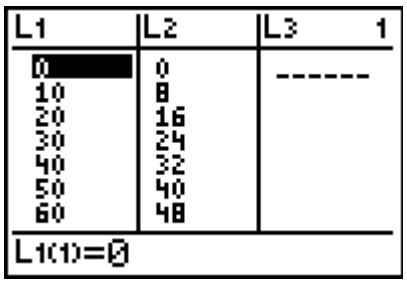
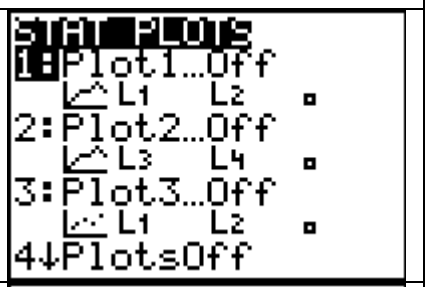
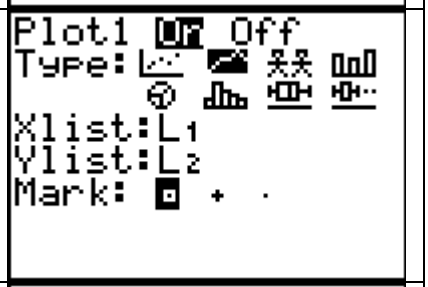
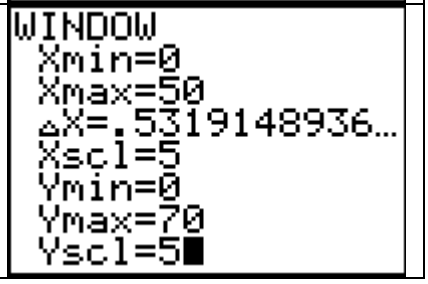
5. Which staircase was steeper based upon the ratios. Why?

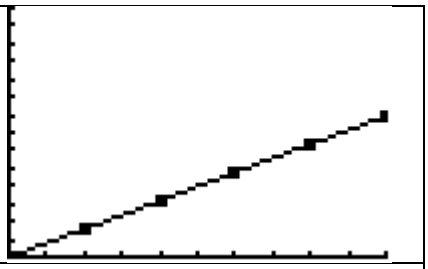
Carpenters build steps with a ratio of the rise to the run between 0.45 and 0.60. Did your steps fall within this range?

Look at Figure 1, Step A and Step B. A line has been drawn on each staircase that touches each step. The steepness of this line is also the slope of the line as it represents the vertical change/horizontal change.

Slope = $\frac{\text{Vertical change}}{\text{Horizontal change}}$

Next, we will use the TI-73 calculator to set up a table of coordinates and to graph the line that would touch each of the steps in your staircases.

1. Clear the Home screen and press [2nd] [MEM] **ClrAllLists.** Press [ENTER] then [CLEAR].	
2. Press [LIST] Enter coordinates for your first stair case. Move to L1 and enter the *x*-coordinates in order, pressing [ENTER] after each entry. Move to L2 and do the same for the *y*-coordinates. An example for a staircase with a rise of 8 and a run of 10 is to the right. Tip: You must have the coordinates matched in L1 and L2. Otherwise your graph will not run correctly.	
3. To graph the line, press [2nd] [PLOT] and see if Plots 2 and 3 are off. If not, select **4:PlotsOff** and press [ENTER].	
4. Select **On** and press [ENTER]. Press [▼] to move to **Type**, use the arrow keys to choose the connected line graph, and press [ENTER]. Move down to **Xlist** and choose the list that your *x*-coordinate data is in by pressing [2nd] [STAT] moving to your list, and pressing [ENTER]. Do the same for **Ylist.** Move down to **Mark,** choose the first mark, and press [ENTER].	
5. In order to see the graph, you need to set the viewing window before graphing. Press [WINDOW] and choose the **Xmin, Xmax, Ymin, Ymax, Xscl** and **Yscl** values based upon the numbers in the x and y list. Tip: Do not change the ΔX or ΔY = value. The calculator adjusts this value automatically.	

6. Press GRAPH to see the line.	
7. Repeat 2 through 6 for Staircase B. This time put your *x*-coordinate data in L3 and your *y*-coordinate data L4, turn off **Plot 1** and turn on **Plot 2.**	

6. Compare the steepness of the lines. Which Staircase had the steepest line.

7. What comparison did you see between the steepness of the lines and the slope of the line?

8. Extension: Create one more graph on your calculator of a staircase that has a slope between 0.45 and 0.60, the recommended range for staircases. Repeat 2 through 6 for Staircase C. This time put your *x*-coordinate data in L5 and your *y*-coordinate data L6, turn off **Plot 1** and **Plot 2** and turn on **Plot 3.**

   Rise =

   Run =

   Slope =

Adapted from Friel, S. (Ed.). (2001). *Navigating through Algebra in Grades 6-8*, pp. 47-48.Reston, VA: National Council of Teachers of Mathematics.