How Steep is Too Steep?
Adapted from Discovering Mathematics with the TI-73

1. Convert the measurement in inches to centimeters to check accuracy. Set the mode to show 2 digits after the decimal point.

Press [UNIT] [UNIT] to enter the fraction in inches.

Press [CONVERT] to access the unit conversion menu.

Press [ ] to choose the Length menu.

Convert inches to centimeters.

2. Use the Draw function to draw a model of the stairs. Be sure all stat plots are turned off and that there are no equations in the editor.
Set a friendly window.

Press \[ \text{DRAW} \] 8:Pen.

Move the cursor to the origin. Press \[ \text{DRAW} \] to turn the pen on.

Move the cursor up the vertical height of the stairs and then right the horizontal length (depth) of the stairs. Continue until you reach the edge of the window. Do not go past your \text{Xmax} or \text{Ymax} values or you will change the viewing window.

Press \[ \text{DRAW} \] to turn the pen off.

Save your picture by pressing [DRAW] | 1:StorePic \[ \]. If your picture reappears, it has been saved.
3. Use the Manual-Fit function to place a line showing the steepness of the stairs.

Press [] [STAT] | 3:Manual-Fit. Move the cursor to the upper vertex of one stair and press [] to select it. Move to the upper vertex of a different stair and press [] to select it.

Write down the equation you see in the upper left corner.

4. Use the | and [] keys to move the line to the lower vertices of the stairs. Notice what happens to the equation as you move the line.

Now experiment with using the | and } keys to move the line.

Return your line to its original position.
5. Go to your & editor and enter your original equation in Y1.
   
   Also enter \( Y_2 = MX + B \).
   
   Change the line symbol for \( Y_2 \) to the key.

   Press \( \text{__M} \) to store the value 0.75 for the variable \( M \).
   
   Press \( \text{__B} \) to store the value 18 for the variable \( B \).

   Now
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1. Measure the vertical height (rise) and the horizontal length (run) of a set of stairs. Measure in both centimeters and inches. Record your measurements in the table below.

<table>
<thead>
<tr>
<th></th>
<th>Centimeters to the nearest tenth</th>
<th>Inches to the nearest eighth of an inch</th>
</tr>
</thead>
<tbody>
<tr>
<td>rise</td>
<td></td>
<td></td>
</tr>
<tr>
<td>run</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. Find the ratio the rise to the run using your centimeter measurements.

3. Find the ratio the rise to the run using your inch measurements.

4. How did the ratios compare?

5. Write the equation of your manual-fit line. What do you notice about the ratio you found in Question 4?

6. After moving the line, how can you be sure you returned it to its original position?

7. If you multiply the X in the equation by a bigger number, what happens to the line?

8. If you multiply the X in the equation by a smaller number, what happens to the line?

9. If you add a bigger number to the X in the equation, what happens to the line?

10. If you add a smaller number to the X in the equation, what happens to the line?