Create: Exploring Transformations of a Function
MATH NSPIRED

Activity Overview

In this activity, you will create a new document with a Graphs &
Geometry *application to explore transformations of an absolute value
function. You will use the table feature to examine the effect the
transformation has on the coordinates.*

Activity Materials

- *Technology needed (TI-Nspire™ handheld, computer software)*

Steps

Step 1:   Preparing the Document

1.   Open a new document by clicking **⌂ on** **> New Document >
     Add Notes**.

2.   Using this Notes page as a title page, give it an appropriate title,
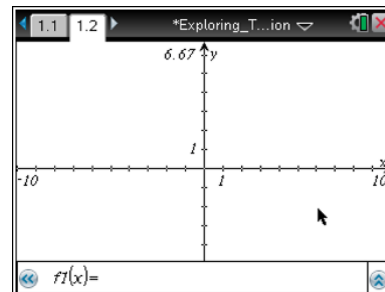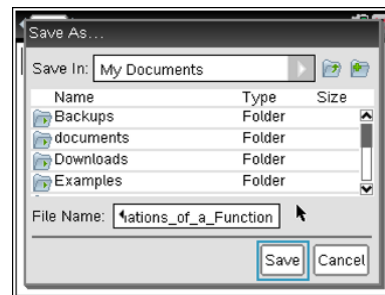   such as **Exploring Transformations of a Function**.

Note: To type capital letters, press the **⇧shift** key, then the letter.

3.   Press **doc▾** **> File > Save As…**
     Type: **Exploring_Transformations_of_a_Function**.

Note: To obtain the underscore, press **ctrl** **␣**.

     Tab to **⌈save⌉**, and press **enter**.

4.   To add a new *Graphs* page, press **ctrl** **doc▾** **> Add Graphs**.

Step 2:   Enter the function into f1(x).
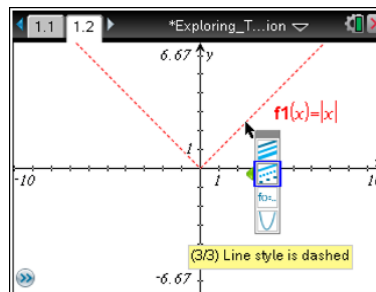
1. The cursor should be in the function entry line at the bottom of the screen.
2. To graph **f1**(x) = $|x|$, type: [A] [B] [S] [(] [X] [)] [enter] .

Note: You can also access the absolute value template by pressing the [⌐ᵃᵇˢ⌐] key.
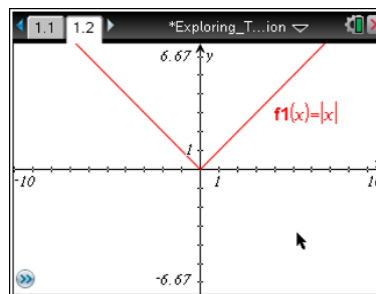
Step 3:   Change the attributes of the graph to create a dashed line.

1. To change the attributes, move the cursor near the graph until the cursor becomes a pointed finger (☝) and the graph turns bold.
2. Press [ctrl] [menu] **> Attributes**. A drop-down menu appears. Select the third line style in the second row of attributes by pressing ▼ ▶ ▶ so that "(3/3) Line style is dashed" appears. Press [enter]. Move the cursor away from the graph.

Step 4:   Enter a second function into f2(x).

1. Press [tab] to move the cursor to the function entry line for **f2**(x).

Note: You may also click the chevron (») or press [ctrl] [G] to display and/or hide the function entry line.

2. To graph **f2**(x) = 3$|x|$, type [3] [A] [B] [S] [(] [X] [)] [enter].

3. To move the function labels, move the cursor until it hovers over one of the labels. The word "label" appears and the cursor turns into an open hand (🖐). Press [ctrl] [✋] to close the hand (✊). Move the function label to an open space near the bottom left of the screen and press [✋]. Repeat for the other function label.

Note: An alternate method of selecting an object is to press and hold [✋] when the cursor is an open hand 🖐.
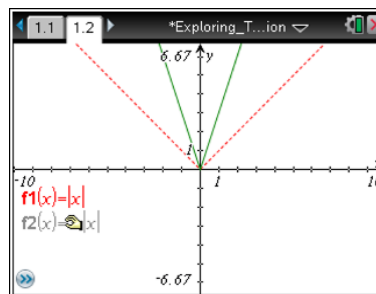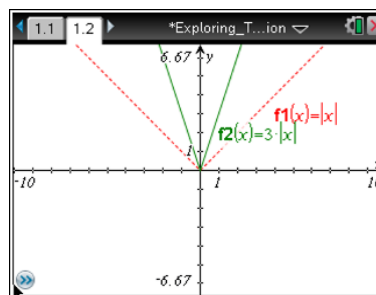
Step 5:   Insert a table into a split screen layout.

1. To insert a table, press [ctrl] [T].
2. Notice that we cannot see the values of **f2**(x) in the second column. To view these values, in the next step we will adjust the widths of the two parts of the split screen.
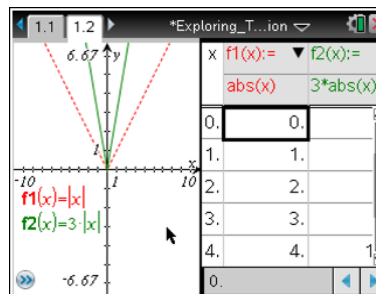
Step 6: Adjust the widths of the split screen.

1. Press `doc▾` **> Page Layout > Custom Split**.

2. The message "Use + or – to choose a layout" appears for a moment, which allows you to toggle between a horizontal or vertical split. You may test this feature now if you wish, but a vertical split is the preferred view for this lesson.

3. To change the widths of the two parts of the screen, press ◀ or ▶. In this case, press ◀ a few times until you can read the values in the **f2**(*x*) column.

4. Press `enter`.
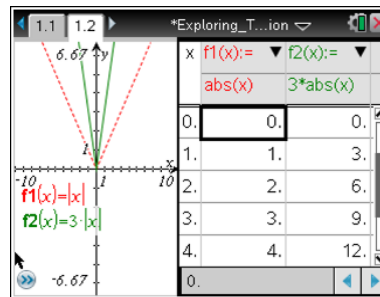
Step 7: Edit the function in f2 and observe the graph and table.

1. Use the `tab` key to highlight the top of the table. Then use the ▼ ▶ keys to select the cell containing $3 \cdot$ abs(*x*).

Note: You can also use the touchpad mouse to click on that cell.

2. To edit the expression, select **Menu > Table > Edit Expression**, or you may double-click the cell. Redefine **f2**(*x*) as $-3 \cdot |x|$.

3. This action will be repeated again by the students to redefine **f2**(*x*) as each of the following: $2 \cdot |x|$, $1 \cdot |x| - 2$, and $1 \cdot |x| + 1$.
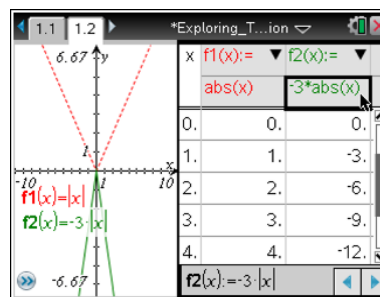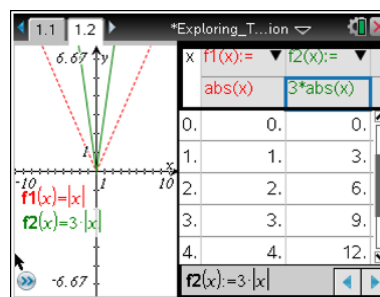
Step 8: Save the document

1. Redefine **f2**(*x*) back to its original definition, **f2**(*x*) = $-3 \cdot |x|$.

2. Press `ctrl` `S` to save the document.