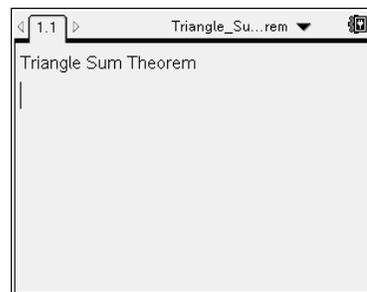# Creating: Triangle Sum Theorem
MATH NSPIRED

Activity Overview:

In this activity, you will create and calculate an expression, draw a parallel line to a given segment, and measure and label angles.

Materials

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

Note: The teacher .tns file already has the triangle with slider built. If you are interested in building the triangle with slider yourself, see the Appendix at the end of this document.

Open the file *Triangle_Sum_Theorem_Teacher.tns.*

Move to page 1.2.

Step 1:   Calculating the sum of the measures of the angles of the triangle

1. Press **Menu > Actions > Text.**
2. Move the cursor to an empty part of the screen to create a text box. Press 🖱. Type *a + b + c* and press (enter).
3. Create another text box and type *m<A + m<B + m<C* and press (enter). Look to the figure at the right for proper placement.
4. Create 2 text boxes with **=** and press (enter).
5. Create 2 text boxes with **+** and press (enter).
6. Create 3 text boxes with *a*, *b*, and *c,* and press (enter).
7. Press **Menu > Actions > Calculate.**
8. Move the cursor to the expression *a + b + c* and press 🖱. Click on each corresponding angle measurement. Move the sum to the right of the second **=** sign and press 🖱 to place it.
9. Still using the Calculate tool, move the cursor to *a* and press 🖱. Click on the measure of ∠A, and then move that measure to the appropriate place and press 🖱 to place it. Repeat for *b* and *c*. Press (esc).
10. Move any text box or calculation to the desired location by moving the cursor over it, press (ctrl) 🖱 to grab it, move it, and then press 🖱 to place it.
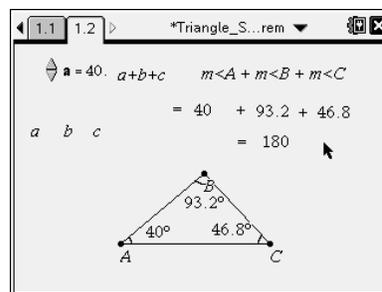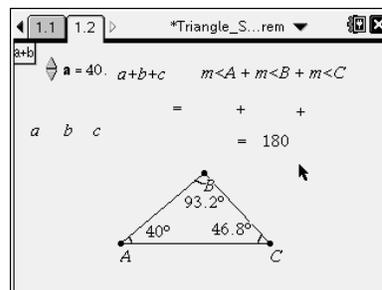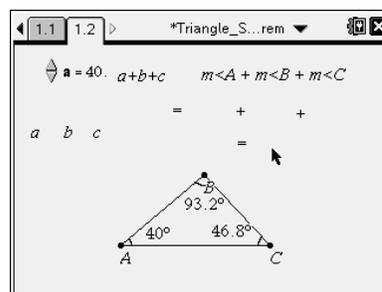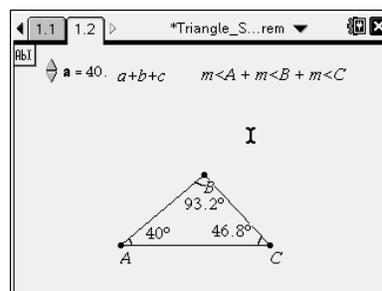
11. Press **Menu > Actions > Hide/Show.**
12. Hide the expressions that you calculated by pressing 🖰 on top of them. Press (esc).
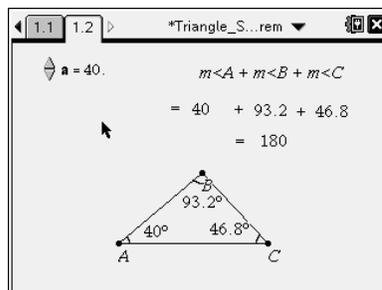
Move to page 1.3.

Step 2: Constructing a line through point *B* parallel to $\overline{AC}$

1. Press (menu) > **Construction > Parallel.**
2. Move the cursor to click on point *B* and then $\overline{AC}$.
3. Press (esc) to exit the **Parallel** tool.
4. Move the cursor to one "end" of the parallel line, press (ctrl) 🖰 (enter) to grab the end of the line, and pull it to make it longer. Repeat for the other "end" of the parallel line.
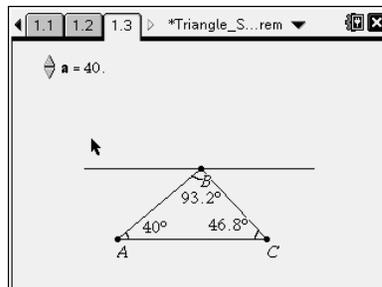
Step 3: Measuring angles

1. Press (menu) > **Measurement > Angle.**
2. Measure the angle adjacent to ∠*ABC* on the left by clicking on point *A*, then point *B*. Move the cursor to the left of point *B* on the parallel line until you see the words *point on.* Move the cursor to a desired location for point *X*. Press (enter). Press (⇧shift) [X] to label the point. Press (esc) twice to exit the **Angle** tool. Move the angle measurement to the desired location.
3. Repeat steps 1 and 2 to measure the angle adjacent to ∠*ABC* on the right. Call it ∠*YBC*.
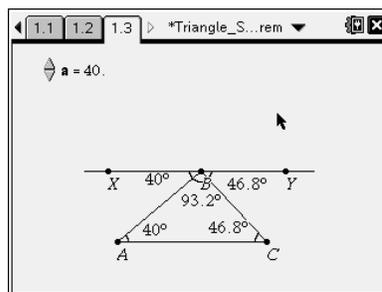
Step 4 Saving the document
1. Press (ctrl) [S].

Note: If you modified the file *Triangle_Sum_Theorem_Teacher.tns*, press (doc▾) > **File > Save As … Triangle_Sum_Theorem** so that the filename corresponds to the one mentioned in the student handout.
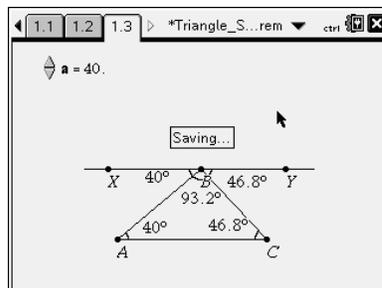
Appendix—Creating the Triangle with Slider

Step 1: Preparing the document

1. Open a new document by clicking on (🏠on) > **New Doc > Add Notes.**

2. Type: Triangle Sum Theorem.

Note: To obtain capital letters, press the (⇧shift) key, then the letter.

3. Press (doc▾) **> File > Save As ….**
   Type: Triangle_Sum_Theorem.
    Tab to [save] and press (enter).

Note: To obtain the underscore, press (ctrl) (⎵).

4. To add a new page, press (ctrl) (doc▾) **> Add Geometry.**

5. To hide the scale in the top right corner of the screen, go to **Menu > View > Hide Scale.**

6. Press (🏠on) **> Settings & Status > Settings > Graphs & Geometry.** Select Fix 0 for display digits. Tab to Graphing Angle. Select Degree. Then press (tab) to move from one field to the next and press [🔧] to uncheck all the boxes. Tab to OK and press [🔧] or (enter). At the Home screen press the number next to the word *Current* to return to the current file.
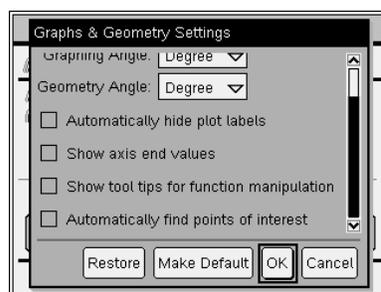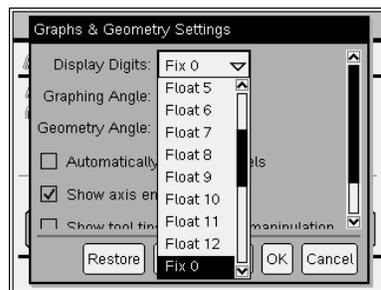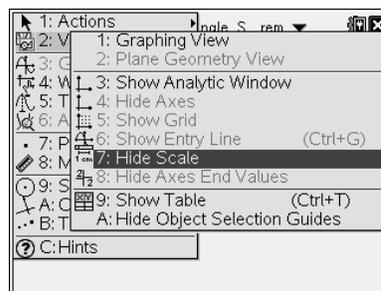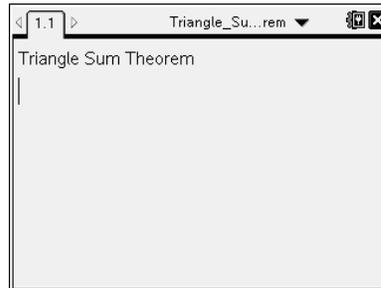
Step 2: Making a Slider and calculating an expression

1. Press **Menu > Actions > Insert Slider.** Move the slider using the Touchpad or Clickpad to the upper right corner of the screen and press (enter).

2. Press **A** to type **a** in place of *v1* and press (enter).

3. With the cursor inside the slider box, press (ctrl) **>** (menu) **> Settings.** Change the settings as shown at right. Press (tab) to move from one field to the next. Press 🖱 to check or uncheck a box. Tab to OK and press (enter).

4. Press (menu) **> Actions > Text.** Move the cursor to a space below the slider and press 🖱.

5. Press **A** (enter) (esc).

6. Press **Menu > Actions > Calculate.**

7. Move towards *a* until you see the hand and the word *expression* appears. Press 🖱.

8. Press **L**. The value 40 should faintly appear. Use the Touchpad or Clickpad to move the 40 to the desired location and press 🖱. Press (esc).
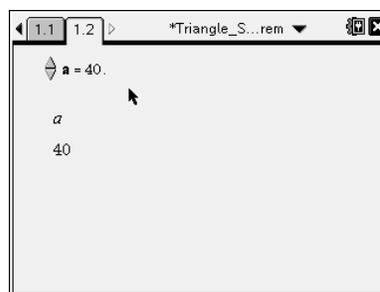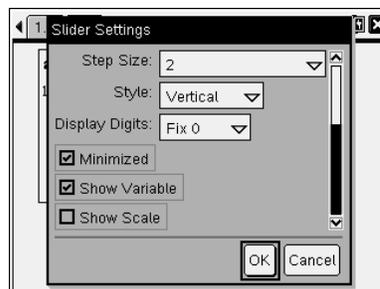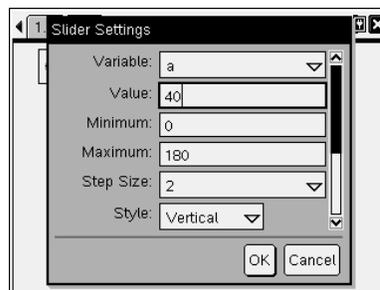
Step 3:   Making a rotating line to form an angle

1. Press (menu) **> Points & Lines > Line.**

2. Move the cursor down and to the right of the screen and press
    [⊞] to mark a point.

3. Immediately press (⇧shift) [C] to label the point.

4. Move the cursor to the left to extend the line horizontally and
    press [⊞]. Press (esc).

5. Press (menu) **> Transformation > Rotation.**

6. Move toward the line until you see 🖑 and the word *line* appears.
    Press [⊞].

7. Move along the line to the left until you see the words *point on*.
    Press [⊞].

8. Immediately press (⇧shift) [A] to label the new point on the line.

9. Move the cursor toward the 40 until you see the hand 🖑 and the
    word *number.* Press [⊞]. Press (esc).

10. Hide the expression, *a*, and the value, *40*, by using (menu) **>
    Actions > Hide/Show.**

11. Move the cursor over the *a* and press [⊞]. Then move the cursor
    over the 40 and press [⊞].

12. Press (esc) to exit the **Hide/Show** tool.
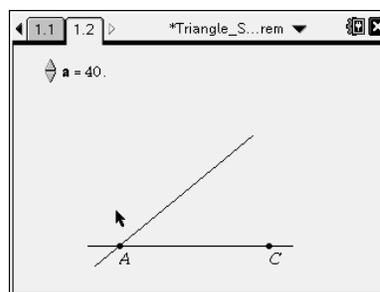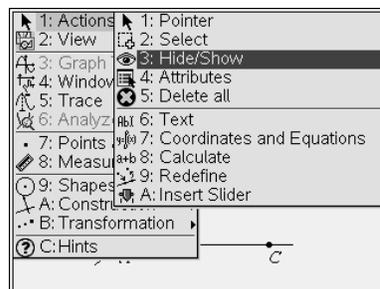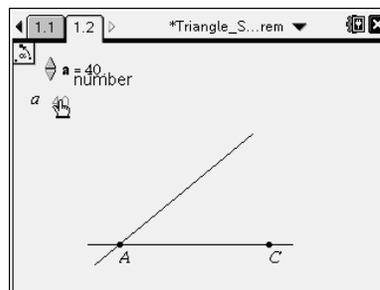
Step 4:   Making another point

1. Press (menu) **> Points & Lines > Point On.**

2. Move the cursor close to the line that goes through point *A* but
    not point *C* until you see the word *line*. Press [⊞]. Move the
    cursor until you see the words *point on* at the desired location
    for point *B*. Press [⊞].

3. Immediately press (⇧shift) [B] to label the point.

4. Press (esc) to exit the **Points & Lines** tool.
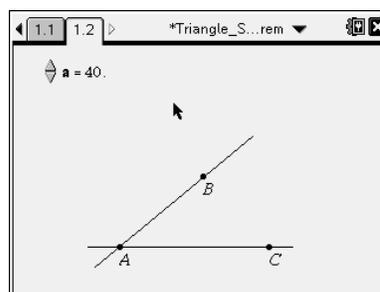
Step 5:   Making the triangle

1. Press (menu) **> Shapes > Triangle.**
2. Move the cursor until you see the words *point A* and press 🖱.
3. Move the cursor until you see the words *point B* and press 🖱.
4. Move the cursor until you see the words *point C* and press 🖱.
5. Press (esc) to exit the **Triangle** tool.
6. Press (menu) **> Actions > Hide/Show.**
7. Move the cursor to one of the lines until you see the word *line* and press 🖱.
8. Move the cursor to the other line until you see the word *line* and press 🖱.
9. Press (esc) to exit the **Hide/Show** tool.
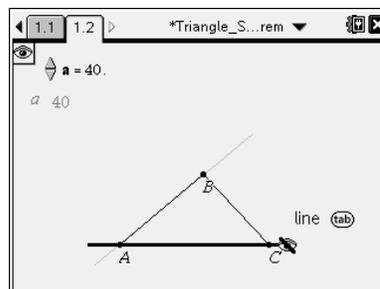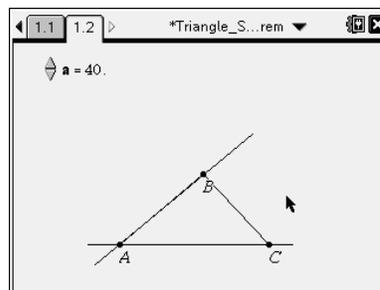
Step 6:   Measuring the angles

1. Press (menu) **> Measurement > Angle.** (To measure an angle, click on three points, always selecting the vertex of the angle second.)
2. To measure ∠*BAC,* move to point *B* and press 🖱.
3. Move to point *A* and press 🖱.
4. Move to point *C* and press 🖱.
5. Repeat for ∠*CBA* and ∠*ACB*.
6. Press (esc) to exit the **Angle** tool.
7. Move the angle measurements to the desired location by moving the cursor over the *text* that is the angle measure, press (ctrl) 🖱 to grab the measure, move it to the desired location and press 🖱 to leave it there.
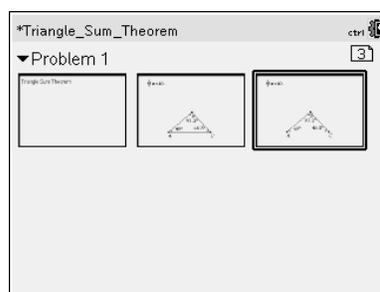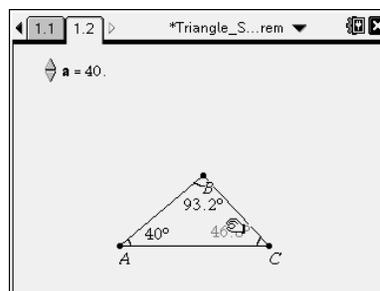
Step 7:   Duplicating a page

1. Press (ctrl) ▲, (ctrl) C (to copy), (ctrl) V (to paste).
2. Press (enter) to return to page 1.3 of the current document.

Step 8:   Saving the document

1.   Press (ctrl) S.