Geometry Software Lab

Two-Dimensional Figures

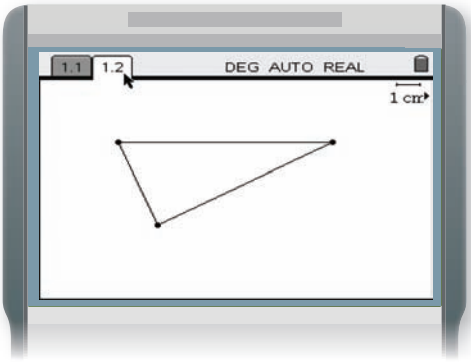
TI-Nspire™

You can use **TI-Nspire Technology** to draw and investigate polygons.

ACTIVITY 1 Draw a Polygon

In this activity you will choose three points to form a triangle using **TI-Nspire Technology**. They might be different from the points shown here, but the keystrokes and general principles remain the same.

Draw $\triangle XYZ$.



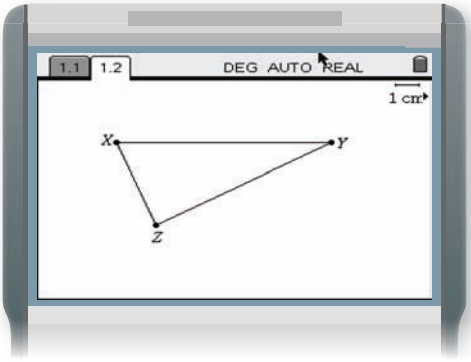
Step 1 Create a new document and add three points.

KEYSTROKES: (home) 6: New Document 2: Add Graphs & Geometry
(menu) 2: View 2: Plane Geometry View

To make points: (menu) 6: Points & Lines 1: Point; Press (enter) for each point, then (esc) to end the **point** tool.

Step 2 Add three line segments to form a triangle.

KEYSTROKES: (menu) 6: Points & Lines 5: Segment; Move the cursor over the first point and press (enter) when it flashes **point**. Move the cursor over the second point and press (enter) when it flashes **point**. Repeat until you have a triangle. Press (esc) to end the **segment** tool.

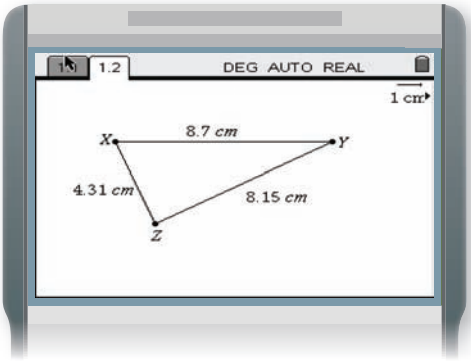


Step 3 Add labels to the vertices of the triangle.

KEYSTROKES: (menu) 1: Actions 6: Text; Move your cursor over the first point and press (enter) when it flashes **point**. Then (ctrl) (caps) X (enter). Repeat for point Y and point Z. Then press (esc) to end the **text** tool.

ACTIVITY 2 Measure Sides

Find XY, YZ, and ZX.



Step Select the **Length** command under the **Measurement** menu to display the lengths of $\overline{XY}$, $\overline{YZ}$, and $\overline{ZX}$.

KEYSTROKES: (menu) 7: Measurement 1: Length; Move the cursor over line segment $\overline{XY}$. When **segment *XY*** flashes, press (enter). Move the cursor off the segment and press (enter). This pastes the measurement. Repeat the steps for $\overline{YZ}$ and $\overline{ZX}$. Then press (esc) to end the **length** tool.

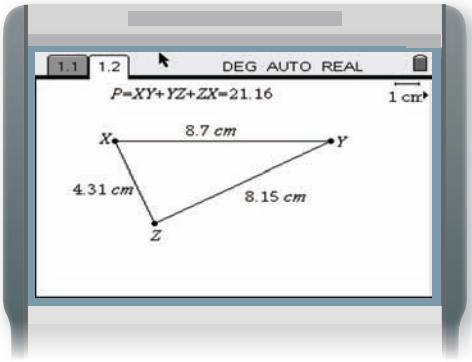
$\overline{XY} = 8.7$ cm

$\overline{YZ} = 8.15$ cm

$\overline{ZX} = 4.31$ cm

ACTIVITY 3 Find Perimeter

Find the perimeter of $\triangle XYZ$.



Step 1 **Insert a text box for the formula for perimeter and type the formula.**

KEYSTROKES: menu 1: Actions 6: Text enter; Type P = X Y ctrl + Y Z ctrl + Z X enter. Then press esc to end the text tool.

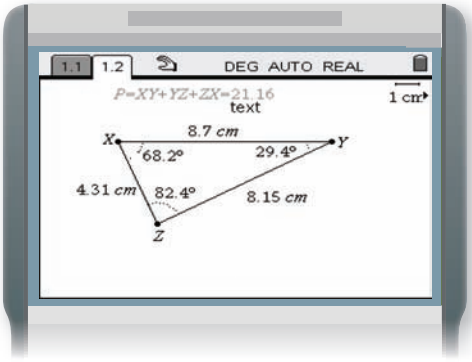
Step 2 **Use the Calculate tool to calculate the perimeter of $\triangle XYZ$**

KEYSTROKES: menu 1: Actions 8: Calculate; Move your cursor over $P = XY + YZ + ZX$, when it flashes expression P, press enter. Then move your cursor over measurement for $\overline{XY}$. When the number flashes, press enter. Then move your cursor over measurement for segment $\overline{YZ}$. When the number flashes, press enter. Do the same for $\overline{ZX}$. Move the calculation beside the label $P = XY + YZ + ZX$ and press enter. Press esc to end the calculate tool.

The perimeter of $\triangle XYZ$ is 21.16 centimeters.

ACTIVITY 4 Measure Angles

Find $m\angle X$, $m\angle Y$, and $m\angle Z$.



Step 1 Recall that $\angle X$ can also be named $\angle YXZ$ or $\angle ZXY$. Use the pointer to select points Y, X, and Z in order.

Step 2 Select the Angle command from the Measurement menu to find $m\angle X$.

Step 3 Select points X, Y, and Z. Find $m\angle Y$.

Step 4 Select points X, Z, and Y. Find $m\angle Z$.

KEYSTROKES: menu 7: Measurement 4: Angle; Move the cursor over point Y. When it flashes point Y, press enter. Move the cursor over point X. When it flashes point X, press enter. Move the cursor over point Z. When it flashes point Z, press enter. Repeat for the other two angles. Then press esc to end the process.

Analyze the Results

1. Add the side measures from Activity 2. How does this compare to the result in Activity 3?
2. What is the sum of the angle measures of $\triangle XYZ$?
3. Repeat the activities for each figure.

   a. irregular quadrilateral **b.** square **c.** pentagon **d.** hexagon
4. Draw another quadrilateral and find its perimeter. Then enlarge your figure using the **Dilate** command (menu **A: Transformation** **5:Dilation**). How does changing the sides affect the perimeter?
5. Compare your results with those of your classmates.
6. Make a conjecture about the sum of the measures of the angles in any triangle.
7. What is the sum of the measures of the angles of a quadrilateral? pentagon? hexagon?
8. How are the sums of the angles of polygons related to the number of sides?
9. Test your conjecture on other polygons. Does your conjecture hold? Explain.
10. When the sides of a polygon are changed by a common factor, does the perimeter of the polygon change by the same factor as the sides? Explain.