

Triangle Areas

Student Activity

7 8 9 10 11 12



Introduction

In this activity you will explore different ways to determine the area of a triangle.

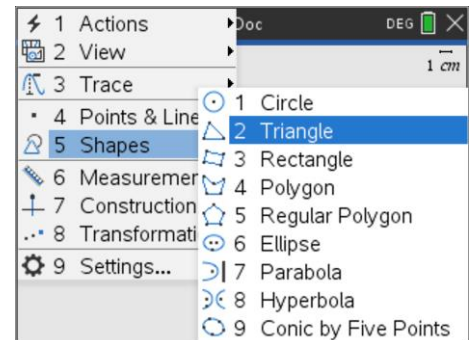
Exploring

Open a new TI-Nspire document and insert a Geometry Application.

From the menu:

[menu] > **Shapes** > **Triangle**

Draw a triangle by clicking to create a vertex and then moving the mouse to a new location, press ESC once you have created your triangle.

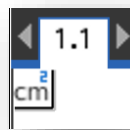


The next task is to measure the area of the triangle.

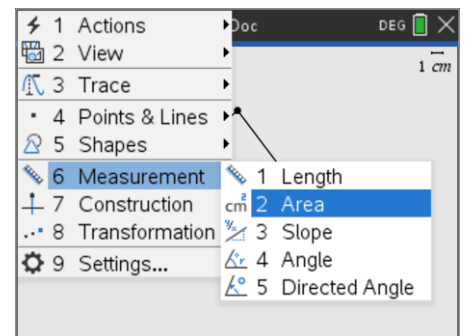
From the menu:

[menu] > **Measurement** > **Area**

With the measurement tool activated, select the triangle and the area will be displayed.



Note the measurement tool icon on the top left of the screen, press ESC to release the tool.

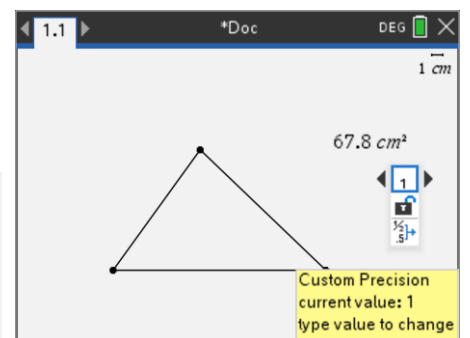


Drag the triangle vertices around on the screen and see how the area of the triangle is automatically updated.

Try and get the area as close to 100cm² as possible.



Navigate over the top of the measurement and press: **[ctrl]** + **[menu]** to change the precision. Use the left and right arrows on the navigation pad to increase or decrease the quantity of decimal places displayed.

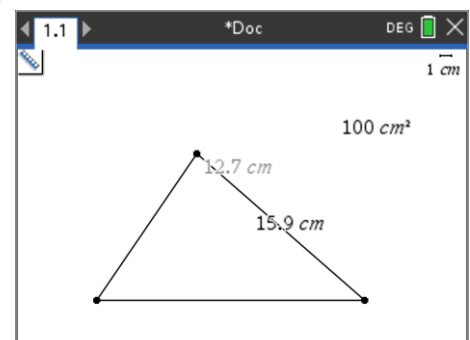


The next task is to measure the length of each side of the triangle.

From the menu:

[menu] > **Measurement** > **Length**

With the measurement tool activated, select one vertex and then the next. The length of the side will be displayed. Just like the area, these measurements are dynamic and update when the triangle is changed.



Question: 1

When the triangle has an area of close to 100cm^2 , record the three side lengths.

Question: 2

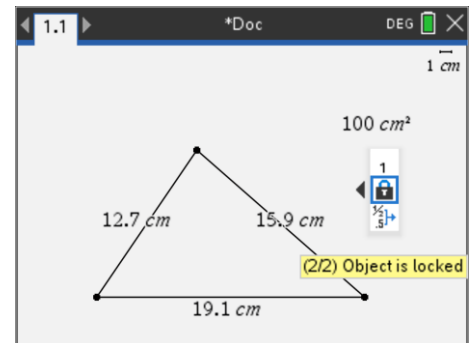
Change the side lengths and try to create another triangle with an area of 100cm^2 .

Is it possible to have different shaped triangles with the same area?

Move the mouse over the measurement for the triangle area then press:

ctrl + **menu** > **Attributes**

Navigate down to the padlock, then use the right arrow key to lock the measurement. The area of the triangle is now locked.



Place the mouse over one of the triangle's vertices. The mouse will turn into a 'hand' and the tool tip "point" will be displayed. Press:

ctrl and click on the centre of the track pad.

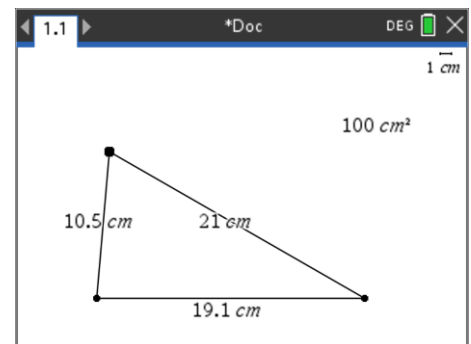
Alternatively, when the word "point" appears, click and hold the centre of the track pad. Swiping over the track pad now will attempt to move the triangle vertex (point).



To keep track of the movement of the vertex, press:

menu > **Trace** > **Geometry Trace**

Place the mouse over the top vertex and then grab and move it.

**Question: 3**

With the triangle area locked on 100cm^2 (approximately), describe how each vertex on the triangle moves.

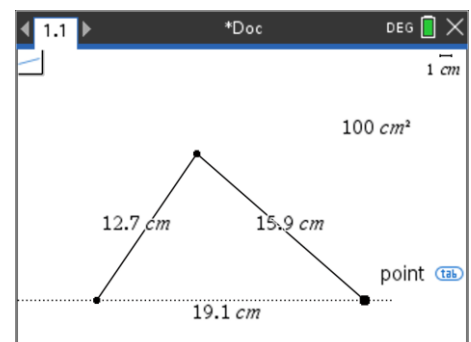
Question: 4

As a vertex is moved, what measurements remain constant? Which measurements change?

To help understand what is happening a couple of 'construction' lines need to be added to the diagram, press:

menu > **Points & Lines** > **Line**

Create a line that passes through the two vertices on the base of the triangle.



Now create a line perpendicular to the base of the triangle passing through the opposite vertex.

menu > **Construction** > **Perpendicular**

A perpendicular is a relationship between two lines such that the angle between them is 90° .

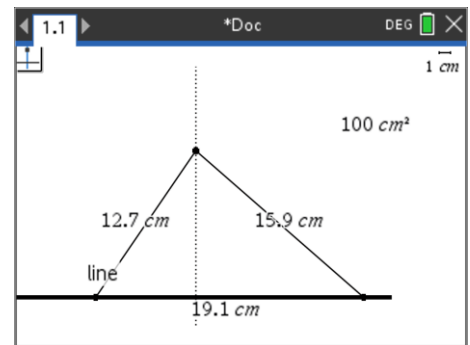
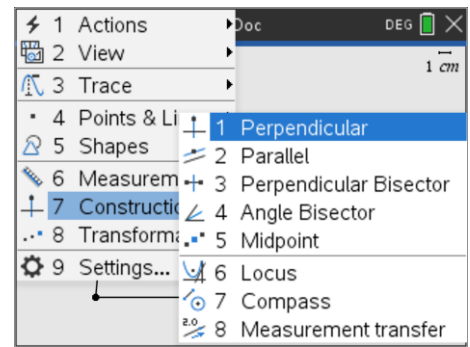
With the perpendicular tool active, place the mouse over the vertex closest to the top of the screen and click to select the vertex. Then move towards the opposite side.

A line perpendicular to the 'base' of the triangle will appear as a dotted line, not that the tool tip must say "line". Click on the line to complete the construction of the perpendicular line.

Remember to press ESC to release the perpendicular construction tool.

Press P (point shortcut) and place a point where the altitude meets the base of the triangle. Watch for the tool tip: "Intersection Point".

A line perpendicular to the base, passing through the opposite vertex is referred to as an "**Altitude**". Think of the triangle as a pointy mountain, the base is the ground and the opposite vertex is the mountain peak or apex.



Question: 5

Measure the length of the altitude. Drag the top vertex around (triangle area still locked). Does the altitude of the triangle change?

Question: 6

Write down the length of your triangle base and the altitude. Multiply these values together and comment on your result.

Question: 7

Unlock the triangle area, then move the top vertex around to change the triangle area. Record the length of the base, triangle altitude and triangle area. Move the vertex around several times, record the three measurements each time and summarise your findings.