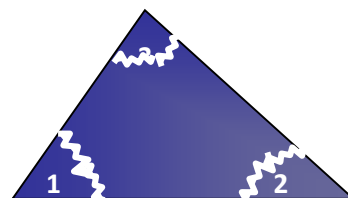


The Angles of a Triangle

Activity

STEP 1 Draw triangles

Draw and cut several different triangles.



STEP 2 Tear off corners

For each triangle, tear off the three corners and place them next to each other, as shown in the diagram.



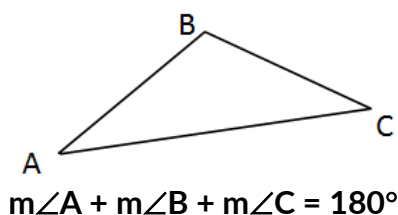
STEP 3 Make conjecture.

Make a conjecture about the sum of the measures of the interior angles of a triangle.

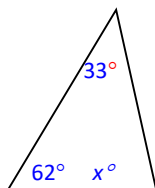
Triangulation is a method used in surveying. Land is divided into adjacent triangles. By measuring the sides and angles of one triangle and applying properties of triangles, surveyors can gather information about adjacent angles.

Theorem: Triangle Angle Sum Theorem

The sum of the angle measures of a triangle is 180° .



Example 1: Find the value of x in the acute triangle.



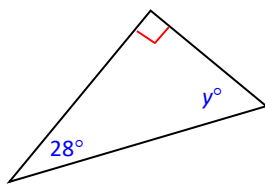
$$62^\circ + 33^\circ + x^\circ = 180^\circ$$

$$95^\circ + x^\circ = 180^\circ$$

$$95^\circ - 95^\circ + x^\circ = 180^\circ - 95^\circ$$

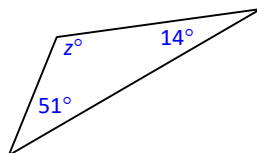
$$x^\circ = 85^\circ$$

Example 2: Find y in the right triangle.



$$\begin{aligned} 28^\circ + 90^\circ + y^\circ &= 180^\circ \\ 118^\circ + y^\circ &= 180^\circ \\ 118^\circ - 118^\circ + y^\circ &= 180^\circ - 118^\circ \\ y^\circ &= 62^\circ \end{aligned}$$

Example 3: Find z in the obtuse triangle.



$$\begin{aligned} 14^\circ + 51^\circ + z^\circ &= 180^\circ \\ 65^\circ + z^\circ &= 180^\circ \\ 65^\circ - 65^\circ + z^\circ &= 180^\circ - 65^\circ \\ z^\circ &= 115^\circ \end{aligned}$$

Example 4: The second angle in a triangle is twice as large as the first. The third angle is half as large as the second. Find the angle measures and draw possible picture.

Let x° = the first measure.
Then $2x^\circ$ = second angle measure
 $\frac{1}{2}(2x)^\circ = x$ = third angle measure.

$$\begin{aligned} x^\circ + 2x^\circ + x^\circ &= 180^\circ \\ 4x^\circ &= 180^\circ \\ 4x^\circ \div 4 &= 180^\circ \div 4 \\ x^\circ &= 45^\circ \end{aligned}$$

Triangle Sum Theorem
Combine Like terms

Two angles measure 45° , and one angle measures 90° .
The triangle has two congruent angles.
The triangle is an isosceles right triangle.

