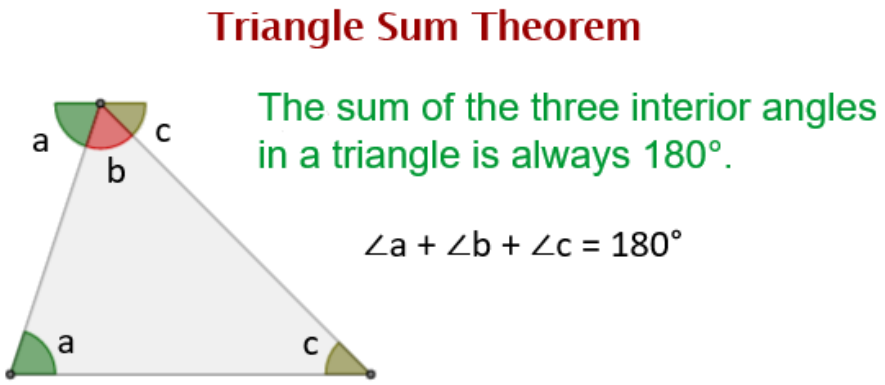
TRIANGLES (Triangle Sum Theorem)



Unit Overview

In this unit, students will learn and be able to apply the Triangle Sum Theorem.

Key Vocabulary

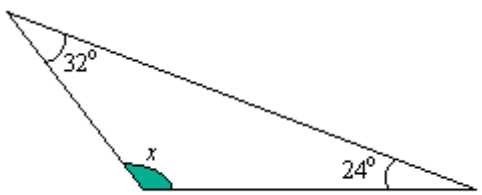
Triangle	Has three sides and three angles; always add to 180°
Equilateral Triangle	Three equal sides; always 60°
Isosceles Triangle	Two equal sides and two equal angles
Scalene Triangle	No equal sides and no equal angles
Triangle Sum Theorem	Sum of the three interior angles in a triangle is always 180°

Triangle Sum Theorem

In a triangle, the three interior angles always add to 180°.

$x + y + z = 180°$

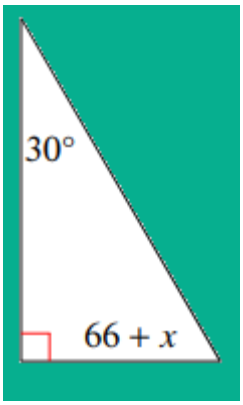
Example A: Find the missing "*x*."



a.) Start: $x + y + z = 180°$

b.) Fill in what we know: $x + 32° + 24° = 180°$
c.) Add interior angles: $x + 56° = 180°$
d.) Calculate for x: $x = 180° - 56°$
$x = 124°$

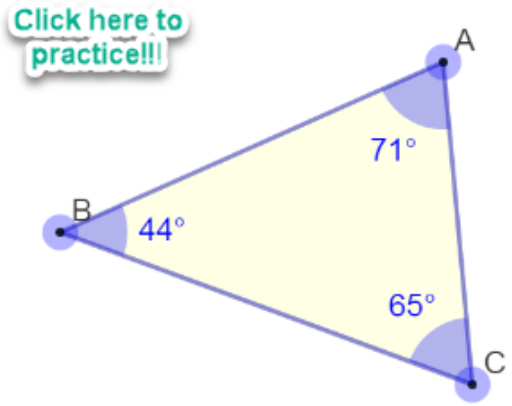
Example B: Solve for x.



a.) Start: $x + y + z = 180°$
b.) Fill in what we know: $30° + 90° + 66 + x = 180°$
c.) Add interior angles: $186° + x = 180°$
d.) Calculate: $x = 180° - 186°$
$x = -6$

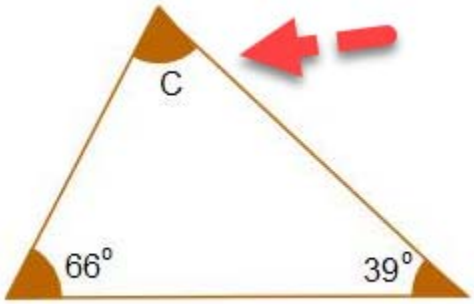
REMEMBER: ALL THREE INTERIOR ANGLES OF A TRIANGLE MUST ADD TO 180°

$$71° + 44° + 65° = 180°$$



Let's Practice

1.) Find the Missing Angle "C."



Answer:

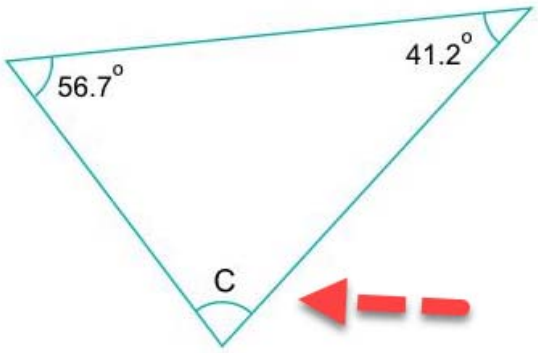
Start With: $A + B + C = 180°$

Fill in what we know: $66° + 39° + C = 180°$

Rearrange: $C = 180° - 66° - 39°$

Calculate: $\boxed{C = 75°}$

2.) Find the Missing Angle “C”



Answer:

Start With: $A + B + C = 180°$

Fill in what we know: $56.7° + 41.2° + C = 180°$

Rearrange: $C = 180° - 56.7° - 41.2° = 180° - 97.9°$

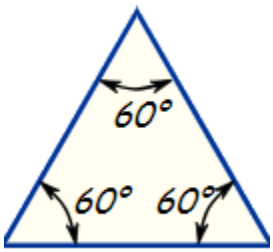
Calculate: $C = 82.1°$

Equilateral, Isosceles and Scalene

These are three special names given to triangles that tell how many side and angles are equal. Triangles are polygons that have three sides, three vertices, and three angles. One way to classify triangles is by the length of their sides.

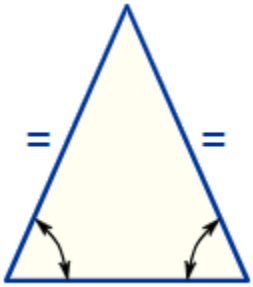
Equilateral Triangles

An equilateral triangle has all three sides equal in length. Its three angles are also equal, and they are each 60º.



Isosceles Triangles

An isosceles triangle has two sides of equal length. The angles opposite the equal sides are also equal.

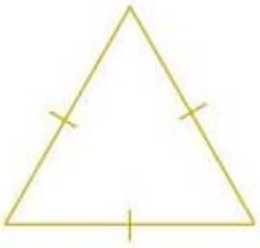


Scalene Triangles

A scalene triangle has no sides of equal length. Its angles are also all different in size. The shortest side would be opposite the smallest angle. The longest side will be the biggest angle.

Let's Practice

3.) Name the type of triangle below.



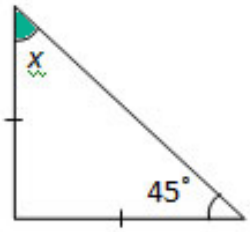
Answer:

It is a triangle because it has three sides and three angles.

It is a **regular (equilateral) triangle** because it has:

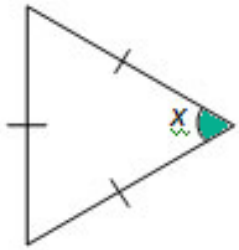
- Three equal sides
- Three equal angles, always 60°

4.) Find the value of angle "*x*" for the following triangle:



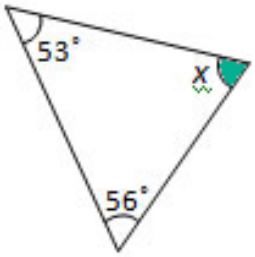
(**Answer:** $x = 45$ degrees)

5.) Find the value of angle "*x*" for the following triangle:



(**Answer:** $x = 60$ degrees)

6.) Find the value of angle "*x*" for the following triangle:

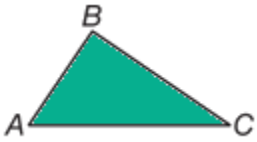


(**Answer:** $x = 71$ degrees)

Summary of Triangle Sum Theorem

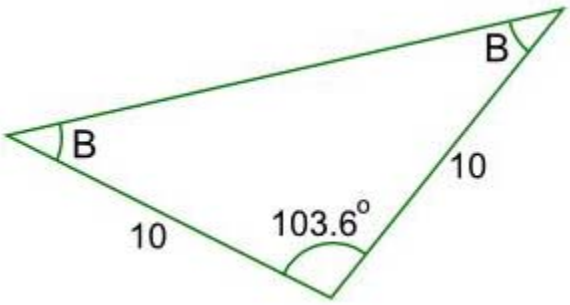
The sum of the three angles in any triangle sum to 180 degrees. If the measures of two angles of a triangle are known, the measure of the third angle can always be found.

Triangle Angle Sum Theorem	The sum of the measures of the angles of a triangle is 180. In the figure at the right, $m\angle A + m\angle B + m\angle C = 180$.



Let's Practice

7.) What is the size of the missing angle "B?"



Answer:

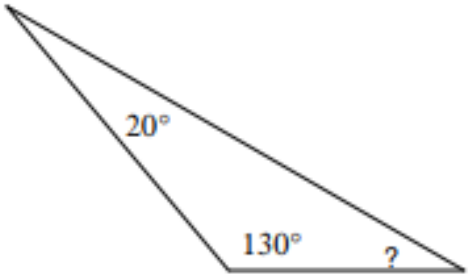
The triangle has two equal sides of length 10 units, so it is isosceles.
So the two angles marked B must be equal.

Next, in a triangle all three angles must add to 180°
So: $103.6° + B + B = 180°$
Then: $103.6° + 2B = 180°$

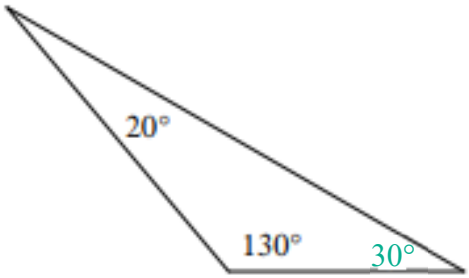
Rearrange: $2B = 180° - 103.6° = 76.4°$

Divide by 2: $B = 76.4° \div 2 = 38.2°$

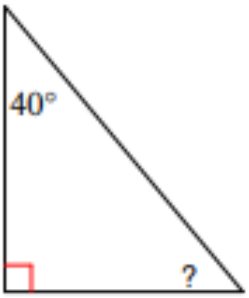
8.) What is the size of the missing angle “?”



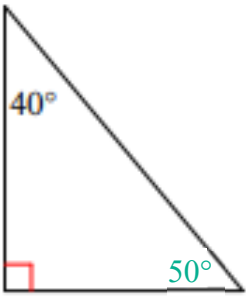
Answer:



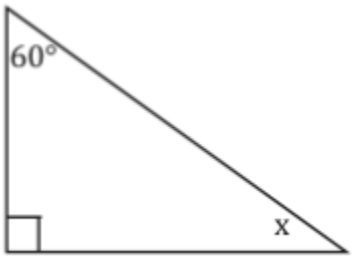
9.) What is the size of the missing angle “?”



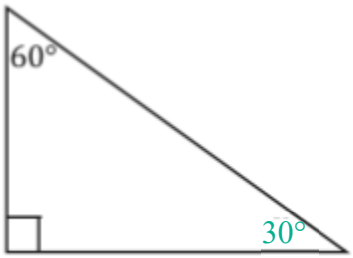
Answer:



10.) What is the size of the missing angle "*x*?"



Answer:



Below are additional educational resources and activities for this unit.

Click on the icon to the left to watch a video on Triangle Sum Theorem.

Get in the game

Click on the icon to the left to practice the Triangle Sum Theorem.

Click on the icon to the left to watch a video and complete activities on Types of Triangles.

Practice 1: Angles in a Triangle

Practice 2: Triangle Sum Theorem