LEARNING TARGETS
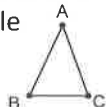
I can classify triangles and find measures of their angles

A *triangle* is a polygon with three sides. We name a triangle using the vertices of the triangle. For example, the triangle [△ABC figure] is called "triangle ABC" or using notation it would be $\triangle ABC$.

We can classify a triangle using its side lengths and its angle measures.

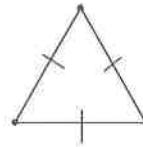**CLASSIFYING TRIANGLES BY SIDE LENGTH**

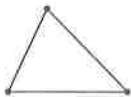| Scalene Triangle	Isosceles Triangle	Equilateral Triangle
A triangle in which all 3 sides have different lengths.	A triangle with at least two congruent sides.	A triangle with all three sides that are congruent.

CLASSIFYING TRIANGLES BY ANGLE MEASURE

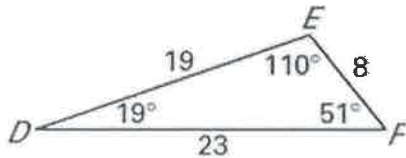| Acute triangle	Right Triangle	Obtuse Triangle	Equiangular Triangle
A triangle in which all angles are acute	A triangle with exactly one right angle.	A triangle with exactly one obtuse angle.	A triangle with all three angles congruent.
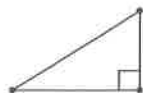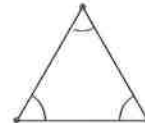
Example 1: Classify the triangle by its sides and by its angles.

a.
[Triangle DEF with D, E, F vertices; side DE = 19, angle at D = 19°, angle at E = 110°, EF = 8, angle at F = 51°, DF = 23]

b.
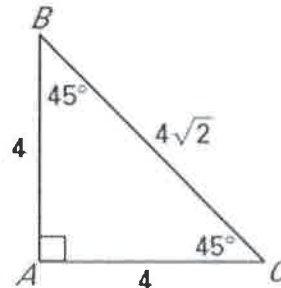[Triangle ABC with B at top, angle B = 45°, AB = 4, BC = 4√2, right angle at A, AC = 4, angle C = 45°]

- Since all side lengths are different, ΔDEF is a scalene triangle.

- Since one angle is obtuse, ΔDEF is an obtuse triangle.

- Since two side lengths are the same, ΔABC is an isosceles triangle.

- Since ΔABC has a 90° angle, it is a right triangle.

Every triangle has three angles, one at each vertex inside the triangle. These angles are called *interior angles.*

Theorem 4.1 – Triangle Sum Theorem
The sum of the measure of the interior angles of a triangle is __**180°**__.
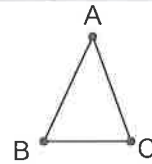
$$m\angle A + m\angle B + m\angle C = \underline{\quad \textbf{180°} \quad}$$

Example 2: Find angle measures in triangles.
Find x. Then classify the triangle by its angles.

a)

$90 + 2x + x = 180$
$90 + 3x = 180$
$3x = 90$
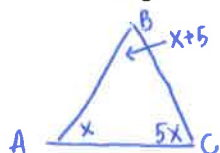$\boxed{x = 30}$

Classification: Right △
(the △ has one 90° angle)

b)

$3x + 2x + 55 = 180$
$5x + 55 = 180$
$5x = 125$
$\boxed{x = 25}$

Classification: Acute △
(all angles are less than 90°)

c)

$(4x - 5)°$
$= 4(12) - 5$
$= 43°$

$(3x + 11)°$
$= 3(12) + 11$
$= 47°$

$90 + 4x - 5 + 3x + 11 = 180$
$7x + 96 = 180$
$7x = 84$
$\boxed{x = 12}$

Classification: Right △
(the △ has one 90° angle)

d) In △ABC, $m\angle B$ is 5 more than the $m\angle A$, and $m\angle C$ is five times $m\angle A$. What is the measure of each angle? Classify the triangle by its angle measures.

$m\angle A = x$
$m\angle B = x + 5$
$m\angle C = 5x$

$x + x + 5 + 5x = 180$
$7x + 5 = 180$
$7x = 175$
$\boxed{x = 25}$

$\boxed{\begin{array}{l} m\angle A = 25° \\ m\angle B = 30° \\ m\angle C = 125° \end{array}}$

Classification: Obtuse △

Answers: 1. a. Obtuse scalene   b. Right isosceles
2. a. x = 30; right   b. x = 25; acute c. x = 12; right   d. x = 25; 25°, 125°, 30°; obtuse