CHAPTER 14

Understanding 2D and 3D Shapes

Triangles:

We had learnt in the lesson "Basic Geometric Ideas"

The points, which are not on a straight line, are called non-collinear points. We can also call them co-planar points.

When we join any 3 non-collinear points using only 3 line segments we get a shape! Can you recall what the shape is?

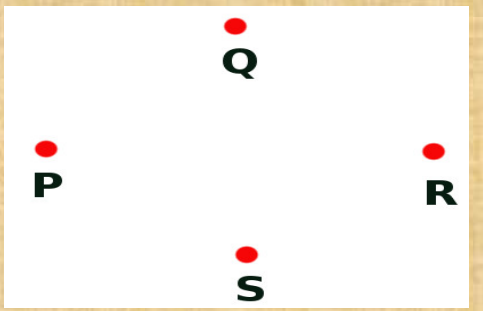
Yes, it is a triangle.

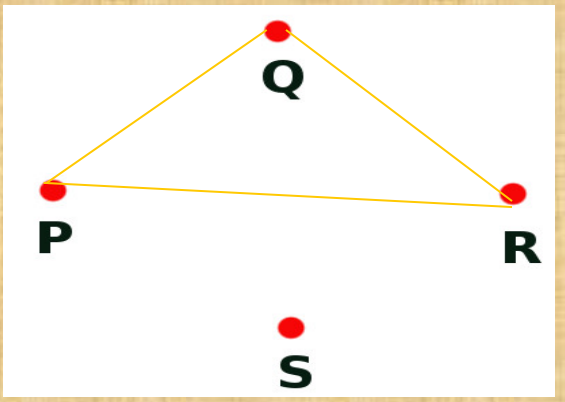
A triangle has three vertices, three angles and three sides.

VERTICES : P, Q, R

ANGLES : $\angle P, \angle Q$ and $\angle R$

SIDES : $\overline{PR}$, $\overline{QR}$, $\overline{PQ}$

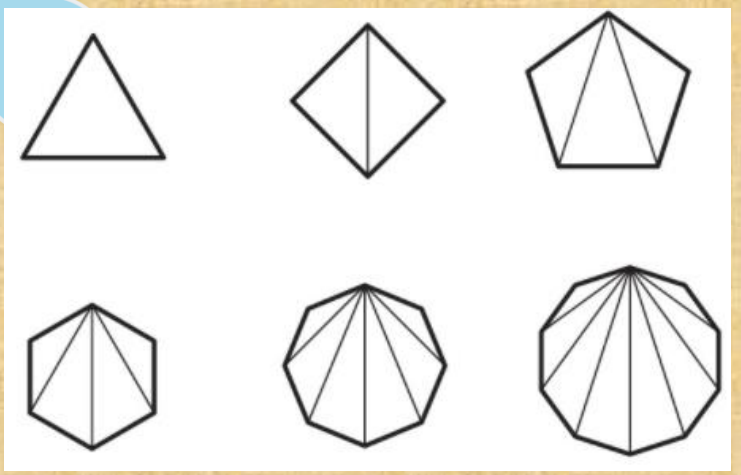




Why Triangles are important.

They are one of the first shapes studied in geometry.

Triangles are particularly important because all other polygons can be decomposed into triangles.



Understanding the basic properties of triangles allows for deeper study of larger polygons.

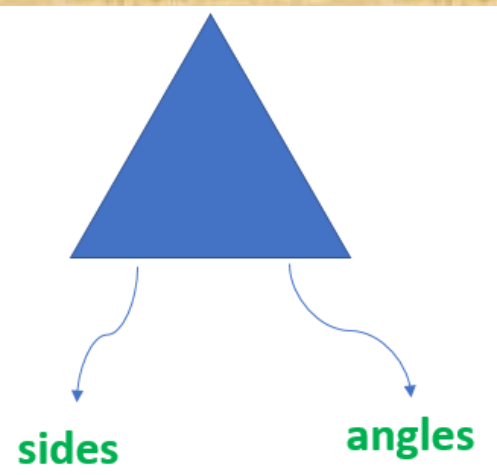
Classification of triangles

Triangles are classified in two ways.

1) Classification by sides

2) Classification by angles

Classification of triangles

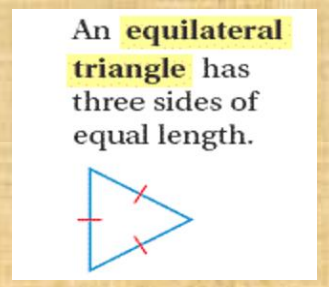


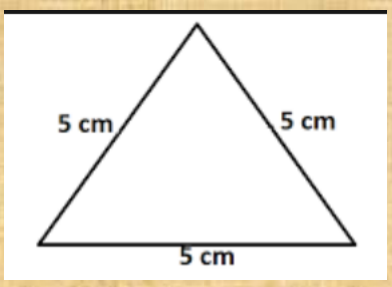
Classifying triangles by sides:

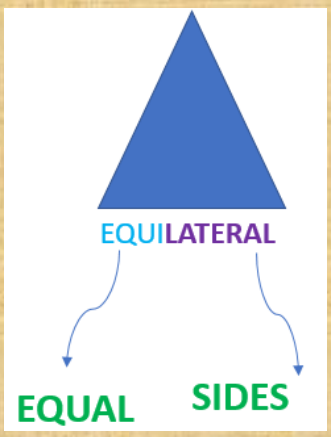
An equilateral triangle – In an equilateral triangle, all three sides are of equal length. In the word equilateral, equi means equal and lateral means sides.

In figure, the two red lines indicate that those two line segments/sides are of equal length.

In the given figure, the triangle has three sides, which measure 5cm each.

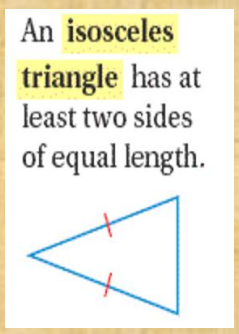


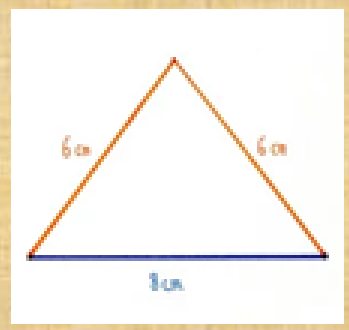


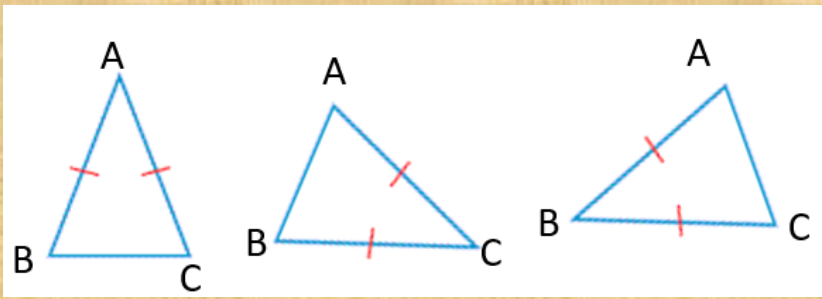


An isosceles triangle – In an isosceles triangle, two sides of the triangle are of equal length. In figure 1, the two red lines indicate that those two line segments /sides are of equal length. In the figure 2, the triangle has two sides that measure 6cm each and the third side measures 8 cm.

Note that in an isosceles triangle, any of the two sides can be equal as shown.

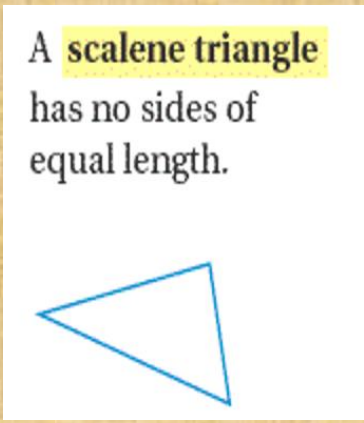


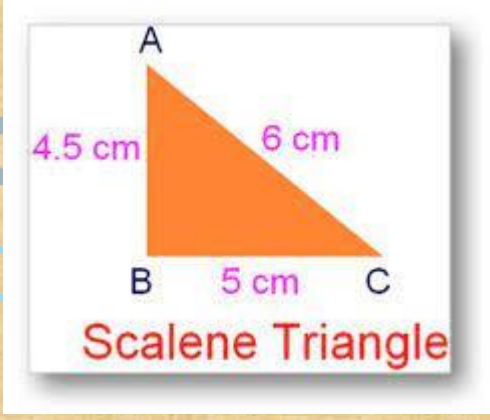




A scalene triangle – In a scalene triangle, all three sides measure different lengths.

In the figure 2, note that the measures of all the sides of the triangle are of different length.



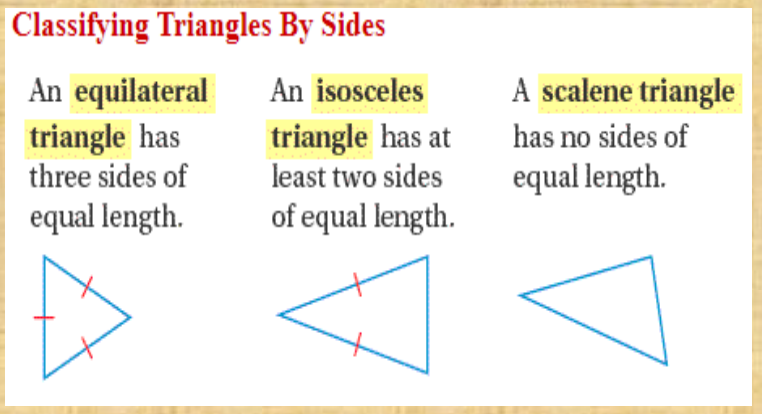


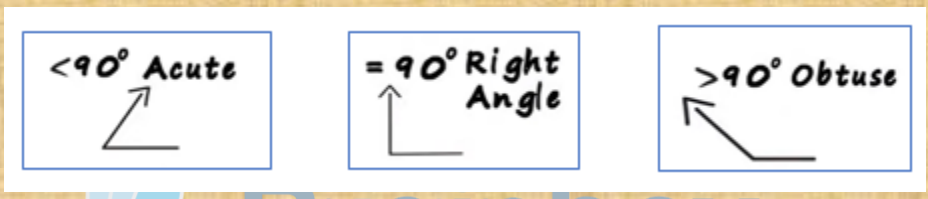
Now let us look at names of triangles based on angles.

If each angle of the triangle is less than 90 degree, that is if each angle is an acute angle then is it is an ACUTE ANGLE TRIANGLE.

If a triangle has one angle equal to 90 degrees then it is a right angle triangle. Note that the other two angles will be acute angles

If a triangle has one angle greater than 90 degrees then the triangle is called as an Obtuse angle triangle.



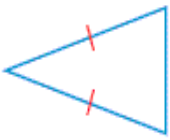


LET US TAKE A QUICK RECAP OF THE TYPES OF TRIANGLES

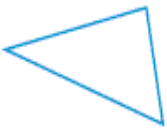
Classifying Triangles By Sides

An **equilateral triangle** has three sides of equal length.

An **isosceles triangle** has at least two sides of equal length.



A **scalene triangle** has no sides of equal length.



Classifying Triangles by Angles

An **acute triangle** has three acute angles.

A **right triangle** has one right angle.

An **obtuse triangle** has one obtuse angle.