## Triangles

The main concepts from this chapter that are covered here are-

- What is a triangle?

- Similarity criteria of two polygons having the same number of sides

- Similarity criteria of triangles

- Proof of Pythagoras Theorem

- Example Questions

- Problems based on Triangles

- Articles Related to Triangles

### What is Triangle?

A triangle can be defined as a polygon which has three angles and three sides. The interior angles of a triangle sum up to 180 degrees and the exterior angles sum up to 360 degrees. Depending upon the angle and its length, a triangle can be categorized in the following types-

1. Scalene Triangle – All the three sides of the triangle are of different measure

2. Isosceles Triangle – Any two sides of the triangle are of equal length

3. Equilateral Triangle – All the three sides of a triangle are equal and each angle measures 60 degrees

4. Acute angled Triangle – All the angles are smaller than 90 degrees

5. Right angle Triangle – Anyone of the three angles is equal to 90 degrees

6. Obtuse-angled Triangle – One of the angles is greater than 90 degrees

### Similarity Criteria of Two Polygons Having the Same Number of Sides

Any two polygons which have the same number of sides are similar if the following two criteria are met-

1. Their corresponding angles are equal, and
2. Their corresponding sides are in the same ratio (or proportion)

## Similarity Criteria of Triangles

To find whether the given two triangles are similar or not, it has four criteria. They are:

- **Side-Side- Side (SSS) Similarity Criterion** – When the corresponding sides of any two triangles are in the same ratio, then their corresponding angles will be equal and the triangle will be considered as similar triangles.

- **Angle Angle Angle (AAA) Similarity Criterion** – When the corresponding angles of any two triangles are equal, then their corresponding side will be in the same ratio and the triangles are considered to be similar.

- **Angle-Angle (AA) Similarity Criterion** – When two angles of one triangle are respectively equal to the two angles of the other triangle, then the two triangles are considered as similar.

- **Side-Angle-Side (SAS) Similarity Criterion** – When one angle of a triangle is equal to one angle of another triangle and the sides including these angles are in the same ratio (proportional), then the triangles are said to be similar.

## SIMILAR FIGURES

- Two figures having the same shape but not necessary the same size are called similar figures.
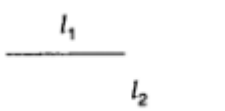- All congruent figures are similar but all similar figures are not congruent.

## SIMILAR POLYGONS
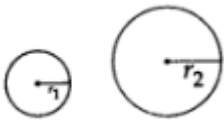
Two polygons are said to be similar to each other, if:

(i) their corresponding angles are equal, and

(ii) the lengths of their corresponding sides are proportional
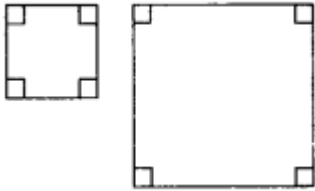
### Example:

Any two-line segments are similar since length are proportional

$l_1$
_____

$l_2$
_____

Any two circles are similar since radii are proportional

Any two squares are similar since corresponding angles are equal and lengths are proportional.
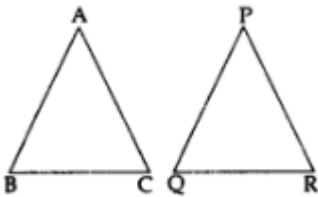
## Note:

Similar figures are congruent if there is one to one correspondence between the figures.

∴ From above we deduce:

Any two triangles are similar, if their

(i) Corresponding angles are equal

∠A = ∠P

∠B = ∠Q

∠C = ∠R

(ii) Corresponding sides are proportional

AB/PQ=AC/PR=BC/QR