TRIANGLES

CONCEPT OF SIMILARITY

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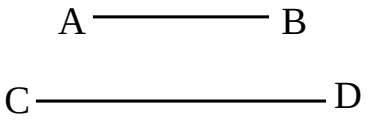
INTRODUCTION

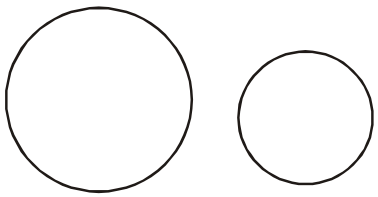
In previous classes, we have learnt about the congruency of two geometric figures. In this chapter we shall learn about these geometric figures. Which have the same shape but not necessary have the same size. These kind of geometric figures are known as similar figures. So the congruent figures are always similar figures but similar figures need not be congruent figures.

(i) Two line segments are similar



(The two line segments are congruent if they have the same length)

(ii) Two circles are similar.



(The two circles are congruent. If they have the same radius)

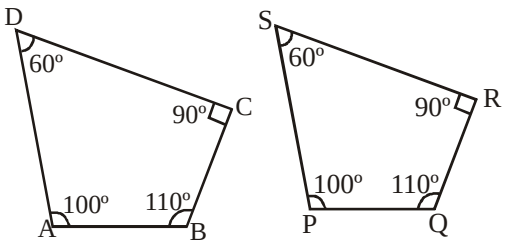
SIMILAR POLYGONS

Two polygons of the same number of sides are said to be similar. If

(i) Their corresponding angles are equal

(ii) Their corresponding sides are in the same ratio

Ex. 1 If two polygons ABCD and PQRS are similar then



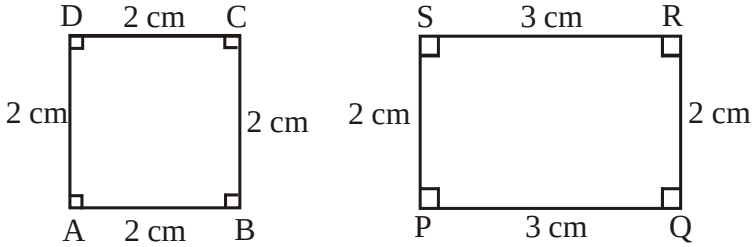
Sol. By the definition

$$\frac{AB}{PQ}=\frac{BC}{QR}=\frac{CD}{RS}=\frac{DA}{SP}$$

So corresponding sides are proportional.

Therefore quadrilateral ABCD and PQRS are similar

Ex. 2



Sol. Clearly A square ABCD and rectangle PQRS are equiangular.

But corresponding sides of square ABCD and rectangle PQRS are not proportional.

Therefore square ABCD and rectangle PQRS are not similar.

Note : If one polygon is similar to a second polygon and the second polygon is similar to a third polygon, then the first polygon is similar to the third polygon.

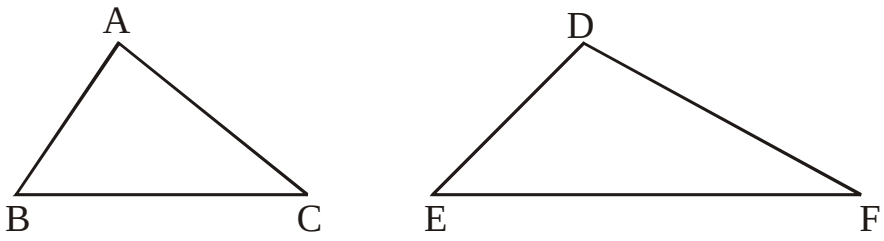
SIMILARITY OF TRIANGLES

Two triangles are said to be similar if

(i) Their corresponding angles are equal (or triangles are equiangular)

(ii) Their corresponding sides are in the same ratio (or proportional)

The sign '∼' is used to represent the similarity of two triangles. ΔABC ∼ ΔDEF means ΔABC is similar to ΔDEF.



Hence by definition of similarity of two triangles,

$\angle A = \angle D$, $\angle B = \angle E$, $\angle C = \angle F$ and $\frac{AB}{DE} = \frac{BC}{EF} = \frac{CA}{FD}$

NOTE :

(i) Any two congruent figures are always similar but two similar figures are not necessarily congruent.

(ii) Equiangular triangles means that the corresponding angles of the triangles are equal.