### Basic Concepts

1. Two figures having the same shape but not necessarily the same size are called similar figures.
2. All the congruent figures are similar but the converse is not true.
3. Two polygons of the same number of sides are similar, if
(i)   Their corresponding angles are equal
(ii)   Their corresponding sides are in the same ratio (i.e., proportion)
4. Two triangles are similar, if
(i)   Their corresponding angles are equal.
(ii)   Their corresponding sides are in the same ratio (or proportion)
5. **Basic Proportionality Theorem (B.P.T.) (Thales Theorem)**
   In a triangle, a line drawn parallel to one side, to intersect the other sides in distinct points, divides the two sides in the same ratio.
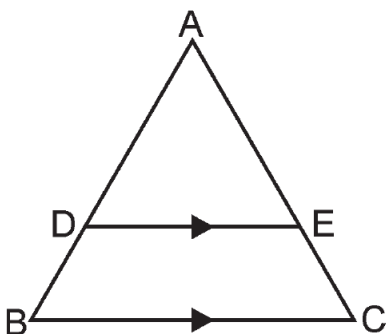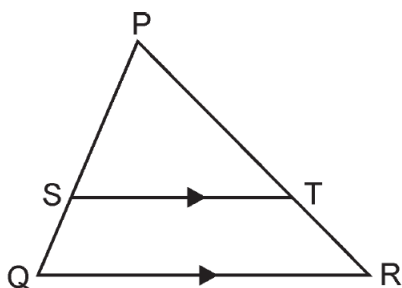

   In ΔABC, if DE ∥ BC then
(i) $\dfrac{AD}{DB} = \dfrac{AE}{EC}$
(ii) $\dfrac{AB}{AD} = \dfrac{AC}{AE}$
(iii) $\dfrac{AB}{DB} = \dfrac{AC}{EC}$
6. **Converse of Basic Proportionality Theorem**
   If a line divides any two sides of a triangle in the same ratio, the line is parallel to the third side.

In ΔPQR, if $\dfrac{PS}{SQ} = \dfrac{PT}{TR}$, then ST $\parallel$ QR.

7. If in two triangles, corresponding angles are equal, then their corresponding sides are in the same ratio and hence the two triangles are similar (*AAA similarity criterion*).

8. If in two triangles, two angles of one triangle are respectively equal to the angles of the other triangle, then the two triangles are similar (*AA similarity criterion*).

9. If in two triangles, corresponding sides are in the same ratio, then their corresponding angles are equal and hence the triangles are similar (*SSS similarity criterion*).

10. If 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 similar (*SAS similarity criterion*).

11. If a perpendicular is drawn from the vertex of the right angle of a right triangle to the hypotenuse, then the triangles on both sides of the perpendicular are similar to the whole triangle and also to each other.

12. The ratio of the areas of two similar triangles are equal to the ratio of the squares of any two corresponding sides.

13. The areas of two similar triangles are in the ratio of the squares of the corresponding altitudes.

14. The areas of two similar triangles are int eh ratio of the squares of the corresponding medians.

15. If the areas of two similar triangles are equal, then the triangles are congruent, i.e., equal and similar triangles are congruent.

16. **Pythagoras theorem**

    In a right triangle, the square of the hypotenuse is equal to the sum of the squares of the other two sides. In figure, $\angle B = 90^0$, so $AC^2 = AB^2 + BC^2$.
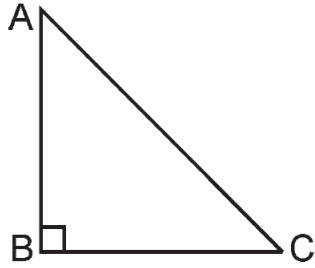
17. Converse of Pythagoras theorem

In a triangle, if the square of one side is equal to the sum of the squares of the other two sides, then the angle opposite to the first side is a right angle.