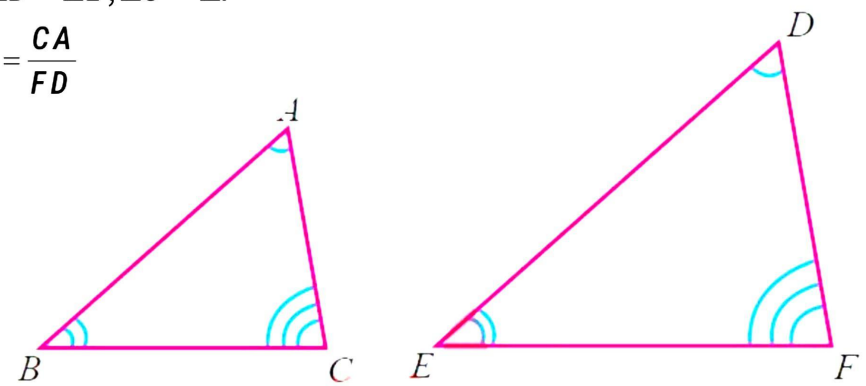
CLASS X : CHAPTER - 6
TRIANGLES

NCERT NICHOOD

All those objects which have the same shape but different sizes are called similar objects.
Two triangles are similar if
(i) their corresponding angles are equal (or)
(ii) their corresponding sides have lengths in the same ratio (or proportional)

Two triangles ΔABC and ΔDEF are similar if
$(i) \angle A = \angle D, \angle B = \angle E, \angle C = \angle F$
$(ii) \frac{AB}{DE} = \frac{BC}{EF} = \frac{CA}{FD}$



Basic Proportionality theorem or Thales Theorem
If a straight line is drawn parallel to one side of a triangle intersecting the other two sides, then it divides the two sides in the same ratio.

If in a ΔABC, a straight line DE parallel to BC, intersects AB at D and AC at E, then
$(i) \frac{AB}{AD} = \frac{AC}{AE}$ $(ii) \frac{AB}{DB} = \frac{AC}{EC}$

Converse of Basic Proportionality Theorem (Converse of Thales Theorem)
If a straight line divides any two sides of a triangle in the same ratio, then the line must be parallel to the third side.

Angle Bisector Theorem
The internal (external) bisector of an angle of a triangle divides the opposite side internally (externally) in the ratio of the corresponding sides containing the angle.

Converse of Angle Bisector Theorem
If a straight line through one vertex of a triangle divides the opposite side internally (externally) in the ratio of the other two sides, then the line bisects the angle internally (externally) at the vertex.

Criteria for similarity of triangles
The following three criteria are sufficient to prove that two triangles are similar.

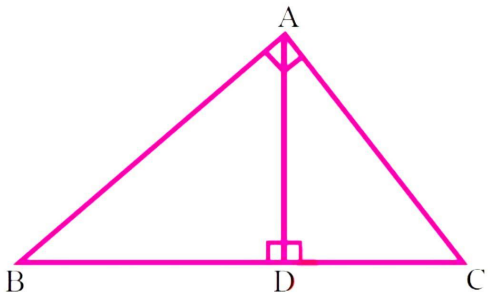
(i) AAA (Angle-Angle-Angle) similarity criterion
If in two triangles, corresponding angles are equal, then their corresponding sides are in the same ratio (or proportion) and hence the two triangles are similar.
Remark: If two angles of one triangle are respectively equal to two angles of another triangle, then the two triangles are similar.

(ii) SSS (Side-Side-Side) similarity criterion for Two Triangles
In two triangles, if the sides of one triangle are proportional (in the same ratio) to the sides of the other triangle, then their corresponding angles are equal and hence the two triangles are similar.

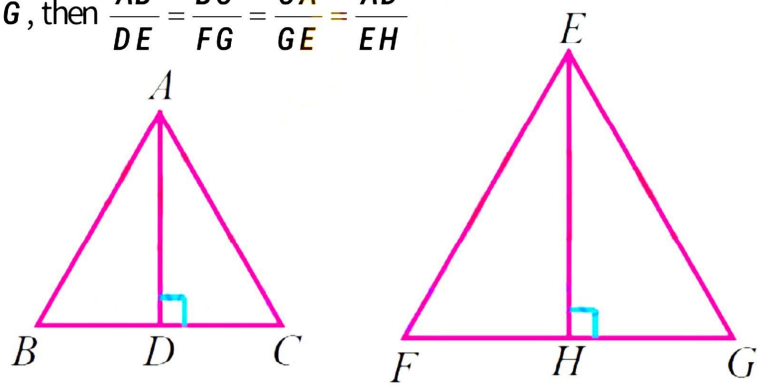
(iii) SAS (Side-Angle-Side) similarity criterion for Two Triangles
If one angle of a triangle is equal to one angle of the other triangle and if the corresponding sides including these angles are proportional, then the two triangles are similar.

Areas of Similar Triangles
The ratio of the areas of two similar triangles is equal to the ratio of the squares of their corresponding sides.

If a perpendicular is drawn from the vertex of a right angled triangle to its hypotenuse, then the triangles on each side of the perpendicular are similar to the whole triangle.
Here, (a) $\Delta DBA \sim \Delta ABC$
(b) $\Delta DAC \sim \Delta ABC$
(c) $\Delta DBA \sim \Delta DAC$



If two triangles are similar, then the ratio of the corresponding sides is equal to the ratio of their corresponding altitudes.
i.e., if $\Delta ABC \sim \Delta EFG$, then $\frac{AB}{DE} = \frac{BC}{FG} = \frac{CA}{GE} = \frac{AD}{EH}$



If two triangles are similar, then the ratio of the corresponding sides is equal to the ratio of the corresponding perimeters.
If $\Delta ABC \sim \Delta EFG$, then $\frac{AB}{DE} = \frac{BC}{FG} = \frac{CA}{GE} = \frac{AB+BC+CA}{DE+FG+GE}$

Pythagoras theorem (Baudhayan theorem)
In a right angled triangle, the square of the hypotenuse is equal to the sum of the squares of the other two sides.

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.