CHAPTER 7
TRIANGLES

NOTES

- **Congruent Figures:** Two plane figures are congruent if they have the same shape and the same size.
- **Similar Figures:** Two figures having the same shape but not necessary the same size are called similar figures.

All congruent figures are always similar but similar figures need not be congruent.

- **Similar Polygons:** Two polygons having the same number of sides are similar, if
  a) their corresponding angles are equal and
  b) their corresponding sides are in the same ratio.
- **Similar Triangles:** Two triangles are similar, if
  a) their corresponding angles are equal and
  b) their corresponding sides are in the same ratio.
- **Theorem 7.1**

  Basic Proportionality Theorem (or Thale's Theorem):

  If a line is drawn parallel to one side of a triangle intersecting the other two sides, then it divides the other two sides in the same ratio.
- **Theorem 7.2**

  Converse of Basic Proportionality Theorem:

  If a line divides two sides of a triangle in the same ratio, then the line is parallel to the third side.
- **Theorem 7.3**

  The internal bisector of an angle of a triangle divides the opposite sides internally in the ratio of the other two sides.
- **Criteria for similarity of triangles**
  - **Theorem 7.4 (AAA similarity)**

    If the corresponding angles of two triangles are equal, then the triangles are similar.

Corollary: (AA similarity)

If two angles of one triangle are respectively equal to two angles of another triangle, then the two triangles are similar.

- **Theorem 7.5 (SSS similarity)**

  If the corresponding sides of two triangles are in the same ratio, then the triangles are similar.

Definitions:

1. Two triangles are similar if the corresponding angles are equal.
2. Two triangles are similar if the corresponding sides are in the same ratio.

- **Theorem 7.6 (SAS similarity)**

  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, the triangles are similar.

- **Theorem 7.7**

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

➢ **Areas of Similar Triangles**

Theorem 7.8 The ratio of the areas of two similar triangles is equal to the ratio of the squares of their corresponding sides.

➢ **Theorem 7.9 (Pythagoras Theorem)**

In a right triangle the square of the hypotenuse is equal to the sum of the squares of the other two sides.

➢ **Theorem 7.10 (Converse of Pythagoras Theorem)**

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

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