Similarity

Important Concepts

1. Geometric figures, that have the same shape but may not have the same size, are said to be similar figures.

2. Any two congruent figures are always similar but two similar figures need not necessarily be congruent.

3. Two triangles which have the three angles of one triangle equal to the three angles of the other triangle respectively and the size of their corresponding sides are proportional, are said to be similar triangles.
   In other words two triangles will be similar if:
   i. Their corresponding angles are equal.
   ii. Their corresponding sides are proportional.

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

5. If the corresponding sides of two triangles are proportional, then they are similar by SSS Similarity**.**

6. If in two triangles, one pair of corresponding sides are Proportional and the included angles are equal then the two triangles are similar by SAS Similarity.

7. If two triangles are similar to a third triangle, then they are similar to each other.

8. Basic Proportional Theorem: In a triangle, a line drawn parallel to one side of a triangle, to intersect its other sides in distinct points, divides them in the same ratio.

9. Converse of Basic Proportionality Theorem: If a line divides any two sides of a triangle in the same ratio, then this line is parallel to the third side of the triangle.

10. The ratio between the areas of two similar triangles is equal to the ratio of the squares of the corresponding sides.

11. The ratio between the areas of two similar triangles is equal to the ratio of the squares of the corresponding altitudes.

Maps and Models:

1. Scale factor (k) is that number by which the object is multiplied to get the image.

2. If $k > 1$ the size transformation is called enlargement.

3. It $k < 1$ the size transformation is called reduction.

4. The map of a plane figure and the actual figure are similar to one another.
   If the map of a plane figure is drawn to the scale 1: k, then
   i. The length of the actual figure $= k \times (\text{length of the map})$
   ii. The breadth of the actual figure $= k \times (\text{breadth of the map})$
   iii. The area of the actual figure $= k^2 \times (\text{area of the map})$

5. The model of a plane figure and the actual figure are similar to one another.
   If the model of a plane figure is drawn to the scale 1: k, then
   i. Each side of the actual figure $= k \times (\text{the corresponding side of the model})$
   ii. The area of the actual figure $= k^2 \times (\text{area of the model})$

6. The model of a solid and the actual solid are similar to one another.
   If the model of a solid is drawn to the scale 1: k, then
   i. Each side of the actual solid $= k \times (\text{the corresponding side of the model})$
   ii. The surface area of the actual solid $= k^2 \times (\text{surface area of the model})$
   iii. The volume of the actual solid $= k^3 \times (\text{volume of the model})$