

CLASS X

SUBJECT: MATHEMATICS

TOPIC	TRIANGLES
PREREQUISITE KNOWLEDGE	Knowledge of different types of triangles as per sides and angles Similar Figures
OBJECTIVES	The students will be able to: Similarity of Triangles Criteria for Similarity of Triangles Areas of Similar Triangles Pythagoras Theorem
THE HISTORY OF TRIANGLES	A triangle is a type of polygon having three sides and three angles. The triangle is a closed figure formed from three straight line segments joined at their ends. A triangle must have at least some area, so all three corner points of a triangle cannot lie in the same line. The sum of the lengths of any two sides of a triangle is Line Segments at the ends can be called the corners, angles, or vertices of the triangle. Since any given triangle lies completely within a plane, triangles are often treated as two-dimensional geometric figures. As such, a triangle has no volume and, because it is a two-dimensionally closed figure, the flat part of the plane inside always greater than the length of the third side. The preceding statement is sometimes called the. Triangle Inequality
SUMMARY OF THE CHAPTER	1. Two figures having the same shape but not necessarily the same size is 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 and (ii) their corresponding sides are in the same ratio (i.e., proportion). 4. If a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points, then the other two sides are divided in the same ratio. 5. If a line divides any two sides of a triangle in the same ratio, then the line is parallel to the third side. 6. 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). 7. If in two triangles, two angles of one triangle are respectively equal to the two angles of the other triangle, then the two triangles are similar (AA similarity criterion). 8. 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). 9. 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). 10. The ratio of the areas of two similar triangles is equal to the square of the ratio of their corresponding sides. 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. In a right triangle, the square of the hypotenuse is equal to the sum of the squares of the other two sides (Pythagoras Theorem). 13. If in a triangle, square of one side is equal to the sum of the squares of the other two sides, then the angle opposite the first side is a right angle.
TRANSACTION METHODOLOGY	Strategies used: 1) Warm up session: - By talking briefly about the history of triangles and similarity and congruence of any two objects. - Identification of the different types of triangles with their angles and sides. 2) Chit Activity: - Divide the class in groups. Create chits with name of triangles written on them. Tell the students of each group to pick one chit and ask them to identify the triangles. Thereafter tell them to write it on board. 3) Finding similarity of triangles: In this activity the students will solve the problems in their notebooks. 1. Posing the Task “Recreate the triangular pattern that is on the board with cut outs and different coloured cards. Feel free to use as many shapes as you like, stick the shapes together any way you like or overlap shapes.” 2. Anticipated Student Response As shown in the board plan, we anticipate the following responses from the students: a. Students will recreate the pattern using strips rather than triangles. b. Use rectangles and triangles. c. Students will use similar triangles. 3. Comparing and Discussing First student asked to present their solution will be one who used strips. Second student asked to present their solution will be one who use direct angles and strips and triangles Third student asked to present their solution will be one who used similar triangle 4. Summing up Discussion about similar triangles. Angles, sides, slopes. Work towards definition of similar triangles.

EXPECTED LEARNING OUTCOMES	Students will be able to: Congruence and similarity, Conditions for similarity of two polygons, Similarity of Triangles, Similarity and correspondence of vertices, Criteria for similarity of triangles; (i) AAA or AA (ii) SSS (iii) SAS • If a line is drawn parallel to one side of a triangle to intersect the other two sides, then these two sides are divided in the same ratio (Basic Proportionality Theorem) and its converse. • Ratio of the areas of two similar triangles is equal to the ratio of the squares of their corresponding sides. • Perpendicular drawn from the vertex of the right angle of a right triangle to its hypotenuse divides the triangle into two triangles which are similar to the whole triangle and to each other. • In a right triangle, the square on the hypotenuse is equal to the sum of the squares on the other two sides (Pythagoras Theorem) and its converse.
PRACTICE QUESTIONS/ ASSESSMENTS	Q1. It is given that $\triangle ABC \sim \triangle EDF$ such that $AB = 5$ cm, $AC = 7$ cm, $DF = 15$ cm and $DE = 12$ cm. Find the lengths of the remaining sides of the triangles. Q2. Prove that if a line is drawn parallel to one side of a triangle to intersect the other two sides, then the two sides are divided in the same ratio. Q3. A 5 m long ladder is placed leaning towards a vertical wall such that it reaches the wall at a point 4 m high. If the foot of the ladder is moved 1.6 m towards the wall, then find the distance by which the top of the ladder would slide upwards on the wall. Q4. For going to a city B from city A, there is a route via city C such that $AC \perp CB$, $AC = 2x$ km and $CB = 2(x + 7)$ km. It is proposed to construct a 26 km highway which directly connects the two cities A and B. Find how much distance will be saved in reaching city B from city A after the construction of the highway Q5. A flag pole 18 m high casts a shadow 9.6 m long. Find the distance of the top of the pole from the far end of the shadow. 8. A street light bulb is fixed on a pole 6 m above the level of the street. If a woman of height 1.5 m casts a shadow of 3m, find how far she is away from the base of the pole. Q 6.O is the point of intersection of the diagonals AC and BD of a trapezium ABCD with AB parallel to DC. Through O, a line segment PQ is drawn parallel to AB meeting AD in P and BC in Q. Prove that $PO = QO$. Q7 Prove that the area of the semicircle drawn on the hypotenuse of a right-angled triangle is equal to the sum of the areas of the semicircles drawn on the other two sides of the triangle.

	Q8. Prove that the area of the equilateral triangle drawn on the hypotenuse of a right-angled triangle is equal to the sum of the areas of the equilateral triangles drawn on the other two sides of the triangle. Q9. Diagonals of a trapezium PQRS intersect each other at the point O, PQ parallel to RS and $PQ = \frac{1}{3} RS$. Find the ratio of the areas of triangles POQ and ROS. Q10 Hypotenuse of a right triangle is 25 cm and out of the remaining two sides, one is longer than the other by 5 cm. Find the lengths of the other two sides.
EVALUATION	Class Test, Extra Questions, Lab Manual Activity, Oral Questions