Verify that the Triangles On the Same Base

OBJECTIVE

To verify that the triangles on the same base and between the same parallels are equal in area.

Materials Required

1. A plywood piece
2. Geometry box
3. Graph paper
4. Two wooden strips
5. Colours
6. Cutter
7. Adhesive
8. Pins

Prerequisite Knowledge

1. Basic concepts of triangle.
2. Area of a triangle.

Theory

1. For basic concept of triangle refer to Activity 12.
2. Area of a triangle = ½ x Base x Height

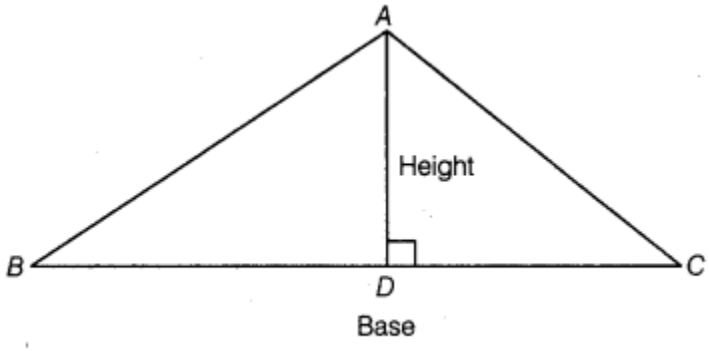

Fig. 21.1

Procedure

1. Take a rectangular plywood piece of suitable size and by using adhesive, paste a graph paper on it.
2. Fix a pair of horizontal wooden strips (parallel to each other) on it. (see Fig. 21.2)
3. Along the first strip (base strip), fix two points B and C on the graph paper.
4. On the second strip, fix a pin at a point, say A. (see Fig. 21.2)
5. Join CA and CB and obtain ΔACB. (see Fig. 21.2)

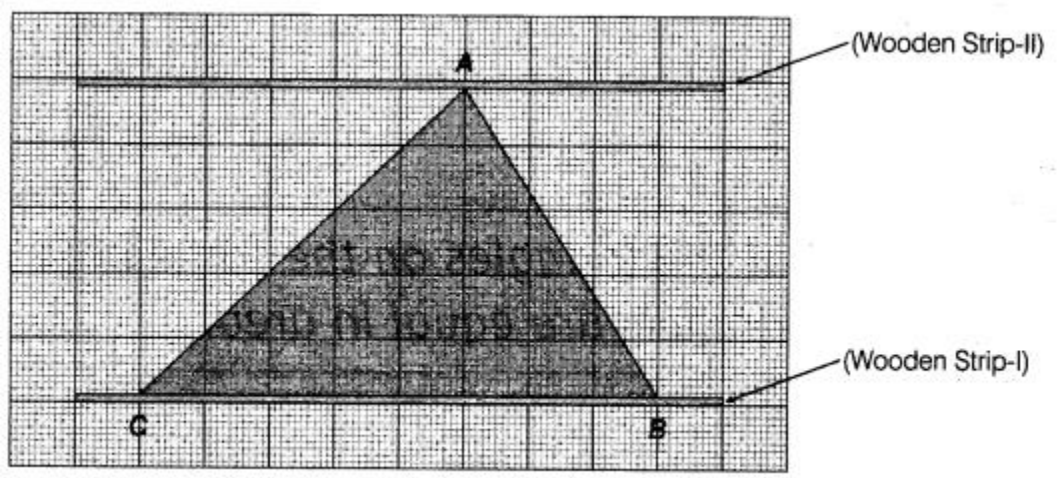

Fig. 21.2

6. On the second strip, take other two points, say A' and A", (see Fig. 21.3)
7. To form two more triangles, join A'C, A' B, A"C and A" B and obtain triangles, (see Fig. 21.3)

Demonstration

1. In Fig. 21.3, count the number of squares in each triangle by taking half square as ½ and more than half square as 1, leaving those squares which are less than half.
2. We find that all the triangles have same area.

Observation

1. The number of squares in ΔABC = …… , i.e. Area of ΔABC = ……. units
2. The number of squares in ΔA'BC = …… , i.e. Area of ΔA'BC = ……. units
3. The number of squares in ΔA"BC = …… , i.e. Area of ΔA"BC = ……. units

   Hence, area of ΔABC = area of ΔA'BC = area of ΔA"BC

   Note Area of all triangles are approximately equal.

Result

We have verified that the area of triangles on the same base and between the same parallels, are equal.

Application

The result is useful in

1. Solving many type of geometrical problems.
2. Finding the formula for area of a triangle.

Viva Voce

Question 1:
If two triangles are on the same base and between the same parallels, then what is the relationship between their areas?
Answer:
Both triangles have equal area.

Question 2:
What is the formula for area of a triangle?
Answer:
Area of a triangle is half the product of its base and the corresponding altitude.

Question 3:
If a triangle and a parallelogram are on the same base and between the same parallels, then what will be the relation in their areas?
Answer:
Area of triangle will be half the area of parallelogram.

Question 4:
If two triangles lie on the same base and having equal areas. Will the triangles have equal altitudes?
Answer:
Yes, triangles will have equal altitudes.

Question 5:
If we draw infinite number of triangles on the same base and between the same parallel lines. Does the area of each triangle increases with increasing the distance from previous drawn triangle?
Answer:
No, their areas will be same.

Question 6:
If a student calculate the area of three triangles, which are drawn on the same base and between the same parallel lines. The areas calculated by him, different for third triangle. Does he correct?

Answer:
No, the area of all three triangles should be equal.

Suggested Activity

To verify the converse of this theorem.