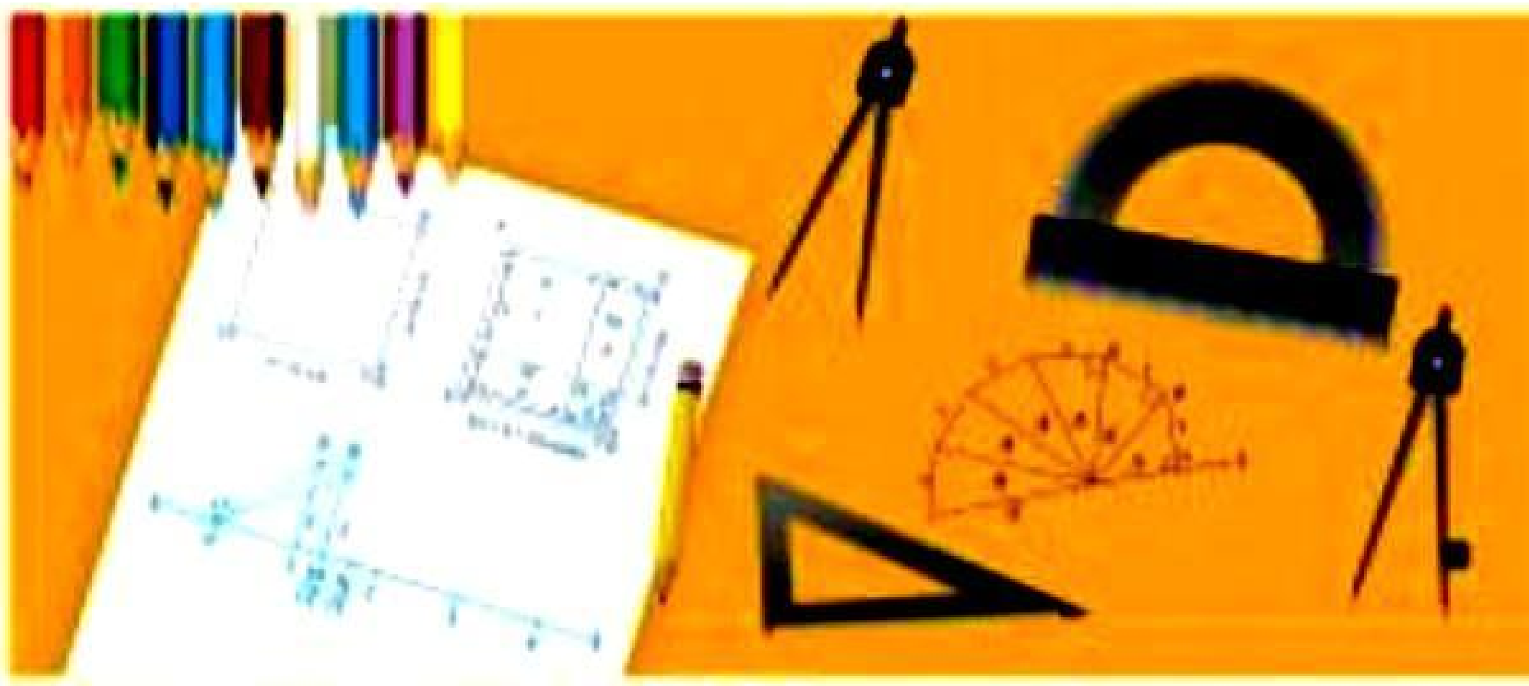

ACTIVITY

The Same Base And Between The Same Parallels

Objective

To show that the triangles on the same base and between the same parallel lines are equal in area experimentally.

Material Required

Glazed papers, a pair of scissors, a pencil, glue stick, white sheet.

Theory

Familiarity with triangles.

Formula for the area of triangle $= \frac{1}{2} \times$ base $\times$ height

Shortest distance between the two parallel lines.

Procedure

Draw any triangle on a glazed paper and name its ABC.

Cut the triangle and paste it on the white sheet as shown in fig. (i).

Cut another triangle EGH such that EH = BC [fig. (ii)]

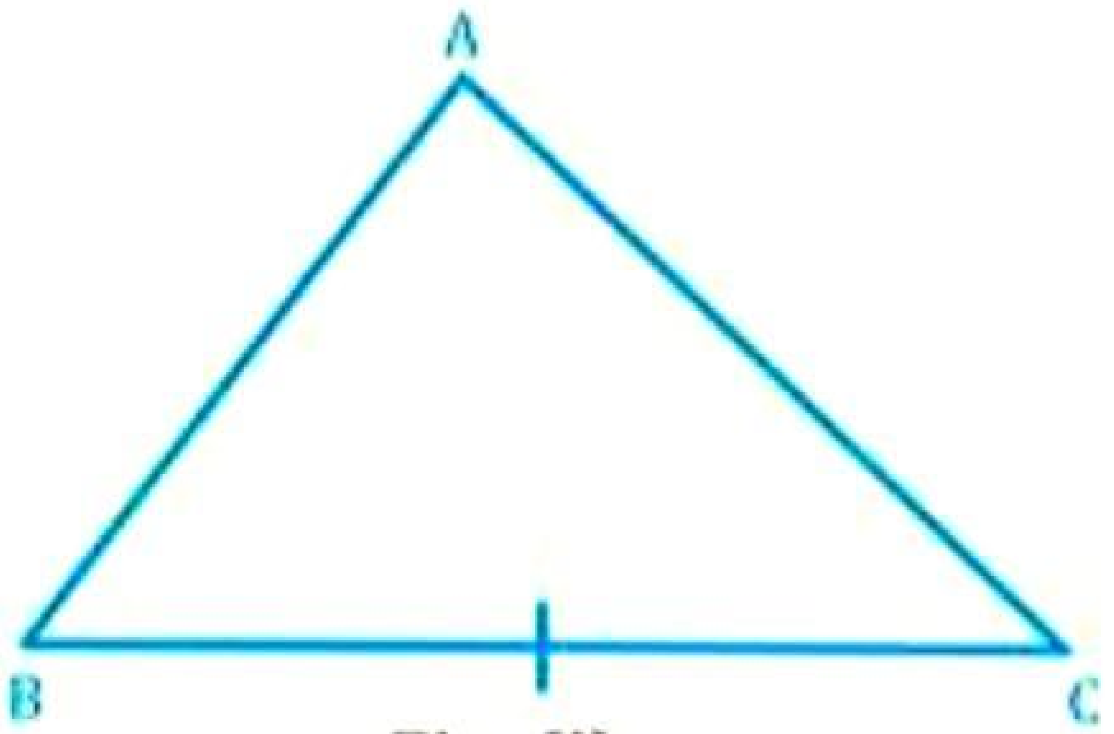

Fig. (i)

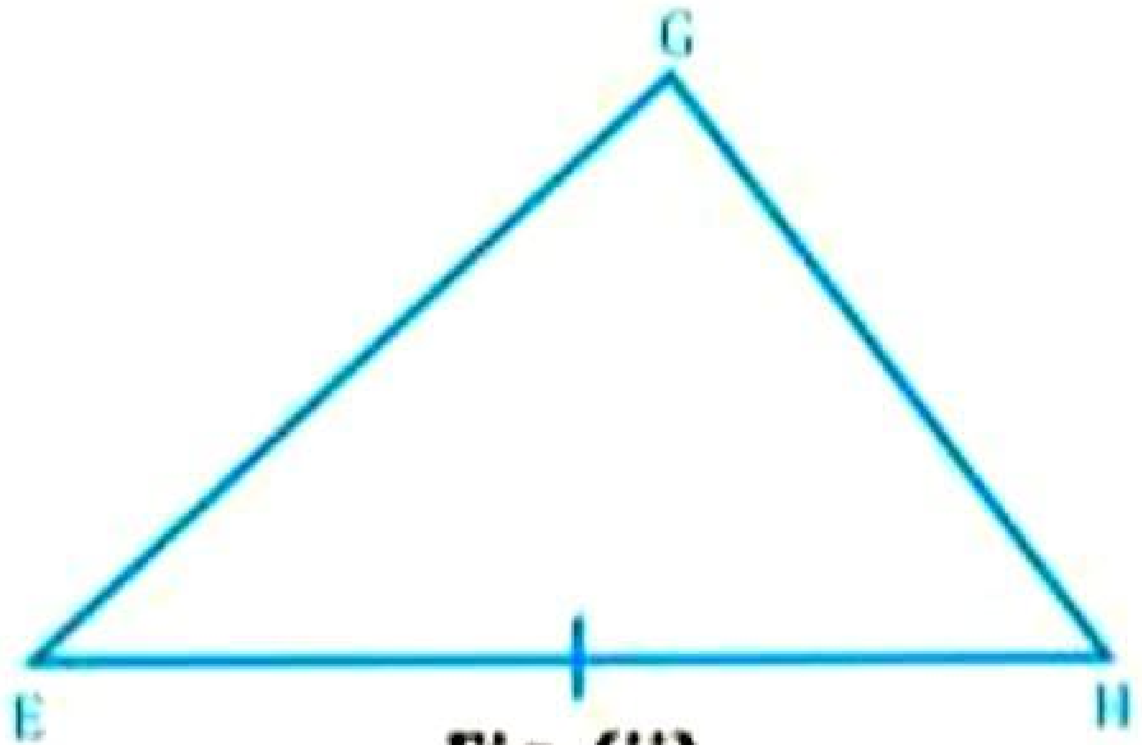

Fig. (ii)

Draw a line l at point A such that l is parallel to BC as shown in fig. (iii).

Draw any triangle KBC with the base BC and its vertex K lying on line l as shown in fig (iii).

Paste ΔEGH on △ ABC such that EH lies on BC and G does not lie on line l as shown in fig (iii).

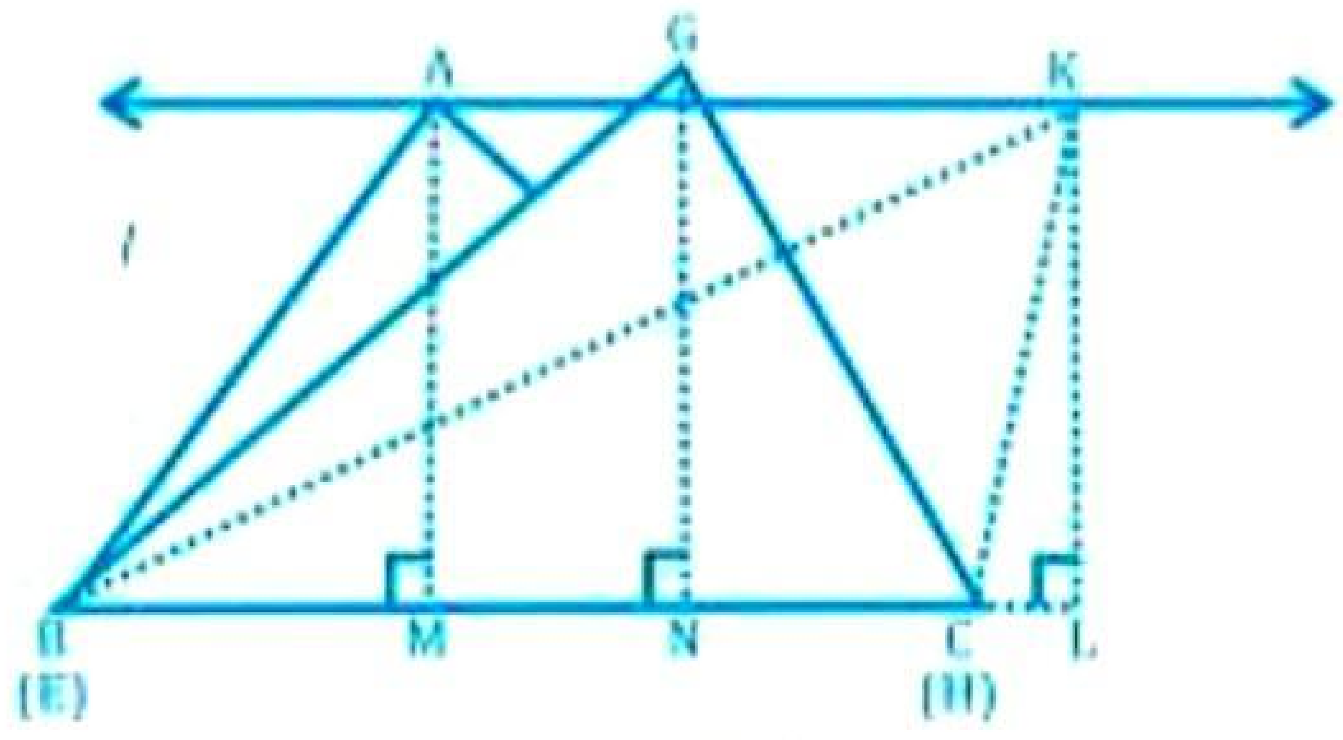

Fig. (iii)

Observation

$ar(\triangle ABC) = \frac{1}{2} \times \text{base} \times \text{height}$

$= \frac{1}{2} \times BC \times (\perp \text{ distance between} \parallel \text{lines } l \text{ and } BC)$

$= \frac{1}{2} \times BC \times AM$

$ar(\triangle BKC) = \frac{1}{2} \times BC \times (\perp\text{distance between} \parallel \text{lines } l \text{ and } BC) = \frac{1}{2} \times BC \times KL$

$= \frac{1}{2} \times BC \times AM$ ($\perp$ distance between $\parallel$ lines is always same), ($KL = AM$)

$\therefore ar(\triangle ABC) = ar(\triangle BKC)$

$ar(\triangle EGH) = \frac{1}{2} \times \text{base} \times \text{height}$

$= \frac{1}{2} \times BC \times (\perp \text{ distance from } G \text{ to } BC)$

$= \frac{1}{2} \times BC \times GN$

but, $AM \neq GN$

$\therefore ar(\triangle ABC) \neq ar(\triangle EGH)$

Result

We have verified that two triangles on the same base and between the same parallel lines are equal in area.

Learning Outcome

We learnt that areas of two or more triangles are same if they lie on the same base and between the same parallel lines. Triangles having same base but different perpendicular heights are not same and their areas are also not equal.

Activity Time

Students can verify this theorem by graphical and counting methods.
[**Hint:** Draw two triangles on the same base and between the same height and then count the squares covered by two triangles on the graph paper].

Viva Voce

Q1. If two triangles are on the same base and between the same parallels, then what is the relationship between their areas?

Ans: Both triangles have equal area.

Q2. If a student calculates 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?

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

Q3. 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?

Ans: Area of triangle will be half the area of the parallelogram.

Q4. If two triangles lie on the same base and having equal areas. Will the triangles have equal altitudes?

Ans: Yes, triangles will have equal altitudes.

Q5. If we draw infinite number of triangles on the same base and between the same parallel lines. Does the area of each triangle increase with increasing the distance from previous drawn triangle?

Ans: No, their areas will be same.

Q6. What is the formula for the area of a triangle?

Ans: Area of a triangle is half the product of its base and the corresponding altitude.

Multiple Choice Questions

Q 1. In $\triangle ABC$, $AB = AC$ and $\angle B = 50^\circ$, then find $\angle C$.

(a) 50° (b) 40° (c) 80° (d) 120°

Q 2. In triangles ABC and PQR, $AB = AC$, $\angle C = \angle P$ and $\angle B = \angle Q$. The two triangles are:

(a) Isosceles but not congruent
(b) Isosceles and congruent
(c) Congruent but not isosceles
(d) Neither congruent nor isosceles

Q 3. In $\triangle ABC$, $\angle C = \angle A$ and $BC = 4$ cm and $AC = 5$ cm, then find the length of AB.

(a) 5 cm (b) 3 cm (c) 4 cm (d) 2.5 cm

Q 4. Two sides of a triangle are of lengths 5 cm and 1.5 cm. The length of the third side of the triangle cannot be:

(a) 3.6 cm (b) 4.1 cm (c) 3.8 cm (d) 3.4 cm

Q 5. For two triangles, if two angles and the included side of one triangle are equal to two angles and the included side of another triangle. Then the congruency rule is:

(a) SSS (b) ASA (c) SAS (d) None of the above

Q 6. In triangles ABC and DEF, $AB = FD$ and $\angle A = \angle D$. The two triangles will be congruent by SAS axiom if:

(a) $BC = EF$ (b) $AC = DE$ (c) $AC = EF$ (d) $BC = DE$

Q 7. In triangles ABC and DEF, $AB = FD$ and $\angle A = \angle D$. The two triangles will be congruent by SAS axiom if:

(a) $BC = EF$ (b) $AC = DE$ (c) $AC = EF$ (d) $BC = DE$

ANSWER KEY

1. (a)	2. (d)	3. (c)	4. (d)	5. (c)	6. (b)	7. (b)