Activity 28

Objective

To multiply a fraction by a number [say, $\frac{3}{4} \times 7$]

Material Required

Buttons (50 pieces) only.

Method of Construction

1. Take seven boxes each containing 4 balls (Fig.1).

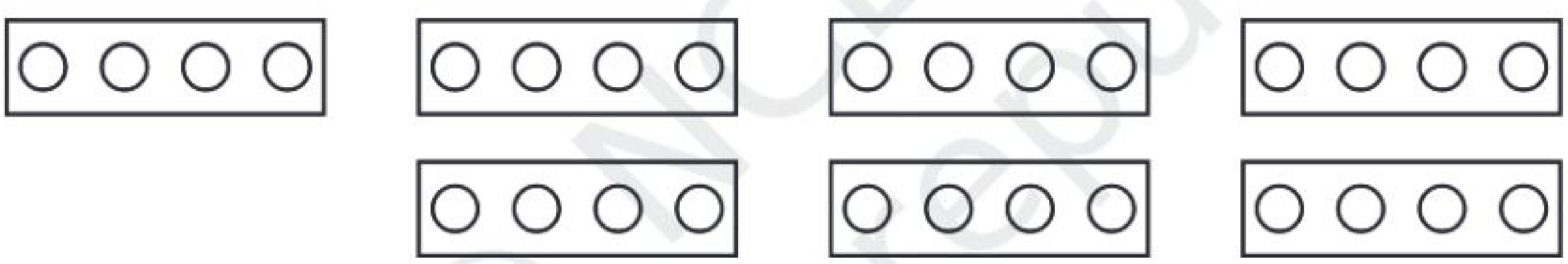


Fig. 1

2. Take out 3 balls from each box (Fig. 2).

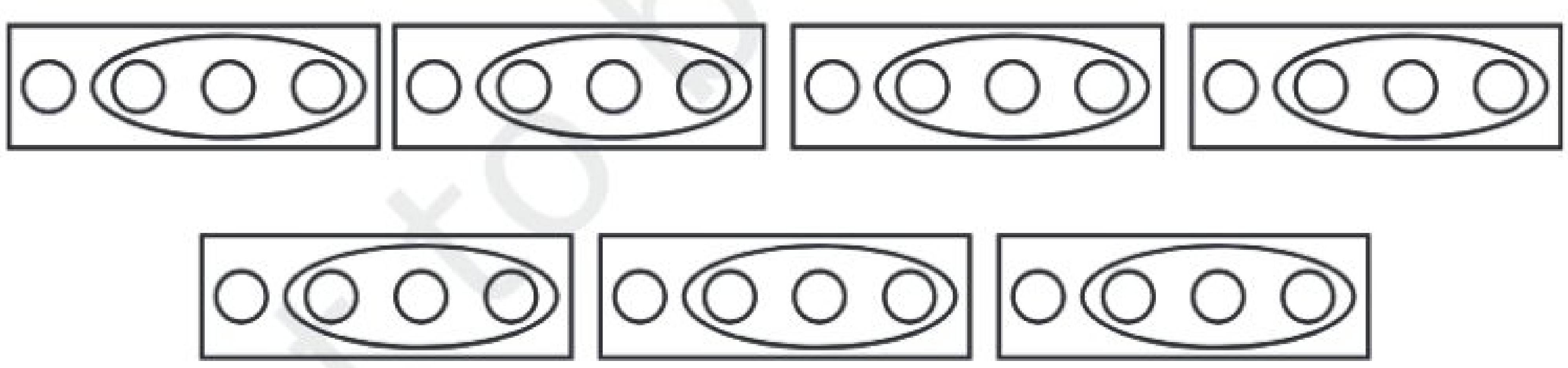


Fig. 2

Demonstration

1. In each box, the 3 balls taken out represent the fraction $\frac{3}{4}$.

2. There are 7 boxes. Thus we have $\frac{3}{4}$ taken 7 times i.e., $\frac{3}{4}$ added 7 times or $\frac{3}{4} \times 7$.

3. Total number of balls taken out from 7 boxes = 21.

   Each remaining ball represents the fraction $\frac{1}{4}$.

   So, fraction represented by 21 balls = $\underbrace{\frac{1}{4}+\frac{1}{4}+......+\frac{1}{4}}_{21 \text{times}}$.

   Thus, $\frac{3}{4} \times 7 = \frac{21}{4}$.

OBSERVATION

Number of balls in one box = __________.

Fraction representing 1 ball = __________.

Fraction representing 3 balls in a box = __________.

Total number of balls taken out from 7 boxes represents $\frac{3}{4} \times$ _____.

Fraction represented by total number of balls taken out = ______.

So, $\frac{3}{4} \times$ _____ $= \frac{\_\_}{4}$.

APPLICATION

This activity is useful in explaining multiplication of a fraction by a number.

Activity 29

Objective

To divide integers using unit squares of different colours

Materials Required

Cardboard, white paper, red and blue grid paper, colour pens/pencils (Red and Blue), adhesive, ruler, scissors.

Method of Construction

1. Take a cardboard of convenient size and paste a white paper on it.

2. Take a blue grid paper and cut out sufficient number of square pieces of unit squares. Let each square represent an integer '+1' (Fig.1).

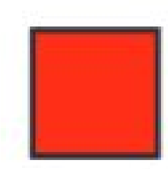


Fig. 1

3. Take a red grid paper and cut out sufficient number of square pieces of unit area. Let each square represent an integer '–1' (Fig. 2).

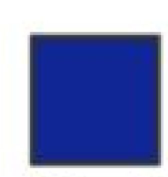


Fig. 2

4. Paste one blue unit square and one red unit square together back to back so that one side of the square is blue and the other is red.

I. Positive integer divided by a positive integer, 6 ÷ 2

1. Take 6 blue squares and arrange them in a row as shown in Fig. 3.

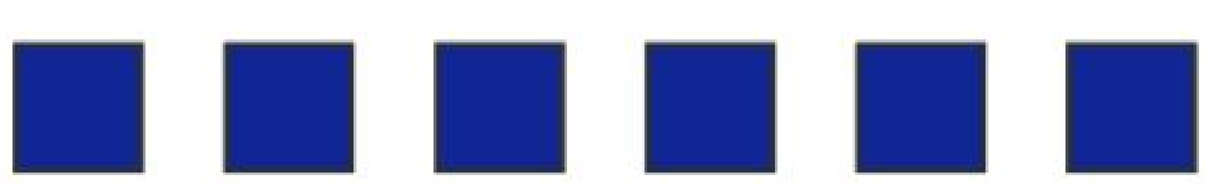


Fig. 3

2. Divide these blue squares into two groups taking one by one as shown in Fig. 4.

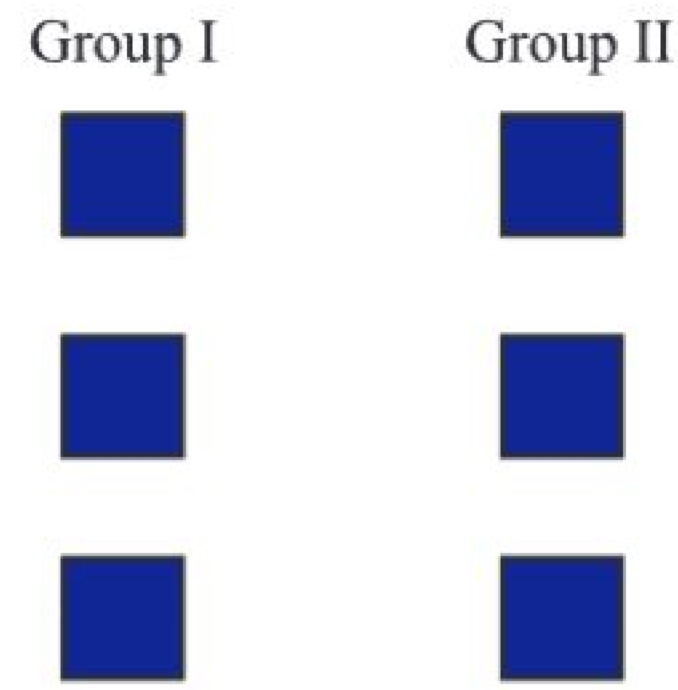


Fig. 4

3. Each group contains 3 blue squares. So, $6 \div 2 = 3$

II. (–6) ÷ 2 (negative integer divided by a positive integer)

4. Take 6 red unit squares and arrange them as shown in Fig. 5.

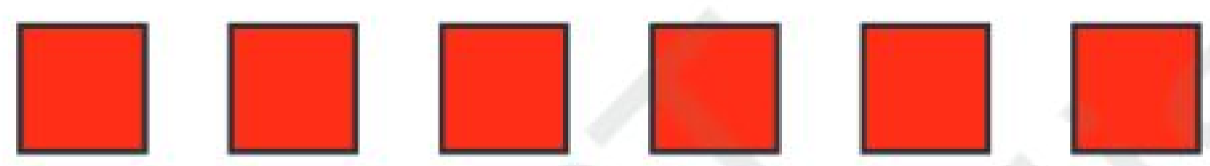


Fig. 5

5. Now divide the above red squares into two groups taking them one by one [Fig. 6].

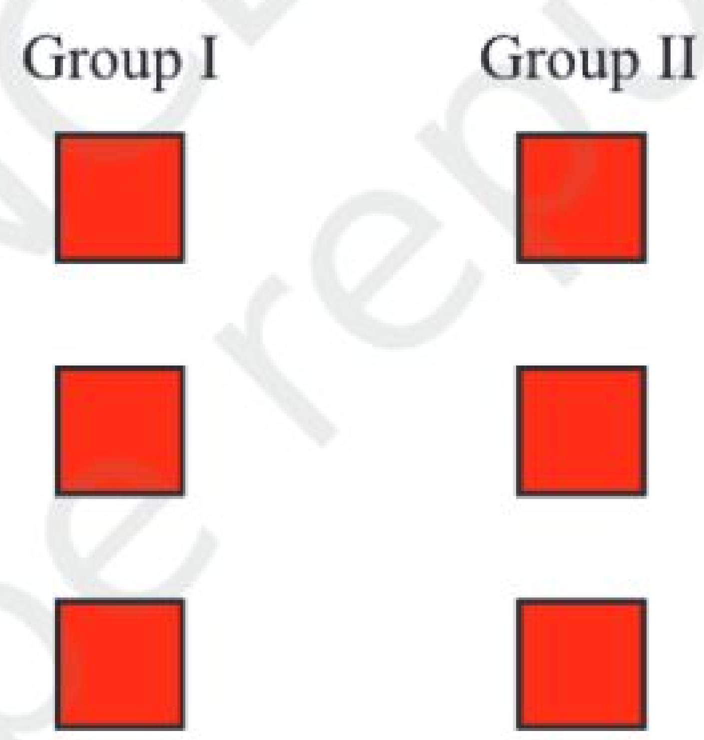


Fig. 6

6. Each group contains 3 red squares. Thus, $(-6) \div 2 = -3$.

III. 6 ÷ (–2) (positive integer divided by a negative integer)

7. Take 6 blue unit squares and arrange them in a row as shown in Fig. 7.

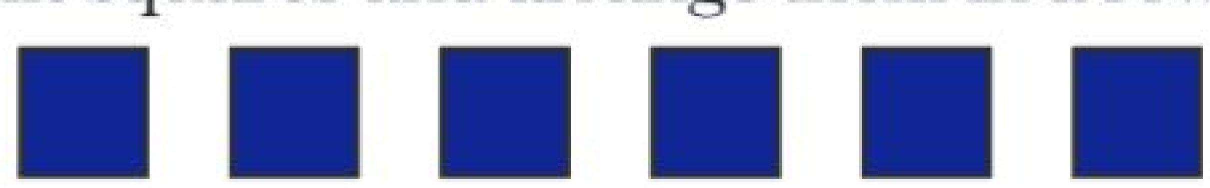


Fig. 7

8. Since we have to divide by a negative integer so invert each square of Fig. 7 once (Fig. 8).

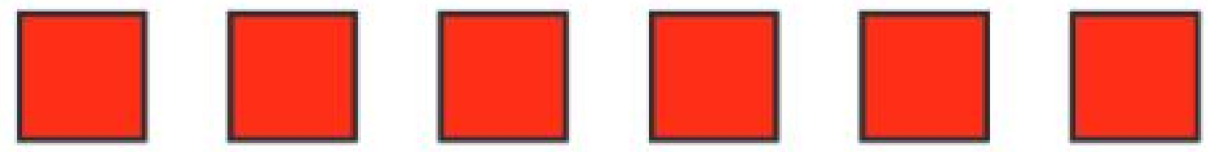


Fig. 8

9. Now divide the above red squares into two groups taking them one by one [Fig. 9].

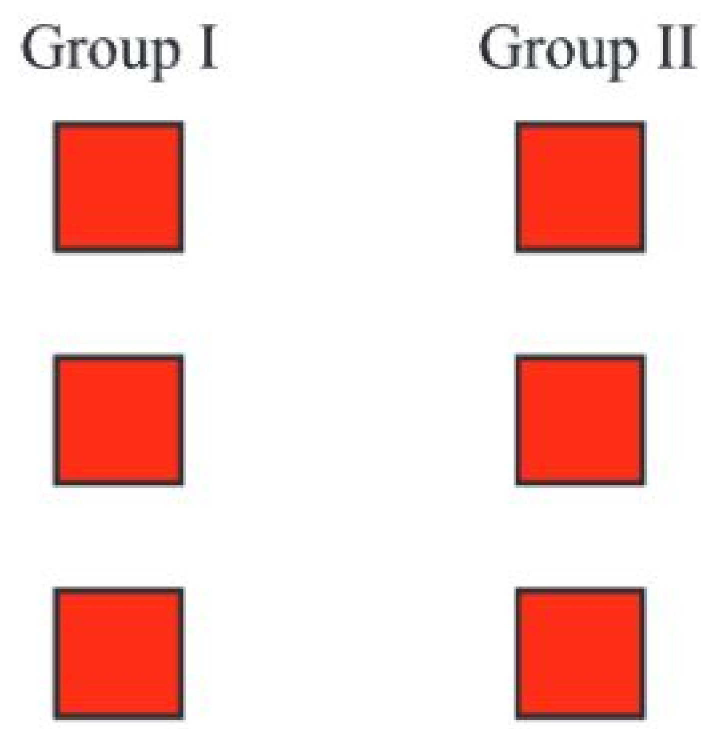


Fig. 9

10. Since each group contains 3 red unit squares so, 6 ÷ (–2) = –3.

IV. (–6) ÷ (–2) (negative integer divided by a negative integer).

11. Take 6 red unit squares and arrange them as shown in Fig. 10.

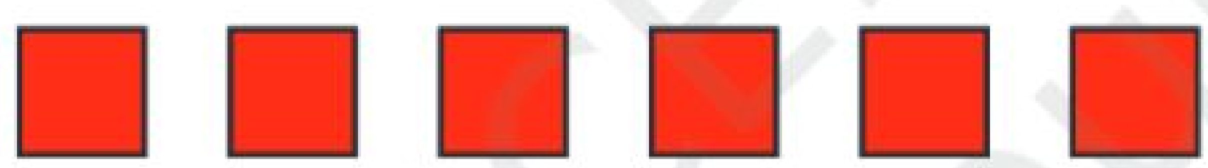


Fig. 10

12. Since we have to divide by a negative integer, so invert each square of Fig. 10 once (Fig. 11).

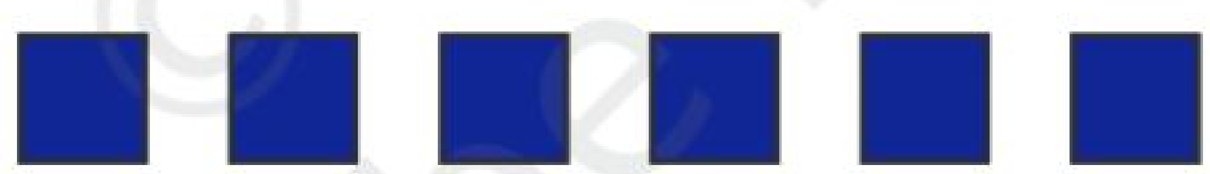


Fig. 11

13. Now divide all the squares in Fig. 11 into two groups taking them one by one [Fig. 12].

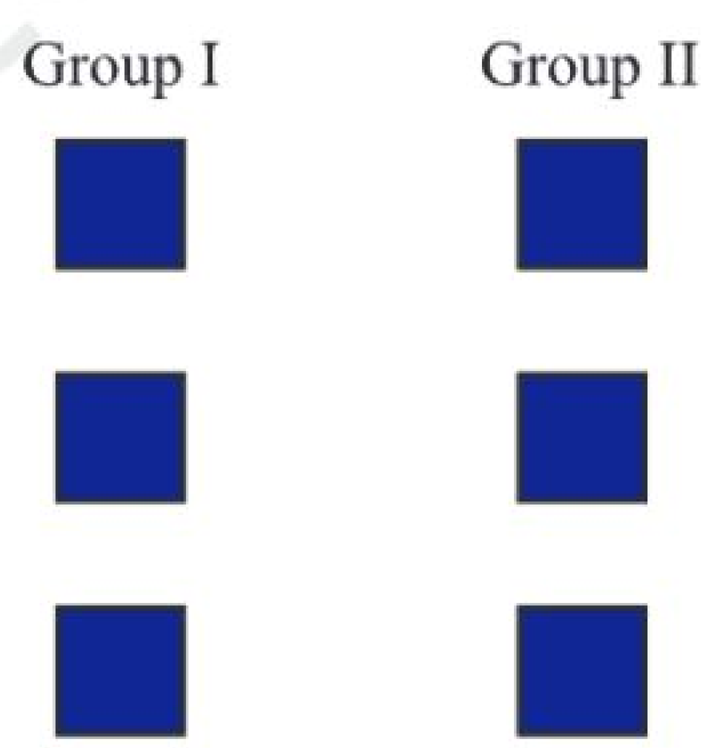


Fig. 12

14. Since each group contains 3 blue squares, so, $(-6) \div (-2) = 3$.

This activity may be performed for finding other quotients such as

$6 \div 3$, $-6 \div 3$, $6 \div (-3)$, $(-4) \div (-2)$, $-8 \div (-4)$ etc.

Observation

Fill in the blanks:

$6 \div 2$ = ___ 3___.

$-6 \div 2$ = ___ –3___.

$6 \div (-2)$ = ___ –3___.

$-6 \div (-2)$ = ______.

$8 \div 4$ = ______.

$-8 \div 4$ = ______.

$8 \div (-4)$ = ______.

$-15 \div (-3)$ = ______.

$20 \div (-4)$ = ______.

$16 \div (-2)$ = ______.

$-14 \div 2$ = ______.

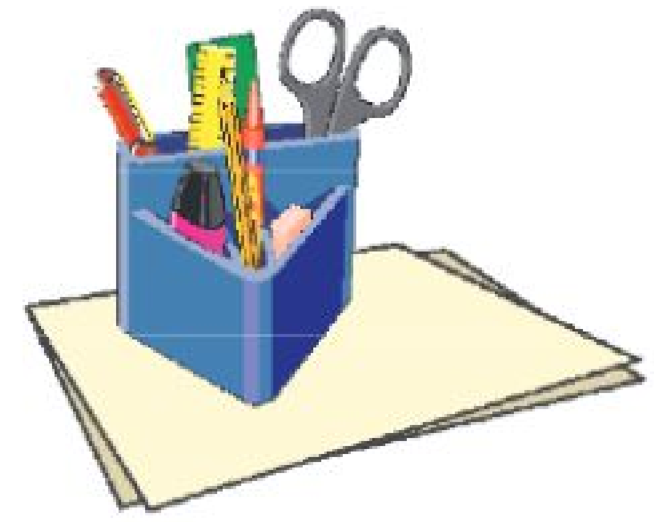
$-18 \div (-9)$ = ______.

$10 \div (-5)$ = ______.

Application

This activity is useful in explaining division of two integers with same or different signs and to understand rules of division of integers.

Activity 30



Objective

To explain SAS criterion for congruency of two triangles

Material Required

Cardboard, cutter, white paper, geometry box, pencil, sketch pens, coloured glaze papers.

Method of Construction

1. Take a cardboard of convenient size and paste a white paper on it.
2. Make a pair of triangles GHI and JKL in which GH = JK, GI = JL and $\angle G = \angle J$ on a glaze paper (Fig. 1) and make cutouts of Δ GHI and Δ JKL.
3. Paste Δ GHI on the cardboard.

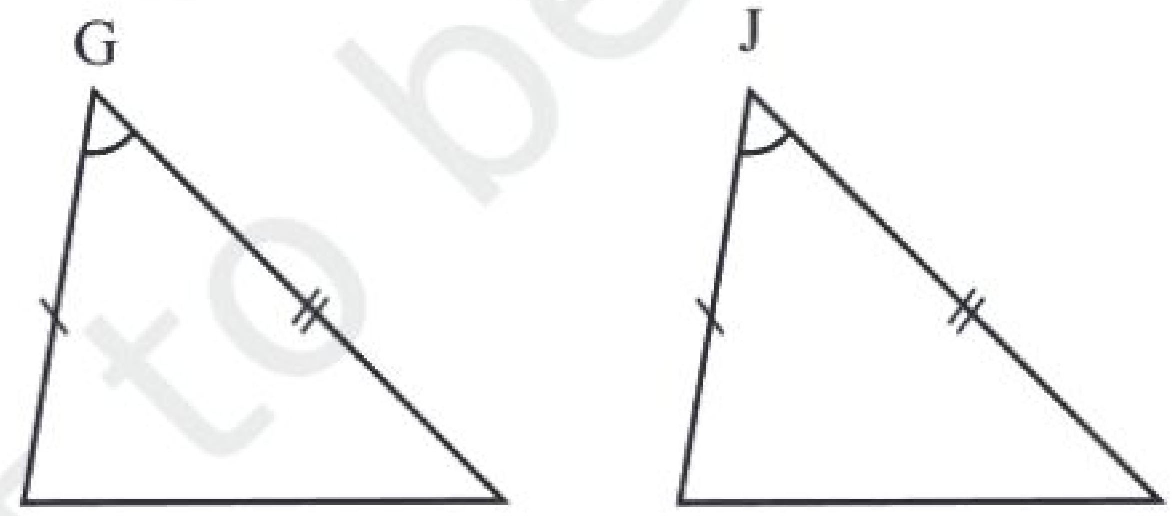


Fig. 1

Demonstration

Superpose the cut out of Δ JKL on Δ GHI and see whether it covers the triangle or not by suitable arrangement. On Δ GHI, Δ JKL covers completely only under the correspondence $G \leftrightarrow J$, $H \leftrightarrow K$, $I \leftrightarrow L$, (Fig. 2).

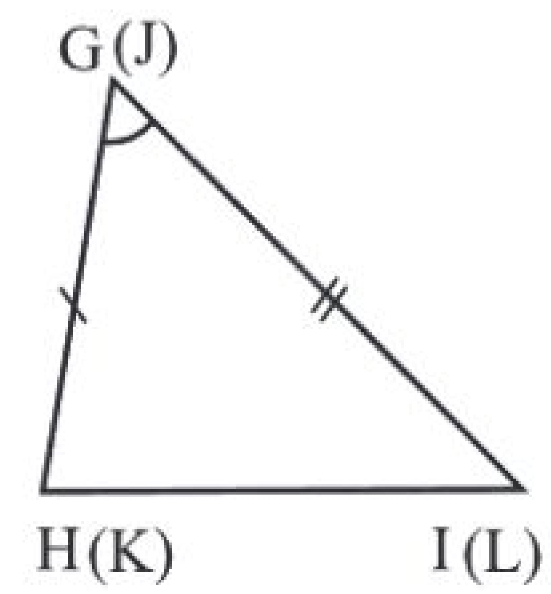


Fig. 2

So, Δ GHI ≅ Δ JKL.

This is SAS criterion for congruency of two triangles.

Observation

On actual measurement:

∠H = ________. ∠K = ________.

∠I = ________. ∠L = ________.

HI = ________. KL = ________.

∠H = ∠K

∠I = ∠ ________.

HI = ________.

So, Δ GHI ≅ ________.

Application

This SAS criterion is useful in solving various geometrical problems.