MATH ACTIVITY

STD – X

A.P

ACTIVITY

Theme

Sum of n Natural Numbers.

Objective

To verify that the sum of first n natural numbers is $\frac{n(n+1)}{2}$

Background Knowledge

1. Number system
2. Area of a square = side × side
3. Area of a rectangle = Length × Breadth

Materials Required

1. Square paper
2. White chart paper
3. Pen of different colours
4. Geometry box
5. A pair of scissors
6. Adhesive

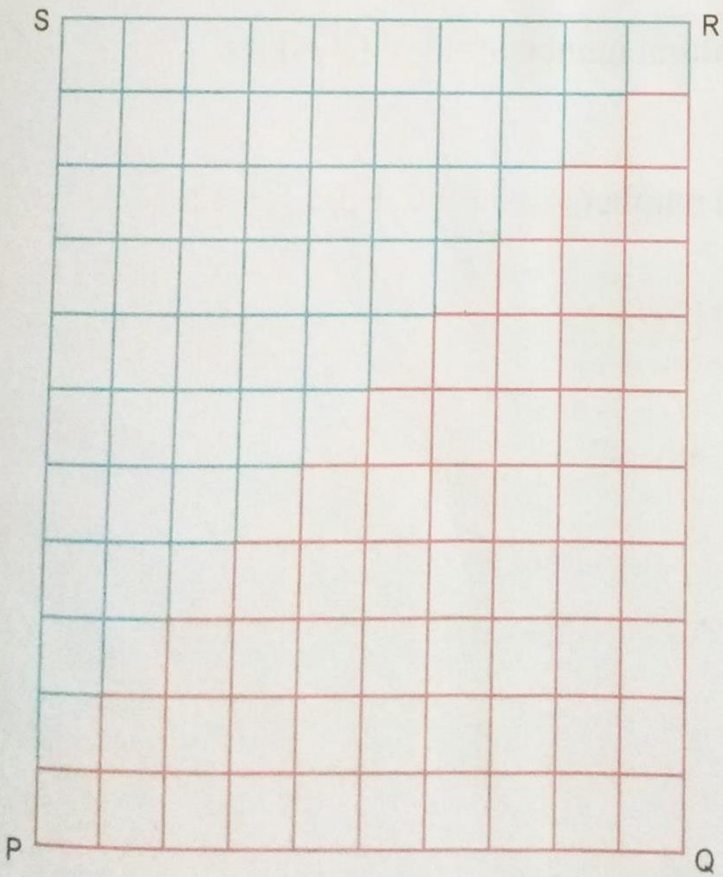
PROCEDURE

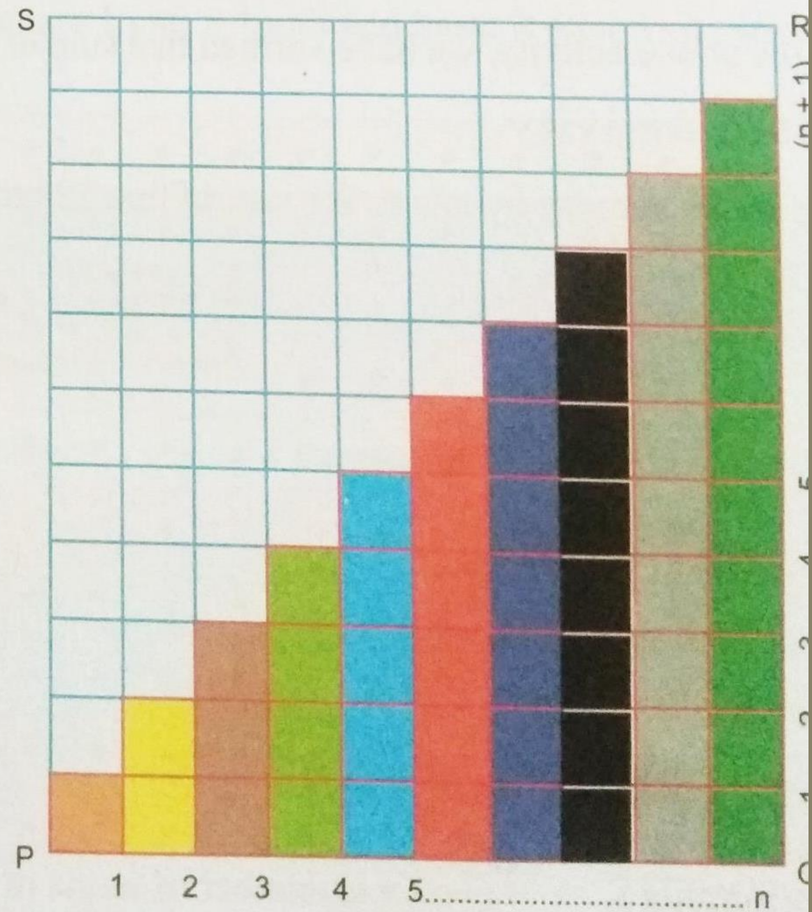
Steps to Follow

1. Let us find the sum of first '*n*' natural number.

   $1 + 2 + 3 + 4 + \dots\dots\dots + n$

2. Take a square paper and paste it on a white chart paper. Mark the vertices as A,B,C,D. (See Fig. 5





3. Draw the vertical and horizontal lines on the square paper to make a square of size 1cm × 1cm. (See Fig. 5.1)
4. Paint the rectangular strips having lengths 1 unit, 2 units, 3 units, ... upto n units each of the same width 1cm. (See Fig. 5.2)
5. Mark the rectangles as 1, 2, 3, 4, ..., n (n + 1) along the vertical line and 1, 2, 3, ..., n along horizontal line (See Fig. 5.1)

Observations

We observe that:

1. In Fig. 5.1, we observe that the area of the coloured region is one half of the area of rectangle PQRS Thus, area of coloured region

$$= \frac{1}{2} \text{ [Area of the rectangle PQRS]}$$

$$= \frac{1}{2} [n(n+1)] \text{ sq. units}$$

$$= \frac{1}{2} n(n+1) \text{ sq. units} \qquad \text{.........(i)}$$

2. We can also observe that the area of coloured region

$$= \text{Sum of the area of coloured region}$$

$$= \text{[Area of square of size } 1 \times 1] + \text{[Area of rectangle of size } 2 \times 1]$$
$$+ \text{[Area of rectangle of size } 3 \times 1] \text{....... [Area of rectangle of size } n \times 1]$$

$$= (1 \times 1) + (2 \times 1) + (3 \times 1) + \text{.........} (n+1)] \text{ sq. unit}$$

$$= [1 + 2 + 3 + \text{.........} + n] \text{ sq. unit} \qquad \text{........ (ii)}$$

From equations (i) and (ii) we get

$$[1 + 2 + 3 + 4 \text{ .... } + n] = \frac{1}{2} n(n+1).$$

Result

Through the above activity, we have verified that sum of n natural numbers $= \frac{1}{2} n(n+1)$.