

# Activity 6

## OBJECTIVE

To find the sum of first  $n$  natural numbers.

## MATERIAL REQUIRED

Cardboard, coloured papers, white paper, cutter, adhesive.

## METHOD OF CONSTRUCTION

1. Take a rectangular cardboard of a convenient size and paste a coloured paper on it. Draw a rectangle ABCD of length 11 units and breadth 10 units.
2. Divide this rectangle into unit squares as shown in Fig. 1.
3. Starting from upper left-most corner, colour one square, 2 squares and so on as shown in the figure.

## DEMONSTRATION

1. The pink colour region looks like a stair case.
2. Length of 1st stair is 1 unit, length of 2nd stair is 2 units, length of 3rd stair 3 units, and so on, length of 10th stair is 10 units.

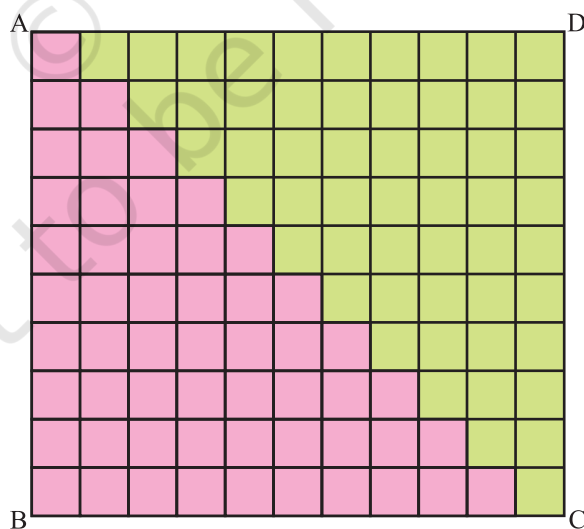


Fig. 1

3. These lengths give a pattern

1, 2, 3, 4, ..., 10,

which is an AP with first term 1 and common difference 1.

4. Sum of first ten terms

$$= 1 + 2 + 3 + \dots + 10 = 55 \quad (1)$$

Area of the shaded region  $= \frac{1}{2}$  (area of rectangle ABCD)

$= \frac{1}{2} \times 10 \times 11$ , which is same as obtained in (1) above. This shows that the

sum of the first 10 natural numbers is  $\frac{1}{2} \times 10 \times 11 = \frac{1}{2} \times 10(10+1)$ .

This can be generalised to find the sum of first  $n$  natural numbers as

$$S_n = \frac{1}{2} n(n+1) \quad (2)$$

### OBSERVATION

For  $n = 4$ ,  $S_n = \dots$

For  $n = 12$ ,  $S_n = \dots$

For  $n = 50$ ,  $S_n = \dots$

For  $n = 100$ ,  $S_n = \dots$

### APPLICATION

Result (2) may be used to find the sum of first  $n$  terms of the list of numbers:

1.  $1^2, 2^2, 3^2, \dots$

2.  $1^3, 2^3, 3^3, \dots$

to be studied in Class XI.