

Activity 7

OBJECTIVE

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

MATERIAL REQUIRED

Cardboard, thermocol balls, pins, pencil, ruler, adhesive, white paper.

METHOD OF CONSTRUCTION

1. Take a piece of cardboard of a convenient size and paste a white paper on it.
2. Draw a square of suitable size on it ($10 \text{ cm} \times 10 \text{ cm}$).
3. Divide this square into unit squares.
4. Fix a thermocol ball in each square with the help of a pin as shown in Fig. 1.
5. Enclose the balls as shown in the figure.

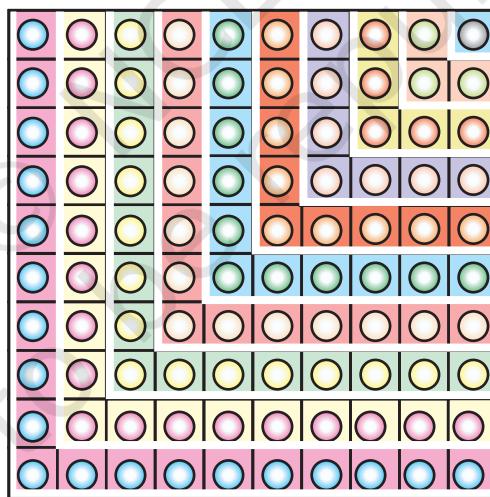


Fig. 1

DEMONSTRATION

Starting from the uppermost right corner, the number of balls in first enclosure (blue colour) = 1 ($= 1^2$),

the number of balls in first 2 enclosures = $1 + 3 = 4 (=2^2)$,
the number of balls in first 3 enclosures = $1 + 3 + 5 = 9 (=3^2)$,

the number of balls in first 10 enclosures = $1 + 3 + 5 + \dots + 19 = 100 (=10^2)$.

This gives the sum of first ten odd natural numbers. This result can be generalised for the sum of first n odd numbers as:

$$S_n = 1 + 3 + \dots + (2n - 1) = n^2 \quad (1)$$

OBSERVATION

For $n = 4$ in (1), $S_n = \dots$

For $n = 5$ in (1), $S_n = \dots$

For $n = 50$ in (1), $S_n = \dots$

For $n = 100$ in (1), $S_n = \dots$

APPLICATION

The activity is useful in determining formula for the sum of the first n odd natural numbers.