

Activity 8

OBJECTIVE

To find the sum of the first n -even natural numbers.

MATERIAL REQUIRED

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

METHOD OF CONSTRUCTION

1. Take a piece of cardboard of a convenient size and paste a white paper on it.
2. Draw a rectangle of suitable size on it ($10 \text{ cm} \times 11 \text{ cm}$).
3. Divide this rectangle into unit squares.
4. Fix a thermocol ball in each square using a pin as shown in the Fig. 1.
5. Enclose the balls as shown in the figure.

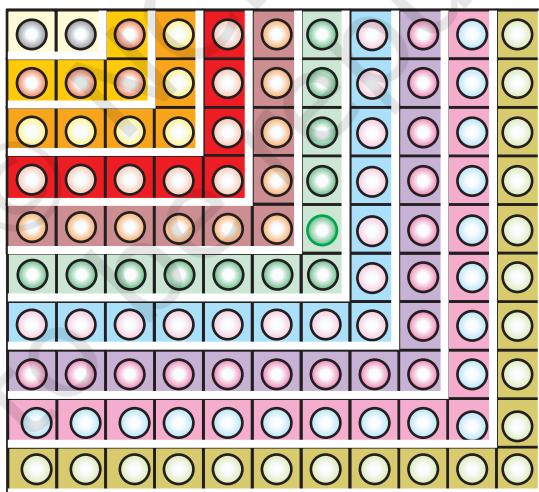


Fig. 1

DEMONSTRATION

Starting from the uppermost left corner,

the number of balls in first enclosure = 2 ($= 1 \times 2$),

the number of balls in first two enclosures = $2 + 4 = 6$ ($= 2 \times 3$),

the number of balls in first three enclosures = $2 + 4 + 6 = 12$ ($= 3 \times 4$),

⋮

the number of balls in first six enclosures = $2 + 4 + 6 + 8 + 10 + 12 = 42$ ($= 6 \times 7$)

the number of balls in first ten enclosures = $2 + 4 + 6 + 8 + \dots + 20 = 110$ ($= 10 \times 11$)

This gives the sum of first ten even natural numbers.

This result can be generalised for the sum of first n even natural numbers as

$$S_n = 2 + 4 + 6 + \dots + 2n = n \times (n + 1) \quad (1)$$

OBSERVATION

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

For $n = 7$ in (1), $S_n = \dots$

For $n = 40$ in (1), $S_n = \dots$

For $n = 70$ in (1), $S_n = \dots$

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

APPLICATION

The formula $S_n = n(n+1)$ is useful in finding out the sum of the first n even numbers.