

IV. WHAT IS THE SUM OF 2, 5, 8, ..., 38?

01) Total: $2 + 5 + 8 + \dots + 38 = ?$

☺ Just add: $2 + 5 + 8 + 11 + 14 + 17 + 20 + 23 + 26 + 29 + 32 + 35 + 38 = 260!$

02) Any other way? ☺ *Think Laterally!* ☺

We know, total is same, if average replaces numbers.

Numbers	2	5	8	11	38
Using average	20	20	20	20	20

$$\text{Total} = 20 \times 13 = 260 \quad \text{☺☺☺}$$

❖

$\text{Total} = \text{Average} \times \text{Number of items}$

$$\begin{aligned} \text{Total} &= \text{Half of end numbers} \quad \times \text{Number of numbers} \\ &= \text{Middle number} \quad \times \text{Number of numbers} \\ &= \text{Half of symm placed numbers} \times \text{Number of numbers} \end{aligned}$$

NATURAL NUMBERS

03) What is the sum of the first 9 natural numbers?

$$1 + 2 + 3 + 4 + \dots + 9 = ?$$

☺ Total = $9 \times 5 = 45$

We can say this in different ways:

- ❖ Total = last no. \times ave.
- = last no. \times half of next no.
- = half of last no. \times next number
- = half (last no. \times next no.)

GENERALISE

Take a seq. of n terms, with first term a , last term l , average m and sum S_n .

❖ $S_n = n m$

❖ $S_n = n \times \frac{a+l}{2} = \frac{n}{2}(a+l)$

If you take the first n natural numbers, $1 + 2 + 3 + \dots + n$

❖ $S_n = n \times \frac{n+1}{2} = \frac{n \times (n+1)}{2} \qquad 9 \times \frac{9+1}{2} = \frac{9}{2} \times (9+1) = \frac{9 \times (9+1)}{2} = 45$

04) What is the total of 1, 2, 3, to 21?

☺ $21 \times 11 = 231$

05) What is the total of 1, 2, 3, to 22?

☺ $11 \times 23 = 253$

06) What is the total of 21, 22, 23, to 35?

☺ $15 \times 28 = 280 + 140 = 42$