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ARITHMETIC PROGRESSION

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ARITHMETIC PROGRESSION (AP): Sequence in which each term is obtained by adding a fixed number to the previous term.

Eg: 1st term $a_1 = 2$

let fixed number we add = 3.

$\therefore$ $2 \xrightarrow{+3} 5 \xrightarrow{+3} 8 \xrightarrow{+3} 11 \xrightarrow{+3} 14 \cdots$ = A.P

$a_1 = 2$, $a_2 = 5$, $a_3 = 8$, $a_4 = 11$, $a_5 = 14 \cdots a_n$.

Fixed term = Common Difference (d) = (next - before).

$d = a_2 - a_1 = a_3 - a_2 = a_4 - a_3 \cdots = a_n - a_{n-1}$

In A.P, all common difference (d) are equal.

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general form of AP:

$a, a+d, a+2d, a+3d \cdots a+nd$.

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n^{th} TERM OF AP:

$a_1 = a$

$a_2 = a+d = a+(2-1)d$

$a_3 = a+2d = a+(3-1)d$

$a_4 = a+3d = a+(4-1)d$

$\vdots$

$a_{10} = a+9d = a+(10-1)d$

$\downarrow$

$\boxed{a_n = a+(n-1)d}$

$\boxed{n^{th} \text{ term of AP} = a_n + a+(n-1)d}$

Find 101^{st} term of A.P. 2, 5, 8, 11, 14 .....

$$a_n = a + (n-1)d$$

$$a_{101} = a + (101-1)d$$

$$= 2 + (100)\,3 \qquad (a_1 = 2\,;\ d = 3)$$

$$= 2 + 300$$

$$a_{101} = 302$$

Middle Term:

Odd Number:

$$\left(\frac{n+1}{2}\right)^{th}$$

Even Number:

$$\left(\frac{n}{2}\right)^{th},\ \left(\frac{n}{2}+1\right)^{th}.$$

Sum of first n terms of an AP:

$$S_n = \frac{n}{2}\,[2a + (n-1)d] \quad // \quad S_n = \frac{n}{2}\,[a + a_n]$$