

Arithmetic Series



Sum of Arithmetic Sequence

$$S_n = \frac{n}{2}(a_1 + a_n)$$



Find the sum of the sequence
5, 8, 11, 14, 17, 20.

$$n = 6$$
$$a_1 = 5$$

$$a_n = 20$$



$$S_n = \frac{n}{2} (a_1 + a_n)$$

$$S_6 = \frac{6}{2} (5 + 20)$$

$$S_6 = 3 \cdot 25$$

$$S_6 = 75$$



Find the sum of the first seven terms of
4, 10, 16, ...

$$n = 7 \quad a_1 = 4$$

$$a_7 = ?$$

to find a_7

$$a_n = a_1 + (n-1)d$$

$$a_7 = 4 + (7-1)6$$

$$a_7 = 4 + 36$$

$$a_7 = 40$$

$$S_7 = \left(\frac{7}{2}\right)(4 + 40)$$

$$\boxed{S_7 = 154}$$

Find the S_{10} of 6, 18, 30, ...

$$\begin{aligned}n &= 10 \\ a_1 &= 6 \\ a_{10} &= ?\end{aligned}$$

$$a_{10} = 6 + (10-1)(12)$$

$$a_{10} = 114$$


$$S_{10} = \frac{10}{2} (6 + 114)$$

$$\boxed{S_{10} = 600}$$



Evaluate: $\sum_{n=1}^{10} 2n$

explicit formula for finding the terms in the sequence



index \rightarrow
(term numbers)

$$S_n = \frac{n}{2} (a_1 + a_n)$$

$$a_1 = 2(1) = 2$$

$$a_{10} = 2(10) = 20$$

$$\begin{aligned} n &= 10 \\ a_1 &= 2 \\ a_{10} &= 20 \\ &= \frac{10}{2} (2 + 20) \\ &= 110 \end{aligned}$$

Evaluate: $\sum_{n=1}^{15} 3n - 1$

$$S_n = \frac{n}{2} (a_1 + a_n)$$


$$n = 15$$

$$a_1 = 2$$

$$a_{15} = 44$$

$$S_n = \frac{15}{2} (2 + 44)$$

$$S_n = 345$$


$$a_1 = 3(1) - 1 = 2$$
$$a_{15} = 3(15) - 1 = 44$$