

Arithmetic Series (A) $S_n = \frac{n}{2} (2a + (n-1)d)$

An arithmetic sequence starts with 5 and has common difference 7.
The last term is 82. Find the sum of the sequence.

$$\begin{aligned}a &= 5, \quad d = 7 & S_{12} &= \frac{12}{2} (10 + (12-1)(7)) \\u_n &= 5 + (n-1)(7) & &= 6(10 + 77) \\82 &= 5 + 7n - 7 & &= 6(87) \\82 &= 7n - 2 & &= 522 \\84 &= 7n \\n &= 12\end{aligned}$$

The n th term of a sequence is $2n + 3$. Find the sum of the first 16 terms.

$$\begin{aligned}a &= 5, \quad d = 2 \\S_{16} &= \frac{16}{2} (10 + (16-1)(2)) \\&= 8(10 + (15)(2)) \\&= 8(40) \\&= 320\end{aligned}$$

Find the sum of the first 12 terms of the sequence 7, 15, 23, 31, ...

$$\begin{aligned}a &= 7, \quad d = 8 \\S_{12} &= \frac{12}{2} (14 + (12-1)(8)) \\&= 6(14 + 88) \\&= 6(102) \\&= 612\end{aligned}$$