Arithmetic Series

Let's figure out the formula to find the sum of a finite series.

$2 + 4 + 6 + 8$ (+2, +2, +2)

2, 4, ... 165

$2 + 4 + 6 + 8 + 10 + 12$ (+2, +2, +2, +2, +2)

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

$2 + 6 + 10 + 14 + 18 + 22 + 26 + 30$ (+4, +4, +4, +4, +4, +4, +4)

Sum of Arithmetic Sequence

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

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

$n = 6$

$a_1 = 5$

$a_6 = 20$

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

$S_6 = 75$

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

+6 +6

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

$a_7 = 40$

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

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

$S_7 = 154$

Find the sum of the first 30 multiples of 3.

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

$a_{30} = 3 + (30-1)3$

$a_{30} = 90$

$S_{30} = \frac{30}{2}(3+90)$

Find the sum of the multiples of 6 from 24 to 120 inclusive.

$$S_{17} = \frac{17}{2}(24 + 120)$$

$$S_{17} = 1,224$$

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

total # of terms: 10

explicit eq. for arithmetic seq.

index → $n=1$

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

$S_{10} = \frac{10}{2}(2 + 20)$

$S_{10} = 110$

$a_1 = 2(1) = 2$

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

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

$a_1 = 3(1)-1 = 2$

$a_n = 3(15)-1 = 44$

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

$S_{15} = 345$