Arithetic Series:

Sequence of numbers such that the difference between consective terms is a constant.

example:

$1, 3, 5, 7, 9, \ldots, a_n$

n^{th} term, 1^{st} term, difference between consective terms

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

$$a_n = a_m + (n-m)k$$

Sum:

$$1 + 3 + 5 + 7 + 9 = S_n$$
$$9 + 7 + 5 + 3 + 1 = S_n$$
$$\underbrace{10 + 10 + 10 + 10 + 10}_{5(1+9)} = 2S_n$$

$$S_n = \sum_{i=1}^{n} a_1 + (i-1)k = \frac{n(a_1 + a_n)}{2}$$

index of counting

examples:

Determine the 10^{th} term of the sequence and its sum.

Q: $1, 3, 5, 7, \ldots$

A: $k = 7-5 = 2$, $a_{10} = a_1 + (n-1)k = 1 + (10-1)2 = 19$, $S_n = \frac{n(a_1 + a_n)}{2} = \frac{(10)(1+19)}{2} = 100$

Q: $-16, -12, -8, -4, 0, 4, \ldots$

A: $k = (-12)-(-16) = 4$, $a_{10} = a_1 + (n-1)k = -16 + (10-1)4 = 20$, $S_n = \frac{n(a_1 + a_n)}{2} = \frac{(10)(-16+20)}{2} = 20$