6.4 - Arithmetic Series

Arithmetic Sequence: 2, 5, 8, 11, 14, ...

Arithmetic Series: 2 + 5 + 8 + 11 + 14 + ...

An arithmetic series is the SUM of the terms in an arithmetic sequence.
S_n represents the sum of the first n terms

eg. For 2 + 5 + 8 + 11 + ...

S_2 = S_3 =

Johann Carl Friedrich Gauss
German mathematician

Development of the Arithmetic Series Formula:

Gauss added the numbers from 1 to 100 by:

1 + 2 + 3 + ... + 99 + 100
100 + 99 + 98 + ... + 2 + 1

Each sum would =
There would be sums all together... but this is of the series added together so the sum is what it should be.

$$S_{100} = \frac{}{2}$$
$$=$$

Try it out! Nice party trick :)

In general, an arithmetic sequence is: a, a + d, a + 2d, + ... + , t_n - d, t_n

So, in general, the sum of an arithmetic sequence is:

a + (a + d) + (a + 2d) + ... + (t_n - d) + t_n
t_n + t_n - d

Arithmetic Series Formulas

Any term in an arithmetic sequence/series , t_n can be found using:

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

Any sum in an arithmetic series, S_n can be found using:

$$S_n = \frac{n(a + t_n)}{2} \quad \text{or} \quad S_n = \frac{n}{2}[2a + (n-1)d]$$

Ex. 1 Find the indicated sum for each series.

a) $4 + 6 + 8 + 10 + \ldots \; S_{42}$

b) $5 - 3 - 11 - 19 - \ldots, S_{17}$

Ex. 2 Find the sum of the series.

a) $2 + 5 + 8 + 11 + \ldots + 254$

b) $5 + 3 + 1 - 1 - \ldots - 401$

Ex. 3 Find the sum of the first 42 terms of an arithmetic series with $t_1 = 7$ and $t_{42} = 212$.