

## Arithmetic Series

Arithmetic Series: is the indicated sum of the terms of an arithmetic sequence.

Formulas of an Arithmetic Series:

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

\* use when given  $a_1$  &  $a_n$

$$S_n = \frac{n}{2}[2a_1 + (n-1)d]$$

\* Use when you have no  $a_n$

Arithmetic Means:

$$d = \frac{\text{last term} - \text{first term}}{\text{difference of } n\text{'s}}$$

1) Write an arithmetic sequence with 4 arithmetic means between 4.3 and 12.8.

$$\overset{n=1}{4.3}, \quad \text{---}, \quad \text{---}, \quad \text{---}, \quad \text{---}, \quad \overset{n=6}{12.8}$$

$$d = \frac{12.8 - 4.3}{6 - 1} = \frac{8.5}{5} = 1.7$$

$$\boxed{4.3, 6, 7.7, 9.4, 11.1, 12.8}$$

2) find the 28<sup>th</sup> partial sum  $27 + 14 + 1 + \dots$   $n=28, a_1=27, d=-13$

$$S_n = \frac{n}{2}[2a_1 + (n-1)d]$$

$$S_{28} = \frac{28}{2}[2(27) + (28-1)(-13)]$$

$$S_{28} = 14(54 - 351)$$

$$\boxed{S_{28} = -4158}$$

Evaluate the series to the given term.

3)  $1+5+9+\dots+77$  \* Find  $n$  first

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

$$a_n = 1 + (n-1)4$$

$$77 = 1 + (n-1)4$$

$$77 = 1 + 4n - 4$$

$$77 = 4n - 3$$

$$80 = 4n$$

$$20 = n$$

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

$$S_{20} = \frac{20}{2} (1 + 77)$$

$$S_{20} = 780$$

4)  $-5 + 2 + 9 + \dots + 317$

Sigma Notation:

$\sum$  ← sigma symbol ⇒ means you find the sum

\* Find  $a_1$  &  $a_n$  (first & last) terms first \*

5)  $\sum_{n=6}^{10} (5n-17)$   $n=10-6+1=5$

6)  $\sum_{n=1}^{30} (2n-1)$

$$a_1 = 5(6) - 17$$

$$a_1 = 13$$

$$a_n = 5(10) - 17$$

$$a_n = 33$$

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

$$S_5 = \frac{5}{2} (13 + 33)$$

$$S_5 = 115$$

P.605:  
28-32,  
39-44,  
46-53