

12.2- Arithmetic Sequences and Series

Arithmetic Sequence- a sequence in which the difference between consecutive terms is a constant (common difference-d)

Examples:

3, 9, 15, 21, 27

$$21 - 15 = d$$

$$9 - 3 = d$$

$$27 - 21 = d$$

$$d = 6$$

4, 2, 0, -2, -4, -6,

$$-4 - (-2) = d$$

$$d = -2$$

a_1

$$a_2 = a_1 + d$$

$$a_3 = a_2 + d = (a_1 + d) + d = a_1 + 2d$$

$$a_4 = a_3 + d = (a_1 + 2d) + d = a_1 + 3d$$

$$a_5 = a_1 + 4d$$

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

arithmetic
sequence

Examples:

Write a rule (equation) for the n th term of the arithmetic sequence, then find a_{20} .

1) $3, 9, 15, 21, 27, \dots$

$$a_n = 3 + (n-1)6$$

$$a_n = 3 + 6n - 6$$

$$\boxed{a_n = 6n - 3}$$

$$a_{20} = 6(20) - 3$$

$$120 - 3$$

$$a_{20} = 117$$

2) $17, 14, 11, 8, \dots$

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

$$a_n = 17 + (n-1)(-3)$$

$$= 17 - 3n + 3$$

$$\boxed{a_n = 20 - 3n}$$

$$a_{20} = 20 - 3(20)$$

$$20 - 60$$

$$\boxed{-40}$$

$$3. a_{11} = -57, d = -7$$

$$a_{11} = a_1 + (11-1)d$$

$$-57 = a_1 + 10(-7)$$

$$-57 = a_1 - 70$$

$$a_1 = 13$$

$$a_n = 13 + (n-1)(-7)$$

$$13 - 7n + 7$$

$$a_n = 20 - 7n$$

$$4. a_7 = 26, a_{16} = 71$$

Arithmetic Series

Example:

$$3 + 9 + 15 + 21 + 27 + 33 = S_6$$

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

Example:

Find the sum: $\sum_{i=1}^{12} 2 + 7i$

Find S_{15} . 2, 6, 10, 14, ...