9.2 Arithmetic Sequence

▼ Definition of an Arithmetic Sequence

When the difference between successive terms of a sequence is constant, the sequence is called arithmetic. The constant is called the common difference.

▼ Examples: Is the sequence arithmetic? If so, find the 1st term & the common difference

▼ Example 1: $\{4, 6, 8, 10, ...\}$

▼ Example 2: $\{3, 6, 12, 24, ...\}$

▼ Example 3: $\{s_n\} = \{3n + 5\}$

▼ Example 4: $\{t_n\} = \{4 - n\}$

▼ Example 5: $\{a_n\} = \{2^n\}$

▼ Example 6: $b_1 = 1; b_n = nb_{n-1}$

▼ Example 7: $c_1 = 8; c_n = c_{n-1} + 3$

▼ Formula for the nth term of an arithmetic sequence

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

a_1 is the first term in the sequence

d is the common difference

▼ Examples: Write the nth term of the arithmetic sequence.

Is the sequence arithmetic? If so, find the first term and the common difference and write the nth term of the arithmetic sequence

▼ Example 1:

$\{4, 6, 8, 10, ...\}$

▼ Example 2:

$\{7, 1, -5, -11, ...\}$

▼ Example: Find the 23rd term of the arithmetic sequence

$\{8, 11, 14, 17, ...\}$

▼ Formula for the recursive definition of an arithmetic sequence

$$a_1 = a; a_n = a_{n-1} + d$$

a is the first term

d is the common difference

▼ Examples: Write the recursive definition of the arithmetic sequence

Is the sequence arithmetic? If so, find the first term and the common difference and write the recursive definition of the sequence

▼ Example 1:

$\{4, 6, 8, 10, ...\}$

▼ Example 2:

$\{7, 1, -5, -11, ...\}$

▼ Example 3: Find the first term and the common difference of the arithmetic sequence described. Give the nth term definition and a recursive definition for the arithmetic sequence.

The 6th term is 5 and the 22nd term is 37.

▼ Formula for sum of an arithmetic sequence

$$\sum_{i=1}^{n} a_i = \frac{n}{2}\left(a_1 + a_n\right)$$

▼ Examples: Find the sum of the arithmetic sequence

Find the sum of the first n terms of the arithmetic sequence

▼ Ex 1: $\{a_n\} = \{4n - 3\}$

▼ Ex 2: $\{a_n\} = \{6, 13, 20, 27, ...\}$

▼ Example 3:

A quilt is designed in the shape of an equilateral triangle, 5 inches on each side. Each section of the quilt is in the shape of an equilateral triangle, 1 inch on a side. The sections are to alternate in color as show in the picture. How many dark green sections will be required? How many light green sections will be required?