9-2 Notes Arithmetic Sequences Name _____
Pre-Calculus

I. Evaluating Arithmetic Sequences

When any two numbers in a sequence differ by a constant value, the sequence is identified as an **Arithmetic Sequence**.

An arithmetic sequence may be defined recursively as: $a_1 = a$, $a_n - a_{n-1} = d$

For an arithmetic sequence $\{a_n\}$ whose first term is a_1 and common difference is d, the nth term is determined by the formula: $a_n = a_{n-1} + d$

Determine if the sequence is arithmetic, what is the common difference?

1. 4, 6, 8, 10, …

2. $\{s_n\} = \{3n + 5\}$

3. $\{t_n\} = \{4 - n\}$

For an arithmetic sequence $\{a_n\}$ whose first term is a_1 and common difference is d, the nth term is determined by the formula: $a_n = a_1 + (n - 1)d$

4. Find the forty-first term of the arithmetic sequence: 2, 6, 10, 14, 18, …

5. The 8^{th} term of an arithmetic sequence is 75, and the 20^{th} term is 39.

   a. Find the first term and the common difference.

   b. Give a recursive formula for the sequence.

   c. What is the nth term of the sequence?

II. Finding the Sum of an Arithmetic Sequence

The sum of the first n terms of an arithmetic sequence is known as a **Partial Sum of an Arithmetic Sequence**. Let $\{a_n\}$ be an arithmetic sequence with first term a_1 and common difference of d. The sum S_n of the first n terms of $\{a_n\}$ may be found in two ways:

$$S_n = a_1 + a_2 + a_3 + \ldots + a_n = \sum_{k=1}^{n} [a_1 + (k-1)d]$$

OR

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

1. Find the sum S_n of the first n terms of the sequence: $\{a_n\} = \{3n + 5\}$

2. Find the sum: 60 + 64 + 68 + 72 + … + 120