Math 3 **1.4 Arithmetic Sequences and Series** Unit 1 Day 4

**Sequence of Numbers:**

Each term in a sequence can be referred to by its place in the sequence. For example, first term, third term, nth term. The rule used to generate a sequence is often described by referring to the nth term.

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| **Example:** | **Term Numbers** | **The nth term is:** |
| 3, 6, 9, 12, … | The 4th term is: | *3n* so the 8th term is: |
| 2, 8, 18, 32, … | The 2nd term is: | *2n2* so the 4th term is: |

A sequence can develop in four ways:

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| **Divergent** | tutserterim63 |  |
| **Convergent** | tutserterim64 |  |
| **Periodic** | tutserterim65 |  |
| **Oscillating** | tutserterim66 |  |

**Arithmetic Sequences:** Sequences of numbers that follow a pattern of adding a fixed number from one term to the next. It is a sequence with a general term.

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| **Arithmetic Sequences**an= a1 + (n-1)dan = nth term d = common difference n = term number |

**Example 1:** Find the next four terms in the following arithmetic sequences:

1. 2, 6, 10, 14, 18, 22, …
2. -5, -3, -1, 1, 3, …
3. 1, 4, 7, 10, 13, 16, …

**Example 2:**  Write the general rule (equation) of the nth term for the three examples above.

1. 2, 6, 10, 14, 18, 22, …
2. -5, -3, -1, 1, 3, …
3. 1, 4, 7, 10, 13, 16, …

**Series:** **Example:** 3 + 6 + 9 + 12 + 15

**Arithmetic Series:** The sum of an arithmetic sequence.

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| **Arithmetic Series (Sum of Series)** $S\_{n}=\frac{n}{2}(a\_{1}+a\_{n})$n = # of terms in sequence |

**Example 3:** Find the sum of the following sequence. 3 + 7 + 11 + 15 + … + 35

**Example 4:** Find the sum of the following sequence. -2 + 1 + 4 + 7 + … + 25

**Application:** Suppose that you play black jack at Harrah’s on June 1 and lost $1000. Tomorrow you bet and lose $15 less. Each day, you lose $15 less than your previous loss. What will your total losses be for the 30 days of June?

**Exercises:** Find the sums.

1. 5 + 10 + 15 +.... + 500
2. 3 + 6 + 9 + .... + 99
3. -5 + -15 + -25 + -35 + ... + -95
4. What is the sum of the numbers 1 to 100?
5. Find the sum of the first 27 terms of the series that starts 7 + 3 – 1 – 5