# Mathematics 11U 7.1 – Arithmetic Sequences

First, some terminology:

## Sequence:

- an ordered list of numbers
- ex: -4, 1, 4, 9, 10, 12, 100

## Term:

- a number in a sequence
- subscripts are used to identify the position of the term
- $t_2 = 1 \qquad t_6 = 12$

## Arithmetic Sequence:

- a sequence that has the same difference between consecutive terms, known as the common difference, or d
- ex: 4,9,14,19,24…
- ex: 10, 4, -2, -8 …

## Geometric Sequence:

- a sequence that has the same ratio between consecutive terms, known as the common ratio, or r
- ex: 4,8,16,32,64…

- ex: 10, 4, $\frac{8}{5}$, $\frac{16}{25}$…

## Recursive Sequence:

- a sequence for which one or more terms is given and each successive term is determined from the previous terms(s)
- ex: 1, 1, 2, 3, 5, 8, 13, 21, 34,

## General Term:

- a formula, labeled $t_n$, that expresses each term of the sequence as a function of its position.
- ex: If $t_n = 2n + 1$, then $t_{12} = 2(12) + 1 = 25$.

The formula: (known as the General Term formula):

## Example 1

Determine if the following sequence is arithmetic. If it is, state the General Term, then find the 40th term in the sequence.

3, 12, 21, 30, …

## Example 2

The $7^{th}$ term in an arithmetic sequence is 53 and the $11^{th}$ is 97. Find the common difference, the first term, the General Term, then the $18^{th}$ term.

## Example 3

How many terms in the finite arithmetic sequence?

18, 11, 4, -3, …, -129

# Mathematics 11U 7.2 – Geometric Sequences

## Geometric Sequence:

- a sequence that has the same ratio between consecutive terms, known as the common ratio, or r
- ex: 2, 6, 18, 54

## General Term:

- a formula, labeled $t_n$, that expresses each term of the sequence as a function of its position.

The formula: (known as the General Term formula):

## Example 1

Determine if the following sequence is geometric. If it is, state the General Term, then find the $9^{th}$ term in the sequence.

$\frac{-1}{8}, \frac{1}{2}, 2\ldots$

## Example 2

How many terms in the sequence:

52612659, 17537553, …, 11

# Mathematics 11U 7.5 – Arithmetic Series

## Series:

- the sum of the terms of a sequence
- Add up this sequence WITHOUT using a calculator

$$3 + 7 + 11 + 15 + 19 + 23 + 27$$

## Arithmetic Series Formula:

## Example 1

Find $S_{22}$ of the sequence 32, 25, 18, ….

## Example 2

Find the sum of the arithmetic series:

8 + 11 + 14 + … + 2129

# Mathematics 11U 7.6 – Geometric Series

This time, we have two formulas:

Example 1

Find $S_{12}$ of the sequence 12, 24, 48, ….

## Example 2

Calculate the sum of the geometric series:

3 - 15 + 75 - … - 234375