

Objective: To determine whether a sequence is arithmetic, geometric, or neither and to supply missing terms of a sequence.

ESLRs: at the end of this document.

Definition: A **sequence** is an ordered set of numbers.

A **sequence** can be defined as a function whose domain (x-values) consists of consecutive positive integers.

These numbers are called the "**term number**" of the sequence, where the corresponding value (the range or y-value) is called the "**term**" of the sequence.

A sequence is **finite** if it has a limited number of terms and **infinite** if it does not.

Here is an example of a sequence:

Term Number: 1, 2, 3, 4, 5, 6, ...

Actual Term: 3, 5, 7, 9, 11, 13, ...

The Notation ... indicates an infinite sequence.

Definition: A sequence in which a constant d can be added to each term to get the next term is called an **arithmetic sequence**, or arithmetic progression. The constant d is called the **common difference**.

Ex 1) For each arithmetic sequence, find d the common difference and the next two terms of the sequence.

Ex 1a) 4, 7, 10, 13, 16, ...

$$d = 3 \quad (7-4, \text{ and } 10-7, \text{ and } 13-10, \text{ and } 16-13)$$

The next term is:

$$16 + 3 \text{ or } 19$$

The next term is:

$$19 + 3 \text{ or } 22$$

Ex 1b) 50, 45, 40, 35, 30, ...

Common difference, d : -5

($45-50$, $40-45$, $35-40$, $30-35$)

The next term: 25 ($30 + -5$)

The next term: 20 ($25 + -5$)

Definition: A sequence in which a constant r can be **multiplied** by each term to get the next term is called a **geometric sequence**. The constant r is called the **common ratio**.

Ex 2) For each geometric sequence, find the common ratio and the next two terms.

Ex 2a) 2, 6, 18, 54, ...

Common Ratio r : 3 ($6 \div 2$, $18 \div 6$, $54 \div 18$)

Next Term: $54 \cdot 3 = 162$

Next Term: $162 \cdot 3 = 486$

Ex 3) Using the given formula for the n th term (general),
find: t_1, t_2, t_3 , and t_4 (term numbers 1-4)

$$3a) t_n = 5 + 4n$$

n	
1	$t_1 = 5 + 4(1) = 9$
2	$t_2 = 5 + 4(2) = 13$
3	$t_3 = 5 + 4(3) = 17$
4	$t_4 = 5 + 4(4) = 21$

9, 13, 17, 21, ...

$$3b) t_n = n^2$$

n	
1	$t_1 = (1)^2 = 1$
2	$t_2 = (2)^2 = 4$
3	$t_3 = (3)^2 = 9$
4	$t_4 = (4)^2 = 16$

1, 4, 9, 16, ...

$$3c) t_n = 3 \cdot 2^n$$

n	
1	$t_1 = 3 \cdot 2^1 = 6$
2	$t_2 = 3 \cdot 2^2 = 12$
3	$t_3 = 3 \cdot 2^3 = 24$
4	$t_4 = 3 \cdot 2^4 = 48$

6, 12, 24, 48, ...

Ex 4) Find the next term in the sequence:

2, 6, 12, 20, 30, ? \rightarrow 42 (30 + 12)

4 6 8 10 12