

## SEQUENCES AND SERIES

03 FEBRUARY 2014



### Lesson Description

In this lesson we:

- Revise calculations for arithmetic and geometric sequences
- Revise calculations for arithmetic and geometric series



### Summary

Arithmetic	Geometric
Constant difference = $d$ $d = T_2 - T_1$ OR $d = T_3 - T_2$	Constant ratio = $r$ $r = \frac{T_2}{T_1}$ OR $r = \frac{T_3}{T_2}$
$T_n = a + (n - 1)d$	$T_n = ar^{n-1}$
$S_n = \frac{n}{2}[2a + (n - 1)d]$	$S_n = \frac{a(r^n - 1)}{r - 1}$
	$S_n = \frac{a(1 - r^n)}{1 - r}$
	$S_\infty = \frac{a}{1 - r}$



### Test Yourself

Select the most correct answer from the options given. Write down only the correct letter

#### Question 1

The first three terms of an arithmetic sequence are  $2x-2$ ;  $x+2$ ;  $3(x+5)$ . Solve for  $x$

- A. -3
- B. -1
- C. 1
- D. 3

#### Question 2

What is the third term of an arithmetic sequence whose 17<sup>th</sup> term is 9 and 21<sup>st</sup> term is 12.

- A.  $-\frac{3}{2}$
- B.  $-\frac{4}{5}$
- C.  $\frac{5}{2}$
- D.  $-\frac{2}{5}$

**Question 3**

The value of  $x$  in the arithmetic sequence 2; 10;  $x$  is:

- A. 12
- B. 50
- C. 18
- D. 20

**Question 4**

The value of  $x$  in the geometric sequence 2; 6;  $x$

- A. 10
- B. 8
- C. 9
- D. 18

**Question 5**

The sequence 2; -4; -10; ..... is:

- A. Arithmetic,  $d = 6$
- B. Arithmetic,  $d = -6$
- C. Geometric,  $r = 2$
- D. Geometric,  $r = -2$

**Question 6**

The number of terms in the series:  $2 + 6 + 10 + 14 + \dots + 78$

- A. 5 terms
- B. 4 terms
- C. 20 terms
- D. 78 terms

**Question 7**

The sequence  $\frac{1}{8}; \frac{1}{4}; \frac{1}{2}; \dots$  has:

- A. A constant ratio of  $r = \frac{1}{2}$ .
- B. A constant ratio of  $r = \frac{1}{8}$ .
- C. A constant ratio of  $r = 2$ .
- D. A constant ratio of  $r = 8$ .

**Question 8**

The sum of the first eight terms of the arithmetic sequence:

$x; x + 1; x + 2; \dots$  is:

- A.  $8x + 8$
- B.  $8x + 7$
- C.  $8x + 32$
- D.  $8x + 64$

**Question 9**

In the sequence: 2 ; 3 ; 2 ; 6 ; 2 ; 9 ; 2 ; 12 ; ... .. The 81<sup>st</sup> term is

- A. 243
- B. 2
- C. 81
- D. 162

**Question 10**

In the sequence: 2 ; 3 ; 2 ; 6 ; 2 ; 9 ; 2 ; 12 ; ... .. The 20<sup>th</sup> term is

- A. 60
- B. 2
- C. 30
- D. 40

**Improve your Skills****Question 1**

Given the arithmetic sequence: 23; 27; 31 ..... Determine:

- a. The 27<sup>th</sup> term.
- b. Which term equals 243.

**Question 2**

Find the sum of the following finite series 2 + 6 + 10 + 14 + ..... + 122

**Question 3**

The twelfth term of an arithmetic sequence is 5, and the common difference between successive terms is 3. Determine which term has a value of 47.

**Question 4**

The fourth term of an arithmetic series is 55 and the tenth term is 45. Find n if  $T_n < 0$

**Question 5**

Given the geometric sequence:  $\frac{3}{4}; \frac{3}{2}; 3; \dots$  Determine in simplest exponential form

- a.  $T_{11}$
- b. Which term equals 24 576

**Question 6**

The third term of a geometric series is 8 and the eighth term is  $\frac{1}{4}$ . Calculate:

- a. The common ratio.
- b. The sum of the first eight terms.

**Question 7**

In a geometric sequence, the third term is  $5m + 1$ , the fourth term is  $m+1$  and the fifth term is  $m-2$ . If all the terms are positive, calculate the value of m.