



# CAMI Mathematics: Grade 12

## 12.2 Patterns, sequences and series

### 12.2 Arithmetic sequences

1. Determine  $T_7$  in the sequence -18; -12; -6; .....
2. Determine the first three terms of the sequence with  $T_1 = -6$  and  $T_{16} = 54$ .
3. Determine the first term and the constant difference if  $T_n = 11 - 6n$ .
4. Which term in the sequence -7; -13; -19; ... is equal to -91?
5. The first two terms of a sequence are  $u$  and  $y$ . What is the value of  $T_{32}$  in terms of  $u$  and  $y$ ?
6. The sum of the first three terms in a sequence is 30, and the product of the first two terms is 180. Give the first three terms.
7. The first three terms of a sequence are  $p + 1$ ;  $2p + 2$ ;  $4p$ . Calculate the value of  $p$  and the first three terms of the sequence.
8. Insert three arithmetic means between 15 and 27.
9. Determine the arithmetic mean of 16 and -2.
10. Determine the first 4 terms of the sequence with general term  $T_k = 6k - 1$ .



## MEMO

### 12.2 Arithmetic sequences [4.1.6.1; 4.1.6.2; 4.1.6.3]

1.  $-18; -12; -6; \dots$

$$a = -18; d = 6$$

$$T_7 = a + 6d$$

$$T_7 = -18 + 6(6) = 18$$

2.

$$T_1 = -6 = a$$

$$T_{16} = 54$$

$$T_{16} = a + 15d$$

$$54 = -6 + 15d$$

$$60 = 15d$$

$$\therefore d = 4$$

Sequence:  $-6 ; -2 ; 2$

3.

$$T_n = 11 - 6n$$

$$T_1 = 11 - 6 = 5$$

$$T_2 = 11 - 6(2) = -1$$

$$a = 5; d = -6$$

4.  $-7; -13; -19; \dots$

$$a = -7; d = -6$$

$$T_n = a + (n-1)d$$

$$-91 = -7 + (n-1)(-6)$$

$$-91 = -7 - 6n + 6$$

$$6n = 90$$

$$\therefore n = 15$$

5.  $a = u$  and  $d = y - u$

$$T_{32} = a + 31d$$

$$T_{32} = u + 31(y - u)$$

$$T_{32} = 31y - 30u$$



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6.  $a + (a + d) + (a + 2d) = 30$  and  $a(a + d) = 180$

$$3a + 3d = 30$$

$$a + d = 10$$

$$a = 10 - d$$

$$\therefore a = 18$$

Sequence: 18 ; 10 ; 2

$$a^2 + ad = 180$$

$$(10 - d)^2 + (10 - d)d = 180$$

$$100 - 20d + d^2 + 10d - d^2 = 180$$

$$\therefore d = -8$$

7.  $p + 1; 2p + 2; 4p$

$$2p + 2 - (p + 1) = 4p - (2p + 2)$$

$$p + 1 = 2p - 2$$

$$p = 3$$

Sequence: 4 ; 8 ; 12

8.  $a = 15$  and  $T_5 = 27$

$$T_5 = 27$$

$$27 = 15 + 4d$$

$$12 = 4d$$

$$\therefore d = 3$$

Sequence: 15 ; 18 ; 21 ; 24 ; 27

9.

$$\text{Mean} = \frac{16 - 2}{2} = 7$$

10.

$$T_k = 6k - 1$$

$$T_1 = 5$$

$$T_2 = 11$$

$$T_3 = 17$$

$$T_4 = 23$$