# Class 11 Mathematics · Chapter 8: Sequences and Series

**Answer key and marking scheme** · 20 marks · about 40 minutes · based on NCERT

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**1.** For the sequence $a_n = (-1)^n(3n - 2)$, the value of $a_7 + a_8$ is [1]

(a) 3 (b) −3
(c) 41 (d) −41

**Answer: (a)** $a_7 = (-1)^7(19) = -19$ and $a_8 = (+1)(22) = 22$, so $a_7 + a_8 = 3$.

**2.** The 2nd term of a G.P. is 6 and its 5th term is −48. The sum of its first four terms is [1]

(a) −15 (b) 45
(c) 15 (d) −45

**Answer: (c)** $ar^4/ar = r^3 = -48/6 = -8$, so $r = -2$ and $a = 6/(-2) = -3$. The terms are −3, 6, −12, 24, with sum 15.

**3.** The value of $\Sigma_{k=1}^{6} (-1)^k k$ is [1]

(a) −3 (b) 3
(c) 21 (d) 0

**Answer: (b)** $-1 + 2 - 3 + 4 - 5 + 6 = 3$.

**4.** Three numbers are inserted between 2 and 162 so that the five numbers form a G.P. The product of the three inserted numbers is [1]

(a) 324 (b) 1944
(c) 5832 (d) 18

**Answer: (c)** $r^4 = 162/2 = 81$, so $r = \pm 3$. The product $G_1G_2G_3 = (2r)(2r^2)(2r^3) = 8r^6 = 8 \times 729 = 5832$ for either sign; it is also $(\sqrt{(2 \times 162)})^3 = 18^3$.

**5.** The 7th term of the G.P. 486, −162, 54, ... is [1]

(a) $-\frac{2}{3}$ (b) −2
(c) 6 (d) $\frac{2}{3}$

**Answer: (d)** $a = 486$, $r = -162/486 = -1/3$, so $a_7 = 486 \times (-1/3)^6 = 486/729 = 2/3$.

**6.** A culture of 500 cells triples every 2 hours. After how many hours will it have 40,500 cells? [2]

After k two-hour periods there are $500 \times 3^k$ cells. $500 \times 3^k = 40500$ gives $3^k = 81 = 3^4$, so $k = 4$ periods, which is 8 hours.

- $500 \times 3^k = 40500$ gives $k = 4$ (1)
- 8 hours (1)

**7.** Show that the sequence $a_n = 5 \times 3^{2n - 1}$ is a G.P., and write its first term and common ratio. [2]

$a_{n+1}/a_n = 5 \times 3^{2n+1}/(5 \times 3^{2n-1}) = 3^2 = 9$, a constant, and every term is non-zero, so the sequence is a G.P. $a_1 = 5 \times 3 = 15$ and $r = 9$.

- $a_{n+1}/a_n = 9$, constant: a G.P. (1)
- first term 15, common ratio 9 (1)


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**8.** The 4th term of an A.P. is 14 and its 9th term is 34. Find the sum of its first 12 terms. [2]

$a + 3d = 14$ and $a + 8d = 34$ give $d = 4$, $a = 2$. $S_{12} = (12/2)[2(2) + 11(4)] = 6 \times 48 = 288$.

- $a = 2$, $d = 4$ (1)
- $S_{12} = 288$ (1)

**9.** The first term of a G.P. is 1, its last term is 128 and the sum of all its terms is 255. Find the common ratio and the number of terms. [3]

With $l = ar^{n-1}$, $S = (lr - a)/(r - 1)$. So $255 = (128r - 1)/(r - 1)$, $255r - 255 = 128r - 1$, $127r = 254$ and $r = 2$. Then $1 \times 2^{n-1} = 128 = 2^7$, so $n = 8$.

- $S = (lr - a)/(r - 1)$ written from $S_n$ and $l = ar^{n-1}$ (1)
- $r = 2$ (1)
- $n = 8$ (1)

**10.** Meera saves ₹50 in the first week and, in every later week, ₹15 more than in the week before. How much has she saved in all at the end of 20 weeks? [3]

The weekly savings form an A.P. with $a = 50$ and $d = 15$. $S_{20} = (20/2)[2(50) + 19(15)] = 10 \times (100 + 285) =$ ₹3850.

- an A.P. with $a = 50$, $d = 15$ (1)
- $S_{20} = 10[100 + 285]$ (1)
- ₹3850 (1)

**11.** Two positive numbers are in the ratio 1 : 4, and their A.M. exceeds their G.M. by 2. Find the numbers. [3]

Let the numbers be $a$ and $4a$ ($a > 0$). $A = 5a/2$ and $G = \sqrt{(4a^2)} = 2a$. $A - G = a/2 = 2$, so $a = 4$. The numbers are 4 and 16 (check: $A = 10$, $G = 8$).

- $A = 5a/2$ and $G = 2a$ (1)
- $a/2 = 2$ (1)
- the numbers 4 and 16 (1)


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