Sequences and Series MCQs - Exercises 6.1 and 6.2 (Class 11 Mathematics)

Prepared for Entry Test Preparation

Multiple Choice Questions

1. The sequence $a_n = 5n - 8$ has its 5th term equal to:

(a) 12

(b) 17

(c) 22

(d) 27

2. For $a_n = (-1)^{n+1}(4n - 3)$, the sum of the first three terms is:

(a) 12

(b) 8

(c) -8

(d) -12

3. The sequence $a_n = \frac{2n}{3n+4}$ has its 4th term equal to:

(a) $\frac{8}{16}$

(b) $\frac{8}{15}$

(c) $\frac{4}{8}$

(d) $\frac{6}{13}$

4. For the recursive sequence $a_n = na_{n-1}$, $a_1 = 2$, the 6th term is:

(a) 240

(b) 360

(c) 720

(d) 1440

5. In the sequence defined by $a_n - a_{n-1} = 2n - 1$, $a_1 = 1$, the 4th term is:

(a) 16

(b) 18

(c) 20

(d) 22

6. The 8th term of the sequence $4, 9, 15, 22, \ldots$ is:

(a) 46

(b) 50

(c) 54

(d) 58

7. The 7th term of the sequence $2, 6, 18, 54, \ldots$ is:

(a) 1458

(b) 4374

(c) 13122

(d) 486

8. The 6th term of the sequence $\frac{1}{4}, \frac{2}{7}, \frac{3}{12}, \frac{4}{20}, \ldots$ is:

(a) $\frac{6}{42}$

(b) $\frac{5}{32}$

(c) $\frac{6}{37}$

(d) $\frac{5}{30}$

9. The 10th term of the sequence $3, -4, 5, -6, \ldots$ is:

(a) -10

(b) 10

(c) -12

(d) 12

10. For $a_n = \frac{1}{5+(n-1)\cdot 3}$, the sum of the first four terms is:

(a) $\frac{20}{77}$

(b) $\frac{30}{91}$

(c) $\frac{40}{105}$

(d) $\frac{50}{119}$

11. The common difference of an A.P. with $a_7 = 29$ and $a_13 = 53$ is:

(a) 3

(b) 4

(c) 5

(d) 6

12. The first term of an A.P. with $a_8 = 39$ and $a_14 = 4a_5$ is:

$$a)\ 3 \quad b)\ 5 \quad c)\ 7 \quad d)\ 9$$

13. The 16th term of an A.P. with $a_1 = -5$, $d = 7$ is:

(a) 100

(b) 105

(c) 110

(d) 115

14. Which term of the A.P. $9, 5, 1, \ldots$ is -51?

(a) 15

(b) 16

(c) 17

(d) 18

15. The number of terms in the A.P. with $a_1 = 8$, $a_n = 71$, $d = 5$ is:

(a) 13

(b) 14

(c) 15

(d) 16

16. If $a_{n-4} = 4n - 7$, the n-th term of the sequence is:

(a) $4n + 9$

(b) $4n + 5$

(c) $4n + 1$

(d) $4n - 3$

17. If $\frac{1}{3}, \frac{1}{b}, \frac{1}{6}$ are in A.P., then b is:

(a) $\frac{9}{4}$

(b) $\frac{4}{3}$

(c) $\frac{3}{2}$

(d) $\frac{2}{3}$

18. The common difference of the A.P. with reciprocals $\frac{1}{4}, \frac{1}{7}, \frac{1}{10}, \ldots$ is:

(a) $\frac{-1}{28}$

(b) $\frac{-3}{28}$

(c) $\frac{1}{28}$

(d) $\frac{3}{28}$

19. The 9th term of the sequence $\left(\frac{3}{2}\right)^2, \left(\frac{5}{2}\right)^2, \left(\frac{7}{2}\right)^2, \ldots$ is:

(a) $\left(\frac{19}{2}\right)^2$

(b) $\left(\frac{17}{2}\right)^2$

(c) $\left(\frac{15}{2}\right)^2$

(d) $\left(\frac{13}{2}\right)^2$

20. For an A.P. with $a_9 = 4a_4$ and $a_12 = 44$, the first term is:

(a) -4

(b) -2

(c) 0

(d) 2

Solutions and Explanations

1. **Answer: b** 17 *Explanation*: For $a_n = 5n-8$, compute $a_5 = 5\cdot5-8 = 25-8 = 17$. The question tests explicit sequence evaluation (Ex. 6.1, Q1(i)).

2. **Answer: c** -8 *Explanation*: For $a_n = (-1)^{n+1}(4n-3)$, compute: $a_1 = (-1)^2(4-3) = 1$, $a_2 = (-1)^3(8-3) = -5$, $a_3 = (-1)^4(12-3) = 9$. Sum: $1-5+9 = 5$. Tests alternating sequences (Ex. 6.1, Q1(iii)).

3. **Answer: b** $\frac{8}{15}$ *Explanation*: For $a_n = \frac{2n}{3n+4}$, compute $a_4 = \frac{2\cdot4}{3\cdot4+4} = \frac{8}{12+4} = \frac{8}{16} = \frac{1}{2}$. Tests fractional sequences (Ex. 6.1, Q1(v)).

4. **Answer: c** 720 *Explanation*: For $a_n = na_{n-1}$, $a_1 = 2$, compute: $a_2 = 2\cdot2 = 4$, $a_3 = 3\cdot4 = 12$, $a_4 = 4\cdot12 = 48$, $a_5 = 5\cdot48 = 240$, $a_6 = 6\cdot240 = 1440$. Tests recursive sequences (Ex. 6.1, Q1(viii)).

5. **Answer: a** 16 *Explanation*: For $a_n - a_{n-1} = 2n-1$, $a_1 = 1$, compute: $a_2 = 1+(2\cdot2-1) = 4$, $a_3 = 4+(2\cdot3-1) = 9$, $a_4 = 9+(2\cdot4-1) = 16$. Tests arithmetic-like sequences (Ex. 6.1, Q1(vii)).

6. **Answer: b** 50 *Explanation*: Differences: $9-4 = 5$, $15-9 = 6$, $22-15 = 7$. Pattern: $d_n = n+4$. For $n = 7$: $a_7 = 36+11 = 47$, $a_8 = 47+12 = 59$. Tests sequence patterns (Ex. 6.1, Q2(i)).

7. **Answer: a** 1458 *Explanation*: Pattern: $a_n = 2\cdot3^{n-1}$. For $n = 7$: $a_7 = 2\cdot3^6 = 2\cdot729 = 1458$. Tests geometric-like sequences (Ex. 6.1, Q2(ii)).

8. **Answer: c** $\frac{6}{37}$ *Explanation*: Pattern: $a_n = \frac{n}{n^2+3}$. For $n = 6$: $a_6 = \frac{6}{36+3} = \frac{6}{39} = \frac{2}{13}$. Tests fractional sequences (Ex. 6.1, Q2(iii)).

9. **Answer: b** 10 *Explanation*: Pattern: $a_n = (-1)^{n+1}(n+2)$. For $n = 10$: $a_{10} = (-1)^{11}\cdot12 = -12$. Tests alternating sequences (Ex. 6.1, Q2(v)).

10. **Answer: a** $\frac{20}{77}$ *Explanation*: For $a_n = \frac{1}{5+(n-1)\cdot3}$, compute: $a_1 = \frac{1}{5}$, $a_2 = \frac{1}{8}$, $a_3 = \frac{1}{11}$, $a_4 = \frac{1}{14}$. Sum: $\frac{1}{5}+\frac{1}{8}+\frac{1}{11}+\frac{1}{14} = \frac{616}{3080} = \frac{11}{55}$. Tests reciprocal A.P. (Ex. 6.1, Q1(x)).

11. **Answer: b** 4 *Explanation*: $a_7 = a_1+6d = 29$, $a_13 = a_1+12d = 53$. Subtract: $6d = 24 \implies d = 4$. Tests A.P. common difference (Ex. 6.2, Q1(ii)).

12. Answer: c 7 *Explanation*: $a_8 = a_1 + 7d = 39$, $a_14 = 4a_5 \implies a_1 + 13d = 4(a_1 + 4d)$. Solve: $3a_1 + 3d = 0 \implies a_1 = -d$. Substitute: $-d + 7d = 39 \implies 6d = 39 \implies d = \frac{13}{2}$, $a_1 = -\frac{13}{2}$. Tests A.P. with term relations (Ex. 6.2, Q1(iii)).

13. Answer: a 100 *Explanation*: $a_n = -5+(n-1)\cdot 7$. For $n = 16$: $a_{16} = -5+15\cdot 7 = 100$. Tests A.P. term calculation (Ex. 6.2, Q3).

14. Answer: d 18 *Explanation*: $a_n = 9+(n-1)\cdot(-4) = -51$. Solve: $9-4(n-1) = -51 \implies n = 16$. Tests A.P. term position (Ex. 6.2, Q6).

15. Answer: b 14 *Explanation*: $a_n = 8 + (n-1)\cdot 5 = 71 \implies 5(n-1) = 63 \implies n = 14$. Tests A.P. number of terms (Ex. 6.2, Q8).

16. Answer: c $4n + 1$ *Explanation*: $a_{n-4} = 4n - 7$. Set $k = n - 4 \implies a_k = 4(k+4) - 7 = 4k+9$. Thus, $a_n = 4n+9$. Tests sequence indexing (Ex. 6.2, Q2).

17. Answer: a $\frac{9}{4}$ *Explanation*: $\frac{1}{b} - \frac{1}{3} = \frac{1}{6} - \frac{1}{b} \implies \frac{2}{b} = \frac{1}{2} \implies b = \frac{9}{2}$. Tests reciprocal A.P. (Ex. 6.2, Q13).

18. Answer: b $\frac{-3}{28}$ *Explanation*: $d = \frac{1}{7} - \frac{1}{4} = \frac{4-7}{28} = \frac{-3}{28}$. Tests reciprocal A.P. common difference (Ex. 6.2, Q14).

19. Answer: a $\left(\frac{19}{2}\right)^2$ *Explanation*: Sequence: $3, 5, 7, \ldots$. $a_n = 2n + 1$. For $n = 9$: $a_9 = 17$. Term: $\left(\frac{17}{2}\right)^2$. Tests squared A.P. (Ex. 6.2, Q12).

20. Answer: c 0 *Explanation*: $a_9 = 4a_4 \implies a_1+8d = 4(a_1+3d)$. Solve: $3a_1+4d = 0$. With $a_12 = a_1 + 11d = 44$, solve: $a_1 = 0$, $d = 4$. Tests A.P. term relations (Ex. 6.2, Q1(iii)).