MIND CURVE · INFINITY THINK BEYOND

Arithmetic Progressions

Chapter 5 · Previous Year Questions with Answers · Class X Mathematics Standard (041)

01 TOPIC 1 Identifying an AP, Common Difference & nth Term

QUICK RECAP

- A list $a,\ a+d,\ a+2d,\ldots$ is an AP with first term a and common difference $d = a_{k+1} - a_k$ (constant). d may be positive, negative or zero.
- nth term: $a_n = a + (n-1)d$. nth term from the end of an AP with last term l: $l - (n-1)d$.
- $a,\ b,\ c$ are in AP $\iff 2b = a + c$ (b is the arithmetic mean). Number of terms: $n = \dfrac{l-a}{d} + 1$.
- Recall: multiples of k between two numbers form an AP with $d = k$.

Q1 MCQ · 1 mark — **2023** – 30/C/1

If $x,\ 2x+9,\ 4x+3$ are three consecutive terms of an A.P., then the value of x is :

(A) 3 (B) 10
(C) 13 (D) 15

ANSWER **(D) 15**

Q2 MCQ · 1 mark — **2023** – 30/C/2

If $2x,\ x+10,\ 3x+2$ are three consecutive terms of an A.P., then the value of x is :

(A) 4 (B) 5
(C) 6 (D) 8

ANSWER **(C) 6**

Q3 MCQ · 1 mark — **2023** – 30/C/3

If $x+1,\ 3x$ and $4x+2$ are three consecutive terms of an A.P., then the value of x is :

(A) 2 (B) 3
(C) 4 (D) 5

ANSWER **(B) 3**

Q4 MCQ · 1 mark — **2023** – 30/C/B

The 4^{th} term from the end of an AP $-11,\ -8,\ -5,\ \ldots,\ 49$ is :

(A) 40 (B) 37
(C) 43 (D) 58

ANSWER **(A) 40**

Q5 MCQ · 1 mark — **2023** – 30/1/1, 30/1/3

If $p-1,\ p+1$ and $2p+3$ are in A.P., then the value of p is

(A) -2 (B) 4
(C) 0 (D) 2

ANSWER *
$2(p+1)=(p-1)+(2p+3) \Rightarrow 2p+2=3p+2 \Rightarrow p=0$

(C) 0

Q6 MCQ · 1 mark — **2023** – 30/1/2

If $a,\ b,\ c$ form an A.P. with common difference d, then the value of $a-2b-c$ is equal to

(A) $2a+4d$ (B) 0
(C) $-2a-4d$ (D) $-2a-3d$

ANSWER *
$a-2(a+d)-(a+2d)=-2a-4d$

(C) $-2a-4d$

Q7 MCQ · 1 mark — **2023** – 30/4/1

The next term of the A.P. : $\sqrt{6},\ \sqrt{24},\ \sqrt{54}$ is :

(A) $\sqrt{60}$ (B) $\sqrt{96}$
(C) $\sqrt{72}$ (D) $\sqrt{216}$

ANSWER *
$\sqrt{6},\ 2\sqrt{6},\ 3\sqrt{6}$; next term $4\sqrt{6}=\sqrt{96}$

(B) $\sqrt{96}$

Q8 MCQ · 1 mark — **2023** – 30/4/3

The next term of the A.P. : $\sqrt{7},\ \sqrt{28},\ \sqrt{63}$ is :

(A) $\sqrt{70}$ (B) $\sqrt{80}$
(C) $\sqrt{97}$ (D) $\sqrt{112}$

ANSWER *
$\sqrt{7},\ 2\sqrt{7},\ 3\sqrt{7}$; next term $4\sqrt{7}=\sqrt{112}$

(D) $\sqrt{112}$

Q9 MCQ · 1 mark — **2023** – 30/4/2

If $k+2,\ 4k-6$ and $3k-2$ are three consecutive terms of an A.P., then the value of k is :

(A) 3 (B) -3
(C) 4 (D) -4

ANSWER *

$2(4k-6) = (k+2) + (3k-2) \Rightarrow 8k - 12 = 4k \Rightarrow k = 3$

(A) 3

Q10 MCQ · 1 mark — **2023** – 30/5/1, 30/5/3

The common difference of the A.P. whose n^{th} term is given by $a_n = 3n + 7$, is :

(A) 7 (B) 3
(C) $3n$ (D) 1

ANSWER *

$d = a_{n+1} - a_n = 3$

(B) 3

Q11 MCQ · 1 mark — **2023** – 30/5/2

The common difference of the A.P. whose n^{th} term is given by $a_n = 5n - 7$ is :

(A) -7 (B) 7
(C) 5 (D) -2

ANSWER *

$d = a_{n+1} - a_n = 5$

(C) 5

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Q12 MCQ · 1 mark — **2023** – 30/5/1, 30/5/3

The 11^{th} term from the end of the A.P. : $10,\ 7,\ 4,\ \ldots,\ -62$ is :

(A) 25 (B) 16
(C) -32 (D) 0

ANSWER *

From the end: first term -62, $d = 3$; $-62 + 10 \times 3 = -32$

(C) -32

Q13 MCQ · 1 mark — **2023** – 30/5/2

The 13^{th} term from the end of the A.P. : $20,\ 13,\ 6,\ -1,\ \ldots,\ -148$ is :

(A) 57 (B) -57
(C) 64 (D) -64

ANSWER *

From the end: first term -148, $d = 7$; $-148 + 12 \times 7 = -64$

(D) -64

Q14 MCQ · 1 mark — **2024** – 30/S/1, 30/S/2, 30/S/3

If $k + 7,\ 2k - 2$ and $2k + 6$ are three consecutive terms of an A.P., then the value of k is :

(A) 15
(B) 17
(C) 5
(D) 1

ANSWER (B) 17

Q15 MCQ · 1 mark **2024** – 30/S/1

The 7^{th} term from the end of the A.P. : $-8,\ -5,\ -2,\ \ldots,\ 49$ is :

(A) 67
(B) 13
(C) 31
(D) 10

ANSWER (C) 31

Q16 MCQ · 1 mark **2024** – 30/S/3

Two A.P.s have the same first term. The common difference of the first A.P. is -3 and of the second A.P. is -5. The difference of the 6^{th} term of the second A.P. from that of the first A.P. is :

(A) 2
(B) -8
(C) -10
(D) 10

ANSWER (D) 10

Q17 MCQ · 1 mark **2024** – 30(B)/S

If 5 times the 5^{th} term of an A.P. is equal to 9 times the 9^{th} term, then its 14^{th} term is :

(A) 5
(B) 9
(C) 0
(D) 14

ANSWER (C) 0

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Q18 MCQ · 1 mark **2024** – 30/1/2

n^{th} term of an A.P. is $7n + 4$. The common difference is :

(A) $7n$
(B) 4
(C) 7
(D) 1

ANSWER *

$d = a_{n+1} - a_n = 7$

(C) 7

Q19 MCQ · 1 mark **2024** – 30/2/1

The common difference of an A.P. in which $a_{15} - a_{11} = 48$, is

(A) 12
(B) 16
(C) -12
(D) -16

ANSWER *

$4d = 48 \Rightarrow d = 12$

(A) 12

Q20 MCQ · 1 mark — **2024** – 30/2/2

Which term of the A.P. $-29,\ -26,\ -23,\ \ldots,\ 61$ is 16 ?

(A) 11^{th} (B) 16^{th}
(C) 10^{th} (D) 31^{st}

ANSWER *
$-29 + 3(n-1) = 16 \Rightarrow n = 16$

(B) 16^{th}

Q21 MCQ · 1 mark — **2024** – 30/2/3

The common difference of an A.P. in which $a_{20} - a_{15} = 20$, is

(A) 4 (B) 5
(C) $4d$ (D) $5d$

ANSWER *
$5d = 20 \Rightarrow d = 4$

(A) 4

Q22 MCQ · 1 mark — **2024** – 30/3/1, 30/3/3

The common difference of the A.P. $\frac{1}{2x}, \frac{1-4x}{2x}, \frac{1-8x}{2x}, \ldots$ is :

(A) $-2x$ (B) -2
(C) 2 (D) $2x$

ANSWER *
$d = \frac{1-4x}{2x} - \frac{1}{2x} = \frac{-4x}{2x} = -2$

(B) -2

Q23 MCQ · 1 mark — **2024** – 30/4/1, 30/4/3

Three numbers in A.P. have the sum 30. What is its middle term ?

(A) 4 (B) 10
(C) 16 (D) 8

ANSWER *
$(a-d) + a + (a+d) = 3a = 30 \Rightarrow a = 10$

(B) 10

Q24 MCQ · 1 mark — **2024** – 30/4/2

If the first three terms of an A.P. are $3p-1,\ 3p+5,\ 5p+1$ respectively; then the value of p is :

(A) 2 (B) -3
(C) 4 (D) 5

ANSWER *

$2(3p+5) = (3p-1) + (5p+1) \Rightarrow 6p + 10 = 8p \Rightarrow p = 5$

(D) 5

Q25 MCQ · 1 mark — **2024** – 30/5/1, 30/5/3

The next (4^{th}) term of the A.P. $\sqrt{18},\ \sqrt{50},\ \sqrt{98},\ \ldots$ is :

(A) $\sqrt{128}$ (B) $\sqrt{140}$
(C) $\sqrt{162}$ (D) $\sqrt{200}$

ANSWER *

$3\sqrt{2},\ 5\sqrt{2},\ 7\sqrt{2}$; next term $9\sqrt{2} = \sqrt{162}$

(C) $\sqrt{162}$

Q26 MCQ · 1 mark — **2024** – 30/5/1, 30/5/2

The number of terms in the A.P. $3,\ 6,\ 9,\ 12,\ \ldots,\ 111$ is :

(A) 36 (B) 40
(C) 37 (D) 30

ANSWER *

$3 + (n-1)3 = 111 \Rightarrow n = 37$

(C) 37

Q27 MCQ · 1 mark — **2024** – 30/5/2

The next (4^{th}) term of the A.P. $\sqrt{7},\ \sqrt{28},\ \sqrt{63},\ \ldots$ is :

(A) $\sqrt{70}$ (B) $\sqrt{84}$
(C) $\sqrt{97}$ (D) $\sqrt{112}$

ANSWER *

$\sqrt{7},\ 2\sqrt{7},\ 3\sqrt{7}$; next term $4\sqrt{7} = \sqrt{112}$

(D) $\sqrt{112}$

Q28 MCQ · 1 mark — **2024** – 30/5/3

The 14^{th} term from the end of the A.P. $-11,\ -8,\ -5,\ \ldots,\ 49$ is :

(A) 7 (B) 10
(C) 13 (D) 28

ANSWER *

From the end: $49 - 13 \times 3 = 10$

(B) 10

Q29 MCQ · 1 mark — **2025** – 30/S/1, 30/S/2, 30/S/3

The 6^{th} term of the AP $\sqrt{27},\ \sqrt{75},\ \sqrt{147}, \ldots$ is :

(A) $\sqrt{243}$
(B) $\sqrt{363}$
(C) $\sqrt{300}$
(D) $\sqrt{507}$

ANSWER (D) $\sqrt{507}$

Q30 MCQ · 1 mark — **2025** – 30/S/2

Which term of the AP $7,\ 10,\ 13,\ \ldots$ is 52 ?

(A) 13^{th}
(B) 15^{th}
(C) 16^{th}
(D) 17^{th}

ANSWER (C) 16^{th}

Q31 MCQ · 1 mark — **2025** – 30/S/3

If the 23^{rd} term of an AP exceeds its 16^{th} term by 21, then the common difference is :

(A) 1
(B) 2
(C) 3
(D) 7

ANSWER (C) 3

Q32 MCQ · 1 mark — **2025** – 30(B)/S

The 21^{st} term of an AP, whose first two terms are -3 and 4 respectively, is :

(A) 17
(B) 143
(C) 137
(D) 153

ANSWER (C) 137

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Q33 MCQ · 1 mark — **2025** – 30(B)/S

The 5^{th} term from the end of an AP $-11,\ -8,\ -5, \ldots,\ 55$ is :

(A) 1
(B) 43
(C) 40
(D) 46

ANSWER (B) 43

Q34 MCQ · 1 mark — **2025** – 30/1/2

Three numbers in AP have the sum 30. What is its middle term ?

(A) 4
(B) 10
(C) 16
(D) 8

ANSWER *
$(a-d)+a+(a+d)=30 \Rightarrow a=10$
(B) 10

Q35 MCQ · 1 mark — **2025** – 30/1/3

The 11^{th} and 13^{th} term of an AP are 39 and 45, respectively. What is the common difference of the AP ?

(A) 42
(B) 21
(C) 6
(D) 3

ANSWER *

$2d = 45 - 39 = 6 \Rightarrow d = 3$

(D) 3

Q36 MCQ · 1 mark **2025** – 30/2/1, 30/2/3

The 10^{th} term of the AP $5, \frac{19}{4}, \frac{9}{2}, \frac{17}{4}, \ldots$ is :

(A) $\frac{11}{4}$
(B) $\frac{4}{11}$
(C) $\frac{13}{4}$
(D) $\frac{4}{13}$

ANSWER *

$d = -\frac{1}{4}; a_{10} = 5 - \frac{9}{4} = \frac{11}{4}$

(A) $\frac{11}{4}$

Q37 MCQ · 1 mark **2025** – 30/2/2

The 9^{th} term from the end (towards first term) of the AP $7, 11, 15, 19, \ldots, 147$ is :

(A) 135
(B) 125
(C) 115
(D) 39

ANSWER *

$147 - 8 \times 4 = 115$

(C) 115

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Q38 MCQ · 1 mark **2026 (I)** – 30(B)

The 31^{st} term of the A.P. : $-\frac{5}{6}, -\frac{3}{4}, -\frac{2}{3}, -\frac{7}{12}, \ldots$ is

(A) $\frac{-5}{3}$
(B) $\frac{5}{3}$
(C) $\frac{12}{20}$
(D) $\frac{-12}{20}$

ANSWER *

$d = -\frac{3}{4} + \frac{5}{6} = \frac{1}{12}$

$a_{31} = -\frac{5}{6} + 30 \times \frac{1}{12} = \frac{-10 + 30}{12} = \frac{5}{3}$

(B) $\frac{5}{3}$

Q39 MCQ · 1 mark **2026 (I)** – 30(B)

If a, b, c and d are consecutive terms of an A.P., then $c - b$ is equal to :

(A) $d - a$
(B) $d - b$
(C) $d - c$
(D) $c - a$

ANSWER *

Consecutive terms of an AP have the same difference: $b - a = c - b = d - c$.

(C) $d - c$

Q40 MCQ · 1 mark **2026 (I)** – 30/1/1, 30/1/3

The common difference of the AP : $\sqrt{2},\ 2\sqrt{2},\ 3\sqrt{2},\ 4\sqrt{2},\ \ldots$ is :

(A) $\sqrt{2}$ (B) 1
(C) $2\sqrt{2}$ (D) $-\sqrt{2}$

ANSWER *

$d = 2\sqrt{2} - \sqrt{2} = \sqrt{2}$

(A) $\sqrt{2}$

Q41 MCQ · 1 mark **2026 (I)** – 30/1/2

The first term of an AP is p and the common difference is q, then its 10^{th} term is :

(A) $q - 9p$ (B) $p - 9q$
(C) $p + 9q$ (D) $2p + 9q$

ANSWER *

$a_{10} = a + 9d = p + 9q$

(C) $p + 9q$

Q42 MCQ · 1 mark **2026 (I)** – 30/2/1, 30/2/3

Which of the following sequence is **not** an A.P. ?

(A) $2,\ \frac{5}{2},\ 3,\ \frac{7}{2},\ \ldots$ (B) $-1.2,\ -3.2,\ -5.2,\ -7.2,\ \ldots$
(C) $\sqrt{2},\ \sqrt{8},\ \sqrt{18},\ \ldots$ (D) $1^2,\ 3^2,\ 5^2,\ 7^2,\ \ldots$

ANSWER *

$1,\ 9,\ 25,\ 49$: differences $8,\ 16,\ 24$ are not equal

(D) $1^2,\ 3^2,\ 5^2,\ 7^2,\ \ldots$

Q43 MCQ · 1 mark **2026 (I)** – 30/2/2

The value of x for which $2x,\ (x + 10)$ and $(3x + 2)$ are the three consecutive terms of an A.P. is :

(A) 6 (B) -6
(C) 18 (D) -18

ANSWER *

$2(x + 10) = 2x + 3x + 2 \Rightarrow 3x = 18 \Rightarrow x = 6$

(A) 6

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Q44 MCQ · 1 mark — **2026 (I)** – 30/3/1, 30/3/2, 30/3/3

The n^{th} term of the A.P. $\frac{-1}{3}, \frac{2}{3}, \frac{5}{3}, \frac{8}{3}, \ldots$ is :

(A) $3n - 4$
(B) $n - \frac{4}{3}$
(C) $\frac{n-2}{3}$
(D) $\frac{n-4}{3}$

ANSWER *

$a = -\frac{1}{3}$, $d = 1$: $a_n = -\frac{1}{3} + (n-1) = n - \frac{4}{3}$

(B) $n - \frac{4}{3}$

Q45 MCQ · 1 mark — **2026 (I)** – 30/4/1

The n^{th} term of an A.P. is $\sqrt{2}n + 1$. Its common difference is

(A) $\sqrt{2}$
(B) $\sqrt{2}n$
(C) 1
(D) $\sqrt{2} + 1$

ANSWER *

$a_{n+1} - a_n = \sqrt{2}$

(A) $\sqrt{2}$

Q46 MCQ · 1 mark — **2026 (I)** – 30/5/1, 30/5/3

If a_n represents n^{th} term of the A.P. $-\frac{15}{4}, -\frac{10}{4}, -\frac{5}{4}, \ldots$ then value of $a_{16} - a_{12}$ is

(A) 4
(B) $\frac{5}{4}$
(C) 5
(D) $\frac{25}{4}$

ANSWER *

$d = \frac{5}{4}$; $a_{16} - a_{12} = 4d = 5$

(C) 5

Q47 MCQ · 1 mark — **2026 (I)** – 30/5/2

In an A.P., if $a_{14} - a_8 = 24$, then the common difference of the A.P. is

(A) 6
(B) 4
(C) ± 4
(D) 3

ANSWER *

$6d = 24 \Rightarrow d = 4$

(B) 4

Q48 MCQ · 1 mark — **2026 (II)** – 30/7/1, 30/7/3

Which of the following sequences is an AP ?

(A) $2,\ 4,\ 8,\ 16, \ldots$
(B) $3,\ 3+\sqrt{2},\ 3+2\sqrt{2}, \ldots$
(C) $1,\ 3,\ 9,\ 27, \ldots$
(D) $\sqrt{3},\ \sqrt{6},\ \sqrt{9}, \ldots$

ANSWER **(B) $3,\ 3+\sqrt{2},\ 3+2\sqrt{2}, \ldots$**

Q49 MCQ · 1 mark — **2026 (II)** – 30/7/2

If the common difference of an A.P. is 5, then the value of $a_{18} - a_{13}$ is :

(A) 10
(B) 20
(C) 25
(D) 30

ANSWER **(C) 25**

Q50 MCQ · 1 mark — **2026 (II)** – 30/8/1, 30/8/2

Which term of A.P. $21,\ 18,\ 15,\ \ldots$ is zero ?

(A) 9^{th}
(B) 5^{th}
(C) 8^{th}
(D) 10^{th}

ANSWER **(C) 8^{th}**

Q51 MCQ · 1 mark — **2026 (II)** – 30(B)

The 10^{th} term from the end of an AP $-12,\ -9,\ -6,\ \ldots,\ 60$ is :

(A) 36
(B) 30
(C) 33
(D) 32

ANSWER **(C) 33**

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Q52 MCQ · 1 mark — **2026 (II)** – 30(B)

If the common difference of an AP is -5, then $a_{28} - a_{23}$ is equal to :

(A) -5
(B) -25
(C) 25
(D) 5

ANSWER **(B) -25**

Q53 Assertion–Reason · 1 mark — **2023** – 30/4/1, 30/4/2, 30/4/3

Assertion (A) : $a,\ b,\ c$ are in A.P. if and only if $2b = a + c$.
Reason (R) : The sum of first n odd natural numbers is n^2.

(A) Both true, R explains A · (B) Both true, R does not explain A · (C) A true, R false · (D) A false, R true

ANSWER *

A: $b - a = c - b \iff 2b = a + c$, true. R: $1 + 3 + \cdots + (2n-1) = \frac{n}{2}(1 + 2n - 1) = n^2$, true, but it does not explain A.

(B) Both Assertion (A) and Reason (R) are true and Reason (R) is not the correct explanation of Assertion (A).

Q54 Assertion–Reason · 1 mark — **2024** – 30(B)/S

Assertion (A) : The eighth term of the A.P. $\frac{1}{m}, \frac{1+2m}{m}, \frac{1+4m}{m}, \ldots$ is $\frac{1+14m}{m}$.
Reason (R) : The n^{th} term of A.P. $(a_n) = a + (n-1)d$.

(A) Both true, R explains A · (B) Both true, R does not explain A · (C) A true, R false · (D) A false, R true

ANSWER

(A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).

Q55 Assertion–Reason · 1 mark — **2025** – 30/2/1, 30/2/2, 30/2/3

Assertion (A) : Common difference of the AP : $5,\ 1,\ -3,\ -7,\ \ldots$ is 4.
Reason (R) : Common difference of the AP : $a_1,\ a_2,\ a_3,\ \ldots,\ a_n$ is obtained by $d = a_n - a_{n-1}$.

(A) Both true, R explains A · (B) Both true, R does not explain A · (C) A true, R false · (D) A false, R true

ANSWER *

$d = 1 - 5 = -4 \neq 4$, so A is false; R is true.

(D) Assertion (A) is false, but Reason (R) is true.

Q56 Assertion–Reason · 1 mark — **2025** – 30/5/1, 30/5/2, 30/5/3

Assertion (A) : For an A.P., $3,\ 6,\ 9,\ \ldots,\ 198$, 10^{th} term from the end is 168.
Reason (R) : If 'a' and 'l' are the first term and last term of an A.P. with common difference 'd', then n^{th} term from the end of the given A.P. is $l - (n-1)d$.

(A) Both true, R explains A · (B) Both true, R does not explain A · (C) A true, R false · (D) A false, R true

ANSWER *

$198 - 9 \times 3 = 171 \neq 168$: A is false; R is true.

(D) Assertion (A) is false, but Reason (R) is true.

Q57 Very Short Answer · 2 marks · Internal choice (OR) part — **2022** – 30/1/3

In an AP, if $a_2 = 26$ and $a_{15} = -26$, then write the AP.

ANSWER *

$a + d = 26,\ a + 14d = -26 \Rightarrow 13d = -52 \Rightarrow d = -4$

$a = 30$; AP is $30,\ 26,\ 22,\ \ldots$

$30,\ 26,\ 22,\ \ldots$

Q58 Very Short Answer · 2 marks · Internal choice (OR) part — **2022** – 30/2/1, 30/2/2

Which term of the A.P. $-\frac{11}{2}, -3, -\frac{1}{2}, \ldots$ is $\frac{49}{2}$?

ANSWER *

$a = -\frac{11}{2},\ d = \frac{5}{2}$

$-\frac{11}{2} + (n-1)\frac{5}{2} = \frac{49}{2} \Rightarrow n - 1 = 12 \Rightarrow n = 13$

13^{th} **term**

Q59 Very Short Answer · 2 marks · Internal choice (OR) part — **2022** – 30/2/1, 30/2/2

Find a and b so that the numbers $a,\ 7,\ b,\ 23$ are in A.P.

ANSWER *

$2b = 7 + 23 \Rightarrow b = 15$

$d = 15 - 7 = 8 \Rightarrow a = 7 - 8 = -1$

$a = -1,\ b = 15$

Q60 Very Short Answer · 2 marks · Internal choice (OR) part — **2022** – 30/2/3

In an A.P. if the sum of third and seventh term is zero, find its 5^{th} term.

ANSWER *

$(a + 2d) + (a + 6d) = 0 \Rightarrow 2(a + 4d) = 0$

$a_5 = a + 4d = 0$

$a_5 = 0$

Q61 Very Short Answer · 2 marks · Internal choice (OR) part — **2022** – 30/2/3

Determine the A.P. whose third term is 5 and seventh term is 9.

ANSWER *

$a + 2d = 5, a + 6d = 9 \Rightarrow d = 1$

$a = 3$; AP is $3,\ 4,\ 5,\ \ldots$

$3,\ 4,\ 5,\ \ldots$

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Q62 Very Short Answer · 2 marks — **2022** – 30/3/1, 30/3/2, 30/3/3

For what value of 'n', are the n^{th} terms of the APs : $9,\ 7,\ 5,\ \ldots$ and $15,\ 12,\ 9,\ \ldots$ the same ?

ANSWER *

$9 + (n - 1)(-2) = 15 + (n - 1)(-3)$

$(n - 1) = 6 \Rightarrow n = 7$

$n = 7$

Q63 Very Short Answer · 2 marks — **2022** – 30/6/1

For the A.P. $a_1,\ a_2,\ a_3,\ \ldots$ if $\frac{a_4}{a_7} = \frac{2}{3}$, then find $\frac{a_6}{a_8}$.

ANSWER *

$3(a + 3d) = 2(a + 6d) \Rightarrow a = 3d$

$\frac{a_6}{a_8} = \frac{a + 5d}{a + 7d} = \frac{8d}{10d} = \frac{4}{5}$

$\frac{4}{5}$

Q64 Very Short Answer · 2 marks · Internal choice (OR) part — **2022** – 30/6/1, 30/6/3

Find the number of terms of the A.P. : $293,\ 285,\ 277,\ \ldots,\ 53$

ANSWER *

$a = 293,\ d = -8$: $293 + (n-1)(-8) = 53$

$n - 1 = 30 \Rightarrow n = 31$

31

Q65 Very Short Answer · 2 marks · Internal choice (OR) part — **2022** – 30/6/2

How many terms are there in the A.P. : $12x,\ 10x,\ 8x,\ \ldots,\ -2x$?

ANSWER *

$a = 12x,\ d = -2x$: $12x + (n-1)(-2x) = -2x$

$n - 1 = 7 \Rightarrow n = 8$

8

Q66 Very Short Answer · 2 marks · Internal choice (OR) part — **2022** – 30/6/2

Find the number of all integers between 2 and 100, divisible by 3.

ANSWER *

$3,\ 6,\ \ldots,\ 99$: $3 + (n-1)3 = 99$

$n = 33$

33

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Q67 Very Short Answer · 2 marks — **2022** – 30/6/2

Which term of the A.P. $5,\ 15,\ 25,\ \ldots$ will be 130 more than its 31^{st} term ?

ANSWER *

$a_{31} = 5 + 30(10) = 305$; required term $= 435$

$5 + (n-1)10 = 435 \Rightarrow n = 44$

44^{th} term

Q68 Very Short Answer · 2 marks · Internal choice (OR) part — **2022** – 30/B/5

Find the number of terms in the following AP : $5,\ 11,\ 17,\ \ldots,\ 203$

ANSWER *

$5 + (n-1)6 = 203$

$n - 1 = 33 \Rightarrow n = 34$

34

Q69 Very Short Answer · 2 marks · Internal choice (OR) part · **2022** – 30/B/6

Find the 10^{th} term of the A.P. : $\sqrt{3},\ \sqrt{12},\ \sqrt{27},\ \ldots$

ANSWER *

AP: $\sqrt{3},\ 2\sqrt{3},\ 3\sqrt{3}, \ldots$ with $d = \sqrt{3}$

$a_{10} = \sqrt{3} + 9\sqrt{3} = 10\sqrt{3}$

$10\sqrt{3}$

Q70 Short Answer · 3 marks · Internal choice (OR) part · **2023** – 30/4/1, 30/4/3

How many terms are there in an A.P. whose first and fifth terms are -14 and 2, respectively and the last term is 62.

ANSWER *

$a = -14,\ a + 4d = 2 \Rightarrow d = 4$

$-14 + (n-1)4 = 62 \Rightarrow n - 1 = 19$

$n = 20$

20 terms

Q71 Short Answer · 3 marks · Internal choice (OR) part · **2023** – 30/4/1, 30/4/3

Which term of the A.P. : $65,\ 61,\ 57,\ 53,\ \ldots$ is the first negative term ?

ANSWER *

$a = 65,\ d = -4$: $a_n = 65 - 4(n-1) < 0$

$\Rightarrow n - 1 > 16.25 \Rightarrow n \geq 18$

$a_{18} = 65 - 68 = -3$; the 18^{th} term is the first negative term

18^{th} **term** (-3)

Q72 Short Answer · 3 marks · Internal choice (OR) part · **2023** – 30/4/2

The sum of first 15 terms of an A.P. is 750 and its first term is 15. Find its 20^{th} term.

ANSWER *

$\frac{15}{2}[30 + 14d] = 750 \Rightarrow 30 + 14d = 100$

$d = 5$

$a_{20} = 15 + 19 \times 5 = 110$

$a_{20} = 110$

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Q73 Short Answer · 3 marks — **2023** – 30/5/1

If p^{th} term of an A.P. is q and q^{th} term is p, then prove that its n^{th} term is $(p+q-n)$.

ANSWER *

$a+(p-1)d=q$ ...(i), $a+(q-1)d=p$ ...(ii)

(i) − (ii): $(p-q)d=q-p \Rightarrow d=-1$; then $a=q+p-1$

$a_n=a+(n-1)d=(p+q-1)-(n-1)=p+q-n$

Q74 Short Answer · 3 marks — Internal choice (OR) part — **2024** – 30/2/1, 30/2/2, 30/2/3

In an A.P., the sum of three consecutive terms is 24 and the sum of their squares is 194. Find the numbers.

ANSWER *

Let the terms be $a-d,\ a,\ a+d$: $3a=24 \Rightarrow a=8$

$(a-d)^2+a^2+(a+d)^2=3a^2+2d^2=194 \Rightarrow 2d^2=2 \Rightarrow d=\pm 1$

The numbers are 7, 8, 9 (or 9, 8, 7)

7, 8, 9 (or 9, 8, 7)

Q75 Long Answer · 5 marks — Internal choice (OR) part — **2023** – 30/6/3

The sum of first seven terms of an A.P. is 182. If its 4^{th} term and the 17^{th} term are in the ratio $1:5$, find the A.P.

ANSWER *

$S_7=\frac{7}{2}(2a+6d)=182 \Rightarrow a+3d=26$

$5(a+3d)=a+16d \Rightarrow a+16d=130$

$13d=104 \Rightarrow d=8,\ a=2$

AP: $2,\ 10,\ 18,\ \ldots$

$2,\ 10,\ 18,\ \ldots$

Q76 Long Answer · 5 marks — Internal choice (OR) part — **2024** – 30/1/2, 30/1/3

The sum of first and eighth terms of an A.P. is 32 and their product is 60. Find the first term and common difference of the A.P. Hence, also find the sum of its first 20 terms.

ANSWER *

$a+a_8=32,\ a\cdot a_8=60$: a and a_8 are roots of $t^2-32t+60=0$, i.e. 2 and 30

If $a=2,\ a_8=30$: $7d=28 \Rightarrow d=4$; $S_{20}=10(4+76)=800$

If $a=30,\ a_8=2$: $d=-4$; $S_{20}=10(60-76)=-160$

$a=2,\ d=4,\ S_{20}=800$ **or** $a=30,\ d=-4,\ S_{20}=-160$

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Q77 Long Answer · 5 marks · Internal choice (OR) part — **2026 (II)** – 30/8/1, 30/8/3

If $x,\ y,\ z$ are $p^{\text{th}},\ q^{\text{th}},\ r^{\text{th}}$ terms respectively of an A.P., then prove that $p(y-z)+q(z-x)+r(x-y)=0$.

ANSWER

$x=a+(p-1)d$ ...(i), $y=a+(q-1)d$ ...(ii), $z=a+(r-1)d$ ...(iii) — ½+½+½

Subtracting: $x-y=(p-q)d,\ y-z=(q-r)d,\ z-x=(r-p)d$ — ½+½+½

LHS $=p(y-z)+q(z-x)+r(x-y)=p[(q-r)d]+q[(r-p)d]+r[(p-q)d]$ — 1

$=(pq-pr+qr-qp+rp-rq)\,d=0=$ RHS — 1

02 TOPIC 2 Sum of First n Terms

QUICK RECAP

- $S_n=\frac{n}{2}[2a+(n-1)d]=\frac{n}{2}(a+l)$, where l is the last term.
- $a_n=S_n-S_{n-1}$ (for $n\geq 2$) and $a_1=S_1$. Sum of first n natural numbers $=\frac{n(n+1)}{2}$.

Q78 MCQ · 1 mark — **2023** – 30/6/1, 30/6/2, 30/6/3

If the sum of the first n terms of an A.P. be $3n^2+n$ and its common difference is 6, then its first term is

(A) 2 (B) 3
(C) 1 (D) 4

ANSWER *

$a=S_1=3+1=4$

(D) 4

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Q79 MCQ · 1 mark — **2024** – 30/S/2

In an A.P., the first and last terms are 7 and 73 respectively. If the sum of all its terms is 480, then the number of terms of the A.P. is :

(A) 6 (B) 12
(C) 18 (D) 30

ANSWER **(B) 12**

Q80 MCQ · 1 mark — **2024** – 30(B)

The sum of the first three terms of an AP is 30 and the sum of the last three terms is 36. If the first term is 9, then the number of terms is :

(A) 10 (B) 5
(C) 6 (D) 13

ANSWER *

$3a+3d=30\Rightarrow d=1$; last three: $3l-3d=36\Rightarrow l=13$

$n=\frac{l-a}{d}+1=\frac{13-9}{1}+1=5$

(B) 5

Q81 MCQ · 1 mark — **2024** – 30/1/3

In an A.P., if the first term $(a) = -16$ and the common difference $(d) = -2$, then the sum of first 10 terms is :

(A) -200
(B) -70
(C) -250
(D) 250

ANSWER *
$S_{10} = 5[2(-16) + 9(-2)] = 5(-50) = -250$
(C) -250

Q82 MCQ · 1 mark — **2024** – 30/3/2

If the sum of first n terms of an A.P. is $3n^2 + 4n$ and its common difference is 6, then its first term is :

(A) 7
(B) 4
(C) 6
(D) 3

ANSWER *
$a = S_1 = 3 + 4 = 7$
(A) 7

Q83 MCQ · 1 mark — **2025** – 30/S/1

If the sum of the first 'n' terms of an AP is $2n^2 + 5n$, then its common difference is :

(A) 2
(B) 4
(C) 5
(D) 7

ANSWER **(B) 4**

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Q84 MCQ · 1 mark — **2025** – 30(B)

If the first term of an A.P. is -12 and the common difference is 4, then the sum of its first 7 terms is

(A) -24
(B) -48
(C) 0
(D) 48

ANSWER *
$S_7 = \frac{7}{2}[2(-12) + 6(4)] = \frac{7}{2} \times 0 = 0$
(C) 0

Q85 MCQ · 1 mark — **2025** – 30/1/1

If the sum of first m terms of an AP is $2m^2 + 3m$, then its second term is :

(A) 10
(B) 9
(C) 12
(D) 4

ANSWER *

$a_2 = S_2 - S_1 = 14 - 5 = 9$

(B) 9

Q86 MCQ · 1 mark — **2026 (I)** – 30/4/2

In an A.P., $a = -3$ and $S_{17} = 357$. The value of a_{17} is

(A) 47 (B) 39
(C) 45 (D) 42

ANSWER *

$\frac{17}{2}(-3 + a_{17}) = 357 \Rightarrow a_{17} = 42 + 3 = 45$

(C) 45

Q87 MCQ · 1 mark — **2026 (I)** – 30/4/3

If sum of first ten terms of an A.P. is zero with a as the first term and d, the common difference, which of the following relation is true ?

(A) $10a + 9d = 0$ (B) $2a = 9d$
(C) $a_{10} = -a$ (D) $a_{10} = a$

ANSWER *

$S_{10} = 5(2a + 9d) = 0 \Rightarrow 2a + 9d = 0; a_{10} = a + 9d = -a$

(C) $a_{10} = -a$

Q88 Assertion–Reason · 1 mark — **2024** – 30(B)

Assertion (A) : The sum of the first fifteen terms of the AP $21, 18, 15, 12, \ldots$ is zero.
Reason (R) : The sum of the first n terms of an AP with first term 'a' and common difference 'd' is given by $S_n = \frac{n}{2}[a + (n-1)d]$.

(A) Both true, R explains A · (B) Both true, R does not explain A · (C) A true, R false · (D) A false, R true

ANSWER *

$S_{15} = \frac{15}{2}[42 + 14(-3)] = 0$: A is true. The correct formula is $S_n = \frac{n}{2}[2a + (n-1)d]$, so R is false.

(C) Assertion (A) is true, but Reason (R) is false.

Q89 Very Short Answer · 2 marks · Internal choice (OR) part — **2022** – 30/1/1, 30/1/2

Find the sum of first 30 terms of AP : $-30, -24, -18, \ldots$

ANSWER *

$a = -30,\ d = 6$

$S_{30} = \frac{30}{2}[2(-30) + 29(6)] = 15 \times 114 = 1710$

$S_{30} = 1710$

Q90 Very Short Answer · 2 marks | Internal choice (OR) part | **2022** – 30/1/1, 30/1/2

In an AP if $S_n = n(4n+1)$, then find the AP.

ANSWER *

$a_1 = S_1 = 5, S_2 = 18 \Rightarrow a_2 = 13$

$d = 8$; AP is $5,\ 13,\ 21,\ \ldots$

$5,\ 13,\ 21,\ \ldots$

Q91 Very Short Answer · 2 marks | Internal choice (OR) part | **2022** – 30/1/3

Find the sum of the first twelve 2-digit numbers which are multiples of 6.

ANSWER *

$12,\ 18,\ \ldots$ with $a = 12,\ d = 6$; $a_{12} = 12 + 66 = 78$

$S_{12} = \frac{12}{2}(12 + 78) = 540$

540

Q92 Very Short Answer · 2 marks | **2022** – 30/2/1, 30/2/2, 30/2/3

Find the sum of first 20 terms of an A.P. whose n^{th} term is given as $a_n = 5 - 2n$.

ANSWER *

$a_1 = 3, a_{20} = -35$

$S_{20} = \frac{20}{2}(3 - 35) = -320$

$S_{20} = -320$

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Q93 Very Short Answer · 2 marks | **2022** – 30/3/1, 30/3/2

Find the sum of first 20 terms of an AP in which $d = 5$ and $a_{20} = 135$.

ANSWER *

$a + 19(5) = 135 \Rightarrow a = 40$

$S_{20} = \frac{20}{2}(40 + 135) = 1750$

$S_{20} = 1750$

Q94 Very Short Answer · 2 marks | **2022** – 30/3/3

Find the common difference 'd' of an AP whose first term is 10 and the sum of the first 14 terms is 1505.

ANSWER *

$\frac{14}{2}[2(10) + 13d] = 1505 \Rightarrow 20 + 13d = 215$

$d = 15$

$d = 15$

Q95 Very Short Answer · 2 marks — **2022** – 30/4/2

If the first term of an A.P. is 5, the last term is 15 and the sum of first n terms is 30, then find the value of n.

ANSWER *

$S_n = \frac{n}{2}(a + l) \Rightarrow 30 = \frac{n}{2}(5 + 15)$

$n = 3$

$n = 3$

Q96 Very Short Answer · 2 marks — **2022** – 30/4/3

Find the sum of all 11 terms of an A.P. whose 6^{th} term is 30.

ANSWER *

$S_{11} = \frac{11}{2}[2a + 10d] = 11(a + 5d)$

$= 11 \times a_6 = 11 \times 30 = 330$

$S_{11} = 330$

Q97 Very Short Answer · 2 marks · Internal choice (OR) part — **2022** – 30/6/1, 30/6/3

Find the sum of the first 40 positive integers divisible by 7.

ANSWER *

$7,\ 14,\ \ldots,\ 280$

$S_{40} = \frac{40}{2}(7 + 280) = 5740$

5740

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Q98 Very Short Answer · 2 marks · Internal choice (OR) part — **2022** – 30/B/5

Find the sum of the first 20 terms of an AP whose n^{th} term is given as $a_n = 5 - 3n$.

ANSWER *

$a_1 = 2, a_{20} = -55$

$S_{20} = \frac{20}{2}(2 - 55) = -530$

$S_{20} = -530$

Q99 Very Short Answer · 2 marks · Internal choice (OR) part — **2022** – 30/B/6

Find the sum of the first 10 multiples of 5, using an A.P.

ANSWER *

$5,\ 10,\ \ldots,\ 50$

$S_{10} = \frac{10}{2}(5 + 50) = 275$

275

Q100 Very Short Answer · 2 marks **2022** – 30/B/6

If the sum of the first n terms of an A.P. is given by $S_n = 2n^2 + n$, then determine its 10^{th} term.

ANSWER *

$a_{10} = S_{10} - S_9 = 210 - 171$

$= 39$

$a_{10} = 39$

Q101 Very Short Answer · 2 marks Internal choice (OR) part **2026 (I)** – 30/3/1, 30/3/2

In an A.P., the first term is 32 and the last term is -10. If the common difference is -2, then find the number of terms and their sum.

ANSWER *

$32 + (n-1)(-2) = -10 \Rightarrow n = 22$

$S_{22} = \frac{22}{2}(32 - 10) = 242$

$n = 22$; **sum** $= 242$

Q102 Very Short Answer · 2 marks Internal choice (OR) part **2026 (I)** – 30/3/1, 30/3/2

Find the sum of the first 28 terms of an A.P. whose n^{th} term is given by $a_n = 3n - 2$.

ANSWER *

$a_1 = 1, a_{28} = 82$

$S_{28} = \frac{28}{2}(1 + 82) = 1162$

$S_{28} = 1162$

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Q103 Very Short Answer · 2 marks Internal choice (OR) part **2026 (I)** – 30/3/3

In an A.P., the first term is 4 and the last term is 31. If sum of all the terms is 175, find the number of terms and the common difference.

ANSWER *

$\frac{n}{2}(4 + 31) = 175 \Rightarrow n = 10$

$31 = 4 + 9d \Rightarrow d = 3$

$n = 10, d = 3$

Q104 Very Short Answer · 2 marks Internal choice (OR) part **2026 (I)** – 30/3/3

How many terms of the A.P. $21,\ 18,\ 15,\ \ldots$ must be added to get the sum zero ?

ANSWER *

$\frac{n}{2}[42 + (n-1)(-3)] = 0 \Rightarrow 45 - 3n = 0$

$n = 15$

15 terms

Q105 Short Answer · 3 marks **2022** – 30/4/1

If the last term of an A.P. of 30 terms is 119 and the 8^{th} term from the end (towards the first term) is 91, then find the common difference of the A.P. Hence, find the sum of all the terms of the A.P.

ANSWER *

8^{th} term from the end $= l - 7d \Rightarrow 119 - 7d = 91 \Rightarrow d = 4$

$a = 119 - 29 \times 4 = 3$

$S_{30} = \frac{30}{2}(3 + 119) = 1830$

$d = 4$; $S_{30} = 1830$

Q106 Short Answer · 3 marks **2022** – 30/4/2

In an A.P., the sum of first n terms is $\frac{n}{2}(3n + 5)$. Find the 25^{th} term of the A.P.

ANSWER *

$a_{25} = S_{25} - S_{24}$

$= \frac{25}{2}(80) - 12(77) = 1000 - 924$

$= 76$

$a_{25} = 76$

Q107 Short Answer · 3 marks Internal choice (OR) part **2023** – 30/C/1, 30/C/2, 30/C/3

Find the sum of all integers between 50 and 500, which are divisible by 7.

ANSWER

$56, 63, \ldots, 497$. Here $a = 56$ and $d = 7$ — 1

Let $a_n = 497 \Rightarrow 56 + (n - 1) \times 7 = 497$ — ½

$\Rightarrow n = 64$ — ½

$S_{64} = \frac{64}{2} \times (56 + 497) = 17696$ — 1

17696

Q108 Short Answer · 3 marks Internal choice (OR) part **2023** – 30/C/1, 30/C/2, 30/C/3

How many numbers lie between 10 and 300, which when divided by 4 leave a remainder 3 ? Also, find their sum.

ANSWER

$11, 15, \ldots, 299$. Here $a = 11$ and $d = 4$ — 1

Let $a_n = 299 \Rightarrow 11 + (n - 1) \times 4 = 299$ — ½

$\Rightarrow n = 73$ — ½

$S_{73} = \frac{73}{2} \times (11 + 299) = 11315$ — 1

73 numbers; sum $= 11315$

Q109 Short Answer · 3 marks **2023** – 30/5/2

In an A.P., the sum of the first n terms is given by $S_n = 6n - n^2$. Find its 30^{th} term.

ANSWER *

$a_{30} = S_{30} - S_{29}$

$= (180 - 900) - (174 - 841) = -720 + 667$

$= -53$

$\boxed{a_{30} = -53}$

Q110 Short Answer · 3 marks **2023** – 30/5/3

Find the common difference of an A.P. whose first term is 8, the last term is 65 and the sum of all its terms is 730.

ANSWER *

$S_n = \frac{n}{2}(a + l) \Rightarrow 730 = \frac{n}{2}(73) \Rightarrow n = 20$

$65 = 8 + 19d$

$d = 3$

$\boxed{d = 3}$

Q111 Short Answer · 3 marks Internal choice (OR) part **2024** – 30/2/1, 30/2/2, 30/2/3

If the sum of first m terms of an A.P. is same as sum of its first n terms $(m \neq n)$, then show that the sum of its first $(m + n)$ terms is zero.

ANSWER *

$\frac{m}{2}[2a + (m-1)d] = \frac{n}{2}[2a + (n-1)d] \Rightarrow 2a(m-n) + d[(m^2 - n^2) - (m-n)] = 0$

$\Rightarrow (m-n)[2a + (m+n-1)d] = 0$; since $m \neq n$, $2a + (m+n-1)d = 0$

$S_{m+n} = \frac{m+n}{2}[2a + (m+n-1)d] = 0$

Q112 Short Answer · 3 marks Internal choice (OR) part **2024** – 30/3/1, 30/3/2, 30/3/3

If the sum of first 7 terms of an A.P. is 49 and that of first 17 terms is 289, find the sum of its first 20 terms.

ANSWER *

$S_7 = 7(a + 3d) = 49 \Rightarrow a + 3d = 7$; $S_{17} = 17(a + 8d) = 289 \Rightarrow a + 8d = 17$

$d = 2,\ a = 1$

$S_{20} = 10(2 + 38) = 400$

$\boxed{S_{20} = 400}$

Q113 Short Answer · 3 marks Internal choice (OR) part **2024** – 30/3/1, 30/3/2, 30/3/3

The ratio of the 10^{th} term to its 30^{th} term of an A.P. is 1 : 3 and the sum of its first six terms is 42. Find the

first term and the common difference of A.P.

ANSWER *

$3(a+9d) = a+29d \Rightarrow a = d$

$S_6 = 3(2a+5d) = 21a = 42$

$a = 2,\ d = 2$

$\boxed{a = 2,\ d = 2}$

Q114 Short Answer · 3 marks Internal choice (OR) part **2024** – 30/5/1, 30/5/2, 30/5/3

If the sum of the first 14 terms of an A.P. is 1050 and the first term is 10, then find the 20^{th} term and the n^{th} term.

ANSWER *

$S_{14} = 7(20+13d) = 1050 \Rightarrow 20+13d = 150 \Rightarrow d = 10$

$a_{20} = 10 + 19 \times 10 = 200$

$a_n = 10 + (n-1)10 = 10n$

$\boxed{a_{20} = 200;\ a_n = 10n}$

Q115 Short Answer · 3 marks Internal choice (OR) part **2024** – 30/5/1, 30/5/2, 30/5/3

The first term of an A.P. is 5, the last term is 45 and the sum of all the terms is 400. Find the number of terms and the common difference of the A.P.

ANSWER *

$S_n = \frac{n}{2}(5+45) = 400 \Rightarrow n = 16$

$45 = 5 + 15d$

$d = \frac{40}{15} = \frac{8}{3}$

$\boxed{n = 16,\ d = \frac{8}{3}}$

Q116 Short Answer · 3 marks **2025** – 30(B)/S

The sum of the third and seventh terms of an AP is 40 and the sum of its sixth and fourteenth terms is 70. Find the sum of the first ten terms of the AP.

ANSWER

$a_3 + a_7 = 40 \Rightarrow 2a + 8d = 40$ or $a + 4d = 20$ ...(1) ½

$a_6 + a_{14} = 70 \Rightarrow 2a + 18d = 70$ or $a + 9d = 35$ ...(2) ½

Solving (1) and (2), $a = 8$ and $d = 3$ ½+½

$S_{10} = \frac{10}{2} \times [2(8) + 9(3)]$ ½

$= 215$ ½

$\boxed{S_{10} = 215}$

Q117 Short Answer · 3 marks | Internal choice (OR) part | **2026 (I)** – 30/5/1, 30/5/2, 30/5/3

In an A.P., 15^{th} term exceeds the 8^{th} term by 21. If sum of first 10 terms is 55, then form the A.P.

ANSWER *

$7d = 21 \Rightarrow d = 3$

$5(2a + 27) = 55 \Rightarrow a = -8$

AP: $-8,\ -5,\ -2,\ \ldots$

$-8,\ -5,\ -2,\ \ldots$

Q118 Short Answer · 3 marks | Internal choice (OR) part | **2026 (I)** – 30/5/1, 30/5/2, 30/5/3

The sum of first n terms of an A.P. is $2n^2 + 13n$. Find its n^{th} term and hence 10^{th} term.

ANSWER *

$a_n = S_n - S_{n-1} = 2n^2 + 13n - [2(n-1)^2 + 13(n-1)]$

$= 4n + 11$

$a_{10} = 51$

$a_n = 4n + 11$; $a_{10} = 51$

Q119 Short Answer · 3 marks | **2026 (II)** – 30(B)

The sum of the first eight terms of an AP is 124 and that of the first twenty terms is 670. Find the AP and hence find its 15^{th} term.

ANSWER

Let first term $= a$, common difference $= d$. $S_8 = 4[2a + 7d] = 124 \Rightarrow 2a + 7d = 31$ — ½

$S_{20} = 10[2a + 19d] = 670 \Rightarrow 2a + 19d = 67$ — ½

On solving, $a = 5$ and $d = 3$ — 1

AP is $5,\ 8,\ 11, \ldots$ — ½

Hence 15^{th} term $= a + 14d = 5 + 42 = 47$ — ½

AP: $5,\ 8,\ 11, \ldots$; $a_{15} = 47$

Q120 Long Answer · 5 marks | Internal choice (OR) part | **2023** – 30/C/B

Solve the equation for x : $-4 + (-1) + 2 + \cdots + x = 437$.

ANSWER

$S_n = 437,\ a = -4,\ d = 3,\ a_n = x$ — 1

$437 = \frac{n}{2}[-8 + (n-1)3]$ — 1

$\Rightarrow 3n^2 - 11n - 874 = 0$ — 1

or $(3n + 46)(n - 19) = 0 \Rightarrow n = 19$ — 1

$x = a_{19} = -4 + 18(3) = 50$ — 1

$x = 50$

Q121 Long Answer · 5 marks · Internal choice (OR) part — **2023** – 30/C/B

The sum of first n terms of an AP is $5n^2 + 3n$. If its n^{th} term is 168, find n. Also, find the 20^{th} term of the AP.

ANSWER

$S_n = 5n^2 + 3n \Rightarrow S_1 = 8 \Rightarrow a = 8$ — 1

$S_2 = a_1 + a_2 = 26 \Rightarrow a_2 = 18 \Rightarrow d = 18 - 8 = 10$ — 1½

$a_n = 168 = 8 + (n-1)10 \Rightarrow n = 17$ — 1½

$a_{20} = 8 + 190 = 198$ — 1

$n = 17$; $a_{20} = 198$

Q122 Long Answer · 5 marks · Internal choice (OR) part — **2023** – 30/1/1, 30/1/2, 30/1/3

The ratio of the 11^{th} term to 17^{th} term of an A.P. is 3 : 4. Find the ratio of 5^{th} term to 21^{st} term of the same A.P. Also, find the ratio of the sum of first 5 terms to that of first 21 terms.

ANSWER *

$\frac{a+10d}{a+16d} = \frac{3}{4} \Rightarrow 4a + 40d = 3a + 48d \Rightarrow a = 8d$

$\frac{a_5}{a_{21}} = \frac{a+4d}{a+20d} = \frac{12d}{28d} = \frac{3}{7}$

$S_5 = \frac{5}{2}(2a + 4d) = 50d$, $S_{21} = \frac{21}{2}(2a + 20d) = 378d$

$S_5 : S_{21} = 50 : 378 = 25 : 189$

$a_5 : a_{21} = 3 : 7$; $S_5 : S_{21} = 25 : 189$

Q123 Long Answer · 5 marks — **2023** – 30/2/1

How many terms of the arithmetic progression 45, 39, 33, ... must be taken so that their sum is 180 ? Explain the double answer.

ANSWER *

$a = 45,\ d = -6$: $\frac{n}{2}[90 + (n-1)(-6)] = 180 \Rightarrow n(48 - 3n) = 180$

$\Rightarrow n^2 - 16n + 60 = 0 \Rightarrow (n-6)(n-10) = 0$

$n = 6$ or $n = 10$

Double answer: $a_7 = 9,\ a_8 = 3,\ a_9 = -3,\ a_{10} = -9$ and $a_7 + a_8 + a_9 + a_{10} = 0$, so the sum of the first 6 terms and of the first 10 terms are both 180.

6 terms or 10 terms

Q124 Long Answer · 5 marks · Internal choice (OR) part — **2023** – 30/6/1

The ratio of the 11^{th} term to the 18^{th} term of an A.P. is 2 : 3. Find the ratio of the 5^{th} term to the 21^{st} term.

Also, find the ratio of the sum of first 5 terms to the sum of first 21 terms.

ANSWER *

$3(a+10d) = 2(a+17d) \Rightarrow a = 4d$

$\frac{a_5}{a_{21}} = \frac{a+4d}{a+20d} = \frac{8d}{24d} = \frac{1}{3}$

$S_5 = \frac{5}{2}(2a+4d) = 30d,\ S_{21} = \frac{21}{2}(2a+20d) = 294d$

$S_5 : S_{21} = 30 : 294 = 5 : 49$

$a_5 : a_{21} = 1 : 3;\ S_5 : S_{21} = 5 : 49$

Q125 Long Answer · 5 marks · Internal choice (OR) part · **2023** – 30/6/1

If the sum of first 6 terms of an A.P. is 36 and that of the first 16 terms is 256, find the sum of first 10 terms.

ANSWER *

$S_6 = 3(2a+5d) = 36 \Rightarrow 2a+5d = 12$

$S_{16} = 8(2a+15d) = 256 \Rightarrow 2a+15d = 32$

$d = 2,\ a = 1$

$S_{10} = 5(2+18) = 100$

$S_{10} = 100$

Q126 Long Answer · 5 marks · Internal choice (OR) part · **2023** – 30/6/3

The sum of first q terms of an A.P. is $63q - 3q^2$. If its p^{th} term is -60, find the value of p. Also, find the 11^{th} term of this A.P.

ANSWER *

$a_1 = S_1 = 60,\ S_2 = 114 \Rightarrow a_2 = 54,\ d = -6$

$60 - 6(p-1) = -60 \Rightarrow p - 1 = 20 \Rightarrow p = 21$

$a_{11} = 60 - 60 = 0$

$p = 21;\ a_{11} = 0$

Q127 Long Answer · 5 marks · Internal choice (OR) part · **2024** – 30/1/2, 30/1/3

In an A.P. of 40 terms, the sum of first 9 terms is 153 and the sum of last 6 terms is 687. Determine the first term and common difference of A.P. Also, find the sum of all the terms of the A.P.

ANSWER *

$S_9 = \frac{9}{2}(2a+8d) = 153 \Rightarrow a+4d = 17$

Last 6 terms are a_{35} to a_{40}: $3(a_{35}+a_{40}) = 687 \Rightarrow 2a+73d = 229$

Solving: $65d = 195 \Rightarrow d = 3,\ a = 5$

$S_{40} = 20(10+39\times 3) = 2540$

$a = 5,\ d = 3;\ S_{40} = 2540$

Q128 Long Answer · 5 marks | Internal choice (OR) part | **2025** – 30/3/1, 30/3/3

The sum of the third term and the seventh term of an AP is 6 and their product is 8. Find the sum of the first sixteen terms of the AP.

ANSWER *

$a_3 + a_7 = 2a + 8d = 6 \Rightarrow a + 4d = 3$

$(a + 2d)(a + 6d) = 8 \Rightarrow (3 - 2d)(3 + 2d) = 8 \Rightarrow d = \pm\frac{1}{2}$

$d = \frac{1}{2}: a = 1, S_{16} = 8\left[2 + 15 \times \frac{1}{2}\right] = 76$

$d = -\frac{1}{2}: a = 5, S_{16} = 8\left[10 - \frac{15}{2}\right] = 20$

$S_{16} = 76$ **or** 20

Q129 Long Answer · 5 marks | Internal choice (OR) part | **2025** – 30/3/2

An AP consists of 'n' terms whose n^{th} term is 4 and the common difference is 2. If the sum of 'n' terms of AP is -14, then find 'n'. Also, find the sum of the first 20 terms.

ANSWER *

$a = 4 - 2(n - 1) = 6 - 2n; S_n = \frac{n}{2}(a + 4) = n(5 - n) = -14$

$\Rightarrow n^2 - 5n - 14 = 0 \Rightarrow (n - 7)(n + 2) = 0 \Rightarrow n = 7$

$a = -8; S_{20} = 10[-16 + 19 \times 2] = 220$

$n = 7; S_{20} = 220$

Q130 Long Answer · 5 marks | Internal choice (OR) part | **2025** – 30/3/2

The sum of the first six terms of an arithmetic progression is 42. The ratio of the 10^{th} term to the 30^{th} term is 1 : 3. Calculate the first and the thirteenth terms of the AP.

ANSWER *

$S_6 = 3(2a + 5d) = 42 \Rightarrow 2a + 5d = 14$

$3(a + 9d) = a + 29d \Rightarrow a = d$

$7a = 14 \Rightarrow a = d = 2; a_{13} = 2 + 24 = 26$

$a = 2, a_{13} = 26$

Q131 Long Answer · 5 marks | Internal choice (OR) part | **2026 (II)** – 30/8/2

Find the sum of first 22 terms of an A.P. in which $d = 7$ and 22^{nd} term is 149.

ANSWER

$a_{22} = 149 \Rightarrow a + 21 \times 7 = 149$ — 1½

$\Rightarrow a = 2$ — 1

$S_{22} = \frac{22}{2} \times (2 + 149)$ — 1½

$= 1661$ — 1

$S_{22} = 1661$

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TOPIC 3

03 Word Problems on AP

QUICK RECAP

- Identify a (first term) and d (fixed increase/decrease) from the situation, then use a_n for a particular term and S_n for a total.
- Number of terms is always a natural number; reject negative or fractional values of n.

Q132 Short Answer · 3 marks — **2022** – 30/4/3

The sum of the first three terms of an A.P. is 33. If the product of first and third term exceeds the second term by 29, find the A.P.

ANSWER *

Let the terms be $a-d,\ a,\ a+d$: $3a = 33 \Rightarrow a = 11$

$(11-d)(11+d) = 11+29 \Rightarrow 121 - d^2 = 40 \Rightarrow d = \pm 9$

AP: $2,\ 11,\ 20,\ \ldots$ or $20,\ 11,\ 2,\ \ldots$

$2,\ 11,\ 20,\ \ldots$ or $20,\ 11,\ 2,\ \ldots$

Q133 Short Answer · 3 marks · Internal choice (OR) part — **2023** – 30/4/2

Rohan repays his total loan of ₹ 1,18,000 by paying every month starting with the first instalment of ₹ 1,000. If he increases the instalment by ₹ 100 every month, what amount will be paid by him in the 30^{th} instalment ? What amount of loan has he paid after 30^{th} instalment ?

ANSWER *

$a = 1000,\ d = 100$

$a_{30} = 1000 + 29 \times 100 = ₹3900$

$S_{30} = \frac{30}{2}(1000 + 3900) = ₹73500$

₹ 3,900; ₹ 73,500

Q134 Short Answer · 3 marks — **2025** – 30/2/1, 30/2/2

A sum of ₹ 2,000 is invested at 7% per annum simple interest. Calculate the interests at the end of 1st, 2nd and 3rd year. Do these interests form an AP ? If so, find the interest at the end of the 27th year.

ANSWER *

Interest after n years $= \frac{2000 \times 7 \times n}{100} = 140n$: ₹140, ₹280, ₹420

Difference is constant (₹140), so they form an AP with $a = 140,\ d = 140$

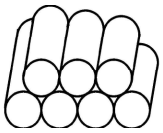
$a_{27} = 140 + 26 \times 140 = ₹3780$

₹ 140, ₹ 280, ₹ 420; yes; ₹ 3,780

Q135 Long Answer · 5 marks · Internal choice (OR) part — **2023** – 30/1/1, 30/1/2, 30/1/3

250 logs are stacked in the following manner : 22 logs in the bottom row, 21 in the next row, 20 in the row next to it and so on (as shown by an example). In how many rows, are the 250 logs placed and how many

logs are there in the top row ?



ANSWER *

$a = 22,\ d = -1$: $S_n = \frac{n}{2}[44 - (n-1)] = 250$

$\Rightarrow n^2 - 45n + 500 = 0 \Rightarrow (n-20)(n-25) = 0$

$n = 25$ gives $a_{25} = 22 - 24 = -2 < 0$, not possible; so $n = 20$

Top row: $a_{20} = 22 - 19 = 3$ logs

20 rows; 3 logs in the top row

Q136 Long Answer · 5 marks Internal choice (OR) part **2025** – 30/3/1, 30/3/3

The minimum age of children eligible to participate in a painting competition is 8 years. It is observed that the age of the youngest boy was 8 years and the ages of the participants, when seated in order of age, have a common difference of 4 months. If the sum of the ages of all the participants is 168 years, find the age of the eldest participant in the painting competition.

ANSWER *

$a = 8,\ d = \frac{1}{3}$ year: $\frac{n}{2}\left[16 + \frac{n-1}{3}\right] = 168$

$\Rightarrow n^2 + 47n - 1008 = 0 \Rightarrow (n-16)(n+63) = 0 \Rightarrow n = 16$

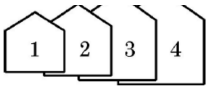
Eldest: $a_{16} = 8 + 15 \times \frac{1}{3} = 13$ years

13 years

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Q137 Long Answer · 5 marks Internal choice (OR) part **2026 (II)** – 30/8/1, 30/8/3

The houses in a row are numbered consecutively 1 to 49. Show that there exist a value of x such that sum of numbers of houses preceding the house numbered x is equal to the sum of numbers of houses following x. Find the value of x.



ANSWER

Here $a = 1,\ d = 1$ and $n = 49$. $S_{x-1} = S_{49} - S_x$ — 1

$\frac{x-1}{2}[2 \times 1 + (x-1-1) \times 1] = \frac{49}{2}[2 \times 1 + 48 \times 1] - \frac{x}{2}[2 \times 1 + (x-1) \times 1]$ — 2

$\Rightarrow x^2 = 1225$ — 1½

$x \neq -35 \therefore\ x = 35$ — ½

$x = 35$

Q138 Long Answer · 5 marks Internal choice (OR) part **2026 (II)** – 30/8/2

Split 207 into three parts such that these three parts are in A.P. and the product of the two smaller parts is

4623.

ANSWER

Let three parts be $(a-d),\ a$ and $(a+d)$ ½

$(a-d)+a+(a+d)=207$ 1

$\Rightarrow a=69$ ½

Also $a\times(a-d)=4623$ ½

$\Rightarrow 69\times(69-d)=4623$ 1

$\Rightarrow d=2$ ½

Therefore, required three parts are 67, 69 and 71 1

The parts are 67, 69 and 71.

Q139 Case Study · 4 marks **2022** – 30/1/1, 30/1/2, 30/1/3

Case study: In Mathematics, relations can be expressed in various ways. The matchstick patterns are based on linear relations. Different strategies can be used to calculate the number of matchsticks used in different figures. One such pattern is shown below. Observe the pattern and answer the following questions using Arithmetic Progression :

(a) Write the AP for the number of triangles used in the figures. Also, write the n^{th} term of this AP. **[2]**

(b) Which figure has 61 matchsticks ? **[2]**



Figure 1 *Figure 2* *Figure 3*

ANSWER *

(a) Triangles: $4,\ 6,\ 8,\ \ldots\ (a=4,\ d=2)$

$a_n=4+(n-1)2=2n+2$

(b) Matchsticks: $12,\ 19,\ 26,\ \ldots\ (a=12,\ d=7)$

$12+(n-1)7=61\Rightarrow n=8$; Figure 8 has 61 matchsticks

Q140 Case Study · 4 marks **2024** – 30/S/1, 30/S/2, 30/S/3

Case study: A school has decided to plant some endangered trees on 51^{st} World Environment Day in the nearest park. They have decided to plant those trees in few concentric circular rows such that each succeeding row has 20 more trees than the previous one. The first circular row has 50 trees.

(i) How many trees will be planted in the 10^{th} row ? **[1]**

(ii) How many more trees will be planted in the 8^{th} row than in the 5^{th} row ? **[1]**

(iii) (a) If 3200 trees are to be planted in the park, then how many rows are required ? **[2]**

OR

(iii) (b) If 3200 trees are to be planted in the park, then how many trees are still left to be planted after the 11^{th} row ? **[2]**

ANSWER

Here $a = 50$ and $d = 20$. (i) $a_{10} = 50 + 9 \times 20$ ½

$= 230$ ½

(ii) $a_8 - a_5 = 3 \times 20 = 60$ 1

(iii)(a) Let $S_n = 3200 \Rightarrow \frac{n}{2}[2 \times 50 + (n-1) \times 20] = 3200$ ½

$\Rightarrow n^2 + 4n - 320 = 0$ ½

$\Rightarrow (n + 20)(n - 16) = 0$ ½

$n \neq -20 \therefore\ n = 16$; 16 rows are required ½

OR (iii)(b) Required number of trees $= S_n - S_{11}$ ½

$= 3200 - \frac{11}{2}[2 \times 50 + 10 \times 20]$ 1

$= 1550$ ½

Q141 Case Study · 4 marks **2024** – 30/4/1, 30/4/2, 30/4/3

Case study: Treasure Hunt is an exciting and adventurous game where participants follow a series of clues/numbers/maps to discover hidden treasures. While playing a treasure hunt game, some clues (numbers) are hidden in various spots collectively forming an A.P. If the number on the n^{th} spot is $20 + 4n$, then answer the following questions to help the players in spotting the clues :

(i) Which number is on first spot ? **[1]**

(ii) (a) Which spot is numbered as 112 ? **[2]**

OR

(ii) (b) What is the sum of all the numbers on the first 10 spots ? **[2]**

(iii) Which number is on the $(n-2)^{th}$ spot ? **[1]**

ANSWER *

(i) $a_1 = 20 + 4 = 24$

(ii)(a) $20 + 4n = 112 \Rightarrow n = 23$; the 23^{rd} spot

OR (ii)(b) $a_{10} = 60$; $S_{10} = \frac{10}{2}(24 + 60) = 420$

(iii) $a_{n-2} = 20 + 4(n-2) = 4n + 12$

Q142 Case Study · 4 marks **2025** – 30/S/1, 30/S/2, 30/S/3

Case study: In the month of September, villagers of Ankurhut were falling ill with high temperature. Paracetamol was one of the highest sold medicines during that phase. A survey was conducted to estimate the overall sale of Paracetamol of each pharmacy during the last 7 days. It was observed that the number of Paracetamol sold in different shops were all 3-digit numbers, divisible by 13, taken in order.

(i) How many Paracetamols were sold by the 7^{th} pharmacy ? **[1]**

(ii) What was the difference between the number of Paracetamols sold by the 14^{th} and the 9^{th} pharmacy ? **[1]**

(iii) (a) How many Paracetamols were sold by the 9^{th} pharmacy from the last ? **[2]**

OR

(iii) (b) What was the total number of Paracetamols sold in that week ? **[2]**

ANSWER

(i) A.P. formed is $104,\ 117,\ 130, \ldots$ with $a = 104$ and $d = 13$ ½

$a_7 = 104 + 6 \times 13 = 182$ ½

(ii) $a_{14} - a_9 = 5 \times 13 = 65$ 1

(iii)(a) Last term of A.P. is 988 and $d = -13$ (from the end) 1

$a_9 = 988 + 8 \times (-13) = 884$ 1

OR (iii)(b) $988 = 104 + (n-1) \times 13 \Rightarrow n = 69$ 1

$S_{69} = \frac{69}{2} \times (104 + 988) = 37674$ 1

Q143 Case Study · 4 marks **2025** – 30(B)

Case study: To inculcate the good habit of savings in her children, Reema brought a piggy bank and after putting a ₹ 10 coin in it, she handed it over to her daughter Amisha and asked her to put money in it from her pocket money at the beginning of every week. Amisha put two ten rupee coins at the beginning of next (second) week and in this way increases her savings by one ₹ 10 coin every week.

(a) How many coins were added in the piggy bank at the beginning of 5^{th} week ? **[1]**

(b) How many ₹ 10 coins will be there in the piggy bank after the end of 7 weeks ? **[1]**

(c) (i) If the piggy bank can hold a maximum of 300 ₹ 10 coins, after how many weeks it would be full ? **[2]**

OR

(c) (ii) Find the total amount of money in the piggy bank at the end of 20 weeks. **[2]**

ANSWER *

Coins put each week: $1,\ 2,\ 3,\ \ldots$ ($a = 1,\ d = 1$). (a) $a_5 = 5$ coins

(b) $S_7 = \frac{7}{2}(1 + 7) = 28$ coins

(c)(i) $\frac{n(n+1)}{2} = 300 \Rightarrow n^2 + n - 600 = 0 \Rightarrow (n + 25)(n - 24) = 0 \Rightarrow n = 24$ weeks

OR (c)(ii) $S_{20} = \frac{20 \times 21}{2} = 210$ coins; amount = ₹2100

Q144 Case Study · 4 marks **2025** – 30/1/1, 30/1/2, 30/1/3

Case study: A school is organizing a charity run to raise funds for a local hospital. The run is planned as a series of rounds around a track, with each round being 300 metres. To make the event more challenging and engaging, the organizers decide to increase the distance of each subsequent round by 50 metres. For example, the second round will be 350 metres, the third round will be 400 metres and so on. The total number of rounds planned is 10.

(i) Write the fourth, fifth and sixth term of the Arithmetic Progression so formed. **[1]**

(ii) Determine the distance of the 8^{th} round. **[1]**

(iii) (a) Find the total distance run after completing all 10 rounds. **[2]**

OR

(iii) (b) If a runner completes only the first 6 rounds, what is the total distance run by the runner ? **[2]**

ANSWER *

$a = 300,\ d = 50$. (i) 450 m, 500 m, 550 m

(ii) $a_8 = 300 + 7 \times 50 = 650$ m

(iii)(a) $S_{10} = \frac{10}{2}[600 + 9 \times 50] = 5250$ m

OR (iii)(b) $S_6 = \frac{6}{2}[600 + 5 \times 50] = 2550$ m

Q145 Case Study · 4 marks **2025** – 30/5/1, 30/5/2, 30/5/3

Case study: In an equilateral triangle of side 10 cm, equilateral triangles of side 1 cm are formed as shown in the figure below, such that there is one triangle in the first row, three triangles in the second row, five triangles in the third row and so on. Based on given information, answer the following questions using Arithmetic Progression.

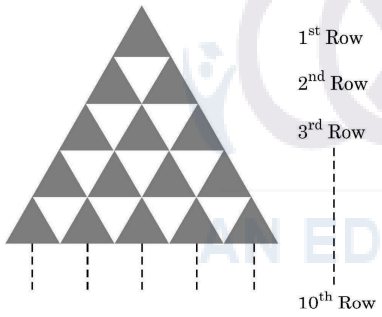
(i) How many triangles will be there in bottom most row ? **[1]**

(ii) How many triangles will be there in fourth row from the bottom ? **[1]**

(iii) (a) Find the total number of triangles of side 1 cm each till 8^{th} row. **[2]**

OR

(iii) (b) How many more number of triangles are there from 5^{th} row to 10^{th} row than in first 4 rows ? Show working. **[2]**



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ANSWER *

Triangles in rows: $1,\ 3,\ 5,\ \ldots$ ($a = 1,\ d = 2$), 10 rows. (i) $a_{10} = 1 + 9 \times 2 = 19$

(ii) 4^{th} row from the bottom is the 7^{th} row: $a_7 = 13$

(iii)(a) $S_8 = \frac{8}{2}(2 + 14) = 64$

OR (iii)(b) $S_4 = 16$, $S_{10} = 100$; rows 5 to 10 have $100 - 16 = 84$; $84 - 16 = 68$ more triangles

Q146 Case Study · 4 marks **2025** – 30/6/1, 30/6/2, 30/6/3

Case study: In order to organise Annual Sports Day, a school prepared an eight lane running track with an integrated football field inside the track area. The length of innermost lane of the track is 400 m and each subsequent lane is 7.6 m longer than the preceding lane. Based on given information, answer the following questions, using concept of Arithmetic Progression.

(i) What is the length of the 6^{th} lane ? **[1]**

(ii) How long is the 8^{th} lane than that of 4^{th} lane ? **[1]**

(iii) (a) While practicing for a race, a student took one round each in first six lanes. Find the total distance covered by the student. **[2]**

OR

(iii) (b) A student took one round each in lane 4 to lane 8. Find the total distance covered by the student. **[2]**

ANSWER *

$a = 400,\ d = 7.6$. (i) $a_6 = 400 + 5 \times 7.6 = 438$ m

(ii) $a_8 - a_4 = 4 \times 7.6 = 30.4$ m

(iii)(a) $S_6 = \frac{6}{2}[800 + 5 \times 7.6] = 2514$ m

OR (iii)(b) $a_4 = 422.8$, $a_8 = 453.2$; distance $= \frac{5}{2}(422.8 + 453.2) = 2190$ m

Q147 Case Study · 4 marks — **2026 (I)** – 30/1/3

Case study: In a potato race, a bucket is placed at the starting point, which is 5 m from the first potato. The other potatoes are arranged 3 m apart in a straight line, with a total of 10 potatoes, as shown in the figure. A competitor starts from the bucket, picks up the nearest potato, runs back to the bucket to drop it in, then returns to pick up the next potato. This process continues until all the potatoes are in the bucket.

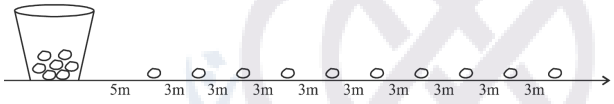
(i) What is the distance covered to pick up the first potato and drop it in bucket ? **[1]**

(ii) What is the distance covered to pick up the second potato and drop it in bucket ? **[1]**

(iii) (a) What is the total distance the competitor has to run ? **[2]**

OR

(iii) (b) If average speed of competitor is 5 m/s, then find the average time taken by competitor to put all the potatoes in the bucket. **[2]**



ANSWER *

(i) $2 \times 5 = 10$ m

(ii) $2 \times (5 + 3) = 16$ m

(iii)(a) Distances $10,\ 16,\ 22,\ \ldots$ ($a = 10,\ d = 6, n = 10$): $S_{10} = 5[20 + 54] = 370$ m

OR (iii)(b) Time $= \frac{370}{5} = 74$ seconds

Q148 Case Study · 4 marks — **2026 (I)** – 30/4/1, 30/4/2, 30/4/3

Case study: 'Kolam' is a decorative art which is made with rice flour in South Indian States. It is drawn on grid pattern of dots. One such art work is shown below. Observe the given figure carefully. There are 4 dots in first square, 8 dots in second square, 12 dots in third square and so on.

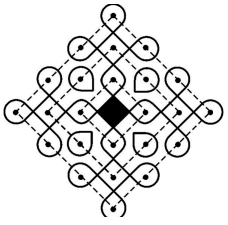
(i) Show that number of dots given above form an A.P. Write the first term and common difference. **[1]**

(ii) Write n^{th} term of the A.P. formed. **[1]**

(iii) (a) The pattern is expanded on a large ground. If total 220 dots are used, then find the number of squares formed. **[2]**

OR

(iii) (b) Is it possible to complete n number of squares using 100 dots ? If yes, then find the value of n. **[2]**



ANSWER *

(i) $4,\ 8,\ 12,\ \ldots$: difference is constant (4), so it is an AP; $a = 4,\ d = 4$

(ii) $a_n = 4 + (n-1)4 = 4n$

(iii)(a) $S_n = \frac{n}{2}(8 + 4(n-1)) = 2n(n+1) = 220 \Rightarrow n^2 + n - 110 = 0 \Rightarrow (n+11)(n-10) = 0 \Rightarrow n = 10$ squares

OR (iii)(b) $2n(n+1) = 100 \Rightarrow n^2 + n - 50 = 0$; $D = 201$ is not a perfect square, so n is not a natural number. Not possible.

Q149 Case Study · 4 marks — **2026 (I)** – 30/2/1, 30/2/2, 30/2/3

Case study: Your elder brother wants to buy a car and plans to take a loan from a bank for his car. He repays his total loan of ₹ 1,18,000 by paying every month, starting with the first instalment of ₹ 1,000 and he increases the instalment by ₹ 100 every month.

(i) Find the amount paid by him in the 30^{th} instalment. **[1]**

(ii) If the total number of instalments is 40, what is the amount paid in the last instalment ? **[1]**

(iii) (a) What amount does he still have to pay after the 30^{th} instalment ? **[2]**

OR

(iii) (b) Find the ratio of the tenth instalment to the last instalment. **[2]**

ANSWER *

$a = 1000,\ d = 100$. (i) $a_{30} = 1000 + 29 \times 100 = ₹3900$

(ii) $a_{40} = 1000 + 39 \times 100 = ₹4900$

(iii)(a) $S_{30} = \frac{30}{2}(1000 + 3900) = ₹73500$; still to pay $= 118000 - 73500 = ₹44500$

OR (iii)(b) $a_{10} = ₹1900$; $a_{10} : a_{40} = 1900 : 4900 = 19 : 49$

Q150 Case Study · 4 marks — **2026 (II)** – 30/7/1, 30/7/2, 30/7/3

Case study: A road roller, often called a roller compactor or just a roller, is an engineering vehicle used to compact soil, gravel, concrete, or asphalt in the construction of roads and foundations. Similar machines are also used in landfills or agriculture. Past records of a road roller manufacturing company show that the number of products produced each year forms an Arithmetic Progression (AP). The company produced 270 road rollers in the 4^{th} year and 510 in the 10^{th} year.

(i) What was the company's production in the 1^{st} year ? **[1]**

(ii) What was the company's production in the 8^{th} year ? **[1]**

(iii) (a) What was the company's total production of the first 6 years ? **[2]**

OR

(iii) (b) Find the ratio of 2^{nd} year's production to 8^{th} year's production. **[2]**

ANSWER

(i) $a + 3d = 270$ (I), $a + 9d = 510$ (II) — ½

Solving (I) and (II), $a = 150$; production in first year $= 150$ — ½

(ii) Solving (I) and (II), $d = 40$ — ½

$\therefore\ a_8 = 150 + 280 = 430$ — ½

(iii)(a) $S_6 = \frac{6}{2}[2 \times 150 + 5 \times 40]$ — 1

$= 1500$ — 1

OR (iii)(b) $a_2 = 150 + 40 = 190$ — 1

$\therefore\ a_2 : a_8 = 190 : 430 = 19 : 43$ — 1

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REFERENCES

Questions: CBSE Previous Year Question Papers – www.cbse.gov.in/cbsenew/question-paper.html

Answers: CBSE Marking Schemes – www.cbse.gov.in/cbsenew/marking-scheme.html