Arithmetic Progressions

1. Find the general term of the series 4, 7, 10, 13.....
(a) 3n - 7 (b) 3n + 7
(c) 3n +1 (d) 3n – 1

2. Which is the first negative term of the arithmetic progression 35, 30, 25,.....?
(a) 7th term (b) 5th term
(c) 9th term (d) 11th term

3. Find the next term of the arithmetic progression $\sqrt{12}, \sqrt{27}, \sqrt{48}$
(a) $\sqrt{75}$ (b) $\sqrt{60}$
(c) $\sqrt{80}$ (d) $\sqrt{90}$

4. What is the term of an arithmetic progression whose sum to 'n' terms is $2n^2 - 3n$?
(a) 4n - 3 (b) 4n - 5
(c) 4n + 5 (d) 5 - 4n

5. Which term of the arithmetic progression 30, 27, 24,.... is O?
(a) 8th term (b) 10th term
(c) 13th term (d) 11th term

6. The numbers 28, 22, 'x', 'y', 4 are in arithmetic progression. What are the respective values of 'x' and 'y'?
(a) 10, 16 (b) 20, 18
(c) 18, 16 (d) 16, 10

7. What is the sum to 'n' terms of the series $\sqrt{5}, \sqrt{20}, \sqrt{45}, \sqrt{80}, ...?$
(a) $\frac{n(n+1)\sqrt{5}}{2}$ (b) $\frac{n(n+1)}{\sqrt{2}}$
(c) $\frac{n}{2}\left(\frac{(n+1)}{\sqrt{5}}\right)$ (d) $n(n+1)\sqrt{5}$

8. What is the sum of the first 'n' even numbers?
(a) n^2+1 (b) $n(n-1)$
(c) n^2-n (d) $n(n+1)$

9. What is the sum of first 'n' odd numbers starting from 11?
(a) n^2+10n (b) n^2-10n
(c) $10n-n^2$ (d) n^2

10. How many two digit numbers are divisible by 4?
(a) 20 (b) 16
(c) 25 (d) 22

11. How many terms of the arithmetic progression 1, 9, 17, ... must be taken to give a sum of 1540?
(a) 10 (b) 40
(c) 20 (d) 15

12. What is the sum of 36 terms of the series whose n^{th} term is 5n + 4?
(a) 4347 (b) 3474
(c) 4374 (d) 3447

13. Divide 21 into three parts that are in arithmetic progression and whose product is 168.
(a) 3, 6, 9
(b) 14, 17, 11
(c) 2, 6, 14
(d) 2, 7, 12

14. Which term of the arithmetic progression 3, 8, 13, ... is 55 more than its 20th term?
(a) 29th term
(b) 31st term
(c) 25th term
(d) 27th term

15. Identify the formula for then n^{th} term of the arithmetic progression whose first term,
(a) is 2 - x, and the common difference,
(d) is 'x'.
(a) $2+x-nx$
(b) $2+(n-2)x$
(c) $2-x-nx$
(d) $2+(n-1)x$

16. Find the number of terms of the arithmetic progression $\frac{1}{3},\frac{1}{2},\frac{2}{3},.....\frac{11}{6}$

(a) 8 (b) 10
(c) 12 (d) 13

17. The first, second and last terms of an arithmetic progression are 5, 9 and 101 respectively. Find the number of terms in the arithmetic progression.

(a) 30 (b) 50
(c) 25 (d) 75

18. Find the sum of the first 18 terms, of the arithmetic progression 12b, 8b, 4b,.....

(a) 126b
(b) -56b
(c) 256b
(d) - 288b

19. Find the sum of the arithmetic progression, $x-2y, 2x-y, 3x.....11x+8y$.

(a) $33(2x+y)$
(b) $22(2x+y)$
(c) $28(x+y)$
(d) $33x+11y$

20. Find the sum from the sixth term to the twelfth term of the arithmetic progression 6, 10, 14, ...

(a) 176
(b) 232
(c) 266
(d) 184

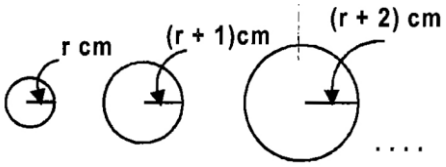
21. The first term and the common difference of an arithmetic progression are 13 and 5 respectively. Find the sum from the 6^{th} term to the 20th term.

(a) 876
(b) 146
(c) 1095
(d) 1080

22. Find the value of 'n' if the sum of the first 'n' terms of the A.P.I 5, 23, 31, ... is 708.

(a) 9 (b) 8
(c) 12 (d) 10

23. A piece of wire is used to make circles of the following pattern.



The radius of the first circle is 'r' cm and it is increased by 1 cm successively. Find the length of the wire that is required to make 5 such circles.

(a) $(10\pi + r)cm$
(b) $2\pi\, cm$
(c) $10\pi(r+2)cm$
(d) $2\pi(r+2)cm$

24. An arithmetic progression has a 3rd term of 13 and a last term of 148. If the common difference is 5, find the number of terms of the progression.

(a) 30
(b) 40
(c) 50
(d) 75

25. Given that the sum of the first 'n' terms of an arithmetic progression is 2n2 + 3n, find the twelfth term.

(a) 7^2
(b) 36
(c) $\sqrt{625}$
(d) 56

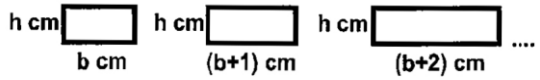
26. The first two terms of an arithmetic progression are 27 and 24 respectively. How many terms of the progression are to be added to get - 30?

(a) 15 (b) 20
(c) 25 (d) 18

27. A secondary school had an enrolment of 1620 students in the year 2009 which increases by 150 students per year. What was the enrolment in the year 2013?

(a) 2170 (b) 2070
(c) 2220 (d) 2150

28. A piece of wire is used to make rectangles with the same height of 'h' cm. The lengths of the rectangles are increased by 1 cm successively.



Find the total length of wire required to make 7 rectangles in this pattern.

(a) 2[h + b + 7] (b) 2b + h + 7

(c) 2n + h + 6 (d) 2[b + h + 6]

29. The postal rates in India from town M to town N are tabulated as shown.

Weight (g)	**1-60**	**61-80**	**81-100**	**101-120**	**121-140**
Postal Rate(`)	**3.00**	**3.50**	**4.00**	**4.50**	**5.00**

Amir posts a 230 g parcel from town M to town N, what is the postal charge?

(a) ` 8.00 (b) ` 7.50

(c) ` 7.00 (d) ` 6.00

30. A cineplex has 13 rows of seats with 10 seats in the first row, 12 in the second, 14 in the third and so on. What is the total number of seats in the cineplex?

(a) 252 (b) 256

(c) 258 (d) 286

31. Sulekha intends to read a 200 page book within a specific period-She starts by reading 11 pages on the first day and increases her rate of reading by reading an extra 2 pages for each subsequent day How long will she take to finish reading the book?

(a) 20

(b) 10

(c) 15

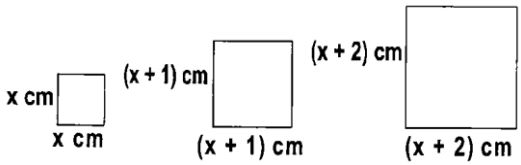
(d) 25

32. The 6th term of an arithmetic progression is 30 and the sum of the first six terms is 210. Find the sum of the next 6 consecutive terms.

(a) 100 (b) 50

(c) 138 (d) 204

33. The given figure shows a pattern of several squares drawn consecutively.



The perimeters of the squares in figure form an arithmetic progression. The length of the first square is x cm and the length of the other consecutive squares differ from each other by 1 cm. Given the sum of the perimeters of the first five squares is 160 cm, find the sum of the perimeters of the first 10 squares.

(a) 280cm

(b) 240cm

(c) 420 cm

(d) 360 cm

34. In an arithmetic progression, the fourth term is 8 and the sum of 12 terms is 156.

Find the value of 'p' if the p^{th} term is 1000.

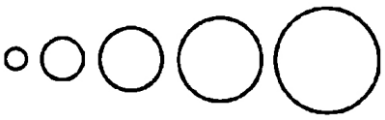
(a) 200

(b) 500

(c) 300

(d) 100

35. A roll of thread 907i cm long is cut into 5 parts to make up 5 circles as shown in the figure.



The radii of the circles increase by 1 cm consecutively. Find the radius of the smallest circle.

(a) 7 cm (b) 5 cm

(c) 6 cm (d) 9 cm

36. A circle is divided into 18 sectors such that the angles subtended at the centre form an arithmetic progression. Given that the angle of the smallest sector is 11.5°, find the angle of the biggest sector.

(a) 30° (b) 15.5°

(c) 45° (d) 28.5°

37. An arithmetic progression has 10 terms. The sum of the odd terms is 245 whereas the sum of the even terms is 305. Find the common difference.
(a) 2 (b) 7
(c) 3 (d) 1

38. Given an arithmetic progression -10,-5, 0,..... Identify three consecutive terms of the progression whose sum is 90.
(a) 26, 31, 36 (b) 25, 30, 35
(c) 20, 30, 40 (d) 18, 23, 28

39. The first three terms of a sequence are 8, 'y' and 18. Find the positive value of 'y' so that the sequence is an arithmetic progression.
(a) 26 (b) 18
(c) 12 (d) 13

40. The sum of the first 10 terms of an arithmetic progression is four times the sum of its first five terms. Find the ratio of the first term to the common difference.
(a) 1:4 (b) 4:1
(c) 2:1 (d) 1:2

41. How many numbers between 100 and 1000 are divisible by 7?
(a) 7 (b) 128
(c) 132 (d) 127

42. Find the sum of 14 AM's between 5 and 8.
(a) 91 (b) 89
(c) 90 (d) 85

43. If $1^3+2^3+.....+m^3=3025$, find m.
(a) 12
(b) 10
(c) 17
(d) 12

44. If m^{th} term of an arithmetic progression is 'n' and n^{th} term is 'm', find its $(m+n)^{th}$ term.
(a) 0
(b) $m+n-p$
(c) $m+n$
(d) $\frac{mn}{m+n}$

45. The sum to 'n' natural numbers is S_1 sum of the squares of 'n' natural numbers is S_2 and sum of the cubes of 'n' natural numbers is S_3 Which of the following is equal to $9S_2^2$?
(a) $(1-8S_1)S_2$
(b) $S_3(1+8S_1)$
(c) $S_1(1+8S_2)$
(d) $S_1(1-8S_3)$

46. In an arithmetic progression if 7 times the 7^{th} term is equal to 11 times the 11^{th} term, find its 18th term.
(a) 1 (b) 0
(c) -1 (d) 2

47. Find the sum of the numbers in between 1 and 1000 which are divisible by 9.
(a) 55944 (b) 54954
(c) 99994 (d) 99894

48. There are 'n' arithmetic means in between 'a' and 'b'. Find the common difference.
(a) $\frac{b-a}{n+1}$ (b) $\frac{b+a}{n-1}$
(c) $\frac{b-a}{n-1}$ (d) $\frac{b+a}{n+1}$

49. What is the sum of 'n' arithmetic means between 'a' and 'b'?
(a) $\frac{3}{2}(a+2b)$ (b) $\frac{n}{2}[a+b]$
(c) $\frac{n}{2}[a-b]$ (d) $\frac{n}{4}[a+b]$

50. Find the sum of $\left(1-\frac{1}{n}\right)+\left(1-\frac{2}{n}\right)+\left(1-\frac{3}{n}\right)....$ terms.
(a) $\frac{n}{2}$ (b) $\frac{n-1}{2}$
(c) $\frac{n+1}{2}$ (d) $\frac{n(n+1)}{n^2}$

51. In an arithmetic progression, if $t_p=q, t_q=p$, find t_{pq}.
(a) $p+q-pq$ (b) $p+q$
(c) $p-q+pq$ (d) $pq-p-q$

52. Find three numbers in arithmetic progression whose sum is 3 and product is-35.

(a) $1,5,7$ (b) $-5,7,-1$

(c) $-5,1,7$ (d) $-7,5,-1$

53. Which of the following is incorrect?

(a) S_n of the arithmetic progression $3, 13, 23, \ldots.$ is $5n^2 - 8n$.

(b) $S_n = 3n^2 - 8n$ is the sum of an arithmetic progression whose common difference is 6.

(c) n^{th} term, $t_n = s_n - s_{n-1}$

(d) The n^{th} term of an arithmetic progression is $t_n = a + (n-1)d$.

54. Given P=3+5+7+ .... (n terms) and Q = 5 + 8 +11 +..... (10 terms).What is the value of 'n' if $\frac{P}{Q} = 7$?

(a) 25 (b) 35

(c) 30 (d) 20

55. What is the value of 'x' if $2x, x+10$ and $3x+2$ are in arithmetic progression?

(a) 5 (b) 6

(c) 4 (d) -6

Answer - Keys

1. C	**2.** C	**3.** A	**4.** B	**5.** D	**6.** D
7. A	**8.** D	**9.** A	**10.** D	**11.** C	**12.** B
13. D	**14.** B	**15.** B	**16.** B	**17.** C	**18.** D
19. A	**20.** C	**21.** C	**22.** C	**23.** C	**24.** A
25. A	**26.** B	**27.** C	**28.** D	**29.** B	**30.** D
31. B	**32.** C	**33.** C	**34.** B	**35.** A	**36.** D
37. D	**38.** B	**39.** D	**40.** D	**41.** B	**42.** A
43. B	**44.** A	**45.** B	**46.** B	**47.** A	**48.** A
49. B	**50.** B	**51.** A	**52.** C	**53.** A	**54.** B
55. B					

Solutions

1. (c) The general term of an arithmetic progression is given by $a+(n-1)d$ where 'a' is the first term and 'd' is the common difference.

Here, a = 4 and $d = 13-10 = 10-7$

$= 7-4 = 3$.

$\therefore$ Then n^{th} term

$= 4+(n-1)3$

$= 3n+1$

2. (c) The given arithmetic progression is 35, 30, 25, ...

Here, a = 35 and d = (-5).

n^{th} term, $t_n = a+(n-1)d$

$= 40-5n$

For the first negative term, $t_n < 0$

$\Rightarrow \quad 40-5n<0$

$\Rightarrow \quad 8<n \quad \Rightarrow \quad n>8$

$\therefore \quad n=9$

3. (a) Not available

4. (b) Not available

5. (d) Not available

6. (d) Not available

7. (a) Not available

8. (d) The first 'n' even numbers are 2, 4, 6,… 2n.

$\therefore \; S_n = \frac{n}{2}(2+2n) = n(n+1)$

9. (a) Odd numbers starting from 11 are 11, 13, 15, 17, 19, ...

Sum to 'n' odd numbers, where a = 11, d = 2 is

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

$= n(10+n) = 10n+n^2$

10. (d) Not available

11. (c) Not available

12. (b) Not available

13. (d) Not available

14. (b) Not available

15. (b) Not available

16. (b) Not available

17. (c) Not available

18. (d) Not available

19. (a) Not available

20. (c) $T_6+T_7+.....+T_{12} = S_{12}-S_5$

$= \frac{12}{2}[2\times 6+(12-1)\times 4]$

$-\frac{5}{2}[2\times 6+(5-1)\times 4] = 266$

Thus, the required sum is 266.

21. (c) $t_6 = 13+5(5) = 13+25 = 38$

$t_{20} = 13+19(5) = 13+95 = 108$

$S_{15} = \frac{15}{2}[38+108] = 1095.0$

22. (c) $S_n = \frac{n}{2}[2a+(n-1)d]$

$\Rightarrow [4n+59][n-12] = 0$

$\Rightarrow n = \frac{-59}{4}$ or $n = 12$

Hence, the number of terms is n = 12.

23. (c) The circumferences of the successive circles (in cm) are

$2\pi r, 2\pi(r+1)-2\pi(r+2),.....$

$T_2 - T_1 = 2\pi(r+1) - 2\pi r = 2\pi$

$T_3 - T_2 = 2\pi(r+2) - 2\pi(r+1) = 2\pi$

$$S_5 = \frac{5}{2}(4\pi r + 4(2\pi))$$

$$= 10\pi(r+2)cm$$

24. (a) Not available

25. (a) Not available

26. (b) Not available

27. (c) Not available

28. (d) Not available

29. (b) Not available

30. (d) Not available

31. (b) Not available

32. (c) Not available

33. (c) Not available

34. (b) Given, $t_4 = 8; S_{12} = 156$

$\Rightarrow$ a = 2 and d = 2

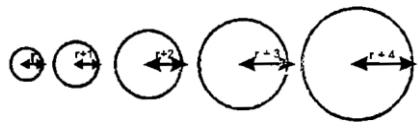
$t_n = a + (p-1)d$

$\Rightarrow$ $t_n = a + (p-1)d$

$\Rightarrow$ $2 + 2(p-1) = 1000$

$\Rightarrow$ $p = 500$

35. (a)



Circumference of 5 circles

$= 2\pi r + 2\pi(r+1) + 2\pi(r+2)$

$+2\pi(r+3) + 2\pi(r+4) = 90\pi$

$\Rightarrow$ $10\pi r = 70\pi$

$\therefore$ Radius of the smallest circle,

r = 7 cm.

36. (d) Since $S_{10} = 360$, a = 115 and d = 1.

$t_n = a + (n+1)d$

$t_{15} = 11.5 + (18-1)(1) = 28.5^o$

$\therefore$ The angle of the biggest sector is 28.5^o

37. (d) Not available

38. (b) Not available

39. (d) Not available

40. (d) Not available

41. (b) Not available

42. (a) $a + 15d = 8$

a = 5 (Given)

$\Rightarrow$ $d = \frac{1}{5}$

$$5, \frac{26}{5}, \frac{27}{5}, ... \frac{39}{5}, 8$$

$$S_{14} = \frac{14}{2}\left[2\left(\frac{26}{5}\right) + 13\left(\frac{1}{5}\right)\right]$$

$$= \frac{14}{2}\left[\frac{52+13}{5}\right] = 91$$

43. (b) Sum of cubes of 1st 'm' natural numbers

$$= \left[\frac{m(m+1)}{2}\right]^2 = 3025$$

Hence, m = 10.

44. (a) $t_m = a + (m-1)d$ ....(1)

$t_n = a + (n-1)d$ ....(2)

Subtracting (2) from (1), we get Solving the two equations, we get

$d = -1$ and $a = n + m - 1$

$\Rightarrow$ $t_{(m+n)} = a + (m+n-1)d$

$$= n + m - 1 - m - n + 1 = 0$$

45. (b) $pS_2^2 = 9\left[\frac{n(n+1)(2n+1)}{6}\right]^2$

$= 9\frac{n^2(n+1)^2(2n+1)^2}{36}$

$= \frac{n^2(n+1)^2}{4}[4n^2+4n+1]$

$= S_3[4n(n+1)+1]$

$= S_3(8S_1+1)$

46. (b) $7t_7 = 11t_{11}$

$\Rightarrow 7[a+6d] = 11[a+10d]$

$\Rightarrow a+17(-d) = 0$

$\Rightarrow t_{18} = 0$

47. (a) 9, 18, 27, ...999

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

$\Rightarrow\ 999 = 9+(n-1)9$

$\Rightarrow\ 111 = n$

48. (a) $t_1 = a; t_{n+2} = b$

$t_{n+2} = a+(n+2-1)d$

$\Rightarrow \quad b = a+(n+2-1)d$

$\Rightarrow \quad \frac{b-a}{n+1} = d$

49. (b) 1^{st} term of 'n' AM.s between 'a' & 'b'

$= a+\frac{b-a}{n+1} = \frac{an+b}{n+1}$

Last term of 'n' A.M.s between 'a' & V

$= b-\frac{b-a}{n+1} = \frac{bn+a}{n+1}$

Sum of the terms

$= \frac{n}{2}\left[\frac{na+b}{n+1}+\frac{bn+a}{n+1}\right]$

$= \frac{n}{2}\left[\frac{(n+1)(a+b)}{n+1}\right]$

$= \frac{n}{2}(a+b)$

50. (b) (1 + 1 + ... 'n' terms)

$-\left(\frac{1}{n}+\frac{2}{n}+\text{.....'}n\text{'terms}\right)$

$= n-\left(\frac{1+2+3+.....+\text{'}n\text{'terms}}{n}\right)$

$= n-\frac{n(n+1)}{2n}$

$= n-\frac{n+1}{2} = \frac{n-1}{2}$

51. (a) Not available

52. (c) Not available

53. (a) Not available

54. (b) Not available

55. (b) Not available