

STD 9 Maths [Manjari]
Sequence and progression

*** Choose the right answer from the given options. [1 Marks Each]**

[40]

1. What is the next number in the sequence 4, 8, 12, 16, ____?
(A) 18 (B) 20 (C) 22 (D) 24
2. Which sequence follows addition of 5?
(A) 2, 7, 12, 17 (B) 3, 6, 12, 24 (C) 1, 4, 9, 16 (D) 5, 15, 30, 60
3. What is the next number in the pattern 1, 3, 6, 10, ____?
(A) 12 (B) 14 (C) 15 (D) 16
4. Find the missing term: 2, 4, 8, 16, ____
(A) 24 (B) 28 (C) 30 (D) 32
5. Which of the following is an arithmetic sequence?
(A) 5, 10, 20, 40 (B) 2, 4, 6, 8 (C) 1, 2, 4, 8 (D) 3, 9, 27, 81
6. What is the common difference in the sequence 9, 14, 19, 24?
(A) 3 (B) 4 (C) 5 (D) 6
7. What is the next number in the sequence 1, 8, 27, 64, ____?
(A) 81 (B) 100 (C) 125 (D) 144
8. Find the missing term: 5, 10, 17, 26, ____
(A) 35 (B) 36 (C) 37 (D) 38
9. Which sequence follows multiplication by 3?
(A) 1, 3, 9, 27 (B) 2, 4, 6, 8 (C) 5, 10, 15, 20 (D) 3, 6, 12, 18
10. What is the next term in 50, 45, 40, 35, ____?
(A) 25 (B) 28 (C) 30 (D) 32
11. What is the common difference in 20, 25, 30, 35?
(A) 3 (B) 4 (C) 5 (D) 6
12. Which sequence represents cube numbers?
(A) 1, 4, 9, 16 (B) 1, 8, 27, 64 (C) 2, 4, 8, 16 (D) 5, 10, 15, 20
13. Find the next number in 3, 7, 13, 21, ____
(A) 29 (B) 30 (C) 31 (D) 32
14. What is the next term in the sequence 8, 16, 24, 32, ____?
(A) 36 (B) 40 (C) 42 (D) 48
15. Find the missing number: 6, 11, 16, 21, ____

(A) 24 (B) 25 (C) 26 (D) 27

16. What is the next number in the sequence 7, 14, 21, 28, ___?

(A) 30 (B) 32 (C) 35 (D) 42

17. Which of the following is not an arithmetic sequence?

(A) 3, 6, 9, 12 (B) 10, 20, 30, 40 (C) 1, 2, 4, 8 (D) 5, 10, 15, 20

18. Find the next term in 9, 18, 27, 36, ____

(A) 40 (B) 42 (C) 45 (D) 54

19. 4 groups in a class were asked to come up with an arithmetic progression (AP).

Shown below are their responses:

Group	Arithmetic progression
(i)	4, 2, 0, -2, ...
(ii)	41, 38.5, 36, 33.5, ...
(iii)	-19, -21, -23, -25, ...
(iv)	-3, -3, -3, -3, ...

Which of these groups correctly came up with an AP?

- (A) only groups (i) and (iii)
(B) (b) only groups (ii) and (iii)
(C) (c) only groups (i), (ii) and (iii)
(D) all groups (i), (ii), (iii) and (iv)

20. If 5^{th} term of an AP is $\frac{1}{4}$ and 4^{th} term is $\frac{1}{5}$, then its 20^{th} term is:

(A) 0 (B) 1 (C) -1 (D) 3

21. If n^{th} term of an A.P. is $7n-4$, then the common difference of the AP is:

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

22. If the common difference of an AP is 3, then $a_{20} - a_{15}$ is

(A) 5 (B) 3 (C) 15 (D) 20

23. If the common difference of an AP is 7, then the value of $a_7 - a_4$ is:

(A) 7 (B) 14 (C) 21 (D) 24

24. If the n^{th} term of an AP is $(2n + 1)$, then the sum of its first three terms is:

(A) $6n + 3$ (B) 15 (C) 12 (D) 21

25. If the n^{th} term of an AP is given by $3 + \frac{2}{3}n$, then the sum of the first 31 terms =

(A) $\frac{1371}{3}$ (B) $\frac{1271}{3}$ (C) $\frac{1351}{3}$ (D) $\frac{1971}{3}$

26. If the sum of n terms of an A.P. is $2n^2 + 5n$, then which of its term is 143?

(A) 32 (B) 35 (C) 38 (D) 185

27. If the sum of n terms of an A.P. is $3n^2 + 5n$, then which of its term is 164?

(A) 25^{th} (B) 26^{th} (C) 27^{th} (D) 28^{th}

28. If the sum of n terms of an arithmetic progression $S_n = n^2 - n$ then its third term is:

(A) 2

(B) 4

(C) 6

(D) 9

29. In an AP, if $a = 1, a_n = 20$ and $S_n = 399$, then n is:

(A) 19

(B) 21

(C) 38

(D) 42

30. In an AP, $S_p = q, S_q = p$, then S_{p+q} is equal to :

(A) $-(p+q)$

(B) 1

(C) 0

(D) pq

31. Sum of all multiples of 7 lying between 500 and 900 is :

(A) 35600

(B) 39900

(C) 38600

(D) 37500

32. The 10^{th} term of the AP 5, 8, 11, 14, ... is:

(A) 32

(B) 35

(C) 38

(D) 185

33. The 21^{st} term of the AP whose first two terms are -3 and 4 is:

(A) 17

(B) 137

(C) 143

(D) -143

34. The list of numbers -10, -6, -2, 2, ... is:

(A) an AP with $d = -16$ (B) an AP with $d = 4$ (C) an AP with $d = -4$

(D) not an AP

35. The sum of first 16 terms of the AP 11, 6, 2, ... is:

(A) -424

(B) 320

(C) -352

(D) -400

36. The sum of first five multiples of 3 is:

(A) 45

(B) 55

(C) 65

(D) 75

37. The sum of first n terms of an AP is $3n^2 + 4n$ and its common difference is 6, then its first term is:

(A) 7

(B) 4

(C) 6

(D) 3

38. The value of middle most term(s) of the AP: -11, -7, -3, ..., 49 is:

(A) 12, 13

(B) 15, 16

(C) 17, 21

(D) 25, 26

39. Total number of terms in the AP: 7, 16, 25, ..., 349 =

(A) 35

(B) 36

(C) 37

(D) 39

40. The first four terms of an AP, whose first term is -2 and the common difference is -2, are:

(A) -2, 0, 2, 4

(B) -2, -4, -8, -16

(C) -2, -4, -6, -8

(D) -2, -4, -8, -16

*** A statement of Assertion (A) is followed by a statement of Reason (R). [5]**
Choose the correct option.

Directions: In each question below, there are two statements labelled as Assertion (A) and Reason (R). Choose the correct answer as per the options given below:

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (c) (A) is true but (R) is false
- (d) (A) is false but (R) is true

41. Assertion (A) : Sum of first 15 terms of $2 + 5 + 8 \dots$ is 345.

Reason (R) : Sum of first n terms in an A.P. is given by the formula:

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

42. Assertion (A) : Sum of natural numbers from 1 to 100 is 5050

Reason (R) : Sum of n natural numbers is $\frac{n(n+1)}{2}$

43. Assertion (A) : The common difference of $5, 4, 3, 2, \dots$ A.P. is -1.

Reason (R): The constant difference between any two terms of an AP is commonly known as common difference.

44. Assertion (A): The sequence $-1, -1, -1, \dots, -1$ is an AP.

Reason (R): In an AP $a_n - a_{n-1}$ is constant where $n \geq 2$ and $n \in N$.

45. Assertion (A): The value of n , if $a = 10, d = 5, a_n = 95$ is 16.

Reason (R): The formula of general term a_n is $a_n = a + (n - 1)d$.

*** Answer the following short questions. [2 Marks Each]**

[80]

46. In an AP:

given $a = 5, d = 3, a_n = 50$, find n and S_n

47. In an AP:

given $a = 7, a_{13} = 35$, find d and S_{13} .

48. Find the sum of the following APs:

-37, -33, -29, to 12 terms

49. Find the sum of the following APs:

$\frac{1}{15}, \frac{1}{12}, \frac{1}{10}, \dots$ to 11 terms.

50. Check whether 301 is a term of the list of numbers $5, 11, 17, 23, \dots$.

51. Find the common difference of the AP:

$\frac{1}{3q}, \frac{1-6q}{3q}, \frac{1-12q}{3q}, \dots$

52. Write the next terms of the AP: $\sqrt{8}, \sqrt{18}, \sqrt{32}, \dots$.

53. In Sierpinski Carpet, find the number of squares produced in (i) step 5 (ii) step 8.

54. Show that the progression $0.4, 0.8, 1.6, \dots$ is a G.P. Write its

7^{th} term.

55. Show that the progression 0.4, 0.8, 1.6, is a G.P. Write its common ratio
56. Show that the progression 0.4, 0.8, 1.6, is a G.P. Write its n^{th} term
57. Show that the progression $-\frac{3}{4}, \frac{1}{2}, -\frac{2}{3}, \frac{4}{9}, \dots$ is a G.P. Write its 6^{th} term.
58. Show that the progression $-\frac{3}{4}, \frac{1}{2}, -\frac{2}{3}, \frac{4}{9}, \dots$ is a G.P. Write its common ratio
59. Show that the progression $-\frac{3}{4}, \frac{1}{2}, -\frac{2}{3}, \frac{4}{9}, \dots$ is a G.P. Write its n^{th} term
60. Show that the progression $2, 2\sqrt{2}, 4, 4\sqrt{2}, \dots$ is a G.P. Write its 11^{th} term
61. Show that the progression -27, 9, -3, 1, $-\frac{1}{3}, \dots$ is a G.P. Write its common ratio
62. Show that the progression 625, 125, 25, 5, $\frac{1}{5}, \dots$ is a G.P. Write its common ratio
63. Find the 4^{th} term from the end of the G.P. $\frac{2}{81}, \frac{2}{27}, \frac{2}{9}, \dots, 54$.
64. Find the 6^{th} term from the end of the G.P. 16, 8, 4, 2, $\dots, \frac{1}{512}$.
65. Show that the progression 2, 6, 18, 54, 162, is a G.P. Write its common ratio
66. Show that the progression 2, 6, 18, 54, 162, is a G.P. Write its first term
67. Find the sum of all natural numbers less than 200 which are divisible by 5.
68. Find the sum of natural numbers less than 500 and divisible by both 3 and 7.
69. Find the sum of all natural numbers between 200 and 300 which are divisible by 4.
70. Find the sum of all two digits odd positive numbers.
71. Find the sum of the integers between 1 and 200 which are Multiples of 3 or 7
72. Find the sum of the first m natural numbers.
73. In an AP:
 $a_3 = 15, S_{10} = 125$, find d and
74. In an AP:
 $d = 5, S_9 = 75$, find a and a_9

75. In an AP:
 $a = 5, a_2 = 9$, find d and a_3 .
76. In an AP:
 $a = 6, d = 3$, find a_5 and S_5 .
77. Find the sum of the following APs:
 $a, (a + b), (a + 2b), \dots$ up to n terms
78. Find the sum of the following APs:
 $(a - b)^2, (a^2 + b^2), (a + b)^2, \dots$ upto n terms.
79. If the n th term of an AP is given by $a_n = 7n + 1$, find the sum of first 30 terms of the A.P.
80. If the n th term of an AP is given by $a_n = 5 - 2n$, find the sum of first 25 terms of an AP.
81. If the n th term of an AP is given by $a_n = 5n - 3$, find the sum of first 20 terms of the AP.
82. If the n th term of an AP is given by $a_n = 9 - 5n$, find the sum of first 15 terms.
83. Represent the following APs graphically, whose :
 first term, $a = 4$, common difference, $d = -1$
84. Write first four terms of the AP, when the first term a and the common difference d are given as follows:
 $a = -1.25, d = -0.25$
85. Write first four terms of the AP, when the first term a and the common difference d are given as follows:
 $a = -2, d = 0$

*** Answer the following questions. [3 Marks Each]**

[120]

86. Find the smallest value of n such that the sum of the first n natural numbers is greater than 1,000.
87. Find the 10^{th} and 15^{th} terms of the sequence $t_n = 5n - 3$ for $n \geq 1$.
88. How many moves are required for 12 discs? Comment on whether it is practical to complete.
89. Find the minimum moves for 10 discs.
90. In Sierpinski Gasket, find the number of triangles left a steps 6th step.
91. Which term of the G.P. 5, 10, 20, 40, is 640?
92. The $4^{th}, 6^{th}$ and last term of a geometric progression are 10, 40 and 640 respectively. If the common ratio is positive, find the first term, common ratio and the number of terms of the series.

93. Find the G.P. whose 4^{th} and 7^{th} terms are $\frac{1}{18}$ and $-\frac{1}{486}$ respectively.
94. In a Geometric Progression (G.P.), the first term is 24 and the fifth term is 8. Find the ninth term of the G.P.
95. Find the G.P. whose 5^{th} and 8^{th} terms are 80 and 640 respectively.
96. Which term of the AP 5, 9, 13, ..., is 81? Also, find the sum $5 + 9 + 13 + \dots + 81$?
97. Find the sum:
 $1 + 3 + 5 + 7 + \dots + 199$
98. Find the sum:
 $18 + 15\frac{1}{2} + 13 + \dots + (-49\frac{1}{2})$
99. Find the sum:
 $(1 - \frac{1}{n}) + (1 - \frac{2}{n}) + (1 - \frac{3}{n}) \dots$ up to n terms.
100. The first and last terms of an AP are 4 and 81 respectively. If the common difference is 7, how many terms are there in the AP and what is their sum?
101. Find the 20^{th} term of the AP whose 7^{th} term is 24 less than the 11^{th} term, first term being 12.
102. 26^{th} , 11^{th} and the last term of an AP are, 0, 3, and $-\frac{1}{5}$ respectively. Find the common difference and the number of terms of the AP.
103. Determine the AP whose fifth term is 19 and the difference of the eighth term from the thirteenth term is 20.
104. Find the 12^{th} term and n^{th} term of the AP 16, 9, 2, -5,
105. The sides of a right-angled triangle are in AP. Show that they are in the ratio 3 : 4 : 5.
106. Find the value of the middle most term(s) of the AP: -11, -7, -3, ... 49
107. Find the:
 29^{th} term of the AP: $2\frac{3}{4}, 3\frac{1}{4}, 3\frac{3}{4}, 4\frac{1}{4}, \dots$
108. Which term of the AP. 3, 14, 25, 26, ... will be 99 more than its 25^{th} term?
109. Find the AP whose fourth term is 9 and the sum of its sixth term and thirteenth term is 40.
110. The sum of 4^{th} and 8^{th} terms of an AP is 24 and the sum of 6^{th} and 10^{th} terms is 44. Find AP.
111. If the 9^{th} term of an AP is zero, prove that its 29^{th} term is twice its 19^{th} term.
112. 14, 21, 28, 35, ... and 26, 39, 52, 65, ... are two arithmetic progressions such that the p^{th} term of the first arithmetic progression is the same as the q term of the second arithmetic progression. Derive a relationship between p and q .

113. A child saves ₹10 on day 1 , ₹12 on day 2 , ₹14 on day 3 , and so on. How much money will he save on 365th day?
114. A man starts repaying a loan as first installment of ₹100. If he increases the installment by ₹ 5 every month, what amount he will pay in the 30 th installment?
115. In a garden there are 30 mango trees in the first row, twenty seven in the second, twenty four in the third and so on. There are six trees in the last row. How many rows are there of mango trees?
116. Mohit was appointed as a lecturer. He was offered monthly salary of ₹15000, with annual increment of ₹500 . In the tenth year what would be his salary?
117. Riya saves ₹50 in the first week and increases her saving by ₹10 every week. How much will she save in the 15th week?
118. Rohan is appointed at an initial salary of ₹5000 with an increment of ₹ 500 every year. What will be his salary in the 20th year of his service?
119. Sandeep started work in 1995 at an annual salary of ₹5000 and received an increment of ₹200 each year. In which year did his income reach ₹7000 ?
120. Find the sums given below:
 $7 + 10\frac{1}{2} + 14 + \dots + 84$
121. Find: $(4 - \frac{1}{n}) + (4 - \frac{2}{n}) + (4 - \frac{3}{n}) + \dots$ to n terms.
122. The first and the last terms of an AP are 17 and 350 respectively. If the common difference is 9, how many terms are there and what is their sum?
123. Which term of the AP 3,15,27,39,... will be 120 more than its 21 st term?
124. Determine the AP whose 3rd term is 5 and the 7th term is 9.
125. How many natural numbers are there between 200 and 500 which are divisible by 7 ?

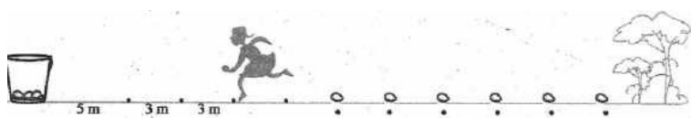
*** Questions with calculation. [4 Marks Each]**

[160]

126. How many 2-digit numbers are divisible by 3? What is the sum of all these 2-digit numbers?
127. Find the 12th term of a GP with common ratio 2, whose 8th term is 192.
128. Which term of the GP: 2, 6, 18, ... is 4374? Write the explicit formula as well as the recursive formula for the nth term.
129. A ball is dropped from a height of 80 metres. After hitting the ground, it bounces back to 60% of the height from which it fell. It continues bouncing in this way—each time rising to 60% of the previous height.
 What is the total vertical distance the ball has travelled by the time it hits the ground for the 6th time?

130. Which term of the sequence $2, 2\sqrt{2}, 4, \dots$ is 128?
131. Find the 31^{st} term of an AP whose 11^{th} term is 38 and 16^{th} term is 73.
132. Determine the AP whose third term is 16 and whose 7^{th} term exceeds the 5^{th} term by 12.
133. How many multiples of 4 lie between 10 and 250?
(Hint: All multiples of 4 form an AP. Find the smallest and largest multiples of 4 between 10 and 250.)
134. The number of bacteria in a certain culture doubles every hour. If there were 30 bacteria present in the culture originally, how many bacteria will be present at the end of the 2^{nd} hour, 4^{th} hour, n^{th} hour?
135. Which term of the GP: 2, 8, 32, ... is 131072? Write the explicit formula as well as the recursive formula for the n^{th} term.
136. The sum of the first three terms of a GP is $\frac{13}{12}$ and their product is -1. Find the common ratio and the terms.
137. Determine whether 97 and 172 are terms of the sequence $t_n = 5n - 3$ for $n \geq 1$.
138. Find the n^{th} term of the AP: 11, 8, 5, 2, ... Write the recursive rule for this AP.
139. If the 4th and 7th terms of a G.P. are 54 and 1458 respectively, then find its:
(i) common ratio, r
(ii) first term, a
(iii) n th term, a_n
(iv) 6th term, a_6
140. Show that the progression 81, 27, 9, 3, 1, is a G.P. Write its
(i) first term
(ii) common ratio
(iii) n th term
(iv) 11th term
141. Show that the progression 3, 6, 12, 24, 48, is a G.P. Write its:
(i) first term
(ii) common ratio
(iii) n th term
(iv) 10th term
142. Show that $a_1, a_2, \dots, a_n$ form an AP where a_n is defined as below. Also find S_{15} in each case.
 $a_n = 3 + 4n$
143. Show that $a_1, a_2, \dots, a_n$ form an AP where a_n is defined as below. Also find S_{15} in each case.
 $a_n = 9 - 5n$

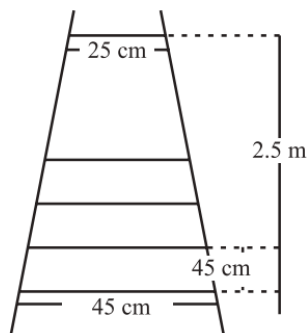
144. In a potato race, a bucket is placed at the starting point, which is 5 m from the first potato, and the other potatoes are placed 3 m apart in a straight line. There are ten potatoes in the line, as shown in the figure.



A competitor starts from the bucket, picks up the nearest potato, runs back with it, drops it in the bucket, runs back to pick up the next potato, runs to the bucket to drop it in, and she continues in the same way until all the potatoes are in the bucket. What is the total distance the competitor has to run?

145. In an $A.P.$, if $S_n = 3n^2 + 5n$ and $a_k = 164$, find the value of k .
146. The first term of an AP is -5 and the last term is 45. If the sum of the terms of the AP is 120, then find the number of terms and the common difference.
147. The first term of an AP is 3, the last term is 83 and the sum of all its terms is 903. Find the number of terms and the common difference of the AP.
148. The 19th term of an AP is equal to three times its 6th term. If its 9th term is 19, find the AP.
149. Which term of the AP $-7, -12, -17, -22, \dots$ will be -82? Is -100 any term of the AP?
150. Which term of the AP $21, 18, 15, \dots$ is -96? Also, check whether 0 is a term of the AP.
151. Two APs have the same common difference. The difference between their 100th terms is 123456. What is the difference between their millionth terms?
152. In a given AP, if p th term is q and q th term is p , show that n th term is $(p + q - n)$.
153. Find the 12th term from the end of the AP: $-2, -4, -6, \dots, -100$.
154. Represent the following GPs graphically, whose :
first term, $a = 1$, common ratio, $r = 2$.
155. Represent the following GPs graphically, whose :
first term $a = 4$, common ratio, $r = -2$
156. Raghav buys a shop for ₹120000. He pays half of the amount in cash and agrees to pay the balance in 12 annual instalments of ₹ 5000 each. If the rate of interest is 12% per annum and he pays with the instalment the interest due on the unpaid amount, find the total cost of the shop.
157. A ladder has rungs 25 cm apart (as shown in the given figure). The rungs decrease uniformly in length from 45 cm at the bottom to 25 cm at the top. If the top and the bottom rungs are $12\frac{1}{2}m$ apart, what is the length of the wood

required for the rungs?



158. The 16th term of an AP is five times its third term. If its 10th term is 41, then find the sum of its first 15 terms.
159. The first and last term of an AP are 8 and 65 respectively. If the sum of all its terms is 730, find its common difference.
160. In an AP $S_5 + S_7 = 167$ and $S_{10} = 235$. Find AP.
161. The sum of first m terms of an AP is $\frac{3m^2 + 7m}{2}$. Find its m th term.
162. Show that $(a - b)^2$, $(a^2 + b^2)$ and $(a + b)^2$ are in AP.
163. In which of the following situations, does the list of numbers involved make an arithmetic progression, and why?
- (i) The fee charged from a student every month by a school for the whole session when the monthly fee is ₹400.
 - (ii) The fee charged every month by a school from classes I to XII when the monthly fee for class I is 250, and it increases by 50 for the next higher class.
 - (iii) The amount of money in the account of Varun at the end of every year when ₹1000 is deposited at simple interest of 10% per annum.
164. In which of the following situations, does the list of numbers involved make an arithmetic progression, and why?
- (i) The taxi fare after each km when the fare is 24 for the first km and 10 for each additional km.
 - (ii) The amount of air present in a cylinder when a vacuum pump removes $\frac{1}{4}$ of the air in the cylinder at a time.
 - (iii) The cost of digging a well after every metre of digging when it costs 150 for the first metre and rises by 50 for each subsequent metre.
 - (iv) The amount of money in the account every year when ₹10000 is deposited at compound interest at 8% per annum.
165. Two arithmetic progressions have the same first term. The common difference of one progression is 4 more than the other progression. 124th term of the first arithmetic progression is the same as 42th term of the second. Find one set of possible values of the common differences.

* Answer the following questions. [5 Marks Each]

[120]

166. Which term of the AP: 21, 18, 15, ... is -81 ? Also, is 0 a term of this AP? Give reasons for your answer.
167. An AP consists of 50 terms in which the 3^{rd} term is 12 and the last term is 106. Find the 29^{th} term.
(Hint: If 'a' is the first term and 'd' the common difference, then we arrive at the equations $a + 2d = 12$ and $a + 49d = 106$. Solve this pair of linear equations for 'a' and 'd'.)
168. A sequence is given by the recursive rule $t_1 = 2, t_{n+1} = 3t_n - 2$ for $n \geq 1$. Which term of the sequence is 730?
169. A ball is dropped from a height of 80 metres. After hitting the ground, it bounces back to 60% of the height from which it fell. It continues bouncing in this way—each time rising to 60% of the previous height.
What height does the ball reach after the 5th bounce?
170. Fig. shows Stages 0 to 3 of the Sierpiński square carpet. Stage 0 of this fractal is a square sheet of paper. To construct Stage 1, each side of the square is trisected and the points of trisection of opposite sides are joined to obtain nine smaller squares. The centre square is then removed and the 8 smaller squares are retained, leaving a square hole in the centre. The same process is repeated on the eight smaller shaded squares to obtain Stage 2 and so on.

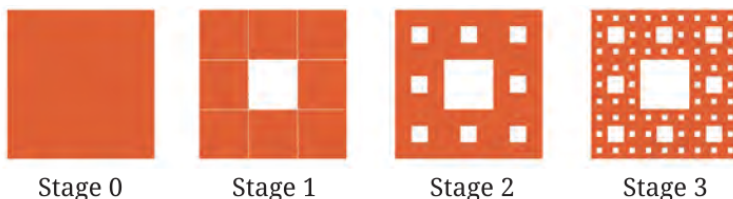


Fig. : Stages 0, 1, 2 and 3 of the Sierpiński square carpet

Look at Fig. and try to answer the following questions.

- How many red squares are there in Stages 0 to 3?
 - Can you predict the number of red squares in Stages 4 and 5?
 - Can you find a rule for the number of red squares at the n^{th} stage? Write the explicit formula as well as the recursive formula for the number of red squares at any stage.
 - Suppose the area of the square in Stage 0 is 1 square unit. What is the area of the red region in Stages 1, 2 and 3? What will be the area of the red region in Stages 4 and 5? Find the explicit as well as the recursive formula for the area of the red region at the n th stage. What happens to this area as n , the number of stages, goes on increasing?
171. Find a GP for which the sum of the first two terms is -4 and the fifth term is 4 times the third term.
172. Find all possible ways of expressing 100 as the sum of consecutive natural numbers.

173. The sum of the 4th and 8th terms of an AP is 24 and the sum of the 6th and 10th terms is 44. Find the first three terms of the AP.
174. The sum of the first three terms of a geometric progression is 26, and the sum of their squares is 364. Find the terms of the GP.
175. Suppose $P_1 = 1, P_2 = 2$ and for $n > 2, P_n = P_1 + P_2 + \dots + P_{n-1} + 1$. Find the values of $P_1, P_2, \dots, P_8$. Can you find a simpler recursive formula for P_n ? Can you give an explicit formula?
176. Suppose $W_1 = 1, W_2 = 2$ and for $n > 2, W_n = W_1 + W_2 + \dots + W_{n-2} + 2$. Find the values of $W_1, W_2, \dots, W_8$. Do you recognise this sequence?
177. Find the first five terms of the sequence in which the n^{th} term is given by (i) $t_n = 3n - 4$, (ii) $t_n = 2 - 5n$, and (iii) $t_n = n^2 - 2n + 3$ for $n \geq 1$.
178. A sequence is given by the recursive rule $t_1 = -5, t_{n+1} = t_n + 3$ for $n \geq 1$. Find the first five terms of the sequence. Is 52 a term of this sequence? If so, which term is it?
179. Let $T_1 = 1, T_2 = 2, T_3 = 4$, and $T_n = T_{n-1} + T_{n-2} + T_{n-3}$ for $n \geq 4$. Find T_4, T_5, T_6, T_7 , and T_8 .
180. If $a_n = 3 - 4n$, show that $a_1, a_2, a_3, \dots$ form an AP. Also, find S_{20} .
181. Which term of the AP: $-2, -7, -12, \dots$ will be -77 ? Find the sum of this AP up to the term -77 .
182. Divya deposited ₹1000 at compound interest at the rate of 10% per annum. The amounts at the end of first year, second year, third year, form an AP. Justify your answer.
183. Which of the following are APs? If they form an AP, find the common difference d and write three more terms.
 (i) $3, 3 + \sqrt{2}, 3 + 2\sqrt{2}, 3 + 3\sqrt{2}, \dots$
 (ii) $0, -4, -8, -12$
 (iii) $-\frac{1}{2}, -\frac{1}{2}, -\frac{1}{2}, -\frac{1}{2}, \dots$
184. The sum of first n terms of an AP is represented by $S_n = 6n - n^2$. Find the common difference.
185. If $S_n = 3n^2 - 4n$, then find the n^{th} terms.
186. If $S_n = \frac{1}{2}(3n^2 + 7n)$, find n^{th} term and 20th term.
187. In an AP, the sum of first n terms is $\left(\frac{3n^2}{2} + \frac{5n}{2}\right)$. Find its 25th term.
188. In a school, students thought of planting trees in and around the school to reduce air pollution. It was decided that the number of trees that each section of each class will plant, will be the same as the class in which they are studying, e.g., a section of class I will plant 1 tree, a section of class II will plant 2 trees and

so on till class XII. There are three sections of each class. How many trees will be planted by the students?

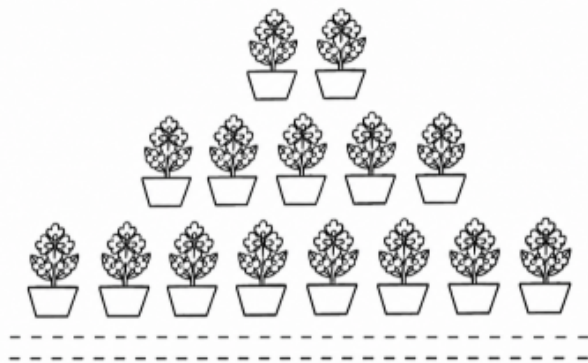
189. The sequence 2, 9, 16, is given.

- (i) Identify if the given sequence is an AP.
- (ii) Find the 20th term of the sequence.
- (iii) Find the difference between the sum of its first 22 and 25 terms.
- (iv) Is the term 102 belong to this sequence?
- (v) If k is added to each of the above terms, will the new sequence be in AP?

*** Case study based questions.**

[16]

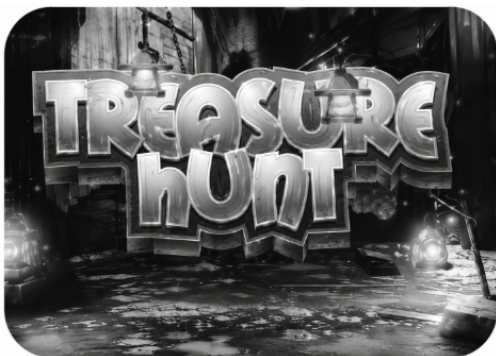
190.



Roshni being a plant lover decides to start a nursery. She bought few plants with pots. She placed the pots in such a way that the number of pots in the first row is 2, in the second is 5, in the third row is 8 and so on. Based on the above information, answer the following questions:

- (i) How many pots are placed in the 7th row?
- (ii) If Roshni wants to place 100 pots in total, then find the total number of rows formed in the arrangement.
- (iii) How many pots are placed in the last row?
- (iv) If Roshni has sufficient space for 12 rows, then how many total number of pots are placed by her with the same arrangement?

191.



Treasure Hunt is an exciting and adventurous game where participants follow a series of clues/numbers/ maps to discover hidden treasures. Players engage in a thrilling quest, solving puzzles and riddles to unveil the location of the coveted

prize. 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?
- (ii) Which spot is numbered as 112?
- (iii) What is the sum of all the numbers on the first 10 spots?
- (iv) Which number is on the $(n-2)^{th}$ spot?

192.



The marathon is a long-distance foot race with a distance of 42.195 km, usually run as a road race, but the distance can be covered on trail routes. The marathon can be completed by running or with a run/walk strategy. The marathon was one of the original modern Olympic events in 1896.

Neha, a student of class IX, wishes to participate in a marathon. She decided to begin her practice by gradually increasing her running distance. In the first week, she decided to run 3 km each day and increase the distance by 2 km each week, i.e., in the second week she would run 5 km each day, in the third week she would run 7 km each day and so on.

Based on the above information, answer the following questions:

- (i) What distance will Neha cover each day of the 8^{th} week of her practice?
- (ii) In which week would she be able to run for 45 km each day?
- (iii) What is the total distance covered by Neha after 11 weeks, if she practiced for 5 days in each week?
- (iv) Had she increased the distance by 3 km each week instead of 2 km each week, in how many weeks would she have trained herself to run for 42 km per day?

193.



India is competitive manufacturing location due to the low cost of manpower and strong technical and engineering capabilities contributing to higher quality production runs. The production of TV sets in a factory increases uniformly by a fixed number every year. It produced 16000 sets in 6th year and 22600 in 9th year.

- (i) In which year, the production is 29,200 sets?
- (ii) Find the production in the 8th year.
- (iii) Find the production in first 3 years.
- (iv) Find the difference of the production in 7th year and 4th year.
