

SATISH SCIENCE ACADEMY

DHANORI PUNE-411015

ARITHMETIC PROGRESSIONS

Class 10 - Mathematics

| Time Allowed: 3 hours | | Maximum Marks: 180 | |
|-----------------------|--|--|-----------|
| | | Section A | |
| 1. | n th term of an A.P. is 7n + 4. The common | difference is: | [1] |
| | a) 4 | b) 7 | |
| | c) 7n | d) 1 | |
| 2. | In an A.P., if the p th term is q and the q th to | erm is p then its n th term is | [1] |
| | a) p - q - n | b) p - q + n | |
| | c) $p + q + n$ | d) p + q - n | |
| 3. | The 7th term from the end of the A.P11, | -8, -5,, 49 is | [1] |
| | a) 28 | b) 31 | |
| | c) -11 | d) -8 | |
| 4. | How many terms are there in the A.P. give | n below? | [1] |
| | 14, 19, 24, 29,, 119 | | |
| | a) 22 | b) 21 | |
| | c) 18 | d) 14 | |
| 5. | Which of the following statement is correc | rt? | [1] |
| | a. Sum of n terms of the list of numbers | $\sqrt{2}, \sqrt{8}, \sqrt{18}, \sqrt{32},$ is $\frac{n(n+1)}{\sqrt{2}}$. | |
| | b. The common difference of the A.P. giv | en by $a_n = 3n + 2$ is 3. | |
| | c. The sum of the A.P. (-5), (-8), (-11) | (-230) is -8930. | |
| | a) Only (a) and (b) | b) Only (b) | |
| | c) (a), (b) and (c) | d) Only (a) | |
| 6. | The number of terms in the A.P. 3, 6, 9, 12 | ,, 111 is: | [1] |
| | a) 36 | b) 30 | |
| | c) 40 | d) 37 | |
| 7. | The common difference of an A.P. in whic | h a ₁₈ - a ₁₄ = 32 is | [1] |
| | a) -8 | b) 6 | |
| | c) 8 | d) -6 | |
| 8. | If S _n denote the sum of the first n terms of | an A.P. If $S_{2n} = 3Sn$, then $S_{3n} : Sn$ is equa | ll to [1] |

| | a) 10 | b) 4 | |
|-----|--|--|-----|
| | c) 8 | d) 6 | |
| 9. | The 9th term of an A.P. is 499 and the 499th term is 9 | . The term which is equal to zero is | [1] |
| | a) 510 th term | b) 500 th term | |
| | c) 508 th term | d) 504 th term | |
| 10. | If x, $2x + 9$, $4x + 3$ are three consecutive terms of an A | A.P., then the value of x is: | [1] |
| | a) 15 | b) 3 | |
| | c) 13 | d) 10 | |
| 11. | If the sum of the n terms of an A.P is $2n^2+5n$, then its | nth term is | [1] |
| | a) 4n + 3 | b) 3n + 4 | |
| | c) n - 4 | d) 4n - 3 | |
| 12. | In an A.P., if the first term $a = 7$, n^{th} term $a_n = 84$ and | the sum of first n terms $s_n = \frac{2093}{2}$, then n is equal to: | [1] |
| | a) 26 | b) 24 | |
| | c) 22 | d) 23 | |
| 13. | The value of x for which $2x$, $(x + 10)$ and $(3x + 2)$ are | the three consecutive terms of an AP, is: | [1] |
| | a) 18 | b) -18 | |
| | c) 6 | d) -6 | |
| 14. | The first and last terms of an A.P. are 1 and 11. If thei | r sum is 36, then the number of terms will be | [1] |
| | a) 7 | b) 5 | |
| | c) 8 | d) 6 | |
| 15. | The production of TV in a factory increases uniformly | y by a fixed number every year. It produced 8000 sets in 6^{th} | [1] |
| | year and 11300 in 9 th year. Find the production in the | 6 years. | |
| | a) 40500 | b) 31500 | |
| | c) 20500 | d) 20000 | |
| 16. | If a, b and c are in A. P., then the value of $\frac{a-b}{b-c}$ is | | [1] |
| | a) $\frac{a}{b}$ | b) 1 | |
| | c) $\frac{c}{a}$ | d) $\frac{b}{c}$ | |
| 17. | What is 20th term from the end of the AP 3, 8,13,, 2 | 53? | [1] |
| | a) 148 | b) 163 | |
| | c) 158 | d) 153 | |
| 18. | Which term of the A.P29, -26, -23,, 61 is 16? | | [1] |
| | a) 11 th | b) 31 st | |
| | c) 10 th | d) 16 th | |
| 19. | The next two terms of the AP: k, $2k + 1$, $3k + 2$, $4k + 1$ | 3, are | [1] |

CONTACT:8830597066 | 9130946703

2/9

| | a) 5k + 4 and 6k + 5 | b) 4k + 4 and 4k + 5 | |
|-----|---|---|-----|
| | c) 5k + 5 and 6k + 6 | d) 5k and 6k | |
| 20. | The common difference of an A.P., if $a_{23} - a_{19} = 32$, i | S: | [1] |
| | a) 8 | b) -8 | |
| | c) -4 | d) 4 | |
| 21. | Assertion (A): a, b, c are in A.P. if and only if 2b = a | + c. | [1] |
| | Reason (R): The sum of first n odd natural numbers is n ² . | | |
| | 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. | |
| 22. | Assertion (A): $\sqrt{3}$, $2\sqrt{3}$, $3\sqrt{3}$, $4\sqrt{3}$ this series forms Reason (R): Since common difference is same and equivalent terms of the series of th | s an A.P. qual to $\sqrt{3}$ therefore given series is an AP. | [1] |
| | 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. | |
| 23. | Assertion (A): If S_n is the sum of the first n terms of | an A.P., then its n^{th} term a_n is given by $a_n = S_n - S_{n-1}$ | [1] |
| | Reason (R): The 10 th term of the A.P. 5, 8, 11, 14, | is 35. | |
| | 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. | |
| 24. | Assertion (A): If n th term of an A.P. is 7 - 4n, then its Reason (R): Common difference of an A.P. is given b | s common difference is -4. by $d = a_{n-1} - a_n$ | [1] |
| | 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. | |
| 25. | Assertion (A): Sum of first 10 terms of the arithmetic Reason (R): Sum of n terms of an A.P. is given as S _n difference. | c progression -0.5, -1.0, -1.5, is -27.5 = $\frac{n}{2}[2a + (n-1)d]$ where a = first term, d = common | [1] |
| | 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. | |
| 26. | Assertion (A): The sum of the first n terms of an AP | is given by $S_n = 3n^2 - 4n$. Then its nth term $a_n = 6n - 7$ | [1] |
| | Reason (R): nth term of an AP, whose sum to n terms is S_n , is given by $a_n = S_n - S_{n-1}$ | | |
| | 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. | |
|-----|---|---|-----|
| 27. | Assertion (A): Sum of first hundred even natural num | bers divisible by 5 is 500 | [1] |
| | Reason (R): Sum of first n-terms of an A.P. is given b | y S _n = $\frac{n}{2}[a + l]$ where l = last term. | |
| | 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. | |
| 28. | Assertion (A): Common difference of an AP in which | a ₂₁ - a ₇ = 84 is 14 | [1] |
| | Reason (R): nth term of AP is given by $a_n = a + (n - 1)$ |)d | |
| | 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. | |
| 29. | Assertion (A): Sum of natural number from 1 to 100 i | s 5050. | [1] |
| | Reason (R): Sum of n natural number is $\frac{n(n+1)}{2}$. | | |
| | a) Both A and R are true and R is the correct | b) Both A and R are true but R is not the | |
| | explanation of A. | correct explanation of A. | |
| | c) A is true but R is false. | d) A is false but R is true. | |
| 30. | Assertion (A): Arithmetic mean between 8 and 12 is 1 | 0. | [1] |
| | Reason (R): Arithmetic mean between two numbers a | and b is given as $\frac{a+b}{2}$. | |
| | a) Both A and R are true and R is the correct | b) Both A and R are true but R is not the | |
| | explanation of A. | correct explanation of A. | |
| | c) A is true but R is false. | d) A is false but R is true. | |
| | Sect | ion B | |
| 31. | The production of TV sets in a factory increases unifor | mly by a fixed number every year. It produced 16000 sets | [2] |
| | in 6 th year and 22600 in 9 th year. Find the production of | luring 8 th year. | |
| 32. | Find how many two - digit numbers are divisible by 6. | | [2] |
| 33. | If the n th term of a progression is (4n - 10) show that it is an A.P. Find its 16th term. | | [2] |
| 34. | Find the 8 th term from the end of the A.P. 7,10, 13,, | 184. | [2] |
| 35. | Which term of the AP 72,68,64, 60, is 0? | | [2] |
| 36. | Find the sum of all multiples of 5 lying between 101 and 999. | | [2] |
| 37. | Is the given series 1, 3, 9, 27, forms an AP? If It the next three terms. | forms an AP, then find the common difference d and write | [2] |
| 38. | Write the next two terms of the A.P.: | | [2] |
| | $\sqrt{27},\sqrt{48},\sqrt{75},$ | | |
| 39. | For what value of n , are the n th terms of the APs: 9, 7, | 5, and 15, 12, 9, the same? | [2] |
| 40. | Is the given sequence 1^2 , 3^2 , 5^2 , 7^2 , forms an AP? | If it forms an AP, then find the common difference d and | [2] |
| | write the next three terms. | | |
| 41. | In an A.P. given that the first term (a) = 54, the commo | on difference (d) = -3 and the n^{th} term $(a_n) = 0$, find n and | [2] |
| | the sum of first n terms (S_n) of the A.P. | | |

| 42. | The sum of the 5th and the 7th terms of an AP is 52 and the 10th term is 46. Find the AP. | [2] | | |
|-----|--|-----|--|--|
| 43. | A man receives Rs. 60 for the first week and Rs. 3 more each week than the preceding week. How much does he | [2] | | |
| | earn by the 20th week? | | | |
| 44. | Write first four terms of the AP, when the first term a = 10 and the common difference d = 10. | [2] | | |
| 45. | Find the sum of the first 15 terms of sequences having n^{th} term as $b_n = 5 + 2n$. | [2] | | |
| | Section C | | | |
| 46. | If $a_n = 3 - 4n$, show that a_1 , a_2 , a_3 form an A.P. Also find S_{20} . | [3] | | |
| 47. | How many terms of the AP : 9, 17, 25, must be taken to give a sum of 636? | [3] | | |
| 48. | Find the sum of all natural numbers between 100 and 500 which are divisible by 8. | [3] | | |
| 49. | The 4 th term of an AP is zero. Prove that its 25 th term is triple its 11 th term. | [3] | | |
| 50. | Determine the AP whose third term is 16 and the 7 th term exceeds the 5 th term by 12. | [3] | | |
| 51. | Find the sum of the first 40 positive integers divisible by 6. | [3] | | |
| 52. | Tanvy joined her job in a company in the year 2015 on a monthly salary of ₹40000 with an annual increment of | [3] | | |
| | ₹2500. In which year will she get ₹65000 as monthly salary? | | | |
| 53. | If the sum of the first 14 terms of an A.P. is 1050 and its first term is 10, then find the 21st term of the A.P. | [3] | | |
| 54. | A sum of ₹2800 is to be used to award four prizes. If each prize after the first is ₹200 less than the preceding | [3] | | |
| | prize, find the value of each of the prizes. | | | |
| 55. | The ratio of the 11th term to the 18th term of an AP is 2:3. Find the ratio of the 5th term to the 21st term, and | [3] | | |
| | also the ratio of the sum of the first 5 terms to the sum of first 21 terms. | | | |
| | Section D | | | |
| 56. | Read the following text carefully and answer the questions that follow: | [4] | | |
| | | | | |

Aahana being a plant lover decides to convert her balcony into beautiful garden full of plants. She bought few plants with pots for her balcony. She placed the pots in such a way that number of pots in the first row is 2, second row is 5, third row is 8 and so on.



- i. Find the number of pots placed in the 10th row. (1)
- ii. Find the difference in the number of pots placed in 5th row and 2nd row. (1)
- iii. If Aahana wants to place 100 pots in total, then find the total number of rows formed in the arrangement. (2)OR

If Aahana has sufficient space for 12 rows, then how many total number of pots are placed by her with the same arrangement? (2)

57. Sehaj Batra gets pocket money from his father every day. Out of pocket money, he saves money for poor people [4] in his locality. On 1st day he saves Rs. 27.5 On each succeeding day he increases his saving by Rs. 2.5.



Find

i. the amount saved by Sehaj on 10th day,

ii. the amount saved by Sehaj on 25th day, and the total amount saved by Sehaj in 30 days.

58. **Read the following text carefully and answer the questions that follow:**

Your elder brother wants to buy a car and plans to take loan from a bank for his car. He repays his total loan of \mathfrak{F} 1,18,000 by paying every month starting with the first instalment of \mathfrak{F} 1000. If he increases the instalment by \mathfrak{F}

100 every month , answer the following:



- i. Find the amount paid by him in 30th installment. (1)
- ii. Find the amount paid by him in 30 installments. (1)
- iii. If total installments are 40 then amount paid in the last installment? (2)

OR

Find the 10^{th} installment, if the 1^{st} installment is of ₹ 2000. (2)

59. Read the following text carefully and answer the questions that follow:

Akshat's father is planning some construction work in his terrace area. He ordered 360 bricks and instructed the supplier to keep the bricks in such as way that the bottom row has 30 bricks and next is one less than that and so on.



The supplier stacked these 360 bricks in the following manner, 30 bricks in the bottom row, 29 bricks in the next row, 28 bricks in the row next to it, and so on.

- i. In how many rows, 360 bricks are placed? (1)
- ii. How many bricks are there in the top row? (1)
- iii. How many bricks are there in 10th row? (2)

OR

If which row 26 bricks are there? (2)

[4]

[4]

60. Elpis Technology is a laptop manufacturer. The company works for many branded laptop companies and also [4]

provides them with spare parts. Elpis Technology produced 6000 units in 3rd year and 7000 units in the 7th year.



Assuming that production increases uniformly by a fixed number every year, find

- i. the production in the 1st year, (2)
- ii. the production in the 5th year, (1)
- iii. the total production in 7 years. (1)

61. Read the following text carefully and answer the questions that follow:

Deepa has to buy a scooty. She can buy scooty either making cashdown payment of ₹ 25,000 or by making 15 monthly instalments as below.

Ist month - ₹ 3425, Ilnd month - ₹ 3225, Illrd month - ₹ 3025, IVth month - ₹ 2825 and so on



- i. Find the amount of 6th instalment. (1)
- ii. Total amount paid in 15 instalments. (1)
- iii. Deepa paid 10th and 11th instalment together find the amount paid that month. (2)

OR

If Deepa pays ₹2625 then find the number of instalment. (2)

62. Elpis Technology is a TV manufacturer company. It produces smart TV sets not only for the Indian market but [4] also exports them to many foreign countries. Their TV sets have been in demand every time but due to the Covid-19 pandemic, they are not getting sufficient spare parts especially chips to accelerate the production. They have to work in a limited capacity due to the lack of raw material.



They produced 600 sets in the third year and 700 sets in the seventh year. Assuming that the production increases uniformly by a fixed number every year, find:

- i. the production in the 1st year (2)
- ii. the production in the 10th year (1)
- iii. the total production in first 7 years (1)

63. **Read the following text carefully and answer the questions that follow:**

India is competitive manufacturing location due to the low cost of manpower and strong technical and

[4]

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. Find the production during first year. (1)

ii. Find the production during 8th year. (1)

iii. Find the production during first 3 years. (2)

OR

In which year, the production is ₹ 29,200. (2)

64. Read the following text carefully and answer the questions that follow:

While preparing for a competitive examination, Akbar came across a match-stick pattern based question. The pattern is given below:



Fig. (1) Fig. (2) Fig. (3)

Based on the above information, answer the following questions:

i. Write first term and common difference of the A.P. formed by number of squares in each figure.

ii. Write first term and common difference of the A.P. formed by number of sticks used in each figure.

iii. a. How many squares are there in Fig. (10)? Also, write the number of sticks used in Fig. (10).

OR

b. If 88 sticks are used to make mth figure (Fig. (m)), find the value of m. How many squares are formed in this figure?

65. Akshat's father is planning some construction work in his terrace area. He ordered 360 bricks and instructed the **[4]** supplier to keep the bricks in such as way that the bottom row has 30 bricks and next is one less than that and so on.



The supplier stacked these 360 bricks in the following manner, 30 bricks in the bottom row, 29 bricks in the next row, 28 bricks in the row next to it, and so on.

- i. In how many rows, 360 bricks are placed?
- ii. How many bricks are there in the top row?

Section E

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[4]

- 66. Find the value of x, when in the A.P. given below 2 + 6 + 10 + ... + x = 1800. [5] 67. Write the expression $a_n - a_k$ for the AP: a, a + d, a + 2d, ... and find the common difference of the A.P for which [5] $a_{10} - a_5 = 200$ 68. Divya deposited ₹1000 at compound interest at the rate of 10% per annum. Find the amount at the end of first [5] year, second year, third year,..., and so on. Does this situation make an arithmetic progression. If yes, why? 69. Find the sum of all natural numbers between 1 and 100, which are divisible by 3. [5] 70. The first term of an A.P. is 22, the last term is -6 and the sum of all the terms is 64. Find the number of terms of [5] the A.P. Also, find the common difference. 71. Ramkali would need ₹1800 for admission fee and books etc., for her daughter to start going to school from next [5] year. She saved ₹50 in the first month of this year and increased her monthly saving by ₹20. After a year, how much money will she save? Will she be able to fulfil her dream of sending her daughter to school? 72. Solve the equation: [5] $-4 + (-1) + 2 + 5 + \dots + x = 437.$ 73. Find the middle term of the sequence formed by all three-digit numbers which leave a remainder 3 when divided [5] by 4. Also, find the sum of all numbers on both sides of the middle term.
- 74. Find the 20th term from the last term of the AP : 3, 8, 13, ..., 253. [5]
- 75. Solve the AP: (-4) + (-1) + 2 + 5 + --- + x = 437.

[5]