MATHS

BOOKS - RD SHARMA MATHS (HINGLISH)

ARITHMETIC PROGRESSIONS

Others

1. Find the middle term of the A.P. 213, 205, 197, ..., 37.

2. If in an A.P. the sum of m terms is equal to n and the sum of n terms is equal to m then prove that the sum of $(m+n)$ terms is $-(m+n)$

3. If the mth term of an A.P. is $\dfrac{1}{n}$ and the nth terms is $\dfrac{1}{m}$, show that the sum of mn terms

is $\frac{1}{2}(mm + 1).$

4. Find the 0 where the AP is 40,37,...

5. Find whether 0 (zero) is a term of the AP 40, 37, 34, 31, ...

6. If $\dfrac{1}{x+2}, \dfrac{1}{x+3}, \dfrac{1}{x+5}$ are in A.P. Then,

$x =$ (a)5 (b) 3 (c) 1 (d) 2

7. Find the number of natural numbers between 101 and 999 which are divisible by both 2 and 5.

8. The sum of first 6 terms of an arithmetic progression is 42. The ratio of its 10th term to its 30th term is $1:3$. Calculate the first and 13th term of an AP.

9. Find the sum of first 20 terms of an A.P., in which 3rd term is 7 and 7th term is two more than thrice of its 3rd term.

10. The sum of 5th and 9th terms of AP is 30. If its 25th term is three times it 8th term, find the AP.

11. The sum of three numbers in A.P. is 12 and the sum of their cubes is 288. Find the numbers.

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

13. If S_n, the sum of first n terms of an A.P., is given by $S_n = 5n^2 + 3n$, then find its nth term.

14. Find the sum of all natural numbers between 250 and 1000 which are exactly divisible by 3.

15. The sum of the first p, q, r terms of an A.P. are a, b, c respectively. Show that

$$\frac{a}{p}(q - r) + \frac{b}{q}(r - p) + \frac{c}{r}(p - q) = 0$$

16. If m times the mth term of an A.P. is equal to n times its nth term, show that the $(m+n)^{th}$ term of the A.P. is zero.

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

18. If mth term of an AP is 1/n and its nth term is 1/m , then show that its (mn)th term is 1

19. For the following arithmetic progressions write the first term and common difference $\dfrac{1}{3}, \dfrac{5}{3}, \dfrac{9}{3}, \dfrac{13}{3},$ (ii) 0. 6, 1. 7, 2. 8, 3. 9, ..

20. Is 184 a term of the sequence 3,7,11, ... ?

21. If the 10th term of an A.Pis 52 and 17th term is 20 more than the 13th term, find the A.P.

22. If the 8th term of an A.P. is 31 and the 15th term is 16 more than the 11th term, find the A.P.

23. Write the first five terms of each of the following sequences whose n th terms are:

$a_n = 3n + 2$ (ii) $a_n = \dfrac{n - 2}{3}$ $a_n = 3^n$ (iv)

$a_n = \dfrac{3n - 2}{5}$ $\quad a_n = (-1)^n \cdot 2^n$ (vi)

$a_n = \dfrac{n(n - 2)}{2}$ $\quad a_n = n^2 - n + 1$ (vii)

$a_n = 2n^2 - 3n + 1$ $a_n = \dfrac{2n - 3}{6}$

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24. Let a sequence be defined by

$a_1 = 1, a_2 = 1$ and $a_n = a_{n-1} + a_{n-2}$ for all

$n > 2$, Find $\dfrac{a_{n+1}}{a_n}$ for $n = 1, 2, 3, 4$.

25. Find the indicated terms in each of the following sequences whose nth terms are:

$a_n = 5_n - 4;\ a_{12} and a_{15}$

$a_n = \dfrac{3n - 2}{4n + 5};\ a + 7 and a_8$

$a_n = n(n - 1);\ a_5 and a_8$

$a_n = (n - 1)(2 - n)3 + n);\ a_1, a_2, a_3$

$a_n = (-1)^n;\ a_3, a_5, a_8$

26. Write the first five terms of the sequence defined by $a_n = (-1)^{n-1} \cdot 2^n$

27. Which term of the A.P. 3,10,17, ... will be 84 more than its 13th term?

28. Let sequence by defined by

$a_1 = 3, a_n = 3a_{n-1} + 1$ for all $n > 1$

29. A sequence is defined by

$a_n = n^3 - 6n^2 + 11n - 6$. Show that the

first three terms of the sequence are zero and

all other terms are positive.

30. Which term of the arithmetic progression 8,14,20,26, ... will be 72 more than its 41st term?

31. Find the term of the arithmetic progression 9,12,15,18, ... which is 39 more than its 36th term.

32. If the nth term of an A.P. is $(2n + 1)$, find the sum of first n terms of the A.P.

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33. Two A.P's have the same common difference. The difference between their 100th terms is 111222333. What is the difference between their Millionth terms?

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34. Find the 8th term from the end of the A.P.

7,10,13, ..., 184

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35. Find the sum of all three digit natural numbers, which are divisible by 7.

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36. If $\dfrac{a^{n+1} + b^{n+1}}{a^n + b^n}$ is the A.M. between a and b

. Then, find the value of n.

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37. Find the number of integers between 50

and 500 which are divisible by 7.

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38. 150 workers were engaged to finish a piece of work in a certain number of days. Four workers dropped the second day, four more workers dropped the third day and so on. It takes 8 more days to finish the work now. Find the number of days in which the work was completed.

39. How many numbers of two digits are divisible by 7?

40. Along a road lie an odd number of stones placed at intervals of 10 metres. These stones have to be assembled around the middle stone. A person can carry only one stone at a time. A man carried the job with one of the end stones by carrying them in succession. In

carrying all the stones he covered a distance of 3 km. Find the number of stones.

41. Divide 32 into four parts which are in A.P. such that the product of extremes is to the product of means is 7:15.

42. Find the sum of first 30 terms of an A.P. whose second term is 2 and seventh term is 22.

43. Ramkali would need Rs. 1800 for admission fee and books etc., for her daughter to start going to school from next year. She saved Rs. 50 in the first month of this year and increased her monthly saving by Rs. 20. After a

year, how much money will she save? Will she be able to fulfil her dream of sending her daughter to school?

44. The first and the last terms of an A.P. are 5 and 45 respectively. If the sum of all its terms is 400, find its common difference.

45. Two cars start together in the same direction from the same place. The first goes with uniform speed of 10 km/h. The second goes at a speed of 8 km/h in the first hour and increases the speed by $\dfrac{1}{2}$ km/h in each succeeding hour. After how many hours will the second car overtake the first car if both cars go non-stop?

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

47. If $(m + 1)^{th}$ term of an A.P. is twice the $(n + 1)^{th}$ term, prove that $(3m + 1)^{th}$ term is twice the $(m + n + 1)^{th}$ term.

48. 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?

49. The sum of the first p, q, r terms of an A.P. are a, b, c respectively. Show that

$$\frac{a}{p}(q - r) + \frac{b}{q}(r - p) + \frac{c}{r}(p - q) = 0$$

50. The ratio of the sum of n terms of two A.Ps is $(7n + 1) : (4n + 27)$. Find the ratio of their m^{th} terms.

51. If there are $(2n + 1)$ terms in A.P., then prove that the ratio of the sum of odd terms and the sum of even terms is $(n + 1) : n$

52. Raghav buys a shop of Rs. 1,20,000. He pays half of the amount in cash and agrees to pay the balance in 12 annual instalments of Rs. 5000 each. If the rate of interest is 12% and the pays with the instalment the interest due

on the unpaid amount, find the total cost of the shop.

53. Which term of the A.P. 3,15,27, 39, ... will be 120 more than its 21st term?

54. The 17th term of an A.P. is 5 more than twice its 8th term. If the 11th term of the A.P. is

43, find the nth term.

55. The sum of three numbers in A.P. is -3, and their product is 8. Find the numbers.

56. Find the four numbers in A.P. whose sum is 20 and the sum of whose squares is 120.

57. The sum of three terms of an A.P. is 21 and the product of the first and the third terms exceeds the second term by 6, find three terms.

58. The angles of a quadrilateral are in A.P. whose common difference is 10. Find the angles.

59. Consider the A.P. $2, 5, 8, 11, \ldots\ldots, 302$. Show that twice of the middle term of the above A.P. is equal to the sum of its first and last term.

60. For what value of n the nth terms of the following two A.Ps the same? $1, 7, 13, 19,$ (ii) $69, 68, 67,$

61. How many terms are there in the sequence

$3, 6, 9, 12, 111$?

62. Find the middle term of the A.P.

$6, 13, 20, \ldots\ldots 216$.

63. Show that the sequence 9,12,15,18,... is an A.P. Find its 16th term and the general term.

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64. Which term of the sequence $-1, 3, 7, 11, 95$?

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65. Write the sequence with nth terms:

$a_n = 3 + 4n$ (ii) $a_n = 5 + 2n$ $a_n = 6 - n$ (iv)

$a_n = 9 - 5n$

66. Then n^{th} term of an A.P. is $6n + 2$. Find the common difference.

67. Show that the sequence defined by $a_n = 5n - 7$ is an A.P., find its common difference.

68. Show that the sequence defined by $a_n = 3n^2 - 5$ is not an A.P.

69. Find the 10th term from the end of the A.P. 8,10,12, ... 126.

70. The 19th term of an A.P. is equal to three times its 9th term.If its $9th$ term is 19, find the A.P.

71. If the 5th term of an A.P. is 31 and 25th term is 140 more than the 5th term, find the A.P.

72. The first and last term of an A.P. are a and l respectively. If S is the sum of all the terms of the A.P. and the common difference is given by $\dfrac{l^2 - a^2}{k - (l + a)}$, then $k = $ (a)S(b) $2S$ (c) $3S$ (d) none of these

73. Find the number of all three digit natural numbers which are divisible by 9.

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74. If the seventh term of an AP is 1/9 and its ninth term is 1/7, find its $(63)^{rd}$ term.

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75. The 24th term of an A.P. is twice its 10th term. Show that its 72th term is 4 times its 15th term.

76. If $2x, x + 10, 3x + 2$ are in A.P., find the value of x.

77. If the numbers a, b, c, d, e form an A.P. , then find the value of $a - 4b + 6c - 4d + e.$

78. The 9th term of an A.P. is equal to 6 times its second term. If its 5th term is 22, find the A.P.

79. The sum of 5th and 9th term of an A.P. is 72 and the sum of 7th and 12th terms is 97 . Find that

80. The sum of 4th and 8th terms of an A.P. is 24 and the sum of 6th and 10th terms is 44. Find the A.P.

81. Write an $A\dot{P}$ having 4 as the first terms and -3 as the comon difference.

82. If the first term of an A.P. is a and nth term is b, then its common difference is

A. $\dfrac{b-a}{n+1}$

B. $\dfrac{b-a}{n-1}$

C. $\dfrac{b-a}{n}$

D. $\dfrac{b+a}{n-1}$

Answer: B

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83. If $k,\ 2k-1$ and $2k+1$ are three consecutive terms of an A.P., the value of k is

A. -2

B. 3

C. -3

D. 6

Answer: B

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