CHAPTER 6

Sequences and Series (Progressions)

- A sequence is defined as an array of numbers in such a manner so that there is a similarity in a given array, which enables us to determine the term or terms preceding or succeeding to such an array.
- A sequence can be categorized into 3 parts:
  a) Arithmetic Progression
  b) Geometric Progression
  c) Harmonic Progression

	Arithmetic Progression	**Geometric Progression**
Definition	Series which increases or decreases by a fixed quantity	Series which increases or decreases by a fixed proportion
First Term	a	a
Constant	Common Difference = d	Common Ratio = r
Last Term	$l = t_n = a + (n-1)d$	$l = t_n = a.r^{n-1}$
Sum	$S_n = \frac{n}{2}[2a + (n-1)d]$ $S_n = \frac{n}{2}(a + l)$	$S_n = a.\frac{1-r^n}{1-r}$ when $r < 1$

- If three numbers are in G.P., their Logarithms are always in A.P.

Infinite GP Series

$$a + ar + ar^2 + ar^3 + ...\alpha = \frac{a}{1-r} \quad \text{given } |r| < 1$$

Sum of Natural Numbers:

$$\sum n = 1 + 2 + 3 + ... + n = \frac{n(n+1)}{2}$$

$$\sum n^2 = 1^2 + 2^2 + 3^2 + ... + n^2 = \frac{1}{6}n(n+1)(2n+1)$$

$$\sum n^3 = 1^3 + 2^3 + 3^3 + ... + n^3 = \left[\frac{n(n+1)}{2}\right]^2 = \frac{n^2(n+1)^2}{4}$$

Harmonic Progression(H.P)

- Three numbers are in H.P, If their reciprocals are in A.P
- a,b,c are in H.P , if $\frac{1}{a}\ \frac{1}{b}\ \frac{1}{c}$ are in A.P.
- H.P fails when one of the terms of the A. P is Zero.

t_n of HP= $\frac{1}{t_n \text{ of the crresponding A.P}}$

Concept of A.M , G.M and H.M

If a & b are any unequal real numbers then,

	A.M(A)	G.M(G)	H.M(H)
Definition	$\frac{a+b}{2}$	$+\sqrt{ab}$	$\frac{2ab}{a+b}$
Relation	i) A > ii) $A \times H$	G > = G^2	H

Things to remember

- The ratio of the sum of X number of A.Ms to the sum of Y number of A.Ms is always X : Y
- Two numbers can have more than one A.M/G.M/H.M
- A.Ms/G.Ms/ H.Ms are also the members of A.P/G.P/ H.P

Arithmetic Progression

1. Find the 10^{th} term of the series: 2, 6, 10, 14, ….
   a) 34
   b) 36
   c) 38
   d) 42

2. Which term of the series 1, 5, 9, 13, ….. is 101?
   a) 25^{th}
   b) 26^{th}
   c) 28^{th}
   d) 30^{th}

3. The 10^{th} and 18^{th} terms of an A.P. are 41 and 73 respectively. Find 26^{th} term.
   a) 50
   b) 100
   c) 123
   d) 105

4. The fifth and eleventh terms of an AP are 41 and 20 respectively. The first term of the progression is :
   a) 55
   b) 27
   c) 41
   d) 14

5. If the *nth* term of the A.P.9, 7, 5, ….is same as the *nth* term of the A.P. 15, 12, 9, …. find *n.*
   a) 7
   b) - 7
   c) 5
   d) 17

6. If the pth term of an AP is q and the qth term is p, then the mth term is:
   a) p + q
   b) p + q + m
   c) p + q – m
   d) None of the above

7. If 10 times the 10^{th} term of an A.P. is equal to 15 times the 15^{th} term, then 25^{th} term of the A.P. is ____.
   a) 1
   b) 25
   c) 0
   d) –25

8. The ratio of the 7^{th} term to the 3^{rd} term of an AP is 12 : 5, find the ratio of the 13^{th} term to the 4^{th} term.
   a) 3 : 10
   b) 10 : 3
   c) 9 : 4
   d) 4 : 1

9. The sum of three numbers in AP is 12 and the sum of their squares is 66. Find the numbers.
   a) 7, 4, 1
   b) 8, 6, 2
   c) 7, 5, 2
   d) 2, 5, 7

10. Find the four terms in AP whose sum is 20 and the sum of whose squares is 120.
   a) 2, 4, 6, 8
   b) 8, 6, 4, 2
   c) 2, 5, 7, 8
   d) Both a) & b)

11. Three numbers are in A.P. if the sum of these numbers be 27 and the product 648, find the numbers.
   a) (6, 9, 15)
   b) (6, 9, 12)
   c) (6, 10, 13)
   d) (5, 8, 11)

12. Find the four numbers in A.P., whose sum is 50 and in which the greatest number is 4 times the least.
    a) 5, 10, 15, 25
    b) 5, 10, 15, 30
    c) 5, 10, 15, 20
    d) None of the above

13. Find the increasing AP, the sum of whose first three terms is 27 and the sum of their squares is 275.
    a) 5, 10, 15, 20, …
    b) 4, 9, 14, 19, …
    c) 5, 9, 13, 17, …
    d) 3, 9, 15, 21, …

14. 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.
    a) (1, 7, 13)
    b) (7, 13, 19)
    c) (1, 5, 9)
    d) None of the above

15. The digits of a positive integer, having three digits are in AP and their sum s 15. The number obtained by reversing the digits is 594 less then original number. Find the number.
    a) 659
    b) 582
    c) 852
    d) 258

16. If each of a series in AP be multiplied by 5, would the series so obtained be again in AP?
    a) Yes
    b) No, it will change to HP
    c) No, it will change to GP
    d) None of the above

17. Divide 20 into four parts which are in AP and such that the product of the first and fourth is to the product of the second and third in the ratio 2 : 3.

a) 2, 4, 6, 8

b) 2, 3, 7, 9

c) 8, 6, 5, 3

d) 1, 4, 6, 9

18. The angles of a quadrilateral are in A.P. whose common difference is 10^{o}. Find the angles (in degrees).

a) 65, 75, 85, 95

b) 75, 85, 95, 115

c) 55, 75, 95, 115

d) 75, 85, 95, 105

19. The 6^{th} and 17^{th} terms of an A.P are 19 and 41 respectively, find the 40^{th} term.

a) 78

b) 98

c) 102

d) 87

20. If the 3rd and the 6th term of an AP are 7 and 13 respectively, work out the sum of the first 20 terms of the series.

a) 340

b) 540

c) 550

d) 440

21. The first and the last terms of an AP having finite number of terms are respectively. - 2 and 124 and the sum of the AP is 6161. Find the number of terms in the AP.

a) 98

b) 99

c) 100

d) 101

22. If Dena saves ₹ 1 today, ₹ 2 the next day, ₹ 3 the succeeding day and so on, what will be Dena's total savings in 365 days?
    a) ₹ 66700
    b) ₹ 66895
    c) ₹ 65495
    d) ₹ 66795

23. The third term of an AP is 7 and the seventh term exceeds three times the third term by 2. What is the sum of the first term, the common difference and the sum of first 20 terms?
    a) 743
    b) 742
    c) 741
    d) 740

24. If the sum of p terms of an AP is same as the sum of its q terms, then the sum of the first (p + q) terms is:
    a) 0
    b) p + q
    c) p – q
    d) None of the above

25. The sum of n terms of an AP is $3n^2 + 5n$, find the number of the term which is equal to 152.
    a) 15
    b) 21
    c) 25
    d) 52

26. The sum of n terms of an AP is n^2. Find its common difference.
    a) 1
    b) – 1
    c) 3
    d) 2

27. Moi borrows ₹ 1000 and agrees to repay without interest in 10 installments, each installment being less than preceeding by ₹ 8. Find his first installment.
    a) ₹ 100
    b) ₹ 136
    c) ₹ 125
    d) ₹ 134

28. A farmer undertakes to pay off a debt of ₹ 6240 by monthly installments. He pays ₹ 300 as the first installment and increases every subsequent installment by ₹ 40 over the immediate previous installment. In how many installments his debt will be cleared up?
    a) 10
    b) 16
    c) 14
    d) 12

29. Boi arranges to pay off a debt of ₹ 9600 in 48 installments which form an A.P. When 40 of these installments are paid Boi becomes insolvent and the creditor finds that ₹ 2400 still remains unpaid. Find the value of the second installment paid by Boi. Ignore Interest.
    a) ₹ 87.5
    b) ₹ 82.5
    c) ₹ 92.5
    d) None of the above

30. The cost of boring a tube-well, 600 metres deep, is as follows: 25 paise for the first metre and an additional 4 paise for every subsequent metre. Find the total cost of boring.
    a) ₹ 7000
    b) ₹ 7300
    c) ₹ 7330
    d) ₹ 7338

31. The sum of the first 50 terms of an AP is 200, and the sum of the next 50 terms is 2700. Find the common difference.

a) – 1

b) 2

c) 1

d) – 2

32. The sum of n terms of an AP, whose first term is 22 and common difference is – 4, is 64. Find n.

a) 4

b) 8

c) Both a) and b)

d) None of them

33. If the pth term of an AP is 4p – 1, find the 40^{th} term and the sum of first 40 terms.

a) 159, 3420

b) 159, 3240

c) 168, 3240

d) None of the above

34. Let a, b, c be respectively the sum of first p, q and r terms of an AP. Then what is the value of $\frac{a}{p}(q-r)+\frac{b}{q}(r-p)+\frac{c}{r}(p-q)$.

a) 1

b) – 1

c) 2

d) 0

35. Let a, b, c be respectively the pth, qth and rth term of an AP. Find the value of p(b–c) + q(c–a) + r(a–b)

a) 0

b) 1

c) – 1

d) None of the above

36. Find the sum of the first hundred even natural numbers divisible by 5.
    a) 50500
    b) 50050
    c) 50005
    d) 50000

37. Find the sum of all numbers lying between 100 and 1000 which are divisible by 13.
    a) 37600
    b) 37674
    c) 36457
    d) 45875

38. How many numbers of two digit are divisible by 3?
    a) 25
    b) 31
    c) 29
    d) 30

39. Find the sum of all odd numbers between 100 and 200.
    a) 8500
    b) 7500
    c) 5500
    d) 6500

41. The sum of all odd integers between 1 and 1000 which are divisible by 3 is _____.
    a) 86337
    b) 83667
    c) 76638
    d) 73569

42. If S_1, S_2, S_3 be the sums of n terms of three AP and the first term of each AP being 1 and the respective common difference are 1, 2, 3; then $S_1 + S_3$ = ?
    a) S_2
    b) $3S_2$
    c) $0.5S_2$
    d) $2S_2$

43. An AP consists of n terms. If the sum of its first three terms is x and the sum of the last three terms is y, then the sum of all the terms of the AP is:

    a) $\frac{n}{6}(xy)$

    b) $\frac{n}{6}(x+y)$

    c) $n(x+y)$

    d) $\frac{n(x-y)}{6}$

44. 300 trees are planted in a regular pattern in rows in the shape of an isosceles triangle, the numbers in the successive rows diminishing by one from the base to the apex. How many trees are there in the row, which forms the base of the triangle

    a) 30

    b) 21

    c) 27

    d) 24

45. The first and the last term of an AP are "a" and "1" respectively. The sum of nth term from the beginning and the nth term from the end is:

    a) a + 1

    b) a – 1

    c) a + 31

    d) 2a + 1

46. If the sums of n, 2n and 3n terms of an AP be S_1, S_2 and S_3 respectively, then show that S_3 = ?

    a) $3(S_2 - S_1)$

    b) $(S_2 - S_1)$

    c) $2(S_2 - S_1)$

    d) $3(S_2 + S_1)$

47. If S_n be the sum of n consecutive terms of an AP, then the value of $S_{n+3} - 3S_{n+2} + 3S_{n+1} - S_n$ is:

    a) 0

    b) 1

    c) 2

    d) 3

48. If the first, second and last term of an AP are a, b and c respectively, then the sum of all terms of the AP is

a) $\frac{(a+c)(b+c-2a)}{(b-a)}$

b) $\frac{(a+c)(b+c-2a)}{2(b-a)}$

c) $\frac{(a-c)(b+c-2a)}{2(b-a)}$

d) $\frac{(a+c)(b+c+2a)}{2(b-a)}$

49. The sum of first n terms of two AP are in the ratio (7n + 2) : (n + 4). Find the ratio of their 5^{th} terms.

a) 1 : 5

b) 5 : 1

c) 2 : 3

d) 3 : 2

Sum of Series

Find the sum of the following series:

50. 1 + 2 + 3 + ……. + 200

a) 20100

b) 2870

c) 3025

d) 1409400

51. $1^2 + 2^2 + 3^2 + ... + 20^2$

a) 3025

b) 2870

c) 20100

d) 1409400

52. $1^3 + 2^3 + 3^3 + \ldots\ldots\ldots\ldots + 10^3$
    a) 1409400
    b) 20100
    c) 3025
    d) 2870

53. $31^3 + 32^3 + 33^3 + \ldots. + 50^3$
    a) 2010000
    b) 3025000
    c) 2870000
    d) 1409400

54. 2 + 3 + 5 + 7 + 8 + 11 + 11 + 15 + 14 + 19 + ……. to 40 terms
    a) 1430
    b) 1340
    c) 650
    d) 5000

55. $2\log a + 2\log a^2 + 2\log a^3 + \ldots.. + 2\log a^n$
    a) nloga
    b) n(n+ 1) loga
    c) loga
    d) (n + 1) loga

56. $(1.2.3) + (2.3.4) + (3.4.5) + \ldots\ldots\ldots\ldots + t_n$
    a) $\frac{(n+1)(n+2)(n+3)}{4}$
    b) $\frac{n(n+1)(n+2)(n+3)}{6}$
    c) $\frac{n(n+1)(n+2)(n+3)}{4}$
    d) None of the above

57. 6 + 27 + 128 + 629 + ……+ t_n
    a) $5\left(\frac{5^n-1}{4}\right)+\frac{n(n+1)}{4}$
    b) $5\left(\frac{5^n-1}{4}\right)+\frac{n(n+1)}{2}$
    c) $\left(\frac{5^n-1}{4}\right)+\frac{n(n+1)}{2}$
    d) None of the above

58. $t_n = n^2 + 2^n$

a) $\frac{n(n+1)(2n+1)}{6} + 2(2^n - 1)$

b) $\frac{(n+1)(2n+1)}{6} + 2(2^n - 1)$

c) $\frac{n(n+1)^2}{6} + 2(2^n - 1)$

d) None of the above

59. $(3.8)+(6.11)+(9.14)+.....+t_n$

a) $3(n+1)(n+3)$

b) $(3n+1)(n+3)$

c) $3n(n+1)(n+3)$

d) $3(n+1)(3n+2)$

60. $\frac{1}{1.2} + \frac{1}{2.3} + \frac{1}{3.4} + ... + t_n$

a) $\frac{n}{2n+1}$

b) $\frac{n}{n+1}$

c) $\frac{1}{n+1}$

d) None of the above

61. $\frac{1}{2.5} + \frac{1}{5.8} + \frac{1}{8.11} + ... + t_n$

a) $\frac{n}{(3n+2)}$

b) $\frac{n^2}{2(3n+2)}$

c) $\frac{1}{n(3n+2)}$

d) $\frac{n}{2(3n+2)}$

62. $7 + 77 + 777 + \ldots\ldots\ldots\ldots + t_n$

a) $\frac{7}{81}\left(10^n - 9n - 10\right)$

b) $\frac{7}{9}\left(10^{n+1} - 9n - 10\right)$

c) $\frac{7}{81}\left(10^{n+1} - 9n - 10\right)$

d) None of the above

63. $0.9 + 0.99 + 0.999 + \ldots\ldots\ldots\ldots\ldots\ldots + t_n$

a) $n + \frac{1}{9}\left[1 - \frac{1}{10^n}\right]$

b) $n - \frac{1}{9}\left[1 - \frac{1}{10^{n-1}}\right]$

c) $n - \frac{1}{9}\left[1 - \frac{1}{10^n}\right]$

d) $n - \frac{1}{9}\left[1 - \frac{1}{10^{n+1}}\right]$

Geometric Progression

64. Find the 12^{th} term of the sequence 1, 2, 4, 8, ….

a) 2048

b) 1024

c) 512

d) None of the above

65. If the 5th and the 10th terms of a G.P. are 32 and 1024 respectively, find the first term and the common ratio

a) 2, 2

b) 2, 3

c) 1, 2

d) 2, 4

66. Find the 4th term of the G.P. whose 5th term is 32 and the 8th term is 256.

a) 14

b) 16

c) 18

d) 20

67. Find the three numbers in G.P. whose sum is 14 and product is 64.
    a) 2, 6, 8
    b) 1, 4, 16
    c) 2, 4, 8
    d) None of the above

68. The sum of three numbers in G.P. is 26 and their product is 216. Find the numbers.
    a) 2, 6, 8
    b) 2, 6, 18
    c) 2, 16, 18
    d) None of the above

69. If the G.P.'s 5, 10, 20 ….. and 1280, 640, 320 …. have their *nth* terms equal, find the value of *n.*
    a) 2
    b) 7
    c) 5
    d) 8

70. A sum of ₹ 312 is divided among four persons A, B, C, D; the amounts received by them forms a GP. If A and D together receive ₹ 252, find the amount received by each person separately.
    a) 2, 5, 55, 250
    b) 12, 5, 55, 240
    c) 2, 10, 50, 250
    d) None of the above

71. In a G.P., the common ratio is equal to the 1st term. If the fifth term is 243, find the 10th term.
    a) 49049
    b) 59049
    c) 59059
    d) 69079

72. The common ratio, last term, and the sum of a G.P. are 3, 486 and 728 respectively. The first term of the progression is:
    a) 4
    b) 6
    c) 8
    d) 2

73. When a certain golf ball is dropped on a piece of pavement, it bounces to a height of three-fifth the distance from which it falls. If the ball is dropped from a height of 100 cm, how far it has travelled when it hits the pavement for the tenth time ?

    a) 397 cm

    b) 400 cm

    c) 450 cm

    d) 460 cm

74. A bouncing tennis ball rebounds each time to a height equal to one half the height of the previous bounce. If it is dropped from a height of 16 meters, find the total distance it has travelled when it hits the ground for the 10^{th} time (in metres).

    a) 46.29

    b) 41.29

    c) 47.94

    d) 51.87

75. Three numbers are in A.P. and their sum is 15. If 1, 3, 9 be added to them respectively, they form a G.P. Find the numbers.

    a. 15, 5, - 5

    b. 3, 5, 7

    c. 7, - 5, 3

    d. Either a) or b)

76. The sum of three terms in G.P. is 14. If the first two terms are each increased by 1 and the third term is decreased by 1, the resulting numbers are in A.P. The G.P. is:

    a. 2, 4, 8

    b. 8, 4, 2

    c. Both a) and b)

    d. None of them

77. The sum of three numbers in G.P. is 56. If 1, 7, 21 are subtracted from the numbers respectively, resulting numbers form the consecutive terms of an A.P. Find the numbers.

    a. 8, 34, 32

    b. 8, 16, 32

    c. 6, 20, 36

    d. 4, 8, 32

78. In a set of four numbers, the first three are in GP, and the last three are in AP, with common difference of 6. If the first number is the same as the fourth; the four numbers are:
    a. 8, 4, 2, 8
    b. 8, – 4, 2, 8
    c. 4, 2, 1, 4
    d. 4, – 2, 1, 4

79. Find three unequal positive integers a, b, c such that 2, a, b forms an AP and a, b, c forms a GP.
    a) 4, 8, 12
    b) 4, 6, 7
    c) 4, 6, 9
    d) 4, 8, 11

80. If p, q, r are in AP and x, y, z are in GP; then the value of $x^{q-r}.y^{r-p}.z^{p-q}$ is:
    a. 0
    b. – 1
    c. 1
    d. All of the above

81. If x, y, z be the pth, qth and rth terms respectively, both of an AP and of a GP series, then find the value of $x^{y-z}.y^{z-x}.z^{x-y}$.
    a. – 1
    b. 1
    c. 0
    d. None of the above

82. If x, y, z respectively are the pth, qth and rth term of a GP, then find the value of $x^{q-r}.y^{r-p}.z^{p-q}$.
    a) 0
    b) 1
    c) -1
    d) None of the above

83. If a, b, c respectively are the xth, yth and zth terms of a GP, find the value of $(y - z) \log a + (z - x) \log b + (x - y) \log c$.
    a. 1
    b. 0
    c. – 1
    d. None of the above

84. If a, b, x, y, z are positive numbers such that a, x, b are in AP; a, y, b are in GP and $(a + b)z = 2ab$, then x, y, z are in:
    a. Arithmetic Progression
    b. Geometric Progression
    c. Harmonic Progression
    d. None of the above

85. If x, y, z are in GP, then logx, logy, logz are in:
    a. Harmonic Progression
    b. Geometric Progression
    c. Arithmetic Progression
    d. None of the above

86. If S_1, S_2, S_3 be respectively the sum of n, 2n and 3n terms of a GP, then $S_1 (S_3 - S_2) - (S_2 - S_1)^2$ is:
    a) n
    b) 2n
    c) 3n
    d) 0

87. If "a" be the first term, "b" the nth term and "p" the product of the first n terms of a GP, then which of the following is true?
    a) $p = ab$
    b) $p = (ab)^n$
    c) $p^2 = (ab)^n$
    d) None of the above

88. The third term of a GP is 4. The product of the first five terms is:
    a) 4^3
    b) 4^5
    c) 4^4
    d) None of the above

89. The sum of 1st six terms of a G.P. is 9 times the sum of the first three terms. Find the common ratio.
    a. 2
    b. 3
    c. 4
    d. 8

90. The sum of the first three terms of a G.P. is to the sum of the first six terms as 125:152. Find the common ratio of the G.P.
    a. 0.40
    b. 0.50
    c. 0.75
    d. 0.60

91. The first, tenth and twenty-eighth term of an AP are three successive terms of a GP. Find the common ratio of the GP. Given that the sum of the first 28 terms of the AP is 210, find its first term.
    a. 2, 2
    b. 2, 3
    c. 3, 2
    d. – 3, 2

93. An air pump used to extract air from a vessel removes one-tenth of the air at stroke each stoke. Find what fraction of original volume of air is left after the 5th stroke.
    a) 0.54899
    b) 0.54999
    c) 0.59049
    d) 0.60099

Infinite GP Series

94. $1+\frac{1}{3}+\frac{1}{3^2}+\frac{1}{3^3}+.....\infty$

a) $\frac{1}{2}$

b) $\frac{1}{3}$

c) $\frac{3}{2}$

d) None of the above

95. $1+\frac{1}{1.05}+\frac{1}{(1.05)^2}+\frac{1}{(1.05)^3}+\frac{1}{(1.05)^4}+...\infty$

a) 21

b) 12

c) 11

d) 5

96. $\frac{1}{\log_3 e}+\frac{1}{\log_3 e^2}+\frac{1}{\log_3 e^4}+\frac{1}{\log_3 e^8}+...\infty$

a) log e

b) loge3

c) 2loge3

d) None of the above

97. The first term of an infinite Geometric Progression series, whose sum to infinity is 8 and second term is 2 is:

a) 2

b) 4

c) 8

d) 5

98. The sum of the first 2 terms of a Geometric Progression is 5/3 and the sum to infinity is 3. The first term of the GP is:

a) 1

b) 2 / 3

c) 3 / 2

d) 2

99. For the series given in the previous question, what is its common ratio :

a) 1

b) 2/3

c) 3/2

d) 2

100. For a GP series, sum to infinity is 15 and the sum of the squares of the terms of this same series, to infinity is 45. What is the common ratio of the series?
a) 1 b) 2 / 3 c) 3 / 2 d) 2

101. The sum of an infinite GP whose first term is 28 and the fourth term is 4/49 is:
a) 28/3 b) 98/3 c) 91/3 d) None of the above

102. A person is entitled to receive an annual payment, which for each year is less by $1/10^{th}$ of what it was for the previous year. If the first payment is ₹ 100m what is the maximum amount he can receive, however long he may live?
a. ₹ 2000 b) ₹ 1100 c) ₹ 1560 d) ₹ 1000

103. Two infinite Geometric Progression start from the same number. The respective common ratios are 0.85 and 0.55. If S_1 and S_2 denote the sum of the first and the second series respectively, then which of the following is true?
a. $S_1 = S_2$ b) $S_1 = 2\ S_2$ c) $S_1 = 3\ S_2$ d) $2\ S_1 = 3\ S_2$

104. If in an infinite Geometric Progression, each term is twice the sum of all succeeding terms, then what is the value of common ratio, if its first term is 2?
a. ½ b) 1/3 c) ¼ d) 1/5

105. If r > 1 and

$$x = a + \frac{a}{r} + \frac{a}{r^2} + \frac{a}{r^3} + ... + \infty$$

$$y = b - \frac{b}{r} + \frac{b}{r^2} - \frac{b}{r^3} + ... + \infty$$

$$z = c + \frac{c}{r^2} + \frac{c}{r^4} + \frac{c}{r^6} + ... + \infty$$

Then find the value of xy/z
a) abc b) ac/b c) ab/c d) bc/a

106. If $x = 1 + a + a^2 + a^3 + a^4 + ...$ □ and
$y = 1 + b + b^2 + b^3 + b^4 + ...$ □
then what is the value of
$1 + ab + a^2b^2 + a^3b^3 + ...\infty$ □
a) $\frac{xy}{x+y-1}$
b) $\frac{x}{y(x+y)}$
c) $\frac{xy}{x+y+1}$
d) none

107. Evaluate the followings:
(a) $0.\bar{4}$ b) $0.\overline{42}$ c) $0.\overline{423}$ d) $0.4\overline{23}$

108. If a, b, c, d are in GP, then (a + b), (b + c), (c + d) are in:
a. Arithmetic Progression
b. Geometric Progression
c. Harmonic Progression
d. Both a) and b) but not c)

109. If a, b, c, d are in Geometric Progression then $(a^2 + b^2)$, $(b^2 + c^2)$, $(c^2 + d^2)$ are in:
a. Geometric Progression
b. Arithmetic Progression
c. Both a) and b) above
d. None of the above

110. If $\frac{1}{a}, \frac{1}{b}, \frac{1}{c}$ are in AP, then $\frac{b+c}{a}, \frac{c+a}{b}, \frac{a+b}{c}$ are in:
a. Harmonic Progression
b. Arithmetic Progression
c. Geometric Progression
d. None of the above

111. If a^2, b^2, c^2 are in AP, the $\frac{a}{b+c}, \frac{b}{c+a}, \frac{c}{a+b}$ are in:
a. Geometric Progression
b. Arithmetic Progression
c. Both a) and b) above
d. None of the above

112. If a, b, c are in AP, then $\frac{1}{\sqrt{b}+\sqrt{c}}, \frac{1}{\sqrt{c}+\sqrt{a}}, \frac{1}{\sqrt{a}+\sqrt{b}}$ are in:
a. Geometric Progression
b. None of the above
c. Arithmetic Progression
d. Harmonic Progression

113. If $\frac{b+c-a}{a}, \frac{c+a-b}{b}, \frac{a+b-c}{c}$ are in AP, then $\frac{1}{a}, \frac{1}{b}, \frac{1}{c}$ are in:'
a. Harmonic Progression
b. Geometric Progression
c. Arithmetic Progression
d. None of the above

114. If a, b, c are in HP, then $\frac{a}{b+c}, \frac{b}{c+a}, \frac{c}{a+b}$ are in:
a. Arithmetic Progression
b. Geometric Progression
c. Harmonic Progression
d. None of the above

A.M, G.M & H.M

115. Insert three arithmetic means between 2 and 10.
a. 4, 6, 8 b. 3, 6, 9 c. 5, 7, 9 d. 1, 2, 3

116. Insert 4 arithmetic means between 52 and 77.
   a) 56, 61, 66, 71 c. 58, 63, 68, 73
   b) 57, 62, 67, 72 d. None of the above

117. The ratio of the sum of x AM to y AM between two numbers is:
   a) x : y b) x2 : y2 c) 1 : 1 d) None of the above

118. Insert three Geometric Means between 3 and 48.
   a. 6, 18, 24 c. 6, 24, 36
   b. 6, 12, 24 d. None of the above

119. What is the ratio of two positive number a & b when (a **>** b) when the ratio of their arithmetic mean to geometric mean is found to be 5 : 3.
   a) 1:9 b) 1:5 c) 3:5 d) 9:1

120. If a, b, c are in GP and x, y be the arithmetic means between a, b and b, c respectively, then which of the following/s is/are true?

   a. $\frac{a}{x}+\frac{c}{y}=2$
   b. $\frac{1}{x}+\frac{1}{y}=\frac{2}{b}$
   c. Both a) and b) above
   d. Neither a) nor b) is true

121. K is the arithmetic mean of two given quantities and p, q are the two geometric means between the same two quantities, then the value of $p^3 + q^3$ is:
   a) 2pq b. 2pqK c. 2K d. None of the above

122. In a GP, (p + q)th term is m and (p – q)th term is n, then the series pth term is:
   a) mn
   b) m + n
   c) m – n
   d) $(mn)^{0.5}$

123. If A.M. = 25; H. M. = 9, then GM = ?
   a. 15 b. 20 c. 21 d. 19

124. The AM of two observations is 36 and their GM is 24. Then the HM is:
   a. 14 b. 15 c. 16 d. 18

125. The arithmetic mean of two observations is 25 and their geometric mean is 15. The two observations are:
   a. 25 and 25 b. 45 and 5 c. 35 and 15 d. 30 and 20