VIRTUAL COACHING CLASSES
ORGANISED BY BOS (ACADEMIC), ICAI

FOUNDATION LEVEL PAPER 3:
BUSINESS MATHEMATICS LOGICAL REASONING AND STATISTICS

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GEOMETRIC PROGRESSION

If in a sequence of terms each term is constant multiple of the proceeding term, then the sequence is called a Geometric Progression (G.P). The constant multiplier is called the *common ratio*

$$a, ar, ar^2, ar^3, ar^4, ar^5, \ldots\ldots\ldots\ldots ar^n$$

$$t_n = ar^{n-1}$$

Common ratio $r = \dfrac{t_n}{t_{n-1}}$

Sum of first n terms of a GP is

$$S_n = a\,(\,1 - r^n) / (\,1 - r\,) \text{ when } r < 1$$

$$S_n = a\,(\,r^n - 1\,) / (\,r - 1\,) \text{ when } r > 1$$

If $n \to \infty$, $1/R^n \to 0$

If series is infinite, sum of the GP is

Thus $\quad S_\infty = \dfrac{a}{1-r}, \; r < 1$

Geometric Progression & Geometric Mean

If a, b, c are three numbers in GP, then Geometric mean is 'b' such that

$$b^2 = a *c$$

Three numbers in GP should be taken as a/r, a and ar

Five numbers in GP should be taken as a/ r^2, a/r, a, ar, ar^2

GP

Questions

1. Sequence is given and nth term is asked.

2. Some terms are given and you are asked to find the sequence.

3. You are asked to find Geometric mean

4. You are asked to find the sum of the series.

5. Other mix sums

GP - Sequence is given and nth term is asked.

1. The 7th term of the series 6, 12, 24,……is
   (a) 384   (b) 834   (c) 438   (d) none of these

2. t_8 of the series 6, 12, 24,…is
   (a) 786   (b) 768   (c) 867   (c) none of these

3. t_{12} of the series −128, 64, −32, ….is
   (a) − 1/16   (b) 16   (c) 1/16   (d) none of these

4. The 4th term of the series 0.04, 0.2, 1, … is
   (a) 0.5   (b) 1/2   (c) 5   (d) none of these

5. The last term of the series 1, 2, 4,…. to 10 terms is
   (a) 512   (b) 256   (c) 1024   (d) none of these

GP-Some terms are given and you are asked to find the sequence.

Pg 6.11

Example 2: Find the G.P where 4th term is 8 and 8th term is 128/625

11. The second term of a G P is 24 and the fifth term is 81. The series is
    (a) 16, 36, 24, 54,..   (b) 24, 36, 53,…   (c) 16, 24, 36, 54,..   (d) none of these

12. The sum of 3 numbers of a G P is 39 and their product is 729. The numbers are
    (a) 3, 27, 9   (b) 9, 3, 27   (c) 3, 9, 27   (d) none of these

13. In a G. P, the product of the first three terms 27/8. The middle term is
    (a) 3/2   (b) 2/3   (c) 2/5   (d) none of these

GP- You are asked to find Geometric mean

Pg 6.10   **Example 1:** Insert 3 geometric means between 1/9 and 9.

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GP-You are asked to find the sum of the series.

- Pg 6.12 **Example 1:** Find the sum of $1 + 2 + 4 + 8 + \ldots$ to 8 terms.,

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- **Example 2:** Find the sum to n terms of $6 + 27 + 128 + 629 + \ldots\ldots$

Example 3: Find the sum to n terms of the series
$3 + 33 + 333 + \ldots\ldots$

Example 4: Find the sum of n terms of the series $0.7 + 0.77 + 0.777 + \ldots.$ to n terms

Example 5: Evaluate $0.21\dot{7}\dot{5}$ using the sum of an infinite geometric series.

8. The sum of the series –2, 6, –18, …. to 7 terms is
   (a) –1094　　　　　(b) 1094　　　　　(c) – 1049　　　　　(d) none of these

9. The sum of the series 243, 81, 27, …. to 8 terms is

   (a) 36　　　　　(b) $\left(36\dfrac{13}{30}\right)$　　　　　(c) $36\dfrac{1}{9}$　　　　　(d) none of these

10. The sum of the series $\dfrac{1}{\sqrt{3}}+1+\dfrac{3}{\sqrt{3}}+$ ……to 18 terms is

    (a) $9841\dfrac{(1+\sqrt{3})}{\sqrt{3}}$　　　　　(b) 9841　　　　　(c) $\dfrac{9841}{\sqrt{3}}$　　　　　(d) none of these

GP-mixed sums

- 6.10 **Example 2:** Which term of the progression 1, 2, 4, 8,… is 256?

- Pg 6.13 **Example 6:** Find three numbers in G. P whose sum is 19 and product is 216.

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14. If you save 1 paise today, 2 paise the next day 4 paise the succeeding day and so on, then your total savings in two weeks will be
    (a) ₹ 163   (b) ₹ 183   (c) ₹ 163.83   (d) none of these

17. The sum of the first 20 terms of a G. P is 244 times the sum of its first 10 terms. The common ratio is
    (a) $\pm\sqrt{3}$ (b) ± 3 (c) $\sqrt{3}$ (d) none of these

GP

(I) A person is employed in a company at ₹ 3000 per month and he would get an increase of ₹ 100 per year. Find the total amount which he receives in 25 years and the monthly salary in the last year.

(II) A person borrows ₹ 8,000 at 2.76% Simple Interest per annum. The principal and the interest are to be paid in the 10 monthly instalments. If each instalment is double the preceding one, find the value of the first and the last instalment.

1. Three numbers are in AP and their sum is 21. If 1, 5, 15 are added to them respectively, they form a G. P. The numbers are
   (a) 5, 7, 9   (b) 9, 5, 7   (c) 7, 5, 9   (d) none of these

2. The sum of $1 + 1/3 + 1/3^2 + 1/3^3 + \ldots + 1/3^{n-1}$ is
   (a) 2/3   (b) 3/2   (c) 4/5   (d) none of these

3. The sum of the infinite series $1 + 2/3 + 4/9 + ..$ is
(a) 1/3   (b) 3   (c) 2/3   (d) none of these

4. The sum of the first two terms of a G.P. is 5/3 and the sum to infinity of the series is 3. The common ratio is
(a) 1/3   (b) 2/3   (c) −2/3   (d) none of these

6. The sum of three numbers in G.P. is 70. If the two extremes by multiplied each by 4 and the mean by 5, the products are in AP. The numbers are
(a) 12, 18, 40   (b) 10, 20, 40   (c) 40, 20, 10   (d) none of these

7. The sum of 3 numbers in A.P. is 15. If 1, 4 and 19 be added to them respectively, the results are is G. P. The numbers are
(a) 26, 5, −16   (b) 2, 5, 8   (c) 5, 8, 2   (d) none of these

8. Given x, y, z are in G.P. and $x^p = y^q = z^\sigma$, then $1/p$, $1/q$, $1/\sigma$ are in
(a) A.P.   (b) G.P.   (c) Both A.P. and G.P.   (d) none of these

A

11. The A.M. of two positive numbers is 40 and their G. M. is 24. The numbers are
    (a) (72, 8)　　　　(b) (70, 10)　　　　(c) (60, 20)　　　　(d) none of these

12. Three numbers are in A.P. and their sum is 15. If 8, 6, 4 be added to them respectively, the numbers are in G.P. The numbers are
    (a) 2, 6, 7　　　　(b) 4, 6, 5　　　　(c) 3, 5, 7　　　　(d) none of these

13. The sum of four numbers in G. P. is 60 and the A.M. of the first and the last is 18. The numbers are
    (a) 4, 8, 16, 32　　　　(b) 4, 16, 8, 32　　　　(c) 16, 8, 4, 20　　　　(d) none of these

14. A sum of ₹ 6240 is paid off in 30 instalments such that each instalment is ₹ 10 more than the proceeding installment. The value of the 1st instalment is
    (a) ₹ 36　　　　(b) ₹ 30　　　　(c) ₹ 60　　　　(d) none of these

GP

15. The sum of $1.03 + (1.03)^2 + (1.03)^3 + ...$ to n terms is
    (a) $103\{(1.03)^n - 1\}$ (b) $103/3\{(1.03)^n - 1\}$ (c) $(1.03)^n - 1$ (d) none of these

16. If x, y, z are in A.P. and x, y, (z + 1) are in G.P. then
    (a) $(x - z)^2 = 4x$ (b) $z^2 = (x - y)$ (c) $z = x - y$ (d) none of these

17. The numbers x, 8, y are in G.P. and the numbers x, y, –8 are in A.P. The value of x and y are
    (a) (–8, –8)   (b) (16, 4)   (c) (8, 8)   (d) none of these

18. The nth term of the series 16, 8, 4,.... in $1/2^{17}$. The value of n is
    (a) 20   (b) 21   (c) 22   (d) none of these

THANK YOU