CHAPTER-9
SEQUENCES & SERIES
04 MARK TYPE QUESTIONS

Q. NO	QUESTION	MARK
1.	The sum of 1st three terms of a G.P is 13/12 and their product is -1. Find the common ratio and the terms?	4
2.	The difference between any two consecutive interior angles of a polygon is 5^0. if the smallest angle is 120^0, find the number of sides of the polygon?	4
3.	One side of an equilateral triangle is 24cm. The midpoints of its sides are joined to form another triangles whose midpoints are in turn joined to form still another triangle this process continuous indefinitely. Based on the above information answer the following questions (i) The side of the 5th triangle is (in cm) (a) 3 (b) 6 (c) 1.5 (d) 0.75 (ii) Sum of perimeters of first 6 triangles (a) $\frac{569}{4}$ (b) $\frac{567}{4}$ (c) 120 (d) 144 (iii) Area of all the triangles in (sq. cm) (a) 576 (B) $192\sqrt{3}$ (c) $144\sqrt{3}$ (d) $169\sqrt{3}$ OR (iii) The sum of perimeters of all the triangles(in cm) is (a)144 (b) 169 (c) 400 (d) 625	4
4.	The number of bacteria in certain culture doubles every hour. Given that the number of bacteria present at the end of 4th hour was 160000 **Based** on the above information, answer **the** following questions: (i) Find the number of bacteria present originally (ii) Find the number of bacteria present at the end of 7th hour. (iii)Find the sum of number of bacteria present originally to the end of 8th hour. **OR** (iii) If the number of bacteria triples every hour, then find the number of bacteria present at the end of 4th hour	4

5.	In a G.P., the 3rd term is 24 and the 6th term is 192.
	Based on the above information answer the following questions :
	(i) First term of G. P. is
	   a) 6 b) 8 c) 9 d) 10
	(ii) Common ratio of G.P. is
	   a) 3 b) 2 c) 4 d) 6
	(iii) 10th term of G.P. is
	   a) 3150 b) 3060 c) 3072 d) 3070
	(iv) Sum of first six terms of G.P. is
	a) 360 b) 370 c) 380 d)378
		4

6.	A company produces 500 computers in the third year and 600 computers in the seventh year. Assuming that the production increases uniformly by a constant number every year, answer the following questions. (i) How many computers were produced in the first year? (ii) By what number does the production increase every year? (iii) How many computers will be produced in the 21st year? (iv) Find the total production in 10 years.	4
7.	The angles of a quadrilateral are in A.P., whose common difference is 10. Find the angles.	4
8.	The third term of G.P. is 4. Find the product of its first 5 terms .	4
9.	The number of bacteria in a certain culture triple every hour. If there were 20 bacteria present in the culture originally, difference between the numbers of bacteria at the end of 5th and 3rd hour?	4
10.	 Varun has a rectangular solid block. The length of three unequal edges of that rectangular solid block are in G.P. The volume of the block is 512 cm^3 and the total surface area is 448 cm^2. Solve for the length of the longest edge.	4
11.		4

Ravi is the owner of factory, he purchased new machine for factory which costs him Rs.15625, and due to the continuous working of machine Ravi reckons that the cost of the machine will depreciate each year by 20%. At the end of 5 years he finds that he is not gaining that much expected profit through that machine, so he wishes to sell it. Find out the estimated value at the end of 5 years as per his estimation of price depreciation.

| 12. | The AM between two distinct positive numbers is twice the GM between them. Find the ratio of the greater to the smaller number. | 4 |
| 13. | The sum of three numbers in geometric progression is 56. If we subtract 1,7,21 from these numbers in that order, we obtain an arithmetic progression. Find the numbers. | 4 |

ANSWERS:

Q. NO	ANSWER	MARKS
1.	Let the terms of the G.P. be a/r,a,ar. It is given that $a/r+a+ar=13/12$ and $a/r \times a \times ar=-1$ $\Rightarrow a(r^2+r+1)/r=13/12$ and $a^3=-1$ $\Rightarrow a=-1$ and $a(r^2+r+1)=13r/12$ $\Rightarrow r^2+r+1=-13r/12$ $\Rightarrow 12r^2+25r+12=0$ $\Rightarrow 12r^2+16r+9r+12=0 \Rightarrow (3r+4)(4r+3)=0 \Rightarrow r=-4/3$ or $-3/4$	4
2.	It is known that the sum of all angles of a polygon with n sides is 180(n−2). $\therefore Sn=180(n-2)$ $2n[2a+(n-1)d]=180(n-2)$ $2n[2(120)+(n-1)5]=180(n-2)$ $n[240+5n-5]=360(n-2)$ $240n+5n^2-5n=360n-720$ $5n^2-125n+720=0$ $n^2-25n+144=0$ $(n-9)(n-16)=0$ $\therefore n=9,16$	4
3.	(i) c (ii) b (iii) b or (iii) a	4
4.	(i) 10000 (ii) 1280000 (iii) 5110000 or (iii) 810000	4
5.	(i) a (ii) b (iii) c (iv) d	4
6.	Let a be the no. of computers produced in 1st year and d be the uniform increase in production every year. $a_3 = a + 2d = 500$ ….(i) $a_7 = a + 6d = 600$ ….(ii) Subtracting (i) form (ii) we get, d = 25 (i) Putting this value in (i) we get a = 450. So, 450 computers were produced in 1st year (ii) d = 25, so production increases by 25 every year (iii) $a_{21} = a + 20d = 450 + 20 \times 25 = 950$. So, 950 computers were produced in 21st year (iv) $S_{10} = 10[2a + 9d]/2 = 5[2 \times 450 + 9 \times 25] = 5[900+225] = 5 \times 1125 = 5625$. So, total production in 10 years was 5625	4
7.	Given: d = 10 We know that the sum of all angles in a quadrilateral is 360. Let us assume the angles are a − 3d, a − d, a + d, a + 3d So, a − 2d + a − d + a + d + a + 2d = 360	4

	4a = 360 a = 90… (i) And, (a – d) – (a – 3d) = 10 2d = 10 d = 10/2 = 5 *Hence, the angles are a – 3d, a – d, a + d, a + 3d which is 75º, 85º, 95º, 105º*	
8.	Given the third term of G.P, $T_3 = 4$ To find the product of first five terms We know that, $T_n = a\, r^{n-1}$ It is given that, $T_3 = 4$ $\Rightarrow ar^{3-1} = 4$ $\Rightarrow ar^2 = 4$ … (i) Product of first 5 terms = $a \times ar \times ar^2 \times ar^3 \times ar^4$ $= a^5 r^{1+2+3+4}$ $= a^5 r^{10}$ $= (ar^2)^5$ $= (4)^5$ [from (i)]	4
9.	Clearly number of bacteria at the end of different hours form a G.P. with 1st term a= 20 and common ratio r = 3 Number of bacteria present at the end of 2nd hour = Third term of G.P. $= 20.3^2$ Number of bacteria present at the end of 3rd hour = 4th term of G.P. $= 20.3^3$ Number of bacteria present at the end of 5th hour = 6th term of G.P. $= 20.3^5$ Difference between the number of bacteria at the end 3rd and 5th hour $= 20.3^5 - 20.3^3$ $= 20\,(3^5 - 3^3)$	4
10.	Length, breadth and height of the rectangular block be $\dfrac{a}{r},\ a$ and ar. As these three are in G.P.	4

	$Volume = l \times b \times h$	
	$\Rightarrow 512 = \dfrac{a}{r} \times a \times ar$	
	$\Rightarrow a^3 = 512$	
	$\Rightarrow a = 8 ....(1)$	
	Now, the total surface area is given by S and	
	$S = 2[lb + bh + hl]$	
	$\Rightarrow 448 = 2a^2 \left[\dfrac{1}{r} + r + 1 \right]$	
	$\Rightarrow 448 = 2(8)^2 \left[\dfrac{1 + r^2 + r}{r} \right]$	
	$\Rightarrow \dfrac{448}{128} = \dfrac{1 + r^2 + r}{r}$	
	$\Rightarrow 2 + 2r + 2r^2 = 7r$	
	$\Rightarrow (r - 2)(r - 1) = 0$	
	$\Rightarrow r = 2 \ or \ r = \dfrac{1}{2}$	
	Therefore edges are 4, 8, 16 when r =2	
	And 16, 8, 4 when r =$\dfrac{1}{2}$	
	Longest edge = 16	
11.	After one year, value of machine	4
	$= \left[15625 - 15625 \times \dfrac{20}{100} \right]$	
	=15625−3125= Rs. 12500	
	After two years, value of machine	
	$= \left[12500 - 12500 \times \dfrac{20}{100} \right]$	
	=12500−2500= Rs. 10000	
	After three years, value of machine	
	$= \left[10000 - 10000 \times \dfrac{20}{100} \right]$	
	=10000−2000= Rs. 8000	
	The sequences of values of machine is 12500, 10000, 8000, ... is a G.P.	
	Here $a = 12500, \quad r = \dfrac{10000}{12500} = \dfrac{4}{5}$	
	$\therefore a_5 = ar^4 = 12500 \times \left(\dfrac{4}{5} \right)^4$	
	$\Rightarrow a_5 = 12500 \times \dfrac{256}{625}$	
	$\Rightarrow a_5 = Rs. \ 5120$	

	Thus the value of machine at the end of 5 years = Rs. 5120.	
12.	Let the larger number be a and smaller number b $$\frac{a+b}{2} = 2\sqrt{ab}$$ $$\Rightarrow a+b = 4\sqrt{ab}$$ $$\Rightarrow (a+b)^2 = 16ab$$ *Now* $$(a-b)^2 = (a+b)^2 - 4ab$$ $$\Rightarrow (a-b)^2 = 12ab$$ $$\Rightarrow a-b = 2\sqrt{3ab}$$ *Solving* $$a = 2+\sqrt{3}, b = 2-\sqrt{3}$$ $$a:b = 2+\sqrt{3} : 2-\sqrt{3}$$	
13.	Let the three numbers are $$a, ar, ar^2$$ $$\therefore a + ar + ar^2 = 56$$ By the questions a-1 , $ar - 7, ar^2 - 21$ are in AP $$ar - 7 = \frac{(a-1) + (ar^2 - 21)}{2}$$ $$\Rightarrow 2ar - 14 = a + ar^2 - 22$$ $$\Rightarrow ar = 16$$ $$\therefore dividing$$ $$\frac{1 + r + r^2}{r} = \frac{56}{16}$$ $$\Rightarrow 2 + 2r + 2r^2 = 7r$$ $$\Rightarrow r = 2, \frac{1}{2}$$ Hence the no are 32,16,8	