



# MATHS

## BOOKS - PATHFINDER MATHS (BENGALI ENGLISH)

### SAME SPECIAL SEQUENCE

#### Question Bank

1. Let  $\langle a_n \rangle$  be the sequence defined by

$$a_1 = 3 \text{ and } a_n = 3a_{n-1} + 2 \text{ for all } n > 1$$

..Find  $a_3$ .



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2. Find the 8th term of the G.P 0.3,0.06,0.012.....



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3. Find the sum of 41,36,31.....to 12terms.



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4. How many terms are there in the A.P. 7, 10, 13, ....., 43?



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5. Show that the sequence  $\log a, \log(ab), \log(ab^2), \log(ab^3), \dots$  is in A.P



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6. If the  $m^{\text{th}}$  term and the  $n^{\text{th}}$  term of an A.P. are respectively  $\frac{1}{n}$  and  $\frac{1}{m}$ , then the  $(mn)^{\text{th}}$

term of the A.P. is



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7. Determine the number of terms in the A.P. 3, 7, 11, ..., 407. Also find its 20th term from the last.



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8. In a certain A.P the 24th term is twice the 10th term. Prove that the 72nd term is twice

the 34th term .



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



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10. Find the sum first 24 terms of A.P.  $a_1, a_2, a_3$  ,....., if it is know that

$$a_1 + a_5 + a_{10} + a_{15} + a_{20} + a_{24} = 225$$



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11. If the  $P^{th}$  and  $q^{th}$  terms of an A.P are  $a$  and  $b$  respectively, then show that the sum of first  $(p+q)$  terms of that A.P is  $\frac{1}{2}(p+q)$

$$\left( a + b + \frac{a - b}{p - q} \right)$$



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12. If  $s_1$  be the sum of  $(2n+1)$  terms of an A.P and  $s_2$  be the sum its odd terms, then prove

that  $s_1 : s_2 = (2n + 1) : (n + 1)$



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**13.** The ratio of the sum of  $n$  terms of two A.P.s is  $(7n+1):(4n+27)$ . Find the ratio of their  $22^{nd}$  terms.



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**14.** If  $a^2, b^2, c^2$  are in A.P., then prove that

$\frac{1}{b+c}, \frac{1}{c+a}, \frac{1}{a+b}$  are in A.P.



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**15.** Find the sum of the following series

$6+66+666+\dots$  to  $n$  term



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**16.** If the first and the  $n^{\text{th}}$  term of a G.P. are  $a$  and  $b$ , respectively, and if  $P$  is the product of  $n$  terms, prove that  $P^2 = (ab)^n$ .



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**17.** Find the equations of the lines, which cut-off intercepts on the axes whose sum and product are 1 and  $-6$ , respectively.



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**18.** If  $S_1$ ,  $S_2$  and  $S_3$  be respectively the sum of  $n$ ,  $2n$  and  $3n$  terms of a G.P. Prove that  $S_1(S_3 - S_2) = (S_2 - S_1)^2$ .



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19. If  $S$  be the sum.  $P$  be the product, and  $R$  the sum of the reciprocals of  $n$  terms in a G.P.,

Prove that 
$$P^2 = \left( \frac{S}{R} \right)^n$$



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20. If  $x = 1 + a + a^2 + \dots \infty$  where

$|a| < 1$  and  $y = 1 + b + b^2 + \dots \infty$  where

$|b| < 1$

.Prove

that

$$1 + ab + a^2b^2 + \dots \infty = \frac{xy}{x + y - 1}$$



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21. Prove that :

$$\left( 2^{\frac{1}{4}} \cdot 4^{\frac{1}{8}} \cdot 8^{\frac{1}{16}} \cdot 16^{\frac{1}{32}} \dots \infty \right) = 2$$



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22. Find the value of  $n$  so that  $\frac{a^{n+1} + b^{n+1}}{a^n + b^n}$

may be the geometric mean between  $a$  and  $b$ .



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**23.** Insert 4 arithmetic mean between 5 and 20.



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**24.** If  $n$  is a even number, find the sum of the series upto  $n$  terms

$$1^2 - 2^2 + 3^2 - 4^2 + 5^2 - \dots$$



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**25.** Find the sum of the following series :

$$1 + 5 + 12 + 22 + 35 + \dots \text{ to } n \text{ terms.}$$



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**26.** Sum the following series to  $n$  terms

$$5+7+13+31+85+\dots$$



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**27.** If  $f$  is a function satisfying  $f(x+y) = f(x)f(y)$  for

all  $x, y \in \mathbb{N}$  which that  $f(1) = 3$  and  $\sum_{x=1}^n f(x) =$

120, find the value of  $n$ .



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28. If  $A$  and  $G$  be A.M. and G.M., respectively between two positive numbers, prove that the numbers are  $A \pm \sqrt{(A + G)(A - G)}$ .



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