



MATHS

BOOKS - PATHFINDER MATHS (BENGALI ENGLISH)

PERMUTATION AND COMBINATIONS

Question Bank

1. If $m > n$ and n be two positive integers then product $n(n-1)(n-2)\dots(n-m)$ in the factorial form is

A. $\frac{n!}{(n - m + 1)!}$

B. $\frac{n!}{(n - m - 1)!}$

C. $\frac{n!}{(n + m - 1)!}$

D. $\frac{n!}{(n + m + 1)!}$

Answer: B



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2. The value of $\frac{n!}{(n - 2)!}$ is

A. $n(n-1)$

B. $(n-1)(n-2)$

C. $(n+1)(n)$

D. $(n-2)(n-3)$

Answer: A



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3. The result of $\binom{n-1}{r} + \binom{n-1}{r-1} =$

A. $\binom{n}{r-1}$

B. $\binom{n+1}{r}$

C. $\binom{n}{r}$

D. $\binom{n+1}{r-1}$

Answer: C



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4. If ${}^n C_p = {}^n C_q$ and $p \neq q$ then $(n-p)$ is

A. $-q$

B. q

C. $n-q$

D. $-2q$

Answer: B



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5. If $nC_r + nC_{r+1} = (n + 1)C_x$ then $x = ?$

A. a) r

B. b) $r-1$

C. c) n

D. d) $r+1$

Answer: D



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6. ${}^{11}C_8 + {}^{11}C_9 =$ which of the following

A. 440

B. 330

C. 220

D. 110

Answer: C



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7. If $16C_r = {}^{16}C_{2r+1}$ then the value of r will be

A. 6

B. 5

C. 4

D. 3

Answer: B



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8. If ${}^9P_5 = x^9P_3$ then the value of x will be

A. 56

B. 42

C. 30

D. 20

Answer: C



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9. If ${}^n P_r = {}^n P_{r+1}$ and ${}^n C_r = {}^n C_{r-1}$ then the values of n, r are

A. $n=2, r=3$

B. $n=3, r=2$

C. $n=4, r=2$

D. $n=2, r=4$

Answer: B

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10. The value of $\sum_{r=1}^n \frac{{}^n P_r}{r!}$ is

A. 2^n

B. $2^n - 1$

C. 2^{n-1}

D. $2^n + 1$

Answer: B

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11. Let T_n denote of the number of triangles which can be formed using the vertices of a regular polygon of n sides If $T_{n+1} - T_n = 21$ then n is

A. 5

B. 7

C. 6

D. 4

Answer: B



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12. The number of parallelograms that can be formed from a set of four parallel straight lines intersecting another set of three parallel straight lines is

A. 6

B. 18

C. 12

D. 9

Answer: B



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13. A polygon has 44 diagonals the number of sides of the polygon is

A. 11

B. 7

C. 8

D. 9

Answer: A



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14. In a room each person present shakes hand with the other . If the total number handshakes is 66 the number of persons present inn the room is

A. 11

B. 12

C. 13

D. 14

Answer: B



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15. The value of :

$${}^{15}C_1 + {}^{15}C_3 + {}^{15}C_5 + \dots + {}^{15}C_{15} \text{ is}$$

A. 15×16

B. 2^{15}

C. 15×2^8

D. 2^{14}

Answer: D



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16. The number of 10 digit numbers formed by using the digits 1&2 is

A. ${}^{10}C_1 + {}^9C_2$

B. 2^{10}

C. $10!$

D. ${}^{10}C_2$

Answer: B



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17. The maximum number of trials to open n locks by n keys is 105. Then n is

A. 13

B. 35

C. 14

D. 27

Answer: C



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18. The number of circles that can be drawn out of 10 points of which 7 are collinear is

A. 120

B. 113

C. 85

D. 86

Answer: C



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19. The number of different 6-digit numbers that can be formed using the three digits 0,1,2 is

A. 3^6

B. 3^5

C. 2×3^5

D. 3×2^5

Answer: C



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20. The number of ways in which 6 different balls can be put in two boxes of different sizes so that no box remain empty is :

A. 62

B. 64

C. 36

D. 72

Answer: A



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21. If 7 points out of 12 are in same st. line the number of triangles formed by them is

- A. 19
- B. 185
- C. 201
- D. 215

Answer: B



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22. The total number of 9 digit numbers which have all different digit is

A. $10!$

B. $9!$

C. $9(9)!$

D. $8(9)!$

Answer: C



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23. The number of ways in which 5 letters can be posted in 10 letter boxes is

A. 50

B. ${}^{10}P_5$

C. 5^{10}

D. 10^5

Answer: D



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24. The number of five digit telephone numbers none of their digits being repeated is

A. 50

B. ${}^{10}P_5$

C. 5^{10}

D. 10^5

Answer: B



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25. There are 13 stations on a certain railway line. How many kinds of different single third class tickets have to be printed in order that it may be possible to travel from any station to any other?



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26. Prove that $\frac{2n!}{n!} = \{1.3.5\dots . (2n - 1)\}2^n$



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27. Find the number of diagonals in a polygon with n sides.



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28. A man has 6 friends. In how many ways can he invite one or more of them to a party?



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29. Find the value of n ${}^n C_4 : {}^n C_3 = 35 : 2$



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30. If ${}^n C_1, {}^n C_2$ and ${}^n C_3$ are in AP. Find the value of n.



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31. How many numbers of 5 digits can be formed with the digits 0,2,5,6,7 without taking any of these digits more than once.



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32. A child has 6 pockets and 4 coins. Find the number of ways the child can put the coins in the pocket.



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33. Find the number of ways in which one or more letters can be selected from the letters PPPQQQRRRRRSTUV.



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34. If n parallel straight line in a plane are intersected by a family of m parallel lines, how many parallelograms are there in the network thus formed?



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35. Prove that product of any r consecutive natural numbers is always divisible by $r!$



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36. If $\frac{{}^n P_{r-1}}{a} = \frac{{}^n P_r}{b} = \frac{{}^n P_{r+1}}{c}$ then show that $b^2 - ab - ac = 0$



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37. Prove that $33!$ is divisible by 2^{16}



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38. Find the value of k if ${}^k C_9 = (k^2 - 2k) {}^k C_6$



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39. If ${}^n P_r = 336$ and ${}^n C_r = 56$ then find n and r .



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40. If $2 \leq r \leq n$ show that

$${}^n C_r + 2^n {}^{n-1} C_{r-1} + {}^{n-2} C_{r-2} = {}^{n+2} C_r$$



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41. Find the number of different factors of 3528 which are greater than 1 and less than 3528



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42. In a plane there are 10 points out of which no three are collinear except the four which lie on a straight line . By joining these 10 points how many straight lines.



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43. In a plane there are 10 points out of which no three are collinear except the four which lie on a straight line . By joining these 10 points how many triangles may be obtained.



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44. In how many ways can be 9 man be selected from 15 men so as always to exclude 3 particular man.



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45. In how many ways can 9 men be selected from 15 men so as always to include 3 particular men.



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46. How many each consisting of five different letters can be formed by taking 2 consonants from 9 different consonants and 3 vowels from 5 different vowels?



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47. In how many ways can six students be seated in a line so that two particular students do not sit together?



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48. Find the value of x if ${}^x P_2 = 6$



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49. In how many ways can 5 boys and 3 girls be arranged so that no two girls will sit side by side.



50. Find the number of different arrangements with the letters of the word 'ALGEBRA' so that the two A's are not together?

A. In the word 'ALGEBRA', there are 2 A's, one each of L, G, E, B, R. \therefore Number of possible

arrangement of the letters = $\frac{7!}{2!} = 2520$, For

2 A's together the number of arrangement = $6!$,

\therefore required number of arrangements =

$$2520 - 6! = 2520 - 720 = 1800.$$

B.

C.

D.

Answer:



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51. How many numbers of 4 digit greater than 6000 can be formed with the digits 3,4,5,6,8? (no digit is repeated in any number). How many of these numbers so formed.



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52. A book store has 2 different books each having 3 volumes and 3 other different books, each having 2 volumes be arranged in a shelf, so that the volumes of the same book may remain side by side ?



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53. From 5 oranges, 4 mangoes and 2 apples, how many different selection of fruits can be made taking at least one of each kind, if the fruits of the same kind are of different shapes ?



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54. For a certain class, in how many different routines can the 5 different subjects be allotted in 6 different periods ?



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55. An examinee is required to answer 6 questions out of 12 questions which are divided into two groups each containing 6 questions, and he is not permitted to answer more than 4 questions from

any group. In how many ways can be answered 6 questions ?



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56. Find the number of permutations of the letters of the words 'FORECAST' and 'MILKY' taking 5 at a time of which 3 letters from the first word and 2 from the second.



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57. How many triangles can be formed by joining the angular points of a decagon ? How many diagonals will it have ?



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58. Show that

$$1 \cdot {}^1 P_1 + 2 \cdot {}^2 P_2 + 3 \cdot {}^3 P_3 + \dots + n \cdot {}^n P_n = {}^{n+1} P_{n+1}$$



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59. Out of 14 articles, 10 are of the same type and each of the remaining is of different type. Find the number of combinations if 10 articles are taken at a time ?



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60. Find the rank of the word 'MAKE' when its letters are arranged as in a dictionary.



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61. Find the number of ways in which the letters of the word 'INTERMEDIATE' can be arranged taken all at a time so that the vowels are not all together.



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62. How many seven-digit numbers are there, the sum of whose digit is even?



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63. How many five-digit telephone numbers are there, the sum of whose digits is even ?



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64. How many 4 digit numbers can be formed from the digits 1, 1, 2, 2, 3, 3, 4, 5 ?



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65. Find the number of students to be selected at a time from a group of 14 students so that the

number of sections is greatest. find the greatest number of selection. Also find the greatest number of selections when there are 15 students.



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66. Find the sum of the five digit numbers formed by the digits 2, 3, 4, 5, 6 .



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67. A boat has a crew of 8 men of which 2 can row only on one side and only on the other. In how,

many ways can the crew be arranged equally both sides in the boat ?



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68. Show that the total number of selection that can be made out of the letters of the phrase "daddy did a deadly deed" is 1919.



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69. A committee of 5 is to be formed from 9 women and 8 men. if the committee commands women's

majority, then find the number of ways this can be done ?



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70. A 5-digit number is divisible by 3 and it is formed by using 0, 1, 2, 3, 4, and 5 without repetition. Find the total number of ways in which such a number can be formed ?



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71. Find the number of (i) Combination (ii) Permutation of the letters of the word "IMPRESSION" taking 4 letters at a time.



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72. Find the number of ways in which a selection of four letters can be made from the letters of the word "PROPORTION".



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73. Find the word in 50th position in the dictionary when the letters of the word "AGAIN" are arranged.



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74. How many ways n distinct objects be placed in 2 different boxes so that no box remains empty?



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75. How many ways the three angular points of a regular decagon can be selected so that no two

angular points are consecutive.



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76. Find the number of words that can be made by writing down the letters of the word 'CALCULATE' such that each starts and ends with a consonant.



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77. In an election the number of contestants is one more than the number of maximum candidates for which a voter can vote. If the total number of ways

in which a voter can vote be 62, find the number of candidates.



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78. Find the number of combinations and Permutations of 4 letters taken from the word EXAMINATION .



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79. In how many ways a committee of 6 can be formed from a group of 10 doctors of whom 6 are

ladies and 4 are gents so that one particular lady doctor must be included in the committee.



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80. Car licenses of a certain place consist of 3 letters followed by 3 digits, followed by a letter. The letters L and O must not be used and the first of the digits must not be zero. If repetitions of letters and digits are allowed, how many different number plates are available.



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81. Find the number of ways in which the letters of the word 'STATISTICS' can be arranged so that I do not not come together?



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