MATHS

BOOKS - ARIHANT MATHS (HINGLISH)

PERMUTATIONS AND COMBINATIONS

Examples

1. A hall has 12 gates. In how many ways can a man enter the hall through one gate and come out through a different gate?

A. 23

B. 132

C. 12

D. 110

Answer: B

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2. There are three stations A,B and C five routes for going from station A to station B and four routes for going from station B to station C. find number of different ways through which a person can go from A to C via B.

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3. There are 25 students in a class in which 15 boys and 10 girls. The class teacher select either a boy or girl for monitor of the class. In how many ways the class teacher can make this selection?

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4. There are 4 students for physics, 6 students for chemistry and 7 students of mathematics gold medal. In how many ways one of these gold medals be awarded?

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5. Find n, if $(n+2)! = 60 \times (n-1)!$

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6. Evaluate $\sum_{r=1}^{n} r \times r!$

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7. Find the remainder when $\sum_{r=1}^{n} r!$ is divided by 15, if $n \geq 5.$

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8. Find the exponent of 3 in 100!.

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9. Prove that 33! Is divisible by 2^{19} and what is the largest integer n such that 33! Is divisible by 2^n?

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10. Find the number of zeros at the end of 100!.

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11. For how many positive integral values of n does n! end with precisely 25 zeros?

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12. Find the exponent of 80 in 200!.

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13. Find the numbers of positive integers from 1 to 1000, which are divisible by at least 2, 3, or 5.

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14. If $\hat{} \, 56P_{r+6} : {}^{54}P_{r+3} = 30800 : 1, \text{ find} r$

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15. Find n, ${}^{n+5}P_{n+1} = \frac{11}{2}(n-1) \cdot {}^{n+3}P_n.$

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16. If $.^{m+n}P_2 = 90$ and $.^{m-n}P_2 = 30$, find the value of m and .

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17. Find the value of r, if

(i) $.^{11}P_r = 990$

(ii) $.^{8}P_5 + 5 \cdot .^{8}P_4 = .^{9}P_r$

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18. Prove that

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

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19. The number of other permutations of the letters of the word SIMPLETON taken all at a time is :

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20. How many different signals can be given using any number of flags from 4 flags of different colours?

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21. Find the total number of 9-digit numbers which have all different digits.

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22. A five digit number divisible by 3 is to be formed using the numerals 0, 1, 2, 3, 4 and 5, without repetition. The total number of ways this can be done, is

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23. A five digit number is formed by the digits 1,2,3,4,5 without repetition.

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24. Find the number of permutations of letters a, n, c, d, e, f, g taken all together if neither $begn$ or cad pattern appear.

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25. How many words can be formed with the letters of the word 'ARIHANT' by rearranging them?

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26. Find the number of permutations of the letters of the words 'DADDY DID A DEADY DEED'.

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27. How many words can be formed with the ltters of the words

(i) HIGH SCHOOL and

(ii) INTERMEDIATE by rearranging them?

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28. A child has four pocket and three marbles. In how many ways can the child put the marbles in its pocket?

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29. There are m men and n monkeys $(n > m)$. If a man have any number of monkeys. In how many ways may every monkey have a master?

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30. How many four-digit numbers can be formed by using the digits 1, 2, 3, 4, 5, 6, 7 if at least one digit is repeated.

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31. In how many ways can 4 prizes be distributed among 5 students, if no student gets all the prizes?

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32. Find the number of n digit numbers, which contain the digits 2 and 7, but not the digits 0, 1, 8, 9.

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33. Show that the total number of permutations of n different things takenn not more than r at a time, when each thing may be repated any number of times is $\frac{n(n^r - 1)}{(n-1)}$.

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34. How many permutations can be made out of the letters of the word 'TRIANGLE'? How many of these will begin with T and end with E?

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35. In how many ways can the letter of the word 'INSURANCE' be arranged, so that the vowels are never separate?

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36. How many words can be formed with the letters of thw word 'PATALIPUTRA' without changing the relative positions of vowels and consonants?

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37. Find the number of permutations that can be had from the letters of the word 'OMEGA' (i) O and A occuping end places. (ii) E being always in the middle.

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38. Find the number of ways in which 12 different beads can be arranged to form a necklace.

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39. Consider 21 different pearls on a necklace. How many ways can the pearls be placed in on this necklace such that 3 specific pearls always remain together?

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40. In how many ways can 24 persons be seated round a table, if there are 13 sets?

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41. Find the number of ways in which three americans, two british, one chinese, one dutch and one egyptiann can sit on a round table so that persons of the sme nationality are separated.

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42. In how many different ways can five boys and five girls form a circle such that the boys and girls alternate?

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43. If 20 persons were invited for a party, in how many ways can they and the host be seated at a circular table? In how many of these ways will two particular persons be seated on either side of the host?

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44. How many necklace of 12 beads, each can be made from 18 beads of various colours?

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45. If $.^{15}C_{3r} = .^{15}C_{r+3}$, find $.^{r}C_{2}$.

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46. If $.^{n}C_{9} = .^{n}C_{7}$, find n.

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47. Prove that

$$\binom{n}{r} + 2\binom{n}{r-1} + \binom{n}{r-2} = \binom{n+2}{r}$$

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48. If $.^{2n}C_3 : ^nC_3 = 11 : 1$, find the value of n.

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49. If $.^{n+1}C_{r+1} : ^nC_r : ^{n-1}C_{r-1} = 11 : 6 : 3$, find the values of n and r.

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50. If $.^{n}C_{r-1} = 36, .^{n}C_{r} = 84$ and $.^{n}C_{r+1} = 126,$ find

find r.

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51. Property:Product of r consecutive number is divisible

by r!

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52. Evaluate

$$\hat{}\ (47)C_4 + \sum_{j=0}^{3} {}^{50-j}C_3 + \sum_{k=0}^{5} {}^{56-k}C_{53-k}.$$

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53. Prove that the greatest value of $.^{2n}C_r(0 \leq r \leq 2n)$ is $.^{2n}C_n$ (for $1 \leq r \leq n$).

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54. Thirty six games were played in a football tournament with each team playing once against each other. How many teams were there?

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55. In how many ways can a cricket team of eleven players be chosen out a batch 15 players, if (i) a particular is always chosen. (ii) a particular player is never chosen?

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56. How many different selections of 6 books can be made from 11 different books, if

(i) two particular books are always selected.

(ii) two particular books are never selected?

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57. A person tries to form as many different parties as he can, out of his 20 friends. Each party should consist of the same number. How many friends should be invited at a time? In how many of these parties would the same friends be found?

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58. Mohan has 8 friends, in how many ways he invite one or more of them to dinner?

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59. A question paper consists of two sections having respectively, 3 and 5 questions. The followinng note is given on the paper "it is not necessory to attempt all the questions one questions from each section is compulsory". In how many ways can candidate select the questions?

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60. A student is allowed to select at most n books from a collection of (2n+1) books. If the total number of ways in which a student selects at least one book is 63. then n equals to -

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61. There re three books of physics, four of chemistry and five of mathematics. How many different collections can be made such that each collection consists of

(i) one book of each subject

(ii) atleast one book of each subject.

(iii) atleast one book of mathematics.

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62. Find the total number of selections of at least one red ball from a bag containing 4 red balls and 5 black balls, balls of the same colour being identical.

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63. There are p copies each of n different books. Find the number of ways in which a nonempty selection can be made from them.

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64. There are 4 oranges, 5 apples and 6 mangoes in a fruit basket. In how manyways can a person make a selection of fruits from among the fruits in the basket?

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65. Find the number of ways in which onee or more letters can be selected from the letter.

AAAAA BBBB CCC DD EFG.

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66. Find the number of proper factors of the number 38808. Also, find sum of all these divisors.

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67. The number of even proper divisors of 1008

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68. Find the total number of proper factors of the number 35700. Also find sum of all these factors sum of the odd proper divisors the number of proper divisors divisible by 10 and the sum of these divisors.

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69. If N = 10800, find the(i) the number of divisors of the form 4m +2,(ii) the number of divisors which are multiple of 10(iii) the number of divisors which are multiple of 15.

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70. Find the number of divisors of the number $N = 2^3 . 3^5 . 5^7 . 7^9$ which are perfect squares.

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71. In how many ways the number 10800 can be resolved as a product of two factors?

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72. In how many ways the number 18900 can be split in two factors which are relatively prime or co prime

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73. In how many ways can 52 cards be distributed (i) Equally among 4 players and , (ii) Equally into 4 groups ?

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74. In how many ways can 12 different balls be divided between 2 boys, one receiving 5 and the other 7 balls?

Also, in how many ways can these 12 balls be divided into groups of 5,4 and 3 balls, respectively?

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75. Find the number of ways to give 16 different things to three persons A, B, C so that B gets 1 more than A and C gets 2 more than B.

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76. In how many ways can 9 different books be distributed among three students if each receives atleast 2 books?

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77. In how many ways 5 different balls can be arranged into 3 different boxes so that no box remains empty?

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78. In how many ways 5 different balls can be distributed into 3 boxes so that no box remains empty?

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79. . In how many ways can 5 different books be tied up in three bundles?

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80. Let $n(A) = 5$ and $n(B) = 3$ then find the number of injective functions and onto functions from A to B

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81. In how many ways 5 different balls can be arranged into 3 different boxes so that no box remains empty?

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82. Four boys picked 30 apples. The number of ways in which they can divide then if all the apples are identical is

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83. Find the number of solutions of $x + y + z + w = 20$ under the following conditions:

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84. The number of integral solutions of equation $x + y + z + t = 29,$ when $x \geq 1, y \geq 2, z \geq 2, 3$ and $t \geq 0$ is

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85. The number of solutions to the system of equations $x_1 + x_2 + x_3 + x_4 + x_5 = 20$ and $x_1 + x_2 = 15$ wher $x_k \geq 0$

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86. The number of non negative integral solutions of $3x + y + z = 24$ is

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87. In how many ways can three persons, each throwing a single dice once, make a sum of 15?

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88. In how many ways in which an examiner can assign 30 marks to 8 questions, giving not less than 2 marks to any question.

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89. A bag has contains 23 halls in which 7 are identical . Then number of ways of selecting 12 balls from bag.

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90. A person writes letters to six friends and addresses the corresponding envelopes. In how many ways can the letters be placed in the envelopes so that

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91. In how many ways the sum of upper faces of four distinct die can be five?

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92. In an examination, the maximum mark for each of the three papers is 50 and the maximum mark for the fourth paper is 100. Find the number of ways in which the candidate can score 605 marks in aggregate.

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93. Find the coefficient of α^6 in the product $(1+\alpha+\alpha^2)(1+\alpha+\alpha^2)(1+\alpha+\alpha^2+\alpha^3)$

$(1+\alpha)(1+\alpha)(1+\alpha)$.

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94. Find the number of different selections of 5 letters, which can be made from

$5A's, 4B's, 3C's, 2D's$ and $1E$

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95. Find the number of combinations and permutations of 4 letters taken from the word EXAMINATION.

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96. Find the number of non-negative integral solutions of $x_1 + x_2 + x_3 + 4x_4 = 20.$

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97. Find the number of positive unequal integral solutions of the equation x+y+z+w=20.

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98. In how many ways can 15 identical blankets be distributed among six beggars such that everyone gets at least one blanket and tow particular beggars get equal blankets and another three particular beggars get equal blankets.

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99. Find the number of positive integral solutions of the inequality $3x + y + z \leq 30.$

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100. In how many ways can we get a sum of atmost 15 by throwing six distincct dice?

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101. In how many ways can we get a sum greater than 15 by throwing six distinct dice?

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102. Find the total number of positive integral solutions for (x, y, z) such that $xyz = 24.$ Also find out the total number of integral solutions.

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103. There are 10 points in a plane out of these points no three are in the same straight line except 4 points which are collinear. How many

(i) straight lines

(ii) trian-gles

(iii) quadrilateral, by joining them?

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104. Find n, ${}^{n+5}P_{n+1} = \frac{11}{2}(n-1)\cdot {}^{n+3}P_n$.

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105. The interior angles of a regular polygon measure 150° each. The number of diagonals of the polygon is

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106. In a polygon the number of diagonals 77. Find the number of sides of the polygon.

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107. If n lines are drawn in a plane such that no two of them are parallel and no three of them are concurrent, such that these lines divide the planein 67 parts, then find number of different points at which these lines will cut.

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108. Find number of rectangles in a chessboard, which are not a square.

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109. Find the number of rectangles excluding squares from a rectangle of size 9×6.

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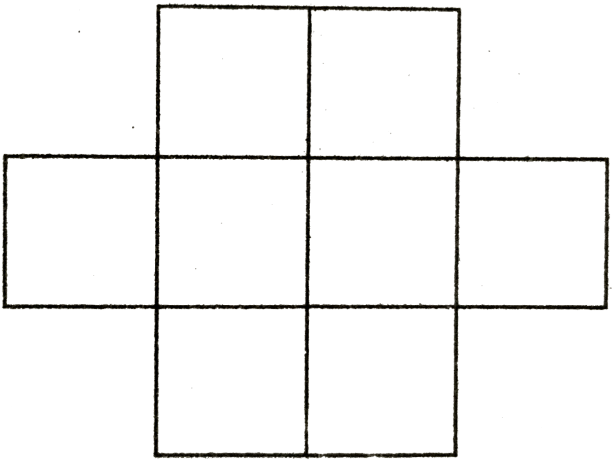
110. Six X 's have to be placed in the squares of the figure below, such that each row contains atleast one X. in how many different ways can this be done?



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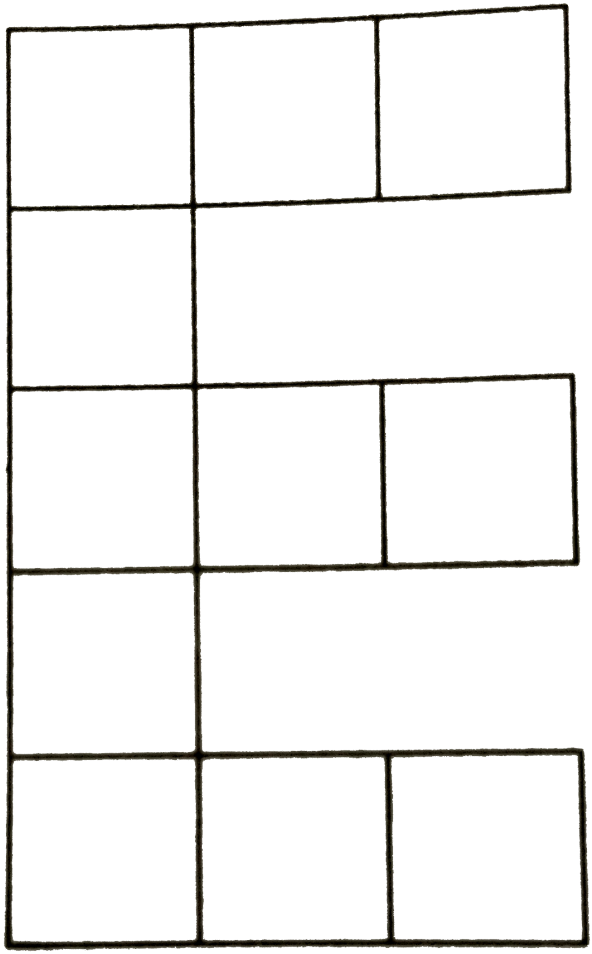
111. In how many ways the letters of the word DIPESH can be placed in the squares of the adjoining figure so that no row remains empty?



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112. If the letters of the word are arranged as in dictionary, find the rank of the following words.(0) RAJU(ii) AIRTEL(ii) UMANG

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113. If letters of the word are arranged as in dictionary, find the rank of the following words.(i) INDIA (ii) SURITI (ii) DOCOMO

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114. There are 10 candidates for an examination out of which 4 are appearing in Mathematics and remaining 6 are appearing indifferent subjects. In how many ways can they be seated in a row so that no two Mathematics candidates are together?

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115. In how many ways can 7 plus (+) and 5 minus (-) signs be arranged in a row so that no two minus (-) signs are together?

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116. Find the numbers of ways in which 5 girls and 5 boys can be arranged in a row if no two boys are together.

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117. Find the number of ways in which 5 girls and 5 boys can be arranged a n row if boys and girls are alternative.

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118. A is a set containing n elements. A subset P_1 of A is chosen. The set A is reconstructed by replacing the elements P Next, a of subset P_2 of A is chosen and again the set is reconstructed by replacing the elements of P_2, In this way, m subsets $P_1, P_2 \ldots. , P_m$ of A are chosen. The number of ways of choosing $P_1, P_2, P_3, P_4 \ldots P_m$

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119. A is a set containing n elements. A subset P of A is chosen. The set A is reconstructed by replacing the elements of P. A subset of A is again chosen. Find the number of ways of choosing P and Q,

so that

(i) $P \cap Q$ contains exactly r elements.

(ii) $P \cap Q$ contains exactly 2 elements.

(iii) $P \cap Q = \phi$

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120. The sum of the digits in the unit place of all numbers formed with the help of 3,4,5,6 taken all at a time is

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121. Find the sum of all five digit numbers ,that can be formed using the digits $1, 2, 3, 4$ and 5 (repetition of digits not allowed)

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122. Number of words of 4 letters that can be formed with the letters of the word IIT JEE, is

A. 42

B. 82

C. 102

D. 142

Answer: C

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123. Let y be element of the set $A = \{1, 2, 3, , 5, 6, 10, 15, 30\}$ and x_1, x_2, x_3 be integral solutions of $x_1 x_2 x_3 = y$, is

A. 27

B. 64

C. 81

D. 256

Answer: B

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124. The number of positive integer solutions of $a+b+c=60$, where a is a factor of b and c, is

A. 184

B. 200

C. 144

D. 270

Answer: C

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125. The number of times the digit 3 will be writtenn when listing the integers from 1 to 1000, is

A. 269

B. 271

C. 300

D. 302

Answer: C

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126. The number of points having position vector $a\hat{i} + b\hat{j} + c\hat{k}$, where $1 \leq a, b, c \leq 10$ and $a, b, c \in N$, such that $2^a + 3^b + 5^c$ is a multiple of 4 is (A) 1000 (B) 500 (C) 250 (D) 125

A. 70

B. 140

C. 210

D. 280

Answer: A

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127. Number of positive unequal integral solutions of the equation $x + y + z = 12$ is

A. 21

B. 42

C. 63

D. 84

Answer: B

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128. 12 boys and 2 girls are to be seated in a row such that there are atleast 3 boys between the 2 girls. The number of ways this can be done is $\lambda \times 12!$. The value of λ is

A. 55

B. 110

C. 20

D. 45

Answer: B

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129. A is a set containing n elements. A subset P of A is chosen. The set A is reconstructed by replacing the elements of P. A subset Q of A is again chosen, the number of ways of choosing so that $(P \cup Q)$ is a proper subset of A, is

A. 3^n

B. 4^n

C. $4^n - 2^n$

D. $4^n - 3^n$

Answer: D

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130. Let N be a natural number. If its first digit (from the left) deleted, it gets reduced to $\frac{N}{29}$. The sum of all the digits of N is

A. 14

B. 17

C. 23

D. 29

Answer: A

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131. If the number of ways of selecting n cards out of unlimited number of cards bearing the number 0,9,3, so that they cannot be used to write the number 903 is 96, then n is equal to

A. 3

B. 4

C. 5

D. 6

Answer: C

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132. In a plane there are two families of lines $y = x + r, y = -x + r,$ where $r \in \{0, 1, 2, 3, 4\}$. The number of squares of diagonals of length 2 formed by the lines is:

A. 9

B. 16

C. $\frac{3}{2} \cdot .^4 C_2$

D. $5_{C_2} + .^3 P_2$

Answer: A::C

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133. Number of ways in which three numbers in AP can be selected from 1,2,3, . .,n is

A. $\left(\frac{n-1}{2}\right)^2$, if n is even

B. $\frac{n(n-2)}{4}$, if n is even

C. $\frac{(n-1)^2}{4}$, if n is odd

D. $\frac{n(n+1)}{2}$, if n is odd.

Answer: B::C

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134. If n objects are arrange in a row, then the number of ways of selecting three of these objects so that no two of them are next to each other is a. $\hat{} n-2C_3$ b. $\hat{} n-3C_2$ c. $\hat{} n-3C_3$ d. none of these

A. $.^{n-2}C_3$

B. $.^{n-3}C_3+.^{n-3}C_2$

C. $\frac{(n-2)(n-3)(n-4)}{6}$

D. $.^{n}C_2$

Answer: A::B::C

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135. Given that the divisors of $n = 3^p \cdot 5^q \cdot 7^r$ are of of the form $4\lambda + 1, \lambda \geq 0$. Then,

A. p+r is always even

B. p+q+r is even orr odd

C. q can be any integer

D. if p is even, then r is odd

Answer: A::B::C

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136. Number of ways in which 15 identical coins can be put into 6 different bags

A. is coefficient of x^{15} in $x^6(1 + x + x^2 + \ldots \infty)^6$, if no bag remains empty

B. is coefficient of x^{15} in $(1 - x)^{-6}$

C. is same as number of the integral solutions of $a + b + c + d + e + f = 15$

D. is same as number of non-negative integral solutions of $\sum_{i=1}^{6} x_i = 15$

Answer: A::B::D

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137. All the letters of the word 'AGAIN' be arranged and the words thus formed are known as 'Simple Words'. If a vowel appears in between two similar letters, the number of simple words is

A. 12

B. 6

C. 36

D. 14

Answer: B

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138. All the letters of the word 'AGAIN' be arranged and the words thus formed are known as 'Simple Words'. Further two new types of words are defined as follows:

(i) Smart word: all the letters of the word 'AGAIN' are being used, but vowels can be repeated as many times as we need.

(ii) Dull word: All the letters of the word 'AGAIN' are being used, but consonants can be repeated as many times as we need.

Q. Number of 7 letter smart words is

A. 1500

B. 1050

C. 1005

D. 150

Answer: B

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139. All the letters of the word 'AGAIN' be arranged and the words thus formed are known as 'Simple Words'. Further two new types of words are defined as follows:

(i) Smart word: all the letters of the word 'AGAIN' are being used, but vowels can be repeated as many times as we need.

(ii) Dull word: All the letters of the word 'AGAIN' are being used, but consonants can be repeated as many times as we need.

Q. Number of 7 letter dull words inw hich no two vowels are together, is

A. 402

B. 420

C. 840

D. 42

Answer: B

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140. Consider a plygon of sides $'n'$ which satisflies the equation $3.\ .^{n}p_{4} = .^{n-1}p_{5}$

Rajdhani express travelling from Delhi to Mumbai has n station enroute. Number of ways in which a train can be stopped at 3 stations

A. 20

B. 35

C. 56

D. 84

Answer: D

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141. Consider a polygon of sides 'n' which satisfies the equation $3 \cdot .^{n} P_4 = .^{n-1} P_5$.

Q. Number of quadrilaterals thatn can be formed using the vertices of a polygon of sides 'n' if exactly 1 side of the quadrilateral in common with side of the n-gon, is

A. 96

B. 100

C. 150

D. 156

Answer: C

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142. Consider a polygon of sides 'n' which satisfies the equation $3 \cdot .^n P_4 = .^{n-1} P_5$.

Q. Number of quadrilaterals that can be made using the vertices of the polygon of sides 'n' if exactly two adjacent sides of the quadrilateral are common to the sides of the n-gon is

A. 50

B. 60

C. 70

D. 80

Answer: A

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143. Consider the number $N = 2016$.

Q. Number of cyphers at the end of $.^{N}C_{N/2}$ is

A. 0

B. 1

C. 2

D. 3

Answer: C

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144. Consider the number $N = 2016.$

Q. Sum of the even divivisors of the number N is

A. 6552

B. 6448

C. 6048

D. 5733

Answer: B

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145. If $\binom{18}{r-2}+2\binom{18}{r-1}+\binom{18}{r}\geq\binom{20}{13}$, then the number of values of r are

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146. If λ be the number of 3-digit numbers are o the form xyz with $x<y, z<y$ and $x\neq 0$, the value of $\frac{\lambda}{30}$ is

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147. Match the following Column I to Column II

	Column I		Column II
(A)	The sum of the factors of 8! which are odd and are the form $3\lambda + 2, \lambda \in N$, is	(p)	384
(B)	The number of divisors of $n = 2^7 \cdot 3^5 \cdot 5^3$ which are the form $4\lambda + 1, \lambda \in N$, is	(q)	240
(C)	Total number of divisors of $n = 2^5 \cdot 3^4 \cdot 5^{10} \cdot 7^6$ which are the form $4\lambda + 2, \lambda \geq 1$, is	(r)	11
(D)	Total number of divisors of $n = 3^5 \cdot 5^7 \cdot 7^9$ which are the form $4\lambda + 1, \lambda \geq 0$, is	(s)	40

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148. Statement-1: Number of rectangles on a chessboard is $.^8C_2 \times .^8C_2$.

Statement-2: To form a rectangle, we have to select any two of the horizontal lines and any two of the vertical lines.

A. Statement-1 is true, statement-2 is true, statement-2 is a correct explanation for statement-1

B. Statement-1 is true, statement-2 is true, statement-2 is not a correct explanation for statement-1

C. Statement-1 is true, statement-2 is false

D. Statement-1 is false, statement-2 is true

Answer: d

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149. Statement-1: If $f:\{a_1, a_2, a_3, a_4, a_5\} \to \{a_1, a_2, a_3, a_4, a_5\}$, f is onto and $f(x) \neq x$ for each

$\xi n\{a_1, a_2, a_3, a_4, a_5\}$, is equal to 44.

Statement-2: The number of derangement for n objects is

$$n!\sum_{r=0}^{n}\frac{(-1)^r}{r!}.$$

A. Statement-1 is true, statement-2 is true, statement-2 is a correct explanation for statement-1

B. Statement-1 is true, statement-2 is true, statement-2 is not a correct explanation for statement-1

C. Statement-1 is true, statement-2 is false

D. Statement-1 is false, statement-2 is true

Answer: a

View Text Solution

150. Solve the inequality

$$.^{x-1}C_4 - .^{x-1}C_3 - \frac{5}{2}.^{x-2}C_2 < 0, x \in N.$$

Watch Video Solution

151. Find the sum of the series

$$(1^2+1)1! + (2^2+1)2! + (3^2+1)3! + .. + (n^2+1)n!$$

.

Watch Video Solution

152. Find the negative terms of the sequence

$$X_n = \frac{.^{n+4}P_4}{P_{n+2}} - \frac{143}{4P_n}$$

Watch Video Solution

153. How many integers between 1 and 1000000 have the sum of the digit equal to 18?

Watch Video Solution

154. How many differennt car licence plates can be constructed, if the licences containn three letters of the english alphabet followed by a three digit number,

(i) if repetition are allowed?

(ii) If repetitionn are not allowed?

Watch Video Solution

155. Seven relatives of a man comprises four ladies and three gentlemen: his wife has also seven relatives-three of them are ladies and four gentlemen. In how many ways fan they invite 3 ladies and 3 gentlemen at a dinner party so that there are three mans relatives and three wifes relatives?

Watch Video Solution

156. A team of ten is to be formed from 6 male doctors and 10 nurses of whom 5 are male and 5 are female. In how many ways can this be done, if the team must have atleast 4 doctors and atleast 4 nurses with atleast 2 male nurses and at least 2 female nurses?

Watch Video Solution

157. A number of four different digits is formed with the help of the digits 1,2,3,4,5,6,7 in all possible ways.

(i) How many such numbers can be formed?

(ii) How many of these are even?

Watch Video Solution

158. India and South Africa play One Day International Series until one team wins 4 matches. No match ends in a draw. Find in how many ways series can be won ?

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159. Let n and k be positive such that $n \leq \frac{k(k+1)}{2}$.The number of solutions $(x_1, x_2, \ldots. x_k), x_1 \leq 1, x_2 \leq 2, \ldots\ldots., x_k \leq k,$ all integers, satisfying $x_1 + x_2 + \ldots. + x_k = n$, is ....

Watch Video Solution

160. Find the number of all whole numbers formed on the screen of a calculator which can be recognised as numbers with (unique) correct digits when they are read inverted. The greatest number formed onn its screen is 999999.

Watch Video Solution

161. How many different numbers which are smallerr than 2×10^8 and are divisible by 3, can be written by means of the digits 0,1 and 2?

Watch Video Solution

162. There are n straight lines in a plane such that n_1 of them are parallel in onne direction, n_2 are parallel in different direction and so on, n_k are parallel in another direction such that $n_1 + n_2 + .. + n_k = n$. Also, no three of the given lines meet at a point. prove that the total number of points of intersection is $\frac{1}{2}\left\{n^2 - \sum_{r=1}^{k} n_r^2\right\}$.

Watch Video Solution

163. There are p intermediate stations on a railway line from one terminus to another . In how many ways a train can stop at 3 of these intermediate stations if no two of those stopping stations are to be consecutive ?

Watch Video Solution

164. How many different seven digit numbers are there the sum of whose digits is even ?

Watch Video Solution

165. There are $2n$ guests at a dinner party. Supposing that eh master and mistress of the house have fixed seats opposite one another and that there are two specified guests who must not be placed next to one another, show that the number of ways in which the company can be placed is $(2n - 2!) \times (4n^2 - 6n + 4)$.

Watch Video Solution

166. Find the number of triangles whose angular points are at the angular points of a given polygon of n sides, but none of whose sides are the sides of the polygon.

Watch Video Solution

167. Prove that $(n!)$ is divisible by $(n!)^{n-1}!$

Watch Video Solution

Jee Type Solved Examples Single Matching Type Questions

1.

	Column I		Column II
(A)	Four dice (six faced) are rolled. The number of possible outcomes in which atleast one die shows 2, is	(p)	210
(B)	Let A be the set of 4-digit numbers $a_1a_2a_3a_4$, where $a_1 > a_2 > a_3 > a_4$. Then, $n(A)$ is equal to	(q)	480
(C)	The total number 3-digit numbers, the sum of whose digits is even, is equal to	(r)	671
(D)	The number of 4-digit numbers that can be formed from the digits 0, 1, 2, 3, 4, 5, 6, 7, so that each number contains digit 1, is	(s)	450

.

View Text Solution

Exercise For Session 1

1. There are three routes: air, rail and road for going from chennai to hyderabad. But from hyderabad to vikarabad, there are two routes, rail and road. The number of routes from chennai to vikarabad via hyderabad is

A. 4

B. 5

C. 6

D. 7

Answer: C

Watch Video Solution

2. There are 6 books on mathematics, 4 books on physics annd 5 books on chemistry in a book shop. The number of ways can a student purchase either a book on mathematics or a book on chemistry, is

A. 10

B. 11

C. 8

D. 15

Answer: B

Watch Video Solution

3. If a, $b$and c are three consecutive positive integers such that $\frac{1}{a!}+\frac{1}{b!}=\frac{\lambda}{c!}$

A. a

B. b

C. c

D. a+b+c

Answer: C

Watch Video Solution

4. If n! ,$3\times n!$ and (n+1)! are in G P, then n!, 5 x n! and (n+1)! are in

A. AP

B. GP

C. HP

D. AGP

Answer: A

Watch Video Solution

5. Sum of the series $\sum_{r=1}^{n}(r^2+1)r!$ is

A. $(n+1)!$

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

C. $n\cdot(n+1)!$

D. $n \cdot (n+2)!$

Answer: C

Watch Video Solution

6. If $15! = 2^{\infty} \cdot 3^{\beta} \cdot 5^{\gamma} \cdot 7^{\delta} \cdot 11^{\theta} \cdot 13^{\phi}$, then the value of $\infty - \beta + \gamma - \delta + \theta - \phi$, is

A. 4

B. 6

C. 8

D. 10

Answer: B

Watch Video Solution

7. The number of naughts standing at the end of 125! Is

A. 29

B. 30

C. 31

D. 32

Answer: C

Watch Video Solution

8. The exponent of 12 in 100! is

A. 24

B. 25

C. 47

D. 48

Answer: C

Watch Video Solution

9. The number $24!$ is divisible by

A. 6^{24}

B. 24^{6}

C. 12^{12}

D. 48^5

Answer: B

Watch Video Solution

10. The last non-zero number at the end of 20! is ?

A. 2

B. 4

C. 6

D. 8

Answer: B

Watch Video Solution

11. The number of prime numbers among the numbers $105! + 2, 105! + 3, 105! + 4, \ldots., 105! + 104, 105! + 105,$ is

A. 31

B. 32

C. 33

D. None of these

Answer: D

Watch Video Solution

Exercise For Session 2

1. If $.^{n}P_{5}=20.^{n}P_{3}$, find the value of n.

A. 4

B. 8

C. 6

D. 7

Answer: B

Watch Video Solution

2. If $.^{9}P_{5}+5\cdot .^{9}P_{4}$, then n+r equals

A. 13

B. 14

C. 15

D. 16

Answer: C

View Text Solution

3. if $.^{m+n}P_2 = 56$ and $.^{m-n}P_3 = 24$, then $\frac{.^m P_3}{.^n P_2}$ equals

A. 20

B. 40

C. 60

D. 80

Answer: C

Watch Video Solution

4. if $.^{2n+1}P_{n-1} : ^{2n-1}P_n = 7 : 10$, then $.^{n}P_3$ equals

A. 60

B. 24

C. 120

D. 6

Answer: D

Watch Video Solution

5. If a train, five seats are vacant, the number of ways three passengers can sit, is

A. 10

B. 20

C. 30

D. 60

Answer: D

Watch Video Solution

6. If a denotes the number of permutations of $(x+2)$ things taken all at a time, b the number of permutations of x things taken 11 at a time and c the number of permutations of $x-11$ things taken all at a time such that $a=182bc$, find the value of x.

A. 10

B. 12

C. 15

D. 18

Answer: B

Watch Video Solution

7. The number of nine nonzero digits such that all the digits in the first four places are less than the digit in the middle and all the digits in the last four places are greater than that in the middle is a. $2(4!)$ b. $3(7!)/2$ c. $2(7!)$ d. $\hat{}\ 4P_4 \times^4 P_4$

A. 48

B. 7560

C. 10080

D. 696

Answer: D

Watch Video Solution

8. Total number of words that can be formed using all letters of the word "DIPESH" that neither beginns with 'I' nor ends with 'D' is equal to

A. 504

B. 480

C. 624

D. 969

Answer: A

Watch Video Solution

9. The number of all five digit numbers which are divisible by 4 that can be formed from the digits 0,1,2,3,4 (without repetition) is

A. 36

B. 30

C. 34

D. None of these

Answer: B

Watch Video Solution

10. How many words can be formed with the letters o the word MATHEMATICS by rearranging them.

A. $\frac{11!}{2!2!}$

B. $\frac{11!}{2!}$

C. $\frac{11!}{2!2!2!}$

D. $11!$

Answer: C

Watch Video Solution

11. Six identical coins are arranged in a row. The total number of ways in which the number of heads is equal to the number of tails is

A. 9

B. 20

C. 40

D. 120

Answer: B

Watch Video Solution

12. A train time table must be compiled for various days of the week, so that two trains twice a day depart for three days, one train daily for two days, and three trains once a day for two days. How many diferent time table can be compiled?

A. 140

B. 210

C. 133

D. 72

Answer: B

Watch Video Solution

13. Five persons entered the lift cabin on the ground floor of a 8 floor house. Suppose each of them can leave the cabin independently at any floor beginning with the first. The total number of ways in which each of the five person can leave the cabin at any one of the 7 floor, is

A. 5^7

B. 7^5

C. 35

D. 2520

Answer: B

Watch Video Solution

14. Four die are rolled. The number of ways in which atleast one die shows 3, is

A. 625

B. 671

C. 1256

D. 1296

Answer: B

Watch Video Solution

15. The number of 4-digit numbers that can be made with the digits 1,2,3,4 and 5 in which atleast two digits are identical, is

A. $4^5 - 5!$

B. 505

C. 600

D. 120

Answer: B

Watch Video Solution

Watch Video Solution

16. There are unlimited number of identical balls of three different colours. How many arrangements of atmost 7 balls in a row can be made by using them?

A. 2187

B. 343

C. 399

D. 3279

Answer: D

Watch Video Solution

Exercise For Session 3

1. How many words can be formed from the letters of the word 'COURTEST' whose first letter is C and the last letter is Y?

A. 6!

B. 8!

C. 2(6)!

D. 2(7)!

Answer: A

Watch Video Solution

2. The number of words of that can be made by writing down the letters of the word CALCULATE such that each word starts and ends with a consonant, is

A. $\frac{3}{2}(7)!$

B. $2(7)!$

C. $\frac{5}{2}(7)!$

D. $3(7)!$

Answer: C

Watch Video Solution

3. The number of words which can be formed from the letters of the word "MAXIMUM" if two consonants cannot occur together?

A. $4!$

B. $3! \times 4!$

C. $3!$

D. $\frac{4!}{3!}$

Answer: A

Watch Video Solution

4. All the letters of the word EAMCET are arranged in all possible ways. The number such arrangements in which no two vowels are adjacent to each other is

A. 54

B. 72

C. 114

D. 360

Answer: B

Watch Video Solution

5. How many words can be formed with the letters of the word 'DELHI' if E and H never occur together?

A. 6

B. 12

C. 24

D. 60

Answer: C

Watch Video Solution

6. In how many ways can 5 boys and 3 girls sit in a row so that no two girls are together ?

A. $5! \times 3!$

B. $.^4 P_3 \times 5!$

C. $.^6 P_3 \times 5!$

D. $.^5 P_3 \times 3!$

Answer: C

Watch Video Solution

7. There are n numbered seats around a round table. Total number of ways in which $n_1(n_1 < n)$ persons can sit around the round table, is equal to

A. $.^n C_{n_1}$

B. $.^n P_{n_1}$

C. $.^n C_{n_1 - 1}$

D. $.^n P_{n_{1-1}}$

Answer: B

Watch Video Solution

Watch Video Solution

8. In how many ways 7 men and 7 women can be seated around a round table such that no two women can sit together

A. 7!

B. $7! \times 6!$

C. $(6!)^2$

D. $(7!)^2$

Answer: B

Watch Video Solution

9. Find number of ways that 8 beads o different colors be strung as a necklace.

A. 2520

B. 2880

C. 4320

D. 5040

Answer: A

Watch Video Solution

10. If 11 members of a committee sit at a round table so that the president and secretary always sit together, then the number of arrangements, is

A. $9! \times 2$

B. $10!$

C. $10! \times 2$

D. $11!$

Answer: A

Watch Video Solution

11. In how many ways can 15 members of a council sit along a circular table, when the secretary is to sit on one side of the chairman and the deputy secretary on the other side?

A. $12! \times 2$

B. 24

C. $15! \times 2$

D. 30

Answer: A

Watch Video Solution

Exercise For Session 4

1. If $.^{43}C_{r-6} = .^{43}C_{3r+1}$, the value of r is

A. 6

B. 8

C. 10

D. 12

Answer: D

Watch Video Solution

2. If $\hat{} \ 18C_{15} + 2^{18}C_{16} +^{17} C_{16} + 1 =^{n} C_{3}$, then $n =$

A. 18

B. 20

C. 22

D. 24

Answer: B

Watch Video Solution

3. If $.^{20}C_{n+1} = .^{n}C_{16}$, the value of n is

A. 7

B. 10

C. 13

D. None of these

Answer: D

Watch Video Solution

4. If ${}^{47}C_4 + \sum_{r=1}^{5} {}^{52-r}C_3$ is equal to

A. $.^{47} C_6$

B. $.^{52} C_5$

C. $.^{52} C_4$

D. None of these

Answer: C

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5. If $.^{n} C_3 + .^{n} C_4 > .^{n+1} C_3$ then

A. $n > 6$

B. $n < 6$

C. $n > 7$

D. $n < 7$

Answer: A

Watch Video Solution

6. The solution set ${}^{10}C_{x-1} > 2.{}^{10}C_x$ is

A. {1,2,3}

B. {4,5,6}

C. {8,9,10}

D. {9,10,11}

Answer: C

Watch Video Solution

7. if $.^{2n} C_2 :^n C_2 = 9 : 2 \text{ and } .^n C_r = 10$, then r is equal to

A. 2

B. 3

C. 4

D. 5

Answer: A

Watch Video Solution

8. If $.^{2n}C_3 :^n C_2 = 44 : 3$, for which of the following value of r, the value of $.^n C_r$ will be 15.

A. r=3

B. r=4

C. r=5

D. r=6

Answer: B

Watch Video Solution

9. If $\hat{} \ nP_r =^n P_{r+1} and^n C_r =^n C_{r-1},$ then the value of $n + r$ is.

A. 2

B. 3

C. 4

D. 5

Answer: B

Watch Video Solution

10. If $.^n P_r = 840, .^n C_r = 35,$ then find $n =$

A. 1

B. 3

C. 5

D. 7

Answer: D

Watch Video Solution

11. If $.^{n} P_3 + .^{n} C_{n-2} = 14n$, the value of n is

A. 5

B. 6

C. 8

D. 10

Answer: A

Watch Video Solution

12. There are 12 volleyball players in all in a college, out of which a team of 9 players is to be formed. The captain always remains the same, then in how many ways can the team be formed

A. 36

B. 99

C. 108

D. 165

Answer: D

Watch Video Solution

13. In how many ways can a team 11 players be formed out of 25 players, if 6 out of them are always to be included and 5 always to be excluded a. 2020 b. 2002 c. 2008 d. 8002

A. 2002

B. 2008

C. 2020

D. 8002

Answer: A

Watch Video Solution

14. A man has 10 friends, in how many ways he can invite one or more of them to a party?

A. 10!

B. 2^{10}

C. $10! - 1$

D. $2^{10} - 1$

Answer: D

Watch Video Solution

15. In an examination, there are three multiple choice questions and each question has four choices. Number of ways in which a student can fail to get all answers correct, is

A. 11

B. 12

C. 27

D. 63

Answer: D

Watch Video Solution

16. In an election, the number of candidates is one greater than the persons to be elected. If a voter an vote in 254 ways, the number of candidates is a. 7 b. 10 c. 8 d. 6

A. 6

B. 7

C. 8

D. 10

Answer: C

Watch Video Solution

17. Find the number of groups that can be made from 5 different green balls., 4 different blue balls and 3 different red balls, if at least 1 green and 1 blue ball is to be included.

A. 3700

B. 3720

C. 4340

D. None of these

Answer: B

Watch Video Solution

18. A person is permitted to selected at least one and at most n coins from a collection of $(2n+1)$ distinct coins. If the total number o ways in which he can select coins is 255, find the value of n.

A. 4

B. 8

C. 16

D. 32

Answer: A

Watch Video Solution

Exercise For Session 5

1. There are 3 oranges, 5 apples and 6 mangoes in a fuit basket (all fruits of same kind are identical). Number of ways in which fruits can be selected from the basket, is

A. 124

B. 125

C. 167

D. 168

Answer: C

Watch Video Solution

2. In a city no two persons have identical set of teeth and there is no peson without a tooth. Also no person has more than 32 teeth. If we disguard the shape and size of tooth and consider only the positioning of the teeth, the maximum population of the city is

A. 2^{32}

B. $(32)^2 - 1$

C. $2^{32} - 1$

D. 2^{31}

Answer: C

Watch Video Solution

3. If $a_1, a_2, a_3, \ldots., a_{n+1}$ be $(n+1)$ different prime numbers, then the number of different factors (other than1) of $a_1^m. a_2. a_3 \ldots a_{n+1}$, is

A. m+1

B. (m+1)2^(n)`

C. $m \cdot 2^n + 1$

D. None of these

Answer: D

Watch Video Solution

4. Number of proper factors of 2400 is equal to

A. 34

B. 35

C. 36

D. 37

Answer: A

Watch Video Solution

5. The sum of the divisors of $2^5 \times 3^4 \times 5^2$, is

A. $3^2 \cdot u^1 \cdot 11^2$

B. $3^2 \cdot 7^1 \cdot 11^2 \cdot 31$

C. $3 \cdot 7 \cdot 11 \cdot 31$

D. None of these

Answer: B

Watch Video Solution

6. The number of proper divisors of $2^p \cdot 6^q \cdot 21^r, \forall p, q, r \in N$, is

A. (p+q+1)(q+r+1)(r+1)

B. (p+q+1)(q+r+1)(r+1)-2

C. (p+q)(q+r)r-2

D. (p+q)(q+r)r

Answer: B

Watch Video Solution

7. The number of odd proper divisors of $3^p \cdot 6^q \cdot 15^r, \forall p, q, r, \in N$, is

A. $(p+1)(q+1)(r+1)-2$

B. $(p+1)(q+1)(r+1)-1$

C. $(p+q+r+1)(r+1)-2$

D. $(p+q+r+1)(r+1)-1$

Answer: D

Watch Video Solution

8. The number of proper divisors of 1800, which are also divisible by 10, is

A. 18

B. 27

C. 34

D. 43

Answer: A

Watch Video Solution

9. Total number of 480 that are of the form 4n+2, $n \geq 0$, is equal to

A. 2

B. 3

C. 4

D. 5

Answer: C

Watch Video Solution

10. Total number of divisors of $N = 2^5 \cdot 3^4 \cdot 5^{10} \cdot 7^6$ that are of the form $4n + 2$, $n \geq 1$, is equal to

A. 54

B. 55

C. 384

D. 385

Answer: C

Watch Video Solution

11. Total number of divisors of $n = 3^5 . 5^7 . 7^9$ that are in the form of $4\lambda + 1$; $\lambda \geq 0$ is equal to

A. 15

B. 30

C. 120

D. 240

Answer: D

Watch Video Solution

12. In how many ways 12 different books can be distributed equally among 3 persons?

A. $\frac{12!}{(4!)^3}$

B. $\frac{12!}{(3!)^4}$

C. $\frac{12!}{(4!)^4}$

D. $\frac{12!}{(3!)^3}$

Answer: A

Watch Video Solution

13. Number of ways in which 12 different things can be distributed in 3 groups, is

A. $\frac{12!}{(4!)^3}$

B. $\frac{12!}{3!(4!)^3}$

C. $\frac{12!}{4!(3!)^2}$

D. $\frac{12!}{(3!)^4}$

Answer: B

Watch Video Solution

14. Number of ways in which 12 different things can be divided among five persons so that they can get 2,2,2,3,3 things respectively is

A. $\frac{12!}{(3!)^2(2!)^3}$

B. $\frac{12!15!}{(3!)^2(2!)^3}$

C. $\frac{12!}{(3!)^3(2!)^4}$

D. $\frac{12!5!}{(3!)^2(2!)^4}$

Answer: C

Watch Video Solution

15. Number of ways in which 12 different things can be divided among five persons so that they can get 2,2,2,3,3 things respectively is

A. $\frac{12!}{(3!)^2(2!)^3}$

B. $\frac{12!5!}{(3!)^2(2!)^3}$

C. $\frac{12!}{(3!)^2(2!)^4}$

D. $\frac{12!5!}{(3!)^2(2!)^4}$

Answer: B

Watch Video Solution

16. The total number of ways in which $2n$ persons can be divided into n couples is a. $\frac{2n!}{n!n!}$ b. $\frac{2n!}{(2!)^3}$ c. $\frac{2n!}{n!(2!)^n}$ d. none of these

A. $\frac{2n!}{(n!)^2}$

B. $\frac{2n!}{(2n!)^n}$

C. $\frac{2n!}{n!(2n!)^2}$

D. None of these

Answer: C

Watch Video Solution

17. n different toys have to be distributed among n children. Find the number of ways in which these toys can be distributed so that exactly one child gets no toy.

A. $n!$

B. $n!.^{n}C_2$

C. $(n-1)!.^{n}C_2$

D. $n!.^{n-1}C_2$

Answer: B

Watch Video Solution

18. In how any ways can 8 different books be distributed among 3 students if each receives at least 2 books?

A. 490

B. 980

C. 2940

D. 5880

Answer: C

Watch Video Solution

Exercise For Session 6

1. If number of ways in which 7 different balls can be distributed into 4 different boxes, so that no box remains empty is 100λ, the value of λ is

A. 18

B. 108

C. 1008

D. 10008

Answer: C

Watch Video Solution

2. If number of ways in which 7 different balls can be distributed into 4 boxes, so that no box remains empty is 48λ, the value of λ is

A. 231

B. 331

C. 175

D. 531

Answer: C

Watch Video Solution

3. If number of ways in which 7 identical balls can be distributed into 4 boxes, so that no box remains empty is 4λ, the value of λ is

A. 5

B. 7

C. 9

D. 11

Answer: A

Watch Video Solution

4. Number of non-negative integral solutions of the equation a+b+c=6 is

A. 28

B. 32

C. 36

D. 56

Answer: A

Watch Video Solution

5. The number of integral solutions of $x+y+z=0$ with $x \geq -5, y \geq -5, z \geq -5$ is a. 134 b. 136 c. 138

d. 140

A. 272

B. 136

C. 240

D. 120

Answer: B

Watch Video Solution

6. If a,b and c are integers and $a \geq 1, b \geq 2$ and $c \geq 3$. If $a+b+c=15$, the number of possible solutions of the equation is

A. 55

B. 66

C. 45

D. None of these

Answer: A

Watch Video Solution

7. Number of integral solutions of $2x + y + z = 10(x \geq 0, y \geq 0, Z \geq 0)$ is

A. 18

B. 27

C. 36

D. 51

Answer: C

Watch Video Solution

8. A person writes letters to six friends and addresses the corresponding envelopes. Let x be the number of ways so that atleast two of the letters are in wrong envelopes and y be the number of ways so that all the letters are in wrong envelopes. Then, x-y is equal to

A. 719

B. 265

C. 454

D. None of these

Answer: C

Watch Video Solution

9. A person goes in for an examination in which there are four papers with a maximum of m marks from each paper. The number of ways in which one can get 2m marks is

A. $.^{2m+3}C_3$

B. $\left(\frac{1}{3}\right)(m+1)\left(2m^2+4m+1\right)$

C. $\left(\frac{1}{3}\right)(m+1)\left(2m^2+4m+3\right)$

D. None of these

Answer: C

Watch Video Solution

10. The number of selections of four letters from the letters ofthe word ASSASSINATION is

A. 72

B. 71

C. 66

D. 52

Answer: A

Watch Video Solution

11. The number of positive integral solutions of $2x_1 + 3x_2 + 4x_3 + 5x_4 = 25$, is

A. 20

B. 22

C. 23

D. None of these

Answer: D

View Text Solution

12. If a,b, and c are positive integers such that a+b+c ≤ 8, the number of possible values of the ordered triplet (a,b,c) is

A. 84

B. 56

C. 83

D. None of these

Answer: B

Watch Video Solution

13. The total number of positive integral solution of `15

A. 685

B. 785

C. 1125

D. None of these

Answer: A

Watch Video Solution

14. Find the total number of positive integral solutions for (x, y, z) such that $xyz = 24$. Also find out the total number of integral solutions.

A. 36

B. 90

C. 120

D. None of these

Answer: C

Watch Video Solution

15. There are 12 points in a plane in which 6 are collinear. Number of different straight lines that can be drawn by joining them, is

A. 51

B. 52

C. 132

D. 18

Answer: B

Watch Video Solution

16. 4 points out of 11 points in a plane are collinear. Number of different triangles that can be drawn by joining them, is

A. 165

B. 161

C. 152

D. 159

Answer: B

Watch Video Solution

17. The number of triangles that can be formed with 10 points as vertices n of them being collinear, is 10. Then n is a. 3 b. 4 c. 5 d. 6

A. 3

B. 4

C. 5

D. 6

Answer: C

Watch Video Solution

18. ABCD is a convex quadrilateral and 3, 4, 5, and 6 points are marked on the sides AB, BC, CD, and DA, respectively. The number of triangles with vertices on different sides is

a. 270 b. 220 c. 282 d. 342

A. 270

B. 220

C. 282

D. None of these

Answer: D

Watch Video Solution

19. There are 10 points in a plane of which no three points are collinear and four points are concyclic. The number of different circles that can be drawn through at least three points of these points is a. 116 b. 120 c. 117 d. none of these

A. 116

B. 120

C. 117

D. None of these

Answer: C

Watch Video Solution

20. 4 points out of 8 points in a plane are collinear. Number of different quadrilateral that can be formed by joining them is

A. 56

B. 60

C. 76

D. 53

Answer: D

Watch Video Solution

21. There are 2n points in a plane in which m are collinear.

Number of quadrilateral formed by joining these lines

A. is equal to $.^{2n} C_4 - .^m C_4$

B. is greater than $.^{2n} C_4 \_ .^m C_4$

C. is less than $.^{2n} C_4 - .^m C_4$

D. None of these

Answer: C

Watch Video Solution

22. In a polygon the number of diagonals is 54. the number of sides of the polygon, is

A. 10

B. 12

C. 9

D. None of these

Answer: B

Watch Video Solution

23. In a polygon, no three diagonals are concurrent. If the total number of points of intersection of diagonals interior to the polygon is 70, then the number of diagonals of the polygon is a. 20 b. 28 c. 8 d. none of these

A. 20

B. 28

C. 8

D. None of these

Answer: A

Watch Video Solution

24. If n lines are drawn in a plane such that no two of them are parallel and no three of them are concurrent, such that these lines divide the planein 67 parts, then find number of different points at which these lines will cut.

A. $\sum_{k=1}^{n-1} k$

B. $n(n-1)$

C. n^2

D. None of these

Answer: A

Watch Video Solution

25. Six straight lines are in a plane such that no two are parallel & no three are concurrent. The number of parts in which these lines divide the plane will be

A. 15

B. 22

C. 29

D. 36

Answer: B

Watch Video Solution

26. The parallelogram is cut by two sets of m lines parallel to its sides. The numbers parallelogram thus formed, is

A. $\left(.^{m}C_2\right)^2$

B. $\left(.^{m+1}C_2\right)^2$

C. $\left(.^{m+2}C_2\right)^2$

D. None of these

Answer: C

Watch Video Solution

27. The number of rectangles excluding squares from a rectangle of size 11×8 is 48λ, then the value of λ is

A. 13

B. 23

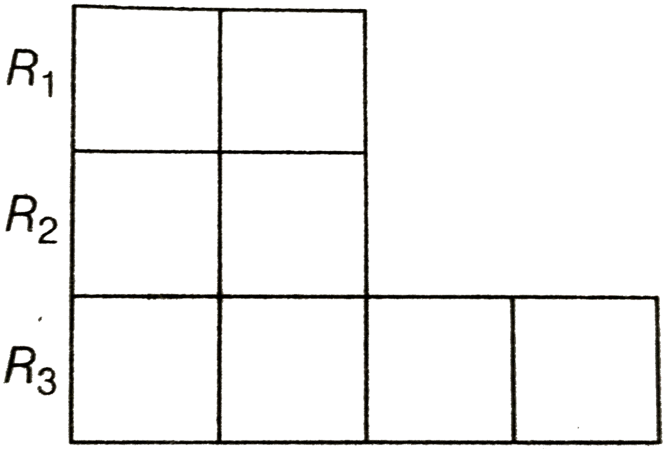
C. 43

D. 53

Answer: C

Watch Video Solution

28. The number of ways the letters of the word PERSON cann be placed in the squares of the figure shown so that no row remain empty is



A. $24 \times 6!$

B. $26 \times 6!$

C. $26 \times 7!$

D. $27 \times 7!$

Answer: B

Watch Video Solution

Exercise For Session 7

1. The letters of the word 'DELHI' are arranged in all possible ways as in a dictionary, the rank of the word 'DELHI' is

A. 3

B. 5

C. 6

D. 7

Answer: B

Watch Video Solution

2. The letters of the word "KANPUR" are arranged in all possible ways as in a dictionary, the rank of the word 'KANPUR' from last is

A. 121

B. 122

C. 598

D. 599

Answer: D

Watch Video Solution

Watch Video Solution

3. The letters of the word "MUMBAI" are arranged in all possible ways as in a dictionary, the rank of the word 'MUMBAI' is

A. 297

B. 295

C. 299

D. 301

Answer: A

Watch Video Solution

4. The letters of the word "CHENNAI" are arranged inn all possible ways as in a dictionary, then rank of the word "CHENNAI" from last is

A. 2016

B. 2017

C. 2018

D. 2019

Answer: C

Watch Video Solution

5. If all the letters of the word 'AGAIN' be arranged as in a dictionary, then fiftieth word is

A. NAAGI

B. NAGAI

C. NAAIG

D. NAIAG

Answer: C

Watch Video Solution

Exercise Single Option Correct Type Questions

1. A lady gives a dinner party to 5 guests to be selected from nine friends. The number of ways of forming the party of 5, given that two of the friends will not attend the party together, is

A. 56

B. 126

C. 91

D. None of these

Answer: C

Watch Video Solution

2. If a,b,c and d are odd natural numbers such that $a+b+c+d=20$, the number of values of the ordered quadruplet (a,b,c,d) is

A. 165

B. 455

C. 310

D. None of these

Answer: A

Watch Video Solution

3. If $l =$ LCM of $8!$, $10!$ and $12!$ and $h =$ HCF of of $8!$, $10!$ and $12!$ then $\frac{l}{h}$ is equal to

A. 132

B. 11800

C. 11880

D. None of these

Answer: C

Watch Video Solution

4. The number of positive integers satisfying the inequality $C(n+1, n-2) - C(n+1, n-1) \leq 100$ is

A. 9

B. 8

C. 5

D. None of these

Answer: B

Watch Video Solution

5. The number of ways in which a score of 11 can be made from a throw by three persons,each throwing a single die once, is

A. 45

B. 18

C. 27

D. 68

Answer: C

Watch Video Solution

6. The number of positive integers with the property that they cann be expressed as the sum of the cubes of 2 positive integers in two different ways is

A. 1

B. 100

C. infinite

D. 0

Answer: C

Watch Video Solution

7. In a plane there are 37 straight lines, of which 13 pass pass through the point B. Besides, no three lines paseh both points A and B and no two are parallel, then theline passes through both points A and B and no number of intersection points the lines have, is

A. 535

B. 601

C. 728

D. 963

Answer: A

Watch Video Solution

8. If a denotes the number of permutations of $(x+2)$ things taken all at a time, b the number of permutations of x things taken 11 at a time and c the number of permutations of $x-11$ things taken all at a time such that $a = 182bc$, find the value of $x\cdot$

A. 15

B. 12

C. 10

D. 18

Answer: B

Watch Video Solution

9. The number of numbers less than 1000 than can be formed out of the digits 0,1,2,3,4 and 5, no digit being repeated, as

A. 130

B. 131

C. 156

D. 158

Answer: B

Watch Video Solution

10. If the permutations of a, b, c, d, e taken all together be written dowan in alphabetical order as in dictionary and numbered then the rank of the permutation debac, is

A. 90

B. 91

C. 92

D. 93

Answer: D

Watch Video Solution

11. On a railway there are 20 stations. The number of different tickets required in order that it may be possible to travel from every station to every station is

A. 210

B. 225

C. 196

D. 105

Answer: A

Watch Video Solution

Watch Video Solution

12. A is a set containing n elements. A subset P of A is chosen at random. The set A is reconstructed by replacing the elements of P. A subset Q is again chosen at random. The Probability that $P \cap Q$ contain just one element, is

A. $2^{2n} - .^{2n} C_n$

B. 2^n

C. $2^n - 1$

D. 3^n

Answer: D

Watch Video Solution

13. The straight lines I_1, I_2, I_3 are paralled and lie in the same plane. A total number of m point are taken on I_1, n points on I_2, k points on I_3. The maximum number of triangles formed with vertices at these points are

A. $.^{m+n+k}C_3$

B. $.^{m+n+k}C_3 - .^{m}C_3 - .^{n}C_3 - .^{k}C_3$

C. $.^{m}C_3 + .^{n}C_3 + .^{k}C_3$

D. None of these

Answer: B

Watch Video Solution

14. Let A be a set of n (≥ 3) distinct elements. The number of triplets (x, y, z) of the A elements in which at least two coordinates is equal to

A. $.^{n}P_{3}$

B. $n^{3} - .^{n}P_{3}$

C. $3n^{2} - 2n$

D. $3n^{2}(n-1)$

Answer: B

Watch Video Solution

15. The total number of five-digit numbers of different digits in which the digit in the middle is the largest is a. $\sum_{n=4}^{9}\hat{}\; {}^{n}P_4$ b. $33(3!)$ c. $30(3!)$ d. none of these

A. $2^2 \cdot 3^2 \cdot 7^2$

B. $2^3 \cdot 3 \cdot 7^3$

C. $2^2 \cdot 3^3 \cdot 7^2$

D. $2^3 \cdot 3^2 \cdot 7^3$

Answer: C

Watch Video Solution

16. The total number of words that can be formed using all letters of the word 'RITESH' that neither begins with I nor ends with R, is

A. 504

B. 480

C. 600

D. 720

Answer: A

Watch Video Solution

17. A man has three friends. The number of ways he can invite one friend everyday for dinner on six successive nights so that no friend is invited more than three times is a. 640 b. 320 c. 420 d. 510

A. 360

B. 420

C. 170

D. 510

Answer: D

Watch Video Solution

18. The number of three digit numbers of the form xyz such that $x < y$, $z \leq y$ and $x \neq 0$, is

A. 240

B. 244

C. 276

D. 285

Answer: C

Watch Video Solution

19. The letters of the word 'MEERUT' are arranged in all possible ways as in a dictionary, then the rank of the word

'MEERUT' is

A. 119

B. 120

C. 121

D. 122

Answer: D

Watch Video Solution

20. The number of ways in which 10 condidates $A_1, A_2, \ldots\ldots, A_{10}$ can be ranked so that A_1 is always above A_2, is

A. 10!

B. $\frac{10!}{2}$

C. 9!

D. None of these

Answer: B

Watch Video Solution

21. Let A be the set of 4-digit numbers $a_1a_2a_3a_4$ where $a_1 > a_2 > a_3 > a_4$, then $n(A)$ is equal to

A. 126

B. 84

C. 210

D. None of these

Answer: C

Watch Video Solution

22. Find the number of distinct rational numbers x such that `o

A. 15

B. 13

C. 12

D. 11

Answer: D

Watch Video Solution

23. The total number of positive integral solutions for (x, y, z) such that $xyz = 24$ is

A. 30

B. 36

C. 90

D. 120

Answer: D

Watch Video Solution

24. ABCD is a convex quadrilateral and 3, 4, 5, and 6 points are marked on the sides AB, BC, CD, and DA, respectively. The number of triangles with vertices on different sides is

a. 270 b. 220 c. 282 d. 342

A. 220

B. 270

C. 282

D. 342

Answer: D

Watch Video Solution

25. In how many ways can a team of 6 horses be selected out of a stud of 16, so that there shall always be three out of A B C A B C, but never A A, B B or C C together a. 840 b. 1260 c. 960 d. 720

A. 720

B. 840

C. 960

D. 1260

Answer: C

Watch Video Solution

26. The number of polynomials of the form $x^3 + ax^2 + bx + c$ that are divisible by $x^2 + 1$, where a, b,c $\in \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$, is

A. 10

B. 15

C. 5

D. 8

Answer: A

Watch Video Solution

27. Let $x_1, x_2, x_3, \ldots, x_k$ be the divisors of positive integer 'n' (including 1 and x). If $x_1 + x_2 + \ldots + x_k = 75$, then $\sum_{r=1}^{k} \frac{1}{x_i}$ is equal to

A. $\frac{k^2}{75}$

B. $\frac{75}{k}$

C. $\frac{n^2}{75}$

D. $\frac{75}{n}$

Answer: D

Watch Video Solution

28. The total number of function f from the set $(1, 2, 3)$ into the set $(1, 2, 3, 4, 5)$ such that $f(i) \leq f(j) \, \forall i < j$ is equal to

A. 35

B. 30

C. 50

D. 60

Answer: A

Watch Video Solution

29. Ten persons numbered 1, ,2 ..,10 play a chess tournament, each player against every other player exactly one game. It is known that no game ends in a draw. If $w_1, w_2, , w_{10}$ are the number of games won by players 1, ,2 3, ...,10, respectively, and $l_1, l_2, , l_{10}$ are the number of games lost by the players 1, 2, ...,10, respectively, then a. $\sum w_1 = \sum l_i = 45$ b. $w_1 + 1_i = 9$ c. $\sum wl12() \underset{=}{\ } 81 + \sum l12$ d. $\sum wli2() \underset{=}{\ } \sum li2$

A. $\sum w_i^2 + 81 - \sum l_i^2$

B. $\sum w_i^2 + 81 = \sum l_i^2$

C. $\sum w_i^2 = \sum l_i^2$

D. None of these

Answer: C

Watch Video Solution

30. In the next world cup of cricket there will be 12 teams, divided equally in two groups. Teams of each group will play a match against each other. From each group 3 top teams will qualify for the next round.In this round each team will play against other once. Each of the four top teams of this round will play amatch against the other three. Two top teams of this round will go to the final round, where they will playthe best of three matches. The minimum number of matches in the next world cup will be

A. 54

B. 53

C. 38

D. 37

Answer: B

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Exercise More Than One Correct Option Type Questions

1. If $300! \neq 3^{m} \times$ an integer, then

A. $m = 148$

B. $m = 150$

C. It is equivalent to number of n is $150! = 2^{n-2} \times$ an integer

D. $m =^{150} C_2$

Answer: A

Watch Video Solution

2. If $102 \neq 2^{\alpha} \cdot 3^{\beta} \cdot 5^{\gamma} \cdot 7^{\delta}$...., then

A. $\alpha = 98$

B. $\beta = 2\gamma + 1$

C. $\alpha = 2\beta$

D. $2\gamma = 3\delta$

Answer: A::B::C::D

Watch Video Solution

3. The number of ways of choosing triplet (x, y, z) such that $z \geq \max\{x, y\} and x, y, z \in \{1, 2, n, n+1\}$ is a. $\hat{} n + 1C_3 +^{n+2} C_3$ b. $n(n+1)(2n+1)/6$ c. $1^2 + 2^2 + + n^2$ d. $2((\hat{}\ (n+2)C_3))_{-n+2} C_2$

A. $.^{n+1} C_3 + .^{n+2} C_3$

B. $\dfrac{n(n+1)(2n+1)}{6}$

C. $1^2 + 2^2 + 3^2 + \ldots + n^2$

D. $2(.^{n+2} C_3) - .^{n+1} C_2$

Answer: A::B::C::D

Watch Video Solution

4. Let n be 4-digit integer in which all the digits are different. If x is the number of odd integers and y is the number of even integers, then

A. $x < y$

B. $x > y$

C. $x + y = 4500$

D. $|x - y| = 56$

Answer: A::D

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Watch Video Solution

5. Let $S = \{1, 2, 3, . . . , n\}$. If X denotes the set of all subsets of S containing exactly two elements, then the value of $\sum_{A \in X}$ (min. A) is given by

A. $.^{n+1} C_3$

B. $.^{n} C_3$

C. $\frac{n(n^2 - 1)}{6}$

D. $\frac{n(n^2 - 3n + 2)}{6}$

Answer: A::C

Watch Video Solution

6. Let p=2520, x=number of divisors of p which are multiple of 6, y=number of divisors of p which are multiple of 9, then

A. x=12

B. x=24

C. y=12

D. y=16

Answer: B::D

Watch Video Solution

7. If n denotes the number of ways of selecting r objects of out of n distinct objects $(r \geq n)$ with unlimited repetition but with each objet included at least once in selection, then n m is equal is a. $\hat{} r - 1C_{r-n}$ b. $\hat{} r - 1C_n$ c. $\hat{} r - 1C_{n-1}$ d. none of these

A. $.^{r-1} C_{r-n}$

B. $.^{r-1} C_n$

C. $.^{r-1} C_{n-1}$

D. $.^{r-1} C_{r-n-1}$

Answer: A::C

Watch Video Solution

8. There are three teams x,x+1 and y childrens and total number of childrens in the teams is 24. if two childrens of the same team do not fight, then

A. maximum number of fights is 190

B. maximum number of fights is 191

C. maximum number of fights occur when x=7

D. maximum number of fights occur when x=8

Answer: B::C::D

Watch Video Solution

9. Let N denotes the number of ways in which 3n letters can be selected from 2n A's, 2nB's and 2nC's. then,

A. $3 \mid (N-1)$

B. $n \mid (N_1)$

C. $(n+1(\mid (N-1)$

D. $3n(n+1) \mid (N-1)$

Answer: A::B::C::D

Watch Video Solution

10. If $\alpha = x_1, x_2, x_3$ and $\beta = y_1, y_2, y_3$ be two three digit numbers, then the number of pairs of α and β that can be formed so that α can be subtracted from β without borrowing.

A. $2! \times 10! \times 10!$

B. $(45)(55)^2$

C. $3^2 \cdot 5^3 \cdot 11^2$

D. `136125

Answer: B::C::D

Watch Video Solution

Exercise Passage Based Questions

1. Consider the Word W=TERRORIST.

Q. Number of four letter words that can be made using only the letters from the word W, if each word must contains atleast one vowel, is

A. 588

B. 504

C. 294

D. 600

Answer: A

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2. Consider the word $W = TERRORIST$ Number of arrangements of the word w, if no two R's are together, is

A. 11460

B. 10400

C. 12600

D. 9860

Answer: C

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3. Consider the Word W=TERRORIST.

Q. Number of arrangements of the word W, if R's as well as T's are separated, is

A. 9860

B. 1080

C. 10200

D. 11400

Answer: C

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4. Different words are formed by arranging the letters of the word 'SUCCESS'

Q. The number of words in which C's are together but S's are separated, is

A. 120

B. 96

C. 24

D. 420

Answer: C

Watch Video Solution

5. Different words are formed by arranging the letters of the word $SUCCESS$, then

A. 120

B. 96

C. 24

D. 180

Answer: B

Watch Video Solution

6. Different words are formed by arranging the letters of the word $SUCCESS$, then

A. 42

B. 40

C. 420

D. 480

Answer: A

Watch Video Solution

7. Different words are being formed by arranging the letter of the word 'ARRANGE'

Q. The number of words in which the two R's are not together, is

A. 1260

B. 960

C. 900

D. 600

Answer: C

Watch Video Solution

8. The number of ways in which the letters of the word ARRANGE be arranged so that

(i) the two R's are never together,

(ii) the two A's are together but not two R's.

(iii) neither two A's nor two R's are together.

A. 1260

B. 900

C. 660

D. 240

Answer: C

Watch Video Solution

9. Different words are being formed by arranging the letter of the word 'ARRANGE'

Q. The rank of the word 'ARRANGE' in the dictionary is

A. 340

B. 341

C. 342

D. 343

Answer: C

Watch Video Solution

10. Let $S(n)$ denotes the number of ordered pairs (x, y) satisfying $\frac{1}{x}+\frac{1}{y}=\frac{1}{n}, \forall, n \in N$ $S(10)$ equals

A. 3

B. 6

C. 9

D. 12

Answer: C

Watch Video Solution

11. Let $S(n)$ denotes the number of ordered pairs (x, y) satisfying $\frac{1}{x}+\frac{1}{y}=\frac{1}{n}, \forall, n \in N$ $S(10)$ equals

A. S(3)+S(4)

B. S(5)+S(6)

C. S(8)+S(9)

D. S(1)+S(11)

Answer: C

Watch Video Solution

12. Let (S) denotes the number of ordered pairs (x,y) satisfying $\frac{1}{x}+\frac{1}{y}=\frac{1}{n}, Aax, y, n \in N.$

Q. $\sum_{r=1}^{10} S(r)$ equals\

A. 47

B. 48

C. 49

D. 50

Answer: B

View Text Solution

13. Let f(n) denotes the number of different ways, the positive integer n ca be expressed as the sum of the 1's and 2's. for example, f(4)=5.

i.e., $4 = 1 + 1 + 1 + 1$

$= 1 + 1 + 2 = 1 + 2 + 1 = 2 + 1 + 1 = 2 + 2$

Q. The value of f{f(6)} is

A. 376

B. 377

C. 321

D. 370

Answer: B

Watch Video Solution

14. Let f(n) denotes the number of different ways, the positive integer n ca be expressed as the sum of the 1's and 2's. for example, f(4)=5.

i.e., $4 = 1 + 1 + 1 + 1$

$= 1 + 1 + 2 = 1 + 2 + 1 = 2 + 1 + 1 = 2 + 2$

Q. The number of solutions of the equation $f(n) = n$, where $n \in N$ is

A. 1

B. 2

C. 3

D. 4

Answer: C

Watch Video Solution

15. Let f(n) denotes the number of different ways, the positive integer n ca be expressed as the sum of the 1's and 2's. for example, f(4)=5.

i.e., $4 = 1 + 1 + 1 + 1$

$= 1 + 1 + 2 = 1 + 2 + 1 = 2 + 1 + 1 = 2 + 2$

Q. In a stage show, f(4) superstars and f(3) junior artists participate. each one is going to present one item, then the number of ways the sequence of items can be planned, if no two junior artists present their items consecutively, is

A. 144

B. 360

C. 4320

D. 14400

Answer: D

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Exercise Single Integer Answer Type Questions

1. The ten's digit of $1! + 2! + 3! + \ldots + 97!$ is

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2. The exponent of 7 in $100C_{50}$ is

Watch Video Solution

3. Let P_n denotes the number of ways in which three people can be selected out of 'n' people sitting in a row, if no two of them are consecutive. If $P_{n+1} - P_n = 15$ then the value of 'n` is____.

Watch Video Solution

4. If the letters of the word are arranged as inn a dictionary. M and n are the rank of the words BULBUL and NANNU respectively, then the value of m-4n is

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5. An n-digit number is a positive number with exactly n digits. Nine hundred distinct n-digit numbers are to be formed using only the three digits 2, 5, and 7. The smallest value of n for which this is possible is a.6 b. 7 c. 8 d. 9

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6. If a, b, c are three natural numbers in AP such that $a+b+c=21$ and if possible number of ordered triplet (a, b, c) is λ, then the value of $(\lambda - 5)$ is

Watch Video Solution

7. If 2λ is the number of ways of selecting 3 member subset of {1,2,3, . .,29}, so that the number form of a GP with integer common ration, then the value of λ is

Watch Video Solution

8. In a certain test, there are n questions. In this test, 2^{n-k} students gave wrong answers to atleast k questions, where k=1,2,3, . . ,. If the total number of wrong answers given in 127, then the value of n is

Watch Video Solution

9. If a seven-digit number made up of all distinct digits 8, 7, 6, 4, 3, $xandy$ divisible by 3, then a. Maximum value of $b.\ c.\ x - yd.$ e. is 9 f. Maximum value of $g.\ h.\ x + yi.$ j. is 12 k. Minimum value of $l.\ m.\ xyn.$ o. is 0 p. Minimum value of $q.\ r.\ x + ys.$ t. is 3

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10. There are five points A,B,C,D and E. no three points are collinear and no four are concyclic. If the line AB intersects of the circles drawn through the five points. The number of points of intersection on the line apart from A and B is

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Exercise Matching Type Questions

1. Match the following Column I to Column II

	Column I		Column II
(A)	${}^{n+4}C_{n+1} - {}^{n+3}C_n = 15(n+2)$, then n equals	(p)	19
(B)	$11 \cdot {}^{n}P_4 = 20 \cdot {}^{n-2}P_4$, then n equals	(q)	27
(C)	${}^{2n}C_3 = 11 \cdot {}^{n}C_3$, then n equals	(r)	16
(D)	${}^{n+2}C_8 : {}^{n-2}P_4 = 57 : 16$, then n equals	(s)	6

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2. Match the following Column A to Column B

	Column I		Column II
(A)	Number of straight lines joining any two of 10 points of which four point are collinear is	(p)	30
(B)	Maximum number of points of intersection of 10 straight lines in the plane is	(q)	60
(C)	Maximum number of points of intersection of 6 circles in the plane is	(r)	40
(D)	Maximum number of points of intersection of 6 parabolas is	(s)	45

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Permutations And Combinations Exercise 5 Matching Type Questions

	Column I		Column II
(A)	balls are identical but boxes are different	(p)	2
(B)	balls are different but boxes are identical	(q)	25
(C)	balls as well as boxes are identical	(r)	50
(D)	balls as well as boxes are identical but boxes kept in a row	(s)	6

1.

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Exercise Statement I And Ii Type Questions

1. Statement-1: The smallest positive integer n such that n! can be expressed as a product of n-3 consecutive integers, is 6.

Statement-2: Product of three consecutive integers is divisible by 6.

A. Statement-1 is true, statement-2 is true, statement-2 is a correct explanation for statement-1

B. Statement-1 is true, statement-2 is true, statement-2 is not a correct explanation for statement-1

C. Statement-1 is true, statement-2 is false

D. Statement-1 is false, statement-2 is true

Answer: B

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2. Statement-1: A number of four different digits is formed with the help of the digits 1,2,3,4,5,6,7 in all possible ways. The number of ways which are exactly divisible by is 200.

Statement-2: A number divisible by 4, if units place digit is also divisible by 4.

A. Statement-1 is true, statement-2 is true, statement-2 is a correct explanation for statement-1

B. Statement-1 is true, statement-2 is true, statement-2 is not a correct explanation for statement-1

C. Statement-1 is true, statement-2 is false

D. Statement-1 is false, statement-2 is true

Answer: C

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3. Statement-1: The number of divisors of 10! Is 280.

Statement-2: 10!=$2^p \cdot 3^q \cdot 5^r \cdot 7^s$, where p,q,r,s $\in$ N.

A. Statement-1 is true, statement-2 is true, statement-2 is a correct explanation for statement-1

B. Statement-1 is true, statement-2 is true, statement-2 is not a correct explanation for statement-1

C. Statement-1 is true, statement-2 is false

D. Statement-1 is false, statement-2 is true

Answer: D

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4. Statement-1: Number of permutations of 'n' dissimilar things taken 'n' at a time is n!.

Statement-2: If n(A)=n(B)=n, then the total number of functions from A to B are n!.

A. Statement-1 is true, statement-2 is true, statement-2 is a correct explanation for statement-1

B. Statement-1 is true, statement-2 is true, statement-2 is not a correct explanation for statement-1

C. Statement-1 is true, statement-2 is false

D. Statement-1 is false, statement-2 is true

Answer: C

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5. Statement-1: If N the number of positive integral solutions of $x_1x_2x_3x_4 = 770$, then N is divisible by 4 distinct prime numbers.

Statement-2: Prime numbers are 2,3,5,7,11,13, . .

A. Statement-1 is true, statement-2 is true, statement-2 is a correct explanation for statement-1

B. Statement-1 is true, statement-2 is true, statement-2 is not a correct explanation for statement-1

C. Statement-1 is true, statement-2 is false

D. Statement-1 is false, statement-2 is true

Answer: D

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6. Statement-1: The total number of ways in which three distinct numbers in AP, can be selected from the set {1,2,3, . .,21}, is equal to 100.

Statement-2: If a,b,c are inn AP, then a+c=2b.

A. Statement-1 is true, statement-2 is true, statement-2 is a correct explanation for statement-1

B. Statement-1 is true, statement-2 is true, statement-2 is not a correct explanation for statement-1

C. Statement-1 is true, statement-2 is false

D. Statement-1 is false, statement-2 is true

Answer: A

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7. Statement-1: the number of even divisors of the number N=12600 is 54.

Statement-2: 0,2,4,6,8, . . . Are even integers.

A. Statement-1 is true, statement-2 is true, statement-2 is a correct explanation for statement-1

B. Statement-1 is true, statement-2 is true, statement-2 is not a correct explanation for statement-1

C. Statement-1 is true, statement-2 is false

D. Statement-1 is false, statement-2 is true

Answer: B

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8. Statement-1: A 5-digit number divisible by 3 is to be formed using the digits 0,1,2,3,4,5 without repetition, then the total number of ways this can be done is 216. Statement-2: A number is divisible by 3, if sum of its digits is divisible by 3.

A. Statement-1 is true, statement-2 is true, statement-2 is a correct explanation for statement-1

B. Statement-1 is true, statement-2 is true, statement-2 is not a correct explanation for statement-1

C. Statement-1 is true, statement-2 is false

D. Statement-1 is false, statement-2 is true

Answer: A

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9. Statement-1: the sum of the diigits in the ten's place of all numbers formed with the help of 3,4,5,6 taken all at a time is 108.

Statement-2: The sum of the digits in the ten's place= The sum of the digits is the units's place.

A. Statement-1 is true, statement-2 is true, statement-2 is a correct explanation for statement-1

B. Statement-1 is true, statement-2 is true, statement-2 is not a correct explanation for statement-1

C. Statement-1 is true, statement-2 is false

D. Statement-1 is false, statement-2 is true

Answer: A

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10. Statement-1: There are $p \geq 8$ points in space no four of which are in the same with exception of $q \geq 3$ points which are in the same plane, then the number of planes each containing three points is $.^p C_3 - .^q C_3$.

Statement-2: 3 non-collinear points alwasy determine unique plane.

A. Statement-1 is true, statement-2 is true, statement-2 is a correct explanation for statement-1

B. Statement-1 is true, statement-2 is true, statement-2 is not a correct explanation for statement-1

C. Statement-1 is true, statement-2 is false

D. Statement-1 is false, statement-2 is true

Answer: D

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11. Statement-1: the highest power of 3 in $.^{50}C_{10}$ is 4.

Statement-2: If p is any prime number, then power of p in n! is equal to $\left[\frac{n}{p}\right]+\left[\frac{n}{p^2}\right]+\left[\frac{n}{p^3}\right]+\ldots$, where $[\cdot]$ denotes the greatest integer function.

A. Statement-1 is true, statement-2 is true, statement-2 is a correct explanation for statement-1

B. Statement-1 is true, statement-2 is true, statement-2 is not a correct explanation for statement-1

C. Statement-1 is true, statement-2 is false

D. Statement-1 is false, statement-2 is true

Answer: D

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12. Statement-1: A convex quindecagon has 90 diagonals.

Statement-2: Number of diagonals in a polygon is $.^{n}C_2 - n.$

A. Statement-1 is true, statement-2 is true, statement-2 is a correct explanation for statement-1

B. Statement-1 is true, statement-2 is true, statement-2 is not a correct explanation for statement-1

C. Statement-1 is true, statement-2 is false

D. Statement-1 is false, statement-2 is true

Answer: A

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Exercise Subjective Type Questions

1. $^{n}C_{n-r}+3.\,^{n}C_{n-r+1}+3.\,^{n}C_{n-r+2}+\,^{n}C_{n-r+3}=\,^{x}C_{r}$

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2. Solve the equation $3^{x+1}C_2+P_2x=4^{x}A_2,\ x\in N.$

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3. Number of positive terms in the sequence $x_n=\frac{195}{4P_n}-\frac{n+3p_3}{P_{n+1}},\ n\in N$ (here $p_n=\ |\angle n$)

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4. Prove that $.^{n-1}C_3 + .^{n-1}C_4 > .^nC_3$ if $n > 7$.

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5. In how many ways can a mixed doubles game in tennis be arranged from 5 married couples, if no husband and wife play in the same game?

A. 120

B. 61

C. 30

D. 60

Answer: D

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6. In how many ways, we can choose two teams of mixed double for a tennis tournament from four couples such that if any couple participates, then it is in the same team?

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7. A family consists of a grandfather, 5 sons and daughters and 8 grand child. They are to be seated in a row for dinner. The grand children wish to occupy the 4 seats at each end and the grandfather refuses to have a grandchild on either side of him. In how many ways can the family be made to sit?

A. 2880

B. 17280

C. 5760

D. 11520

Answer: D

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8. A tea party is arranged for 16 persons along two sides of a long table with 8 chairs on each side. Four persons wish to sit on one particular and two on the other side. In how many ways can they be seated?

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9. Every man who has lived on earth has made a certain number of handshakes. Prove that the number of men who have made an odd number of handshakes is even.

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10. A train is going from cambridge to london stops at nine intermediate stations. Six persons enter the train during the journey with six different tickets. How many different sets of tickets they have had?

A. $.^{46}C_5$

B. $.^{46}C_6$.

C. $.^{45}C_5$

D. $.^{45}C_6$`.

Answer: D

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11. n different things are arrnaged around a circle. In how many ways can 3 objects be selected when no two of the selected objects are consecutive?

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12. A boat is to be manned by eight men, of whom 2 can only row on bow side and 1 can only row on stroke side; in how many ways can the crew be arranged?

A. 3456

B. 1728

C. 576

D. 864

Answer: B

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13. In how any different ways can a set A of $3n$ elements be partitioned into 3 subsets of equal number of elements? The subsets P, Q, R form a partition if $P \cup Q \cup R = A, P \cap R = \varphi, Q \cap R = \varphi, R \cap P = \varphi.$

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14. A square of n units is divided into n^2 squares each of area 1 sq unit. Find the number of ways in which 4 points (out of $(n+1)^2$ vertices of the squares) can be chosen so that they form the vertices of a square.

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15. How many sets of 2 and 3 (different) numbers can be formed by using numbers betweeen 0 and 180 (both including) so that 60 is their average?

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16. There are n straight lines in a plane in which no two are parallel and no three pass through the same point. Their points of intersection are joined. Show that the number of fresh lines thus introduced is $\frac{1}{8}n(n-1)(n-2)(n-3)$

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17. 6 balls marked as 1,2,3,4,5 and 6 are kept in a box. Two players A and B start to take out 1 ball at a time from the box one after another without replacing the ball till the game is over. The number marked on the ball is added each time to the previous sum to get the sum of numbers marked on the balls taken out. If this sum is even, then 1 point is given to the players. the first player to get 2 points is declared winner. at the start of the game, the sum is 0. if A starts to take out the ball, find the number of ways in which the game can be won.

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Exercise Questions Asked In Previous 13 Years Exam

1. There is a rectangular sheet of dimension $(2m-1)\times(2n-1)$, (where $m>0, n>0$) It has been divided into square of unit area by drawing line perpendicular to the sides. Find the number of rectangles having sides of odd unit length.

A. $(m+n+1)^2$

B. $mn(m+1)(n+1)$

C. m^{m+n-2}

D. m^2n^2

Answer: D

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2. If the letters of the word SACHIN are arranged in all possible ways and these words are written out as in dictionary, then the word SACHIN appears at serial number

A. 603

B. 602

C. 601

D. 600

Answer: C

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3. If r, s, t are prime numbers and p, q are the positive integers such that their LCM of p, q is $r^2 t^4 s^2$, then the numbers of ordered pair of (p, q) is

A. 252

B. 254

C. 225

D. 224

Answer: C

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4. At an election a voter may vote for nany number of candidates , not greater than the number t be eected. There are 10 candidates and 4 are to be elected. If a voter for at lest one candidates, thene the number of ways in which he can vote is

A. 5040

B. 6210

C. 385

D. 1110

Answer: C

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5. The letters of the word COCHIN are permuted and all the permutations are arranged in an alphabetical order s in an English dictionary. The number of words that appear before the word COCHIN is a.360 b. 192 c. 96 d. 48

A. 360

B. 192

C. 96

D. 48

Answer: C

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6. The set $S = \{1, 2, 3, , 12)$ is to be partitioned into three sets A, B, C of equal size. Thus, $A \cup B \cup C = S, A \cap B = B \cap C = A \cap C = \varphi$. The number of ways to partition S is

A. $\frac{12!}{3!(4!)^3}$

B. $\frac{12!}{3!(3!)^4}$

C. $\frac{12!}{(4!)^3}$

D. $\frac{12!}{(4!)^4}$

Answer: C

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7. Consider all possible permutations of the letters of the word ENDEANOEL. Match the statements/ expressions in column I with the statement/expressions in

	Column I		Column II
(A)	The number of permutations containing the word ENDEA is	(p)	$5!$
(B)	The number of permutations in which the letters E occurs in the first and the last positions, is	(q)	$2 \times 5!$
(C)	The number of permutations in which none of the letters D, L, N occurs in the last five positions, is	(r)	$7 \times 5!$
(D)	The number of permutations in which the letters A, E, O occur only in odd positions, is	(s)	$21 \times 5!$

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8. How many different words can be formed by jumbling the letters in the word MISSISSIPPI in which no two S are adjacent?

A. $6 \cdot 7 \cdot .^{8} C_4$

B. $6 \cdot 8 \cdot .^{7} C_4$

C. $7 \cdot .^{6} C_4 \cdot .^{8} C_4$

D. $8 \cdot .^{6} C_4 \cdot .^{7} C_4$

Answer: C

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9. In a shop, there are five types of ice-creams available. A child buys six ice-creams.

Statement-1: The number of different ways the child can buy the six ice-creams is $.^{10} C_4$.

Statement-2: The number of different ways the child can buy six ice-creams is equal to the number of different ways to arranging 6A's and 4B's in a row.

A. Statement-1 is true, statement-2 is true, statement-2 is a correct explanation for statement-1

B. Statement-1 is true, statement-2 is true, statement-2 is not a correct explanation for statement-1

C. Statement-1 is true, statement-2 is false

D. Statement-1 is false, statement-2 is true

Answer: A

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10. The number of seven digit integers, with sum of the digits equal to 10 and formed by using the digits 1, 2 and 3 only, is

A. 55

B. 66

C. 77

D. 88

Answer: C

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11. From 6 different novels and 3 different dictionaries, 4 novels and 1 dictionary are to be selected and arranged in a row on a shelf so that the dictionary is always in the middle. Then the number of such arrangements is (1) less than 500 (2) at least 500 but less than 750 (3) at least 750 but less than 1000 (4) at least 1000

A. atleast 1000

B. less than 500

C. atleast 500 but less than 750

D. atleast 750 but less than 1000

Answer: A

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12. There are two urns. Urn A has 3 distinct red balls and urn B has 9 distinct blue balls. From each urn two balls are taken out at random and then transferred to the other. The number of ways in which this can be done is

A. 36

B. 66

C. 108

D. 109

Answer: C

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13. Statement-1: The number of ways of distributing 10 identical balls in 4 distinct boxes such that no box is empty is ${}^{9}C_{3}$.

Statement-2: The number of ways of choosing any 3 places from 9 different places is ${}^{9}C_{3}$.

A. Statement-1 is true, statement-2 is true, statement-2 is a correct explanation for statement-1

B. Statement-1 is true, statement-2 is true, statement-2 is not a correct explanation for statement-1

C. Statement-1 is true, statement-2 is false

D. Statement-1 is false, statement-2 is true

Answer: A

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14. There are 10 points in a plane, out of these 6 are collinear. The number of triangles formed by joining these points, is

A. $N > 190$

B. $N \leq 100$

C. $100 < N \leq 140$

D. $140 < N \leq 190$

Answer: B

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15. The total number of ways in which 5 balls of differert colours can be distributed among 3 persons so thai each person gets at least one ball is

A. 75

B. 150

C. 210

D. 243

Answer: B

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16. Let n denote the number of all n-digit positive integers formed by the digits $0, 1$ or both such that no consecutive digits in them are 0. Let b_n = the number of such n-digit integers ending with digit 1 and c_n= the number of such n-digit integers ending with digit 0. The value of b_6, is

A. 7

B. 8

C. 9

D. 11

Answer: B

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17. Let a_n denote the number of all n-digit numbers formed by the digits 0,1 or both such that no consecutive digits in them are 0. Let b_n be the number of such n-digit integers ending with digit 1 and let c_n be the number of such n-digit integers ending with digit 0. Which of the following is correct ?

A. $a_{17} = a_{16} + a_{15}$

B. $c_{17} \neq c_{16} + c_{15}$

C. $b_{17} \neq b_{16} + c_{16}$

D. $a_{17} = c_{17} + b_{16}$

Answer: A

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18. Assuming the balls to be identical except for difference in colours, the number of ways in which one or more balls can be selected from 10 white, 9 green and 7 black balls is

(1) 880 (2) 629 (3) 630 (4) 879

A. 630

B. 879

C. 880

D. 629

Answer: B

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19. Let T_n be the number of all possible triangles formed by joining vertices of an n-sided regular polygon. If $T_{n+1} - T_n = 10$, then the value of n is (1) 5 (2) 10 (3) 8 (4) 7

A. 5

B. 10

C. 8

D. 7

Answer: A

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20. Consider the set of eight vector $V = \left\{a\hat{i} + b\hat{j} + c\hat{k}; a, bc \in \{-1, 1\}\right\}$. Three non-coplanar vectors can be chosen from V is 2^p ways. Then p is______.

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21. Let `n_1

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22. Let $n \geq 2$ be integer. Take n distinct points on a circle and join each pair of points by a line segment. Color the line segment joining every pair of adjacent points by blue

and the rest by red. If the number of red and blue line segments are equal, then the value of n is

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23. Six cards and six envelopes are numbered 1, 2, 3, 4, 5, 6 and cards are to be placed in envelopes so that each envelope contains exactly one card and no card is placed in the envelope bearing the same number and moreover cards numbered 1 is always placed in envelope numbered 2. Then the number of ways it can be done is

A. 264

B. 265

C. 53

D. 67

Answer: C

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24. The number of integers greater than 6,000 that can be formed, using the digits 3, 5, 6, 7 and 8, without repetition, is :

A. 120

B. 72

C. 216

D. 192

Answer: D

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25. Let n be the number of ways in which 5 boys and 5 girls can stand in a queue in such a way that all the girls stand consecutively in the queue. Let m be the number in which 5 boys and 5 girls stand in such a way that exactly four girls stand consecutively in the queue. Then the value of $\frac{m}{n}$ is ____

A. 1

B. 5

C. 6

D. 4

Answer: B

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26. If all the words (with or without meaning) having five letters, formed using the letters of the word SMALL and arranged as in a dictionary; then the position of the word SMALL is :

A. 59th

B. 52nd

C. 58th

D. 64th

Answer: C

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27. A debate club consists of 6 girls and 4 boys. A team of 4 members is to be selected from this club including the selection of a captain (from among these 4 members) for the team. If the team has to include at most one boy, then the number of ways of selecting the team is

A. 380

B. 320

C. 260

D. 95

Answer: A

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28. A man X has 7 friends, 4 of them are ladies and 3 are men. His wife Y also has 7 friends, 3 of them are ladies and 4 are men. Assume X and Y have no common friends. Then the total number of ways in which X and Y together can throw a party inviting 3 ladies and 3 men, so that 3 friends of each of X and Y are in the party, is : 469 (2) 484 (3) 485 (4) 468

A. 484

B. 485

C. 468

D. 469

Answer: B

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