MATHS

BOOKS - CENGAGE MATHS (ENGLISH)

PERMUTATIONS AND COMBINATIONS

Others

1. The number of triangles that can be formed with 10 points as vertices n of them being collinear, is 110. Then n is a. 3 b. 4 c. 5 d. 6

A. 3

B. 4

C. null

D. null

Answer: null

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2. n lines are drawn in a plane such that no two of them are parallel and no three of them are concurrent. The number of different points at which these lines will cut is a. $\sum_{k=1}^{n-1} k$ b. $n(n-1)$ c. n^2 d. none of these

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3. The last digit of $(1! + 2! + \quad + 2005!)^{500}$ is (A) 9 (B) 2 (C) 7 (D) 1

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4. The number of ways of choosing a committee of two women and three men from five women and six men, if Mr. A refuses to serve on the committee if Mr. B is a member and Mr. B can only serve if Miss C is the member of the committee is a. 60 b. 84 c. 124 d. none of these

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5. 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

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6. 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

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7. A person predicts the outcome of 20 cricket matches of his home team. Each match can result in either a win, loss, or tie for the home team. Total number of ways in which he can make the predictions so that exactly 10 predictions are correct is equal to a. $\hat{\ } 20C_{10} \times 2^{10}$ b. $\hat{\ } 20C_{10} \times 3^{20}$ c. $\hat{\ } 20C_{10} \times 3^{10}$ d. $\hat{\ } 20C_{10} \times 2^{20}$

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8. In a group of 13 cricket players, 4 are bowlers. Find out in how many ways can they form a cricket team of 11 players in which at least 2 bowlers re included. a. 55 b. 72 c. 78 d. none of these

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9. Let there be $n \geq 3$ circles in a plane. The value of n for which the number of radical centers is equal to the number of radical axes is (assume that all radical axes and radical centers exist and are different). a. 7 b. 6 c. 5 d. none of these

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10. The number of different ways in which five "alike dashes" and "eight alike" dots can be arranged using only seven of these "dashes" and "dots" is a. 350 b. 120 c. 1287 d. none of these

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11. Statement 1: the number of ways of writing 1400 as a product of two positive integers is 12. Statement 2: 1400 is divisible by exactly three prime factors.

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12. Rajdhani Express going from Bombay to Delhi stops at five intermediate stations, 10 passengers enter the train during the journey with 10 different ticket of two class. The number of different sets of tickets they may have is a. $\hat{} 15C_{10}$ b. $\hat{} 20C_{10}$ c. $\hat{} 30C_{10}$ d. none of these

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13. In a certain test, there are n question. In the test, 2^{n-i} students gave wrong answers to at least i questions, where $i = 1, 2, \ldots\ldots\ldots\ldots, n$ if the total number of wrong answers given is 2047, then n is equal to a. 10 b. 11 c. 12 d. 13

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14. 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 object included at least once in selection, then N is equal is a. $.^{r-1}C_{r-n}$ b. $.^{r-1}C_{n}$ c. $.^{r-1}C_{n-1}$ d. none of these

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15. Number of ways in which 30 identical things are distributed among six persons is a.$^{17}C_5$ if each gets odd number of things b.$^{16}C_{11}$ if each gets odd number of things c.$^{14}C_5$ if each gets even number of things (excluding 0) d.$^{15}C_{10}$ if each gets even number of things (excluding 0)

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16. If $10! = 2^p.3^q.5^r.7^s$, then $(A)\ 2q = p\ (B)\ pqrs = 64\ (C)$ number of divisors of $10!$ is $280\ (D)$ number of ways of putting $10!$ as a product of two natural numbers is 135

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17. A is a set containing n elements. A subset P_1 is chosen and A is reconstructed by replacing the elements of P_1. The same process is repeated for subsets $P_1, P_2, \ldots, P_m$ with $m > 1$. The number of ways of choosing $P_1, P_2, \ldots, P_m$ so that $P_1 \cup P_2 \cup \ldots \cup P_m = A$ is (a) $(2^m - 1)^{mn}$ (b)$(2^n - 1)^m$ (c)$(m+n)C_m$ (d) none of these

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18. Let n be a four-digit integer in which all the digits are different. If x is number of odd integers and y is number of even integers, then a. x less than y b. x greater than y c. $x+y=4500$ d. $|x-y|=54$

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19. If $P=21(21^2-1^2)(21^2-2^2)(21^2-3^2)..............(21^2-10^2), thenP$ is divisible by a. $22!$ b. $21!$ c. $19!$ d. $20!$

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20. Statement 1: number of ways in which 10 identical toys can be distributed among three students if each receives at least two toys is $.^6C_2$. Statement 2: Number of positive integral solutions of $x+y+z+w=7is^6C_3$.

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21. Statement 1: The number of positive integral solutions of $abc = 30$ is 27. Statement 2: Number of ways in which three prizes can be distributed among three persons is 3^3

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22. Prove by combinatorial argument that $.^{n+1}C_r = ^nC_r + ^nC_{r-1}.$

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

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24. Column I, Column II Number of straight lines joining any two of 10 points of which four points are collinear, p. 30 Maximum number of points of intersection of 10 straight lines in the plane, q. 60 Maximum number of points of intersection of six circles in the plane, r. 40 Maximum number of points of intersection of six parabolas, s. 45

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25. If the number of selections of 6 different letters that can be made from the words SUMAN and DIVYA so that each selection contains 3 letters from each word is N^2, then the value of N is______.

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26. If n_1 and n_2 are five-digit numbers, find the total number of ways of forming n_1 and n_2 so that these numbers can be added without carrying at any stage.

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27. If $n_1 and n_2$ are five-digit numbers, find the total number of ways of forming $n_1 and n_2$ so that these numbers can be added without carrying at any stage.

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28. 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 $x\cdot$

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29. If $nP_r =^n P_{r+1}$ and $nC_r =^n C_{r-1},$ then the value of $(n+r)$ is.

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30. 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 ____

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31. (i) In how many ways can a pack of 52 cards be divided equally among four players? (ii) In how many ways can you divide these cards in four sets, three of them having 17 cards each and the fourth one just one card?

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32. Let $f(n) = \sum_{r=0}^{n} \sum_{k=r}^{n} (kr)$. Find the total number of divisors of $f(9)$.

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33. True or false: The product of any r consecutive natural numbers is always divisible by $r!$

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34. Statement 1: Number of zeros at the end of 50! is equal to 12. Statement 2: Exponent of 2 in 50! is 47.

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35. Using permutation or otherwise, prove that `(n^2)!/(n!)^n is an integer, where n is a positive integer. (JEE-2004]

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36. A number of 18 guests have to be seated, half on each side of a long table. Four particular guests desire to sit on one particular side and three others on the other side. Determine the number of ways in which the sitting arrangements can be made.

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37. Ten persons numbered $1, 2, \ldots., 10$ play a chess tournament, each player against every other player exactly one game. It is known that no game ends in a draw. If $w_1, w_2, \ldots., w_{10}$ are the number of games won by players $1, 2, \ldots., 10$ respectively, and $l_1, l_2, \ldots\ldots\ldots, l_{10}$ are the number of games lost by the players $1, 2, \ldots., 10$ respectively, then a. $\sum w_i = \sum l_i = 45$ b. $w_i + 1_i = 9$ c. $\sum wl_1^2 = 81 + \sum l_1^2$ d. $\sum w_i^2 = \sum l_i^2$

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38. A box contains 2 white balls, 3 black balls & 4 red balls. In how many ways can three balls be drawn from the box if atleast one black ball is to be included in draw (the balls of the same colour are different).

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39. 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

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40. A forecast is to be made of the results of five cricket matches, each of which can be a win or a draw or a loss for Indian team. Let $p =$ number of forecasts with exactly 1 error $q =$ number of forecasts with exactly 3 error $r =$ number of forecasts with all five error Then the correct statement(s) is/are a. $2q = 5r$ b. $8p = q$ c. $8p = r$ d. $2(p + r) > q$

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41. Number of points of intersection of n straight lines if n satisfies $n + 5P_{n+1} = \frac{11(n-1)}{2} \times^{n+3} P_n$ is a. 15 b. 28 c. 21 d. 10

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42. Number of shortest ways in which we can reach from the point (0, 0, 0) to point (3.7, 11) in space where the movement is possible only along the x-axis, y axis and z-axis or parallel to them and change of axes is permitted only at integral points (an integral point is one which has its coordinate as integer) is

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43. Let $f(n)$ be the number of regions in which n coplanar circles can divide the plane. If it is known that each pair of circles intersect in two different points and no three of them have common points of intersection, then (i) $f(20) = 382$ (ii) $f(n)$ is always an even number (iii) $f^{-1}(92) = 10$ (iv) $f(n)$ can be odd

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44. If p, q, r are any real numbers, then (A) $\max(p, q) < \max(p, q, r)$ (B) $\min(p, q) = \frac{1}{2}(p + q - |p - q|)$(C) $\max(p, q) < \min(p, q, r)$ (D) None of these

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45. Number of ways of selecting three integers from $\{1, 2, 3, , n\}$ if their sum is divisible by 3 is a.

$b. c.3d. \left(\hat{} (e. f. n/3g.)h. i. C_j.3k. l. \right) + m. n. (n/3)^{\odot 3p.} q. r.$ s. if

$t. u. n = 3k, k \in Nv.$ w. x.

$y. z.2aa. \left(\hat{} (bb. . n - 1/3dd.)ee. ff. C_g g.3hh. ii. \right) + jj. \left(\hat{} (kk. ll. (mm$

$. (ddd. eee. n + 2fff.), ggg.$

hhh. if $iii. jjj. n = 3k + 1, k \in Nkkk.$ lll. mmm.

$nnn. \infty \odot 2ppp. \left(\hat{} (qqq. rrr. n - 1/3sss.)ttt. \bigcup . C_v vv.3www. \times x. \right) +$

$. \left(\left(mmmm. \bigcap n. n - 1oooo. \right)/3\right)^{pppp.2qqqq.} rrrr. (ssss. . n + 2uuuu.), u$

wwww. if $xxxx. yyyy. n = 3k + 2, k \in Nzzzz.$ aaaaa. bbbbb.

Independent of $ccccc. nddddd.$ eeeee.

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46. The number of ways of choosing triplet (x, y, z) such that $z > \max\{x, y\}$ and $x, y, z \in \{1, 2, \ldots\ldots\ldots n, n+1\}$ is (A) $.^n + 1C_3 +^{n+2} C_3$ $(B) n(n+1)(2n+1)/6$ (C) $1^2 + 2^2 + \ldots\ldots\ldots\ldots. + n^2$ (D) $2(.^{n+2} C_3) - (.^{n+1} C_2)$

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47. Find the value of $4C_1 - 2C_2$

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48. If a seven-digit number made up of all distinct digits 8, 7, 6, 4, 2, x and y divisible by 3, then (A) Maximum value of $x - y$ is 9 (B) Maximum value of $x + y$ is 12 (C) Minimum value of xy is 0 (D) Minimum value of $x + y$ is 3

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49. If n is number of necklaces which can be formed using 17 identical pearls and two identical diamonds and similarly m is number of necklaces which can be formed using 17 identical pearls and 2 different diamonds, then a) n=9 b) m = 18 c) n = 18 d) m = 9

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50. In how many ways can two distinct subsets of the set A of $k(k \geq 2)$ elements be selected so that they haves exactly two common elements?

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51. 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 $(2n-2)! \times (4n^2 - 6n + 4)$.

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52. 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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53. Prove that the number of ways to select n objects from $3n$ objects of whilch n are identical and the rest are different is $2^{2n-1}+\frac{(2n)!}{2(n!)^2}$

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54. An ordinary cubical dice having six faces marked with alphabets A, B, C, D, E, and F is thrown n times and the list of n alphabets showing up are noted. Find the total number of ways in which among the alphabets A, B, C D, E and F only three of them appear in the list.

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55. How many five-digit numbers can be made having exactly two identical digits?

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56. The members of a chess club took part in a round robin competition in which each player plays with other once. All members scored the same number of points, except four juniors whose total score ere 17.5. How many members were there in the club? Assume that for each win a player scores 1 point, 1/2 for a draw, and zero for losing.

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57. Find the number of three-digit numbers from 100 to 999 including all numbers which have any one digit that is the average of the other two.

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58. Find the number of ways of disturbing n identicalobjects among n persons if at least $n-3$ persons get none of these objects.

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59. There are n points in a plane in which no three are in a straight line except m which are all in a straight line. Find the number of (i) different straight lines, (ii) different triangles, (iii) different quadrilaterals that can be formed with the given points as vertices.

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60. The number of arrangements of the letters of the word BANANA in which the two N's do not appear adjacently is a. 40 b. 60 c. 80 d. 100

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61. 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 man's relatives and three wife's relatives?

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62. A three-digit number is to be formed using the digits $0, 1, 2, 3, 4, \text{ and } 5,$ without repetition.

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63. If N is the number of ways in which 3 distinct numbers canbe selected from the set $\{3^1, 3^2, 3^3, , 3^{10}\}$ so that they form a G.P. then the value of $N/5$ is _____.

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64. Find the total number of nine-digit numbers that can be formed using the digits 2, 2, 3, 3, 5, 5, 8, 8, 8 so that the odd digit occupy the even places.

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65. m men and n women are to be seated in a row so that no two women sit together. If $(m > n)$ then show that the number of ways in which they can be seated as $\frac{m!(m+1)!}{(m-n+1)!}$.

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66. 10 different letters of an alphabet are given. Words with 5 letters are formed from these given letters then the numbers of words which have atleast one letter represent is:

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67. $If^{n}C_{r} = 84$, $\text{ and } {}^{n}C_{r-1} = 36$, and r = 1, then find the value of n.

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68. Eight chairs are numbered 1 to 8. Two women and three men wish to occupy one chair each. First, the women choose the chairs from amongst the chairs marked 1 to 4, and then the men select th chairs from amongst the remaining. The number of possible arrangements is a. $\hat{}\ 6C_3 \times^4 C_2$ b. $\hat{}\ 4P_2 \times^4 P_3$ c. $\hat{}\ 4C_2 \times^4 P_3$ d. none of these

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69. The value of expression $.^{47}C_4 + \sum_{j=1}^{5} .^{52-j}C_3$ is equal to a.$.^{47}C_5$ b. $.^{52}C_5$ c. $.^{52}C_4$ d. none of these

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70. The number of n digit numbers which consists of the digit 1 and 2 only if each digit is to be used atleast once is equal to 510, then n is equal to _______.

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71. If $\hat{}\ nC_3 +^n C_4 >^{n+1} C_3$, then a. $n > 6$ b. $n > 7$ c. $n < 6$ d. none of these

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72. The value of $\sum_{r=0}^{n-1} \hat{}\ nC_r / (\hat{}\ nC_r +^n C_{r+1})$ equals a. $n+1$ b. $n/2$ c. $n+2$ d. none of these

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73. A bag contains four one-rupee coins, two twenty-five paisa coins, and five ten-paisa coins. In how many ways can an amount, not less than Rs. 1 be taken out from the bag? (Consider coins of the same denominations to be identical.) a. 71 b. 72 c. 73 d. 80

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74. There are four letters and four directed envelopes. The number of ways in which all the letters can be put in the wrong envelope is a. 8 b. 9 c. 16 d. none of these

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75. Kanchan has 10 friends among whom two are married to each other. She wishes to invite five of them for a party. If the married couples refuse to attend separately, then the number of different ways in she can invite five friends is a. $\hat{} \ 8C_5$ b. $2 \times^8 C_3$ c. $\hat{} \ 10C_5 - 2 \times^8 C_4$ d. none of these

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76. Number of ways in which three numbers in A.P. can be selected from $1, 2, 3, \ldots, n$ is a. $\left(\frac{n-1}{2}\right)^2$ if n is even b. $n\frac{n-2}{4}$ if n is even c. $\frac{(n-1)^2}{4}$ if n is odd d. none of these

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77. The total number of positive integral solution of $15 < x_1 + x_2 + x_3 \leq 20$ is equal to a. 685 b. 785 c. 1125 d. none of these

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78. 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?

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79. The streets of a city are arranged like the like the lines of a chess board. There are m streets running from north to south and n streets from east to west. Find the number of ways in which a man can travel from north-west to south-east corner, covering shortest possible distance.

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80. A batsman scores exactly a century by hitting fours and sixes in 20 consecutive balls. In how many different ways can he do it if some balls may not yield runs and the order of boundaries and over boundaries are taken into account?

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81. In how many ways can $2t+1$ identical balls be placed in three distinct boxes so that any two boxes together will contain more balls than the third?

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82. Sohan has x children by his first wife. Geeta has $(x+1)$ children by her first husband. The marry and have children of their own. The whole family has 24 children. Assuming that two children of the same parents do not fight, prove that the maximum possible number of fights that can take place is 191.

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83. let $a_1, a_2, \ldots a_n$ be in A.P. wth common difference $\frac{\pi}{6}$. if $\sec a_1 \sec a_2 + \sec a_2 \sec a_3 + \ldots . \sec a_{n-1} \sec a_n$=$k(\tan a_n - \tan a_1)$Find the value of k

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84. Six apples and six mangoes are to be distributed among ten boys so that each boy receives at least one fruit. Find the number ways in which the fruits can be distributed.

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85. Find the number of ways in which we can choose 3 squares on a chess board such that one of the squares has its two sides common to other two squares.

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86. If $\alpha =^m C_2, then^\alpha C_2$ is equal to a. $\hat{} m+1C_4$ b. $\hat{} m-1C_4$ c. $3^{m+2}C_4$ d. $3^{m+1}C_4$

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87. Statement 1: $\frac{(n^2)!}{(n!)^n}$ is natural number of for all $n \in N$ Statement 2: Number of ways in which n^2 objects can be distributed among n persons equally is $(n^2)!/(n!)^n$.

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88. Number of ways in which 7 people can occupy 6 seats, 3 seats on each side in a first class railway compartment if two specified persons are to be always included and occupy adjacent seats on the same side is $(5!)\dot{k}, thenk$ has the value equal to ________.

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89. There are 20 books on Algebra and Calculus in one library. For the greatest number of selections each of which consists of 5 books on each topic. If the possible number of Algebra books are N, then the value N/2 is ________.

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90. 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____.

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

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92. There are 2 women participating in a chess tournament. Every participant played 2 games with the other participants. The number of games that the men played between themselves exceeded by 66 as compared to the number of games that the men played with women. If the number of participants is n , then the value of $n-6$ is _____.

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93. Five balls of different color are to be placed in three boxes of different size. Each box can hold all five. In how many different ways can we place the balls so that no box remains empty?

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94. A seven-digit number without repetition and divisible by 9 is to be formed by using seven digits out of $1, 2, 3, 4, 5, 6, 7, 8, 9.$ The number of ways in which this can be done is (a) $9!$ (b) $2(7!)$ (c) $4(7!)$ (d) non of these

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95. n is selected from the set $\{1, 2, 3, \ldots\ldots\ldots\ldots, 100\}$ and the number $2^n + 3^n + 5^n$ is formed. Total number of ways of selecting n so that the formed number is divisible by 4 is equal to (A) 50 (B) 49 (C) 48 (D) None of these.

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96. Messages are conveyed by arranging four white, one blue, and three red flags on a pole. Flags of the same color are alike. If a message is transmitted by the order in which the colors are arranged, the total number of messages that can be transmitted if exactly six flags are used is a. 45 b. 65 c. 125 d. 185

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97. 20 persons are sitting in a particular arrangement around a circular table. Three persons are to be selected for leaders. The number of ways of selection of three persons such that no two were sitting adjacent to each other is a. 600 b. 900 c. 800 d. none of these

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

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99. A is a set containing n different 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 P and Q so that $P \cap Q$ contains exactly two elements is a. $.^n C_3 \times 2^n$ b. $.^n C_2 \times 3^{n-2}$ c. 3^{n-1} d. none of these

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100. Numbers greater than 1000 but not greater than 4000 which can be formed with the digits 0, 1, 2, 3, 4 (repetition of digits is allowed) are a. 350 b. 375 c. 450 d. 576

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101. Find $5C_2$

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102. The number less than 1000 that can be formed using the digits 0, 1, 2, 3, 4, 5 when repetition is not allowed is equal to a. 130 b. 131 c. 156 d. 155

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103. A variable name in certain computer language must be either an alphabet or an alphabet followed by a decimal digit. The total number of different variable names that can exist in that language is equal to a. 280 b. 390 c. 286 d. 296

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104. The number of five-digit numbers that contain 7 exactly once is a. $(41)(9^3)$ b. $(37)(9^3)$ c. $(7)(9^4)$ d. $(41)(9^4)$

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105. The total number of flags with three horizontal strips in order, which can be formed using 2 identical red, 2 identical green, and 2 identical white strips is equal to a. $4!$ b. $3 \times (4!)$ c. $2 \times (4!)$ d. none of these

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106. Let A be a set of $n(\geq 3)$ distance elements. The number of triplets (x, y, z) of the A elements in which at least two coordinates is equal to

a. $\hat{}\ nP_3$ b. $n^3 -^n P_3$ c. $3n^2 - 2n$ d. $3n^2 - (n-1)$

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107. The number of possible outcomes in a throw of n ordinary dice in which at least one of the die shows and odd number is a. $6^n - 1$ b. $3^n - 1$ c. $6^n - 3^n$ d. none of these

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108. In a room there are 12 bulbs of the same wattage, each having separate switch. The number of ways to light the room with different amounts of illumination is (a)$12^2 - 1$ (b) 2^{12} (c) $2^{12} - 1$ (d) none of these

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109. In a city no two persons have identical set of teeth and there is no person without a tooth. Also no person has more than 32 teeth. If we disregard 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) $2^{32 - 1}$

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110. Consider the five points comprising the vertices of a square and the intersection point of its diagonals. How many triangles can be formed using these points?

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111. 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

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112. There are 3 men and 7 women taking a dance class. If N ils number of different ways in which each man be paired with a women partner, and the four remaining women be paired into two pairs each of two, then the value of $N/90$ is_______.

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113. Let $S=\{1, 2, 3, 4\}$. The total number of unordered pairs of disjoint subsets of S is equal a.25 b. 34 c. 42 d. 41

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114. Number of permutations of 1, 2, 3, 4, 5, 6, 7, 8, and 9 taken all at a time are such that the digit 1 appearing somewhere to the left of 2 3 appearing to the left of 4 and 5 somewhere to the left of 6, is $k \times 7!$ Then the value of k is _______.

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115. The number of distinct natural numbers up to a maximum of four digits and divisible by 5, which can be formed with the digits 0, 1 , 2, 3, 4, 5, 6, 7, 8, 9 each digit not occurring more than once in each number, is a. 1246 b. 952 c. 1106 d. none of these

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116. In a three-storey building, there are four rooms on the ground floor, two on the first and two on the second floor. If the rooms are to be allotted to six persons, one person occupying one room only, the number of ways in which this can be done so that no floor remains empty is a. $^8P_6 - 2(6!)$ b. $^8P_6$ c. $^8P_5(6!)$ d. none of these

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117. Find $6C_2$

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118. The number of three-digit numbers having only two consecutive digit identical $N,$ then the value of $(N/2)^{1/2}$ is ______.

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119. Number of four-digit numbers of the form $N = abcd$ which satisfy following three conditions (i) $(ii)(iii)4000 \leq N < 6000(iv)$ (v) (vi) $(vii)N(viii)$ (ix) is a multiple of 5 (x) `(x i) (xii)3lt=b

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120. Find the number of ways in which $5A's$ and $6B's$ can be arranged in a row which reads the same backwards and forwards.

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121. If N is the number of different paths of lentght-12 which leads from A to B in the grid which do not pass through M, then the value of $[N/10] where [.]$ represents the greatest integer function is ________. Fig

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122. 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. $\hat{} 4P_4 \times^4 P_4$

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123. Total number of words that can be formed using all letters of the word BRIJESH that neither begins with I nor ends with B is equal to a. 3720 b. 4920 c. 3600 d. 4800

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124. The total number of five-digit numbers of different digits in which the digit in the middle is the largest is a. $\sum_{n_4}^{9} (n)P_4$ b. $33(3!)$ c. $30(3!)$ d. none of these

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125. The number of four-digit numbers that can be made with the digits 1, 2, 3, 4, and 5 in which at least two digits are identical is a. $4^5 - 5!$ b. 505 c. 600 d. none of these

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126. Total numbers formed less than 3×10^8 and can be formed using the digits 1, 2, 3 is equal to a. $\frac{1}{2}(3^9 + 4 \times 368)$ b. $\frac{1}{2}(3^9 - 3)$ c. $\frac{1}{2}(7 \times 3^8 - 3)$ d. $\frac{1}{2}(3^9 - 3 + 3^8)$

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127. If all the permutations of the letters in the word OBJECT are arranged (and numbered serially) in alphabetical order as in a dictionary, then the 717th word is a. TOJECB b. TOEJBC c. TOCJEB d. TOJCBE

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128. The total number of six-digit natural numbers that can be made with the digits 1, 2, 3, 4, if all digits are to appear in the same number at least once is a. 1560 b. 840 c. 1080 d. 480

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129. Total number of six-digit number in which all and only odd digits appear is a. $\frac{5}{2}(6!)$ b. $6!$ c. $\frac{1}{2}(6!)$ d. none of these

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130. Among the 8! [permutations of the digits 1, 2, 3..., 8, consider those arrangements which have the following property. If we take any five consecutive positions the product of the digits in these positions is divisible by 5. The number of such arrangements is equal to a. $7!$ b. $2.(7!)$ c.$7C_4$ d. none of these

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131. The total number of ways of selecting two numbers from the set $\{1, 2, 3, 4, \ldots\ldots .3n\}$ so that their sum is divisible by 3 is equal to a. $\frac{2n^2 - n}{2}$ b. $\frac{3n^2 - n}{2}$ c. $2n^2 - n$ d. $3n^2 - n$

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132. The total number of times, the digit 3 will be written when the integers having less than 4 digits are listed is equal to a. 300 b. 310 c. 302 d. 306

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133. The total number of divisor of 480 that are of the form $4n+2, n \geq 0,$ is equal to a. 2 b. 3 c. 4 d. none of these

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134. The total number of ways of selecting six coins out of 20 one-rupee coins, 10 fifty-paisa coins, and 7 twenty-five paisa coins is: (a.) 28 (b.) 56 (c.) $\hat{} 37C_6$ (d.) none of these

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135. In how many ways can 17 persons depart from railway station in 2 cars and 3 autos, given that 2 particular persons depart by the same car (4 persons can sit in a car and 3 persons can sit in an auto)? a. $\frac{15!}{2!4!(3!)^3}$ b. $\frac{16!}{(2!)^2 4!(3!)^3}$ c. $\frac{17!}{2!4!(3!)^3}$ d. $\frac{15!}{4!(3!)^3}$

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136. The total number of ways in with three distinct numbers in A.P. can be selected from the set $\{1, 2, 3, \ldots\ldots\ldots.24\}$ is equal to a. 66 b. 132 c. 198 d. none of these

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137. Let $f(n, k)$ denote the number of ways in which k identical balls can be colored with n colors so that there is at least one ball of each color. Then $f(n, 2n)$ must be equal to a. $\hat{}\ 2nC_n$ b. $\hat{}\ 2n - 1C_{n+1}$ c. $\hat{}\ 2n - 1C_n$ d. none of these

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138. 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

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139. Straight lines are drawn by joining m points on a straight line of n points on another line. Then excluding the given points, the number of point of intersections of the lines drawn is (no tow lines drawn are parallel and no these lines are concurrent). a. $4mn(m-1)(n-1)$ b. $\frac{1}{2}mn(m-1)(n-1)$ c. $\frac{1}{2}m^2n^2$ d. $\frac{1}{4}m^2n^2$

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140. 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

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141. The sum of all the numbers of four different digits that can be made by using the digits 0, 1, 2, and 3 is a. 26664 b. 39996 c. 38664 d. none of these

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142. The sum of digits in the unit's place of all numbers formed with the help of 3, 4, 5, 6 taken all at a time is a. 18 b. 432 c. 108 d. 144

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143. A person has n friends. The minimum value of n so that a person can invite a different pairs of friends every day for four weeks in a row is ____.

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144. There are n distinct white and n distinct black ball. If the number of ways of arranging them in a row so that neighbouring balls are of different colors is 1152, then value of n is _______.

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145. Numbers from 1 to 1000 are divisible by 60 but not by 24 is ________.

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146. If the number of ways in which the letters of the word ABBCABBC can be arranged such that the word ABBC does not appear is any word is N, then the value of $\left(N^{1/2} - 10\right)$ is_______.

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147. A class has three teachers, Mr. P , Ms. Q, and Mrs. R and six students A,B,C,D,E,F. Number of ways in which they can be seated in a line of 9 chairs, if between any two teachers there are exactly two students, is $k!(18)$, then value of$k$ is ______.

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148. Column I, Column II The number of five-digit numbers having the product o digit 20 is, p. > 70 A closest has five pairs of shoes. The number of ways in which four shoes can be drawn from it such that there will be no complete pair is, q. < 60 Three ladies have each brought their one child for admission to a school. The principal wants to interview the six persons one by one subject to the condition that no mother is interviewed before her child. The number of ways in which interview can be arranged is, r. $\in (50, 110)$ The figures 4, 5, 6, 7, 8 are written in every possible order. The number of numbers greater than 56000 is, s. $\in (40, 70)$

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149. The number of words of four letters containing equal number of vowels and consonants, where repetition is allowed, is a. 105^2 b. 210×243 c. 105×243 d. 150×21^2

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150. The number of ways in which we can select four numbers from 1 to 30 so as to exclude every selection of four consecutive numbers is a. 27378 b. 27405 c. 27399 d. none of these

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151. The total number of three-letter words that can be formed from the letter of the word SAHARANPUR is equal to a. 210 b. 237 c. 247 d. 227

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152. The number of different seven-digit numbers that can be written using only the three digits 1, 2, and 3 with the condition that the digit 2 occurs twice in each number is a. $\hat{\ } 2P_5 2^5$ b. $\hat{\ } 7C_2 2^5$ c. $\hat{\ } 7C_2 5^2$ d. none of these

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153. The number of ways of arranging m positive and $n(< m + 1)$ negative signs in a row so that no two are together is a.= $\hat{} m + 1p_n$ b.= $\hat{} n + 1p_m$= c.= $\hat{} m + 1c_n$="" d.= $\hat{} n + 1c_m$

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154. The number of ways to fill each of the four cells of the table with a distinct natural number such that the sum of the numbers is 10 and the sums of the numbers placed diagonally are equal is fig a. 4 b. 8 c. 24 d. 6

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155. A library has a copies of one book, b copies each of two books, c copies each of three books, a single copy of d books. The total number of ways in which these books can be arranged in a shelf is equal to a.

$\frac{(a+2b+3c+d)!}{a!(b!)^2(c!)^3}$ b. $\frac{(a+2b+3c+d)!}{a!(2b!)^{c!} \hat{} 3}$ c. $\frac{(a+b+3c+d)!}{(c!)^3}$ d. $\frac{(a+2b+3c+d)!}{a!(2b!)^{c!} \hat{}}$

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156. Three boys of class X, four boys of class XI, and five boys of class XII sit in a row. The total number of ways in which these boys can sit so that all the boys of same class sit together is equal to a. $(3!)^2(4!)(5!)$ b. $(3!)(4!)^2(5!)$ c. $(3!)(4!)(5!)$ d. $(3!)(4!)(5!)^2$

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157. Number of ways in which 25 identical things be distributed among five persons if each gets odd number of things is

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158. Number of ways in which Rs. 18 can be distributed amongst four persons such that nobody receives less than Rs. 3 is a. 4^2 b. 2^4 c. $4!$ d. none of these

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159. $2m$ white counters and $2n$ red counters are arranged in a straight line with $(m+n)$ counters on each side of central mark. The number of ways of arranging the counters, so that the arrangements are symmetrical with respect to the central mark is (A) $.^{m+n}C_m$ (B) $.^{2m+2n}C_{2m}$ (C) $\frac{1}{2}\frac{(m+n)!}{m!n!}$ (D) None of these

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160. A person buys eight packets of TIDE detergent. Eachpacket contains one coupon, which bears one of the let-ters of the word TIDE. If he shows all the letters of theword TIDE, he gets one free packet. If he gets exactlyone free packet, then the number of different possiblecombinations of the coupons is

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161. There are three copies each of four different books. The number of ways in which they can be arranged in a shelf is. a. $\frac{12!}{(3!)^4}$ b. $\frac{12!}{(4!)^3}$ c. $\frac{21!}{(3!)^4 4!}$ d. $\frac{12!}{(4!)^3 3!}$

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162. The number of ways in which 12 books can be put in three shelves with four on each shelf is a. $\frac{12!}{(4!)^3}$ b. $\frac{12!}{(3!)(4!)^3}$ c. $\frac{12!}{(3!)^3 4!}$ d. none of these

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163. 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

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164. Let $x_1, x_2, x_3, \ldots.., x_k$ be the divisors of positive integer n (including 1 and n). If $x_1 + x_2 + x_3 + \ldots\ldots + x_k = 75$ Then $\sum_{i=1}^{k}\left(\frac{1}{x_i}\right)$ is equal to (A) $\frac{75}{k}$ (B)$\frac{75}{n}$ (C) $\frac{1}{n}$ (D)$\frac{1}{75}$

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165. Let $A = \{x_1, x_2, x_3, , x_7\}, B = \{y_1, y_2, y_3\}$ The total number of functions $f: A \to B$ that are onto and there are exactly three element x in A such that $f(x) = y_2$ is equal to a. 490 b. 510 c. 630 d. none of these

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166. The total number of ways in which n^2 number of identical balls can be put in n numbered boxes $(1, 2, 3, ...n)$ such that ith box contains at least i number of balls is a. $.^{n^2} C_{n-1}$ b. $.^{n^2-1} C_{n-1}$ c. $.^{\frac{n^2+n-2}{2}} C_{n-1}$ d. none of these

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167. Six X ' s have to be placed in thesquares of the figure below, such that each rowcontains atleast one X. In how many different wayscan this be done?

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168. Column I, Column II Four dice (six faced) are rolled. The number of possible out comes in which at least one dice shows 2 is, p. 210 Let A be the set of 4-digit number $a_1a_2a_3a_4wherea_1 > a_2 > a_3 > a_4\cdot$ then $n(A)$ is equal to, q. 80 The total number of three-digit numbers, the sum of whose digits is even, is equal to, r. 671 The number of four-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

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169. A committee of 12 is to be formed from nine women and eight men. In how many ways can this be done if at least five women have to be included in a committee? In how many of these committees a. the women hold majority? b. the men hold majority?

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170. Let T_n denote the number of triangles, which can be formed using the vertices of a regular polygon of n sides. It $T_{n+1} - T_n = 21$,then n equals a.5 b. 7 c. 6 d. 4

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171. In a group of boys, two boys are brothers and six more boys are present in the group. In how many ways can they sit if the brothers are not to sit along with each other? a.$2 \times 6!$ b. $\hat{} \ 7P_2 \times 6!$ c. $\hat{} \ 7C_2 \times 6!$ d. none of these

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172. If N is the number of ways in which a person can walk up a stairway which has 7 steps if he can take 1 or 2 steps up the stairs at a time then the value of $N/3$ is ______.

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173. If $\hat{} \ nC_r = 84,^n C_{r-1} = 36, and^n C_{r+1} = 126,$ then find the value of $n\cdot$

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174. Column I Column II Total number of function $f:\{1, 2, 3, 4, 5\}\overrightarrow{1, 2, 3, 4, 5}$ than are on to and $f(i) \neq$ is equal to p. divisible by 11 If $x_1, x_2x_3 = 2 \times 5 \times 7^2,$ then the number of solution set for $(x_1, x_2, x_3) where x_1 \in N, x_1 > 1$ is q. divisible by 7 Number of factors of 3780 are divisible b; either 3 or 2 both is r. divisible by 3 Total number of divisor of $n = 2^5 \times 3^4 \times 5^{10}$ that are of the form $4\lambda + 2, \lambda \geq 1$ is s. divisible by 4

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175. find $7C_4$

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176. A function is defined as $f:[a_1, a_2, a_3, a_4, a_5, a_6]\overrightarrow{b_1, b_2, b_3}.$ Column I, Column II Number of subjective functions, p. is divisible by 9 Number of functions in which $f(ai) \neq bi$, q. is divisible by 5 Number of invertible functions, r. is divisible by 4 Number of many be functions, s. is divisible by 3 , t. not possible

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177. Find the number of ways in which 22 different books can be given to 5 students, so that two students get 5 books each and all the remaining students get 4 books each.

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178. Consider the convex polygon, which has 35 diagonals. Then match the following column. Column I, Column II Number of triangles joining the vertices of the polygon, p. 210 Number of points intersections of diagonal which lies inside the polygon, q. 120 Number of triangles in which exactly one side is common with that of polygon, r. 10 Number of triangles in which exactly two sides are common with that of polygon, s. 60

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179. Find $5C_0$

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180. Consider a 6×6 chessboard. Then match the following columns. Column I, Column II Number of rectangles, p. $\hat{} \ 10C_5$ Number of squares, q. 441 Number of ways three squares can be selected if they are not in same row or column, r. 91 In how many ways eleven + sign can be arranged in the squares if no row remains empty, s. 2400

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181. Find the number of integral solutions of $x_1 + x_2 + x_3 + \ = 24$ subjected to the condition that $1 \leq x_1 \leq 5, 12 \leq x_2 \leq 18$ and $-1 \leq x_3$

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182. Among 10 persons, A, B, C are to speak at a function. The number of ways in which it can be done if A wants to speak before B and B wants to speak before C is a. $10! / 24$ b. $9! / 6$ c. $10! / 6$ d. none of these

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

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184. In how many ways can a team of 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

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

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186. Statement 1: the number of ways in which n persons can be seated at a round table, so that all shall not have the same neighbours in any two arrangements is $(n-1)!/2.$ Statement 2: number of ways of arranging n different beads in circles is $(n-1)!/2.$

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

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188. Statement 1: Number of terms in the expansion of $(x + y + z + w)^{50}$ is $.^{53}C_3$ Statement 2: Number of non-negative solution of the equation $p + q + r + s = 50$ is $.^{53}C_3$

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189. Find the number of seven letter words that can be formed by using the letters of the word SUCCESS so that the two C are together but no two S are together.

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190. The number of ways in which 10 candidates A_1, A_2, A_{10} can be ranked such that A_1 is always above A_{10} is a. $5!$ b. $2(5!)$ c. $10!$ d. $\frac{1}{2}(10!)$

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191. There are six teachers. Out of them two are primary teacher, two are middle teachers, and two are secondary teachers. They are to stand in a row, so as the primary teachers, middle teacher, and secondary teachers are always in a set. Find the number of ways in which they can do so.

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192. In the decimal system of numeration of six-digit numbers in which the sum of the digits is divisible by 5 is a. 180000 b. 540000 c. 5×10^5 d. none of these

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193. There are 2 identical white balls, 3 identical red balls, and 4 green balls of different shades. Find the number of ways in which they can be arranged in a row so that atleast one ball is separated from the balls of the same color.

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194. To fill 12 vacancies, there are 25 candidates of which 5 are from scheduled caste. If three of the vacancies are reserved for scheduled caste candidates while the rest are open to all; the number of ways in which the selection can be made is a. $\hat{} \ 5C_3 \times^{22} C_9$ b. $\hat{} \ 22C_9 -^5 C_3$ c. ^22C_3+^5C_3 d. none of these

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195. Find the number of ways in which 6 boys and 6 girls can be seated in a row so that all the girls sit together and all the boys sit together.

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196. If the difference of the number of arrangements of three things from a certain number of dissimilar things and the number of selection of the same number of things from them exceeds 100, then the least number of dissimilar things is a. 8 b. 6 c. 5 d. 7

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197. The number of ways in which the letters of the word ARRANGE be arranged so that the two R's are never together.

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198. The sum of all four-digit numbers that can be formed by using the digits 2, 4, 6, 8 (when repetition of digits is not allowed) is a. 133320 b. 5333280 c. 53328 d. none of these

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199. Find the value (s) of r satisfying the equation ${}^{69}C_{3r-1} - {}^{69}C_{r^2} = {}^{69}C_{r^2-1} - {}^{69}C_{3r}.$

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200. The number of ordered pairs of integers (x, y) satisfying the equation $x^2 + 6x + y^2 = 4$ is a. 2 b. 8 c. 6 d. none of these

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201. Prove that ${}^{n}C_r +^{n-1} C_r + \ldots +^{r} C_r =^{n+1} C_{r+1}$.

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202. The number of five-digit telephone numbers having atleast one of their digits repeated is a. 90000 b. 100000 c. 30240 d. 69760

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203. If $\hat{} \ (15)C_{3r} =^{15} C_{r+3}$, then find r.

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204. How many numbers can be made with the digits 3, 4, 5, 6, 7, 8 lying between 3000 and 4000, which are divisible by 5 while repetition of any digit is not allowed in any number? a. 60 b. 12 c. 120 d. 24

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205. In how many ways can 10 different prizes be given to 5 students if one particular boy must get 4 prizes and rest of the students can get any number of prizes?

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206. The number of ways in which we can distribute mn students equally among m sections is given by a. $\frac{(mn!)}{n!}$ b. $\frac{(mn)!}{(n!)^m}$ c. $\frac{(mn)!}{m!n!}$ d. $(mn)^m$

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207. Consider the equation $\frac{2}{x}+\frac{5}{y}=\frac{1}{3} where x, y \in N.$ Find the number of solutions of the equation.

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208. 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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209. In how many ways can 10 persons take seats in a row of 24 fixed seats so that no two persons take consecutive seats.

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210. 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. $^{n-2}C_3$ b. $^{n-3}C_2$ c. $^{n-3}C_3$ d. none of these

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211. In how many ways can a party of 6 men be selected out of 10 Hindus, 8 Muslims, and 6 Christians, if the party consists of atleast one person of each religion? Find the number of ways of selection. (Consider only the religion of the person).

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212. Fifteen identical balls have to be put in five different boxes. Each box can contain any number of balls. The total number of ways of putting the balls into the boxes so that each box contains at least two balls is equal to a. $.^9 C_5$ b. $.^{10} C_5$ c. $.^6 C_5$ d. $.^{10} C_6$

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213. 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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214. In how many different ways can the first 12 natural numbers be divided into three different groups such that numbers in each group are in A.P.? a. 1 b. 5 c. 6 d. 4

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215. Find the number of non-negative integral solutions of equation $x + y + z + 2w = 20$.

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216. The number of ways in which we can get a score of 11 by throwing three dice is a. 18 b. 27 c. 45 d. 56

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217. Find the number of non-negative integral solutions of $x+y+z+w \leq 20.$

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218. 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

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219. Find the number of non-negative integral solutions of the equation $x+y+z=10.$

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220. If m parallel lines in a plane are intersected by a family of n parallel lines, the number of parallelograms that can be formed is a. $\frac{1}{4}mn(m-1)(n-1)$ b. $\frac{1}{4}mn(m-1)$ c. $\frac{1}{4}m^2n^2$ d. none of these

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221. Find the number of positive integral solutions of the equation $x+y+z=12.$

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222. The maximum number of points of intersection of five lines and four circles is (A) 60 (B) 72 (C) 62 (D) none of these

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223. Find the number of ways in which n different prizes can be distributed among $m(< n)$ persons if each is entitled to receive at most $n-1$ prizes.

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224. There are three coplanar parallel lines. If any p points are taken on each of the lines, the maximum number of triangles with vertices on these points is a. $3p^2(p-1)+1$ b. $3p^2(p-1)$ c. $p^2(4p-3)$ d. none of these

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225. Find the number of ways in which n distinct objects can be kept into two identical boxes so that no box remains empty.

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226. Two packs of 52 cards are shuffled together. The number of ways in which a man can be dealt 26 cards so that he does not get two cards of the same suit and same denomination is a. $\hat{}\ (52)C_{26}.\ 2^{26}$ b. $\hat{}\ 104C_{26}$ c. $\hat{}\ (52)C_{26}$ d. none of these

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227. Find the number of positive integral solutions of $xyz = 21600.$

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228. A student is allowed to select atmost n books from a collection of (2n+1) books. If the total number of ways in which a student selects atleast one book is 63, then n equals to what?

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229. Find the number of positive integral solutions satisfying the equation $(x_1 + x_2 + x_3)(y_1 + y_2) = 77.$

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230. There are $(n + 1)$ white and $(n + 1)$ black balls, each set numbered $1 \rightarrow n + 1.$ The number of ways in which the balls can be arranged in a row so that the adjacent balls are of different colors is a. $(2n + 2)!$ b. $(2n + 2)! \times 2$ c. $(n + 1)! \times 2$ d. $2\{(n + 1)!\}^2$

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231. Roorkee University has to send 10 professors to 5 centers for its entrance examination, 2 to each center. Two of the enters are in Roorkee and the others are outside. Two of the professors prefer to work in Roorkee while three prefer to work outside. In how many ways can this be made if the preferences are to be satisfied?

A. 5400

B. 5200

C. 4800

D. 4000

Answer: A

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232. 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

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233. In how many ways, two different natural numbers can be selected, which less than or equal to 100 and differ by at most 10.

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234. 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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235. The number of ways of selecting 10 balls from unlimited number of red, black, white and green balls, is

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236. 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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237. There are 5 historical monuments, 6 gardens, and 7 shopping malls in a city. In how many ways a tourist can visit the city if he visits at least one shopping mall.

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238. Let $n_1 < n_2 < n_3 < n_4 < n_5$ be positive integers such that $n_1 + n_2 + n_3 + n_4 + n_5 = 20.$ then the number of distinct arrangements n_1, n_2, n_3, n_4, n_5 is

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239. In an election, the number of candidates exceeds the number to be elected by 2. A man can vote in 56 ways. Find the number of candidates.

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240. A rectangle with sides of lengths $(2n-1)$ and $(2m-1)$ units is divided into squares of unit length. The number of rectangles which can be formed with sides of odd length, is (a) m^2n^2 (b) $mn(m+1)(n+1)$ (c) 4^{m+n-1} (d) non of these

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241. Find the number of odd proper divisors of $3^p \times 6^m \times 21^n$.

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242. If r, s, t are prime numbers and p, q are the positive integers such that their LCM of p, q is $r^2t^4s^2$, then the numbers of ordered pair of (p, q) is (A) 252 (B) 254 (C) 225 (D) 224

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243. Find the number of divisors of 720. How many of these are even? Also find the sum of divisors.

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244. In an examination of nine papers, a candidate has to pass in more papers than the number of paper in which he fails in order to be successful. The number of ways in which he can be unsuccessful is a. 256 b. 266 c. 193 d. 319

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245. How many different signals can be given using any number of flags from 5 flags of different colors?

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246. 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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247. In how many ways can 6 persons stand in a queue?

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

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249. Out of 10 white, 9 black, and 7 red balls, find the number of ways in which selection of one or more balls can be made (balls of the same color are identical).

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250. Two players $P_1 and P_2$ play a series of $2n$ games. Each game can result in either a win or a loss for P_1. the total number of ways in which P_1 can win the series of these games is equal to a. $\frac{1}{2}\left(2^{2n} - \hat{} (2n)C_n\right)$ b. $\frac{1}{2}\left(2^{2n} - 2 \times \hat{} (2n)C_n\right)$ c. $\frac{1}{2}\left(2^{n} - \hat{} (2n)C_n\right)$ d. $\frac{1}{2}\left(2^{n} - 2 \times \hat{} (2n)C_n\right)$

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251. Find the number of ways in which 8 different flowered can be strung to form a garland so that four particular flowers are never separated.

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252. Ten IIT and 2 DCE students sit in a row. The number of ways in which exactly 3 IIT student sit between 2 DCE students is (A) $.^{10}C_3 \times 2! \times 3! \times 8!$ (B) $10! \times 2! \times 3! \times 8!$ (C) $5! \times 2! \times 9! \times 8!$ (D) none of these

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253. If $^{2n+1}P_{n-1} : ^{2n-1}P_n = 3 : 5,$ then find the value of n.

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254. A team of four students is to be selected from a total of 12 students. The total number of ways in which the team can be selected such that two particular students refuse to be together and other two particular students wish to be together only is equal to a. 220 b. 182 c. 226 d. none of these

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255. If $^{9}P_{5} + 5 \cdot ^{9}P_{4} = ^{10}P_{r}$, find the value of r.

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256. There were two women participating in a chess tournament. Every participant played two games with the other participants. The number of games that the men played among themselves proved to exceed by 66 number of games that the men played with the women. The number of participants is a. 6 b. 11 c. 13 d. none of these

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257. Seven athletes are participating in a race. In how many ways can the first three athletes win the prizes?

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258. Two teams are to play a series of five matches between them. A match ends in a win, loss, or draw for a team. A number of people forecast the result of each match and no two people make the same forecast for the series of matches. The smallest group of people in which one person forecasts correctly for all the matches will contain n people, where n is a. 81 b. 243 c. 486 d. none of these

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259. Prove that if $r \leq s \leq n, then^{n}P_{s}$ is divisible by $\hat{} \ nP_{r}$.

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260. The number of even divisor of the number $N = 12600 = 2^{3}3^{2}5^{2}7$ is

a. 72 b. 54 c. 18 d. none of these

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261. Find the number of zeros at the end of 130!.

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262. A candidate is required to answer 6 out of 10 questions, which are divide into two groups, each containing 5 questions. He is not permitted to attempt more than 4 questions from either group. The number of different ways in which the candidate can choose 6 questions is a. 50 b. 150 c. 200 d. 250

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263. Find the exponent of 3 in 100!

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264. Number of ways in which two persons A and B select objects from two different groups each having 20 different objects such that B selects always more objects than A (including the case when A selects no object) is $\left(2^{40} -^{40} C_{21}\right)/2.$ `

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265. If $^{10}P_r = 5040,$ find the value of r.

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266. Statement 1: Number of ways of selecting 10 objects from 42 objects of which 21 objects are identical and remaining objects are distinct is 2^{20}.

Statement 2: $\hat{} \ 42C_0 +^{42} C_1 +^{42} C_2 + \ +^{42} C_{21} = 2^{41}.$

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267. Find the number of zeros at the end in product $5^6.6^7.7^8.8^9.9^{10}.30^{31}$.

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268. Statement 1: Number of ways in which Indian team (11 players) can bat, if Yuvraj wants to bat before Dhoni and Pathan wants to bat after Dhoni is 11!/3!. Statement 2: Yuvraj, Dhoni, and Pathan can be arranged in batting order in 3! ways.

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269. 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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270. Statement 1: When number of ways of arranging 21 objects of which r objects are identical of one type and remaining are identical of second type is maximum, then maximum value of $\hat{}\ 13C_r is 78$. Statement 2: $\hat{}\ 2n + 1C_r$ is maximum when $r = n\cdot$

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271. If $a, b, \in \{1, 2, 3, 4, 5, 6, \}$, find the number of ways a and b can be selected if $\lim_{x \to 0}\left(\frac{a^x + b^x}{2}\right)^{\frac{2}{x}} = 6.$

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272. Statement 1: let $E = \{1, 2, 3, 4\} and F = \{a, b\}\cdot$ Then the number of onto functions from $E \to F is 14$. Statement 2: Number of ways in which four distinct objects can be distributed into two different boxes is 14 if no box remains empty.

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273. In how many ways can Rs. 16 be divided into 4 persons when none of them gets less than Rs. 3?

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274. Statement 1: Number of ways in which India can win the series of 11 matches is 2^{10} . (if no match is drawn). Statement 2: For each match there are two possibilities, India either wins or loses.

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275. Find the number ordered pairs (x,y) if $x, y \in \{0, 1, 2, 3, \ldots, 10\}$ and if $|x - y| > 5$.

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276. Statement 1: If $p, q, < r,$ the number of different selections of $p+q$ things taking r at a time, where p thingks are identical and q other things are identical, is $p+q-r+1.$ Statement 2: If $p, q, > r,$ the number of different selections of $p+q$ things taking r at a time, where p thingks are identical and q other things are identical, is $r-1.$

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277. n different toys have to be distributed among n children. Total number of ways in which these toys can be distributed so that exactly one child gets no toy, is equal to

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278. Statement 1: The number of ways in which three distinct numbers can be selected from the set $\{3^1, 3^2, 3^3, , 3^{100}, 3^{101}\}$ so that they form a G.P. is 2500. Statement 2: if a, b, c are in A.P., then $3^a, 3^b, 3^c$ are in G.P.

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279. यदि प्रत्येक को कम से कम 2 किताबें मिलती हैं तो 3 छात्रों के बीच 8 अलग-अलग पुस्तकों को कैसे वितरित किया जा सकता है?

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280. Statement 1: Total number of five-digit numbers having all different digit sand divisible by 4 can be formed using the digits $\{1, 3, 2, 6, 8, 9\} is 192.$ Statement 2: A number is divisible by 4, if the last two digits of the number are divisible by 4.

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281. Find the number of ways of dividing 52 cards among four players equally.

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282. Statement 1: Number of ways in which 30 can be partitioned into three unequal parts, each part being a natural number is 61. Statement 2; Number of ways of distributing 30 identical objects in three different boxes is $\hat{} \, 30C_2$.

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283. Find the number of ways in which the number 300300 can be split into two factors which are relatively prime.

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284. The number of words of four letters that can be formed from the letters of the word EXAMINATION is a. 1464 b. 2454 c. 1678 d. none of these

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285. Find the number of ways in which 8 non-identical apples can be distributed among 3 boys such that every boy should get at least 1 apple and at most 4 apples.

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286. The number of ways in which the letters of the word PERSON can placed in the squares of the given figure so that no row remains empty is

a. $24 \times 6!$ b. $26 \times 6!$ c. $26 \times 7!$ d. $27 \times 6!$

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287. 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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288. There are two bags each of which contains n balls. A man has to select an equal number of balls from both the bags. Prove that the number of ways in which a man can choose at least one ball from each bag $is^{2n}C_n - 1.$

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289. Find the total number of proper factors of the number 35700. Also find (1)sum of all these factors (2)sum of the odd proper divisors (3)the number of proper divisors divisible by 10 and the sum of these divisors.

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290. 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

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291. There are 3 books of mathematics, 4 of science, and 5 of literature. How many different collections can be made such that each collection consists of one book of each subject.

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292. Number of ways in which a lawn-tennis mixed double be made from seven married couples if no husband and wife play in the same set is a. 240 b. 420 c. 720 d. none of these

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293. 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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294. A teacher takes three children from her class to a zoo at a time, but she does not take the same three children to the zoo more than once. She finds that she went to the zoo 84 times more than a particular child has gone to the zoo. The number of children her class is

a. 12 b. 10 c. 60 d. none of these

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295. Find the number of ways in which the number 94864 can be resolved as a product of two factors.

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296. A class contains three girls and four boys. Every Saturday, five go on a picnic (a different group of students is sent every week). During the picnic, each girl in the group is given a doll by the accompanying teacher. If all possible groups of five have gone for picnic once, the total number of dolls that the girls have got is a. 21 b. 45 c. 27 d. 24

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297. Show that $1! + 2! + 3! + \quad + n!$ cannot be a perfect square for any $n \in N, n \geq 4.$

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298. If all the words formed from the letters of the word HORROR are arranged in the opposite order as they are in a dictionary then the rank of the word HORROR is a. 56 b. 57 c. 58 d. 59

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299. Prove that: $\frac{(2n)!}{n!} = \{1.\ 3.\ 5. \ldots .\ (2n-1)\}2^n.$

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300. A person always prefers to eat parantha and vegetable dish in his meal. How many ways can he makes his platter in a marriage party if there are three types of paranthas, four types of vegetable dish, three types of salads and two types of sauces? a. 3360 b. 4096 c. 3000 d. none of these

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301. The letters of word ZENITH are written in all possible ways. If all these words are written out as in a dictionary, then find the rank of the word ZENITH.

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302. In a class tournament, all participants were to plan different game with one another. Two players fell ill after having played three games each. If the total number of games played in the tournament is equal to 84, the total number of participants in the beginning was equal to a. 10 b. 15 c. 12 d. 14

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

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304. There are 720 permutations of the digits 1, 2, 3, ,4 ,5, 6. Suppose these permutations are arranged from smallest to largest numerical values, beginning from 123456 and ending with 654321. Then the digit in unit place of number at 267th position is_______.

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305. Five different digits from the setoff numbers $\{1, 2, 3, 4, 5, 6, 7\}$ are written in random order. How many numbers can be formed using 5 different digits from set $\{1, 2, 3, 4, 5, 6, 7\}$ if the number is divisible by 9?

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306. A shelf contains 20 books of which 4 are single volume and the other form sets of 8, 5, and 3 volumes. Find the number of ways in which the books (i)may be arranged on the shelf so that (ii)volumes of each set will not be separated. (iii)volumes of each set remain in their due order.

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307. How many different numbers of 4 digits can be formed from the digits 0, 1, 2, ...9 if repetition is allowed.

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308. How many six-digit odd numbers, greater than 6,00,000, can be formed from the digits 5, 6, 7, 8, 9, and 0 if repetition of digits is allowed .

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309. Eleven animals of a circus have to be placed in eleven cages (one in each cage), if 4 of the cages are too small for 6 of the animals, then find the number of the ways of caging all the animals.

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310. If $A = \{x \mid x \text{ is prime number and } x < 30\}$, find the number of different rational numbers whose numerator and denominator belong to A.

A. 70

B. 80

C. 90

D. 100

Answer: C

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311. Find the sum of all the numbers that can be formed with the digits 2, 3, 4, 5 taken all at a time.

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312. How any 4-letters words, with or without meaning, can be formed out of the letters in the word LOGARITHMS, if repetition of letters is not allowed?

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

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314. Find the number of ways in which two Americans, two British, one Chinese, one Dutuch, and one Egyptian can sit on a round table so that persons of the same nationality are separated.

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315. Find the number of permutations of letters a, b, c, d, e, f, g taken all together if neither beg nor cad pattern appear.

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316. 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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317. There are four balls of different colors and four boxes of colors same as those of the balls. Find the number of ways in which the balls, one in each box, could be placed in such a way that a ball does not go to box of its own color.

A. 9

B. 11

C. 13

D. 7

Answer: A

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318. Seven people leave their bags outside at temple and returning after worshiping picked one bag each at random. In how many ways at least one and at most three of them get their correct bags?

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319. Find the number of ways in which 5 distinct balls can be distributed in three different boxes if no box remains empty.

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320. Four buses run between Bhopal and Gwalior. If a man goes from Gwalior to Bhopal by a bus and comes back to Gwalior by another bus, find the total possible ways.

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321. A gentle man wants to invite six friends. In how many ways can he send invitation cards to them, if he has three servants to carry the cards.

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322. Find the total number of ways of answering five objective type questions, each question having four choices

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323. In how many ways the number 7056 can be resolved as a product of 2 factors.

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324. A double-decker bus carry $(u+l)$ passengers, u in the upper deck and l in the lower deck. Find the number of ways in which the $u+l$ passengers can be distributed in the two decks, if $r(\leq l)$ particular passengers refuse to go in the upper deck and $s(\leq u)$ refuse to sit in the lower deck.

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325. Prove that $(n! + 1)$ is not divisible by any natural number between 2 and n

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326. Find the number of different signals that can be generated by arranging at least 2 flags in order (one below the other) on a vertical staff, if five different flags are available.

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327. How many two-digit even numbers can be formed from the digits 1,2, 3, 4, 5 if the digits can be repeated?

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328. Find the number of 4 letter words, with or without meaning, which can be formed out of the letters of the word MAKE, where the repetition of the letters is not allowed.

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329. Find the remainder when $1! + 2! + 3! + 4! + \ldots\ldots. + n!$ is divided by 15, if $n \geq 5$.

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330. Find the total number of ways in which n distinct objects can be put into two different boxes.

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331. Find the total number of two-digit numbers (having different digits), which is divisible by 5.

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332. There are n locks and n matching keys. If all the locks and keys are to be perfectly matched, find the maximum number of trails required to open a lock.

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333. Poor Dolly's T.V. has only 4 channels, all of them quite boring. Hence it is not surprising that she desires to switch (change) channel after every one minute. Then find the number of ways in which she can change the channels so the she is back to her original channel for the first time after 4 min.

A. 56

B. 48

C. 64

D. 36

Answer: B

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334. Find the number of distinct rational numbers x such that $o < x < 1$ and $x = p/q$, where $p, q \in \{1, 2, 3, 4, 5, 6\}$.

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335. Three dice are rolled. Find the number of possible outcomes in which at least one dice shows 5.

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336. Case 4 In how many ways 14 identical toys be distributed among three boys so that each one gets atleast one toy and no two boys get equal no of toys ?

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

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338. The number of non-negative integral solutions of $x_1 + x_2 + x_3 + 4x_4 = 20$ is

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339. 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 60% marks in aggregate.

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340. In how many different ways can 3 persons A, B, C having 6 one-rupee coin 7 one-rupee coin, 8 one-rupee coin, respectively, donate 10 one-rupee coin collectively?

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

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342. In how many ways 3 boys and 15 girls can sits together in a row such that between any 2 boys at least 2 girls sit.

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343. Find the number of distinct throws which can be thrown with n six-faced normal dice, which are indistinguishable among themselves.

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344. If the 11 letters A, B, ..., K denote an arbitrary permutation of he integers $(1, 2, ;\cdot 11)$, then $(A-1)(B-2)(C-3)...(K-11)$ will be a. necessarily zero b. always odd c. always even d. none of these

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345. In how many ways can four people, each throwing a dice once, make a sum of 6?

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346. Find the number of integers which lie between 1 and 10^6 and which have the sum of the digits equal to 12.

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

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348. Let $C_1, C_2, , C_n$ be a sequence of concentric circle. The nth circle has the radius n and it has n openings. A points P starts travelling on the smallest circle C_1 and leaves it at an opening along the normal at the point of opening to reach the next circle C_2 . Then it moves on the second circle C_2 and leaves it likewise to reach the third circle C_3 and so on. Find the total number of different path in which the point can come out of nth circle.

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349. In how many ways can four people, each throwing a dice once, make a sum of 6?

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350. Find n, if $(n+1)! = 12 \times (n-1)!$.

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351. Find the value of t which satisfies $(t - [|\sin x|])! = 3!5!7! where [.]$ denotes the greatest integer function.

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352. Find the total number of integer n such that $2 \leq n \leq 2000$ and H.C.F. of n and 36 is 1.

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353. Find the number of polynomials of the form $x^3 + ax^2 + bx + c$ that are divisible by $x^2 + 1, wherea, b, c \in \{1, 2, 3, 9, 10\}$.

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354. Find the numbers of diagonals in the polygon of n sides.

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355. Find the total number of n -digit number $(n > 1)$ having property that no two consecutive digits are same.

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356. Prove that $(n!)^2 < n^n n! < (2n)!$, for all positive integers n.

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357. Find the sum of the series $\sum_{r=1}^{n} r \times r!$.

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358. Find the exponent of 80 in 200!.

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359. Prove that $.^{n-1}P_r + r.^{n-1}P_{r-1} = .^{n}P_r$

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360. How many ways are there to seat n married couples $(n \geq 3)$ around a table such that men and women alternate and each women is not adjacent to her husband.

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361. A round-table conference is to be held among 20 delegates belonging from 20 different countries. In how many ways can they be seated if two particular delegates are (i) always to sit together, (ii) never to sit together .

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362. How many numbers can be formed from the digits 1, 2, 3, 4 when repetition is not allowed?

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363. Find the three-digit odd numbers that can be formed by using the digits 1, 2, 3, 4, 5, 6 when the repetition is allowed.

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364. If nP5=20nP3 find the value of n

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365. Find the total number of ways of selecting five letters from the word INDEPENDENT.

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366. Passengers are to travel by a double decked bus which can accommodate 13 in the upper deck and 7 in the lower deck. Find the number of ways that they can be distributed if 5 refuse to sit in the upper deck and 8 refuse to sit in the lower deck.

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367. A delegation of four students is to be selected from al total of 12 students. In how many says can the delegation be selected. if all the students are equally willing? if two particular students have to be included in the delegation? if two particular students do not wish to be together in the delegation? if two particular students wish to be included together only in the delegation? if two particular students refuse to be together and two other particular students wish to be together only in the delegation?

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368. In a conference 10 speakers are present. If S_1 wants to speak before $S_2 and S_2$ wants to speak after S_3, then find the number of ways all the 10 speakers can give their speeches with the above restriction if the remaining seven speakers have no objection to speak at any number.

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369. Five boys and five girls sit alternately around a round table. In how many ways can this be done?

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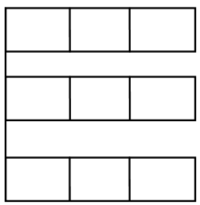
370. Find the number of ways in which A A A B B B can be places in the square of figure as shown, so that no row remains empty is?



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371. A regular polygon of 10 sides is constructed. In how many way can 3 vertices be selected so that no two vertices are consecutive?

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372. In ;a plane, there are 5 straight lines which will pass through a given point, 6 others which all pass through another given point, and 7 others which all as through a third given point. Supposing no three lines intersect at any point and no two are parallel, find the number of triangles formed by the intersection of the straight line.

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373. If $\hat{} 15C_{3r} :^{15} C_{r+1} = 11 : 3$, find the value of $r \cdot$

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374. If the ratio $\hat{} 2nC_3 :^n C_3$ is equal to 11:1 find $n \cdot$

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375. There are n married couples at a party. Each person shakes hand with every person other than her or his spouse. Find the total no. of hand shakes.

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376. Twenty-eight games were played in a football tournament with each team playing once against each other. How many teams were there?

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377. In a certain an algebraical exercise book there and 4 examples on arithmetical progression, 5 examples on permutation and combination, and 6 examples on binomial theorem. Find the number of ways a teacher can select or his pupils at least one but not more than 2 examples from each of these sets.

A. 4500

B. 2550

C. 2850

D. 3150

Answer: D

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378. In a network of railways, a small island has 15 stations. Find the number of different types of tickets to be printed for each class, if every stations must have tickets for other stations.

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379. 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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380. Find the number of ways of selecting 3 pairs from 8 distinct objects.

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381. Out of 10 consonants and 4 vowels, how many words can be formed each containing 3 consonants and 2 vowels?

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382. In how many of the permutations of n thing taken r at a time will three given things occur?

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383. If^(22)P_(r+1) : ^(20)P_(r+2)=11 : 52, $f \in dr$`

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

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385. Five persons entered the lift cabin on the ground floor of an 8-floor building. If each of them can leave the cabin independently at any floor beginning with the first; find the probability of 5 persons leaving at different floor.

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386. In how many ways first and second rank in mathematics, first and second rank in physics, first rank in chemistry, and first rank in English be given away to a class of 30 students.

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387. Find the number of nonzero determinant of order 2 with elements 0 or 1 only.

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388. Let $p, q \varepsilon \{1, 2, 3, 4\}$. The number of equations of the form $px^2 + qx + 1 = 0$ having real roots, is

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389. Nishi has 5 coins, each of the different denomination. Find the number different sums of money she can form.

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390. Find the number of groups that can be made from 5 different green balls, 4 different blue balls and 3 different red balls, if atleast 1 green and

1 blue ball is to be included.

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391. Find the number of natural numbers which are less than 2×10^8 and which can be written by means of the digit 1 and 2.

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392. Find the number of ways in which two small squares can be selected on the normal chessboard if they are not in same row or same column.

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393. Find the number of ways of selection of at least one vowel and one consonant from the word TRlPLE.

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394. 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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395. 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.

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396. Let $S = \{1, 2, 3, \ldots\ldots\ldots\ldots.n\}$ and $A = \{(a, b)|1 \leq a, b \leq n\} = S \times S$. A subset B of A is such that $(x, x) \in B$ for every $x \in S$. Then find the number of subsets B.

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397. A person invites a group of 10 friends at dinner and sits (i) 5 on a round table and 5 on other round table (ii) 4 on one round table 6 on other round table . Find no. of ways in each case in which he can arrange the guest?

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398. Find the number of ways in which 10 different diamonds can be arranged to make a necklace.

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399. Six persons A, B, C, D, E, F, are to be seated at a circular table. In how many ways antis be one if A should have either B or C on his right and B must always have either C or D on his right.

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400. Find the number of ways in which six persons can be seated at a round table, so that all shall not have the same neighbours n any two arrangements.

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401. Find number of seven-digit number in the form of $abcdefg(g, f, e,$ etc. Are digits at units, tens hundreds place etc.) where $a < b < c < d > e > f > g.$

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402. Find the maximum number of points of intersection of 6 circles.

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403. Find the number of different words that can be formed using all the letters of the word DEEPMALA if two vowels are together and the other two are also together but separated from the first two.

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404. The number 916238457 is an example of a nine-digit number which contains each of the digit 1 to 9 exactly once. It also has the property that the digits 1 to 5 occur in their natural order, while the digits 1 to 6 do not. Find the number of such numbers.

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405. There are 10 points on a plane of which 5 points are collinear. Also, no three of the remaining 5 points are collinear. Then find (i) the number of straight lines joining these points: (ii) the number of triangles, formed by joining these points.

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406. Find the total number of rectangles on the normal chessboard.

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407. There are 10 points on a plane of which no three points are collinear. If lines are formed joining these points, find the maximum points of intersection of these lines.

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408. Find the maximum number of points of intersection of 7 straight lines and 5 circles when 3 straight lines are parallel and 2 circle and concentric.

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409. m equi spaced horizontal lines are intersection by n equi spaced vertical lines. If the distance between two successive horizontal lines is same as that between two successive vertical lines, then find the number of squares formed by lines if (m

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410. A box contains 5 different res and 6, different whit balls. In how many ways can 6 balls be selected so that there are at least two balls off each color?

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

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412. Find the number of ways in which 6 men and 5 women can dine at around table if no two women are to sit so together.

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413. For examination, a candidate has to select 7 subjects from 3 different groups A, B, C which contain 4, 5, 6 subjects, respectively. The number of different way in which a candidate can make his selection if he has to select at least 2 subjects form each group is?

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414. In how many ways the letters of the word COMBINATORICS can be arranged if all vowel and all consonants are alphabetically ordered.

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415. A question paper on mathematics consists of 12 questions divided into 3 parts A, B and C, each containing 4 questions. In how many ways can an examinee answer 5 questions selecting at least one from each part.

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416. Find the number of all three elements subsets of the set $\{a_1, a_2, a_3, ...\ .\ a_n\}$ which contain a_3.

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417. A bag contains 50 tickets numbered 1, ,2 3, ...50. Find the number of set of five tickets $x_1 < x_2 < x_3 < x_4 < x_5$ and $x_3 = 30$

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418. Four visitors A, B, C, D arrived at a town that has 5 hotels. In how many ways, can they disperse themselves among 5 hotels.

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419. In how many shortest ways can we reach from the point (0, 0, 0) to point (3, 7, 11) in space where the movement is possible only along the x-axis, y-axis, and z-axis or parallel to them and change of axes is permitted only at integral points. (An integral point is one, which has its coordinate as integer.)

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420. Out of 8 sailors on a boat, 3 can work only on one particular side and 2 only on the other side. Find the number of ways in which the sailors can be arranged on the boat.

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421. In how many ways can 3 ladies and 3 gentlemen be seated around a round table so that any two and only two of the ladies sit together?

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422. 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?

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

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424. Find $5P_2$

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425. Find $5P_3$

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426. Find the number of ways in which $5A's$ and $6B's$ can be arranged in a row which reads the same backwards and forwards.

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427. 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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428. There are six periods in each working day of the school. In how many ways can one arrange 5 subjects such that each subject is allowed at least one period?

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429. Find the number of permutation of all the letters of the word MATHEMATICS which starts with consonants only.

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430. Find $5P_3$

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431. In how many ways can 30 marks be allotted to 8 question if each question carries at least 2 marks?

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432. Find the number of arrangements of the letters of the word SALOON, if the two O's do not come together.

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433. If the best and the worst paper never appear together, find in how many ways six examination papers can be arranged.

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434. Find the number of ways in which the birthday of six different persons will fall in exactly two calendar months.

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435. A committee of 6 is chosen from 10 men and 7 women so as to contain at least 3 men and 2 women. In how many ways can this be done if two particular women refuse to serve on the same committee? a. 850 b. 8700 c. 7800 d. none of these

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436. If $.^{n+2}C_8 : ^{n-2}P_4 : : 57 : 16,$ find n

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437. Find the number of positive integers, which can be formed by using any number of digits from 0, 1, 2, 3, 4, 5 but using each digit not more than once in each number. How many of these integers are greater than 3000?

A. 1380

B. 1480

C. 1420

D. 1580

Answer: A

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438. Find the number of words that can be made out of the letters of the word MOBILE when consonants always occupy odd places.

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439. In how many ways can 5 girls and 5 boys be arranged in a row if all boys are together.

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440. Out of 15 balls, of which some are white and the rest are black, how many should be white so that the number of ways in which the balls can be arranged in a row may be the greatest possible? It is assumed that the balls of same color are alike?

A. $6 \text{ or } 9$

B. $7 \text{ or } 8$

C. $4 \text{ or } 11$

D. $5 \text{ or } 10$

Answer: B

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441. इस दीपावली त्यौहार पर, कक्षा में प्रत्येक छात्र दूसरे को ग्रीटिंग कार्ड भेजता है। यदि कक्षा में 20 छात्र हैं, तो छात्रों द्वारा आदान-प्रदान किए गए ग्रीटिंग कार्ड्स की कुल संख्या पाएं?

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442. If there are 12 persons in a party, and if each two of them shake hands with each other, how many handshake happen in the party?

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443. Find the ratio of $.^{20} C_r$ and $.^{25} C_r$ when each of them has the greatest possible value.

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444. If $a, b, c \in \{1, 2, 3, 4, 5, 6, \}$ find the number of ways a, b, c can be selected if $f(x) = x^3 + ax^2 + bx + c$ is an increasing function.

A. 90

B. 95

C. 96

D. 98

Answer: C

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