



## MATHS

# **BOOKS - ARIHANT MATHS (ENGLISH)**

# **PERMUTATIONS AND COMBINATIONS**

### Examples

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

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

Watch Video Solution

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

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

0	Watch Video Solution

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

Watch Video Solution

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



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

<b>Watch Video Solution</b>
<b>11.</b> For how many positive integral values of n does n! end with precisely 25 zeros?
<b>Watch Video Solution</b>
<b>12.</b> Find the exponent of 80 in 200!.
<b>Vatch Video Solution</b>

13. Find the numbers of positive integers from 1 to 1000,

which are divisible by at least 2, 3, or 5.



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



**19.** The number of other permutations of the letters of

the word SIMPLETON taken all at a time is :

Watch Video Solution

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

Watch Video Solution

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



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



**23.** A five digit number is formed by the digits 1,2,3,4,5 without repetition.Find the probability that the number formed is divisible by 4.



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

Watch Video Solution

25. How many words can be formed with the letters of the

word 'ARIHANT' by rearranging them?

Watch Video Solution

26. Find the number of permutations of the letters of the

words 'DADDY DID A DEADLY DEED'.

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

word 'HIGH SCHOOL' by rearranging them?

Watch Video Solution

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

Watch Video Solution

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



30. How many four-digit numbers can be formed by using

the digits 1, 2, 3, 4, 5, 6, 7 if at least one digit is repeated.



31. In how many ways can 4 prizes be distributed among 5

students, if no student gets all the prizes?



**32.** Find the number of n digit numbers, which contain

the digits 2 and 7, but not the digits 0, 1, 8, 9.



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

Watch Video Solution

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

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

Watch Video Solution

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



**37.** Find the number of permutations that can be had from the letters of the word 'OMEGA' (i) O and A occuping

end places. (ii) E being always in the middle.



38. Find the number of ways in which 12 different beads

can be arranged to form a necklace.

Watch Video Solution

**39.** Consider 21 different pearls on a necklace. How many

ways can the pearls be placed in on this necklace such

that 3 specific pearls always remain together?

40. In how many ways can 24 persons be seated round a

table, if there are 13 sets?



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

Watch Video Solution

42. In how many different ways can five boys and five girls

form a circle such that the boys and girls alternate?





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

Watch Video Solution

44. How many necklace of 12 beads, each can be made

from 18 beads of various colours?

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



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

Watch Video Solution

#### 47. Prove that

$$inom{n}{r}+2inom{n}{r-1}+inom{n}{r-2}=inom{n+2}{r}$$

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

#### Watch Video Solution

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

of n and r.

Watch Video Solution

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

find the value of n.



51. Property: Product of r consecutive number is divisible

by r!



**53.** Prove that the greatest value of  $.^{2n} C_r (0 \le r \le 2n)$  is

$$.^{2n} \, C_n$$
 (for  $1 \leq r \leq n).$ 

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

Watch Video Solution

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

Watch Video Solution

56. How many different selections of 6 books can be made

from 11 different books, if

(i) two particular books are always selected.

(ii) two particular books are never selected?



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



58. Mohan has 8 friends, in how many ways he invite one

or more of them to dinner?



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

Watch Video Solution

**60.** A student is allowed to select at most n books from a collection of (2n+1) books. If the total number of ways in

which a student selects at least one book is 63. then n

equals to -



- 61. There are three books of physics, four of chemistry and five of mathematics. How many different collections can be made such that each collection consists of
  (i) one book of each subject
  (ii) atleast one book of each subject.
- (iii) atleast one book of mathematics.



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

Watch Video Solution

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



64. There are 4 oranges, 5 apples and 6 mangoes in a fruit

basket. In how manyways can a person make a selection of

fruits from among the fruits in the basket?

**Watch Video Solution** 

65. Find the number of ways in which onee or more letters

can be selected from the letter.

AAAAA BBBB CCC DD EFG.



66. Find the number of proper factors of the number

38808. Also, find sum of all these divisors.

**67.** The number of even proper divisors of 1008



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



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





70. Find the number of divisors of the number  $N=2^3.3^5.5^7.7^9$  which are perfect squares.

Watch Video Solution

71. In how many ways the number 10800 can be resolved

as a product of two factors?

Watch Video Solution

72. In how many ways the number 18900 can be split in

two factors which are relatively prime or co prime





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

Watch Video Solution

**74.** In how many ways can 12 different balls be divided between 2 boys, one receiving 5 and the other 7 balls? Also, in how many ways can these 12 balls be divided into groups of 5,4 and 3 balls, respectively?

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

Watch Video Solution

76. In how many ways can 9 different books be distributed

among three students if each receives atleast 2 books?

Watch Video Solution

Watch Video Solution

77. In how many ways 5 different balls can be arranged

into 3 different boxes so that no box remains empty?

78. In how many ways 5 different balls can be distributed

into 3 boxes so that no box remains empty?

Watch Video Solution

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

three bundles?

Watch Video Solution

MARINE AND A CONTRACT

**80.** Let n(A) = 5 and n(B) = 3 then find the number of

injective functions and onto functions from A to B



81. In how many ways 5 different balls can be arranged

into 3 different boxes so that no box remainns empty?

Watch Video Solution

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

Watch Video Solution

**83.** Find the number of solutions of x + y + z + w = 20

under the following conditions:





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

86. The number of non negative integral solutions of 3x + y + z = 24 is Watch Video Solution 87. In how many ways can three persons, each throwing a single dice once, make a sum of 15? Watch Video Solution

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

89. A bag has contains 23 balls in which 7 are identical .

Then number of ways of selecting 12 balls from bag.

Watch Video Solution

**90.** A person writes letters to six friends and addresses the corresponding envelopes. In how many ways can the letters be placed in the envelopes so that all of them are in a wrong envelope

**91.** In how many ways te sum of upper faces of four distinct dices can be six.



**92.** In an examination, the maximum marks for each of the three papers are 50. Maximum marks for the fourth paper are 100. Find the number of ways in which the candidate can score 60% marks in aggregate.



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



94. Find the number of different selections of 5 letters,

which can be made from

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



95. Find the number of (i) combinations. (ii) permutations

of four letters taken from the word EXAMINATIONS.

Watch Video Solution

96. Find the number of non-negative integral solutions of

$$x_1 + x_2 + x_3 + 4x_4 = 20.$$



distributed among six beggars such that everyone gets at least one blanket and tow particular beggars get equal blankets and another three particular beggars get equal

blankets.

Watch Video Solution 99. Find the number of positive integral solutions of the inequality  $3x + y + z \leq 30$ . Watch Video Solution 100. In how many ways can we get a sum of atmost 15 by throwing six distincct dice? Watch Video Solution

101. In how many ways can we get a sum of at most 17 by throwing six distinct dice ? In how many ways can we get a sum greater than 17 ?
Watch Video Solution

**102.** Find the total number of positive integral solutions

for (x, y, z) such that xyz = 24. Also find out the total

number of integral solutions.

Watch Video Solution

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

are collinear. How many

(i) straight lines

(ii) trian-gles

(iii) quadrilateral, by joining them?

Watch Video Solution 104. If  $\hat{n} + 5P_{n+1} = \frac{11(n-1)}{2^{n+3}}P_n$ , find n. Watch Video Solution

105. The interior angles of regular polygon measure  $150^\circ$ 

each. The each number of diagonals of the polygon is



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



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



108. Find number of rectangles in a chessboard, which are

not a square.



**110.** Six X 's have to be placed in the squares of the figure below, such that each row contains atleast one X. in how

# many different ways can this be done?





**111.** In how many ways the letters of the word DIPESH can be placed in the squares of the adjoining figure so that

# no row remains empty?





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

Watch Video Solution

113. If letters of the word are arranged as in dictionary,

find the rank of the following words.(i) INDIA (ii) SURITI (ii)

DOCOMO



**114.** There are 10 candidates for an examination out of which 4 are appearing in Mathematics and remaining 6

are appearing indifferent subjects. In how many ways can they be seated in a row so that no two Mathematics candidates are together?



115. about to only mathematics

Watch Video Solution

116. Find the numbers of ways in which 5 girls and 5 boys

can be arranged in a row if no two boys are together.

Watch Video Solution

117. Find the number of ways in which 5 girls and 5 boys

can be arranged a n row if boys and girls are alternative.



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



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

so that

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

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

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

Watch Video Solution

120. The sum of the digits in the unit place of all numbers

formed with the help of 3,4,5,6 taken all at a time is



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

**Watch Video Solution** 

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

A. 42

B. 82

C. 102

D. 142

### Answer: C



123. Let y be an element of the set  $A = \{1, 2, 3, 4, 5, 6, 10, 15, 30\}$  and  $x_1, x_2, x_3$  be integers such that  $x_1x_2x_3 = y$ , then the number of positive integral solutions of  $x_1x_2x_3 = y$  is

A. 27

B. 64

C. 81

D. 256

**Answer: B** 



B. 200

C. 144

D. 270

Answer: C



125. The number of times the digit 3 will be written when

listing the integers from 1 to 1000, is

A. 269

B. 271

C. 300

D. 302

Answer: C

Watch Video Solution

126. The number of points having position vector  $a\hat{i}+b\hat{j}+c\hat{k}$ , where  $1\leq a,b,c\leq 10$  and  $a,b,c\in N$ ,

such that  $2^a + 3^b + 5^c$  is a multiple of 4 is (A) 1000 (B) 500 (C) 250 (D) 125

A. 70

B. 140

C. 210

D. 280

Answer: A



127. Number of positive unequal integral solutions of the

equation x + y + z = 12 is

A. 21

B.42

C. 63

D. 84

Answer: B

Watch Video Solution

**128.** 12 boys and 2 girls are to be seated in a row such that there are atleast 3 boys between the 2 girls. The number of ways this can be done is  $\lambda imes 12!$ . The value of  $\lambda$  is B. 110

C. 20

D.45

Answer: B



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

 $B.4^n$ 

 $C.4^n - 2^n$ 

 $\mathsf{D.}\,4^n-3^n$ 

### Answer: D

**Vatch Video Solution** 

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

A. 14

B. 17

C. 23

D. 29

Answer: A



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

A. 3

B. 4

C. 5

### Answer: C



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

- A. 9
- B. 16
- C.  $rac{3}{2}\cdot .^4$   $C_2$ D.  $5_{C_2}+.^3$   $P_2$

#### Answer: A::C

133. Number of ways in which three numbers in A.P. can be

selected from 1, 2, 3, ..., n is a.  $\left(\frac{n-1}{2}\right)^2$  if n is even b.  $\left(\frac{n-2}{4}\right)$  if n is even c.  $\left(\frac{n-1}{4}\right)^2$  if n is odd d. none of

these

A. 
$$\left(\frac{n-1}{2}\right)^2$$
, if n is even  
B.  $\frac{n(n-2)}{4}$ , if n is even  
C.  $\frac{(n-1)^2}{4}$ , if n is odd  
D.  $\frac{n(n+1)}{2}$ , if n is odd.

# Answer: B::C



**134.** If n objects are arrange in a row, then the number of ways of selecting three of these objects so that no two of them are next to each other is

A. 
$$.^{n-2} C_3$$
  
B.  $.^{n-3} C_3 + .^{n-3} C_2$   
C.  $\frac{(n-2)(n-3)(n-4)}{6}$ 

 $\mathsf{D..}^n C_2$ 

# Answer: A::B::C



135. Given that the divisors of  $n=3^p\cdot 5^q\cdot 7^r$  are of of the

form  $4\lambda+1, \lambda\geq 0.$  Then,

A. p+r is always even

B. p+q+r is even orr odd

C. q can be any integer

D. if p is even, then r is odd

Answer: A::B::C



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

A. is coefficient of  $x^{15}$  in  $x^6 ig(1+x+x^2+\ldots\inftyig)^6,\,\,$  if

no bag remains empty

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

C. is same as number of the integral solutions of

$$a+b+c+d+e+f = 15$$

D. is same as number of non-negative integral

solutions of 
$$\sum_{i=1}^6 x_i = 15$$

#### Answer: A::B::D

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

A. 12

B. 6

C. 36

D. 14

Answer: B

Watch Video Solution

138. All the letters of the word 'AGAIN' be arranged and the words thus formed are known as 'Simple Words'.Further two new types of words are defined as follows:(i) Smart word: all the letters of the word 'AGAIN' are being used, but vowels can be repeated as many times as we need.

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

Q. Number of 7 letter smart words is a. 1500 b. 1050 c. 1005 d. 150

A. 1500

B. 1050

C. 1005

D. 150

Answer: B



139. All the letters of the word 'AGAIN' be arranged and the words thus formed are known as 'Simple Words'.Further two new types of words are defined as follows:(i) Smart word: all the letters of the word 'AGAIN' are being used, but vowels can be repeated as many times as we need.

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

Q. Number of 7 letter dull words in which no two vowels

are together, is a. 402 b. 420 c. 840 d. 42

A. 402

B. 420

C. 840

D. 42

Answer: B



**140.** Consider a plygon of sides 'n' which satisflies the equation 3.  $.^n p_4 = .^{n-1} p_5$ 

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

A. 20

B.35

C. 56

D. 84

### Answer: D



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

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

A. 96

B. 100

C. 150

D. 156

# Answer: C



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

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

A. 50

B. 60

C. 70

D. 80

Answer: A



**143.** Consider the number N=2016. Find the Number of cyphers at the end of  $.^N \, C_{N\,/\,2}$  is

A. 0

B. 1

C. 2

D. 3

# Answer: C



**144.** Consider the number N=2016.Find the Sum of the even divivisors of the number N.

A. a) 6552

B. 6448

C. 6048

D. 5733

Answer: B



145. If 
$$\binom{18}{r-2}+2\binom{18}{r-1}+\binom{18}{r}\geq \binom{20}{13}$$
, then

the number of values of r are

Watch Video Solution
**146.** If  $\lambda$  be the number of 3-digit numbers are of the form

xyz with  $x < y, z \leq y \, ext{ and } x 
eq 0$ , the value of  $rac{\lambda}{30}$  is



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

147.



**148.** Statement-1: Number of rectangles on a chessboard is  $.^{8} C_{2} \times .^{8} C_{2}$ .

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

A. Statement-1 is true, statement-2 is true, statement-2

is a correct explanation for statement-1

B. Statement-1 is true, statement-2 is true, statement-2

is not a correct explanation for statement-1

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

149. Statement-1: If 
$$f: \{a_1, a_2, a_3, a_4, a_5\} \to \{a_1, a_2, a_3, a_4, a_5\}$$
, f is onto and  $f(x) \neq x$  for each  $x \in \{a_1, a_2, a_3, a_4, a_5\}$ , is equal to 44.

Statement-2: The number of derangement for n objects is  $n! \sum_{r=0}^{n} \frac{(-1)^r}{r!}.$ 

A. Statement-1 is true, statement-2 is true, statement-2

is a correct explanation for statement-1

B. Statement-1 is true, statement-2 is true, statement-2

is not a correct explanation for statement-1

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

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

### Answer: a



151. Find the sum of the series

$$ig(1^2+1ig)1!+ig(2^2+1ig)2!+ig(3^2+1ig)3!+\ldots+ig(n^2+1ig)n!$$



152. Find the negative terms of the sequence

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

Watch Video Solution

**153.** Find the number of integers between 1 and 1000 having the sum of the digits 18.



**154.** How many different car licence plates can be constructed, if the licences contain three letters of the

English alphabet followed by a three digit number, if

repetition are allowed?



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

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



157. A number of four different digits is formed with the

help of the digits 1,2,3,4,5,6,7 in all possible ways. How

many such numbers can be formed?

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

# Watch Video Solution

**159.** Let n and k be positive integers such that n ge K(K +

1)/2 . Find the number of solutions ( $x_1, x_2, x_3, \ldots, x_k$ ) $x_1 \geq 1, x_2 \geq 2, \ldots, X_k \geq k$  , all integers

satisfying the condition

 $x_1+x_2+x_3+\ldots\ldots X_k=n.$ 

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



161. How many different numbers which are smaller than

 $2 imes 10^8$  and are divisible by 3, can be written by means of

the digits 0,1 and 2?

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

Watch Video Solution

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



164. How many different seven digit numbers are there,

the sum of whose digits is even ?



Watch Video Solution

**165.** There are 2n guests at a dinner party. Supposing that eh master and mistress of the house have fixed seats opposite one another and that there are two specified guests who must not be placed next to one another, show that the number of ways in which the company can be placed is  $(2n - 2!) \times (4n^2 - 6n + 4)$ . **166.** Find the number of triangles whose angular points are at the angular points of a given polygon of n sides, but none of whose sides are the sides of the polygon.

Watch Video Solution

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

Watch Video Solution

Jee Type Solved Examples Single Matching Type Questions

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

1.

## Watch Video Solution

## **Exercise For Session 1**

**1.** There are three routes: air, rail and road for going from Chennai to Hyderabad. But from Hyderabad to Vikarabad, there are two routes, rail and road. The number of routes from Chennai to Vikarabad via Hyderabad is: A. (a) 4

B. (b) 5

C. (c) 6

D. (d) 7

Answer: C

Watch Video Solution

**2.** There are 6 books on mathematics, 4 books on physics annd 5 books on chemistry in a book shop. The number of ways can a student purchase either a book on mathematics or a book on chemistry, is B. 11

C. 8

D. 15

Answer: B

Watch Video Solution

**3.** If a, band c are three consecutive positive integers such that  $\frac{1}{a!} + \frac{1}{b!} = \frac{\lambda}{c!}$  then find the value of root under lambda.

A. a

С. с

D. a+b+c

Answer: C

Watch Video Solution

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

A. i) AP

B. ii) GP

C. iii) HP

D. iv) AGP

## Answer: A



### Answer: C



6. If  $15! = 2^{\alpha} \cdot 3^{\beta} \cdot 5^{\gamma} \cdot 7^{\delta} \cdot 11^{\theta} \cdot 13^{\phi}$ , then the value of  $\alpha - \beta + \gamma - \delta + \theta - \phi$  is: A. (a) 4 B. (b) 6 C. (c) 8 D. (d) 10

### Answer: B

Watch Video Solution

7. Find the number of naughts standing at the end of 125!

A. 29

B. 30

C. 31

D. 32

Answer: C

Watch Video Solution

8. The exponent of 12 in 100! is

A. 24

B. 25

C. 47

D. 48

### Answer: C



## **9.** The number 24! is divisible by

 $\textbf{A.}~\textbf{6}^{24}$ 

 $\mathsf{B.}\,24^6$ 

 $C. 12^{12}$ 

D.  $48^5$ 

Answer: B



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

A. 2

B.4

C. 6

D. 8

### Answer: B



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

(a) 31 (b) 32 (c) 33 (d) None of these

A. 31

B. 32

C. 33

D. None of these

### Answer: D



**Exercise For Session 2** 

**1.** If  $.^n P_5 = 20.^n P_3$ , find the value of n.

A. 4

B. 8

C. 6

D. 7

Answer: B



A. 20

B.40

C. 60

D. 80

### Answer: C

# Watch Video Solution

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

### A. 60

B. 24

C. 120

D. 6

Answer: D



**4.** If five seats are vacant in a train, the number of ways three passengers can sit is:

A. (a) 10

B. (b) 20

C. (c) 30

D. (d) 60

Answer: D



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

A. 10

B. 12

C. 15

D. 18

Answer: B



**6.** 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.  $^{4}P_{4} \times ^{4}P_{4}$ 

A. 48

B. 7560

C. 10080

D. 696

Answer: D

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

A. 504

B.480

C. 624

D. 969

Answer: A



8. The number of all five digit numbers which are divisible

by 4 that can be formed from the digits 0,1,2,3,4 (without

repetition) is a. 36 b. 30 c. 34 d. None of these

A. 36

B. 30

C. 34

D. None of these

## Answer: B



9. How many words can be formed with the letters o the

word MATHEMATICS by rearranging them.

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

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

D. 11!

Answer: C



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

A. 9

B. 20

C. 40

D. 120

Answer: B



**11.** 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 different time tables can be compiled? a. 140 b. 210 c. 133 d. 72

A. 140

B. 210

C. 133

D. 72

Answer: B



12. Five persons entered the lift cabin on the ground floor of a 8 floor house. Suppose each of them can leave the cabin independently at any floor beginning with the first. The total number of ways in which each of the five person can leave the cabin at any one of the 7 floor, is (a)  $5^7$  (b)  $7^5$  (c) 35 (d) 2520 B.  $7^{5}$ 

C. 35

D. 2520

Answer: B



13. Four die are rolled. The number of ways in which

atleast one die shows 3, is

(a) 625 (b) 671 (c) 1256 (d) 1296

A. 625

B. 671

C. 1256

D. 1296

Answer: B



14. 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

A.  $4^5 - 5!$ 

 $B.\,505$ 

C. 600

D. 120

### Answer: B



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

(a) 2187 (b) 343 (c) 399 (d) 3279

A. 2187

B. 343

C. 399

D. 3279



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

A. 6!

B. 8!

C. 2(6)!

D. 2(7)!


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

A. 
$$\frac{3}{2}(7)!$$
  
B. 2(7)!  
C.  $\frac{5}{2}(7)!$ 

D. 3(7)!

# Answer: C



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

A. 4!

 $\text{B.}\,3!\times4!$ 

C. 3!

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

### Answer: A

Watch Video Solution

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

A. i) 54

B. ii) 72

C. iii) 114

D. iv) 360

Answer: B



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

A. i) 6

B. ii) 72

C. iii) 24

D. iv) 60

Answer: C



6. In how many ways can 5 boys and 3 girls sit in a row so

that no two girls are together ?

A. 5! imes 3!

B. .<sup>4</sup>  $P_3 \times 5!$ 

C. .<sup>6</sup>  $P_3 \times 5!$ 

D. .<sup>5</sup>  $P_3 imes 3!$ 

### Answer: C

Watch Video Solution

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

A. .<sup>*n*</sup> 
$$C_{n_1}$$

 $\mathsf{B..}^n P_{n_1}$ 

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

 $\mathsf{D}.\,.^n\,P_{n_{1-1}}$ 

# Answer: B



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

A. 7!

 $B.7! \times 6!$ 

 $C.(6!)^2$ 

D.  $(7!)^2$ 

Answer: B

**Watch Video Solution** 

9. Find number of ways that 8 beads o different colors be

strung as a necklace.

A. 2520

B. 2880

C. 4320

D. 5040



**10.** A committee of 11 members sits at a round table. In how many ways can they be seated if the 'President' and the 'Secretary' choose to sit together?

A. 9! imes 2

B. 10!

C. 10! imes 2

D. 11!

### Answer: A



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

A. 12! imes 2

 $\mathsf{B.}\,24$ 

C. 15! imes 2

D. 30

Answer: A

Watch Video Solution

1. If 
$${}^{43}C_{r-6} = {}^{43}C_{3r+1}$$
 then the value of  $r$  is a. 12 b. 8 c. 6  
d. 10 e. 14  
A. 6  
B. 8  
C. 10

D. 12

Answer: D



**2.** If  $\ \ 18C_{15} + 2^{18}C_{16} + {}^{17}C_{16} + 1 = {}^nC_3$ , then n =

A. 18

B. 20

C. 22

D. 24

Answer: B

Watch Video Solution

**3.** If  $.^{20} C_{n+1} =^{n} C_{16}$ , then the value of n is a.7 b. 10 c. 13

d. None of these

A. 7

B. 10

C. 13

D. None of these

# Answer: D



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

A. .
$$^{47} C_6$$

B.  $.^{52} C_5$ 

 $\mathsf{C.}.^{52}C_4$ 

D. None of these

## Answer: C

Watch Video Solution

5. If 
$${}^{n}C_{3} + {}^{n}C_{4} > {}^{n+1}C_{3}$$
, then.

A. n>6

 $\mathsf{B.}\,n<6$ 

 $\mathsf{C}.\,n>7$ 

 ${\rm D.}\,n<7$ 



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

A. 2

B. 3

C. 4

D. 5

#### **Answer: A**



**8.** If  $C_3: C_3: C_2 = 44:3$ , for which of the following value

of r, the value of  $.^n C_r$  will be 15.

B. r=4

C. r=5

D. r=6

Answer: B

**Watch Video Solution** 

9. If 
$$\hat{\ }nP_r=^nP_{r+1}and^nC_r=^nC_{r-1,}$$
 then the value of  $n+r$  is.

A. 2

B. 3

C. 4

D. 5

# Answer: B



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

A. 1

B. 3

C. 5

D. 7

Answer: D



**11.** If  $.^{n} P_{3} + .^{n} C_{n-2} = 14n$ , the value of n is (a) 5 (b) 6 (c) 8 (d) 10

A. 5

B. 6

C. 8

D. 10

Answer: A



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

A. 36

B. 99

C. 108

D. 165

Answer: D

Watch Video Solution

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

A. 2002

B. 2008

C. 2020

D. 8002

Answer: A



14. A man has 10 friends. In how many ways he can invite one or more of them to a party? a. 10! b.  $2^{10}$  c. 10! - 1 d.  $2^{10} - 1$ 

A. 10!

 ${\rm B.}\,2^{10}$ 

C.10! - 1

 $\mathsf{D.}\,2^{10}-1$ 

Answer: D



**15.** In an examinations there are three multiple choice questions and each questions has 4 choices. Find the number of ways in which a student can fail to get all answer correct.

A. 11

B. 12

C. 27

D. 63

Answer: D

Watch Video Solution

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

A. 6

B. 7

C. 8

D. 10

Answer: C



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

A. 3700

B. 3720

C. 4340

D. None of these

Answer: B

Watch Video Solution

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

A. 4 B. 8

C. 16

D. 32

Answer: A

Watch Video Solution

**Exercise For Session 5** 

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

A. 124

B. 125

C. 167

D. 168

Answer: C



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

A. (a) $2^{32}$ 

- $\mathsf{B.(b)}(32)^2-1$
- C. (c) $2^{32}-1$

D. (d) $2^{31}$ 

Answer: C



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

A. (a) m+1

B. (b)  $(m+1)2^n$ 

C. (c)  $m \cdot 2^n + 1$ 

D. (d) None of these

Answer: D



4. Number of proper factors of 2400 is equal to

(a) 34 (b) 35 (c) 36 (d) 37

A. 34

B.35

C. 36

D. 37

Answer: A



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

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

 $\mathsf{B}.\, 3^2 \cdot 7^1 \cdot 11^2 \cdot 31$ 

 $\mathsf{C.}\ 3\cdot 7\cdot 11\cdot 31$ 

D. None of these

# Answer: B



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

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

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

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

### Answer: B

Watch Video Solution

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

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

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

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

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



divisible by 10, are: a. 18 b. 27 c. 34 d. 43

A. 18

B. 27

C. 34

D. 43

Answer: A



**9.** Total number of 480 that are of the form 4n+2,  $n \ge 0$ ,

is equal to

A. 2

B. 3

C. 4

D. 5

### Answer: C



10. Total number of divisors of  $N=2^5\cdot 3^4\cdot 5^{10}\cdot 7^6$  that

are of the form  $4n+2, n\geq 1$ , is equal to a. 54 b. 55 c.

384 d. 385

A. 54

B. 55

C. 384

D. 385

## Answer: C



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

B. 30

C. 120

D. 240

Answer: D



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

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

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

Answer: A



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

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

**Answer: B**


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

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

## Answer: C



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

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

#### Answer: B



**16.** The total number of ways in which 2n persons can be divided into n couples is a.  $\frac{2n!}{n!n!}$  b.  $\frac{2n!}{(2!)^3}$  c.  $\frac{2n!}{n!(2!)^n}$  d.

none of these

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

D. None of these

#### Answer: C



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

A. *n* !

- $\mathsf{B.}\,n {!.}^n \, C_2$
- $\mathsf{C}.\,(n-1)\,!.^n\,C_2$
- D.  $n!.^{n-1}C_2$

### Answer: B



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

A. 490

B. 980

C. 2940

D. 5880

Answer: C



**Exercise For Session 6** 

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

A. 18

B. 108

C. 1008

D. 10008

Answer: C



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

A. 231

B. 331

C. 175

D. 531

Answer: C



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

A. 5

B. 7

C. 9

D. 11

Answer: A



**4.** Number of non-negative integral solutions of the equation a+b+c=6 is a. 28 b. 32 c. 36 d. 56

A. 28

B. 32

C. 36

D. 56

## Answer: A



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

d. 140

A. 272

B. 136

C. 240

D. 120

#### Answer: B



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

A. 55

B. 66

C. 45

D. None of these

## Answer: A





B. 27

C. 36

D. 51

Answer: C



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

A. 719

B. 265

C. 454

D. None of these

#### Answer: C

**Watch Video Solution** 

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

A. 
$$.^{2m+3} C_3$$
  
B.  $\left(rac{1}{3}
ight)(m+1)\left(2m^2+4m+1
ight)$   
C.  $\left(rac{1}{3}
ight)(m+1)\left(2m^2+4m+3
ight)$ 

D. None of these

Answer: C



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

A. 72

B. 71

C. 66

D. 52

Answer: A



**11.** If a,b, and c are positive integers such that  $a+b+c \le 8$ , the number of possible values of the ordered triplet (a,b,c) is

A. 84

B. 56

C. 83

D. None of these

#### Answer: B



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

A. 685

B. 785

C. 1125

D. None of these

Answer: A



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

A. 36

B. 90

C. 120

D. None of these

## Answer: C

Watch Video Solution

**14.** There are 12 points in a plane in which 6 are collinear. Number of different straight lines that can be drawn by joining them, is a.51 b.52 c.132 d.18 B. 52

C. 132

D. 18

Answer: B



**15.** 4 points out of 11 points in a plane are collinear. Number of different triangles that can be drawn by joining them, is a. 165 b. 161 c. 152 d. 159

A. 165

B. 161

C. 152

D. 159

Answer: B



**16.** ABCD is a convex quadrilateral and 3, 4, 5, and 6 points are marked on the sides AB, BC, CD, and DA, respectively. The number of triangles with vertices on different sides is a. 270 b. 220 c. 282 d. 342

A. 270

B. 220

C. 282

D. None of these

Answer: D



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

A. 116

B. 120

C. 117

D. None of these

Answer: C



**18.** 4 points out of 8 points in a plane are collinear. Number of different quadrilateral that can be formed by joining them is

A. 56

B.60

C. 76

D. 53

### Answer: D



**19.** There are 2n points in a plane in which m are collinear. Number of quadrilaterals formed by joining these lines: a. is equal to  $.^{2n} C_4 - .^m C_4$  b. is greater than  $.^{2n} C_4 - .^m C_4$  c. is less than  $.^{2n} C_4 - .^m C_4$  d. None of these

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

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

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

D. None of these



**20.** In a polygon the number of diagonals is 54. The number of sides of the polygon, is A. 10 B. 12 C. 9 D. None of these

A. 10

B. 12

C. 9

D. None of these

#### Answer: B



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

A. 20

B. 28

C. 8

D. None of these

Answer: A

Watch Video Solution

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

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

 $\mathsf{C}.\,n^2$ 

D. None of these

Answer: A



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

A. 15

B. 22

C. 29

D. 36

Answer: B



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

A. 
$$(.^m C_2)^2$$
  
B.  $(.^{m+1} C_2)^2$   
C.  $(.^{m+2} C_2)^2$ 

D. None of these

# Answer: C



25. The number of rectangles excluding squares from a rectangle of size 11 imes 8 is  $48\lambda$ , then the value of  $\lambda$  is

A. 13

B. 23

C. 43

D. 53

Answer: C

Watch Video Solution

**26.** The number of ways the letters of the word PERSON cann be placed in the squares of the figure shown so that

# no row remain empty is



A. 24 imes 6!

- ${\rm B.}\,26\times6!$
- ${\sf C.}\,26 imes7!$
- D. 27 imes7!

Answer: **B** 

Watch Video Solution

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

A. 3

B. 5

C. 6

D. 7

**Answer: B** 

Watch Video Solution

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

A. 121

B. 122

C. 598

D. 599

Answer: D



3. The letters of the word "MUMBAI" are arranged in all

possible ways as in a dictionary, the rank of the word

'MUMBAI' is

A. 297

B. 295

C. 299

D. 301

Answer: A



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

A. 2016

B. 2017

C. 2018

D. 2019

Answer: C

Watch Video Solution

5. If all the letters of the word 'AGAIN' be arranged as in a

dictionary, then fiftieth word is

A. NAAGI

**B. NAGAI** 

C. NAAIG

D. NAIAG

Answer: C

Watch Video Solution

Exercise Single Option Correct Type Questions

**1.** A lady gives a dinner party to 5 guests to be selected from nine friends. The number of ways of forming the party of 5, given that two of the friends will not attend the party together, is B. 126

C. 91

D. None of these

Answer: C



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

A. 165

B.455

C. 310

D. None of these

Answer: A

Watch Video Solution

**3.** If l = LCM of 8!, 10! and 12! and h = HCF of of 8!, 10! and 12! then  $\frac{l}{h}$  is equal to a)132 b)11800 c)11880 d)None of these

A. 132

B. 11800

C. 11880
# D. None of these

### Answer: C



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

A. 9

B. 8

C. 5

D. None of these



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

A. 45

B. 18

C. 27

D. 68

# Answer: C



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

A. 1

B. 100

C. infinite

D. 0

Answer: C

Watch Video Solution

**7.** In a plane there are 37 straight lines, of which 13 passes through the point A and 11 passes through point B. Besides, no three lines passes through one point no line passes through both points A and B and no two are parallel, then find the number of points of intersection of the straight line.

A. 535

B. 601

C. 728

D. 963

Answer: A



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

A. 15

B. 12

C. 10

D. 18

Answer: B



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

A. 130

B. 131

C. 156

D. 158

Answer: B



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

A. 90

B. 91

C. 92

D. 93

Answer: D



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

A. 210

B. 225

C. 196

D. 105

Answer: A



**12.** State { 2,3, 4 } is a subset of { 1, 2, 3, 4, 5 }?

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

A. 
$$.^{m+n+k} C_3$$
  
B.  $.^{m+n+k} C_3 \_ .^m C_3 - .^n C_3 - .^k C_3$   
C.  $.^m C_3 + .^n C_3 + .^k C_3$ 

D. None of these

### Answer: B



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

A. 
$$.^n P_3$$
  
B.  $n^3 - .^n P_3$   
C.  $3n^2 - 2n$   
D.  $3n^2(n-1)$ 

Answer: B



15. The total number of five-digit numbers of different digits in which the digit in the middle is the largest is a.  $\sum_{n=1}^{9}$   $\hat{n}P_4$  b. 33(3!) c. 30(3!) d. none of these A.  $2^2 \cdot 3^2 \cdot 7^2$ B.  $2^{3} \cdot 3 \cdot 7^{3}$ C.  $2^2 \cdot 3^3 \cdot 7^2$ D.  $2^3 \cdot 3^2 \cdot 7^3$ 

#### Answer: C



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

A. 504

B. 480

C. 600

D. 720

Answer: A



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

A. 360

B. 420

C. 170

D. 510

Answer: D

Watch Video Solution

18. The number of three digit numbers of the form xyz such that  $x < y, z \leq y$  and  $x \neq 0$ , is a ) 240 b) 244 c) 276 d) 285

A. 240

B. 244

C. 276

D. 285

Answer: C



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

A. 119

B. 120

C. 121

D. 122

Answer: D



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

A. 10!

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

C. 9!

D. None of these

#### Answer: B



**21.** Let A be the set of 4-digit numbers  $a_1a_2a_3a_4$  where

 $a_1>a_2>a_3>a_4$ , then n(A) is equal to

A. 126

B. 84

C. 210

D. None of these

Answer: C

Watch Video Solution

**22.** How many 3 digit numbers can be formed from the digits 1, 2 , 3, 4 and 5 assuming that repetition of the

digits is allowed.

A. 15

B. 13

C. 12

D. 11

### Answer: D



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

A. 30

B.36

C. 90

D. 120

Answer: D

Watch Video Solution

**24.** ABCD is a convex quadrilateral and 3, 4, 5, and 6 points are marked on the sides AB, BC, CD, and DA, respectively. The number of triangles with vertices on different sides is a. 270 b. 220 c. 282 d. 342

B. 270

C. 282

D. 342

Answer: D



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

### A. 720

B.840

C. 960

D. 1260

Answer: C

**Watch Video Solution** 

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

A. 10

B. 15

C. 5

D. 8

## Answer: A

# Watch Video Solution

27. Let 
$$x_1, x_2, x_3, \ldots, x_k$$
 be the divisors of positive  
integer 'n' (including 1 and x). If  
 $x_1 + x_2 + \ldots + x_k = 75$ , then  $\sum_{i=1}^k \frac{1}{x_i}$  is equal to:  
A. (a)  $\frac{k^2}{75}$   
B. (b)  $\frac{75}{k}$   
C. (c)  $\frac{n^2}{75}$ 

D. (d) 
$$\frac{75}{n}$$



**28.** How many 4 letter code can be formed using the first 10 letters of the english alphabet if no letter can be repeated.

A. 35

B. 30

C. 50

D. 60

## Answer: A

29. Ten persons numbered 1, ,2 ...,10 play a chess tournament, each player against every other player exactly one game. It is known that no game ends in a draw. If  $w_1, w_2, w_{10}$  are the number of games won by players 1, ,2 3, ...,10, respectively, and  $l_1, l_2, \,, l_{10}$  are the number of games lost by the players 1, 2, ...,10, respectively, then a.  $\sum w_1 = \sum l_i = 45$  b.  $w_i + 1_i = 9$  c.  $\sum wi2_{=}81 + \sum li2$  d.  $\sum wi2_{=}\sum li2$ 

- A.  $\sum w_i^2 + 81 \sum l_i^2$
- B.  $\sum w_i^2+81=\sum l_i^2$
- C.  $\sum w_i^2 = \sum l_i^2$
- D. None of these

## Answer: C



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

## A. A. 54 B.53 C. 38 D.37

Β.

С.

D.

Answer: B

Watch Video Solution

# **Exercise More Than One Correct Option Type Questions**

1. If  $300 
eq 3^m imes$  an integer, then find the value of m .

A. m=148

B. m=150

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

integer

D.  $m=.^{150}C_2$ 

### Answer: A



**2.** If  $102! = 2^lpha \cdot 3^eta \cdot 5^\gamma \cdot 7^\delta$ ..., then

A. (a) lpha=98

B. (b)  $eta=2\gamma+1$ 

C. (c) lpha=2eta

D. (d)  $2\gamma=3\delta$ 

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



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

A. 
$$.^{n+1}C_3 + .^{n+2}C_3$$
  
B.  $\frac{n(n+1)(2n+1)}{6}$   
C.  $1^2 + 2^2 + 3^2 + \ldots + n^2$   
D.  $2(.^{n+2}C_3) - .^{n+1}C_2$ 

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



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

A. x < y

 $\mathsf{B.}\, x > y$ 

C. x + y = 4500

D. 
$$|x - y| = 56$$

#### Answer: A::D





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

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

 $\mathsf{B..}^n C_3$ 

C. 
$$rac{nig(n^2-1ig)}{6}$$
D.  $rac{nig(n^2-3n+2ig)}{6}$ 

#### Answer: A::C

Watch Video Solution

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

A. x=12

B. x=24

C. y=12

D. y=16

Answer: B::D



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

#### Answer: A::C



8. There are three teams x,x+1 and y childrens and total number of childrens in the teams is 24. if two

childrens of the same team do not fight, then

A. (a) maximum number of fights is 190

B. (b) maximum number of fights is 191

C. (c) maximum number of fights occur when x=7

D. (d) maximum number of fights occur when x=8

Answer: B::C::D

Watch Video Solution

**9.** How many 3 digit numbers can be formed from the digits 1, 2 , 3, 4 and 5 assuming that repetition of the digits is not allowed .

A. 
$$3 \mid (N-1)$$
  
B.  $n \mid (N_1)$   
C.  $(n+1( \mid (N-1)$   
D.  $3n(n+1) \mid (N-1)$ 

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

Watch Video Solution

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

A. 2! imes 10! imes 10!

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

 $\mathsf{C.}\ 3^2\cdot 5^3\cdot 11^2$ 

D. `136125

Answer: B::C::D

Watch Video Solution

# Exercise Passage Based Questions

1. Find the value of 4!

Watch Video Solution

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

A. 11460

B. 10400

C. 12600

D. 9860

Answer: C



**3.** Consider the Word W=TERRORIST.

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

A. 9860

B. 1080

C. 10200

D. 11400

Answer: C



**4.** How many 3 digit even numbers can be formed from the digits 1, 2 , 3, 4, 5 and 6 assuming that repetition of the digits is allowed .

A. 120

B. 96

C. 24

D. 420

Answer: C

Watch Video Solution

5. Different words are formed by arranging the letters of

the word SUCCESS, then find the total possible words .

A. 120

B. 96

C. 24

D. 180

Answer: B

**Watch Video Solution** 

6. Different words are formed by arranging the letters of

the word SUCCESS, then find the total possible words .

A. 42

B.40

C. 420

D. 480





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

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

A. 1260

B. 960

C. 900

D. 600

Answer: C



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

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

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

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

A. 1260

B. 900

C. 660

D. 240

## Answer: C





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

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

A. 340

B. 341

C. 342

D. 343

Answer: C

Watch Video Solution

10. Let S(n) denotes the number of ordered pairs (x,y) satisfying  $rac{1}{x}+rac{1}{y}=rac{1}{n},\ orall,\,n\in N$  , then find S(10) .

A. 3

B. 6

C. 9

D. 12

## Answer: C



11. Let S(n) denotes the number of ordered pairs (x,y) satisfying  $rac{1}{x}+rac{1}{y}=rac{1}{n},\ orall,\,n\in N$  , then find S(10) .

A. S(3)+S(4)

B. S(5)+S(6)

C. S(8)+S(9)

D. S(1)+S(11)

## Answer: C



12. Let (S) denotes the number of ordered pairs (x,y) satisfying  $rac{1}{x}+rac{1}{y}=rac{1}{n},x,y,n\in N.$ Q.  $\sum_{r=1}^{10}S(r)$  equals B.48

C. 49

D. 50

Answer: B



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

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

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

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

A. 376

B. 377

C. 321

D. 370

Answer: B

Watch Video Solution

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

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

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

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

A. 1

B. 2

C. 3

D. 4

Answer: C



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

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

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

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

A. 144

B. 360

C. 4320

D. 14400

Answer: D



**Exercise Single Integer Answer Type Questions** 

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

Watch Video Solution

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

Watch Video Solution

3. about to only mathematics

Watch Video Solution

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

Watch Video Solution

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



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

Watch Video Solution

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

Watch Video Solution

8. In a certain test, there are n questions. In this test,  $2^{n-k}$  students gave wrong answers to atleast k questions,

where  $k=1,2,3, \ldots$ , If the total number of wrong answers

given in 127, then the value of n is



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



**10.** There are five points A,B,C,D and E. no three points are collinear and no four are concyclic. If the line AB

intersects of the circles drawn through the five points. The number of points of intersection on the line apart from A and B is



# Exercise Matching Type Questions

# 1. Match the following Column I to Column II

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



**2.** If A = { 3 , 5, 7, 9 , 11} and B = { 7,9,11,13 } then find A

intersection **B** 



# Permutations And Combinations Exercise 5 Matching Type Questions

# 1. Match the following Column I to Column II

	Column I		Column II	
(A)	Number of increasing permutations of $m$ symbols are there from the $n$ set numbers $(a_1, a_2, \ldots, a_n)$ , where the order among the numbers, is given by $a_1 < a_2 < a_3 < \ldots < a_{m-1} < a_m$ is	(p)	n <sup>m</sup>	
(B)	There are $m$ men and $n$ monkeys. Number of ways in which every monkey has a master, if a man can have any number of monkeys is	(q)	<sup>m</sup> C <sub>n</sub>	
(C)	Number of ways in which $r$ red balls and $(m - 1)$ green balls can be arranged in a line, so that no two red balls are together is (balls of the same colour are alike)	(r)	<sup>n</sup> C <sub>m</sub>	
(D)	Number of ways in which ' $m$ ' different toys can be distributed in $n$ children, if every child may received any number of toys is	(s)	m <sup>n</sup>	

Watch Video Solution

2. Five balls are to be placed in three boxes in how many

diff. ways can be placed the balls so that no balls remain

empty if

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

Watch Video Solution

# Exercise Statement I And Ii Type Questions

1. Statement-1: The smallest positive integer n such that n!

can be expressed as a product of n-3 consecutive integers,

is 6.

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

A. Statement-1 is true, statement-2 is true, statement-2

is a correct explanation for statement-1

B. Statement-1 is true, statement-2 is true, statement-2

is not a correct explanation for statement-1

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

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

**Answer: B** 



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

A. Statement-1 is true, statement-2 is true, statement-2

is a correct explanation for statement-1

B. Statement-1 is true, statement-2 is true, statement-2

is not a correct explanation for statement-1

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

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

#### Answer: C



- **3.** Statement-1: The number of divisors of 10! Is 280.
- Statement-2: 10!= $2^p \cdot 3^q \cdot 5^r \cdot 7^s$ , where p,q,r,s  $\in$  N.
  - A. Statement-1 is true, statement-2 is true, statement-2

is a correct explanation for statement-1

B. Statement-1 is true, statement-2 is true, statement-2

is not a correct explanation for statement-1

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

#### Answer: D



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

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

A. Statement-1 is true, statement-2 is true, statement-2

is a correct explanation for statement-1

B. Statement-1 is true, statement-2 is true, statement-2

is not a correct explanation for statement-1

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

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

Answer: C



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

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

A. Statement-1 is true, statement-2 is true, statement-2

is a correct explanation for statement-1

B. Statement-1 is true, statement-2 is true, statement-2

is not a correct explanation for statement-1

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

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

## Answer: D



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

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

A. Statement-1 is true, statement-2 is true, statement-2

is a correct explanation for statement-1

B. Statement-1 is true, statement-2 is true, statement-2

is not a correct explanation for statement-1

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

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

## Answer: A



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

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

A. Statement-1 is true, statement-2 is true, statement-2

is a correct explanation for statement-1

B. Statement-1 is true, statement-2 is true, statement-2

is not a correct explanation for statement-1

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

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

## Answer: B



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

A. Statement-1 is true, statement-2 is true, statement-2

is a correct explanation for statement-1

B. Statement-1 is true, statement-2 is true, statement-2

is not a correct explanation for statement-1

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

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

### Answer: A

Watch Video Solution

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

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

A. Statement-1 is true, statement-2 is true, statement-2

is a correct explanation for statement-1

B. Statement-1 is true, statement-2 is true, statement-2

is not a correct explanation for statement-1

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

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

#### Answer: A



10. Statement-1: There are  $p \ge 8$  points in space no four of which are in the same with exception of  $q \ge 3$  points which are in the same plane, then the number of planes each containing three points is  $P^{p}C_{3} - P^{q}C_{3}$ . Statement-2: 3 non-collinear points alwasy determine unique plane.

A. Statement-1 is true, statement-2 is true, statement-2

is a correct explanation for statement-1

B. Statement-1 is true, statement-2 is true, statement-2

is not a correct explanation for statement-1

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

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

Answer: D

Watch Video Solution

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

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

denotes the greatest integer function.

A. Statement-1 is true, statement-2 is true, statement-2

is a correct explanation for statement-1

B. Statement-1 is true, statement-2 is true, statement-2

is not a correct explanation for statement-1

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

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

Answer: D



12. Statement-1: A convex quindecagon has 90 diagonals. Statement-2: Number of diagonals in a polygon is  $.^{n} C_{2} - n.$ 

A. Statement-1 is true, statement-2 is true, statement-2

is a correct explanation for statement-1

B. Statement-1 is true, statement-2 is true, statement-2

is not a correct explanation for statement-1

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

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

**Answer:** A

Watch Video Solution

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

Watch Video Solution

**2.** Solve the equation  $3^{x+1}C_2 + ^2P_2x = 4^xP_2, x \in N.$ 

Watch Video Solution

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

Watch Video Solution

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

Watch Video Solution

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



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

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



**8.** A tea party is arranged for 16 persons along two sides of a long table with 8 chairs on each side. Four persons
wish to sit on one particular and two on the other side. In

how many ways can they be seated?



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



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



digits 1 to 9 if no digit is repeated



12. A boat is to be manned by eight men, of whom 2 can

only row on bow side and 1 can only row on stroke side; in

how many ways can the crew be arranged?



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



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



**15.** 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  $\frac{1}{8}n(n-1)(n-2)(n-3)$ 

Watch Video Solution

**16.** How many 5 digits telephone numbers can be constructed using the digits 0 to 9 if each number starts with 67 and no digit appears more than once?



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

A. 
$$(m + n + 1)^2$$
  
B.  $mn(m + 1)(n + 1)$   
C.  $m^{m+n-2}$   
D.  $m^2n^2$ 

Answer: D

Watch Video Solution

**2.** If the letters of the word SACHIN are arranged in all possible ways and these words are written out as in dictionary, then the word SACHIN appears at serial number 602 (2) 603 (3) 600 (4) 601

A. 603

B. 602

C. 601

D. 600

Answer: C



**3.** 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

- A. 252
- B. 254
- C. 225
- D. 224

Answer: D



**4.** At an election a voter may vote for nany number of candidates , not greater than the number t be eected. There are 10 candidates and 4 are to be elected. If a voter for at lest one candidates, thene the number of ways in which he can vote is (A) 5040 (B) 6210 (C) 385 (D) 1110

A. 5040

B. 6210

C. 385

D. 1110

Answer: C



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

A. 360

B. 192

C. 96

D. 48

Answer: C



6. The set  $S = \{1, 2, 3, \dots, 12\}$  is to be partitioned three sets A, B, C of equal size. Thus, into  $A\cup B\cup C=S, A\cap B=B\cap C=A\cap C=arphi$  . The number of ways to partition S is (1)  $\frac{12!}{3!(4!)^3}$  (2)  $\frac{12!}{3!(3!)^4}$ (3)  $\frac{12!}{(4!)^3}$  (4)  $\frac{12!}{(4!)^4}$ A.  $\frac{12!}{3!(4!)^3}$ B.  $\frac{12!}{3!(3!)^4}$ C.  $\frac{12!}{(4!)^3}$ D.  $\frac{12!}{(4!)^4}$ 

## **7.** Consider all possible permutations of the letters of the word ENDEANOEL. Match the statements/ expressions in

column I with the statement/expressions in

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

Watch Video Solution

8. How many different words can be formed by jumbling

the letters in the word MISSISSIPPI in which no two S are

adjacent? (A)  $7.^{6} C_{4}.^{8} C_{4}$  (B)  $8.^{6} C_{4}.^{7} C_{4}$  (C)  $6.7.^{8} C_{4}$  (D)  $6.8.^{7} C_{4}$ 

A.  $6 \cdot 7 \cdot .^{8} C_{4}$ B.  $6 \cdot 8 \cdot .^{7} C_{4}$ C.  $7 \cdot .^{6} C_{4} \cdot .^{8} C_{4}$ D.  $8 \cdot .^{6} C_{4} \cdot .^{7} C_{4}$ 

## Answer: C



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

Statement-1: The number of different ways the child can

buy the six ice-creams is  $.^{10} C_4$ .

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

A. Statement-1 is true, statement-2 is true, statement-2

is a correct explanation for statement-1

B. Statement-1 is true, statement-2 is true, statement-2

is not a correct explanation for statement-1

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

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

**Answer: A** 



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

A. 55

B. 66

C. 77

D. 88

Answer: C



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

A. atleast 1000

B. less than 500

C. atleast 500 but less than 750

D. atleast 750 but less than 1000

Answer: A



**12.** There are two urns. Urn A has 3 distinct red balls and urn B has 9 distinct blue balls. From each urn two balls are taken out at random and then transferred to the other. The number of ways in which this can be done is (1) 36 (2) 66 (3) 108 (4) 3

A. 36

B. 66

C. 108

D. 3

Answer: C



**13.** Statement-1: The number of ways of distributing 10 identical balls in 4 distinct boxes such that no box is empty is  ${}^9C_3$ .

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

A. Statement-1 is true, statement-2 is true, statement-2

is a correct explanation for statement-1

B. Statement-1 is true, statement-2 is true, statement-2

is not a correct explanation for statement-1

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

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

Answer: A



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

A. N>190

B.  $N \leq 100$ 

- C.  $100 < N \leq 140$
- D.  $140 < N \leq 190$



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

A. 75

B. 150

C. 210

D. 243



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

A. 7

B. 8

C. 9

D. 11



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

A. 
$$a_{17}=a_{16}+a_{15}$$
  
B.  $c_{17}
eq c_{16}+c_{15}$   
C.  $b_{17}
eq b_{16}+c_{16}$   
D.  $a_{17}=c_{17}+b_{16}$ 

## Answer: A



**18.** Assuming the balls to be identical except for difference in colours, the number of ways in which one or more balls can be selected from 10 white, 9 green and 7 black balls is (1) 880 (2) 629 (3) 630 (4) 879

A. 630

B. 879

C. 880

D. 629

Answer: B

Watch Video Solution

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

- A. 5
- B. 10
- C. 8
- D. 7

Answer: A





**21.** A coin is tossed 3 times and the outcomes are recorded . how many possible outcomes are there?



**22.** Let  $n \ge 2$  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



**23.** Six cards and six envelopes are numbered 1, 2, 3, 4, 5, 6 and cards are to be placed in envelopes so that each envelope contains exactly one card and no card is placed in the envelope bearing the same number and moreover cards numbered 1 is always placed in envelope numbered 2. Then the number of ways it can be done is a.264 b. 265 c. 53 d. 67

A. 264

B. 265

C. 53

D. 67

Answer: C



**24.** The number of integers greater than 6,000 that can be formed, using the digits 3, 5, 6, 7 and 8, without repetition, is : (1) 216 (2) 192 (3) 120 (4) 72

A. 120

B. 72

C. 216

D. 192

Answer: D



**26.** If all the words (with or without meaning) having five letters, formed using the letters of the word SMALL and

arranged as in a dictionary; then the position of the word SMALL is : (1) 46th (2) 59th (3) 52nd (4) 58th

A. 59th

B. 52nd

C. 58th

D. 64th

Answer: C



**27.** A debate club consists of 6 girls and 4 boys. A team of 4 members is to be selected from this club including the selection of a captain (from among these 4 members) for

the team. If the team has to include at most one boy, then

the number of ways of selecting the team is

A. 380

B. 320

C. 260

D. 95

Answer: A



**28.** A man X has 7 friends, 4 of them are ladies and 3 are men. His wife Y also has 7 friends, 3 of them are ladies and 4 are men. Assume X and Y have no common

friends. Then the total number of ways in which X and Y together can throw a party inviting 3 ladies and 3 men, so that 3 friends of each of X and Y are in the party, is : 469 (2) 484 (3) 485 (4) 468

A. 484

B. 485

C. 468

D. 469

