



MATHS

BOOKS - CHHAYA PUBLICATION MATHS (BENGALI ENGLISH)

PERMUTATION AND COMBINATION

Illustrative Examples

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



2. If $.^{4-x} P_2 = 6$, find the value of x.





4. If $.^{n+r+1}P_2 = 72$ and $.^{n-r}P_2 = 12$ then find the values of n and r.

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5. If
$$.^{2n+1} P_{n-1} : .^{2n-1} P_n = 3:5$$
 , find n.

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6. Show that , $(2n)! = 2^n . n! [1.3.5...(2n-1)].$

7. Show that 2.6.10.14.. To n factors = (n+1)(n+2)(n+3) ... to n

factors.



8. There are 17 stations from Howrah to Bandel on the railway line .
How many kinds of different single third class tickets must be printed so as to enable a passenger to travel from one station to another?



9. How many words can be made using all the letters in the word MONDAY ? How many of them being with M and do not end with Y?

10. How many words can be made from the letters of the word
COSTING so that the vowels
are always together
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11. How many words can be made from the letters of the word COSTING so that the vowels

are never together

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12. How many words can be made from the letters of the word

COSTING so that the vowels may occupy only old position.

13. Out of the letters A,B,C,p,q,r how many different words can be formed if

(i) the words always being with a capital letter

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14. Out of the letters A,B,C,p,q,r how many different words can be formed if

the words always being with a capital letter and end also with a capital letters ?

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15. In how many ways can 12 examination papers be arranged so that

the best and the worst papers may never come together ?



16. In how many of the permutations of the letters in the word SYNDICATE taken 4 at a time , there shall be

no vowel



17. In how many of the permutations of the letters in the word SYNDICATE taken 4 at a time , there shall be

at least one vowels?



18. How many numbers each lying between 1000 and 10000 can be formed with the digits 1,2,3,4,5,6,7 (no digit being repeated in any number) ?



19. How many odd numbers of 6 significant figures can be formed with the digits 0,1,4,5,6 and 7, none of the digits being repeatedin any of the numbers so formed ?



20. How many even numbers greater than 300 can be formed with the

digits, 1,2,3,4 and 5, no repetitions being allowed?

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21. 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)



22. Find the number of permutations of 20 things taken 5 at a time so

that one particular thing

will always occur



23. Find the number of permutations of 20 things taken 5 at a time so

that one particular thing will never occur.



24. In how many ways can the letters of the word ASSASSINATION be arranged ? In how many of these arangements the vowles always come together ?





27. How many numbers greater than a million can be formed with the

digits 3,4,4,0,3,5,4 ?



28. How many numbers of not more than 4 digits can be formed with

the 1,2,3 and 4 , repetations being allowed ?

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29. In how many ways can 10 H.S. students and 7 B.Com . Students be arranged in a line so that no two B.com. Students may sit together?
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30. Find the number of permutations of n different things taken r at
time so that $m(< r)$ particular things will always occur Vatch Video Solution

31. Find the number of permutations of n different things taken r at time so that $m(\ < r)$ particular things will never occur.



32. The first name of a person consists of 8 letters in which one letter occurs more than once while the other letters are different . If the number of permutations of the letters of his name taken all at a time be 6720 , find the number of times the like letter occurs.



33. Two different books have 3 volumes for each and three other different books have 2 volumes for each . In how many different ways can these 12 volumes be arranged on a shelf , so that the volumes of the same books may remain side by side ?

34. How many numbers of 5 significant digits can be formed using the

digits 5,6,7,8,0 with no digit being repeated in any number?

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35. In how many ways can 5 different subjects be arranged in 6 periods

of a class?

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36. There are four balls of different colours and four boxes of colours same as those of the balls. Find the number of way in which the balls ,one in each box,of its own colour.



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38. In how many ways can 6 men be seated at a round table ?
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39. In how many ways can 6 beads of different colour be arranged to
from a necklace?
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40. Find the values of

 $.^{10} C_4$

41. Find the values of

 $.^9 C_7$



42. If $\cdot^n C_2 = 28$, find n.

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43. If .^{*n*} $P_r = 504$ and .^{*n*} $C_r = 84$ find n and r.

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44. In a meeting there are 10 ladies and 15 gentlemen . A sub - committee consisting of 3 ladies and 5 gentlemen is to be formed . In how many different ways , the sub -committee can be formed ?



45. How many word , of different letters , each consisting of 2 vowels and 4 consonants can be formed from 4 vowels and 10 consonants ?

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46. At an election there are 5 candidates and 3 members are to be elected and a voter is entitled to vote for any number to be elected . In how many ways a voter choose his vote ?

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47. In how many can a committee of 5 be formed from 4 professors

and 6 students so as to include at least 2 professors ?



48. In how many ways 4 cards can be selected from a full pack of 52

cards, so as to include at least 2 aces?



49. A question paper contains 12 questions, divided into three parts. Part A contains 6 questions parts B and C contain 3 questions each A candidate is required to attempt 6 questions, selecting at least 3 questions from part A and at least one from each of the parts B and C In how many ways can the candidate select his 6 questions ?

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50. In how many ways can 7 men be slected from 16 men so that

4 particular men will not be there,



51. In how many ways can 7 men be slected from 16 men so that

4 paticular men will always be there ?

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52. There are n points in a plane , of which no three are collinear
expept m which are collinear. Find the number of
straight lines and
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53. There are n points in a plane , of which no three are collinear expept m which are collinear. Find the number of triangles formed by joining the points.



54. A man has 7 friends . In how many ways may he invite one or more

of them to party?

55. How many different factors can 210 have ?

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56. In how many a ways can 8 different things be divided into groups

of 5 and 3?

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57. In how many ways can 8 different things be divided equally into

two groups ?

58. In how many ways can 8 oranges of different sizes be divided equally between two boys ?



59. In how many ways can the crew of a ten -oared boat be arranged if

3 of the crew can row only on the stroke side and 2 can row only on

the bow side ?

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60. Find the number of

permutations in the letters of the word ACCOUNTANCY taken 4 at a

time .

61. How many different number of 4 digits each (without repetition of digits) can be formed with the digits 0,1,2,3,4,5,6.

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62. How many different number of 4 digits each (without repetition of digits) can be formed with the digits 0,1,2,3,4,5,6 so that the digits in each number are in the

ascending order?

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63. From 10 candidates how many selections of 5 can be made so as to

include both the youngest and the oldest





66. At a certain examination there are 6 question papers on six subjects . In order to pass the examination , a candidate has to secure a minimum of marks in each of the 6 papers . In how many different ways may a candidate fail ?

67. From 8 boys and 5 girls , how many different selections of 5 members can be made so as to include at least one boy and one girl ?

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68. How many different factors can 2160 have ?

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69. How many words of 5 differernt letters can be formed by taking 3

letters from the word POUND and 2 from the word GRAM ?



70. In an assembly of 10 scholars , three are mathematicians and three are physicists , the others are both physicists and mathematicians .

There are two rows containing 5 chairs and it is intended that all mathematicians are to be seated in one row and the physicsts in the other , the remaining scholars are to be seated in either row in the vacant positions left .In how many ways can all the scholars be seated ?

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

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72. Of the 14 articles , 10 are of sme type and each of the remaining is of different type . Find the number of combinations if 10 articles are taken at a time .

73. If n straight lines be drawn in a plane , no two of them being parallel and no three of them being concurrent , how many points of intersection will be there ?



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

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75. Prove that product of any r consecutive natural numbers is always

divisible by r!.



76. The results of 6 cricket test mathes (win loss or draw are to be predicted . How many different forecasts can contain exactly 2 correct results ?



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



78. Find the number of students to be selected at a time from a group of 14 students so that the number of selections is greatest. Find the greatest number of selections. Also find the greatest number of selections when there are 15 students.



79. five points are given on one of two parallel straight lines and ten points are given on the other straight line. How many triangles can be formed by taking these points as vertices of a triangle ?



80. In how many cases there will be 3 Sundays when 20 dates are named at random ?



81. In how many ways three girls and nine boys can be seated in two

vans, each having numbered seats, 3 in the front and 4 at the back.

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Exercise 7 A Mcq

1. If n and m
$$(< n)$$
 are two positive integers then
 $n(n-1)(n-2)...(n-m)=$
A. $\frac{n!}{(m+n)!}$
B. $\frac{n!}{(m-n)!}$
C. $\frac{m!}{(m-n-1)!}$
D. $\frac{n!}{(n-m-1)!}$

,

Answer:

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2.0! =

A. 0

B. 1

 $C.\infty$

D. undefined

Answer:



3.
$$m(m-1)(m-2)...3.2.1 =$$

A. m!

- B. (m + 1)!
- C.(m-1)!
- D. none of these

Answer:

4.
$$n(n-1)(n-2)! =$$

A. (n + 1) ! B. n ! C. (n - 1) ! D. (n - 2) !

Answer:

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5. The number of permutations of n different things taken r at a time in which 4 particular things never occur is -

A. $.^{n} P_{r-4}$ B. $.^{n-4} P_{r-4}$ C. $.^{n-4} P_{r}$ D. $.^{n} P_{r} - 4$

Answer: Watch Video Solution **6.** Which of the following is the value of $.^{10} P_3$? A. 360 B. 720 C. 1440 D. 240 Answer:

Watch Video Solution

7. If . $^{n}P_{r}=x.^{n-1}P_{r-1}$, then which of the following is the value of x?

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

C. $\displaystyle \frac{n-r}{n}$
D. $\displaystyle \frac{n}{n-r}$

Answer:

Watch Video Solution

8. Given , ${}^9P_5=x{}^9P_3$, state which of the following is the value of x :

A. 56

B. 42

C. 30

D. 20

Answer:

9. If n is a positive integer then $.^n P_n$ =

A. 1 B. 0 C. $.^{n-1} P_{n-1}$ D. $.^{n} P_{n-1}$

Answer:

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Exercise 7 A Very Short Answer Type Questions

1. If
$$.^{n+1}P_3 = 10.^{n-1}P_2$$
, find n.





3. If
$$.^{n+1} P_4 : {}^{n-1} P_3 = 72 : 5$$
, find n.



4. If 16.¹⁵
$$P_n = 13.^{16} P_n$$
, find n.

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5. Prove that
$$.^{2n} P_n = \{1.3.5..... (2n-1)\}.2n$$

6. If $.^9 P_5 + 5.^9 P_4 = {}^{10} P_r$, find r.

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7. In how many different ways can 4 prizes be distributed among 10

students ? (Each student being elible for one prize.)

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8. On entering a certain town ,4 travellers find that there are 5 hotels

in the town . If no two travellers get into the same hotel , find in how

many different ways can the travellers reside in the hotels ?



9. 12 ferry - steamers ply between Chandpal Ghat and Botanical Garden . In how many different ways can a person go from Chandpal Ghat to Botanical Garden in one steamer and return in a different steamer ?



10. There are 12 stations on a certain railway line . How many different kinds of tickets of class II must be printed in order that a passenger may go from any one station to any other ?

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11. How many different permutations can be made by taking all the

letters of the word BENGALI?





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14. Find the number of different perpmutations that can be made out

of the letters of the following words :

Commerce
15. Find the number of different perpmutations that can be made out

of the letters of the following words :

Accountant

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16. Find the number of different perpmutations that can be made out

of the letters of the following words :

Engineering

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17. Find the number of different perpmutations that can be made out

of the letters of the following words :

Statistics



18. Find the number of different perpmutations that can be made out

of the letters of the following words :

Success

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19. In how many ways can the letters of the name Gavaskar be arranged so that three a 's may come together ?

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20. In how many ways can the results of 3 successive football matches

be decided ?

21. In how many ways can a person post 5 letters in 4 letters boxes ?

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22. In how many ways four prizes - one for recitation , one for sports ,

one for smartness and one for general proficiency be given aways to 8

boys?

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23. How many three figure numbers can be formed with the digits 1,2,3,4,5,6,7,8,9 , if there is no restriction on the repetition of the digits

?



2. In how many ways can the letter of the word LOGARITHM be arranged ?how many of these arrangements beign with L? how many begin with L and do not end with M?



3. How many diffirent arrangements of the letter of the word BENGAL

can be made so that the two vowels do not come together?



4. In how many ways can the letters of the words STRANGE be arranged so that the vowels may appear in the odd places ?

5. Find how many arrangements can be formed with the letters in the word JUXTAPOSED the vowels always coming together.

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6. Show that the number of ways in which n books may be arranged on a shelf so that two particular books shall not be together is (n-2)(n-1)!



7. In how many ways 3 boys and 5 girls can be arranged in a row so

that all the 3 boys are together?





11. How many numbers lying between 3000 and 4000 can be formed

with the digits 1,2,3,4,5 and 6? (No repetition of digit is allowed .)

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12. If none of the digits 3,5,7,8,9 be repeated , how many different
numbers greater than 7000 can be formed with them ?
hambers greater than / 000 can be formed with them .
Vatch Video Solution
13. How many numbers of 4 - digit greater than 6,000 can be formed

with the digits 3,4,5,6,8? (No digit is repeated in any numbers .) How

manay of these numbers so formed are odd?

14. How many numbers of 5 digits can be formed with the digits

0,2,5,6,7 without taking any of these digits more than once?

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15. How many odd numbers of 5 significant digits can be formed with
the digits 3,6,7,2,0 when no digit is repeated ?
Vatch Video Solution

16. In how many ways can 5 commerce and 4 science students be arranged in a row so that the commerce and the science students are placed alternatelt ?

17. In how many ways can 5 first year students and 3 second year students be seated in a row so that no two second year students may sit together ?

Vatch	Video	Solution

18. In how many of the permutations of 12 things taken 3 at time will

one particular thing (a) always occur (b) never occur ?



19. In how many of the permutations of 12 things taken 6 at a time will

3 particular things (a) always occur b) never occur ?

20. In how many different ways can the letters of the word FOOTBALL

be arranged so that two O s do not come together?

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21. How many different arrangements are possible with the letters of		

the word ALGEBRA? In how many of these ,two A,s will not be together?

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22. How many diffferent words can be formed taking all the letters in

the word PEOPLE in which two P,s will not come together?



23. How many arrangements can be made out of the letters of the word COMMITTEE at a time , such that the four vowels do not come together?



24. Find the number of ways in which the letters of the word ORION

can be arranged so that two consonants do not come together.



25. Show that the letter of the word INSURANCE can be arranged in

twicw as many ways as the letters of the word ECONOMICS .

26. How many different arrangements can be made out of the letters of the expression $x^3y^2z^4$ when written at full length ?



27. The first name of a person consists of 9 letters in which one letters occurs more than once and the other letters are different . If the numbers of permutations of the letters of his name taken all at a time be 15120, find the number of times the like letters occurs .



28. How many numbers of six digits can be formed out of the digits of the numbers 5,6,7,7,2,4 ? How many of these numbers so formed are even ?

29. How many numbers of 8 digits can be formed with the digits

4,2,2,3,3,5,5 so that odd digits are always in odd palces ?

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30. How many numbers greater than a lac be formed with the digits

0,2,5,2,4,5?

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31. How many 6- digits even numbers can be formed from 2,3,5,3,4,5

alone ?

32. How many numbers lying between 3000 and 4000 can be formed with the digits 0,1,2,3.4 , if repetitions of digits being allowed ?

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33. In how many different ways can the four subjects be arranged in 5 periods of a class ?
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34. Find the rank of the word LATE when its letters are arranged as in a dictionary .



35. A code signal uses digit - letters - digit combinations but 0 and 1 are not used for either digits or letters . How many code signals are possible ?

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36. Find the rank of the word Mother when its letters are arranged as

in a dictionary.

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Exercise 7 A Long Answer Type Questions

1. Let $.^{n} P_{r}$ denote the number of permutations of n different things taken r at a time . Then , prove that $1 + 1.^{1} P_{1} + 2.^{2} P_{2} + 3.^{3} P_{3} + ... + n.^{n} P_{n} = .^{n+1} P_{n+1}.$

2. If
$$\frac{\cdot^{n} P_{r-1}}{a} = \frac{\cdot^{n} P_{r}}{b} = \frac{\cdot^{n} P_{r+1}}{c}$$
 prove that , $b^{2} = a(b+c)$
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3. Show that the numbers of permutations of n different things taken all at a time in which m particular things are never together is (n-m)!(n-m+1)!.



4. Find the number of numbers each less than 999 and divisible by 2 which can be formed with the digits 2,3,4,5,6 and 7, no digit occurring more than once in any number.



5. Find the numbers less than 1000 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 .



6. How many numbers of four digits can be formed from the numbers 1,2,3,4 ? Find the sum of all such numbers (the digits are to be used once only).

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7. A library has 5 copies of one books 4 cpies each of two books , 6 copies each of three books and 1 copy each of eight books . In how many ways can all the books be arranged ?

8. In how many ways can the letters of the word CONTACT be arranged (i) without changing the order of the vowels (ii) without changing the relative positions of vowels and consonants (iii) without changing the positions of the vowels ?

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9. Four different letters are written and the corresponding addresses are correctly written on four envelopes . One letter can be replaced in one envelope . Find the numbers of ways so that all the letters are wrongly placed.

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10. Find the total numbers of ways in which six '+' and four ' - ' signs can be arranged in a line such that no two '-' sign occur together.

11. If none of the digits 0,1,2,3,4 be repeated , how many numbers of 5 significant digit can be formed with them ?

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12. find the number of positive number with three digits divisible dy 5
such that the digits in each number in each number are different

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1.
$$C_r + C_r + C_{r-1} = C_{r-1} = C_r$$

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

 $\mathsf{B..}^n C_{r+1}$

 $\mathsf{C..}^{n+1}C_r$

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

Answer: C

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2. If . $^{n}P_{r}=x.^{n}C_{r}$ x=

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

 $\mathsf{B..}^n C_{r-1}$

 $\mathsf{C}.n!$

D. *r* !

Answer: D

3. If $.^n C_3 = k. \ n(n-1)(n-2)$ then k=

A. 1 B. $\frac{1}{2}$ C. $\frac{1}{3}$ D. $\frac{1}{6}$

Answer: D

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4. If $.^n C_p =^n C_q$ and $p \neq q$ then n-p=

A. n-q

B.p

C. q

 $\mathsf{D}.\, p+q$

Answer: C



5. If $(n-r+1)^n C_{r-1} = m imes^n C_r$ then m=

A. r!

B. 1

C. n

D. r

Answer: D



6. The number of combinations of n different things taken r at a time

in which p particular things always occur is -

A. $.^{n-p} C_{r-p}$ B. $.^{n-p} P_{r-p}$ C. pr D. (r-p)!

Answer: A

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7. The number of combinations of n different of n different things taken r at a time in which p particular things never occur is -

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

B. $.^{n-p} C_r$
C. $.^n C_r$
D. $\frac{(n-p)!}{r!}$

Answer: B Watch Video Solution **8.** which of the following is the value of .¹¹ C_8 +¹¹ C_9 ? A. 440 B. 330 C. 220 D. 110 Answer: C Watch Video Solution

9. Which of the followind is the value of .²¹ C_{19} ?

B. 280

C. 350

D. 420

Answer: A

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10. If . 16 $C_r = ^{16}$ C_{2r+1} , then which of the following is the value of r ?

A. 6

B. 5

C. 4

D. 3

Answer: B

Exercise 7 B Very Short Answer Type Questions

1. Explain the concept of permutation and combination.

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2. Find the value of n in each of the following cases :

 $\mathsf{if}\,.^n\,C_{n-2}=21$

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3. Find the value of n in each of the following cases :

if
$$.^{n} C_{n-4} = 70$$

4. Find the value of n in each of the following cases :

if
$$.^{2n} C_4 : {}^n C_3 = 35 : 2$$



5. Find the value of n in each of the following cases :

 $\mathsf{if} \, .^n \, C_5 \, =^n \, C_9$

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6. Find the value of n in each of the following cases :

if . $^{20} C_{3n} = ^{20} C_{2n+5}$

7. If
$$.^{n} C_{7} =^{n} C_{11}$$
 , show that $.^{21} C_{n} = 1330$.

8. If .ⁿ $P_r = 120 imes$.ⁿ C_{n-r} , find the valueof r.



9. If
$$.^{2n} C_r = .^{2n} C_{r+2}$$
 find the value of r.

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10. If . $^{n}C_{4}=21 imes .^{rac{n}{2}}C_{3}$, find the value of n.

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11. How many different triangles can be formed by joining the angular points of a polygon of n side ?find also the number of diagonals of the polygon .

12. n points are in space ,no three of which are collinear .if the number of straight lines and triangles , with the given points only as the vertices ,obtainted by joining them are equal ,find the value of n .

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13. Out of 9 Swarajists and 5 Ministrialists , how many different committees can be formed, each consisting of 6 Swarajists and 2 Ministrialists



14. In how many different ways cann a committee of 5 boys and 3 girls

can be formed out of 15 boys and 10 girls ?

15. In how many ways can 3 mangoes be selected from 10 mangoes so

as to always include a particular mango?

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16. A man has 6 friends .how many ways can be invite one or more of

them to a party?

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17. In how many ways can a person contribute to a charitable fund out

of 1 ten - rupee , 1 five - rupee , 1 two - rupee and 1 one - rupee notes ?

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19. At a certain examination , there are 8 papers . In order to pass the examination a candidate has to secure a minimumof marks in each of the 8 papers . In how many ways can a candidate fail in the examination ?



20. The Indian Cricket XI is to play 5 test matches against M.C.C Cricket XI in the next winter . The results of these 5 matches (win , loss or draw) are to be predicted . How many different forecasts can contain all the 5 correct results ?



1. Find n and r if
$$.^{n} C_{r} : C_{r+1} : C_{r+2} = 1 : 2 : 3.$$



2. Find n and r if $P_r = 336$ and ${}^{n}C_r = 56$.

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3. If
$$m=.^n C_2$$
 show that , $.^m C_2=3.^{n+1} C_4$

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4. Find n and r if $P_r = P_{r+1}$ and $C_r = C_{r-1}$.

5. Show that "
$$^n C_r = rac{n-r+1}{r}.^n C_{r-1}.$$

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6. Show that
$$.^{n} C_{r} + .^{n-1} C_{r-1} + .^{n-1} C_{r-2} = .^{n+1} C_{r}$$
.

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7.
$$^{n}C_{r}+2.^{n}C_{r-1}+.^{n}C_{r-2}=.^{n+2}C_{r}(2\leq r\leq n).$$

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8. Show that ,
$$rac{.^n \, C_r + ^n C_{r-1}}{.^n \, C_{r-1} + ^n C_{r-2}} = rac{.^{n+1} \, p_r}{r.^{n+1} \, p_{r-1}}$$

9. Prove that ,
$$.^{45} C_8 + \sum_{r=1}^{7} .^{52-r} C_7 + \sum_{k=1}^{5} .^{57-K} C_{50-K} = {}^{57} C_8$$

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10. Prove that , $.^{15} C_8 + {}^{15} C_9 - .^{15} C_6 - {}^{15} C_7 = 0$
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11. Prove that , . n C_{r} + 3. n C_{r-1} + 3. n C_{r-2} + n C_{r-3} = $^{n+3}$ C_{r}

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12. Show that
$$rac{\cdot^{4n}C_{2n}}{\cdot^{2n}C_n} = rac{1.3.5.....(4n-1)}{\left\{1.3.5.....(2n-1)
ight\}^2}.$$

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



14. If
$$\frac{\cdot^{n} C_{r-1}}{a} = \frac{\cdot^{n} C_{r}}{b} = \frac{\cdot^{n} C_{r+1}}{c}$$

 $n = \frac{ab + 2ac + bc}{b^{2} - ac}$ and $r = \frac{a(b+c)}{b^{2} - ac}$

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15. If the number of permutations of n different things taken r at time

be denoted by $.^n P_r$, show that , $\frac{.^n P_1}{1!} + \frac{.^n P_2}{2!} + \frac{.^n P_3}{3!} + \ldots + \frac{.^n P_n}{n!} = 2^n - 1$
16. For $n \in N$, Prove that (n+1)[n!n+(n-1)!(2n-1)+(n-2)!(n-1)]=(n+2)!

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17. Evaluate :
$$.^{20} C_5 + \sum_{j=2}^5 .^{25-j} C_4$$

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18. If $.^{n} C_{1}, {}^{n} C_{2}$ and ${}^{n}C_{3}$ are in A.P., find n.

19. Solve :
$$rac{(2x+1)!}{(x+2)!} imes rac{(x-1)!}{(2x-1)!} = rac{3}{5}, (x\in NN)$$

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

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21. How many different triangles can be formed by joining the angular

point of a decagon .find also the number of diogonal of the decagon

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



23. find the number of different words that can be formed from 12 consonants and 5 vowels by taking 4 consonants and 3 vowels in each word.



24. A person has got 15 acquaintances of whom 10 are relatives . In how many ways he may invite 9 guests so that 7 of them would be relatives ?

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25. In how many different ways can 9 men be selected from 15 men so

as to always (i)exclude 3 particular men ,(ii) include 3 particular men?



26. In how many ways can a committee of a 3 ladies and 4 gentlemen be appointed from a meeting consisting of 8 ladies and 7 gentlemen ? What will be the number of ways if Mrs . X refuses to serve in a committee if Mr . Y is a member

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27. m men and n women are to be seated in a row that no two women sit together . If m gt n, then show that the mumber of ways in which they can be sated is $\frac{m!(m+1)!}{(m-n+1)!}$

A. m men and n women are to be seated in a row that no two

women sit togeher . If mgtn, then show that the mumber of

ways in which they can be sated is

B.

C.

D.

Answer:

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28. Eight prizes are to be distributed by a lottery . The first participant taken 5 tickets from a box containing 50 tickets. In how many different ways can he extract them so that exactly two tickets are winning ?

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29. In an election there are 7 candidates and 4 members are to be elected and a voter is entitled to vote any number to be elected . In how many ways may a voter choose his vote ?



30. In a plane there are 10 points out of which no three are collinear except the four which lie on a straight line .By joining these 10 points how many (a) straight lines , (b) trangles can be obtained ?



31. If 20 straight lines be drawn in a plane , no two of them being parallel and no three of them being concurrent , how many points of intersection will be there ?

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32. If 10 parallel lines in a plane are intersected by a family of another

8 parallel lines how many parallelograms are there in the network thus

formed ?

33. There are 15 points in a plane of which 4 points lie in one stright line and another 5 points lie in another straight line . The two lines are parallel and no three of the remaining 6 points are collinear . Find (a) the number of straight lines and

(b) the number of trangles that can be formed by joining the 15 points



34. Show that in the number of combinations of 2n different things taken n at a time , the number of combinations in which a particular thing occurs , is equal to the number in which it does not occur .



35. How many different numbers of 6 digits each (without repetition of

digits) can be formed with the digits 0,1,2,3,4,5,6,7,8 so that the digits

in each number are in the (i) descending order (ii) ascending order ?



36. If the number of combinations of n different things taken (r+r) at a time be equal to the number of combinations taken (r-r) at a time, find the value of n.

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37. In how many ways can a person contribute to a charitabe fund out

of 10 ten - rupee notes, 5 five -rupee notes, 2 two -rupee notes and 1

one - rupee note?



38. Find the number of factors of 37800.



39. Find the number of different factors of 3528 which are greater

than 1 and less than 3528.

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40. Eight questions are given , each question has an alternative Prove that the number of ways in which a student can select one or more Questions is $(2^8 - 1)$.

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41. Prove that the total number of selections that can be made out of

the letters daddy did a deadly deed ids 1919.



42. In how many different ways ten 10 paise and five 5- paise coins can be arranged in a row so that two 5- paise coins are not together ?

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43. From 10 boys and 6 girls , how many different selections can be

made so as to include at least one boy and one girl ?

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44. The results (win , loss or draw) of 10 fooball matches are to be predicted . How many different forecasts can contain exactly 6 correct results ?

45. If the ratio of the total number of combinations of 2n different things to the total number of combinations of n different things be 1025 : 1 , find n .

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46. In how many ways can one or more fruits be selected from 4 apples ,5 oranges and 3 mangoes , if the fruits of the same kind be of the same shape ?

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47. Let t_n denote the number of diagonals of a polygon of n sides . If

 $t_{n+1}-t_n=9$ find n .



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

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Exercise 7 B Long Answer Type Questions

1. An executive committee of 6 is to be formed from 4 ladies and 7 gentlemen . In how many ways can this be formed when the committee contains (i) only 2 lady members, (ii) at least 2 lady members ?



2. Find the number of committees of 5 members that can be formed from 6 gentlemen and 4 ladies if each committee has at least one lady and two gentlemen .



4. A committee of 5 is to be formed from six ladies and four gentlemen. In how many ways this can be done so that the committee contains at least two ladies,



5. A committee of 5 is to be formed from six ladies and four gentlemen . In how many ways this can be done so that the committee contains at most two ladies ?



6. In a cricket team of 14 players 6 are bowlers . How many different teams of 11 players can be selected keeping at least 4 bowlers in the team ?

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7. A box contains 12 lamps of which 5 are defective . In how many ways can a sample of 6 be selected at random from the box so as to include at most 3 defective lamps ?



8. An examinee is required to answer 6 questions out of 12 question which are divided into two groups each containing 6 questions ,and

he is not permitted to answer more than 4 questions from any group .

In how many ways can be answer 6 questions ?

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9. A question paper contains , which are divided into two groups each containing 5 questions . A candidate is asked to answer 6 questions only ,and to choose at least 2 questions from each group . In how many different ways can the candidate make up his choice ?



10. In how many ways can a team of 11 cricketers be chosen from 9 batsmen and 6 bowlers to give a majority of batsman if at least 3 bowlers?

11. The Indian Cricket Eleven is to be selected out of fifteen players , five of them are bowlers . In how many ways the team can be selected so that the team contains at least three bowlers ?



12. How many combinations can be formed of eight counters marked 1,2,3,4,5,6,7,8 taking them 4 at a time , there being at least one odd and one even counter in each combinations ?



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



14. In how many ways can the crew of an eight - oared boat be arranged if 2 of the crew can row only on the stroke side and 1 can row only on the bow side ?



15. Of the 17 articles , 12 are alike and the remaining 5 are different . Find the numbers of combinations , if 13 articles are taken at a time .

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16. Out of 3n given things 2n are alike and the rest are different Show that selection of 2n things can be madde from these 3n things in 2^n different ways .

17. Show that there are 136 ways of selecting 4 letters from the word

EXAMINATION .

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18. Find the total number of ways of selecting 5 letters from the word						
INDEPENDENT .						
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19. Find the number of combinations in the letters of the word

STATISTICS taken 4 at a time .



20. Find the number of permutations in the letters of the word PROPORTION taken 4 at a time .

21. How many different numbers of 4 digits can be formed with the

digits 1,1,2,2,3,4 ?

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22. From 4 apples , 5 oranges and 3 mangoes , how many selections of

fruits can be made , taking at least one of each kind if the fruits of the

same kind are of different shapes ?

23. In how many ways can one or more fruits be selected from 4 apples ,5 oranges and 3 mangoes , if the fruits of the same kind be of the same shape ?

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24. Find the total number of combinations taking at least one green ball and one blue ball , from 5 different gree balls, 4 different blue ball and 3 different red balls .

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25. How many different algebraic quantities can be formed by combining a,b,c,d ,e with the + and - signs , all the letters taken together ?

26. There are n points in space , no four of which are in the same plane with the exception of m points all of which are in the same plane How many planes can be formed by joining them ?



27. n_1 , n_2 and n_3 points are given on the sides BC ,CA and AB respectively of the triangle ABC . Find the number of triangles formed by taking these given points as vertices of a triangle .



28. A man has 7 relatives ,4 of them are ladies and 3 are gentlemen , his wife has also 7 relatives , 3 of them are ladies and 4 are gentlemen . In how many ways can they invite a dinner party of 3 ladies and 3 gentlemen so that there are 3 of the man 's relative and 3 of the wife 's relative ? **29.** Eighteen guests have to be seated , half on each side of a ling 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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Sample Questions For Competitive Exams A Mcq

1. 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

Answer: A::B::D

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2. If
$$P=21ig(21^2-1^2ig)ig(21^2-2^2ig)...ig(21^2-10^2ig)$$
 , then p is divisible by-

A. 22!

B. 21!

C. 19!

D. 20!

Answer: B::C::D



3. Number of points of intersection of n straight lines if n satisfies

$$.^{n+5} P_{n+1} = \frac{11(n-1)}{2} \times .^{n+3} P_n$$
 is
A. 15
B. 28
C. 21
D. 10

Answer: A::C

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4. Number of ways in which 200 people can be divided in 100 couples

is -

A.
$$\frac{200!}{2^{100}(100)!}$$

B. $1 \times 3 \times 5 \times ... \times 199$
C. $\left(\frac{101}{2}\right) \left(\frac{102}{2}\right) ... \left(\frac{200}{2}\right)$



Answer: A::B::C



5. Numbers of ways in which 30 identical things are distributed among six persons is -

A. .¹⁷ C_5 if each gets odd numbers 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)

Answer: A::C

1. If $.^{15} P_r = 2730$, then the value of r will be -

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2. Integer in unit 's place of $\angle 1 + \angle 2 + \angle 3 + \angle 4 + + \angle 98$ will be -

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3. If there are 10 points in a plane such that n of them are in the same straight line , triangles with the vertices at these points that can be formed by joining them are 110 , then the value of n will be -

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4. If $.^{2n} C_3 :^n C_2 = 44 : 3$, then the value of $.^6 C_n$ will be -



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Sample Questions For Competitive Exams D Comprehension Type

1. We have to choose 11 players for a cricket team from 8 batman , 6 bowlers , 4 all rounders and 2 wicket keepers in the following conditions .

The number of selections when almost one all rounder and one wicket keeper will play -

$$. {}^{4}C_{1} \times . {}^{14}C_{11} + . {}^{2}C_{1} \times . {}^{14}C_{10} + . {}^{4}C_{1} \times . {}^{2}C_{1} \times . {}^{14}C_{9} + . {}^{14}C_{11}$$

$$B. . {}^{4}C_{1} \times . {}^{15}C_{11} + . {}^{15}C_{11}$$

$$C. . {}^{4}C_{1} \times . {}^{15}C_{10} + . {}^{15}C_{11}$$

D. none of these

Answer: A

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2. We have to choose 11 players for a cricket team from 8 batman , 6 bowlers , 4 all rounders and 2 wicket keepers in the following conditions . Numer of selections when two particular batsmen do not want to play when a paritcular bowler will play -

A.
$$.^{17} C_{10} + .^{19} C_{11}$$

$$\mathsf{B}.\,.^{17}\,C_{10}+.^{19}\,C_{11}+.^{17}\,C_{11}$$

 $\mathsf{C.}\,.^{17}\,C_{10}+.^{20}\,C_{11}$

 $\mathsf{D}..^{19} C_{10} + .^{19} C_{11}$

Answer: B::C::D

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3. We have to choose 11 players for a cricket team from 8 batman , 6 bowlers , 4 all rounders and 2 wicket keepers in the following conditions .

Number of selections when a particular batsman and a particular wicket keeper do not want to play together -

A. 2.
18
 C_{10}
B. . 19 C_{11} + . 18 C_{10}

 $\mathsf{C.}\,.^{19}\,C_{10}+.^{19}\,C_{11}$

D. none of these

Answer: B::C::D



4. Consider the letters of the word 'MATHEMATICS'

Possible number of words taking all letters at a time such that least one repeating letter is at odd position in each word is -

^	11!		9!
A.	2!2!2!	_	2!2!
D	9!		
ь.	2!2!2!		
c	9!		
C.	2!2!		
П	11!		
υ.	2!2!2		

Answer: D

5. Consider the letters of the word 'MATHEMATICS

Possible number of word taking all letters at a time such that in each word both M's are together and both T's are together but both A's are not together is -

A. $\frac{11!}{2!2!2!} - \frac{10!}{2!2!}$ B. $7!^8C_2$ C. $\frac{6!4!}{2!2!}$ D. $\frac{9!}{2!2!2!}$

Answer: B

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6. Consider the letters of the word 'MATHEMATICS

Possible numbers of words in which no two vowels are together is -

A.
$$7!^{8}C_{4}\frac{4!}{2!}$$

B. $\frac{7!8}{2!}C_{4}\frac{4!}{2!}$
C. $\frac{7!}{2!2!}$.⁸ $C_{4}\frac{4!}{2!}$
D. $\frac{7!}{2!2!2!}$.⁸ $C_{4}\frac{4!}{2!}$

Answer: C

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Sample Questions For Competitive Exams E Assertion Reason Type

1. Statement -I : Number of terms in the expansion of $(x + y + z + w)^{50}$ is $.^{53} C_3$.

Statement -II : Number of non- negative solution of the equation $p+q+r+s=50 ext{ is }.^{53} C_3.$

A. Statement -I is true, Statement -II is true and Statement -II is a

correct explanation for Statement -I.

B. Statement -I is true, Statement -II is true but Statement -II is not

a correct explanation of Statement -I.

C. Statement -I true, Statement -II is false.

D. Statement -I is false , Statement -II is true ,

Answer: A

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2. Statement -I: Number of zeroes at the end of 50! is equal to 12.

Statement -II : Exponent of 2 in 50! is 47.

A. Statement -I is true, Statement -II is true and Statement -II is a

correct explanation for Statement -I.

B. Statement -I is true, Statement -II is true but Statement -II is not

a correct explanation of Statement -I.

C. Statement -I true, Statement -II is false.

D. Statement -I is false , Statement -II is true ,

Answer: B