



## MATHS

### BOOKS - KC SINHA MATHS (HINGLISH)

### PERMUTATIONS - FOR BOARDS

#### Solved Examples

1. There are three letters and three envelopes. Find the total number of ways in which letters can be put into the envelopes so that each envelope has only one letter.

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2. Find the number of possible outcomes of tossing a coin twice.



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3. In a class there are 20 boys and 15 girls. In how many ways can the teacher select one boy and one girl from amongst the students of the class to represent the school in a quiz competition?



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4. A teacher has to select either a boy or a girl from a class of 12 boys and 15 girls for coordinating a school function.

In how many ways can she do it?



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5. There are 5 routes from A to B and 3 routes from place B to place C. Find how many different routes are there from A to C via B.



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6. How many 3 letter code combinations are possible using the first 10 letters of English alphabets if: i. no letter can be repeated, ii. letters can be repeated.



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7. If there are 20 buses playing between places A and B, in how many ways can a round trip from A be made if the return journey was made on: i. the same bus, ii. a different bus.



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8. There are 4 multiple choice questions in an examination. How many sequences of answers are possible, if each question has 2 choices?



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9. A coin is tossed three times and the outcomes are recorded. How many possible outcomes are there? How many possible outcomes if the coin is tossed four times? Five times?  $n$  times?



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



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11. Find the number of odd positive three digit integers.



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**12.** How many odd numbers less than 1000 can be formed using the digits 0, 1, 4, and 7 if repetition of digits is allowed?



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**13.** Find the number of different signals that can be made by arranging at least 3 flags in order on a vertical pole, if 6 different flags are available.



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**14.** How many three digit numbers are there such that at least one of their digits is 7?



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**15.** In how many ways can five people be seated in a car with two people in the front seat and three in the rear, if two particular persons out of the five cannot drive?



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**16.** In how many ways can 5 different balls be distributed among three boxes?



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**17.** How many A.P.s with 10 terms are there whose first term is in the set  $\{1,2,3\}$  and whose common difference is in the set  $\{1,2,3,4,5\}$ ?



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**18.** How many non-zero numbers can be formed using the digits 0,1,2,3,4 and 5 if repetition of digits is not allowed?



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**19.** A class consists of 40 girls and 60 boys. In how many ways can a president, vice president, treasurer and



secretary be chosen i th treasurer must be a girl, the secretary must be a boy and a student may not hold more than one office?



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**20.** Find the total number of ways in which  $n$  distinct objects can be put into two different boxes so that no box remains empty.



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**21.** A team consisting of 7 boys and 3 girls plays singles matches against another team consisting of 5 boys and 5 girls. How many matches can be scheduled between the

two teams if a boy plays against a girl and a girl plays against a boy?



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22. Find:  $\frac{7!}{6!}$



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23. Find :  $\frac{6!}{2 \times 4!}$



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24. Compute:  $\frac{52!}{48!4!}$



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25. Compute:  $\frac{7!}{4!2!}$

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26. Convert the following products into factorial:

5. 6. 7. 8. 9. 1

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27. Convert the following products into factorial: 2.4.6.8.10

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28. If  $\frac{1}{9!} + \frac{1}{10!} = \frac{x}{11!}$  then  $x =$



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29. Prove that  $(n!)^2$



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30. Find the L.C.M. And H.C.F. of  $5!, 6!$  And  $7!$



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31. Prove that  $\frac{(2n+1)!}{n!} = 2^n \{1 \cdot 3 \cdot 5 \cdot (2n-1)(2n+1)\}$



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32. Prove that  $33!$  is divisible by  $2^{15}$ . what is the largest integer  $n$  such that  $33!$  is divisible by  $2^n$ .



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



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34. Prove that  ${}_nP_2 = {}^nP_{n-2}$



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35. Find  $n$  if  ${}^{n-1}P_3 : {}^nP_4 = 1:9$



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36. Find  $r$ , if  $5^4P_r = 6^5P_{r-1}$ .



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37. Find the value of  $n$  such that (i)

$${}^nP_5 = 42^n P_3, n > 4 \quad \text{(ii)} \quad \frac{{}^nP_4}{{}^{n-1}P_4} = \frac{5}{3}, n > 4$$



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38. If  ${}^nP_4 = 360$ , find the value of  $n$ .



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39. If  ${}^nP_3 = 9240$ , find  $n$



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40.  $10p_r = 720$



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



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42.

prove

that

$$1P_1 + 2.2P_2 + 3.3P_3 + \dots + n.nP_n = (n+1)P_{n+1} - 1$$



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43. How many numbers of four digits can be formed with the digits 1,2,3,4, and 5? (if repetition of digits is not allowed).



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**44.** How many numbers lying between 100 and 1000 can be formed with the digits 0, 1, 2, 3, 4, 5, if the repetition of the digits is not allowed?



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**45.** How many numbers greater than 40000 can be formed using the digits 1,2,3,4 and 5 if each digit is used only once in each number?



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**46.** How many different 4-digit numbers can be formed from the digits 2,3,4 and 5 if each digit is used only once

in as number ? Further, how many of these numbers i. end in a 4? ii. end in a 3? iii. End in a 3 or 6?



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**47.** Find the number of numbers between 300 and 3000 which can be formed with the digits 0,1,2,3,4 and 5 no digit being repeated in any number.



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**48.** How many odd numbers greater than 8000 can be formed using the digits 2,3,4,5 and 8 if each digit is used only once in each number?



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**49.** How many even numbers of four digits can be formed with the digits 0,1,2,3,4,5 and 6 no digit being used more than once?



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**50.** How many even numbers are there with three digits such that if 5 is one of the digits, then 7 is the next digit?



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**51.** How many numbers of six digits can be formed from the digits 0,1,3,5,7 and 9 when no digit is repeated? How

many of them are divisible by 10?



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**52.** How many positive numbers can be formed by using any number of the digits 0,1,2,3 and 4 no digit being repeted in any number?



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**53.** How many numbers can be formed with the digits 1, 2, 3, 4, 3, 2, 1 so that the odd digits always occupy the odd places?



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**54.** How many numbers greater than million can be formed with the digits 2,3,0,3,4,2 and 3 if repetition of digits is not allowed?



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**55.** How many numbers of four digits greater than 2300 can be formed with the digits 0, 1, 2, 3, 4, 5 and 6; no digit being repeated in any number?



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**56.** How many four digit natural numbers not exceeding 4321 can be formed with the digits 1, 2, 3 and 4, if the

digits can repeat?



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**57.** How many number of four digits can be formed with the digits 1,2,3, and 4? Find the sum of those numbers.



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**58.** Find the sum of all the four digit numbers which can be formed with the digits 0,1,2 and 3.



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**59.** Find the sum of all the 4-digit numbers which can be formed with the digits 1,2,3,4



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**60.** A gentleman has 6 friends to invite. In how many ways can he send invitation cards to them if he has three servants to carry the cards.



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**61.** In how many ways 3 prizes can be given away to 7 boys when each boy is eligible for any of the prizes.



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**62.** How many numbers greater than 1000, but not greater than 4000 can be formed with the digits 0, 1, 2, 3, 4 if: (i) repetition of digits is allowed? (ii) repetition of digits is not allowed?



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**63.** A telegraph has 5 arms and each arm is capable of 4 distinct positions, including the position of rest. What is the total number of signals that can be made?



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**64.** A letter lock consists of three rings each marked with 10 different letters. In how many ways it is possible to make an unsuccessful attempt to open the lock?



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**65.** The lock of a safe has a dial with holes, say ten, in which the numbers 0,1,2,.....9 are inscribed in each hole. The lock can be opened only when a specific code numbersay of six digits is dialled. Suppose the code number is 249916, it means that the can be opened when we first dial 2, then 4 nd so on. Find the maximum number of trials which do not result in opening the lock.



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**66.** Ten different letters of an alphabet are given. Words with five letters are formed from these given letters. Determine the number of words which have at least one letter repeated.



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**67.** In how many ways can 8 Indians, 4 Americans and 4 Englishmen be seated in a row so that all persons of the same nationality sit together.



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



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**69.** A library has two books each having three copies and three other books each having tow copies. In how many ways can all these books be arranged in a shelf so that copies of the same book are not separated.



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**70.** Three married couples are to be seated in a row having six seats in a cinema hall. If spouses are to be seated next to each other, in how many ways can they be seated? Find also the number of ways of their seating if all the ladies sit together.



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**71.** In how many ways can 10 examination papers be arranged so that the best and worst papers never come together?



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**72.** There are 5 boys and 3 girls. In how many ways can they be seated in a row so that all the three girls do not sit together



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



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**74.** In how many of the distinct permutations of the letters in MISSISSIPPI do the four Is not come together?



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**75.** In how many ways can 7 I. A and I.Sc. Students be seated in a row so that no two of the I.Sc students may sit together?



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**76.** In a class of 10 students there are 3 girls A, B, C. In how many different ways can they be arranged in a row such that no two of the girls are consecutive.



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**77.** In how many ways 4 boys and 4 girls can be seated in a row so that boys and girls are alternate?



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**78.** In how many ways 4 boys and 3 girls can be seated in a row so that they are alternate?



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**79.** In how many ways 10 Indians, 5 Americans and 4 Englishmen can be seated in a row so that neither Americans nor Englishmen sit between Indians.



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**80.** A customer forgets a four-digit code for an Automatic Teller Machine (ATM) in a bank. However, he remembers that this code consists of digits 3, 5, 6 and 9. Find the largest possible number of trials necessary to obtain the correct code.



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**81.** A number lock on a suitcase has 3 wheels each labelled with ten digits 0 to 9. If opening of the lock is a particular sequence of three digits with no repeats, how many such sequences will be possible? Also, find the number of unsuccessful attempts to open the lock.





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**82.** There are 6 items in column A and 6 items in column B. A student is asked to match each item in column A with an item in column B. How many possible, correct or incorrect, answer are there to this question?



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**83.** How many different signals can be made by 5 flags from 8 flags of different colours?



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**84.** Serial numbers for an item produced in a factory are to be made using two letters followed by four digits (0 to 9). If the letters are to be taken from six letters of English alphabet without repetition and the digits are also not repeated in a serial number, how many serial numbers are possible?



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**85.** In how many distinct ways can the product  $xy^2z^2$  be written without using exponents?



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**86.** There are 3 white, 4 red and 1 blue marbles in a bag. They are drawn one by one and arranged in a row. Assuming that all the 8 marbles are drawn, determine the number of different arrangements if marbles of same colour are indistinguishable.



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**87.** In how many ways can 5 flags, in which 3 are red, one is white and one is blue, be arranged on a staff, one below the other, if flags of one colour are not distinguishable?



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**88.** A biologist studying the genetic code is interested to know the number of possible arrangements of 12 molecules in a chain. The chain contains 4 different molecules represented by the initials A(for a Adenine), C (for Cytosine), G (for Guanine) and T (for Thymine) and 3 molecules of each kind. How many different such arrangements are possible?



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**89.** Find the number of permutations of the letters of the word PRE-UNIVERSITY.



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**90.** In how many ways can the letters of the word 'CIVILIZATION' be rearranged?



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**91.** How many words can be formed with the letters of the word UNIVERSITY, the vowels remaining together?



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**92.** In how many ways can the letters of the word DIRECTOR be arranged so that the three vowels are never together?



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**93.** Find the number of rearrangements of the letters of the word BENEVOLENT. How many of them end in L?



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**94.** In how many ways can the letters of the word 'ALGEBRA' be arranged, so that two A's are never together?



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



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**96.** How many different words can be formed with the letters of the word PENCIL when vowels occupy even places.



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**97.** In how many ways can the letters of the word ARRANGE be arranged so that the two A's are together but not two R's



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**98.** It is required to seat 5 men and 4 women in a row so that the women occupy the even places. How many such arrangements are possible ?



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**99.** How many different words can be formed with five given letters of which three are vowels and two are consonants, no two vowels being together in any word?



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**100.** A person is to walk from A to B. However, he is restricted to walk only to the right of A or upwards of A.



but not necessarily in the order shown in the figure. Then find the number of paths from A to B



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**101.** If the letters of the word MOTHER are written in all possible orders and these words are written out as in a dictionary, find rank of the word MOTHER.



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**102.** If the different permutations of all the letters of the word EXAMINATION are listed as in a dictionary; how many words are there in this list before the first word starting with E?



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**103.** Find the number of words with or without meaning which can be made using all the letters of the word AGAIN. If these words are written as in a dictionary, what will be the 50th word?



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## Exercise

**1.** A movie theatre has 3 entrances and 4 exits. In how many ways can a man enter and exit from the theatre?



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2. There are 3 nominations for the post of president, 4 for the post of vice-president and 5 for the secretary. i. In how many ways can candidates be selected for each of these posts? ii. In how many ways can any one of these posts be filled?



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3. Find the number of possible outcomes of tossing a coin four times.



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4. A class consists of 27 boys 14 girls. In how many ways can one boy and one girl be selected to represent the class at a function? ii. From a committee of 8 person, in how many ways can we choose as chairman and a vice-chairman assuming that one person cannot hold more than one positon.



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5. Numbers 1,2, and 3 are written on three cards. How many two digit number4s can be formed by placing two cards side by side?



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6. A person wants to go to another city by bus and return by train. He has a choice of 5 different buses and 4 trains to return. In how many ways can he perform his journey?



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7. Eight children are standing in a queue. i. In how many ways can the queue be formed? ii. How many arrangements are possible if the tallest child stands at the end of the queue?



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8. In how many ways can an examinee answer a set of ten true/false type questions?



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9. How many numbers are there between 100 and 1000 in which all the digits are distinct?



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10. Given 7 flags of different colours, how many different signals can be generated if a signal requires the use of two flags, one below the other?



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**11.** How many 3-digit numbers can be formed from the digits 1, 2, 3, 4 and 5 assuming that (i) repetition of the digits is allowed? (ii) repetition of the digits is not allowed?



**Watch Video Solution**

**12.** How many numbers can be formed from the digits 1, 2, 3 and 9, if repetition of digits is not allowed?



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**13.** There are 6 multiple choice questions in an examination. How many sequence of answers are possible, if the first three questions have 4 choices each and the next three have 5 each?



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**14.** How many three digit numbers are there , with distinct digits, with each digit odd.



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**15.** The first ten English alphabets are written on slips of paper and placed in a box Three of the slips re drawn and



placed in order. How many arrangements are possible?



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**16.** How many 4-letter code can be formed using the first 10 letters of the English alphabet, if no letter can be repeated?



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**17.** How many numbers of four digits greater than 2300 can be formed with the digits 0, 1, 2, 3, 4, 5 and 6; no digit being repeated in any number?



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



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**19.** How many 3 -digit even numbers can be formed from the digits 1, 2, 3, 4, 5, 6 if the digits can be repeated?



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**20.** How many 5-digit numbers can be formed using the digits 0, 1, 2, 3, and 4 if the digits can be repeated in a number?



**Watch Video Solution**

21. How many 3-digit number have exactly one of their digits as 5?



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22. In how many ways can 3 people be seated i a rwo containing 7 seats?



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23. A letter lock consists of three rings each marked with 10 different letters. In how many ways it is possible to make an unsuccessful attempt to open the lock?



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**24.** How many five digit telephone numbers can be constructed using the digits 0 to 9. i. If each number starts with 59, for example 59612 etc. and no digit appears more than once? ii. If each number starts with 67 and no digit appears more than once?



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**25.** Find the number of ways in which one can post 4 letters in 6 letter boxes.



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**26.** In how many ways can 4 different balls be distributed among 5 different boxes, when i. no box has more than one ball. ii. a box can have any number of balls. iii. No box contains all the balls



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**27.** Given 5 flags of different colours, how many different signals can be generated if each signal requires the use of 2 flags, one below the other?



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**28.** Given 4 flags of different colours, how many different signals can be generated, if a signal requires the use of 2 flags one below the other?



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



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



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**31.** A telegraph has 5 arms and each arm is capable of 4 distinct positions, including the position of rest. What is the total number of signals that can be made?



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**32.** A team consists of 5 boys and 4 girls. It plays singles matches against another team consisting of 6 boys and 4 girls. How many matches can be arranged between the

two teams if a boy plays against a boy and a girl plays against a girl?



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**33.** Rajeev has 3 pants and 2 shirts. How many different pairs of a pant and a shirt, can he dress up with?



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**34.** Ali has 2 school bags, 3 tiffin boxes and 2 water bottles. In how many ways can he carry these items choosing one each.



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35. Evaluate the following:  $7!$



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36. Evaluate the following:  ${}^5P_3$



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37. Evaluate the following:  $8! - 5!$



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38. Evaluate the following:  $4! - 3!$



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39. Evaluate the following:  $7! - 5!$



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40. Evaluate the following:  $\frac{6!}{5!}$



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41. Evaluate the following:  $\frac{7!}{5!}$



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42. Evaluate the following:  $\frac{8!}{6!2!}$



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43. Evaluate the following:  $\frac{9!}{4!5!}$



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44. Evaluate the following:  ${}^{12}C_{10}$



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45. Compute:  $(3!)(5!)$



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46. Compute:  $\frac{20!}{18!}$

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47. Compute:  $\frac{1}{5!} + \frac{1}{6!} + \frac{1}{7!}$

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48. Evaluate  $\frac{n!}{r!(n-r)!}$ , when  $n = 5, r = 2$ .

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49. Evaluate  $\frac{n!}{r!(n-r)!}$ , when  $n = 5, r = 2$ .



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50. Evaluate  $\frac{n!}{r!(n-r)!}$ , when  $n = 5, r = 2$ .



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51. Evaluate  $\frac{n!}{(n-r)!}$ , when (i)  $n = 6, r = 2$  (ii)  
 $n = 9, r = 5$



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52. Evaluate  $\frac{n!}{(n-r)!}$ , when (i)  $n = 6, r = 2$  (ii)

$$n = 9, r = 5$$



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53. Convert the following into factorial: 1.3.5.9.11



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54. Convert the following products into factorials: (iii)

$$(n+1)(n+2)(n+3)\dots(2n) \text{ (iv) } 1.3.5.7.9\dots(2n-1)$$



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55. State whether true or false:  $2!+3!=5!$



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56. State whether true or false:  $2! \times 3! = 6!$



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57. State whether true or false:  $\frac{8!}{4!} = 21$



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58. State whether true or false:  $2!+3!=5!$



Watch Video Solution

59. State whether true or false:  $2!+3!=5!$



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60. If  $\frac{1}{8!} + \frac{1}{9!} = \frac{x}{10!}$ , find x



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61. If  $\frac{1}{6!} + \frac{1}{7!} = \frac{x}{8!}$ , find x



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62. If  $\frac{n!}{2!(n-2)!}$  and  $\frac{n!}{4!(n-4)!}$  are in the ratio 2:1, find the value of  $n$ .



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63. Show that  $n!(n+2) = n! + (n+1)!$



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64. Find the value of  $x$  if

$$\frac{(x+2)!}{(2x-1)!} \cdot \frac{(2x+1)!}{(x+3)!} = \frac{72}{7}, \text{ where } x \in \mathbb{N}$$



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**65.** Show that  $27!$  is divisible by  $2^{12}$ . What is the largest natural number  $n$  such that  $27!$  is divisible by  $2^n$ ?



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



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**67.** Find  $r$  if:  ${}^{10}P_r = 2 \cdot {}^9P_r$



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68. Find  $r$  if (i)  ${}^5P_r = 2^6 P_{r-1}$  (ii)  ${}^5P_r = {}^6P_{r-1}$



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69. Find  $r$  if (i)  ${}^5P_r = 2^6 P_{r-1}$  (ii)  ${}^5P_r = {}^6P_{r-1}$



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70. If  ${}^nP_4 = 12 \times {}^nP_2$ , find  $n$ .



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71. If  ${}^nP_5 = 20 \times {}^nP_3$ , find the value of  $n$ .



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72. If  ${}^nP_4 = {}^{n+1}P_4 = 3:4$ , find  $n$ .

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73. If  ${}^{20}P_r = 6840$ , find  $r$ .

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74. If  ${}^{12}P_r = 118800$ , find  $r$ .

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75. Prove that  ${}^{10}P_3 = {}^9P_3 + 3 \cdot {}^9P_2$



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76. If  ${}^{22}P_{r+1} : {}^{20}P_r = 11:52, f \in dr.$



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77. If  ${}^{(m+n)}P_2 = 90$  and  ${}^{m-n}P_2 = 30$  find m and n



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78. How many 4-digit numbers are there with no digit repeated?



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**79.** How many even numbers of three digits each can be made with the digits 1,2,3,4,6,7 if no digit is repeated?



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**80.** How many numbers of four digits can be formed with the digits 1,2,4,5,7 no digit being repeated?



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**81.** How many numbers of 5 digits can be formed with the digits 0,1,2,3,4?



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**82.** Find the numbers of 4-digit numbers that can be formed using the digits, 1,2,3,4,5 if no digit is repeated ?  
How many of these will be even?



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**83.** How many numbers between 100 and 1000 can be formed with digits 1,2,3,4,5,6,7, no digit being repeated?



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**84.** How many numbers lying between 100 and 1000 can be formed with the digits 0, 1, 2, 3, 4, 5, if the repetition of the digits is not allowed?



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**85.** How many numbers each lying between 100 and 1000 can be formed with the digits 2,3,4,0,8,9, no digit being repeated?



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**86.** The total number of 9 digit numbers of different digits is:





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**87.** How many 4-digit numbers can be formed by using the digits 1 to 9 if repetition of digits is not allowed?



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**88.** How many 3-digit numbers can be formed by using the digits 1 to 9 if no digit is repeated?



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**89.** How many natural numbers are there from 1 to 1000 which have none of their digits repeated.



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**90.** How many numbers each lying between 1000 and 10000 can be formed with the digits 0,1,2,3,4,5, no digit being repeated?



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**91.** How many different numbers greater than 5000 can be formed with the digits 0,1,5,9, no digit being repeated?



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**92.** Find the number of numbers lying between 300 and 4000 that can be formed with the digits 0,1,2,3,4,5, no digit being repeated?



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**93.** If repetition of digits is not allowed, how many numbers of four digits divisible by 5 can be formed with the digits 0,4,5,6,7?



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**94.** How many different numbers of six digits each can be formed from the digits 4, 5, 6, 7, 8, 9 when repetition of

digits is not allowed?



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**95.** How many even numbers of 5 digits without repetition can be formed with the digits 1,2,3,4 and 5.



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**96.** Number of natural numbers less than 1000 and divisible by 5 can be formed with the ten digits, each digit not occurring more than once in each number is



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**97.** Find how many numbers between 100 and 999 can be formed with the digits 0,4,5,6,7,8, no digit being used more than once. How many of them are odd?



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**98.** Find the number of numbers of six digits without repetition formed with the digits 1,2,3,4,5,6 in which 5 always occurs in the tens place.



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**99.** How many 6-digit numbers can be formed from the digits 0, 1, 3, 5, 7 and 9 which are divisible by 10 and no digit is repeated ?



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**100.** How many four digits numbers can be formed by using 1, 2, ...7 which are greater than 3400?



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**101.** Find the number of numbers of 4 digits without repetition formed with the digits 1,2,3,4,5 in which 4 occurs in the thousands place and 5 occurs in the units place.



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



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**103.** How many different numbers (without repetition of digits) can be formed from the digits 1, 3, 5, 7, 9 when taken all at a time and what is their sum ?



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**104.** The sum of all the four digit numbers that can be formed with 0,2,3,5 is



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**105.** A servant has to post 5 letters and there are 4 letter boxes. In how many ways can he post the letters?



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**106.** In how many ways can three prizes be given away to 5 students when each student is eligible for any of the prizes?



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**107.** In how many ways can  $n$  things be given to  $p$  persons, when each person can get any number of things ( $n \geq p$ ).



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**108.** Find the number of functions that can be defined from  $A$  to  $B$  if number of distinct elements in  $A$  and  $B$  are  $m$  and  $n$  respectively.



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**109.** In how many different ways the following 5 prizes be distributed among 10 students? First and second in

Mathematics; first and second in physics and first in Hindi.



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**110.** In a steamer there are stalls for 12 animals and there are cows, horses and calves (not less than 12 of each) ready to be shipped, the total number of ways in which the shipload can be made, is



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**111.** In how many ways 5 delegates can be put in 6 hotels of a city if there is no restriction?



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**112.** Find the number of numbers of 5 digits that can be formed with the digits 0,1,2,3 and 4 if repetition of digits is allowed.



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**113.** In how many ways 6 rings of different types can be had in 4 given fingers of a hand?



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**114.** Find the number of numbers of 4 digits greater than 3000 that can be formed with the digits 0,1,2,3,4 and 5 if repetition of digits is allowed.



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**115.** In a town, the car plate numbers contain only three or four digits, not containing the digit 0. What is the maximum number of cars that can be numbered?



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**116.** In how many ways can a ten question multiple choice examination be answered if there are four choices a, b, c and d to each question? If no two consecutive questions are answered the same way, how many ways are there?



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**117.** Find the number of numbers of four digits that can be made from the digits 0,1,2,3,4,5 if digits can be repeated in the same number. How many of these numbers have at least one digit repeated?



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**118.** There are two works each of 3 volumes and two works each of 2 volumes; In how many ways can be 10 books be placed on a shelf so that the volumes of the same work are not separated



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**119.** A library has 5 copies of one book, 4 copies of each of 2 books, 6 copies of each of 3 books and single copies of 8 books. In how many ways can all books be arranged so that copies of the same book are always together?



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**120.** In a dinner party there are 10 Indians, 5 Americans and 5 Englishmen. In how many ways can they be seated in a row so that all persons of the same nationality sit together?



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**121.** There are 5 boys and 3 girls. In how many ways can they be seated in a row so that all the three girls do not sit together



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**122.** 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  $(n - 2)(n - 1)!$



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**123.** Six papers are set in examination, two of them in mathematics: in how many different orders can the papers

be given, provided only that the two mathematical papers are not successive?



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**124.** You are given 6 balls of different colours (black, white, red, green, violet, yellow), in how many ways can you arrange them in a row so that black and white balls may never come together?



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**125.** In how many ways can 4 boys and 3 girls be seated in a row so that no two girls are together?



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**126.** In how many ways can 15 I.Sc and 12 B.Sc. Candidates be arranged in a line so that no two B.Sc. Candidates may occupy consecutive positions?



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**127.** In how many ways can 18 white and 19 black balls be arranged in a row so that no two white balls may be together? It is given that balls of the same colour are identical.



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**128.** In how many ways can 16 rupees and 12 paise coins be arranged in a line so that no two paise coins may occupy consecutive positions?



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**129.** Show that the number of ways in which  $p$  positive and  $n$  negative signs may be placed in a row so that no two negative signs shall be together is  $\binom{p+1}{n} C_n$ .



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**130.**  $m$  men and  $n$  women are to be seated in a row so that no two women sit together. If  $m > n$  then show that the

number of ways in which they can be seated as  $\frac{m!(m+1)!}{(m-n+1)!}$ .



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**131.** 3 women and 5 men are to sit in a row at dinner. Find in how many ways they can be arranged so that no two women sit next to each other.



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**132.** The number of ways of arranging the letters  $AAAAA, BBB, CCC, D, EE \& F$  in a row if the letter C are separated from one another is:



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**133.** Four books, one each in Chemistry, Physics, Biology and Mathematics, are to be arranged in a shelf. In how many ways can this be done?



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**134.** There are 6 candidates contesting for a certain office in a municipal election. In how many ways can their names be listed on a ballot paper?



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**135.** How many different signals can be generated from 6 flags of different colours if each signal makes use of all the flags at a time, placed one below the other?



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**136.** Seven songs are to be rendered in a programme. In how many different orders could they be rendered?



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**137.** Ten horses are running a race. In how many ways can these horses come in the first, second and third place, assuming no ties?



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**138.** Six candidates are called for interview to fill four posts in an office. Assuming that each candidate is fit for each post, determine the number of ways in which i. first and second posts can be filled. ii. First three posts can be filled. iii. All the four posts can be filled.



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**139.** From a pool of 12 candidates in how many ways can we select president, vice-president, secretary and a treasurer if each of the 12 candidates can hold any office?



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**140.** From a committee of 8 persons, in how many ways can we choose a chairman and a vice chairman assuming one person cannot hold more than one position?



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**141.** In how many ways can 4 red, 3 yellow and 2 green discs be arranged in a row if the discs of the same colour are indistinguishable?



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**142.** find the sum of all the 4 digit numbers that can be formed with the digits 1,2,3,4.



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**143.** In the given figure, we see that it has 4 horizontal blocks (or paths) and 3 vertical blocks (or paths). This is known as  $4 \times 3$  grid. Seema wishes to go from A to B, but the instruction is that she must go only on the right and only up, but not necessarily in that order. How many possible paths does she have at her disposal?



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**144.** How many signals can be made by hoisting 2 blue, 2 red and 5 yellow flags on a pole at the same time?



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**145.** How many different signals can be made by hoisting 6 differently coloured flags one above the other when any number of them may be hoisted at once?



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**146.** Find the number of arrangements of the letters of the word "Delhi" if e always comes before i.



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**147.** Find the number of different arrangements (permutations) of the word BANNANA.



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**148.** Find the number of permutations of the letters of the word ALLAHABAD.



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**149.** How many words can be formed from the letters of the word CIRCUMFERENCE.



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**150.** How many different words can be formed with the letters of the word VICE-CHANCELLOR so that the vowels are together?



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**151.** How many words, with or without meaning can be made from the letters of the word MONDAY, assuming that no letter is repeated, if. (i) 4 letters are used at a time, (ii) all letters are used at a time, (iii) all letters are used but first letter i



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**152.** How many words can be formed using all letters of the word, EQUATION, so that i. each letter occurs exactly once? ii. vowels and consonants occur together?



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**153.** The letters of the word TUESDAY are arranged in a line, each arrangement ending with letter S. How many different arrangements are possible? How many of them start with letter D?



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**154.** Find the number of different 8-letter arrangements that can be made from the letters of the word DAUGHTER so that (i) all vowels occur together (ii) all vowels do not occur together.



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**155.** How many different words can be formed with the letters of the word MATHEMATICS ? In how many of them, vowels are together and consonants are together?



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**156.** In how many ways can the letters of the word MUZAFFARPUR, be rearranged? How many such words will begin with M?



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**157.** In how many ways can the letters of the word ASSASSINATION be arranged so that all the S's are together?



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**158.** In how many ways can the letters of the word BANARAS be arranged so that the letters N and S are

never together



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**159.** In how many ways can the letters of the word PLANTAIN be arranged so that the two A do not come together?



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**160.** In how many ways can the letters of the word INTERMEDIATE be arranged so that: the vowels always occupy even places? the relative order of vowels and consonants do not alter?



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**161.** How many words can be formed with the letters of the word PARALLEL so that all Ls do not come together?



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**162.** Find the number of words formed by the letters of the word DELHI which i. begin with D ii. end with I iii. The letter L being always in the middle iv. begin with D and end with I.



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**163.** In how many ways can the letters of the word VIOLENT be arranged so that vowels occupy only the odd places?





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**164.** In how many different ways can the letters of the word SALOON be arranged if the consonants and vowels must occupy alternate places?



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**165.** How many words can be formed out of the letters of the word, ARTICLE, so that vowels occupy even places?



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**166.** Find the number of words formed, with the letters of the word DELHI when any letter may be repeated any number of times.



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**167.** Find the number of 4 letter words, with or without meaning which can be formed out of the letters the words ROSE, when The repetition of the letters is not allowed  
The repetition of the letters is allowed.



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**168.** How many words can be formed by using the letters of the word BHARAT? How many of these words will not contain B and H together? How many of these start with B and end with T?



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**169.** In how many ways can the letters of the word INTERMEDIATE be arranged among themselves so that no two vowels may occupy consecutive places?



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**170.** In how many ways can the letters of the word PERMUTATIONS be arranged if the (i) words start with P and end with S, (ii) vowels are all together, (iii) there are always 4 letters between P and S?



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