

PERMUTATIONS AND COMBINATIONS

CLASS XI (2024-25)

- 1 In how many ways can 6 persons occupy 3 seats?
(A) 15 (B) 20 (C) 120 (D) 60
- 2 How many 3-digit numbers are there?
(A) 999 (B) 900 (C) 1000 (D) 998
- 3 You can go from Delhi to Agra either by car or by bus or by train or by air. In how many ways can you plan your journey from Delhi to Agra?
(A) 5 (B) 4 (C) 12 (D) 6
- 4 By using all the letters of the word DELHI, using each letter exactly once, then the number of word formed with or without meaning are ____
(A) 150 (B) 110 (C) 120 (D) 60
- 5 The number of words (with or without meaning) of three distinct letters of the English alphabet are ____
(A) 15000 (B) 1560 (C) 15600 (D) 10600
- 6 A room has 9 doors. A man enter the room through one door and comes out through a different door. Then total number of ways equal to _____.
(A) 181 (B) 72 (C) 64 (D) 60
- 7 There are three possible ways to go from place A to place B and two possible ways to go from place B to place C. How many possible ways are there to go from place A to place C?
(A) 9 (B) 6 (C) 12 (D) 4
- 8 The number of 6-digit numbers, all digits of which are odd is _____.
(A) 5^6 (B) 6^5 (C) $5!$ (D) $4!$
- 9 The number of permutations of n different objects, taken r at a time, time repetitions are allowed, is _____.
(A) n (B) n! (C) n^r (D) $(n - 1)!$
- 10 The number of ways in which n distinct objects can be put into two different boxes are _____.
(A) 2^n (B) 2^{n-1} (C) n! (D) $(n - 1)!$
- 11 The total number of 9 digit numbers which have all different digits is _____.
(A) 10! (B) 9! (C) $9 \times 9!$ (D) $10 \times 9!$
- 12 All the letters of the word 'EAMCOT' are arranged in different possible ways. The number of such arrangements in which no two vowels are adjacent to each other is (a) 360 (b) 144 (c) 72 (d) 54
(A) 360 (B) 144 (C) 72 (D) 54
- 13 There are four bus routes between A and B, and the three bus routes between B and C. A man can travel round-trip in number of ways by bus from A to C via B. If he does not to use a bus route more than once, in how many ways can be make round trip?
(A) 36 (B) 72 (C) 12 (D) 48
- 14 Eight children are to be seated on a bench, In how many ways can the children be seated ?
(A) 40360 (B) 40,320 (C) 40300 (D) 4800
- 15 The number of different four digit numbers that can be formed with the digits 2, 3, 4, 7 and using each digit only once is (a) 120 (b) 96 (c) 24 (d) 100
(A) 360 (B) 144 (C) 72 (D) 54
- 16 The number of ways that the letters of the word 'APPLE' be arranged is _____.
(A) 60 (B) 720 (C) 30 (D) 120
- 17 The number of 5-digit telephone numbers having at least one of their digits repeated is ____.

- (A) 1000000 (B) 100000 (C) 60760 (D) 69760
- 18 How many numbers are there between 100 and 1000 in which all the digits are distinct?
 (A) 648 (B) 600 (C) 608 (D) 81
- 19 Eight children are to be seated on a bench, How many arrangements are possible if the youngest child sits at the left hand end to the bench ?
 (A) 520 (B) 5040 (C) 720 (D) 5400
- 20 How many 3-digit numbers can be formed by using the digits 1 to 9 if no digit is repeated ?
 (A) 504 (B) 5040 (C) 9! (D) 72
- 21 The number of words formed from the letters of the word LAUGHTER, so that the vowels are never together are _____
 (A) 1440 (B) 14400 (C) 1400 (D) 144
- 22 The number of ways of different teams of 8 players chosen out of 10 players are _____
 (A) 90 (B) 20 (C) 40 (D) 45
- 23 In a football championship, 153 matches were played . Every two teams played one match with each other. The number of teams, participating in the championship is _____.
 (A) 15 (B) 20 (C) 18 (D) 17
- 24 The value of ${}^{15}C_8 + {}^{15}C_9 - {}^{15}C_6 - {}^{15}C_7 =$ _____
 (A) 1 (B) 0 (C) 10 (D) 4
- 25 How many three digit numbers can be formed without using the digits 0, 3, 5, 7, 9. The repetitions of the digits are not allowed?
 (A) 125 (B) 60 (C) 100 (D) 120
- 26 How many 4-letter code can be formed using the first 10 letters of the English alphabet, if no letter can be repeated?
 (A) 5040 (B) 720 (C) 5000 (D) 120
- How many 4 digit numbers can be formed using the digits 0, 1, 2, 3, 4, 5 no digit being repeated ?
 (A) 5040 (B) 300 (C) 500 (D) 125
- 27 If $\frac{1}{6!} + \frac{1}{7!} = \frac{k}{8!}$, find k.
 (A) 81 (B) 64 (C) 100 (D) 120
- 28 How many three digit numbers can be formed without using the digits 0, 3, 5, 7, 9. The repetition of digits is not allowed.
 (A) 81 (B) 60 (C) 30 (D) None of these
- 29 If ${}^4P_2 = n \times {}^4C_2$, find n.
 (A) 1 (B) 2 (C) 3 (D) 4
- ANS: (B) 2
- 30 How many 3-digit numbers can be formed by using the digits 1 to 9 if no digit is repeated?
 (A) 729 (B) 91 (C) 504 (D) 900
- 31 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 but first letter is a vowel?
- 32 Find n, if : $\frac{(2n)!}{5!(2n-3)!} : \frac{n!}{4!(n-2)!} = 52:5$
- 33 How many words each of 3 vowels and 2 consonants can be formed from the letters of the word "INVOLUTE"?
- 34 In how many ways can the word PENCIL be arranged so that N is always next to E?
- 35 In how many ways a committee consisting of 3 men and 2 women, can be chosen from 7 men and 5 women?

- 36 **Azadi Ka Amrit Mahotsav** is an initiative of the Government of India to celebrate and commemorate 75 years of independence of **INDIA** and the glorious history of its people, culture and achievements. After the school programme, Mathematics teacher gave a task to the students of Class XI.



- i) How many different words can be formed with the letters of the word **INDIA**?
 A) 50 B) 60 C) 40 D) 120
- ii) Of all permutations of the letters of the word **INDIA** are arranged as in dictionary, 13th word is _____
 A) DAIIN B) INDIA C) DIAIN D) DAINI
- iii) How many words can be formed starting with the letter D?
 A) 13 B) 15 C) 12 D) 25
- iv) 49th word will be _____
 A) NIADI B) NIDIA C) NAIDI D) NADII
- v) 60th word will be _____
 A) NDIAI B) NIDIA C) NIIDA D) NDAII
- i) B) 60 ii) A) DAIIN iii) C) 12 iv) D) NADII v) C) NIIDA
- 37 A group consists of 4 girls and 7 boys. In how many ways can a team of 5 members be selected if the team has at least one boy and one girl ?
- 38 In how many ways can 5 girls and 3 boys be seated in a row so that no two boys are together ?
- 39 If ${}^nP_r = 336$, ${}^nC_r = 56$. Find n and r
- 40 A mathematics paper consists of 10 questions divided into two parts I and II, each part containing 5 questions. A student is required to attempt 6 questions in all, taking at least 2 questions from each part. In how many ways the student select the questions?
- 41 Among 20 members of a cricket club, there are two wicket- keepers and five bowlers. In how many ways can eleven members be chosen so as to include only one of the wicket- keepers and at least three bowlers?
- 42 There are four bus routes between A and B; and three bus routes between B and C. A man can travel round-trip in number of ways by bus from A to C via B. If he does not want to use a bus route more than once, in how many ways can he make round trip?
- 43 How many three digit odd numbers can be formed by using the digits 1, 2, 3, 4, 5, 6 when
 (i) the repetition of digits is not allowed ?
 (ii) the repetition of digits is allowed ?
- 44 If $nP_5 : nP_3 = 2 : 1$ find n .
- 45 If ${}^nC_5 = {}^nC_7$, find n .
- 46 Evaluate $\frac{n!}{r!(n-r)!}$ when, $r = 2$
- 47 If $\frac{n!}{2!(n-2)!}$ and $\frac{n!}{4!(n-4)!}$ are in the ratio 2 : 1, find the value of n .
- 48 If ${}^9P_5 + 5 \cdot {}^9P_4 = {}^{10}P_r$, then find r .
- 49 If $\frac{1}{8!} + \frac{1}{9!} = \frac{x}{10!}$, find x .
- 50 How many 3-digit numbers can be formed by using the digits 1 to 9 if no digit is repeated ?

- 51 How many numbers are there between 100 and 1000 in which all the digits are distinct ?
- 52 A flag is in the form of three blocks each to be coloured differently. If there are eight different colours of choose from, how many such flags are possible ?
- 53 How many three digit numbers are there with all distinct digits ?
- 54 How many words are there (with or without meaning) of three distinct alphabets ?
- 55 How many 4 digit numbers can be formed using the digits 0, 1, 2, 3, 4, 5 no digit being repeated ?
- 56 For a set of six true or false questions, no student has written all correct answers and no two students have given the same sequence of answers, what is the maximum number of students in the class for this job to be possible ?
- 57 In a class of 25 boys and 15 girls, the teacher wants to select one boy and one girl. In how many ways this can be done ?
- 58 From among the 50 teachers in a school, one principal and two vice principals are to be appointed. In how many ways can this be done ?
- 59 An examination question paper consists of 12 questions divided into parts A and B. Part A consists of 7 questions and part B consists of 5 questions. In how many ways can a student answer 8 questions in the examination if,
- One must answer by selecting at least 3 questions from each part.
 - The student has to answer five from part A and three from part B.
- 60 A committee of 5 is to be formed out of 6 gents and 4 ladies. In how many ways that can be done when i) at least two ladies are included ii) at most two ladies are included
- 61 How many numbers are there between 100 and 1000 in which all the digits are distinct?
- 62 What is the number of ways of choosing 4 cards from a pack of 52 playing cards? In how many of these
- four cards are of the same suit?
 - four cards belong to four different suits?
 - are face cards?
 - two are red cards and two are black cards?
- 63 If all permutations of the letters of the word AGAIN are arranged in the order as in a dictionary. What is the 37th word, 49th word?
- 64 There are 4 multiple choice questions in an examination. How many sequences of answers are possible, if each question has 2 choices ?
- 65 Find n , if $\frac{n!}{(n-2)!} = 930, n \leq 2$.
- 66 Find n , if : $\frac{(2n)!}{5!(2n-3)!} : \frac{n!}{4!(n-2)!} = 52:5$.
- 67 Find n , if : $(n+2)! = 2550 \cdot n!$
- 68 Find n , if : $\frac{1}{9!} + \frac{1}{10!} = \frac{n}{11!}$.
- 69 Prove that : ${}^nP_r = {}^{n-1}P_r + r \cdot {}^{n-1}P_{r-1}$
- 70 How many of the natural numbers from 1 to 1000 have none of their digits repeated ?
- 71 Find n , if : ${}^{2n-1}P_n : {}^{2n+1}P_{n-1} = 22:7$
- 72 Find n , if : ${}^{2n}P_3 = 100 \cdot {}^nP_2$
- 73 Find n , if : $16 \cdot {}^nP_3 = 13 \cdot {}^{n+1}P_3$
- 74 Find n , if : ${}^nC_7 = {}^nC_5$
- 75 Find n , if : ${}^nC_6 : {}^{n-3}C_3 = 33:4$
- 76 Find r , if : ${}^{15}C_r : {}^{15}C_{r-1} = 11:5$

- 77 In how many ways a group of 11 boys can be divided into two groups of 6 and 5 boys each ?
- 78 Solve for x : $\frac{1}{5!} + \frac{1}{6!} = \frac{x}{7!}$
- 79 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.
- 80 There are 3 white, 4 red and one 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.
- 81 An examination paper consists of 12 questions in two parts, part A has 7 questions and part B has 5 questions. A candidate is required to answer 8 questions, selecting at least 3 from each part. In how many ways can he make his selections ?
- 82 How many of the natural numbers from 1 to 1000 have none of their digits repeated ?
- 83 Find the number of different signals that can be generated by arranging at least two flags in order (one below the other) on a vertical staff, if five different flags are available.
- 84 How many words each of 3 vowels and 2 consonants can be formed from the letters of the word “INVOLUTE” ?
- 85 A group consists of 4 girls and 7 boys. In how many ways can a team of 5 members be selected if the team has at least one boy and one girl ?
- 86 In how many ways can 5 girls and 3 boys be seated in a row so that no two boys are together ?
- 87 A committee of 8 students is to be selected from 8 boys and 6 girls. In how many ways this can be done if each group is to consists of at least 3 boys and 3 girls.
- 88 In how many of distinct permutations of the letters in “ MISSISSIPPI ” do the four I’s not come together ?
- 89 A committee of 3 persons is to be constituted from a group of 2 men and 3 women. In how many ways can this be done? How many of these committees would consist of one man and two women ?
- 90 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 ?
- 91 In how many ways can the letters of the word, “ASSASSINATION” be arranged so that all the S’s are together ?
- 92 Find the number of arrangements of the letters of the word INDEPENDENCE. In how many of these arrangements do all the vowels always occur together ?
- 93 A committee of 5 is to be formed out of 6 gents and 4 ladies. In how many ways this can be done when at least two ladies are included.
- 94 How many different 4-digit numbers can be formed from the digits 2, 3, 4 and 6 if each digit is used only once in a number ? Further how many of these numbers end in a 3 or 6 ?
- 95 How many words can be formed using all the letters of the word EQUATION so that (i) all the vowels are together, (ii) consonants occupy the odd places ?
- 96 How many three digit odd numbers can be formed by using the digits 1, 2, 3, 4, 5, 6 when
(i) the repetition of digits is not allowed ?
(ii) the repetition of digits is allowed ?
- 97 A boy has 3 library tickets and 8 books of his interest in the library. Of these 8, he does not want to borrow Mathematics Part II, unless Mathematics Part I is also borrowed. In how many ways can he choose the three books to be borrowed ?
- 98 How many numbers are there between 100 and 1000 such that at least one of the digits is 6 ?
- 99 Five girls and five boys are to be seated on a bench with the boys and girls alternating. Find the number of ways of their seating.
- 100 In how many different ways, the letters of the word ALGEBRA can be arranged in a row if (i) the two

- A's are together ? (ii) the two A's are not together ?
- 101 How many three digit numbers are there which have exactly one of their digits as 6 ?
- 102 How many 3 letter words (with or without meaning) can be formed out of the letters of the word LOGARITHMS, if repetition of letters is not allowed ?
- 103 In how many ways 4 boys and 6 girls be seated in a line so that no two boys may sit together ?
- 104 How many permutations can be made out of the letters of the word TRIANGLE? How many of these will begin with T and end with E ?
- 105 In an examination hall there are four rows of chairs. Each row has 8 chairs one behind the other. There are two classes sitting for the examination with 16 students in each class. It is desired that in each row all students belong to the same class and that no two adjacent rows are allotted to the same class. In how many ways can these 32 students be seated ?
- 106 How many six digit telephone numbers be made if each number starts with 35 and no digit appears more than once ?
- 107 In how many ways can the word PENCIL be arranged so that N is always next to E?
- 108 In how many arrangements of the word GOLDEN will the vowels never occur together ?
- 109 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?
- 110 How many five letter words containing 3 vowels and 2 consonants can be formed using the letters of the word 'EQUATION' so that the two consonants occur together ?
- 111 In how many ways can three prizes be distributed among 4 boys when
(i) no one gets more than one prize,
(ii) a boy can get any number of prizes?
- 112 How many different numbers of six digits (without repetition of digit) can be formed from the digits, 3, 1, 7, 0, 9, 5 ?
(i) How many of them will have 0 in the unit's place ?
(ii) How many of them are divisible by 5 ?
(iii) How many of them are not divisible by 5 ?
- 113 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 ?
- 114 In how many ways can 11 players be chosen out of 15 if
(i) there is no restriction,
(ii) a particular player is always chosen,
(iii) a particular player is never chosen ?
- 115 How many diagonals are there in a polygon of n sides ?
- 116 A polygon has 35 diagonals. Find the number of its sides.
- 117 A committee of 5 is to be selected from among 6 boys and 5 girls. Determine the number of ways of selections if the committee is to consist of at least one boy and one girl.
- 118 From a class of 10 boys and 6 girls, 10 students are to be selected for a competition, at least including 4 boys and 4 girls. The 2 girls who won the prizes last year should be included. In how many ways the selection can be made ?
- 119 From 7 consonants and 4 vowels, how many different words can be formed consisting of 3 consonants and 2 vowels ?
- 120 How many three digit numbers can be formed such that at least one of the digit is 8 ?
- 121 How many 3-digit even numbers can be formed from the digits 1, 2, 3, 4, 5, 6 if the digits can be repeated ?
- 122 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.

123 Find the number of arrangements of the letters of the word INDEPENDENCE. In how many of these arrangements,

(i) do all the vowels always occur together

(ii) do all the vowels never occur together

(iii) do the words begin with I and end in P ?

124 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 is a vowel ?

125 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 ?

126 A mathematics paper consists of 10 questions divided into two parts I and II, each part containing 5 questions. A student is required to attempt 6 questions in all, taking at least 2 questions from each part. In how many ways the student select the questions ?

127 In an examination, a question paper consists of 12 questions divided into two parts I and II, containing 5 and 7 questions, respectively. A student is required to attempt 8 questions in all, selecting at least 3 from each part. In how many ways can a student select the questions ?

128 A candidate is required to answer 7 questions out of 12 questions which are divided into two groups of 6 questions each. He is not permitted to attempt more than 5 questions from either group. In how many ways can he choose 7 questions ?

129 A committee of 5 is to be formed out of 6 men and 4 women. In how many ways can this be done if

(i) at least 2 women are included,

(ii) atmost 2 women are included ?

130 A committee of 12 is to be formed from 9 women and 8 men. In how many ways this can be done if at least five women have to be included in a committee ? In how many of these committee (i) the women are in majority (ii) the men are in majority ?

131 There are three possible ways to go from place A to place B and two possible ways to go from place B to place C. How many possible ways are there to go from place A to place C?

132 A room has 9 doors. A man enter the room through one door and comes out through a different door. Then total number of ways equal to _____ .

133 By using all the letters of the word DELHI, using each letter exactly once, then the number of word formed with or without meaning are 120. State true or false.

ANS: True, as $5 \times 4 \times 3 \times 2 \times 1 = 120$

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

135 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) beginning with D and ending with R

136 How many 4 digit numbers can be formed using the digits 0, 1, 2, 3, 4, 5 no digit being repeated ?

(A) 5040

(B) 300

(C) 500

(D) 125

ALPHA