



MATHS

BOOKS - NCERT MATHS (ENGLISH)

PERMUTATIONS AND COMBINATIONS

Short Answer Type Questions

1. Eight chairs are numbered 1 to 8. Two women and three men wish to occupy one chair each. First, the women choose the chairs

from amongst the chairs marked 1 to 4, and then the men select th chairs from amongst the remaining. The number of possible arrangements is

a. ${}^6C_3 \times {}^4C_2$ b. ${}^4P_2 \times {}^4P_3$

c. ${}^4C_2 \times {}^4P_3$ d. none of these



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2. If the letters of the word 'RACHIT' are arranged in all possible ways as listed in dictionary. Then, what is the rank of the word 'RACHIT' ?



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3. A candidate is required to answer 7 questions out of 12 questions, which are divided into two groups, each containing 6 questions. He is not permitted to attempt more than 5 questions from either group. Find the number of different ways of doing questions.



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4. Out of 18 points in a plane, no three points are in the same straight line except five points which are collinear. The number of straight lines formed by joining them is

A. 144

B. 153

C. 152

D. 140

Answer: A



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5. We wish to select 6 persons from 8, but if the person A is chosen, then B must be chosen. In how many ways can the selections be made?

A. 20

B. 21

C. 22

D. 30

Answer: C



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6. How many committee of five person with a chairperson can be selected from 12 persons ?

A. 960

B. 3960

C. 2960

D. 1960

Answer: B



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7. How many automobile license plates can be made, if each plate contains two different letters followed by three different digits ?



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8. A bag contains 5 black and 6 red balls. Determine the number of ways in which 2

black and 3 red balls can be selected.



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9. Find the number of permutations of n distinct things taken r together, in which 3 particular things must occur together.



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10. Find the number of different words that can be formed from the letters of the word

'TRIANGLE', so that no vowels are together.

A. 12000

B. 14400

C. 13590

D. 11100

Answer: B



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11. Find the number of positive integers greater than 6000 and less than 7000 which are divisible by 5, provided that no digit is to be repeated.



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12. There are 10 persons named $P_1, P_2, P_3, \dots, P_{10}$. Out of 10 persons, 5 persons are to be arranged in a line such that each arrangement P_1 must occur whereas P_4 and

P_5 do not occur. Find the number of such possible arrangements.



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13. There are 10 lamps in a hall. Each one of them can be switched on independently. Find the number of ways in which the hall can be illuminated.



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14. A box contains 2 white balls, 3 black balls and 4 red balls. The number of ways three balls be drawn from the box, if atleast one black ball is to be included in the draw is



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15.

if

$${}^n C_{r-1} = 36, {}^n C_r = 84 \text{ and } {}^n C_{r+1} = 126,$$

then find the value of ${}^r C_2$.



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16. If none of the digits 3, 5, 7, 8, 9 be repeated, how many different numbers greater than 7000 can be formed with them?

A. 190

B. 192

C. 180

D. 185

Answer: B



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17. If 20 lines are drawn in a plane such that no two of them are parallel and so three are concurrent, in how many points will they intersect each other?



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18. In a city all telephone numbers have six digits. The first two digits are always 41 or 42 or 46 or 62. How many telephone numbers have all six distinct digits?



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19. In an examination a student has to answer 4 questions out of 5 questions; questions 1 and 2 are however compulsory. Determine the number of ways in which the student can make the choice.



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20. A polygon has 44 diagonals. The number of its sides are

A. 11

B. 12

C. 13

D. 15

Answer: A



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Long Answer Type Questions

1. 18 mice were placed in two experimental groups and one control groups with all groups equally large. In how many ways can the mice be placed into three groups ?



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2. A big contains six white marbles and five red marbles. Find the number of ways in which four marbles can be drawn from the bag. If (i)

they can be of any colour. (ii) two must be white and two red. (iii) they must all be of the same colour.



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3. In how many ways can a football team of 11 players be selected from 16 players? How many of these will i. include 2 particular players? ii. exclude 2 particular players?



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4. A sports team of 11 students is to be constituted, choosing at least 5 from class XI and at least 5 from class XII. if there are 20 students in each of these classes, in how many ways can the team be constituted. What is the importance of sports in one's life ?



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5. 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 (i) no girl ? (ii) at least one boy and one girl ? (iii) at least 3 girls ?



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



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Objective Type Questions

1. If ${}^n C_{12} = {}^n C_8$ then $n =$

A. 20

B. 12

C. 6

D. 30

Answer: A



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2. The number of possible outcomes when a coin is tossed 6 times is

A. 36

B. 64

C. 12

D. 32

Answer: B



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3. 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

Answer: C



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4. The sum of the digits in the unit place of all numbers formed with the help of 3,4,5,6 taken all at a time is

A. 432

B. 108

C. 36

D. 18

Answer: B



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5. Write the total number of words formed by 2 vowels and 3 consonants taken from 4 vowels and 5 consonants.

A. 60

B. 120

C. 7200

D. 720

Answer: C



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

A. 216

B. 600

C. 240

D. 3125

Answer: A



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7. Every two persons shakes hands with each other at a party and the total number of handshake is 66. The number of guests in the party is?

A. 11

B. 12

C. 13

D. 14

Answer: B



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8. The number of triangles that can be formed by choosing from a set of 12 points, seven of which lie on the same straight line, are:

A. 105

B. 15

C. 175

D. 185

Answer: D



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9. The number of parallelograms that can be formed from a set of four parallel lines intersecting another set of three parallel lines is:

A. 6

B. 18

C. 12

D. 9

Answer: B



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10. The number of ways in which a team of 11 players can be selected from 22 players including 2 of them and excluding 4 of them is

A. ${}^{16}C_{11}$

B. ${}^{16}C_5$

C. ${}^{16}C_9$

D. ${}^{20}C_9$

Answer: C



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11. The number of five digit telephone numbers having at least one of their digits repeated is
90000 b. 100000 c. 30240 d. 69760

A. 90000

B. 10000

C. 30240

D. 69760

Answer: D



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12. The number of ways in which we can choose a committee from four men and six women, so that the committee includes

atleast two men and exactly twice as many women as men is

A. 94

B. 126

C. 128

D. None of these

Answer: A



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13. The total number of 9-digit number which have all different digits is

A. $10!$

B. $9!$

C. $9 \times 9!$

D. $10 \times 10!$

Answer: C



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

A. 1440

B. 144

C. 7!

D. ${}^4C_4 \times {}^3C_3$

Answer: B



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15. Given 5 different green dyes, four different blue dyes and three different red dyes, how many combinations of dyes can be chosen taking at least one green and one blue dye ?

A. 3600

B. 3720

C. 3800

D. 3600

Answer: B



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Fillers

1. If ${}^n P_r = 840$ and ${}^n C_r = 35$, then r is equal to



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2. ${}^{15}C_8 + {}^{15}C_9 - {}^{15}C_6 - {}^{15}C_7$ is equal to

.



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3. The number of permutation of n different objects, taken r at a time, when repetitions are allowed, is



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4. How many different words can be formed from the letters of the word INTERMEDIATE? In how many of them, two vowels never come together?



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5. Three balls are drawn from a bag containing 5 red, 4 white and 3 black balls. The number of ways in which this can be done, if at least 2 are red, is.



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6. Total number of 6-digit numbers in which all the odd digits appear, is



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7. 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



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8. The total number of ways in which six '+' and four '-' signs can be arranged in a line such that no two signs '-' occur together, is





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9. A box contains 2 white balls, 3 black balls and 4 red balls. The number of ways three balls be drawn from the box, if atleast one black ball is to be included in the draw is



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True False

1. There are 12 points in a plane of which 5 points are collinear, then the number of lines obtained by joining these points in pairs is ${}^{12}C_2 - {}^5C_2$.



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2. Three letters can be posted in five letter boxes in 3^5 ways.



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3. In the permutations of n things r , taken together, the number of permutations in which m particular things occur together is

$${}^{n-m}P_{r-m} \times {}^rP_m.$$



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4. 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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5. If some or all of n objects are taken at a time, then the number of combinations is $2^n - 1$.



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6. Find the total number of selections of at least one red ball from a bag containing 4 red

balls and 5 black balls, balls of the same colour being identical.



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



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8. A candidate is required to answer 7 questions out of 12 questions, which are divided into two groups, each containing 6 questions. He is not permitted to attempt more than 5 questions from either group. He can choose the seven questions in 650 ways.



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9. To fill 12 vacancies there are 25 candidates of which 5 are from scheduled castes. If 3 of the

vacancies are reserved for scheduled caste candidates while the rest are open to all, the number of ways in which the selection can be made is ${}^5C_3 \times {}^{20}C_9$.



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Matching The Columns

1. There are 3 books of Mathematics, 4 of Physics and 5 of English. How many different

collections can be made such that each consists at least one book of each subject ?



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2. Five boys and five girls from a line. Find the number of ways of making the seating arrangement under the following condition:



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3. There are 10 professors and 20 lecturers, out of whom a committee of 2 professors and 3 lecturers is to be formed. Find

Column I	Column II
(i) in how many ways committee can be formed?	(a) ${}^{10}C_2 \times {}^{19}C_3$
(ii) in how many ways a particular professor is included?	(b) ${}^{10}C_2 \times {}^{19}C_2$
(iii) in how many ways a particular lecturer is included?	(c) ${}^9C_1 \times {}^{20}C_3$
(iv) in how many ways a particular lecturer is excluded?	(d) ${}^{10}C_2 \times {}^{20}C_3$



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4. Using the digits 1, 2, 3, 4, 5, 6, 7, a number of 4 different digits is formed. Find

Column I	Column II
(i) how many numbers are formed?	(a) 840
(ii) how many numbers are exactly divisible by 2?	(b) 200
(iii) how many numbers are exactly divisible by 25?	(c) 360
(iv) how many of these are exactly divisible by 4?	(d) 40



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5. How many words (with or without dictionary meaning) can be made from the letters of the word MONDAY, assuming that no letter is

repeated, if

Column I	Column II
(i) 4 letters are used at a time.	(a) 720
(ii) All letters are used at a time	(b) 240
(iii) All letters are used but the first is a vowel.	(c) 360



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