



## MATHS

### BOOKS - S CHAND MATHS (ENGLISH)

### PERMUTATIONS AND COMBINATIONS

#### Example

1. The number of numbers divisible by 5 and lying between 40000 and 50000 that can be formed from the digits 0, 3, 4, 5, 8 and 9, when repetition of digits is allowed is

A. 431

B. 48

C. 432

D. 84

**Answer: C**



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2. The number of words with or without meaning that can be formed with the letters of the word 'EQUATION' so that all the vowels occur together is

A.  $| \underline{8}$

B.  $| \underline{5} \times | \underline{3}$

C.  $| \underline{5} \times | \underline{4}$

D.  $\frac{| \underline{8} }{a | \underline{5}}$

**Answer: c**



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3. If  ${}^{n^2-n}C_2 = {}^{n^2-n}C_4$ , then n is equal to

A. 2

B. 3

C. 4

D. 6

**Answer: b**



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4. The value of

$$C(47, 4) + C(51, 3) + C(50, 3) + C(49, 3) + C(48, 3) + C(47, 3)$$

is equal to

A.  $C(47,4)$

B.  $C(52,5)$

C.  $C(52,4)$

D.  $C(47,5)$

**Answer: c**



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5. The sum of 3 digits numbers that can be formed using the digits 3,4 and 5 when repetition of digits is not allowed is

A. 2664

B. 3882

C. 4044

D. 4444

**Answer: a**



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6. There are 10 points in a plane , out of these 6 are collinear .if

$N$  is number of triangles formed by joining these points , then

A.  $N > 190$

B.  $N \leq 100$

C.  $100 < B \leq 140$

$$D. 140 < N < 190$$

**Answer: b**



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7. There are 10 buses running between two towns X and Y. In how many ways can a mango from X to Y and return by a different bus ?



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8. How many different numbers of three digits can be formed with the digits 1,2,3,4,5 no digit is being repeated ?



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9. Each sections in first year of plus two course has exactly 30 students . If there are 3 sections. In how many ways can a set of 3 students representatives be selected from each sections?

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10. How many numbers are there between 100 and 1000 such that every digit is either 2 or 9 ?

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11. How many odd numbers less than 1000 can be formed using the digits 0,2,5, 7, repetitions of digits are allowed ?

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12. A coin is tossed three times and outcomes are recorded .Use the product rule to determine the number of possible outcomes . Then list all the outcomes.



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13. In how many ways can 5 persons occupy 3 vacant seats ?



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14. If  ${}^{12}P_r = 1320$ , find r.



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15. Find the value of n if  ${}^n P_{13} : {}^{n+1} P_{12} = \frac{3}{4}$





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16. Show that  ${}^n P_r = {}^{n-1} P_r + r, {}^{n-1} P_{r-1}$  Where the symbols have their usual meanings.



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17. In how many of the permutations of 10 things taken 4 at a time will (i) one thing always occur, (ii) never occur ?



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18. In how many of the permutations of  $n$  things taken  $r$  at a time will 5 things (i) always occur, (ii) never occur ?



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19. Prove that the number of ways in which  $n$  books can be placed on a shelf when two particular books are never together is  $(n - 2) \times (n - 1)!$



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20. In how many ways can 6 boys and 4 girls be arranged in a straight line so that no two girls are ever together ?



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21. Suppose the six digit 1,2,4,5,6,7 are given to us and we have to find the total number of ways with no repetitions of digits which can be formed under different conditions.



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**22.** How many numbers can be formed by using any number of the digit 3, 1, 5, 7, 2, 9 no digit being repeat in any numbers .

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**23.** How many different numbers can be formed with the digit 1, 3, 5, 7, 9 when taken all at a time and, what is their sum?

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**24.** Suppose the word " PENCIL " is given to us and we have to form words with the letters of this word.

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25. How many ways are there to arrange the letters in the word GARDEN with the vowels in alphabetical order?



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26. In how many ways can the letters of the word 'INDIA' be arranged ?



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27. 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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**28.** A coin is tossed 6. times In how many different ways can we obtain 4 heads and 2 tails?



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



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**30.** There are 3 copies each of 4 different books. Find the number of ways of arranging them on a shelf.



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**31.** Find the number of arrangements of the letters of the word 'BANANA' in which the two N' do not appear adjacently.



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**32.** How many numbers greater than a million can be formed with the digits 2,3,0,3,4,2,3?



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**33.** In how many ways can the letters of the word 'ARRANGE' be arranged such that the two r's do not occur together?



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**34.** If the letters of the word 'AGAIN' be arranged in a dictionary, what is the fiftieth word?



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**35.** The letters of the word 'RANDOM' are written in all possible ways and these words are written out as in a dictionary. Find the rank of the word 'RANDOM'



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**36.** In how many ways can 3 prizes be distributed among 4 boys. When

(i) no boy gets more than one prize

(ii) a boys may get any numbers of prizes

(iii) no boys get all the prizes.

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**37.** How many numbers of 3 -digits can be formed with the digits 1,2,3,4,5 when digits may be repeated?

<b>H</b>	<b>T</b>	<b>O</b>
<b>5</b> ways	<b>5</b> ways	<b>5</b> ways

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**38.** How many numbers each containing four digits can be formed ,when a digit may be repeated any number of times?



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**39.** Eight different letters of an alphabet are given. Words of 4 letters from these are formed. Find the number of such word with at least one letter repeated.



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**40.** 20 persons were Invited for party . In how many ways can they and the host be seated around a circular table? In how many of these ways will two particular persons be seated on either side of the host?



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41. In how many ways can a party of 4 boys and 4 girls be seated at a circular table so that no 2 boys are adjacent?

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42. In how many ways can 10 boys and 5 girls sit around a circular table , so that no two girls sit together?

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43. A round table conference is to be held between 20 delegates of 20 countries. In how many ways can they be seated if two particular delegates are always together.

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**44.** A round table conference is to be held between delegates of 20 countries. In how many ways can they be seated if two particular delegates are never together?



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**45.** Find the number of ways in which (i)  $n$  different beads (ii) 10 different beads can be arranged to form a necklace.



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**46.** Find the numbers of ways in which 10 different flowers can be strung to form a garland so that 4 particular flowers are

never separated.

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47. In how many ways can 7 persons sit around a table so that all shall not have the same neighbours in any two arrangements.

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48. Find the value of  ${}^6C_3$  and  ${}^{30}C_{28}$

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49. IF  ${}^{18}C_r = {}^{18}C_{r+2}$ , Find the value of  ${}^rC_5$

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50. Find the value of  ${}^{47}C_4 + \sum_{r=1}^5 {}^{52-r}C_3$

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51. If  ${}^nC_r$  denotes the numbers of combinations of  $n$  things taken  $r$  at a time, then the expression  ${}^nC_{r+1} + {}^nC_{r-1} + 2 \times {}^nC_r$  equals

$${}^{n+2}C_{r+1}$$

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52. If  ${}^nC_r$  denotes the numbers of combinations of  $n$  things taken  $r$  at a time, then the expression

${}^n C_{r+1} + {}^n C_{r-1} + 2 \times {}^n C_r$  equals

$${}^{n+2} C_{r+1}$$



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53. If  ${}^n C_r$  denotes the numbers of combinations of  $n$  things taken  $r$  at a time, then the expression

${}^n C_{r+1} + {}^n C_{r-1} + 2 \times {}^n C_r$  equals

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

B.  ${}^{n+2} C_r$

C.  ${}^{n+2} C_{r+1}$

D.  ${}^{n+1} C_r$

**Answer:**



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54. If  ${}^n C_r$  denotes the numbers of combinations of  $n$  things taken  $r$  at a time, then the expression  ${}^n C_{r+1} + {}^n C_{r-1} + 2 \times {}^n C_r$  equals

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

B.  ${}^{n+2} C_{r+1}$

C.  ${}^{n-2} C_{r+1}$

D.  ${}^{n-1} C_{r+1}$

**Answer:**



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55. If  ${}^n C_{r-1} = 36$ ,  ${}^n C_r = 84$  and  ${}^n C_{r+1} = 126$  then find the value of  $r$ .



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56. If  ${}^n C_3 + {}^n C_4 > {}^{n+1} C_3$ , then.

A.  $n > 6$

B.  $n > 7$

C.  $n < 6$

D. none of these

Answer: a



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57. In how many ways can 4 persons be selected from amongst 9 persons ? How many times will a particular person be always



selected?



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**58.** How many diagonals are there in an  $n$ -sided polygen ( $n > 3$ )?



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**59.** How many triangles can be formed by joining the vertices of an  $n$ -sided polygen?



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**60.** Find the number of diagonals that can be drawn by joining the angular points of a heptagon.



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**61.** Find the number of diagonals that can be drawn by joining the angular points of a polygon of 20 sides.



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**62.** A committee of 4 is to be selected from amongst 5 boys and 6 girls . In how many ways can this be done so as to include (i) exactly one girl ,(ii) at least one girl?



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**63.** A student is to answer 10 out of 13 questions in an examination such that he must choose at least 4 from the first five questions. Find the numbers of choices available to him.

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**64.** There are 5 questions in a questions paper. In how many ways can boy solve one or more questions?

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**65.** Prove that from the letters of the sentence, 'Daddy did a deadly deed', one or more letters can be selected in 1919 ways.

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**66.** How many different words. Each containing 2 vowels and 3 consonants. Can be formed with 5 vowels and 17 consonants?



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**67.** Find the number of (i) combinations. (ii) permutations of four letters taken from the word EXAMINATIONS.



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## Multiple Choice Questions

**1.** The number of 3 digit odd number, when repetition of digits is allowed is

A. 450

B. 360

C. 400

D. 420

**Answer: A**



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2. The number of numbers divisible by 5 and lying between 40000 and 50000 that can be formed from the digits 0,3,4,5,8 and 9, when repetition of digits is not allowed is

A. 431

B. 48

C. 432

D. 84

**Answer: b**



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3. The number of 4 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 unit place of all the numbers formed using the digits 3,4,5,6 without repetitions, the no. of such numbers are

A. A. 432

B. B. 108

C. C. 36

D. D. 18

**Answer: b**



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5. A five digit number divisible by 3 is to be formed using the digits 0,1,3,5,7,9 without repetitions. The total number of ways

this can be done is

A. 216

B. 192

C. 240

D. 3125

**Answer: b**



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**6.** The total number of 9 digit numbers which have all different digits is

A. 10

B. 9



C. 9 | 9

D. 10 | 10

**Answer: c**



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7. The number of words which can be formed out of the letters of the word *ARTICLE*, so that vowels occupy the even place is

A. 1440

B. 144

C. 9!

D. 10!

**Answer: B**



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**8.** There are 4 bus routes between A and B and 3 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?

A. 72

B. 142

C. 14

D. 19

**Answer: A**



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9. The number of 4 letter words with or without meaning that can be formed out of the letters of the word 'WONDER', if repetition of letters is not allowed is

A. 24

B.  $6^4$

C.  $4^6$

D. 360

**Answer: d**



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

hall can be illuminated is

A.  $2^{10}$

B.  $2^{10} - 1$

C.  $10^2$

D.  $10^2 - 1$

**Answer: B**



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**11.** The number of ways in which 4 books of Mathematics and 3 books of English can be placed in a shelf, so that the books on the same subject always remain together is

A. 144

B. 210

C. 288

D. 372

**Answer: C**



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12. The number of ways in which 5 boys and 3 girls can be seated in a row, so that no two girls sit together is

A.  $\underline{8}$

B.  $\underline{5} \times \underline{3}$

C.  $\underline{3} \times {}^5 P_4$

D.  $\underline{5} \times {}^6 P_3$

**Answer: d**

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13. The number of numbers greater than 56000 that can be formed by using the digits 4,5,6,7,8, no digit being repeated in any number is

A. 18

B. 36

C. 72

D. 90

**Answer: D**

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14. The number of six digit numbers that can be formed by using the digits 1,2,1,2,0,2 is

A. 50

B. 60

C. 110

D. 10

**Answer: a**



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15. The number of signals that can be made by 4 flags of different colours, taking one or more at a time is

A. 48

B. 52

C. 64

D. 56

**Answer: C**



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**16.** In a examination there are four multiple choice questions and each question has 4 choices. Number of ways in which a student can fail to get all answer correct is

(i) 256

(ii) 254

(iii) 255

(iv) 63



A. 256

B. 254

C. 255

D. 63

**Answer: c**



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**17.** The number of words that can be formed out of the letters of the word 'INDEPENDENT', so that vowels and consonants occur together is

A. 960

B. 3360

C. 2160

D. 4320

**Answer: b**



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**18.** In how many ways a committee consisting of 3 men and 2 women can be chosen from 7 men and 5 women?

A. (a) 45

B. (b) 350

C. (c) 4200

D. (d) 230

**Answer: b**



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19. Total number of words formed by 3 vowels and 3 consonants taken from 5 vowels and 5 consonants is equal to

(i) 720

(ii) 7200

(iii) 72000

(iv) 72

A. 720

B. 7200

C. 72000

D. 72

**Answer: c**



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20. Out of 5 men and 2 women a committee of 3 persons is to be formed so as to include atleast one woman. The number of ways in which it can be done is

(i) 10

(ii) 25

(iii) 35

(iv) 45

A. 10

B. 25

C. 35

D. 45

**Answer: b**



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21. The number of ways of selecting 9 balls from 6 red balls, 5 white balls and 5 blue balls, if each selection consists of 3 balls of each colour. Assuming that balls of the same colour are distinguishable is

A. 40

B. 60

C. 180

D. 2000

**Answer: D**



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22. Every body in a room shakes hands with everybody else. The total number of handshakes is 21. The total number of persons

in the room is

A. (a) 6

B. (b) 7

C. (c) 8

D. (d) 9

**Answer: b**



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**23.** The number of triangles that can be formed by choosing the vertices from a set of 12 points, seven of which lie on the same straight line is

(i) 105

(ii) 15

(iii) 175

(iv) 185

A. 105

B. 15

C. 175

D. 185

**Answer: d**



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**24.** The maximum number of points of intersection of 9 straight lines drawn in a plane is

(i) 72

(ii) 36

(iii) 18

(iv) None of these

A. 72

B. 36

C. 18

D. none of these

**Answer: b**



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**25.** 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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**26.** The number of ways in which a team of eleven players can be selected from 22 players always including 2 of them and excluding 4 of them is

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

B.  ${}^{16}C_7$

C.  ${}^{16}C_5$

D.  ${}^{16}C_9$

**Answer: D**



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**27.** The number of 5 digit numbers having atleast one of their digit repeated is

A. 90000

B. 100000

C. 27216

D. 62784

**Answer: d**



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28. Eighteen guests are to be seated half on each side of a long table. Four particular guests desire to sit on particular side and three others on other side of the table. The number of ways in which the seating arrangements can be made is

- A.  $\frac{(11!)}{(5!)(6!)} ((9!))^2$
- B.  $\frac{(11!)}{(5!)(6!)} ((9!))^2 \cdot 2!$
- C.  $\frac{(11!)}{(5!)(6!)} (2!)$
- D.  $\frac{(11!)}{(5!)(6!)} ((9!)) \cdot (2!)$

**Answer: A**



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29. The number of ways in which 12 different objects can be divided into three groups each containing 4 objects is

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

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

C.  $\frac{(12!)}{(4!)}$

D. none of the above

**Answer: A**



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**30.** The number of ways of distributing 12 identical balls in 5 different boxes so that none of the box is empty is

A.  ${}^{12}C_5$

B.  ${}^{17}C_5$

C.  ${}^{16}C_4$

D.  ${}^{11}C_4$

**Answer: d**



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**31.** If the letters of the word 'RACHIT' are arranged in all possible ways as listed in dictionary, then the rank of the word 'RACHIT' is

(i) 480

(ii) 481

(iii) 482

(iv) 483

A. 480

B. 481

C. 482

**Answer: b****Watch Video Solution**

**32.** The number of ways in which  $m$  men and  $n$  women can be seated in a row, so that no two women sit together is

$$(i) \frac{m!(m+1)!}{(m+n-1)!}$$

$$(ii) \frac{m!(m+1)!}{(m-n+1)!}$$

$$(iii) \frac{n!(m+1)!}{(m-n+1)!}$$

$$(iv) \frac{m!(n+1)!}{(m+n-1)!}$$

$$A. \frac{|m|m+1}{|m+n-1|}$$

$$B. \frac{|m|m+1}{|m-n+1|}$$

$$C. \frac{|n|m+1}{|m-n+1|}$$

D.  $\frac{|m|n + 1}{m + n - 1}$

**Answer: b**



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

A. 3

B. 36

C. 66

D. 108

**Answer: D**



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**34.** 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 each group. The number of ways in which he can choose the 7 questions is

A. (a)780

B. (b)640

C. (c)820

D. (d)none of these

**Answer: A**





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35. The number of permutations by taking all letters and keeping the vowels of the word COMBINE in the odd places is.

A. (a)96

B. (b)144

C. (c)512

D. (d)576

Answer: D



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36. If  ${}^{56}P_{r+6} : {}^{54}P_{r+3} = 30800$ , then r is

A. 40

B. 51

C. 101

D. 410

**Answer:**



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**37.** For  ${}^n C_r + 2{}^n C_{r-1} + {}^n C_{r-2} =$

A.  $(a)^{n+1} C_{r-1}$

B.  $(b)^{n+2} C_{r+1}$

C.  $(c)^{n+2} C_r$

D.  $(d)^{n+2} C_r$

**Answer: D**



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**38.** How many different words can be formed by jumbling the letters in the words MISSISSIPPI in which no two S are adjacent?

A.  ${}^6C_4 \cdot {}^7C_4$

B.  $6 \cdot 8^8 C_4$

C.  $6 \cdot 8 \cdot {}^7C_4$

D.  $7 \cdot {}^6C_4 \cdot {}^8C_4$

**Answer: D**



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39. The number of diagonals of a polygon of 20 of sides

A. 210

B. 190

C. 180

D. 170

**Answer: D**



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40. The number of ways in which 6 men and 5 women can dine at a round table if no two women are to sit together is given by.

A.  $6! \times 5!$

B. 30

C.  $5!Xx4!$

D.  $7!Xx5!$

**Answer: A**



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41. 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  $n =$

A. 5

B. 7

C. 6

D. 4

**Answer: B**



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42. If  ${}^{43}C_{r-6} = {}^{43}C_{3r+1}$ , then the value of r is

A. 12

B. 8

C. 6

D. 4

**Answer: A**



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**43.** A committee of 7 members has to be formed from 9 boys and 4 girls. In how many ways can this be done when the committee consists of exactly 3 girls

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**44.** A committee of 7 members has to be formed from 9 boys and 4 girls. In how many ways can this be done when the committee consists of at least 3 girls

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45. A committee of 7 members has to be formed from 9 boys and 4 girls. In how many ways can this be done when the committee consists of at most three girls



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46. In how many ways can the letters of the word ' PERMUTATIONS' be arranged if the words start with P and end with S



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47. In how many ways can the letters of the word ' PERMUTATIONS' be arranged if the vowels are all together





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**48.** In how many different ways can the letters of the word 'SALOON' be arranged if the two O's must not come together?

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**49.** 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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**Exercise 12 A**

1. Two persons go in a railways carriage where there are 6 vacant seats. In how many different ways can they seat themselves?



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2. In how many ways can 2 prizes be awarded to 9 contestants provided no contestant gets both the prizes?



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3. There are three mathematics teachers in a college in which there are 6 classes. In how many different ways can they choose the classes provided one teaches one class only



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4. How many words (with or without meaning) of three distinct letters of the English alphabets are there?



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5. How many numbers are there between 100 and 1000 such that 7 is in the units places?



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6. How many integers of four digits each can be formed with the digits 0,1,3,5,6 (assuming no repetitions)



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7. How many automobiles licence plates can be made if the inscriptions on each contains two different letters followed by three different digits ?



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8. Find the numbers of ways of arranging 6 players to throw the cricket ball so that the oldest players may not throw first.



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9. How many three digit numbers can be formed without using the digits 0,2,3,4,5 and 6?



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10. Find the number of even positive integers which have three digits?



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11. How many 2- digits numbers can be formed from the digits 8,1,3,5 and 4 assuming repetition of digits is allowed?



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12. How many 2- digits numbers can be formed from the digits 8,1,3,5 and 4 assuming repetitions of digits is not allowed?



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13. There are 12 true - false questions in an examination .How many sequences of answer are possible?



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14. How many four -digits even integers can be formed using the digits 0,1,2,3,4,5?



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15. To pass an examinations a students has to pass in each of the 3 papers. In how many ways can a students fail in the examination?



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**16.** How many seven -digits phone numbers are possible if 0 and 1 cannot be used as the first digit and the first three digits cannot be 555, 411 or 936?



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**17.** There are five routes for a journey from stations . A to B . In how many different ways can a man go from A to B and return , if for returning.

any of the routes is taken



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**18.** There are five routes for a journey from stations . A to B . In how many different ways can a man go from A to B and return ,

if for returning.

the same route is taken

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**19.** There are five routes for a journey from stations . A to B . In how many different ways can a man go from A to B and return , if for returning.

the same route is not taken?

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**20.** How many 9- digits numbers of different digits can be formed?

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21. For a set of five true- or -false questions no students has written the all - correct answer ,and no two students have given the same sequence of answer. What is the maximum number of students in the class , for this to be possible?

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## Exercise 12 B

1. Evaluate  $\frac{4!}{2!2!}$

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2. Given the meaning and value of the symbol in the following

${}^5P_2$

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3. Given the meaning and value of the symbol in the following

$${}^7P_3$$

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4. Given the meaning and value of the symbol in the following

$${}^{10}P_4$$

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5. Find n if :

$${}^nP_2 = 30$$

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6. Find n if :

$${}^n P_4 : {}^{n-1} P_3 = 9 : 1$$



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7. Find n if :

$${}^{2n} P_{n+1} : {}^{2n-2} P_n = 56 : 3$$



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8. Find n if :

$${}^{2n+1} P_{n-1} : {}^{2n-1} P_n = 3 : 5$$



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9. Find  $n$  if :

$$P(2n, 3) = 100 P(n, 2)$$



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10. Find  $n$  if :

$$P(n, 6) = 3(P(n, 5))$$



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11. Find  $n$  if :

$$2P(n, 3) = P(n + 1, 3)$$



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12. Find  $r$  if  $5 P(4, r) = 6 P(5, r-1)$ ,  $r \geq 1$ .



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13. Prove that :

$$P(n, n) = 2P(n, n - 2)$$



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14. Prove that

$$P(10, 3) = P(9, 3) + 3P(9, 2)$$



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15. Prove that

$$P(n, r) = (n - r + 1)P(n, r - 1)$$



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16. Prove that

$$P(n, n) = P(n, n - 1)$$



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17. Prove that

$$\text{If } \frac{1}{9!} + \frac{1}{10!} = \frac{x}{11!}, \text{ Find } x.$$



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



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19. Solve for n :

$$\frac{(2n)!}{3!(2n-3)!} : \frac{n!}{2!(n-2)!} = 44:3$$



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20. Solve for n :

$$(n+1)! = 56(n-1)!$$



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21. Prove that  $\frac{2n!}{n!} = 1, 3, 5, \dots (2n-1)2^n$



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22. Convert into factorial ` 7,8,9,10,11, 12, 13, 14, 15.



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## Exercise 12 C

1. Of 12 different books a shelf will hold five. how many different arrangements may be made on the shelf?



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2. In how many ways can the letters of the following words be arranged:

RADIO



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3. In how many ways can the letters of the following words be arranged:

FOREIGN?



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4. In how many other ways can the letters of the word 'SIMPLETON' be arranged?



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5. How many different words beginning and ending with a consonant can be made out of the letters of the word 'EQUATION'?



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6. 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 ?



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7. How many different words can be formed of the letters of the word 'MALKENKOV' so that no two values are together



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8. How many different words can be formed of the letters of the word 'MALKENKOV' so that the vowels may occupy odd places ?



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9. In how many ways can the letters of the word ' COMBINE ' be arranged so that, the vowels are never separated

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10. In how many ways can the letters of the word ' COMBINE ' be arranged so that,  
all the vowels never come together,

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11. In how many ways can the letters of the word ' COMBINE ' be arranged so that,  
vowels occupy only the odd places ?



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12. Three persons have 4 coats, 5 waistcoats ,and 6 hats. Find in how many ways can they put on the clothes.



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13. If out of 6 flags any number of flags can be shown at a time find how many different signals can be made out of them.



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14. In how many ways can 9 things be arranged taken 4 at time , and in how many of these arrangements will a particular thing be included?

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15. How many different numbers of 4 digits each can be formed with the ten digits 0,1,2,...9 when digits are not repeated?

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16. From the digits 1,2,3,4,5,6 how many three - digit odd numbers can be formed when the repetition of the digits is not allowed?

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17. How many different numbers of six digits can be formed with the digits 3,1,7,0,9, 5 ?

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**18.** How many of them are divisible by 10 ?

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**19.** How many different numbers of six digits can be formed with the digits 3,1,7,0,9,5 (without repetition)

(i) How many of them are divisible by 10

(ii) How many of them will have zero in the ten's place ?

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**20.** How many 5-digits telephone numbers can be formed with the digits 0,1,2,....,8,9 if each numbers starts with 35 and no digit appears more than once?



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**21.** In how many ways can 5 boys and 3 girls sit in a row so that no two girls are sit together?



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**22.** There are 5 red , 4 white and 3 blue marbles in a bag. They are drawn one by one and arranged in a row . Assuming that all the 12 marbles are drawn , determine the number of different arrangements.



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23. How many 7-digit number can be formed using the digits 1,2,0,2,4,2 and 4?



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24. In "BHARAT" how many of these B and H are never together?



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25. In how many of the word "BHARAT" these B and H are never together?



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26. How many of these in word "BHARAT" begin with B and end with T ?



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27. Find how many arrangements can be made with the letters of the word ' MATHEMATICS'?



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28. (i) Find how many arrangements can be made with the letters of word " MATHEMATIC"

(ii) In how many of them the vowels occur together?



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**29.** Ten different books are arranged on a shelf . Find the number of different ways in which this can be done. If two specified book are (a) to be together, (b) not to be together.



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**30.** In how many ways can 20 books be arranged on a shelf so that a particular pair of books shall not come together?



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**31.** Find the number of permutations of the letter of the words 'INDIA '



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**32.** Find the number of permutations of the letter of the words  
'ALLAHABAD '



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**33.** Find the number of permutations of the letter of the words  
'CHANDIGARH'



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**34.** Find the number of permutations of the letter of the words  
' COMMISIONS.'



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**35.** Find the number of ways in which five identical balls can be distributed among ten identical boxes, if not more than one can go into a box.



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**36.** How many numbers are there in all which consist of 5 digits?



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**37.** In how many ways can 5 prizes be distributed among 4 students, when each student may receive any number of prizes.



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**38.** In how many ways can 3 letters be posted in four letter boxes in a village ? If all the three letters are not posted in the same letter box. Find the corresponding number of ways of posting.

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**39.** In how many ways can 8 people sit around a table?

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**40.** In how many ways can 10 people sit around a table so that all shall not have the same neighbours in any two arrangement ?

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**41.** In how many ways can 20 persons be seated round a table if there are 9 chairs.



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



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**43.** In how many ways can 30 different pearls be arranged to form a necklace?



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**44.** In how many ways 6 gentleman and 3 ladies can be seated round a table so that every gentleman may have a lady by his side.



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**45.** The letters of the word ZENITH are written in all possible orders. How many words are possible if all these words are written out as in dictionary ? What is the rank of the word ZENITH?



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1. Find the value of :

$${}^5C_2$$



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2. Find the value of :

$${}^{10}C_4$$



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3. Find the value of :

$${}^{50}C_{47}$$



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4. Evaluate

$$C(15, 14)$$



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5. Evaluate

$$C(8, 5)$$



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6. Evaluate

$${}^{11}C_2.$$



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7. Evaluate

$$C(19, 17) + C(19, 18)$$



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8. Evaluate

$$C(31, 26) - C(30, 26)$$



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9. If  ${}^4P_2 = n \cdot {}^4C_2$ . Find the value on f.



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10. If  ${}^nC_4 = {}^nC_6$ , find n.



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11. If  $C(2n, 3) : C(n, 2) = 12 : 1$  find  $n$ ,



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12. If  ${}^nC_r : {}^nC_{r+1} = 1 : 2$  and  ${}^nC_{r+1} : {}^nC_{r+2} = 2 : 3$  determine the values of  $n$  and  $r$ .



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13. If  $C(n, 10) = C(n, 12)$ , determine  $C(n, 5)$



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14. If  $C(2n, r) = C(2n, r+2)$ , find  $r$  in term of  $n$ .



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15. The value of  ${}^{50}C_4 + \sum_{r=1}^6 {}^{56-r}C_3$  is

A.  ${}^{55}C_4$

B.  ${}^{55}C_3$

C.  ${}^{56}C_3$

D.  ${}^{56}C_4$

Answer: D



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16.  ${}^{n-1}C_3 + {}^{n-1}C_4 > {}^nC_3$  if

A.  $n > 7$

B.  $n \geq 7$

C.  $n > 6$

D.  $n \geq 6$

**Answer: A**



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## Exercise 12 E

1. In how many ways can a committee of 8 be chosen from 10 individuals?

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2. In how many ways can a committee of five persons be formed out of 8 members when a particular member is taken every time?

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3. In how many ways can a committee of 4 be selected out of 12 persons so that a particular person may always be taken.

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4. In how many ways can a committee of 4 be selected out of 12 persons so that a particular person may

never be taken?



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5. In how many ways can a team of 11 players be selected from 14 players when two of them can play as goalkeepers only?



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6. A persons has got 12 friends of whom 8 are relatives. In how many ways can he invite 7 guests such that 5 of them may be relatives ?



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7. How many diagonals are there in a polygon of (i) 8 sides (ii) 10 sides?



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8. In how many ways a committee consisting of 3 men and 2 women can be chosen from 7 men and 5 women?



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9. In how many ways can a student choose 5 courses out of 9 courses if 2 courses are compulsory for every student?



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10. In how many ways can we select a cricket eleven from 17 players in which 5 players can bowl? Each cricket team must include 2 bowlers.



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11. How many committees of 5 members each can be formed with 8 officials and 4 non - official members in the following cases:

each consists of 3 officials and 2 non - official members.



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12. How many committees of 5 members each can be formed with 8 officials and 4 non - official members in the following

cases:

each contains at least two non-official members



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**13.** How many committees of 5 members each can be formed with 8 officials and 4 non - official members if a particular official members is never included.



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**14.** How many committees of 5 members each can be formed with 8 officials and non - official members in the following cases:  
a particular non-official members is always included?



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**15.** In a college team there are 15 players of whom 3 are teachers . In how many ways can a team of 11 players be selected so as to include only one teachers

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**16.** In a college team there are 15 players of whom 3 are teachers . In how many ways can a team of 11 players be selected so as to include at least one teachers ?

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**17.** How many different group can be selected for playing tennis out of 4 ladies and 3 gentalemen, there being one lady and one

gentleman on each side?



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18. If  ${}^n C_{10} = {}^n C_{14}$ , find the value of  ${}^n C_{20}$  and  ${}^{25} C_n$ .



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19. In how many ways can I invite one or more six friends to a dinner?



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20. In how many ways can 10 marbles be divided between two boys so that one of them may get 2 and the other 8?



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**21.** In how many ways can a selection be made out of 5 oranges , 8 mangoes and 7 plantains?

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**22.** In how many ways can 20 articles be packed in the parcels so that the first contains 8 articles, the second 7 and the third 5?

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**23.** Find the number of four letter arrangements of the letters of the word ' SHOOT' . How many of them begin with O?

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**24.** Find the number of all possible arrangements of the letters of the word "MATHEMATICS" taken four at a time



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**25.** How many four- letters words can be formed using the letters of the word 'INEFFECTIVE'?



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**26.** Find the number of ways in which (a) a selection ,(b) an arrangement of four letters can be made from the letters of the word 'PROPORTION' ?



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**27.** A table has 7 seats, 4 being on one side facing the window and 3 being on the opposite side. In how many ways can 7 people be seated at the table.

If 3 people , X,Y and Z must sit on the side facing the window ?



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**28.** A table has 7 seats, 4 being on one side facing the window and 3 being on the opposite side. In how many ways can 7 people be seated at the table.

If 3 people , X,Y and Z must sit on the side facing the window ?



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**29.** Seven cards each bearing a letter , can be arranged to spell the word 'DOUBLES' .How many three - letter code- words can be

formed from these cards ?



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**30.** Seven cards each bearing a letter , can be arranged to spell the word 'DOUBLES' .How many three - letter code- words can be formed from these cards ?

How many of these words consist of a vowels between two consonants?



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**31.** How many triangles may be formed by joining any three of the nine points when no three of them are collinear ,



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**32.** How many triangles may be formed by joining any three of the nine points when five of them are collinear?

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**33.** A committee of 5 is to be formed from a group of 12 students consisting of 8 boys and 4 girls in how many ways can the committee be formed if it consists of exactly 3 boys and 2 girls ,

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**34.** A committee of 5 is to be formed from a group of 12 students consisting of 8 boys and 4 girls in how many ways can the committee be formed if it contains at least 3 girls ?



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**35.** There are 5 gentlemen and 4 ladies to dine at a round table. In how many ways can they seat themselves so that no two ladies are together?



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**36.** There are 12 points in a plane of which 5 are collinear. Find the number of triangles that can be formed with vertices at

these points.



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**37.** There 12 points in a plane of which 5 are collinear . Find the number of straight lines obtained by joining these points in pairs.



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**38.** A committee of 5 is to be formed from a group of 10 people consisting 4 single men 4 single women and a married couple. The committee is to consist of a chairman , who must be a single man 2, other men and 2 women,  
Find the total number of committes possible.



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**39.** A committee of 5 is to be formed from a group of 10 people consisting 4 single men 4 single women and a married couple. The committee is to consist of a chairman , who must be a single man 2, other men and 2 women,  
How many of these would include the married couples?



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**40.** A committee of 5 persons is to be formed from a group of 6 gentleman and 4 ladies. In how many ways can this be done if the committee is to include at least one lady ?



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41. Out of 3 books on Economics , 4 books on Political Sciences and 5 books on Geography ,how many collections can be made, If each collection consists of exactly one book on each subject,

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42. Out of 3 books on Economics , 4 books on Political Sciences and 5 books on Geography ,how many collections can be made, If each collection consists of at least one book on each subject?

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43. Find the number of words which can be formed by taking two alike and two different letters from the word 'COMBINATION'



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## Chapter Test Short Answer Type Questions

1. Find the value of  $P(7,3)$



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2. How many numbers of 5 digits can be formed with the digit 0,2,5,6,7 without taking any of these digit more than once.



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3. In how many ways can 8 persons sit in a round table.



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4. In how many ways can 5 letters be posted in 4 letter boxes?



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5. If  ${}^4P_2 = n \cdot {}^4C_2$ . Find the value of  $n$ .



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6. A man has 6 friends. In how many ways may he invite one or more of them to dinner?

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7. In how many ways 5 members forming a committee out of 10 be selected so that 2 particular members must be included ,

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8. In how many ways 5 members forming a committee out of 10 be selected so that 2 particular members must not be included.

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9. 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 words.



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



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11. Find the numbers of ways in which 12 apples may be equilly divided among 3 childrens.



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