

Permutation and Combination

What is Factorial ?

Properties of Factorial.....

Questions Based on Counting Principle

- ✓ Alphabets/Word Arrangement
- ✓ Digit/Number Arrangement
- ✓ Linear Seating Arrangement
- ✓ Circular Seating Arrangement

Alphabets/Word Arrangement Questions

In how many ways can the letters of the word 'RAHUL' be arranged ?

A) 72 B) 144 C) 120 D) 720 E) None of these

In how many ways can the letters of the word 'SANDIP' be arranged ?
A) 72 B) 144 C) 120 D) 720 E) None of these

In how many ways can the letters of the word 'DIVYAM' be arranged ?

A) 72 B) 144 C) 360 D) 720 E) None of these

In how many ways can the letters of the word 'HUTUTUTU' be arranged ?
A) 72 B) 144 C) 360 D) 720 E) None of these

In how many ways can the letters of the word 'SIDDHESHWAR' be arranged ?
A) 72 B) 144 C) 360 D) 720 E) None of these

In how many ways can the letters of the word 'LEADER' be arranged ?

A) 72 B) 144 C) 360 D) 720 E) None of these

In how many different ways can the letters of the word 'LEADING' be arranged in such a way that the vowels always come together ?

A) 360 B) 480 C) 720 D) 5040 E) None of these

Come Together or Not Come Together

In how many different ways can the letters of the word 'MATHEMATICS' be arranged so that the vowels always come together?

- A) 10080
- B) 4989600
- C) 120960
- D) None of these
- E) 455560

In how many different ways can the letters of the word 'OPTICAL' be arranged so that the vowels always come together?

- A) 120
- B) 720
- C) 4320
- D) 2160
- E) None of these

In how many different ways can the letters of the word 'OPTICAL' be arranged so that the vowels may not come together?

A) 120

B) 720

C) 4320

D) 2160

E) None of these

How many arrangements of the letters of the word 'BENGALI' can be made
(i) if the vowels are never together

- A. 720
- B. 5040
- C. 320
- D. 4320
- E. None

In how many different ways can the letters of the word 'CORPORATION' be arranged so that the vowels may not come together?

- A) 810
- B) 1440
- C) 2880
- D) 50400
- E) 5760

In how many different ways can the letters of the word 'DETAIL' be arranged in such a way that the vowels occupy only the odd positions?

- A) 32
- B) 48
- C) 36
- D) 60
- E) 120

In how many ways the word 'SCOOTER' can be arranged such that 'S' and 'R' are always at two ends?

- a) 720
- b) 120
- c) 2520
- d) 5040
- e) None of these

Digits/Number Arrangement Questions

How many 4 digits number can be formed using all four digits 4,3,2 & 1 ?
(repetition is not allowed)?

- A. 120
- B. 24
- C. 720
- D. 360
- E. None

$$[4] \times [3] \times [2] \times [1] = 24$$

Total NO: \rightarrow 4 digit = 24
3 digit = 24
2 digit = 12
1 digit = 4

$$[64]$$

How many 4 digits number can be formed using all four digits 6,4,3,2 & 1 ?
(repetition is not allowed)?

- A. 120
- B. 24
- C. 720
- D. 360
- E. None

$$5 \times 4 \times 3 \times 2 = 120$$

Find total number of the 3 digits odd numbers by using the digits 2, 3, 4, 5 when repetitions of digits are not allowed.

- a) 12
- b) 22
- c) 15
- d) 18
- e) 24

$$\Rightarrow \boxed{2} \times \boxed{3} \times \boxed{\substack{2 \\ 3/5}} = 12$$

$\Rightarrow 2, 3, 4, 5$

Four digit (If repetition are allowed)

$$\boxed{4} \times \boxed{4} \times \boxed{4} \times \boxed{4} = 4^4 = \boxed{256}$$

How many can four digits be formed using the digits 0, 1, 2, and 3 (repetition is allowed)?

- A. 12
- B. 24
- C. 256
- D. 192
- E. None

$$\boxed{3} \boxed{4} \boxed{4} \boxed{4} = 192$$

How many total numbers can be formed using all four digits 1,2,3 & 4 (repetition is not allowed)?

A. 120

B. 24

C. 6

D. 9

E. None

$$\text{four digit} = 4 \times 3 \times 2 \times 1 = 24$$

$$\text{three digit} = 4 \times 3 \times 2 = 24$$

$$\text{two digit} = 4 \times 3 = 12$$

$$\begin{array}{rcl} \text{one digit} & = & 4 \\ & & \hline & & 64 \end{array}$$

How many total numbers can be formed using all four digits 5,4,3 & 2 (repetition is not allowed) ?

- A. 120
- B. 24
- C. None
- D. 360
- E. 64

How many four digits number can be formed by using the digits 0, 2, 4, 6, 7 if repetition of digits is allowed.

- a) 625
- b) 96
- c) 500s
- d) 36
- e) 72

$$\begin{array}{c} \boxed{4} \times \boxed{5} \times \boxed{5} \times \boxed{5} = 500 \\ \times \\ 0 \end{array}$$

Find the numbers between 100 and 1000 in which all digits are distinct.

A. 548

B. 648

C. 748

D. 448

E. 684

$$\boxed{9} \times \boxed{9} \times \boxed{8} = \boxed{648} \quad 0 \text{ to } 9 \rightarrow \text{10 digits}$$

How many numbers between 2000 and 3000 can be formed with the digits 0, 1, 2, 3, 4, 5, 6, 7 (repetition of digits not allowed) ?

- A. 42
- B. 210
- C. 336
- D. 440
- E. 120

$$\begin{array}{c} \boxed{1} \times \boxed{7} \times \boxed{6} \times \boxed{5} = \boxed{210} \\ 2 \end{array}$$

How many 3-digit numbers can be formed from the digits 2, 3, 5, 6, 7 and 9, which are divisible by 5 and none of the digits is repeated?

- A) 5
- B) 10
- C) 15
- D) 20
- E) None

$$\boxed{4} \times \boxed{5} \times \boxed{1} = 20$$

5

How many 4-digit numbers can be formed from the digits 1, 2, 3, 4, 5, 6 and 7 which are divisible by 5 when none of the digits are repeated?

- A) 120
- B) 35
- C) 24
- D) 720
- E) None

How many 4 digits numbers can be formed using digits 0 to 6 exactly once ?

(1) 1180

(2) 720

(3) 2160

(4) 5040

How many 5-digit even numbers can be formed using the digits 0 to 9 ? **(if repetition of digits is allowed)**

- a) 45000
- b) 32805
- c) 90000
- d) 22500

Linear Seating Arrangement

In how many ways can 4 girls and 5 boys be arranged in a row so that all the four girls are together?

A. 12400

B. 14400

C. 17280

D. 18000

E. None

$$(4!) \times (5+1)!$$

$$= 4! \times 6!$$

$$= 24 \times 720$$

$$= \boxed{17280}$$

In how many ways 4 Indians, 5 Africans and 7 Japanese be seated in a row so that all person of same nationality sits together

- a) $4! 5! 7! 3!$
- b) $4! 5! 7! 5!$
- c) $4! 6! 7! 3!$
- d) can't be determined
- e) None of these

4-I, 5-A, 7-J

$$\frac{(4!) (5!) (7!) \times (3!)}{= 4! \times 7! \times 5! \times 3!}$$

In how many ways can 5 boys and 4 girls can be seated in a row so that they are in alternate position.

a) 2780

b) 2880

c) 2800

d) 2980

e) None of these

$$\begin{array}{cccccccc} B_1 & G_1 & B_2 & G_2 & B_3 & G_3 & B_4 & G_4 & B_5 \\ 5 & 4 & 4 & 3 & 3 & 2 & 2 & 1 & 1 \end{array}$$

odd $\rightarrow 5 \rightarrow$ Boys

Even $\rightarrow 4 \rightarrow$ Girls

$$[5!] \times [4!] = 120 \times 24 = [2880]$$

Circular Seating Arrangement

► In how many ways can 6 people be seated at a round table?

- a) 720
- ☒ b) 120
- c) 240
- d) 630
- e) 360

$$\text{Circular} = (n-1)!$$

$$n=6$$

$$(n-1)! = 5! = \boxed{120}$$

There is meeting of 20 delegates is to be held in a hotel. In how many ways these delegates can be seated along a round table, if three particular delegates always seat together.

- a) $17! 3!$
- b) $18! 3!$
- c) $17! 4!$
- d) None

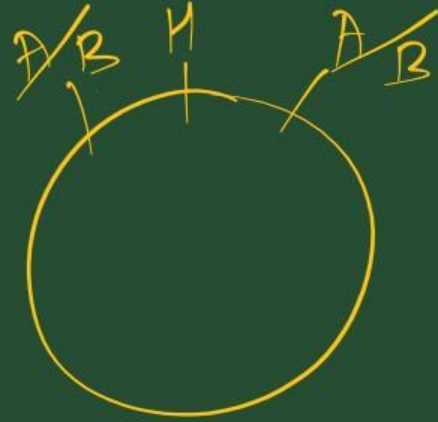
$$\boxed{\text{Total} = 20}$$

$$\rightarrow (3!) \times (17 + 1 - 1)!$$

$$= \boxed{3! \times 17!}$$

20 persons we invited to a party. In how many ways can they be seated in a round table such that two particular persons sit on either side of the host?

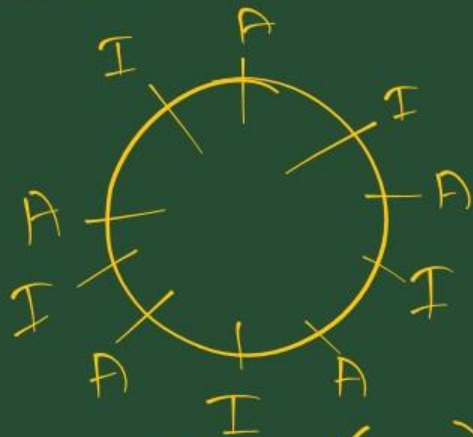
- a) $19! 2!$
- b) $18! 2!$
- c) $20!$
- d) $19!$
- e) $17! 3!$



$$\boxed{2! \times 19!}$$

In how many ways 5 African and 5 Indian can be seated along a circular table, so that they occupy alternate position.

- a) $5! 5!$
- b) $4! 5!$
- c) $5! 4!$
- d) $4! 4!$
- e) None



$$(5!) \times (5-1)! = 5! \times 4!$$
$$(5-1)! \times (5!) = 4! \times 5!$$

► Find the number of ways in which four girls and three boys can arrange themselves in a circular way?

- a) 360
- b) 720
- c) 576
- d) 144
- e) 240

Misc Questions

There are 15 people in a party. Each shake hands with each other. What is the total number of handshakes ?

- A) 110
- B) 105
- C) 210
- D) 120
- E) 160

In party there is a total of 120 handshakes. If all the persons shakes hand with every other person. Then find the number of person present in the party.

- a) 15
- b) 16
- c) 17
- d) 18
- e) None of these

Permutation Formula

$${}_n P_r = \frac{n!}{(n-r)!}$$

In how many ways can three boys can be seated on five chairs ?

- A. 80
- B. 60
- C. 30
- D. 120

In how many ways 8 students can be given 3 prizes such that no student receives more than 1 prize?

A) 348

B) 284

C) 224

D) 336

E) None of these

In how many ways can letters in of the word RAHUL can be arranged so the vowels occupy only odd position ?

- A. 12
- B. 24
- C. 36
- D. 48
- E. 120

In a word jumble, there are 8 consonants and 5 vowels given. Find out in how many ways can we form a 5-letter word having three consonants and 2 vowels?

- A. 67200
- B. 8540
- C. 720
- D. None of these
- E. 5040

Combination

Combination Formula

$${}_nC_r = \frac{n!}{(n-r)!r!}$$

In a class there are 5 Boys and 4 Girls in how many ways a monitor can be chosen ?

A. 10

B. 4

C. 5

D. 9

E. 12

In how many different ways a team of 11 members can be selected from 15 players ?

- A. 1500
- B. 330
- C. 1365
- D. 1175
- E. None

In a class there are 5 Boys and 4 Girls in how many ways a boy and a girl can be selected from the group leaders of two groups ?

- A. 10
- B. 25
- C. 20
- D. 9
- E. 12

In how many ways a committee, consisting of 5 men and 6 women can be formed from 8 men and 10 women?

- A) 266
- B) 5040
- C) 11760
- D) 86400
- E) None of these

In how many ways can a group of 5 men and 2 women be made out of a total of 7 men and 3 women?

- A) 63**
- B) 90**
- C) 126**
- D) 45**
- E) 135**

A teacher wants to select a boy or a girl as a monitor out of 8 boys and a girl out of 7 girls for the writing competition. In how many ways can be select?

- A.42
- B.60
- C.28
- D.56
- E.15

In a class has 3 boys and 2 girls, two students were selected. In how many different ways can they be selected such that both of them are boys or girls ?

A.5

B.8

C.7

D.6

E. None of these

In how many different ways a team of 11 members can be selected from 15 players if 2 particular players are always selected ?

- A. 720
- B. 715
- C. 1365
- D. 750
- E. 1175

In how many different ways a team of 11 members can be selected from 15 players if 2 particular players never selected ?

- A. 72
- B. 75
- C. 78
- D. 750
- E. 1175

In a group of 6 boys and 4 girls, four children are to be selected. In how many different ways can they be selected such that at least one boy should be there?

- A. 159
- B. 194
- C. 205
- D. 209
- E. None of these

In a group of 6 girls and 5 boys, 3 members are to be selected. In how many different ways can they be selected such that at least one girl should be there?

- A.195
- B.210
- C.155
- D.180
- E. None of these

In how many ways a selection of 4 students having at least 2 girls can be selected from 4 girls and 5 boys ?

A.80

B.60

C.90

D.120

E. None of these

A team of 7 children is to be selected out of 7 girls and 5 boys such that it contains at least 5 girls. In how many different ways can the selection be made?

- A) 105
- B) 246
- C) 100
- D) 128
- E) None of these

Read the following statement carefully to answer the given questions.

A committee of 12 persons is to be formed from 9 woman and 8 men.

1. In how many ways this can be done if at least 5 women have to be included in a committee?

- a) 6000 b) 6010 c) 6062 d) 6005 e) None of these

2) In how many of these committees the women are in majority?

- 2000 b) 2700 c) 2705 d) 2702 e) None of these

3) In how many of these committees, the men are in majority?

- a) 1008 b) 1100 c) 1200 d) 1225 e) None of these

Read the following statement carefully to answer the given questions.

A committee of 12 persons is to be formed from 9 woman and 8 men.

1. In how many ways this can be done if at least 5 women have to be included in a committee?

- a) 6000 b) 6010 c) 6062 d) 6005 e) None of these

2) In how many of these committees the women are in majority?

- 2000 b) 2700 c) 2705 d) 2702 e) None of these

3) In how many of these committees, the men are in majority?

- a) 1008 b) 1100 c) 1200 d) 1225 e) None of these

Read the following statement carefully to answer the given questions.

A committee of 12 persons is to be formed from 9 woman and 8 men.

1. In how many ways this can be done if at least 5 women have to be included in a committee?

- a) 6000 b) 6010 c) 6062 d) 6005 e) None of these

2) In how many of these committees the women are in majority?

- 2000 b) 2700 c) 2705 d) 2702 e) None of these

3) In how many of these committees, the men are in majority?

- a) 1008 b) 1100 c) 1200 d) 1225 e) None of these

Read the following statement carefully to answer the given questions.

A committee of 12 persons is to be formed from 9 woman and 8 men.

1. In how many ways this can be done if at least 5 women have to be included in a committee?

- a) 6000 b) 6010 c) 6062 d) 6005 e) None of these

2) In how many of these committees the women are in majority?

- 2000 b) 2700 c) 2705 d) 2702 e) None of these

3) In how many of these committees, the men are in majority?

- a) 1008 b) 1100 c) 1200 d) 1225 e) None of these