1. Out of 7 consonants and 4 vowels, how many words of 3 consonants and 2 vowels can be formed?

A. 24400 B. 21300

C. 210 D. 25200

Hide Answer | Notebook | Discuss

Here is the answer and explanation

Answer : Option D

Explanation :

Number of ways of selecting 3 consonants out of 7 = $^7C_3$

Number of ways of selecting 2 vowels out of 4 = $^4C_2$

Number of ways of selecting 3 consonants out of 7 and 2 vowels out of 4 = $^7C_3$ x $^4C_2$

$= (\frac{7 \times 6 \times 5}{3 \times 2 \times 1}) \times (\frac{4 \times 3}{2 \times 1}) = 210$

It means that we can have 210 groups where each group contains total 5 letters(3 consonants

and 2 vowels).

Number of ways of arranging 5 letters among themselves = 5!

= 5 x 4 x 3 x 2 x 1 = 120

Hence, Required number of ways = 210 x 120 = 25200

2. 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. 209

C. 201 D. 212

Hide Answer | Notebook | Discuss

Here is the answer and explanation

Answer : Option B

Explanation :

In a group of 6 boys and 4 girls, four children are to be selected such that
at least one boy should be there.

Hence we have 4 choices as given below

We can select 4 boys ------(Option 1).

Number of ways to this = $^6C_4$

We can select 3 boys and 1 girl ------(Option 2)

Number of ways to this = ${}^6C_3 \times {}^4C_1$

We can select 2 boys and 2 girls ------(Option 3)

Number of ways to this = ${}^6C_2 \times {}^4C_2$

We can select 1 boy and 3 girls ------(Option 4)

Number of ways to this = ${}^6C_1 \times {}^4C_3$

Total number of ways

$= ({}^6C_4) + ({}^6C_3 \times {}^4C_1) + ({}^6C_2 \times {}^4C_2) + ({}^6C_1 \times {}^4C_3)$

$= ({}^6C_2) + ({}^6C_3 \times {}^4C_1) + ({}^6C_2 \times {}^4C_2) + ({}^6C_1 \times {}^4C_1)$ [*Applied the formula* ${}^nC_r = {}^nC_{(n - r)}$]

$$= [\frac{6 \times 5}{2 \times 1}] + [(\frac{6 \times 5 \times 4}{3 \times 2 \times 1}) \times 4] + [(\frac{6 \times 5}{2 \times 1})\ (\frac{4 \times 3}{2 \times 1})] + [6 \times 4]$$

$= 15 + 80 + 90 + 24$

$= 209$

3. From a group of 7 men and 6 women, five persons are to be selected to form a committee so that at least 3 men are there on the committee. In how many ways can it be done?

A. 624

B. 702

C. 756

D. 812

Hide Answer | Notebook | Discuss

Here is the answer and explanation

Answer : Option C

Explanation :

From a group of 7 men and 6 women, five persons are to be selected with at least 3 men.

Hence we have the following 3 choices

We can select 5 men ------(Option 1)

Number of ways to do this = ${}^7C_5$

We can select 4 men and 1 woman ------(Option 2)

Number of ways to do this = ${}^7C_4 \times {}^6C_1$

We can select 3 men and 2 women ------(Option 3)

Number of ways to do this = ${}^7C_3 \times {}^6C_2$

Total number of ways

$= {}^7C_5 + [{}^7C_4 \times {}^6C_1] + [{}^7C_3 \times {}^6C_2]$

$= {}^7C_2 + [{}^7C_3 \times {}^6C_1] + [{}^7C_3 \times {}^6C_2]$ [*Applied the formula* ${}^nC_r = {}^nC_{(n - r)}$]

$= [\frac{7 \times 6}{2 \times 1}] + [(\frac{7 \times 6 \times 5}{3 \times 2 \times 1}) \times 6] + [(\frac{7 \times 6 \times 5}{3 \times 2 \times 1}) \times (\frac{6 \times 5}{2 \times 1})]$

= 21 + 210 + 525 = 756

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

A. 610 B. 720

C. 825 D. 920

Hide Answer | Notebook | Discuss

Here is the answer and explanation

Answer : Option B

Explanation :

The word 'OPTICAL' has 7 letters. It has the vowels 'O','I','A' in it and these 3 vowels should always come together. Hence these three vowels can be grouped and considered as a
single letter. That is, PTCL(OIA).

Hence we can assume total letters as 5. and all these letters are different.
Number of ways to arrange these letters = 5! = [5 x 4 x 3 x 2 x 1] = 120

All The 3 vowels (OIA) are different
Number of ways to arrange these vowels among themselves = 3! = [3 x 2 x 1] = 6

Hence, required number of ways = 120 x 6 = 720

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

A. 47200 B. 48000

C. 42000 D. 50400

Hide Answer | Notebook | Discuss

Here is the answer and explanation

Answer : Option D

Explanation :

The word 'CORPORATION' has 11 letters. It has the vowels 'O','O','A','I','O' in it and these 5 vowels should always come together. Hence these 5 vowels can be grouped and considered as a single letter. that is, CRPRTN(OOAIO).

Hence we can assume total letters as 7. But in these 7 letters, 'R' occurs 2 times and rest of the letters are different.

Number of ways to arrange these letters = $\frac{7!}{2!} = \frac{7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1}{2 \times 1} = 2520$

In the 5 vowels (OOAIO), 'O' occurs 3 and rest of the vowels are different.

Number of ways to arrange these vowels among themselves = $\frac{5!}{3!} = \frac{5 \times 4 \times 3 \times 2 \times 1}{3 \times 2 \times 1} = 20$

Hence, required number of ways = 2520 x 20 = 50400

6. 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. 1

B. 126

C. 63

D. 64

Hide Answer | Notebook | Discuss

Here is the answer and explanation

Answer : Option C

Explanation :

We need to select 5 men from 7 men and 2 women from 3 women

Number of ways to do this

= $^7C_5$ x $^3C_2$

= $^7C_2$ x $^3C_1$ [*Applied the formula* $^nC_r = {}^nC_{(n-r)}$]

$= (\frac{7 \times 6}{2 \times 1}) \times 3$

= 21 x 3 = 63

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

A. 9800

B. 100020

C. 120960

D. 140020

Hide Answer | Notebook | Discuss

Here is the answer and explanation

Answer : Option C

Explanation :

The word 'MATHEMATICS' has 11 letters. It has the vowels 'A','E','A','I' in it and these 4 vowels must always come together. Hence these 4 vowels can be grouped and
considered as a single letter. That is, MTHMTCS(AEAI).

Hence we can assume total letters as 8. But in these 8 letters, 'M' occurs 2 times, 'T' occurs 2 times but rest of the letters are different.

Hence,number of ways to arrange these letters =

$\frac{8!}{(2!)(2!)} = \frac{8 \times 7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1}{(2 \times 1)(2 \times 1)} = 10080$

In the 4 vowels (AEAI), 'A' occurs 2 times and rest of the vowels are different.

Number of ways to arrange these vowels among themselves = $\frac{4!}{2!} = \frac{4 \times 3 \times 2 \times 1}{2 \times 1} = 12$

Hence, required number of ways = 10080 x 12 = 120960

8. There are 8 men and 10 women and you need to form a committee of 5 men and 6 women. In how many ways can the committee be formed?

A. 10420

B. 11

C. 11760

D. None of these

Hide Answer | Notebook | Discuss

Here is the answer and explanation

Answer : Option C

Explanation :

We need to select 5 men from 8 men and 6 women from 10 women

Number of ways to do this

= ${}^{8}C_5$ x ${}^{10}C_6$

= ${}^{8}C_3$ x ${}^{10}C_4$ [*Applied the formula* ${}^{n}C_r = {}^{n}C_{(n - r)}$]

$= (\frac{8 \times 7 \times 6}{3 \times 2 \times 1})(\frac{10 \times 9 \times 8 \times 7}{4 \times 3 \times 2 \times 1})$

= 56 x 210

= 11760

9. 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?

A. 720

B. 420

C. None of these

D. 5040

Hide Answer | Notebook | Discuss

Here is the answer and explanation

Answer : Option A

Explanation :

The word 'LOGARITHMS' has 10 different letters.

Hence, the number of 3-letter words(with or without meaning) formed by using these letters

= ${}^{10}P_3$

= 10 x 9 x 8

= 720

10. In how many different ways can the letters of the word 'LEADING' be arranged such that the vowels should always come together?

A. None of these
B. 720
C. 420
D. 122

Hide Answer | Notebook | Discuss

Here is the answer and explanation

Answer : Option B

Explanation :

The word 'LEADING' has 7 letters. It has the vowels 'E','A','I' in it and
these 3 vowels should always come together. Hence these 3 vowels can be grouped and considered as a single letter. that is, LDNG(EAI).

Hence we can assume total letters as 5 and all these letters are different.
Number of ways to arrange these letters = 5! = 5 x 4 x 3 x 2 x 1 = 120

In the 3 vowels (EAI), all the vowels are different.
Number of ways to arrange these vowels among themselves = 3! = 3 x 2 x 1= 6

Hence, required number of ways = 120 x 6= 720

11. A coin is tossed 3 times. Find out the number of possible outcomes.

A. None of these
B. 8
C. 2
D. 1

Hide Answer | Notebook | Discuss

Here is the answer and explanation

Answer : Option B

Explanation :

When a coin is tossed once, there are two possible outcomes - Head(H) and Tale(T)

Hence, when a coin is tossed 3 times, the number of possible outcomes
= 2 x 2 x 2 = 8

(The possible outcomes are HHH, HHT, HTH, HTT, THH, THT, TTH, TTT)

12. In how many different ways can the letters of the word 'DETAIL' be arranged such that the vowels must occupy only the odd positions?

A. None of these
B. 64
C. 120
D. 36

Hide Answer | Notebook | Discuss

Here is the answer and explanation

Answer : Option D

Explanation :

The word 'DETAIL' has 6 letters which has 3 vowels (EAI) and 3 consonants(DTL)

The 3 vowels(EAI) must occupy only the odd positions.
Let's mark the positions as (1) (2) (3) (4) (5) (6).
Now, the 3 vowels should only occupy the 3 positions marked as (1),(3) and (5) in any order.

Hence, number of ways to arrange these vowels = $^3P_3$
= 3! = 3 x 2 x 1 = 6

Now we have 3 consonants(DTL) which can be arranged in the remaining 3 positions in any order

Hence, number of ways to arrange these consonants = $^3P_3$
= 3! = 3 x 2 x 1 = 6

Total number of ways
= number of ways to arrange the vowels x number of ways to arrange the consonants
= 6 x 6 = 36

13. A bag contains 2 white balls, 3 black balls and 4 red balls. In how many ways can 3 balls be drawn from the bag, if at least one black ball is to be included in the draw?

A. 64
B. 128
C. 32
D. None of these

Hide Answer | Notebook | Discuss

Here is the answer and explanation

Answer : Option A

Explanation :

From 2 white balls, 3 black balls and 4 red balls, 3 balls are to be selected such that at least one black ball should be there.

Hence we have 3 choices as given below

We can select 3 black balls ----------(Option 1)
We can select 2 black balls and 1 non-black ball------(Option 2)
We can select 1 black ball and 2 non-black balls------(Option 3)

Number of ways to select 3 black balls = 3C3

Number of ways to select 2 black balls and 1 non-black ball = 3C2 x 6C1

Number of ways to select 1 black ball and 2 non-black balls = 3C1 x 6C2

Total number of ways
= 3C3 + (3C2 x 6C1) + (3C1 x 6C2)
= 1 + (3C1 x 6C1) + (3C1 x 6C2) [*Applied the formula* $^nC_r = {}^nC_{(n-r)}$]

$$= 1 + [3 \times 6] + [3 \times (\frac{6 \times 5}{2 \times 1})]$$

= 1 + 18 + 45

= 64

14. In how many different ways can the letters of the word 'JUDGE' be arranged such that the vowels always come together?

A. None of these
B. 48
C. 32
D. 64

Hide Answer | Notebook | Discuss

Here is the answer and explanation

Answer : Option B

Explanation :

The word 'JUDGE' has 5 letters. It has 2 vowels (UE) in it and these 2 vowels should always come together. Hence these 2 vowels can be grouped and considered as a single
letter. That is, JDG(UE).

Hence we can assume total letters as 4 and all these letters are different.
Number of ways to arrange these letters = 4!= 4 x 3 x 2 x 1 = 24

In the 2 vowels (UE), all the vowels are different.
Number of ways to arrange these vowels among themselves = 2! = 2 x 1 = 2

Total number of ways = 24 x 2 = 48

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

A. None of these
B. 120
C. 360
D. 720

Hide Answer | Notebook | Discuss

Here is the answer and explanation

Answer : Option C

Explanation :

The word 'LEADER' has 6 letters.

But in these 6 letters, 'E' occurs 2 times and rest of the letters are different.

$$\text{Hence,number of ways to arrange these letters} = \frac{6!}{2!} = \frac{6 \times 5 \times 4 \times 3 \times 2 \times 1}{2 \times 1} = 360$$

16. How many words can be formed by using all letters of the word 'BIHAR'?

A. 720
B. 24
C. 120
D. 60

| Discuss

Hide Answer | Notebook

Here is the answer and explanation

Answer : Option C

Explanation :

The word 'BIHAR' has 5 letters and all these 5 letters are different.

Total words formed by using all these 5 letters = ${}^5P_5 = 5!$
= 5 x 4 x 3 x 2 x 1 = 120

17. How many arrangements can be made out of the letters of the word 'ENGINEERING' ?

A. 924000
B. 277200
C. None of these
D. 182000

Hide Answer | Notebook | Discuss

Here is the answer and explanation

Answer : Option B

Explanation :

The word 'ENGINEERING' has 11 letters.

But in these 11 letters, 'E' occurs 3 times,'N' occurs 3 times, 'G' occurs 2 times,
'I' occurs 2 times and rest of the letters are different.

$$\text{Hence,number of ways to arrange these letters} = \frac{11!}{(3!)(3!)(2!)(2!)}$$

$$= [\frac{11 \times 10 \times 9 \times 8 \times 7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1}{(3 \times 2 \times 1)(3 \times 2 \times 1)(2 \times 1)(2 \times 1)}] = 277200$$

18. 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. 20
B. 16
C. 8
D. 24

Hide Answer | Notebook | Discuss

Here is the answer and explanation

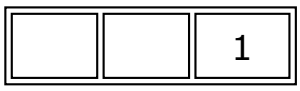
Answer : Option A

Explanation :

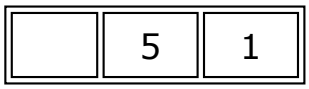
A number is divisible by 5 if the its last digit is a 0 or 5

We need to find out how many 3 digit numbers can be formed from the 6 digits (2,3,5,6,7,9)
which are divisible by 5.

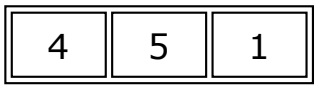
Since the 3 digit number should be divisible by 5, we should take the digit 5 from the 6 digits(2,3,5,6,7,9) and fix it at the unit place.
There is only 1 way of doing this



Since the number 5 is placed at unit place, we have now five digits(2,3,6,7,9) remaining.
Any of these 5 digits can be placed at tens place



Since the digits 5 is placed at unit place and another one digits is placed at tens place,
we have now four digits remaining. Any of these 4 digits can be placed at hundreds place.



Required Number of three digit numbers = 4 x 5 x 1 = 20

19. How many words with or without meaning, can be formed by using all the letters of the word, 'DELHI' using each letter exactly once?

A. 720
B. 24
C. None of these
D. 120

Hide Answer | Notebook | Discuss

Here is the answer and explanation

Answer : Option D

Explanation :

The word 'DELHI' has 5 letters and all these letters are different.

Total words (with or without meaning) formed by using all these 5 letters using each letter exactly once
= Number of arrangements of 5 letters taken all at a time
= $^{5}P_{5}$ = 5! = 5 x 4 x 3 x 2 x 1 = 120

20. What is the value of $^{100}P_{2}$?

A. 9801
B. 12000
C. 5600
D. 9900

Hide Answer | Notebook | Discuss

Here is the answer and explanation

Answer : Option D

Explanation :

$^{100}P_2$ = 100 x 99 = 9900

21. In how many different ways can the letters of the word 'RUMOUR' be arranged?

A. None of these
B. 128
C. 360
D. 180

Hide Answer | Notebook | Discuss

Here is the answer and explanation

Answer : Option D

Explanation :

The word 'RUMOUR' has 6 letters.

But in these 6 letters, 'R' occurs 2 times, 'U' occurs 2 times and rest of the letters are different.

$$\text{Hence, number of ways to arrange these letters} = \frac{6!}{(2!)(2!)} = \frac{6 \times 5 \times 4 \times 3 \times 2 \times 1}{(2 \times 1)(2 \times 1)} = 180$$

22. There are 6 periods in each working day of a school. In how many ways can one organize 5 subjects such that each subject is allowed at least one period?

A. 3200
B. None of these
C. 2400
D. 3600

Hide Answer | Notebook | Discuss

Here is the answer and explanation

Answer : Option D

Explanation :

We have 6 periods and need to organize 5 subjects such that each subject is allowed at least one period.

In 6 periods, 5 can be organized in $^6P_5$ ways.

Remaining 1 period can be organized in $^5P_1$ ways.

Total number of arrangements
= $^6P_5$ x $^5P_1$
= (6 x 5 x 4 x 3 x 2) x (5)
= 720 x 5
= 3600

23. How many 6 digit telephone numbers can be formed if each number starts with 35 and no digit appears more than once?

A. 720
B. 360

C. 1420 D. 1680

Hide Answer | Notebook | Discuss

Here is the answer and explanation

Answer : Option D

Explanation :

The first two places can only be filled by 3 and 5 respectively and there is only 1 way of doing this

Given that no digit appears more than once. Hence we have 8 digits remaining(0,1,2,4,6,7,8,9)

So, the next 4 places can be filled with the remaining 8 digits in $^8P_4$ ways

Total number of ways = $^8P_4$ = 8 x 7 x 6 x 5 = 1680

24. An event manager has ten patterns of chairs and eight patterns of tables. In how many ways can he make a pair of table and chair?

A. 100 B. 80

C. 110 D. 64

Hide Answer | Notebook | Discuss

Here is the answer and explanation

Answer : Option B

Explanation :

He has has 10 patterns of chairs and 8 patterns of tables

Hence, A chair can be arranged in 10 ways and
A table can be arranged in 8 ways

Hence one chair and one table can be arranged in 10 x 8 ways = 80 ways

25. 25 buses are running between two places P and Q. In how many ways can a person go from P to Q and return by a different bus?

A. None of these B. 600

C. 576 D. 625

Hide Answer | Notebook | Discuss

Here is the answer and explanation

Answer : Option B

Explanation :

He can go in any bus out of the 25 buses.
Hence He can go in 25 ways.

Since he can not come back in the same bus that he used for travelling,

He can return in 24 ways.

Total number of ways = 25 x 24 = 600

26. A box contains 4 red, 3 white and 2 blue balls. Three balls are drawn at random. Find out the number of ways of selecting the balls of different colours?

A. 62

B. 48

C. 12

D. 24

Hide Answer | Notebook | Discuss

Here is the answer and explanation

Answer : Option D

Explanation :

1 red ball can be selected in $^4C_1$ ways

1 white ball can be selected in $^3C_1$ ways

1 blue ball can be selected in $^2C_1$ ways

Total number of ways

$= {}^4C_1 \times {}^3C_1 \times {}^2C_1$

$=4 \times 3 \times 2$

$= 24$

27. A question paper has two parts P and Q, each containing 10 questions. If a student needs to choose 8 from part P and 4 from part Q, in how many ways can he do that?

A. None of these

B. 6020

C. 1200

D. 9450

Hide Answer | Notebook | Discuss

Here is the answer and explanation

Answer : Option D

Explanation :

Number of ways to choose 8 questions from part P = $^{10}C_8$

Number of ways to choose 4 questions from part Q = $^{10}C_4$

Total number of ways

$= {}^{10}C_8 \times {}^{10}C_4$

$= {}^{10}C_2 \times {}^{10}C_4$ [*Applied the formula* ${}^nC_r = {}^nC_{(n-r)}$]

$$= \left(\frac{10 \times 9}{2 \times 1}\right)\left(\frac{10 \times 9 \times 8 \times 7}{4 \times 3 \times 2 \times 1}\right)$$

$=45 \times 210$

$= 9450$

28. In how many different ways can 5 girls and 5 boys form a circle such that the boys and the girls alternate?

A. 2880
B. 1400
C. 1200
D. 3212

Hide Answer | Notebook | Discuss

Here is the answer and explanation

Answer : Option A

Explanation :

In a circle, 5 boys can be arranged in 4! ways

Given that the boys and the girls alternate.
Hence there are 5 places for girls which can be arranged in 5! ways

Total number of ways = 4! x 5! = 24 x 120 = 2880

29. Find out the number of ways in which 6 rings of different types can be worn in 3 fingers?

A. 120
B. 720
C. 125
D. 729

Hide Answer | Notebook | Discuss

Here is the answer and explanation

Answer : Option D

Explanation :

The first ring can be worn in any of the 3 fingers
=> There are 3 ways of wearing the first ring

Similarly each of the remaining 5 rings also can be worn in 3 ways

Hence total number of ways

$= 3 \times 3 \times 3 \times 3 \times 3 \times 6 = 3^6 = 729$

30. In how many ways can 5 man draw water from 5 taps if no tap can be used more than once?

A. None of these
B. 720
C. 60
D. 120

Hide Answer | Notebook | Discuss

Here is the answer and explanation

Answer : Option D

Explanation :

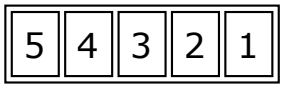
1^{st} man can draw water from any of the 5 taps

2^{nd} man can draw water from any of the remaining 4 taps

3^{rd} man can draw water from any of the remaining 3 taps

4^{th} man can draw water from any of the remaining 2 taps

5^{th} man can draw water from remaining 1 tap



Hence total number of ways = 5 x 4 x 3 x 2 x 1 = 120