Permutation and Combination

1. In how many ways can the letters of the word 'PARAGLIDING' be arranged such that all the vowels occur together?
A. 88322 ways **B. 120960 ways** C. 740 ways D. 144868 ways
E. None of these

Ans:

In the word "PARAGLIDING" there are 11 letters in which there are 4 vowels (i.e. 2 A's and 2 I's) and 7consonants (i.e 2 G's and each of P, R, L, D, N)
Considering vowel as one letter, the number of letters becomes 8 which can be arranged as 8!/ 2!= 40320/2 = 20160
Vowel A and I appear twice , so vowels can be arranged as
4! / (2! × 2!) = 24/4 = 6
Hence the required number of ways in which the letters of the word "PARAGLADING" be arranged so
that all the vowels occur together = 20160 × 6 = 120960
Hence, option B is correct.

2. Five people out of whom only two can drive are to be seated in a five seater car with two seats in front and three in the rear. The people who know driving don't sit together. Only someone who knows driving can sit on the driver's seat. Find the number of ways the five people can be seated.
A. 40 B. 60 C. 48 **D. 36** E. None of these

Ans:

Number of people who can drive = 2
Number of ways of selecting driver = 2C1
The other person who knows driving can be seated only in the rear three seats in 3 ways
Total number of ways of seating the two persons = 2C1 × 3
Number of ways of seating remaining = 3!
Total number of all five can be seated = 2C1 × 3 × 3! = 36
Hence, correct answer is 36
Hence, option D is correct.

3. A boy is playing a Snake & Ladder game; he is on 91 and has to get to 100 to complete the game. There is a snake on 93 and 96. In how many ways he can complete the game, if he doesn't want to roll the dice more than three times.
A. 20 B. 15 **C. 16** D. 18 E. 19

Ans:

91 --92 — 93 — 94 — 95 — 96 — 97 — 98 — 99 — 100

Total position advance needed = 100 – 91 = 9
One roll of dice can't complete the game.
If he completes in two roll of dice.
Possible dice throws are – (3&6), (4&5), (5&4), (6&3)
But (5&4) will bring the token on 96, so this is rejected.
If he completes the game in three roll of dices
First dice reading options are 1,3,4,6
After checking all option and rejecting those in which token reaches on 93 or 96
Possible dice throws are (1,2,6), (1,3,5),(1,5,3), (1,6,2) ;
(3,1,5),(3,3,3),(3,4,2),(3,5,1);
(4,2,3),(4,3,2),(4,4,1)
(6, 1, 2), (6, 2, 1)
Total number of ways = 16
Hence, option C is correct.

4. 8 members are to be selected from a group of 9 males and 7 females. In how many ways will the members with at most 3 females and at least 4 males be selected?
A. 6472 ways B. 6286 ways **C. 6435 ways** D. 6225 ways
E. None of these

Ans:

Case I: 5 males and 3 females can be selected
Number of ways of selection = 9C5 × 7C3 = 126 × 35 = 4410
Case II: 6 males and 2 females can be selected
Number of ways of selection = 9C6 × 7C2 = 84 × 21 = 1764
Case III: 7 males and 1 female can be selected
Number of ways of selection = 9C7 × 7C1 = 36 × 7 = 252
Case IV: 8 males can be selected
Number of ways of selection = 9C8 = 9
So, total number of ways of selecting the members = 4410 + 1764 + 252 + 9 = 6435 ways
Hence, option C is correct.

5. A chess board has rows and columns marked A to H and 1-8. Aman has a knight and a rook which he has to place on the board such that the two pieces are not in same row or column, what is total number of ways he can place the two pieces?
A. 3072 **B. 3136** C. 6272 D. 6144 E. None of these

Ans:

As shows in the image a knight and a rook has to be placed, but not in the same row or column.
Let us select any box out of 64 for placing knight, no of ways = 64C1
Now, row 6 and column c can't be used to place rook. Remaining boxes = 64 – (8 + 7) = 49
The rook can be place in any of 49 boxes, no of ways = 49C1

Total number of possible ways = 49C1 × 64C1 = 3136
Hence, option B is correct.

6. How many three letter words can be formed using the letters of the word "PRACTICES"?
A. 56 B. 336 C. 216 **D. 357** E. None of these

Ans:

Combinations of three different letter	Number of combinations	Number of permutations for each combination	Total number of permutations
3 different letter	8C3 = 56	6	336
2 same letter (eg. c.c.v)	7C1 = 7	3	21
Total			357

Hence, option D is correct.

7. Six students sitting in a row are given one toffee each from three types of toffees such that no two adjacent child gets same type of toffee. In how many ways can the toffees be distributed among the students?
A. 120 B. 24 **C. 96** D. 48 E. None of these

Ans:

Let the students be S1,S2,S3,S4,S5,S6 and
A ,B and C be three types of toffee
S1 can get any of the 3 from A, B, and C in 3 ways
S2 can get any of the 2, other than what A got in 2 ways
S3,S4,S5,S6 each can get different toffee in 2 ways
Total numbers of ways in which distribution can be done
3 × 2 × 2 × 2 × 2 × 2 = 96
Hence, option C is correct.

8. In how many different ways can the letters of the word "Thoughts" be arranged in such a way that the vowels always come together?
A. 2620 ways B. 2420 ways **C. 2520 ways** D. 2320 ways
E. 2120 ways

Ans:

In the word "Thoughts", there are 2 vowels O and U and 6 consonants, 2T's, 2H, 1G and 1S.
Number of ways = 7! × 2! / 2! × 2!
→ 35 × 9 × 8 = 2520 ways.

Hence, option C is correct.

9. An objective test with all the questions mandatory to be answered can be attempted in 127 ways such that the student gets atleast one question right. Find the number of ways in which he can answer 4 questions correctly.
A. 44 **B. 35** C. 28 D. Can't be determined
E. None of these

Ans:

Any question can be answered in 2 ways (right or wrong)
Let the number of questions be N
$2^N - 1 = 127$
Therefore N = 7
Number of ways in answering 4 answers correctly = 7c4 = 35
Hence, option B is correct.

10. A postmaster wants to get delivered 6 letters at six different addresses. In the post office there are 2 postmen then in how many ways can the postmaster send the letters at different addresses through the postmen?
A. 6!2! B. 6! × 2! **C. 64** D. 36 E. None of these

Ans:

Each letter can be delivered at the six different addresses in 2 different ways
Hence, the required number of ways = $2^6 = 64$
Hence, option C is correct.