Permutation and Combination - Free Sample Quiz Explanatory Answers

1. In how many ways can 3 men and their wives be made stand in a line such that none of the 3 men stand in a position that is ahead of his wife?

Explanatory answer

6 people can be made to stand in a line in 6! Ways.

However, the problem introduces a constraint that no man stands in a position that is ahead of his wife.

For any 2 given positions out of the 6 occupied by a man and his wife, the pair cannot re-arrange amongst themselves in 2! Ways as the wife has to be in a position ahead of the man. Only one of the 2! arrangements is allowed.

As there are 3 couples in the group, the total number of ways gets reduced by a factor of (2!*2!*2!).

Hence, the total number of ways = $\frac{6!}{2!*2!*2!}$.

2. How many 5-digit positive integers exist the sum of whose digits are odd?

Explanatory answer

There are $9 * 10^4 = 90000$ 5-digit positive integers.
Out of these 90000 positive integers, the sum of the digits of half of the numbers will add up to an odd number and the remaining half will add up to an even number.

Hence, there are $\frac{90000}{2}$ = 45000 5-digit positive integers whose sum add up to an odd number.

3. When six fair coins are tossed simultaneously, in how many of the outcomes will at most three of the coins turn up as heads?

Explanatory answer

The question requires you to find number of the outcomes in which at most 3 coins turn up as heads.

i.e., 0 coins turn heads or 1 coin turns head or 2 coins turn heads or 3 coins turn heads.

The number of outcomes in which 0 coins turn heads is ${}^6C_0 = 1$ outcome
The number of outcomes in which 1 coin turns head is ${}^6C_1 = 6$ outcomes
The number of outcomes in which 2 coins turn heads is ${}^6C_2 = 15$ outcomes
The number of outcomes in which 3 coins turn heads is ${}^6C_3 = 20$ outcomes.

Therefore, total number of outcomes = 1 + 6 + 15 + 20 = 42 outcomes.