

PRACTICE QUESTIONS INTRODUCTION TO PROBABILITY**EXERCISE – 2.3****USE OF PERMUTATIONS IN PROBABILITY**

1. In how many ways can the letters of the word FACETIOUS be arranged in a line? What is the probability that an arrangement begins with F and ends with S.
(Ans : $9!, 1/72$)
2. On a shelf there are four mathematics books and eight English books.
 - (a) If the books are to be arranged so that the mathematics books are together, in how many ways can this be done?
 - (b) What is the probability that all the mathematics books will not be together?
(Ans : $4!9!, 54/55$)
3. The letters of the word PROBABILITY are arranged at random. Find the probability that the two I's are separated. (Ans : $9/11$)
4. If the letters in the word ABSTEMIOUS are arranged at random, find the probability that vowels and consonants appear alternatively. (Ans : $1/126$)
5. (a) In how many different ways can the letters in the word ARRANGEMENTS be arranged?
(b) Find the probability that an arrangement chosen at random begins with the letters EE.
(Ans : $12!/(2!)^4, 1/66$)
6. If the letters of the word MINIMUM are arranged in a line at random, what is the probability that the arrangement begins with MMM? (Ans : $1/35$)
7. (a) In how many ways can seven people sit at a round table?
(b) What is the probability that husband and wife sit together?
(Ans : $6!, 1/3$)
8. Nine children play a party game and holds hands in circle.
 - (a) In how many different ways can this be done?
 - (b) What is the probability that Ayesha will be holding hands with her friends Saima and Sarah?
(Ans : $8!, 1/28$)
9. The six letters of the word LONDON are each written on a card and the six cards are than shuffled and placed in a line.
 - (a) Calculate the number of different arrangements.
 - (b) Find the probability that middle two cards both have the letter N on them.
 - (c) Find the probability that the two cards with letter O are adjacent and the two cards with letter N are also adjacent.
(Ans : $180, 1/15, 2/15$)
10. (a) Calculate how many different numbers altogether can be formed by taking one, two, three and four digits from the digits 9,8,3 and 2 repetitions not being allowed.
(b) calculate how many of the numbers in part(a) are odd and greater than 800.
(c) If one of the numbers in part (a) is chosen at random, calculate the probability that it will be greater than 300.
(Ans : $64, 18, 21/32$)

EXERCISE – 2.4**USE OF COMBINATIONS IN PROBABILITY**

1. A bag contains 12 balls of which 3 are marked. If 5 balls are drawn out together, what is the probability that 3 of the marked balls are among them.

$$(Ans : \frac{1}{22})$$

2. From a pack of 52 cards, two cards are drawn. What is the probability that one is king and other a Queen.

$$(Ans : \frac{8}{663})$$

3. A bag contains 14 identical balls, 4 of which are red, 5 black and 5 white. Six balls are drawn from the bag. Find the probability that

- (a) 3 are red
(b) at least two are white

$$(Ans : \frac{160}{1001}, \frac{109}{143})$$

4. Of 12 eggs in a refrigerator, 2 are bad. From these, 4 eggs are chosen at random to make a cake. What are the probabilities that

- (a) Exactly one is bad
(b) At least one is bad
(c) At most one is bad

$$(Ans : \frac{16}{33}, \frac{19}{33})$$

5. A bag contains two red, three green and four black balls, Three balls are drawn at random. Find the probability that

- (a) Three balls have different color
(b) Two balls have the same color and third is different
(c) All three balls have the same color

$$(Ans : \frac{2}{7}, \frac{55}{84}, \frac{5}{84})$$

6. Three applicants are to be selected at random out of 4 boys and 6 girls. What is the probability of selecting

- (a) All girls
(b) All boys
(c) At least one boy
(d) At most 2 girls

$$(Ans : \frac{1}{6}, \frac{1}{30}, \frac{5}{6})$$

7. Four persons are chosen at random from a group of ten persons consisting of four men and six women. Three of the women are sisters. Calculate the probabilities that the four persons chosen will be
- (a) Consist of four women
 - (b) Consist of two women and two men
 - (c) Include the three sisters
- (Ans : $1/14, 3/7, 1/30$)
8. A firm buys 3 shipments of parts each month. The purchasing agent selects at random from among four in-state suppliers and six out-of-state suppliers. What is the probability that the orders are placed with
- (a) The in-state suppliers only?
 - (b) The out-of-state suppliers only?
 - (c) At least one in-state supplier?
- (Ans : $\frac{1}{30}, \frac{1}{6}, \frac{5}{6}$)
9. A set of eight cards contains one joker. A and B are two players and A chooses 5 cards at random, B taking the remaining 3 cards. What is the probability that A has the joker?
- (Ans : $\frac{5}{8}$)
10. A certain carton of eggs has 3 bad eggs and 9 good eggs. An omelet is made of 3 eggs randomly chosen from the carton. What is the probability that there are
- (a) No bad eggs
 - (b) At least one bad egg
 - (c) Exactly two bad eggs in the omelet?
- (Ans : 0.38, 0.62, 0.12)