Chapter 10 Permutations & Combinations

1. A band can play 25 different pieces of music. From these pieces of music, 8 are to be selected for a concert.

     a. Find the number of different ways this can be done.

                                                                                                    [1]

     The 8 pieces of music are then arranged in order.

          b. Find the number of different arrangements possible.

                                                                                                    [1]

     The band has 15 members. Three members are chosen at random to be the treasurer, secretary and agent.

          c. Find the number of ways in which this can be done.

                                                                                                    [1]

The Maths Society

2. (a) Eight books are to be arranged on a shelf. There are 4 mathematics books, 3 geography books and 1 French book.
(i) Find the number of different arrangements of the books if there are no restrictions.

[1]

(ii) Find the number of different arrangements if the mathematics books have to be kept together.

[3]

(iii)Find the number of different arrangements if the mathematics books have to be kept together and the geography books have to be kept together.

[3]

(b) A team of 6 players is to be chosen from 8 men and 4 women. Find the number of different ways this can be done if

(i) there are no restrictions,

[1]

(ii) there is at least one woman in the team

[2]

3. (a) Jack has won 7 trophies for sport and wants to arrange them on a shelf. He has 2 trophies for cricket, 4 trophies for football and 1 trophy for swimming. Find the number of different arrangements if

      (i) there are no restrictions,

[1]

      (ii) the football trophies are to be kept together,

[3]

      (iii) the football trophies are to be kept together and the cricket trophies are to be kept together.

[3]

(b) A team of 8 players is to be chosen from 6 girls and 8 boys. Find the number of different ways the team may be chosen if

     (i) there are no restrictions,

[1]

     (ii) all the girls are in the team,

[1]

     (iii) at least 1 girl is in the team.

[2]

4.(a) Eleven different television sets are to be displayed in a line in a large shop.

(i) Find the number of different ways the televisions can be arranged.

[1]

Of these television sets, 6 are made by company *A* and 5 are made by company *B*.

(ii) Find the number of different ways the televisions can be arranged so that no two sets made by company *A* are next to each other.

[2]

(b) A group of people is to be selected from 5 women and 3 men.

(i) Calculate the number of different groups of 4 people that have exactly 3 women.

[2]

(ii) Calculate the number of different groups of at most 4 people where the number of women is the same as the number of men.

[2]

5.(a) Jess wants to arrange 9 different books on a shelf. There are 4 mathematics books, 3 physics books and 2 chemistry books. Find the number of different possible arrangements of the books if

(i) there are no restrictions,

[1]

(ii) a chemistry book is at each end of the shelf,

[2]

(iii) all the mathematics books are kept together and all the physics books are kept together.

[3]

(b) A quiz team of 6 children is to be chosen from a class of 8 boys and 10 girls. Find the number of ways of choosing the team if

(i) there are no restrictions,

[1]

(ii) there are more boys than girls in the team

[4]

6. (a) A5-digit code is to be chosen from the digits 1, 2, 3, 4, 5, 6, 7, 8 and 9. Each digit may be used once only in any 5-digit code. Find the number of different 5-digit codes that may be chosen if

(i) there are no restrictions,

[1]

(ii) the code is divisible by 5,

[1]

(iii) the code is even and greater than 70 000.

[3]

(b) A team of 6 people is to be chosen from 8 men and 6 women. Find the number of different teams that may be chosen if

(i) there are no restrictions,

[1]

(ii) there are no women in the team,

[1]

(iii) there are a husband and wife who must not be separated.

[3]

7. A 5-digit code is formed using the following characters.

Letters   a   e   i   o   u

Numbers   1   2   3   4   5   6

Symbols   @   ∗   #

No character can be repeated in a code. Find the number of possible codes if

(i) there are no restrictions,

[2]

(ii) the code starts with a symbol followed by two letters and then two numbers,

[2]

(iii) the first two characters are numbers, and no other numbers appear in the code.

[2]