Perms and Coms 2

1) In a singing competition there are 8 contestants. Each contestant sings in the first round of this competition.

   (i) In how many different orders could the contestants sing? [1]

   After the first round 5 contestants are chosen.

   (ii) In how many different ways can these 5 contestants be chosen? [2]

   These 5 contestants sing again and then First, Second and Third prizes are awarded to three of them.

   (iii) In how many different ways can the prizes be awarded? [2]

2) A musician has to play 4 pieces from a list of 9. Of these 9 pieces 4 were written by Beethoven, 3 by Handel and 2 by Sibelius. Calculate the number of ways the 4 pieces can be chosen if

   (i) there are no restrictions, [2]

   (ii) there must be 2 pieces by Beethoven, 1 by Handel and 1 by Sibelius, [3]

   (iii) there must be at least one piece by each composer. [4]

3) A committee of 5 people is to be selected from 6 men and 4 women. Find

   (i) the number of different ways in which the committee can be selected, [1]

   (ii) the number of these selections with more women than men. [4]

4) An artist has 6 watercolour paintings and 4 oil paintings. She wishes to select 4 of these 10 paintings for an exhibition.

   (i) Find the number of different selections she can make. [2]

   (ii) In how many of these selections will there be more watercolour paintings than oil paintings? [3]

5) **(a)** 7 boys are to be seated in a row. Calculate the number of different ways in which this can be done if 2 particular boys, Andrew and Brian, have exactly 3 of the other boys between them. [4]

   (b) A box contains sweets of 6 different flavours. There are at least 2 sweets of each flavour. A girl selects 3 sweets from the box. Given that these 3 sweets are not all of the same flavour, calculate the number of different ways she can select her 3 sweets. [3]

6) A student has a collection of 9 CDs, of which 4 are by the Beatles, 3 are by Abba and 2 are by the Rolling Stones. She selects 4 of the CDs from her collection. Calculate the number of ways in which she can make her selection if

   (i) her selection must contain her favourite Beatles CD, [2]

   (ii) her selection must contain 2 CDs by one group and 2 CDs by another. [3]

7)   **(i)** Find the number of different arrangements of the letters of the word MEXICO.

Find the number of these arrangements

(ii) which begin with M,

(iii) which have the letter X at one end and the letter C at the other end.

[5]

Four of the letters of the word MEXICO are selected at random. Find the number of different combinations if

(iv) there is no restriction on the letters selected,

(v) the letter M must be selected.

[3]