EXERCISE 9B

PERMUTATIONS

Permutations. Arrangements of n Objects in a Row when they are not all different

1. In how many ways can the following coloured balls be arranged in a line ? (All the balls are used in each arrangement.)

   (a) 2 red, 2 white, 1 black and 3 green;
   (b) 4 white and 3 black;
   (c) 1 pink, 1 purple and 4 blue.

2. How many permutations are there, of the letters taken all at a time, of:

   (a) SPEEDIE;
   (b) TROTTER;
   (c) EASIER;
   (d) EQUILATERAL.

3. In how many ways can the letters of the word "WARRAWEE" be arranged ?

4. In how many ways can the 5 letters of the word "MANNA" be arranged

   (a) in a row ?
   (b) in a row if the first and last letters are consonants ?
   (c) in a row so that the vowels and the consonants occupy alternate places?

5. In how many ways can the letters of the word "INCISION" be arranged

   (a) in a row
   (b) in a row so that the "I's" are together ?
   (c) in a row if the first and last letters are "I's" ?

ANSWERS – Exercise 9B

1. (a) $\frac{8!}{2!2!3!} = 1680$ (b) $\frac{7!}{4!3!} = 35$ (c) $\frac{6!}{4!} = 30$

2. (a) $\frac{7!}{3!} = 840$ (b) $\frac{7!}{2!3!} = 420$ (c) $\frac{6!}{2!} = 360$ (d) $\frac{11!}{2!2!2!} = 4989600$

3. (a) $\frac{8!}{2!2!2!2!} = 2520$

4. (a) $\frac{5!}{2!2!} = 30$ (b) $\frac{3!}{2!} \times 2 = 6$ (c) $\frac{3!}{2!} \times 1 = 3$

5. (a) $\frac{8!}{2!3!} = 3360$ (b) $\frac{6!}{2!} = 360$ (c) $\frac{6!}{2!} = 360$