1 In how many ways can the letters of MOTOR be arranged in a line?

2 In how many ways can the letters of NEWCASTLE be arranged in a line?

A $4!$ **B** $8!$ **C** $9!$ **D** $\frac{9!}{2!}$

3 The letters of PRINCIPLE are arranged in a line. In how many ways:

(a) can this be done **(b)** can the letters 'P' be next to each other?

4 In how many ways can the letters of PERMUTE be arranged if:

(a) consonants occupy the first and the last places

(b) the vowels and the consonants occupy alternate places?

5 **(a)** In how many ways can the letters of PRECISION be arranged?

(b) In how many of these arrangements do the vowels occupy all the 'even' places (second, fourth, sixth, eighth)?

6 How many arrangements can be made of the letters of DEFINITION if:

(a) the letters 'I' do not occupy the first or last place **(b)** the letters 'I' are together?

7 How many arrangements of the letters of TOMATO are possible if the letters 'O' are never next to each other? Indicate whether each statement is correct or incorrect.

(a) $\frac{6!}{2! \times 2}$ **(b)** $\frac{5!}{2!}$ **(c)** $\frac{6!}{2! \times 2!} - \frac{5!}{2!}$ **(d)** 120

8 How many arrangements of the letters of PARRAMATTA are possible?

9 Seven cubes, identical except that four are red and three are black, are arranged in a row. How many different arrangements are possible?

10 Three blue, three white and three red balls are placed in a row.

(a) How many different arrangements are possible?

(b) In how many of these arrangements are the red balls together?

11 How many seven-digit numbers can be formed that contain all the digits 2, 3, 3, 3, 4, 5, 6?

12 Find the number of different ways in which n students can stand in a row when two are boys, the rest are girls, and the boys all stand together.

13 Five drummers and five singers sit together in a row.

(a) In how many ways can this be done?

(b) In how many ways can this be done if a particular drummer must not sit between two particular singers?