

Permutations and Combinations Questions

- ① Work out the number of arrangements of the letters ABCDE.
- ② Matt, Joe, Ben, Saul, Chris, Anna and Steve stand in a straight line.



Figure 1.9

How many arrangements are possible?

- ③ Here are seven digits: 9 5 1 4 2 3 8
- (i) If each digit can appear no more than once, how many six-digit numbers can be formed?
 - (ii) If each of the six digits can appear more than once, how many six-digit numbers can be formed?
- ④ How many **even** numbers can be made using each of the digits 2, 3, 7, 8 exactly once?
- ⑤ Work out the number of three-digit multiples of 5
- ⑥ Ten books stand next to each other on a shelf.
How many different arrangements are possible?

- PS** ⑦ A toy box has six compartments. Four different toys are to be put in the box.
- (i) If each compartment can hold only one toy, how many arrangements are possible?
 - (ii) If each compartment can hold up to four toys, how many arrangements are possible?

- PS** ⑧ Figure 1.11 shows the net of a cube.
The numbers 1, 2, 3, 4, 5, 6 are to be written on the net – one number per square.
- (i) How many different ways can the numbers be written on the net?
 - (ii) If the net is folded into a cube, the numbers on opposite faces must add to 7

In this case, how many ways can the numbers be written on the net?

- PS** ⑨ A palindromic integer is a whole number which reads the same forwards and backwards.

Two examples of palindromic integers are 15751 and 302203

- (i) Work out the number of three-digit palindromic integers.
- (ii) Work out the number of four-digit palindromic integers.
- (iii) How many palindromic integers are less than one million?
- (iv) How many six-digit palindromic integers are multiples of 9?

- PS** ⑩ Figure 1.12 shows a network comprising five points and the links between them.

B

A tour starts at one point, visits each of the other points, and then returns to its starting point.

For example, ACEDBA is a tour.

Work out the number of different tours.

- PS** ⑪ A network comprises eight points, with a direct link between each pair of points.
Work out the number of different tours.
(See question 10 for a description of a tour.)

- PS** ⑫ A five-digit number greater than 60000 is to be made from these six cards.



Figure 1.13

Each card can be used only once.

- (i) How many five-digit numbers greater than 60000 are possible?
- (ii) How many of these numbers are even?