

Selections & Arrangements

1.

- (i) How many different 3-digit numbers can be formed using the digits 1, 2 and 3 when
- (a) no repetitions are allowed, [1]
 - (b) any repetitions are allowed, [2]
 - (c) each digit may be included at most twice? [2]
- (ii) How many different **4-digit** numbers can be formed using the digits 1, 2 and 3 when each digit may be included at most twice? [5]

2.

- (i) 5 of the 7 letters A, B, C, D, E, F, G are arranged in a random order in a straight line.
- (a) How many different arrangements of 5 letters are possible? [2]
 - (b) How many of these arrangements end with a vowel (A or E)? [3]
- (ii) A group of 5 people is to be chosen from a list of 7 people.
- (a) How many different groups of 5 people can be chosen? [1]
 - (b) The list of 7 people includes Jill and Jo. A group of 5 people is chosen at random from the list. Given that either Jill and Jo are both chosen or neither of them is chosen, find the probability that both of them are chosen. [3]

3.

A bag contains 9 discs numbered 1, 2, 3, 4, 5, 6, 7, 8, 9.

- (i) Andrea chooses 4 discs at random, without replacement, and places them in a row.
- (a) How many different 4-digit numbers can be made? [2]
 - (b) How many different **odd** 4-digit numbers can be made? [3]
- (ii) Andrea's 4 discs are put back in the bag. Martin then chooses 4 discs at random, without replacement. Find the probability that
- (a) the 4 digits include at least 3 odd digits, [4]
 - (b) the 4 digits add up to 28. [3]

Selections & Arrangements

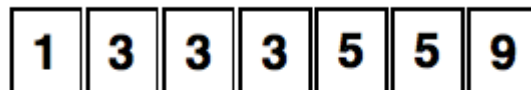
4.

A group of 7 students sit in random order on a bench.

- (i) (a) Find the number of orders in which they can sit. [1]
(b) The 7 students include Tom and Jerry. Find the probability that Tom and Jerry sit next to each other. [3]
- (ii) The students consist of 3 girls and 4 boys. Find the probability that
(a) no two boys sit next to each other, [2]
(b) all three girls sit next to each other. [3]

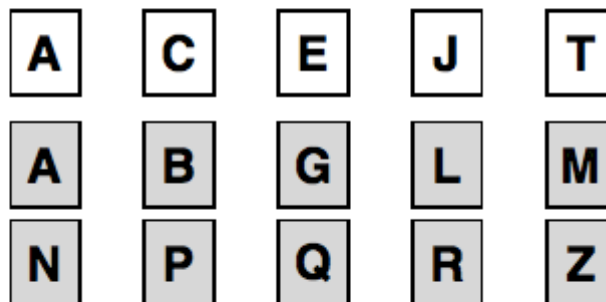
5.

- (i) The diagram shows 7 cards, each with a digit printed on it. The digits form a 7-digit number.



How many different 7-digit numbers can be formed using these cards? [3]

- (ii) The diagram below shows 5 white cards and 10 grey cards, each with a letter printed on it.



From these cards, 3 white cards and 4 grey cards are selected at random **without** regard to order.

- (a) How many selections of seven cards are possible? [3]
(b) Find the probability that the seven cards include exactly one card showing the letter A. [4]

Selections & Arrangements

6.

The menu below shows all the dishes available at a certain restaurant.

Rice dishes	Main dishes	Vegetable dishes
Boiled rice	Chicken	Mushrooms
Fried rice	Beef	Cauliflower
Pilau rice	Lamb	Spinach
Keema rice	Mixed grill	Lentils
	Prawn	Potatoes
	Vegetarian	

A group of friends decide that they will share a total of 2 different rice dishes, 3 different main dishes and 4 different vegetable dishes from this menu. Given these restrictions,

- (i) find the number of possible combinations of dishes that they can choose to share, [3]
- (ii) assuming that all choices are equally likely, find the probability that they choose boiled rice. [2]

The friends decide to add a further restriction as follows. If they choose boiled rice, they will not choose potatoes.

- (iii) Find the number of possible combinations of dishes that they can now choose. [3]

7.

The five letters of the word NEVER are arranged in random order in a straight line.

- (i) How many different orders of the letters are possible? [2]
- (ii) In how many of the possible orders are the two Es next to each other? [2]
- (iii) Find the probability that the first two letters in the order include exactly one letter E. [3]

8.

Three letters are selected at random from the 8 letters of the word COMPUTER, without regard to order.

- (i) Find the number of possible selections of 3 letters. [2]
- (ii) Find the probability that the letter P is included in the selection. [3]

Three letters are now selected at random, one at a time, from the 8 letters of the word COMPUTER, and are placed in order in a line.

- (iii) Find the probability that the 3 letters form the word TOP. [3]

Selections & Arrangements

9.

A test consists of 4 algebra questions, A, B, C and D, and 4 geometry questions, G, H, I and J.

The examiner plans to arrange all 8 questions in a random order, regardless of topic.

- (i) (a) How many different arrangements are possible? [2]
- (b) Find the probability that no two Algebra questions are next to each other and no two Geometry questions are next to each other. [3]

Later, the examiner decides that the questions should be arranged in two sections, Algebra followed by Geometry, with the questions in each section arranged in a random order.

- (ii) (a) How many different arrangements are possible? [2]
- (b) Find the probability that questions A and H are next to each other. [1]
- (c) Find the probability that questions B and J are separated by more than four other questions. [4]

10.

A class consists of 7 students from Ashville and 8 from Bewton. A committee of 5 students is chosen at random from the class.

- (i) Find the probability that 2 students from Ashville and 3 from Bewton are chosen. [3]
- (ii) In fact 2 students from Ashville and 3 from Bewton are chosen. In order to watch a video, all 5 committee members sit in a row. In how many different orders can they sit if no two students from Bewton sit next to each other? [2]