Permutations and combinations
Question Paper 4

Level	International A Level
Subject	Maths
Exam Board	CIE
Topic	Permutations and combinations
Sub Topic	
Booklet	Question Paper 4

Time Allowed: 54 minutes

Score: /45

Percentage: /100

Grade Boundaries:

A*	A	B	C	D	E	U
>85%	'77.5%	70%	62.5%	57.5%	45%	<45%

1   A committee of 6 people, which must contain at least 4 men and at least 1 woman, is to be chosen from 10 men and 9 women.

    (i) Find the number of possible committees that can be chosen.   [3]

   (ii) Find the probability that one particular man, Albert, and one particular woman, Tracey, are both on the committee.   [2]

  (iii) Find the number of possible committees that include either Albert or Tracey but not both.   [3]

  (iv) The committee that is chosen consists of 4 men and 2 women. They queue up randomly in a line for refreshments. Find the probability that the women are not next to each other in the queue [3]

2
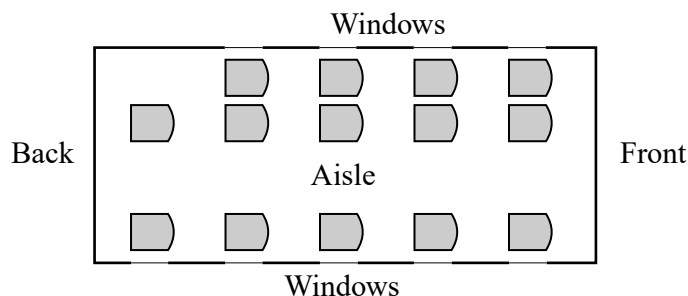
A small aeroplane has 14 seats for passengers. The seats are arranged in 4 rows of 3 seats and a back row of 2 seats (see diagram). 12 passengers board the aeroplane.

    (i) How many possible seating arrangements are there for the 12 passengers? Give your answer correct to 3 signif cant f gures.   [2]

These 12 passengers consist of 2 married couples (Mr and Mrs Lin and Mr and Mrs Brown), 5 students and 3 business people.

   (ii) The 3 business people sit in the front row. The 5 students each sit at a window seat. Mr and Mrs Lin sit in the same row on the same side of the aisle. Mr and Mrs Brown sit in another row on the same side of the aisle. How many possible seating arrangements are there?   [4]

  (iii) If, instead, the 12 passengers are seated randomly, f nd the probability that Mrs Lin sits directly behind a student and Mrs Brown sits in the front row.   [4]

3 **(a)** Find how many numbers between 5000 and 6000 can be formed from the digits 1, 2, 3, 4, 5 and 6

    (i) if no digits are repeated, [2]

    (ii) if repeated digits are allowed. [2]

  (b) Find the number of ways of choosing a school team of 5 pupils from 6 boys and 8 girls

    (i) if there are more girls than boys in the team, [4]

    (ii) if three of the boys are cousins and are either all in the team or all not in the team. [3]

4 A builder is planning to build 12 houses along one side of a road. He will build 2 houses in style A, 2 houses in style B, 3 houses in style C, 4 houses in style D and 1 house in style E.

  (i) Find the number of possible arrangements of these 12 houses. [2]

  (ii)
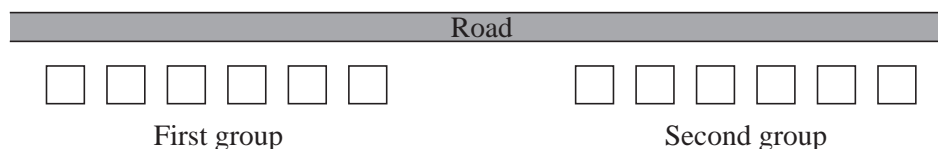
The 12 houses will be in two groups of 6 (see diagram). Find the number of possible arrangements if all the houses in styles A and D are in the firs group and all the houses in styles B, C and E are in the second group. [3]

  (iii) Four of the 12 houses will be selected for a survey. Exactly one house must be in style B and exactly one house in style C. Find the number of ways in which these four houses can be selected. [2]

5 The six digits 4, 5, 6, 7, 7, 7 can be arranged to give many different 6-digit numbers.

  (i) How many different 6-digit numbers can be made? [2]

  (ii) How many of these 6-digit numbers start with an odd digit and end with an odd digit? [4]