Permutations and combinations
Question Paper 1

Level	International A Level
Subject	Maths
Exam Board	CIE
Topic	Permutations and combinations
Sub Topic	
Booklet	Question Paper 1

Time Allowed: **52 minutes**

Score: **/43**

Percentage: **/100**

Grade Boundaries:

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

1   Jodie tosses a biased coin and throws two fair tetrahedral dice. The probability that the coin shows a head is $\frac{1}{3}$. Each of the dice has four faces, numbered 1, 2, 3 and 4. Jodie's score is calculated from the numbers on the faces that the dice land on, as follows:

- if the coin shows a head, the two numbers from the dice are added together;

- if the coin shows a tail, the two numbers from the dice are multiplied together.

Find the probability that the coin shows a head given that Jodie's score is 8.   [5]

2   A committee of 6 people is to be chosen from 5 men and 8 women. In how many ways can this be done

  (i) if there are more women than men on the committee,   [4]

  (ii) if the committee consists of 3 men and 3 women but two particular men refuse to be on the committee together?   [3]

One particular committee consists of 5 women and 1 man.

  (iii) In how many different ways can the committee members be arranged in a line if the man is not at either end?   [3]

3   The 50 members of a club include both the club president and the club treasurer. All 50 members want to go on a coach tour, but the coach only has room for 45 people. In how many ways can 45 members be chosen if both the club president and the club treasurer must be included?   [3]

4   Find the number of different ways that 6 boys and 4 girls can stand in a line if

  (i) all 6 boys stand next to each other,   [3]
  (ii) no girl stands next to another girl.   [3]

5 **(a)** Seven fair dice each with faces marked 1, 2, 3, 4, 5, 6 are thrown and placed in a line. Find the number of possible arrangements where the sum of the numbers at each end of the line add up to 4. [3]

  (b) Find the number of ways in which 9 different computer games can be shared out between Wainah, Jingyi and Hebe so that each person receives an odd number of computer games. [6]

6 A shop has 7 different mountain bicycles, 5 different racing bicycles and 8 different ordinary bicycles on display. A cycling club selects 6 of these 20 bicycles to buy.

  (i) How many different selections can be made if there must be no more than 3 mountain bicycles and no more than 2 of each of the other types of bicycle? [4]

The cycling club buys 3 mountain bicycles, 1 racing bicycle and 2 ordinary bicycles and parks them in a cycle rack, which has a row of 10 empty spaces.

  (ii) How many different arrangements are there in the cycle rack if the mountain bicycles are all together with no spaces between them, the ordinary bicycles are both together with no spaces between them and the spaces are all together? [3]

  (iii) How many different arrangements are there in the cycle rack if the ordinary bicycles are at each end of the bicycles and there are no spaces between any of the bicycles? [3]