Permutations and combinations
Question Paper 3

Level	International A Level
Subject	Maths
Exam Board	CIE
Topic	Permutations and combinations
Sub Topic	
Booklet	Question Paper 3

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 **(a)** Find the number of different ways in which the 12 letters of the word STRAWBERRIES can be arranged

    (i) if there are no restrictions,   [2]

    (ii) if the 4 vowels A, E, E, I must all be together.   [3]

  (b) **(i)** 4 astronauts are chosen from a certain number of candidates. If order of choosing is not taken into account, the number of ways the astronauts can be chosen is 3876. How many ways are there if order of choosing is taken into account?   [2]

    (ii) 4 astronauts are chosen to go on a mission. Each of these astronauts can take 3 personal possessions with him. How many different ways can these 12 possessions be arranged in a row if each astronaut's possessions are kept together?   [2]

2 Twelve coins are tossed and placed in a line. Each coin can show either a head or a tail.

    (i) Find the number of different arrangements of heads and tails which can be obtained.   [2]

    (ii) Find the number of different arrangements which contain 7 heads and 5 tails.   [1]

3 **(a)** Geoff wishes to plant 25 f owers in a f ower-bed. He can choose from 15 different geraniums, 10 different roses and 8 different lilies. He wants to have at least 11 geraniums and also to have the same number of roses and lilies. Find the number of different selections of f owers he can make.   [4]

  (b) Find the number of different ways in which the 9 letters of the word GREENGAGE can be arranged if exactly two of the Gs are next to each other.   [3]

4   Mary saves her digital images on her computer in three separate folders named 'Family', 'Holiday' and 'Friends'. Her family folder contains 3 images, her holiday folder contains 4 images and her friends folder contains 8 images. All the images are different.

   (i) Find in how many ways she can arrange these 15 images in a row across her computer screen if she keeps the images from each folder together.   [3]

   (ii) Find the number of different ways in which Mary can choose 6 of these images if there are 2 from each folder.   [2]

   (iii) Find the number of different ways in which Mary can choose 6 of these images if there are at least 3 images from the friends folder and at least 1 image from each of the other two folders.
                                                                                                             [4]

5
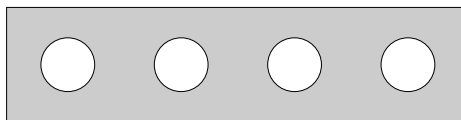
Pegs are to be placed in the four holes shown, one in each hole. The pegs come in different colours and pegs of the same colour are identical. Calculate how many different arrangements of coloured pegs in the four holes can be made using

   (i) 6 pegs, all of different colours,   [1]

   (ii) 4 pegs consisting of 2 blue pegs, 1 orange peg and 1 yellow peg.   [1]

Beryl has 12 pegs consisting of 2 red, 2 blue, 2 green, 2 orange, 2 yellow and 2 black pegs. Calculate how many different arrangements of coloured pegs in the 4 holes Beryl can make using

   (iii) 4 different colours,   [1]

   (iv) 3 different colours,   [3]

   (v) any of her 12 pegs.   [3]

6   A fair f ve-sided spinner has sides numbered 1, 2, 3, 4, 5. Raj spins the spinner and throws two fair dice. He calculates his score as follows.

- If the spinner lands on an **even-numbered** side, Raj **multiplies** the two numbers showing on the dice to get his score.

- If the spinner lands on an **odd-numbered** side, Raj **adds** the numbers showing on the dice to get his score.

Given that Raj's score is 12, f nd the probability that the spinner landed on an even-numbered side. [6]