



IGCSE · Cambridge (CIE) · Further Maths

🕒 1 hour ❓ 17 questions

Exam Questions

Permutations & Combinations

Permutations / Combinations / Problem Solving with Permutations & Combinations

Medium (3 questions)	/8
Hard (10 questions)	/49
Very Hard (4 questions)	/20
Total Marks	/77

Medium Questions

- 1 In an examination, candidates must select 2 questions from the 5 questions in section A and select 4 questions from the 8 questions in section B. Find the number of ways in which this can be done.

(2 marks)

- 2 The digits of the number 6 378 129 are to be arranged so that the resulting 7-digit number is even.
Find the number of ways in which this can be done.

(2 marks)

- 3 (i) Find how many different 5-digit numbers can be formed using five of the eight digits 1, 2, 3, 4, 5, 6, 7, 8 if each digit can be used once only.

[2]

- (ii) Find how many of these 5-digit numbers are greater than 60 000.

[2]

(4 marks)

Hard Questions

- 1 A team of 3 people is to be selected from 4 men and 5 women. Find the number of different teams that could be selected which include at least 2 women.

(2 marks)

- 2 A committee of 5 people is to be formed from 6 doctors, 4 dentists and 3 nurses. Find the number of different committees that could be formed if

(i) there are no restrictions,

[1]

(ii) the committee contains at least one doctor,

[2]

(iii) the committee contains all the nurses.

[1]

(4 marks)

- 3 Find the number of ways in which 12 people can be put into 3 groups containing 3, 4 and 5 people respectively.

(3 marks)

4 (a) A 4-digit code is to be formed using 4 different numbers selected from 1, 2, 3, 4, 5, 6, 7, 8 and 9. Find how many different codes can be formed if there are no restrictions,

(1 mark)

(b) only prime numbers are used,

(1 mark)

(c) two even numbers are followed by two odd numbers,

(2 marks)

(d) the code forms an even number,

(2 marks)

5 (i) Find how many different 5-digit numbers can be formed using the digits 1, 3, 5, 6, 8 and 9. No digit may be used more than once in any 5-digit number.

(ii) How many of these 5-digit numbers are odd?

(iii) How many of these 5-digit numbers are odd and greater than 60 000?

(5 marks)

6 (i) Find how many different 4-digit numbers can be formed using the digits 2, 3, 5, 7, 8 and 9, if each digit may be used only once in any number.

[1]

(ii) How many of the numbers found in part (i) are divisible by 5?

[1]

(iii) How many of the numbers found in part (i) are odd and greater than 7000?

[4]

(6 marks)

7 (i) Find how many different 5-digit numbers can be formed using the digits 1, 2, 3, 5, 7 and 8, if each digit may be used only once in any number.

[1]

(ii) How many of the numbers found in part (i) are not divisible by 5?

[1]

(iii) How many of the numbers found in part (i) are even and greater than 30 000?

[4]

(6 marks)

- 8** (i) Find how many different 4-digit numbers can be formed using the digits 1, 3, 4, 6, 7 and 9. Each digit may be used once only in any 4-digit number.

[1]

- (ii) How many of these 4-digit numbers are even and greater than 6000?

[3]

(4 marks)

- 9** 4-digit numbers are to be formed using four of the digits 2, 3, 7, 8 and 9. Each digit may be used once only in any 4-digit number. Find how many 4-digit numbers can be formed if

- (i) there are no restrictions,

[1]

- (ii) the number is even,

[1]

- (iii) the number is greater than 7000 and odd.

[3]

(5 marks)

10 (a) A 4-digit number is created where each digit must be greater than or equal to 3. The same digit must not appear more than once.

(i) Find the number of 4-digit numbers that can be created.

(ii) Find the number of 4-digit numbers that can be created that are less than 9000.

(3 marks)

(b) A shelf holds 5 horror books, 6 romance books and 4 travel books. I choose six books from the shelf to read.

Find the number of selections possible in the following cases:

(i) I choose an equal number of each type of book,

(ii) I choose 4 horror books and at least 1 travel book.

(5 marks)

Very Hard Questions

- 1 (a)** A photographer takes 12 different photographs. There are 3 photographs of sunsets, 4 of oceans and 5 of mountains.

The photographs are arranged in a line on a wall.

- (i) Find the number of possible arrangements if the first photograph is of a sunset and the last photograph is of an ocean.
- (ii) Find the number of possible arrangements if all the photographs of mountains are next to each other.

(4 marks)

- (b)** Three of the photographs are selected for a competition.

- (i) Find the number of different possible selections if no photograph of a sunset is chosen.
- (ii) Find the number of different possible selections if one photograph of each type (sunset, ocean, mountain) is chosen.

(4 marks)

- 2** Given that $45 \times {}^n C_4 = (n+1) \times {}^{n+1} C_5$, find the value of n .

(4 marks)

- 3** The number of combinations of n items taken 3 at a time is $92n$. Find the value of the constant n .

(4 marks)

- 4** The number of combinations of n items taken 3 at a time is 6 times the number of combinations of n items taken 2 at a time. Find the value of the constant n .

(4 marks)