# Combined & Conditional Probability

## Question Paper

| Course | Edexcel IGCSE Maths |
|---|---|
| Section | 6. Statistics & Probability |
| Topic | Combined & Conditional Probability |
| Difficulty | Hard |

**Time allowed:**        80

**Score:**              /61

**Percentage:**        /100

## Question 1a

Four friends each throw a biased coin a number of times.
The table shows the number of heads and the number of tails each friend got.

|        | Ben | Helen | Paul | Sharif |
|--------|-----|-------|------|--------|
| heads  | 34  | 66    | 80   | 120    |
| tails  | 8   | 12    | 40   | 40     |

The coin is to be thrown one more time.

Which of the four friends' results will give the best estimate for the probability that the coin will land heads?
Justify your answer.

**[1 mark]**

## Question 1b

Paul says,

"With this coin you are twice as likely to get heads as to get tails."

Is Paul correct?
Justify your answer.

**[2 marks]**

## Question 1c

The coin is to be thrown twice.

Use all the results in the table to work out an estimate for the probability that the coin will land heads both times.

**[2 marks]**

## Question 2

In a supermarket, the probability that John buys fruit is 0.7

In the same supermarket, the probability that John independently buys vegetables is 0.4

Work out the probability that John buys fruit or buys vegetables or buys both.

**[3 marks]**

## Question 3

Thelma spins a biased coin twice.
The probability that it will come down heads both times is 0.09
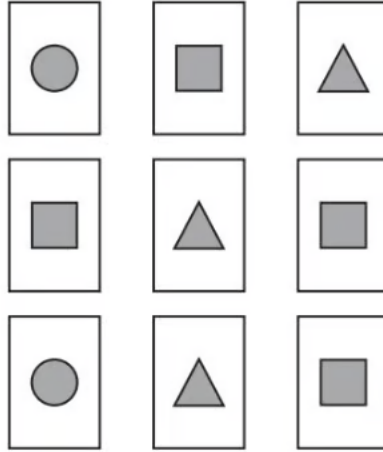
Calculate the probability that it will come down tails both times.

**[3 marks]**

## Question 4

Here are 9 cards.
Each card has a shape on it.



In a game the cards are turned over so that the shapes are hidden.
The cards are then mixed up.

Katie turns over at random two of the cards.

Work out the probability that these two cards have different shapes on them.
You must show all your working.

**[4 marks]**

## Question 5

Carolyn has 20 biscuits in a tin.

She has

12 plain biscuits
5 chocolate biscuits
3 ginger biscuits

Carolyn takes at random two biscuits from the tin.

Work out the probability that the two biscuits were **not** the same type.

[4 marks]

## Question 6

There are three different types of sandwiches on a shelf.

There are

4 egg sandwiches,
5 cheese sandwiches
and 2 ham sandwiches.

Erin takes at random 2 of these sandwiches.

Work out the probability that she takes 2 different types of sandwiches.

[5 marks]

## Question 7

Nomusa has 30 sweets.

She has

18 fruit sweets
7 aniseed sweets
5 mint sweets

Nomusa is going to take at random two sweets.

Work out the probability that the two sweets will **not** be the same type of sweet.
You must show all your working.

**[4 marks]**

## Question 8a

There are 12 counters in a bag.
There is an equal number of red counters, blue counters and yellow counters in the bag.
There are no other counters in the bag.

3 counters are taken at random from the bag.

Work out the probability of taking 3 red counters.

**[2 marks]**

## Question 8b

The 3 counters are put back into the bag.

Some more counters are now put into the bag.
There is still an equal number of red counters, blue counters and yellow counters in the bag.
There are no counters of any other colour in the bag.

3 counters are taken at random from the bag.

Is it now less likely or equally likely or more likely that the 3 counters will be red?
You must show how you get your answer.

[2 marks]

## Question 9

There are 10 pens in a box.

There are $x$ red pens in the box.
All the other pens are blue.

Jack takes at random two pens from the box.

Find an expression, in terms of $x$, for the probability that Jack takes one pen of each colour.
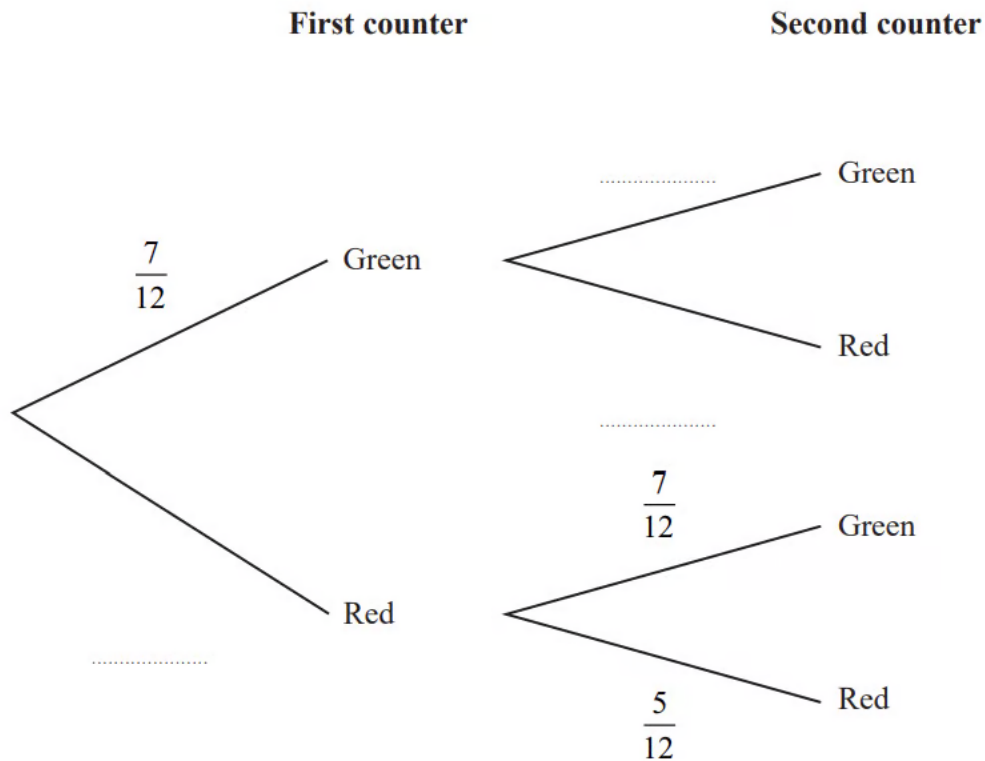Give your answer in its simplest form.

[5 marks]

## Question 10a

Hector has a bag that contains 12 counters.
There are 7 green counters and 5 red counters in the bag.

Hector takes at random a counter from the bag.
He looks at the counter and puts the counter back into the bag.

Hector then takes at random a second counter from the bag.
He looks at the counter and puts the counter back into the bag.

Complete the probability tree diagram.

**First counter**                    **Second counter**

$$\frac{7}{12}$$ Green

.................... Green

Red

.................... 

$$\frac{7}{12}$$ Green

Red

.................... 

$$\frac{5}{12}$$ Red

[2 marks]

## Question 10b

Work out the probability that both counters are red.

**[2 marks]**

## Question 10c

Meghan has a jar containing 15 counters.
There are only blue counters, green counters and red counters in the jar.

Hector is going to take at random one of the counters from his bag of 12 counters.
He will look at the counter and put the counter back into the bag.

Hector is then going to take at random a second counter from his bag.
He will look at the counter and put the counter back into the bag.

Meghan is then going to take at random one of the counters from her jar of counters.
She will look at the counter and put the counter back into the jar.

The probability that the 3 counters each have a different colour is $\dfrac{7}{24}$

Work out how many blue counters there are in the jar.

**[3 marks]**

## Question 11

Jack plays a game with two fair spinners, **A** and **B.**

Spinner **A** can land on the number 2 or 3 or 5 or 7
Spinner **B** can land on the number 2 or 3 or 4 or 5 or 6

Jack spins both spinners.
He wins the game if one spinner lands on an odd number **and** the other spinner lands on an even number.

Jack plays the game twice.
Work out the probability that Jack wins the game both times.

**[4 marks]**

## Question 12a

A bag contains 8 balls.

3 are red and 5 are blue.

2 balls are taken from the bag at random without replacement.

Write down the probability that there is **at least** 1 red ball still in the bag.

**[1 mark]**

## Question 12b

Work out the probability that there are **at least** 2 red balls still in the bag.

**[3 marks]**

## Question 13

Students are asked to choose one subject from Option A and one subject from Option B.

| Option A | Option B |
|---|---|
| Economics | Art |
| Geography | Drama |
| History | Engineering |
| Media Studies | German |
| | Graphics |
| | Music |
| | PE |

If a student chooses their subjects at random, what is the probability that both subjects have the same first letter?

**[3 marks]**

## Question 14

21 people travelled to a meeting.

- 12 used a train.
- 6 used a car.
- 7 did not use a train or a car.
- Some used a train and a car.

Two people are chosen at random from those who used a train.

Find the probability that both these people also used a car.

**[6 marks]**