

# Combined & Conditional Probability

## Question Paper

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

**Time allowed:** 90  
**Score:** /72  
**Percentage:** /100

### Question 1a

David has designed a game.

He uses a fair 6-sided dice and a fair 5-sided spinner.

The dice is numbered 1 to 6

The spinner is numbered 1 to 5

Each player rolls the dice once and spins the spinner once.

A player can win £5 or win £2



David expects 30 people will play his game.

Each person will pay David £1 to play the game.

Work out how much profit David can expect to make.

[4 marks]

### Question 1b

Give a reason why David's actual profit may be different to the profit he expects to make.

[1 mark]

### Question 2

Paul has 8 cards.

There is a number on each card.



Paul takes at random 3 of the cards.

He adds together the 3 numbers on the cards to get a total  $T$ .

Work out the probability that  $T$  is an odd number.

[4 marks]

### Question 3

John has an empty box.

He puts some red counters and some blue counters into the box.

The ratio of the number of red counters to the number of blue counters is 1 : 4

Linda takes at random 2 counters from the box.

The probability that she takes 2 red counters is  $\frac{6}{155}$

How many red counters did John put into the box?

[4 marks]

**Question 4a**

There are  $y$  black socks and 5 white socks in a drawer.

Joshua takes at random two socks from the drawer.

The probability that Joshua takes one white sock and one black sock is  $\frac{6}{11}$

Show that  $3y^2 - 28y + 60 = 0$

[4 marks]

**Question 4b**

Find the probability that Joshua takes two black socks.

[3 marks]

### Question 5a

There are  $n$  sweets in a bag.

6 of the sweets are orange.

The rest of the sweets are yellow.

Hannah takes at random a sweet from the bag.

She eats the sweet.

Hannah then takes at random another sweet from the bag.

She eats the sweet.

The probability that Hannah eats two orange sweets is  $\frac{1}{3}$

Show that  $n^2 - n - 90 = 0$

[3 marks]

### Question 5b

Solve  $n^2 - n - 90 = 0$  to find the value of  $n$ .

[3 marks]

**Question 6a**

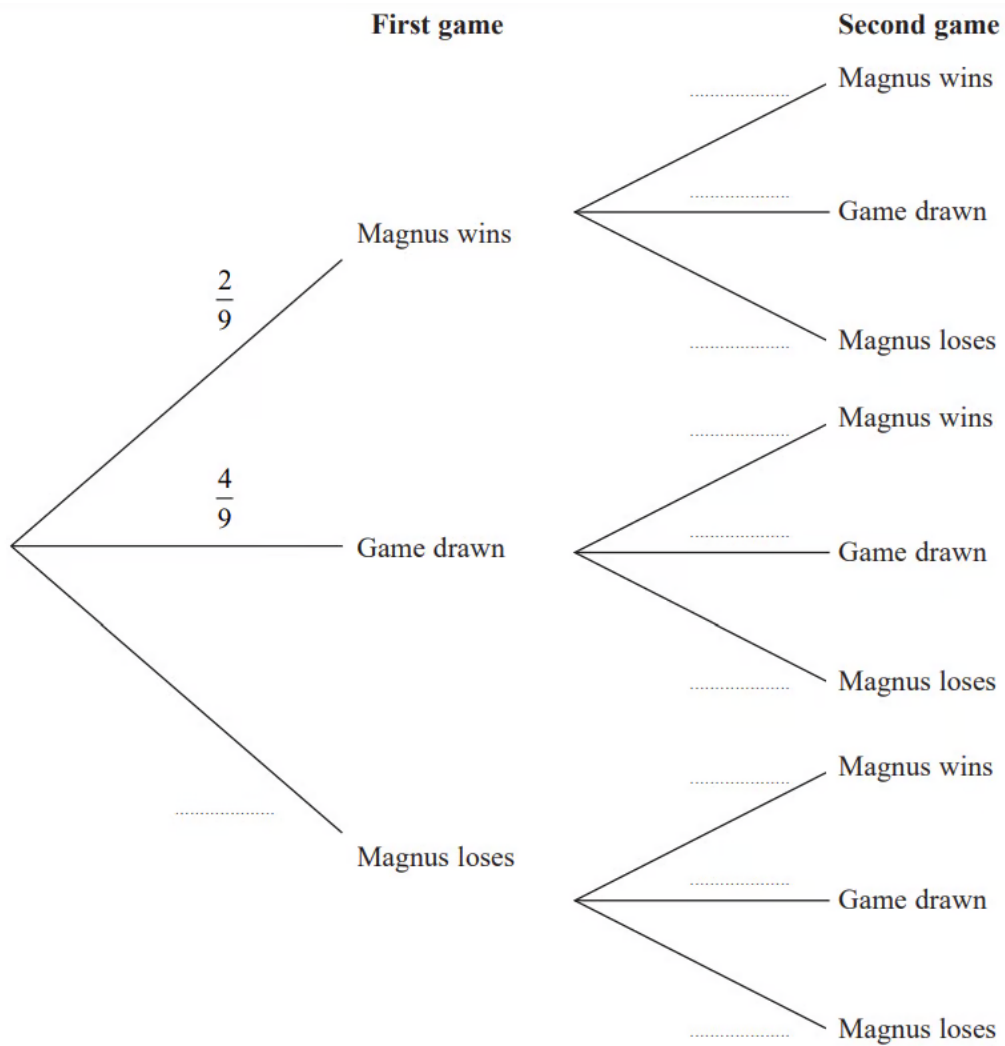
Magnus and Garry play 2 games of chess against each other.

The probability that Magnus beats Garry in any game is  $\frac{2}{9}$

The probability that any game between Magnus and Garry is drawn is  $\frac{4}{9}$

The result of any game is independent of the result of any other game.

Complete the probability tree diagram.



[2 marks]

**Question 6b**

For each game of chess,

the winner gets 2 points and the loser gets 0 points,

when the game is drawn, each player gets 1 point.

Work out the probability that, after 2 games, Magnus and Garry have the same number of points.

**[3 marks]**

**Question 6c**

Magnus and Garry now play a third game of chess.

Work out the probability that, after 3 games, Magnus and Garry have the same number of points.

**[3 marks]**

### Question 7

There are 16 sweets in a bowl.

4 of the sweets are blackcurrant.

5 of the sweets are lemon.

7 of the sweets are orange.

Anna, Ravi and Sam each take at random one sweet from the bowl.

Work out the probability that the 5 lemon sweets are still in the bowl.

[4 marks]

### Question 8

In a bag, there are only

3 blue beads

4 white beads

and  $x$  orange beads.

Jean is going to take at random two beads from the bag.

The probability that Jean will take two beads of the same colour is  $\frac{3}{8}$

Find the total number of beads in the bag.

Show clear algebraic working.

[4 marks]



### Question 9

Pippa has a box containing  $N$  pens.

There are only black pens and red pens in the box.

The number of black pens in the box is 3 more than the number of red pens.

Pippa is going to take at random 2 pens from the box.

The probability that she will take a black pen **followed** by a red pen is  $\frac{9}{35}$

Find the possible values of  $N$ .

Show clear algebraic working.

[5 marks]

### Question 10

A bowl contains  $n$  pieces of fruit.

Of these, 4 are oranges and the rest are apples.

Two pieces of fruit are going to be taken at random from the bowl.

The probability that the bowl will then contain  $(n - 6)$  apples is  $\frac{1}{3}$

Work out the value of  $n$

Show your working clearly.

[6 marks]

### Question 11

Liam is trying to remember a 3-digit code.

He knows the rule that

- the first digit is a cube number
- the second digit is a factor of 16
- the third digit is an odd number.

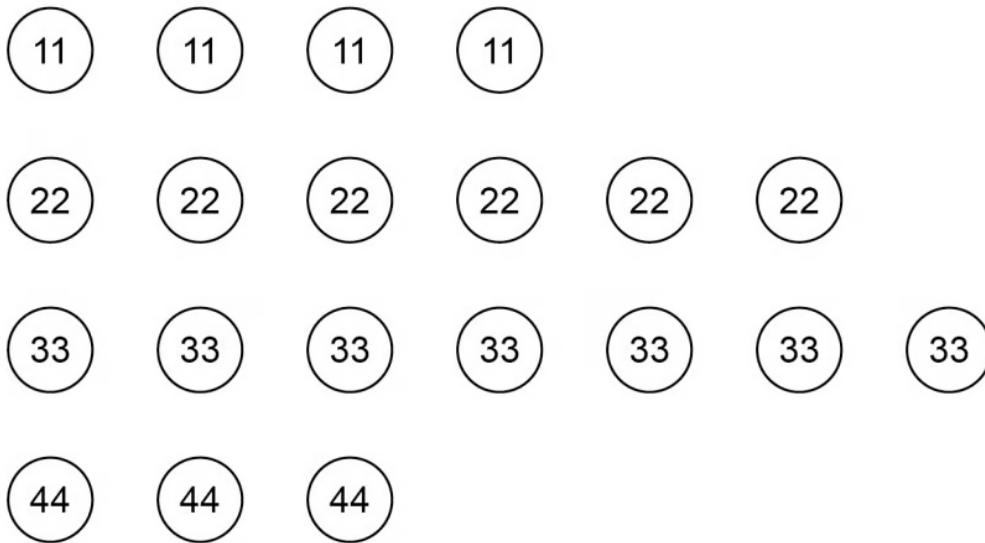
Liam tries at random a code that matches the rule.

Work out the probability that this is the correct code.

[4 marks]

### Question 12

These 20 discs are in a bag.



Two of the discs are taken at random from the bag.

Work out the probability that the first disc has a **smaller** number than the second disc.

[4 marks]

### Question 13

A bag contains 30 discs.

10 are red and 20 are blue.

One disc is taken out at random and replaced by **two** of the other colour.

Another disc is then taken out at random and replaced by **two** of the other colour.

Another disc is then taken out at random.

Work out the probability that all three discs taken out are **red**.

[3 marks]

### Question 14

Bag X contains 9 blue balls and 18 red balls.

Bag Y contains 7 blue balls and 14 red balls.

Liz picks a ball at random from bag X.

She puts the ball into bag Y.

Mike now picks a ball at random from bag Y.

Show that

$$P(\text{Liz picks a blue ball}) = P(\text{Mike picks a blue ball})$$

[4 marks]

**Question 15**

Li has  $t$  toy bricks.

She only has red bricks and blue bricks.

Li picks two bricks, one after the other.

If the first brick she picks is red, the probability that the second brick is red is  $\frac{2}{3}$ .

If the first brick she picks is blue, the probability that the second brick is red is  $\frac{7}{10}$ .

Calculate the value of  $t$ .

$t = \dots\dots\dots$

**[4 marks]**