



Cambridgeshire  
County Council

# The Mathematical Mansion

Click on the picture to  
enter the mansion and  
begin your adventure.



# Introduction

**Welcome to the Mathematical Mansion.**

**You are currently standing in the entrance hall, in front of you is the grand staircase that will take you upstairs and to your left and right are doors that will take you into different rooms on the ground floor.**

**As you move about this old house you will find challenges to solve in each room that you visit. Record your answers to each problem as you go around the mansion, once you have finished all the questions your answer can be checked by someone else who is at home with you.**

**To enter each room just click on one of the links to the right.  
Have fun!**

## The Ground Floor

1. [The kitchen](#)
2. [The drawing room](#)
3. [The library](#)
4. [The dining room](#)
5. [The parlour](#)
6. [The music room](#)
7. [The games room](#)

## Upstairs

8. [The master bedroom – Willow Room](#)
9. [Rupert's Room– Oak Room](#)
11. [Prunella's Room – Rowan Room](#)
12. [The attic](#)

When you have finished all the challenges just click on the door to leave.



# The Kitchen

Mrs Johnson, the family cook, is using an old recipe to make a sponge cake. The only trouble is her weighing scales only have grams on them, and she can only measure to the nearest whole gram. Can you convert the following imperial measures into grams so her reputation as an amazing cook can be maintained? (1oz = 28.3g)

4oz of margarine

5oz of caster sugar

6oz of self raising flour

2 large eggs

1 or 2 drops of vanilla essence

1 tablespoon of boiling water

[Go back to the entrance hall and choose your next room.](#)



# The Drawing Room

Mr and Mrs Pi, the owners of the Mathematical Mansion, are in the drawing room. They have been told that a new rectangular photo frame they have recently bought has a total perimeter of 100cm. If the sides of the frame are always measured in whole centimetres, which one of the following areas couldn't it have?

- a)  $625\text{cm}^2$
- b)  $400\text{cm}^2$
- c)  $200\text{cm}^2$
- d)  $600\text{cm}^2$
- e)  $525\text{cm}^2$

[Go back to the entrance hall and choose your next room.](#)





# The Library

Rupert, the oldest child in the Mathematical Mansion, wants to organise a new set of thirty six books on a shelf in the library. The books are of varying thickness: six books are 5cm thick, twelve of them are 4cm thick, ten of them are  $3\frac{1}{2}$  cm thick and the remaining eight of them are  $2\frac{1}{4}$  cm thick. The shelf is 1m long.

- a) What is the maximum number of books he can get on the shelf?
- b) How many books would be left over?
- c) Use your answer to part *a* to work out how much space would be left on the shelf.



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# The Dining Room

Pennington, the butler, is expecting to serve dinner at 6.45pm precisely. That means that everything has to be ready and cooked 20 minutes before this. Knowing this, what time should each of the following items be placed in the oven or on the stove so they are all ready at the same time?

Roast lamb – 3 hours and 20 minutes (& then left to rest for 15 minutes)

Roast potatoes - 1 hour and 10 minutes

Mashed potatoes – 35 minutes

Steamed vegetables – 23 minutes

Yorkshire pudding – 55 minutes

Gravy – 12 minutes

[Go back to the entrance hall and choose your next room.](#)



# The Parlour

Prunella is in the parlour sitting at the table with 1 of each coin in front of her laid out in a single row.

1. When she adds up the first 4 coins they total £2.56
  2. When she adds up the last 5 coins they total £1.82
- a) Which coin is in the 4<sup>th</sup> position when counting from left to right?



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# The Music Room

Prunella, the youngest child in the Mathematical Mansion is learning to play the piano but at the moment she can only play 4 notes, A, B, C and D.

To make sure she practises her music teacher has listed all the different combinations of the 4 notes so she won't get bored practising.

How many different combinations are there?

The list has been started below, can you finish it?

ABCD, ABDC, ACBD ...



[Go back to the entrance hall and choose your next room.](#)



# The Games Room

Mrs Pi is holding a pool competition in the games room. As each person arrives Mrs Pi knocks their elbow and each person then knocks elbows with every one else in the room just once.

a) If there were 9 people taking part in the pool competition how many 'elbow knocks' would there be?

How many 'elbow knocks' would there be if ..

b) 12 people took part

c) 15 people took part

d) How many people would there be if there were 210 elbow knocks?

[Go back to the entrance hall and choose your next room.](#)



# Willow Room



Mrs Pi is getting ready to go out running around the estate. She has the following choices.

- a) red, blue or yellow t-shirts
- b) purple, green or orange leggings
- c) Spotted, white or black trainers

How many different combinations of outfit are there?

Here are two outfits to get you started...

- 1) Red t-shirt, purple leggings and spotted trainers
- 2) Red t-shirt, purple leggings and white trainers

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# Oak Room



Rupert has friends living all round the world. He is arranging to talk to them over Skype at 6pm on the **31<sup>st</sup> April**. Below there is a list of his friends and where they live:

Edward – Sydney (Australia)

Robert– New York (USA)

Ellie – Cape Town (South Africa)

Marc – Oslo (Norway)

Abbie – Tokyo (Japan)

John – Buenos Aires (Argentina)

What will the local time and date be for each person in the list when they speak to Rupert in England at 6pm on the 31<sup>st</sup> April?

You will need to research the location of each city and how far ahead or behind the time is compared to the United Kingdom (Remember the UK will be on British Summer Time, BST).

[Go back to the entrance hall and choose your next room.](#)

# Rowan Room

Prunella is upstairs trying to complete her homework, which she is allowed to check using a calculator.

Unfortunately the 7 key is broken on the calculator so to check the answer to  $17 \times 18$  Prunella types in the following calculations  $16 \times 18$  which is 288 followed by  $288 + 18 = 306$ . How can she check the following calculations?

- a)  $1011 - 786$
- b)  $237 + 3567$
- c)  $47 \times 20$
- d)  $442 \div 17$
- e)  $27 \times 7$

[Go back to the entrance hall and choose your next room.](#)





# The Attic

In the attic Rupert finds a box of books. The year each book was published is shown in Roman numerals on the spine. Can you order the books from the earliest book to be published to the most modern?

Book a = MCMXC

Book b = MDCCCXC

Book c = MCMXX

Book d = MCML

Book e = MDCCCLI

Book f = MCMXLV

[Go back to the entrance hall and choose your next room.](#)





# Goodbye

**Congratulations on answering all of the questions in the Mathematical Mansion.**

If, when someone checks your answers, you got some of them wrong you are more than welcome to come back and try again. The doors are always open.

