8.

The menu (shown below) in the dining room is propped up on a candlestick. Mrs White likes guests at the house to have a varied menu, so she created one which ensured that no meal was repeated for at least a year. Meals consisted of a starter, main, side dish and a dessert.

On the first day, she served soup, pork, roast potatoes, and apple pie. On the next day, each course is replaced by the next in its list; on reaching the bottom of a list, the next item is the top one.

How many days pass before the same meal is repeated?

Starter	Main	Side	Dessert
Soup	Pork	Roast Potatoes	Apple Pie
Pate	Lamb	Chips	Chocolate Cake
Mushrooms	Fish	Rice	Trifle
	Beef	Pasta	Cheese and Biscuits
	Chicken	Jacket Potatoes	
		Mash	
		Noodles	

Mrs White hired a cook to assist her and he added a new main and a new side to the list, hoping to impress her. Why did she sack him?
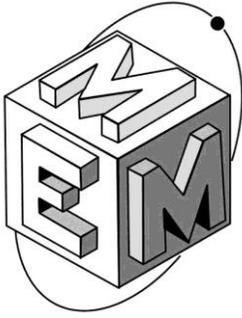
9. Supplementary Question
Whodunnit? Where and with what?

MATHEMATICAL EDUCATION ON MERSEYSIDE

Sponsored by

Challenge '10
For Year 8 or below

Illustrations by Peter H Ackerley

Rules
1) It should be attempted at home during February half term.
2) Your entry must be your own work, though of course you may ask for help on how to start or for the meanings of unfamiliar words.
3) Entries without any working out at all or written on this sheet will not be marked.
4) It is possible to win a prize even if you have not completed all of the questions, so hand in your entry even if it is not quite finished.
5) You must write **your name and school in neat writing on every page.**

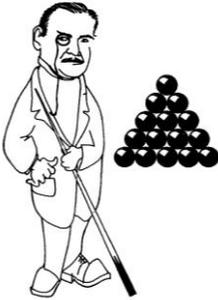Either you or your maths teacher needs to return your entry by 5th March to this address:

All of the prizes will be awarded at an evening of mathematical recreation at the University of Liverpool on 12th May. Solutions will be posted on www.maths.liv.ac.uk/~mem shortly afterwards. We hope that you enjoy the questions.

1.

Miss Scarlet wants to use the secret passage from the lounge to the conservatory. To open the combination lock on the door of the secret passage, she needs to use the clues on a note attached to the door with a dagger.
"The code for the lock is an even four digit cube number, with all the digits different. It is not divisible by 3."
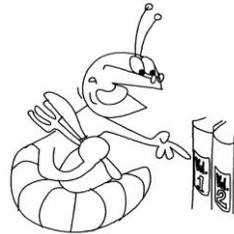
2.

Colonel Mustard is practising his snooker in the billiard room.
How many triangular arrangements of balls (there must be more than 1 ball in the arrangement) are there in this rack of red snooker balls?

3.

In the library there is a five volume set of books: "The Use of Lead Piping in Modern Plumbing", volumes 1-5, arranged in ascending order on the shelf. A bookworm eats its way from the front cover of volume 1 to the back cover of volume 5. If each volume is 3cm thick, how far has the bookworm travelled?
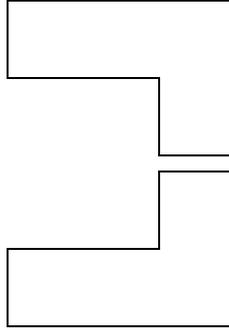
4.

In the ballroom, six girls and four boys are doing a dance. In this dance, all of the boys dance all of the time and must dance with each girl for six bars. How many bars are needed to complete the dance?

5.

Mrs Peacock wants to tile the floor in the hall; however the tiler has thrown a spanner in the works. He's ordered two types of giant 3 foot by 2 foot L-shaped tiles, as shown. The hall is a rectangle measuring 8 foot by 10 foot. Arrange these tiles to cover the floor, without a straight line from one edge to the opposite edge through the tiling.

6.

Professor Plum is making toast in the kitchen. He's using an unusual gas grill. It can only toast one side of each of two slices of toast at a time. Each slice is loaded on to a separate grill pan. The grill is already hot.

It takes both hands to put a slice of bread in, turn it over or take it out. Putting a slice of bread in or pulling a slice of toast out takes 3 seconds, turning it over takes 4 seconds and it takes 30 seconds to toast one side of a slice.

What is the minimum time required to toast 3 slices of bread on both sides?

7.

How many different ways can you arrange the letters of the word REVOLVER?