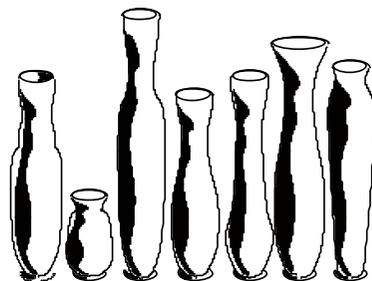


## 6. Honey, Honey

Two jars of delicious honey are hidden here,  
A further two contain Dad's old beer.  
Three jars are filled with rat poison, oh my!  
To help you find the honey, here are clues 1 to 5:  
First, wherever the poison tries to hide,  
You'll always find some on the beer's left side.  
Second, different are those stood at either end,  
But if you want honey, then the left is not your friend.  
Third, as you can see, all the jars are a different size;  
Neither dwarf nor giant holds death in their insides.  
Fourth, the 2<sup>nd</sup> left and 2<sup>nd</sup> right  
Are both the same, now hold on tight.  
For clue number five, it should be known:  
If you want to live, leave the centre bottle alone.



## 7. Does Your Mother Know?

After moving house, Mum is faced with three boxes: one labelled "CD's", one "DVD's" and one "CD's and DVD's". She knows that all three labels are incorrect. What is the minimum total number of items she must look at to re-label all the boxes correctly? Explain your answer.

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The competition is promoted by  
Mathematical Education on Merseyside (MEM)  
Registered Charity No 517028  
The Department of Mathematical Sciences,  
University of Liverpool,  
Liverpool,  
L69 7ZL.

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# MATHEMATICAL EDUCATION ON MERSEYSIDE

Sponsored by



# Challenge '09

## 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 **6<sup>th</sup> March** to this address:

Challenge '09 Entries,  
Chris Marchant,  
Department of Mathematical Sciences,  
University of Liverpool,  
Peach Street,  
Liverpool.  
L69 7ZL.

All of the prizes will be awarded at an evening of mathematical recreation at the University of Liverpool on **3<sup>rd</sup> June**. Solutions will be posted on [www.maths.liv.ac.uk/~mem](http://www.maths.liv.ac.uk/~mem) shortly afterwards. We hope that you enjoy the questions.

### 1. The Day Before You Came

Yesterday, I came home from holiday to find that my annoying brother had come to stay at my house. This morning, I asked on which day he had arrived; his reply was: "Three days before two days after yesterday." When did he arrive?



### 2. Gimme! Gimme! Gimme! (A Man After Midnight)

Stig wakes up in the night and looks at his 12-hour digital clock. Reading the time as a three-digit number, he remarks: "The digits add to six and, if you divide the number by six, the answer is a prime." What time is it?

### 3. Dancing Queen

Eight queens are arranged as shown on part of a chessboard. By moving exactly three of them one space up, down, left or right, position them so that there are exactly two in each row and column, and three on each main diagonal.

#### 4. I Do, I Do, I Do, I Do, I Do

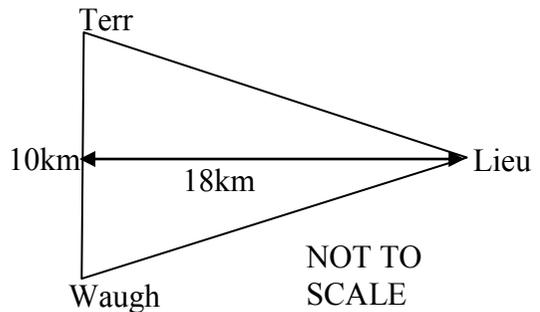
Chiquitita wants to marry a poor man, who has only two copper coins. Her father wants her to marry a rich man who has 98 gold coins. He agrees that he will choose who Chiquitita will marry by drawing one coin from a randomly chosen pot. He lets Chiquitita take all 100 coins and split them, as she chooses, between the three identical pots. How can she maximise the chances of one of her sweetheart's coins being chosen?



#### 5. SOS

A ship in distress sends out an SOS signal. Its signal is picked up by 3 listening posts: Waugh, Terr & Lieu.

Waugh is 10km due South of Terr, and Lieu is 18km due East of the midpoint of the line connecting Waugh and Terr.



Each listening post can only determine within five degrees the bearing of the signal. Using a scale of 1cm:1km, carefully draw a scale diagram and shade the area which needs to be searched.

Bearing from Waugh is between  $063^\circ$  and  $068^\circ$ ; from Terr, it is between  $120^\circ$  and  $125^\circ$ ; and from Lieu, between  $263^\circ$  and  $268^\circ$ .