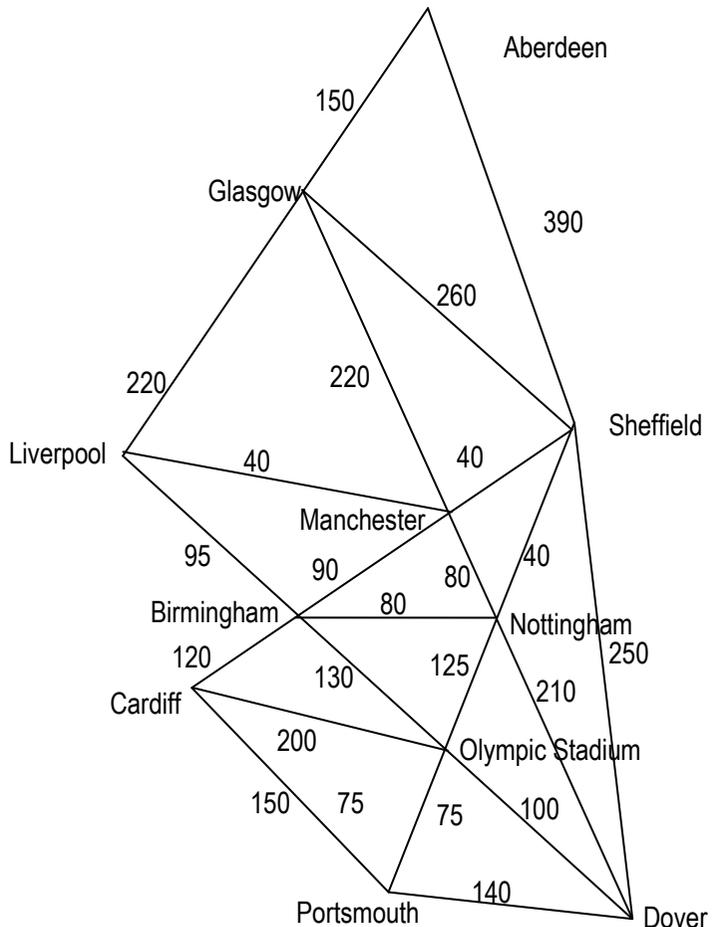


7. Torch Relay

The Olympic committee want as many people as possible to take part in the Olympic torch relay. Each torchbearer is to carry the torch for one mile. Find the longest route around the network, starting and finishing in the Olympic Stadium in London, which does not visit any city more than once.

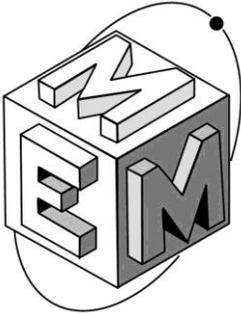


The competition is promoted by
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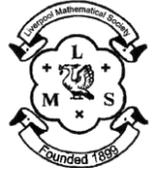
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MATHEMATICAL EDUCATION ON MERSEYSIDE

Sponsored by



Challenge '12

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.**

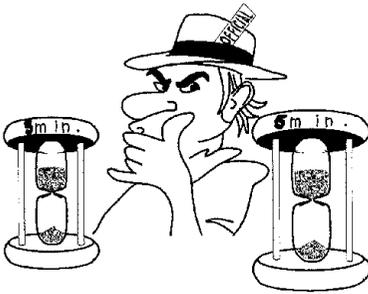
Either you or your maths teacher needs to return your entry by 9th March to this address:

Challenge '12 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 9th May. Solutions will be posted on www.maths.liv.ac.uk/~mem shortly afterwards. We hope that you enjoy the questions.

1. Cycle Time

A cyclist rides 600m up a hill and 400m down the other side. His speed is twice as fast downhill as uphill and the whole journey takes 4 minutes. How long does it take him to reach the summit?



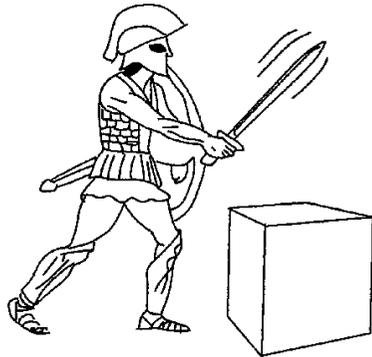
2. Eggs-act Timing.

Due to a computer malfunction, the timers for an event have to use egg timers. They have a 3-minute egg timer and a 5-minute egg timer. Assuming that an egg timer can be instantly turned over, how would they measure each length of time from 1 minute to 10 minutes?

3. Slice the Dice

In the history of the ancient Greek Olympics, the following competition is mentioned:

A warrior has to cut a wooden cube measuring 3 x 3 x 3 feet into 27 unit cubes with his sword, making the minimum number of cuts. The pieces may be rearranged between cuts, but not during them. What is the minimum number of cuts?





4. Who is the Belgian?

Alison, Barry and Charlotte are three Olympians: one is an archer, one a boxer and the third a canoeist. They represent Albania, Belgium and Canada. Given that no initial letters of name, country or sport match, and the Canadian is not a boxer, who is the Belgian?

5. Ticket Prices

Chris, Jo and their three daughters go for a day at the Olympics; the parents watch the fencing and the girls have seats for the gymnastics, at a total cost of £235. Michael and his four friends meet them there. He has spent £135 and plans to see the fencing with Chris and Jo, while his friends enjoy the handball. However, two of Michael's friends decide to swap tickets with two of the girls, giving the girls £60 to cover the price difference. What was the cost of a ticket for each event?



6. Parade

A small country has only 7 athletes: Amy, Barney, Cath, Dylan, Ed, Francis and Gemma, to take part in the parade at the end of the games. The parade rules state that the athletes must walk in 3 pairs behind a single athlete bearing their nation's flag. The order within each pair is unimportant, so AB is the same as BA. How many different ways can the 7 athletes be arranged?