

Challenge '07

For Year 8 Or below

Illustrations by Peter H Ackerley

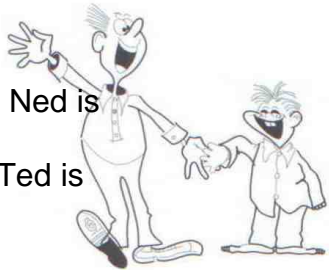
Rules

- 1) The competition is open to all pupils in and around Merseyside who are in Year 8 or below.
- 2) It should be tackled at home, during February half term.
- 3) Your entry must be your own individual effort, though of course you may refer to books, the internet or your teachers on how to start or for the meanings of unfamiliar words.
- 4) Marks will be awarded to clearly explained solutions only.
- 5) We hope that you enjoy the questions.
- 6) 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.
- 7) Hand your neatly written or printed **entry with your name and school on every page**, to your maths teacher as soon as possible after the February half term so they can send them to us by 9th March.
- 8) All of the prizes will be awarded at an evening of mathematical recreation at The University of Liverpool on 22nd May.
- 9) Solutions will be posted on www.maths.liv.ac.uk/~mem by the end of March.

1. A FAMILY QUESTION

Ted is 26 years old, while his son, Ned is 6 years old.

How many years will pass before Ted is 3 times older than Ned?



[There are 1760 yards to a mile.]



2. MAKE ME A MATCH

Seven matches on a table form the false statement shown on the left.

Move just ONE match to turn this false statement into a true statement.

3. SCOUTS' PACE

2007 marks the Centenary of Scouting.

Scouts' Pace is achieved when you run for 1 minute, then walk for 1 minute, then run for 1 minute and so on.

Alternatively, if travelling along a road with lamp posts, you can run from one lamp post to the next, then walk to the third, and then run to the fourth and so on.

Assuming Chris runs at 6mph and walks at 3mph, and that lamp posts are 200 yards apart, which method would be fastest for covering a distance of 1 mile?



4. DAY TRIPPER

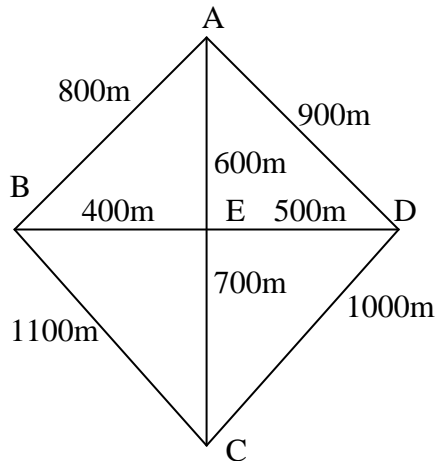
On the first Wednesday of a certain month last year Mr Smith was in London, and then on the Wednesday after the first Tuesday of the month he was in Cardiff. The following month Mr Smith was in Edinburgh on the first Wednesday of the month and then in Liverpool on the Wednesday after the first Tuesday of the month. Work out the actual dates of his visits to these cities.



[The diagram is not to scale. In fact none of the roads needs to be straight!]

5. TREE - MENDERS

Rebecca has a triangular field. Unfortunately, the fences have been ripped out by the recent January storm. All that is left are three trees which marked the midpoint of each side of the triangle. Giving a detailed description and a sketch, explain how you would use geometry to reconstruct the shape of the field.



6. TRUE GRIT

A gritting lorry starts at its base at E. It has to grit all the roads, shown on the left, at least once before finishing at E. What is the shortest distance it must travel to make sure all the roads are gritted?

7. ANYONE FOR TENNIS?

A tennis club needs to have a team of five couples for a mixed doubles competition. There are 5 boys (Andy, Ben, Charlie, Dave and Ed) and 5 girls (Helen, Joanne, Karen, Louise and Michelle) all able to play.



However each boy will only partner certain of the girls.

- A will only partner H, J or K.
- B will only partner H, L or M.
- C will only partner J, K or L.
- D will only partner H, K or M.
- E will only partner J, L or M.

How many different teams of 5 couples can be picked? List the couples.

The competition is promoted by
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The Department of Mathematical Sciences,
The University of Liverpool,
Liverpool,
L69 7ZL.

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