



The Scottish Mathematical Council

www.scot-maths.co.uk

MATHEMATICAL CHALLENGE 2013–2014

Entries must be the unaided efforts of individual pupils.

Solutions must include explanations and answers without explanation will be given no credit.

Do not feel that you must hand in answers to all the questions.

CURRENT AND RECENT SPONSORS OF MATHEMATICAL CHALLENGE ARE

*The Edinburgh Mathematical Society, The Maxwell Foundation, Professor L E Fraenkel,
The London Mathematical Society and The Scottish International Education Trust.*

The Scottish Mathematical Council is indebted to the above for their generous support and gratefully acknowledges financial and other assistance from schools, universities and education authorities.

Particular thanks are due to the Universities of Aberdeen, Edinburgh, Glasgow, Heriot Watt, Stirling, Strathclyde and to Preston Lodge High School, Bearsden Academy, Beaconsfield School and Northfield Academy.

Junior Division: Problems 1

- J1.** A sculpture consists of three large cubes stacked one on top of another without overhanging. The largest cube has edge 3 metres and its base is on the ground. The next cube has edge 2 metres and the top cube has edge 1 metre.
The exposed surface is to be painted blue. Each tin of paint will cover ten square metres. How many tins of paint will be needed?
- J2.** Louise's house has a staircase with twelve steps. She can go down either one step or two steps at a time. For example, she could go down
1, 1, 2, 2, 1, 2, 1, 1, 1
In how many different ways can she go down the staircase taking 1 step or 2 steps each time?
- J3.** A corner deli stocks 4 kinds of bread, 5 kinds of meat and 3 kinds of cheese. It sells three types of sandwiches, each made from one kind of bread with either one kind of meat or one kind of cheese or a slice of meat and a slice of cheese as filling.
How many different sandwiches are on sale?
- J4.** In a recent election, six candidates stood and a total of 51880 votes were cast. The winning candidate beat the others by 1336, 7085, 15333, 15654 and 17102 votes respectively. Candidates lose their deposit if they fail to get more than 5% of the total number of votes cast. How many candidates lost their deposits?
- J5.** In a tennis tournament, each match is played between two players, and the winner proceeds to the next round whereas the loser is eliminated. There are no draws. If necessary, in the first round only, a number of players do not participate.
- (a) A particular tournament starts with 256 players and proceeds until there is one overall winner. How many matches are played in this tournament?
- (b) If the tournament starts with 296 players and proceeds until there is one overall winner. How many matches are played in this tournament?

END OF PROBLEM SET 1