

# The Scottish Mathematical Council

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## MATHEMATICAL CHALLENGE 2019–2020

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.*

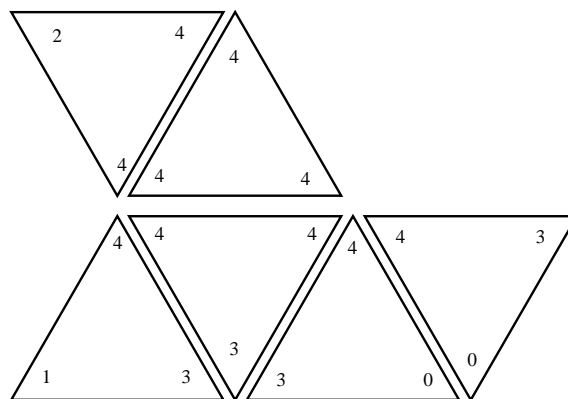
The Scottish Mathematical Council is indebted to the above for their generous support and gratefully acknowledges financial and other assistance from schools, universities and education authorities.

Particular thanks are due to the Universities of Aberdeen, Edinburgh, Glasgow, Heriot Watt, St Andrews, Stirling, Strathclyde and to George Heriot's School, Gryffe High School and Kelvinside Academy.

### Junior Division: Problems 2

- J1.** Three buckets are coloured red, green and blue. Each bucket contains four balls numbered 1, 2, 3, and 4, of the same colour as the bucket. Without looking, Emily chooses one ball at random from each of the buckets. If  $r$ ,  $g$  and  $b$  are the numbers on the balls chosen from the red, green and blue buckets respectively, Emily wins a prize when  $r = g + b$ . What is the probability that Emily wins a prize?

- J2.** Three-sided dominoes are equilateral triangles and one face of each domino has a number in each corner and the other side is blank. The numbers range from 0 up to the highest number in the set, 4. Here is an example of a game which started with the 4 4 4 domino. The set contains all possible different dominoes. How many dominoes are there in the set?



- J3.** (In this question, the possible coins are: 1p, 2p, 5p, 10p, 20p, 50p, £1 and £2.) You and a friend have been saving for your holidays, but you still have a long way to go. So far, you have both saved the same amount of money: £15.39. You discover that your friend has four different types of coin and has the same number of each type. This surprises you, because you have four different types of coin and the same number of each type. Do you have the same number of coins as your friend does? Do not forget to give reasons for your answer.
- J4.** How many positive multiples of 7 that are less than 1,000 end with the digit 3? How many positive multiples of 7 that are less than 10,000 end with the digits 33?
- J5.** A cross-country skier practices the same route from his home to his friend's home and leaves at the same time every day. He realised that when he skis at 10 mph he arrives at 4 minutes past noon, and when he skis at 15 mph he arrives at 4 minutes before noon. How fast would he have to go to reach his friend's house at noon exactly?

END OF PROBLEM SET 2