

The Scottish Mathematical Council

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MATHEMATICAL CHALLENGE 2016-2017

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.*

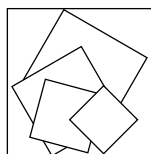
The Scottish Mathematical Council is indebted to the above for their generous support and gratefully acknowledges financial and other assistance from schools, universities and education authorities.

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Junior Division: Problems 1

- J1.** A school has fewer than 200 pupils.
When they line up in rows of 4 there is 1 extra pupil.
When they line up in rows of 5 there are 2 extra pupils.
When they line up in rows of 6 there are 3 extra pupils.
How many pupils could there be in the school?

- J2.** Professor A. M. Nesia has a safe with a combination lock. In her journal, the note she uses to help her remember is this diagram →



and the year of her birth, 1941,

This reminds her that the code is a sequence of five perfect squares (square numbers) in ascending order where the mean = 19, median = 4 and mode = 1.

Find the combination.

- J3.** My petrol tank was a quarter full when I pulled into the petrol station. I put in £22.50 worth of petrol and noticed that the tank was now two thirds full. The cost was £1.20 per litre.

What is the capacity of the petrol tank?

- J4.** A victorious football team in an open-top bus is scheduled to leave the home ground and arrive at the town hall at 11 am. If the bus travels at 15 mph it will arrive 8 minutes early. However if it travels at 10 mph it will arrive 8 minutes late. At what speed must it travel to arrive at 11 am exactly?

- J5.** (a) Adam has a five-digit number

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When he places a 1 at the end of this number it becomes a six-digit number three times as large as the number he obtained when he places a 1 at the start.

Find the five-digit number.

- (b) If you added a 1 in the same way to a 3-digit number how many times as large would it have to be?

END OF PROBLEM SET 1