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.

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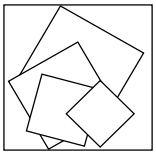
Primary Division: Problems I

P1.1. 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?

P1.2. 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.

P1.3. Fiona and Peter enjoy playing the game Snakes and Ladders.
In one game they noticed that after they had both thrown twice they were both at the foot of the same ladder which took them to square 53.

After two more throws each, they both arrived at the head of a snake and moved down to square 4.

Each time, they threw completely different numbers. The total of the first two throws was 4 more than the total of the second two throws. Also, in the four throws, Fiona did not roll the same number more than once and neither did Peter.

Which numbered square was at the foot of the ladder and which square was at the top of the snake?

END OF PROBLEM SET I