

The Scottish Mathematical Council

www.scot-maths.co.uk

MATHEMATICAL CHALLENGE 2017-2018

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

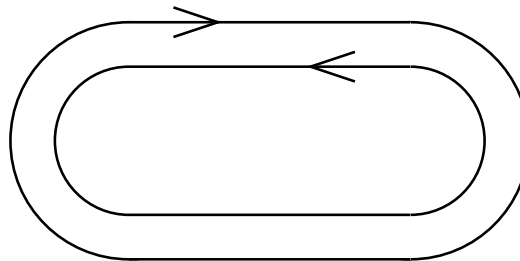
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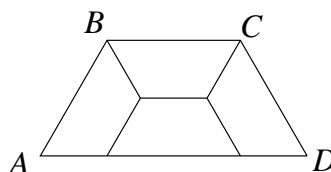
Junior Division: Problems 2

J1.



Trains on the Glasgow Subway depart every 4 minutes, and a complete circuit takes 24 minutes. Ewan sets off at 8.30 am on a train round in one direction at the same time as another train leaves in the opposite direction. How many trains will he pass on a complete circuit back to his starting station? (Do not count trains at the start or end station.)

- J2.** Some people think it is unlucky if the 13th day of a month falls on a Friday. Show that in every calendar year (non-leap or leap) there will always be at least one such unlucky Friday but that there can be no more than three.
- J3.** Three energy saving improvements are advertised to save 25%, 55% and 20% of the energy used. A homeowner makes these three improvements in succession. What overall percentage saving can be expected?
- J4.** A strange announcement was made on the radio about a local election with three candidates: Mrs Allan, Mr Baxter and Ms Campbell.
“Mrs Allan beat Mr Baxter by one eighth of the total votes cast.
Mr Baxter beat Ms Campbell by a seventh of the total votes cast.
The votes cast for Mrs Allan was 350 fewer than 3 times Ms Campbell's votes.”
How many votes did each candidate get?
- J5.** A trapezium $ABCD$ is split into four identical trapezia as shown below.



Given that AB has length 6 cm, find the area of $ABCD$.

END OF PROBLEM SET 2