The Scottish Mathematical Council

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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
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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Junior Division: Problems 1

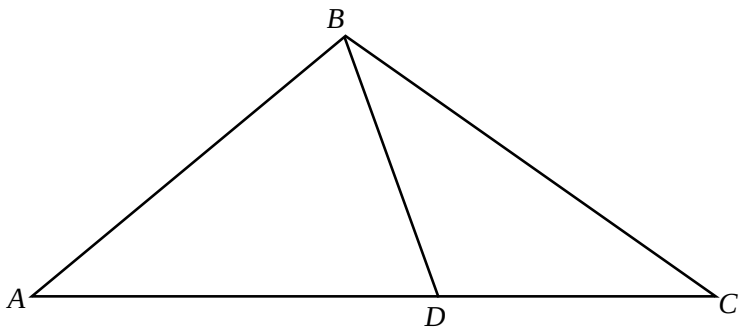
J1. In our local town we still have a grocer, newsagent, butcher and baker and they have shops next to each other. They are all members of the local golf club and their names are Alan, Bill, Colin and David (not, perhaps, in this order).

Colin and David shave themselves whereas the baker prefers to go to the barber's across the way. David and Alan often play golf with the newsagent and the baker. David's shop is next to the butcher's.

One of the men has a beard. What is his occupation?

J2. Jonas travels 26 miles in 3 hours, partly on foot and partly by bike. He walks at 4 mph and cycles at 12mph. For what length of time does Jonas walk? How far does he cycle?

J3.



In the diagram $AB = BC = AD$ and $\angle BAD = 20°$.
Find $\angle CBD$.

J4. Two fractions are equally spaced between $\frac{1}{4}$ and $\frac{2}{3}$ on a number line. What are the two fractions?

J5. The value of 50! is the product of all the whole numbers from 1 to 50 inclusive, i.e.

$$50! = 1 \times 2 \times 3 \times 4 \times \ \ldots \ \times 49 \times 50.$$

Find how many times 2 will divide 50!.

END OF PROBLEM SET 1