

The Scottish Mathematical Council

www.scot-maths.co.uk

MATHEMATICAL CHALLENGE 2025–2026

Golden Jubilee Year

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,

The London Mathematical Society and The Scottish International Education Trust.

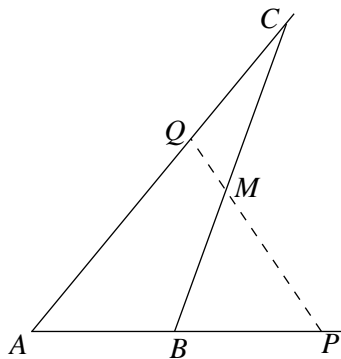
The Scottish Mathematical Council is indebted to the above for their generous support and gratefully acknowledges financial and other assistance from schools, universities and education authorities.

Particular thanks are due to the Universities of Aberdeen, Edinburgh Napier, Moray House, St Andrews, Stirling, Strathclyde and to George Heriot's School and Gryffe High School.

Senior Division: Problems 2

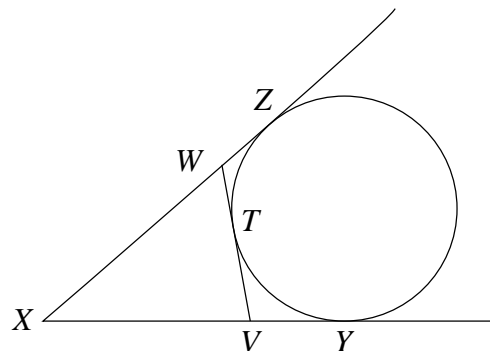
- S1.** In triangle ABC , angle B is twice angle A . Suppose that $BC = a$, $AC = b$ and $AB = c$. Prove that $a(a + c) = b^2$.
- S2.** If $2x^2 - 2xy + y^2 = 289$ where x and y are integers and $x \geq 0$, find all ordered pairs (x, y) which satisfy this equation.
- S3.** In triangle ABC , $BC = a$, $AC = b$ and $AB = c < \frac{1}{2}(a + b)$. Prove that $\angle ACB < \frac{1}{2}(\angle BAC + \angle ABC)$.

S4.



In the diagram, $AB = 6$, $BC = 14$, $AC = 16$, and M is the midpoint of BC . Various lines can be drawn through M , cutting AB (possibly extended) at P and AC (possibly extended) at Q . Determine, with proof, the minimum possible perimeter of triangle APQ .

You may find the following result helpful:



In the diagram, the circle is tangent to XY at Y , to XZ at Z and to VW at T . The perimeter of triangle VXW is independent of the position of T along the minor arc YZ .

SEE OVER FOR QUESTIONS S5.



Mathematical Challenge Problems 2

SENIOR DIVISION 2025-2026

PLEASE USE CAPITALS TO COMPLETE

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— — — — - **CUT ALONG HERE** — — — —

Please write your solutions on A4 paper and staple the above form to them.

PLEASE WRITE YOUR NAME ON EVERY PAGE.

Send your entry through your school to the section organiser.

For further information on the competition, please see the School Materials which have been distributed to schools. A copy of these Materials can be obtained from

<http://www.wpr3.co.uk/MC/materials/index.html>

There are separate links for primary and secondary schools. This page also includes a list of authorities in each section and names and addresses of section organisers.

Senior Division: Problems 2 continued

- S5.** A six digit number is such that the number formed by the last three digits is 4 more than the number formed by the first three digits. For example 345349. Note that a four or five digit number can be padded with leading zeros: for example $008012 = 8012$ or $012016 = 12016$.
Find, showing your method, all such numbers which are also perfect squares.

END OF PROBLEM SET 2

CLOSING DATE FOR RECEIPT OF SOLUTIONS :

27 FEBRUARY 2026

For information about Mathematical Challenge, look on the MC web site: www.scot-maths.co.uk

LINKS TO THE MATHS CHALLENGES ARCHIVES

There are archives of previous questions on: www.wpr3.co.uk/MC-archive/S/index-S.html