

## Student Problems

Students up to the age of 19 are invited to send solutions to either or both of the following problems to Agnes Bokanyi-Toth, School of Science Reception, Schofield Building, Loughborough University, Loughborough, LE11 3TU.

**No solutions were received the problems posed in March. Since this may be due to pressure of school work, I think it is sensible to repeat these.**

Two prizes will be awarded – a first prize of £25, and a second prize of £20 – to the senders of the most elegant solutions for either problem. It is not necessary to submit solutions to both. Solutions should arrive by 13th September 2025 and will be published in the November 2025 issue of the *Gazette*.

The Mathematical Association and the *Gazette* comply fully with the provisions of the 2018 GDPR legislation. Submissions **must** be accompanied by the SPC permission form which is available on the Mathematical Association website

<https://www.m-a.org.uk/the-mathematical-gazette>

*Note that if permission is not given, a pupil may still participate and will be eligible for a prize in the same way as others.*

### Problem 2025.1 (S. N. Maitra)

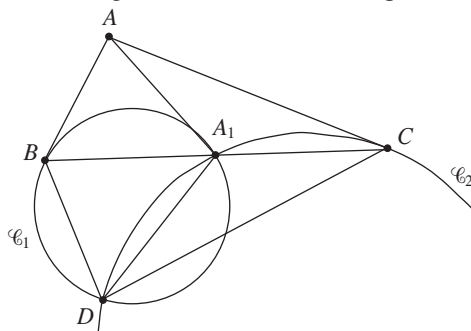
Given that

$$5a^2 + 5b^2 + 10c^2 + d^2 - 4ab - 4bc - 6cd = 4.$$

Determine the solutions where  $a, b, c, d$  are all distinct positive integers.

### Problem 2025.2 (Gerry Leversha)

Let  $\triangle ABC$  be a triangle in which  $A_1$  is the midpoint of  $BC$ .



Circle  $\mathcal{C}_1$  through  $A_1$  is tangential to  $AB$  at  $B$ , and circle  $\mathcal{C}_2$  through  $A_1$  is tangential to  $AC$  at  $C$ . Circles  $\mathcal{C}_1$  and  $\mathcal{C}_2$  meet again at  $D$ . Prove that

$$A_1A \times A_1D = A_1B \times A_1C.$$

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