

UVic Mathematics Competition

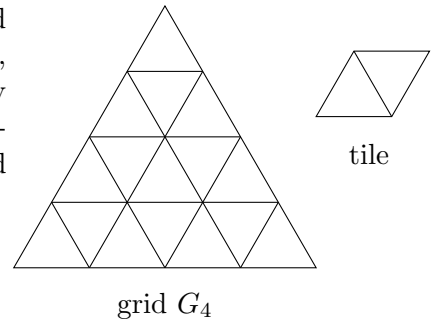
October 6, 2026



- No calculators, books or notes are allowed.
- Write solutions in the booklets provided. Clearly separate rough work from solutions.
- All the necessary work to justify an answer and all the necessary steps of a proof must be shown clearly to obtain full credit.
- Partial credit will be given only for substantial progress toward a solution.
- All questions are of equal value.

Duration: 2 hours

Question 1. Consider a grid G_n of n^2 unit triangles, as illustrated in the diagram for $n = 4$. A tile, shown on the right, may be placed (in any orientation) so as to cover exactly two adjacent unit triangles in G_n . Show that any arrangement of non-overlapping tiles in G_n leaves behind at least n uncovered triangles.



- Question 2.** Determine all positive integers n for which $n^2 - 7n + 14$ divides $n^3 - 5n^2 + 36$.
- Question 3.** The vertices of a hexagon $ABCDEF$ all lie on a unit circle with centre O and satisfy $\angle AOB = \angle COD = \angle EOF = 90^\circ$. Determine the maximum possible area of the hexagon.
- Question 4.** Let t be a real number with $t > 1$ and which is NOT an integer. Show that there exists a positive continuous function $f : [0, t] \rightarrow \mathbb{R}_+$ satisfying

$$\frac{1}{t} \int_0^t f(x) dx > \int_s^{s+1} f(x) dx$$

for every s with $0 \leq s \leq t - 1$.