Tiebreaker, Division B

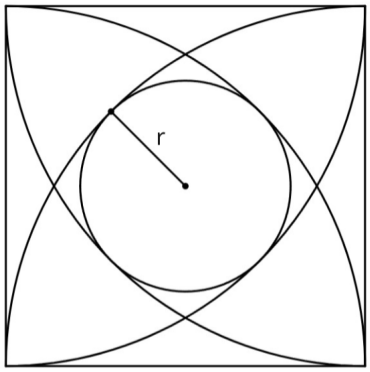
Gunn Math Competition 2026

Instructions and Format

- This round contains 3 short-answer questions to be solved in 15 minutes individually. You may not discuss these problems during the 15 minutes
- Each problem is worth slightly more points than previous problems, but this is only as a tiebreaker between competitors who solve the same number of problems.
- If two competitors have solved the exact same problems, the person who submitted their last answer before is favoured.
- If multiple competitors get 0 problems correct, they are tied with no further tiebreakers.
- All answers are integers between 0 and 999, and so responses must be integers in that range.
- You will be given reminders about the time you have remaining at the 10, 5, 2, and 1 minute mark. At the end, stop immediately after you are told to.
- NO CALCULATORS (or abaci). Protractors, rulers, and compasses are permitted. Do not cheat in any way. When caught, you will be blacklisted from the competition.
- Thank you to our sponsors. Without them, we would never have been able to make this event possible.

1. Four quarter circles of radii 1 are centered at $(0,0), (1,0), (0,1)$, and $(1,1)$ and are entirely contained in the square region satisfying $0 < x, y < 1$ as shown in the diagram. A circle of radius r is inscribed in the region bounded by the four arcs. Compute

$$\lfloor 100r \rfloor.$$



2. Compute

$$\left\lfloor \frac{2026^3 - 1027^3 - 999^3}{5130 \times 4052} \right\rfloor.$$

3. Let $A = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$. Let $f(n)$ be a function that takes in an input from A and outputs a value in A. How many such function $f(n)$ exist such that $f(f(n)) \equiv n^3 \pmod{10}$ for all possible n?