Individual Test, Division B

Gunn Math Competition 2026

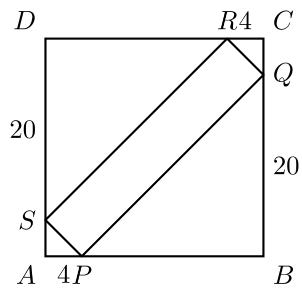
Instructions and Format

- This round contains 10 short-answer questions to be solved in 60 minutes, by yourself. This means that you are not allowed to discuss these problem with anyone outside of your team until Lunch.
- Each problems is worth more points that the previous problems, but not by a significant amount, so be mindful of where you spend your time.
- All answers are integers between 0 and 999, and so answers must be integers in that range.
- You will be given reminders about the time you have remaining. At the end, stop immediately after you are told to.
- Only answers written inside the boxes on the answer sheet will be considered for grading. You will **not** be given additional time to write answers on the answer sheet after the 60 minutes is up.
- 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 and will not be able to participate for the rest of the day.
- Thank you to our sponsors. Without them, we would never have been able to make this event possible.

1. Let $a \oplus b = ab - a + b$. What is the value of

$$(((((7 \oplus 6) \oplus 5) \oplus 4) \oplus 3) \oplus 2) \oplus 1?$$

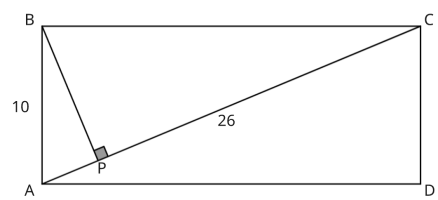
2. Square $ABCD$ has side length 24. Point P is on AB such that $PA = 4$, point Q is on BC such that $QB = 20$, point R is on CD such that $RC = 4$, and point S is on DA such that $SD = 20$. What is the area of the region outside rectangle $PQRS$ but inside square $ABCD$?



3. How many odd numbers under 10000 have all their digits as prime numbers $(2, 3, 5,$ or $7)$?

4. Neil is taking 5 classes and there are 7 class periods in the day. Neil will be happy if his 2 free periods are consecutive or if at least 1 free period is the first or last period. Neil's counselor chooses Neil's 2 free periods at random. Let P denote the probability that Neil will be happy. Compute the greatest whole number less than 1000 times P.

5. In rectangle $ABCD$, diagonal AC has length 26. A point P lies on segment AC such that BP is perpendicular to AC. If $AB = 10$, the length BP is in the form $\frac{m}{n}$, where m and n are relatively prime positive integers. Find $m + n$.



6. For a sequence where $a_1 = 1$, and

$$a_{n+1} = \frac{a_n}{1 + n \cdot a_n}$$

for $n \geq 1$, find the value of $\frac{1}{a_{26}}$.

7. On the moon of Titan, instead of taking the AMC they take the TMC (Titan Math Competition), with 30 questions instead of 25. Their scoring system is also different, as they use the old system. In that system, a correct answer is worth 6 points, an incorrect one is worth 0, and if a question is left blank, 2.5 points are given. How many total scores are possible?

8. Let a, b, and c be distinct values of x that satisfy $x^3 - 6x - 7 = 0$. Compute

$$-a^4b - ab^4 - b^4c - bc^4 - c^4a - ca^4.$$

9. How many triangles have integer side lengths that form an arithmetic sequence with all side lengths under 67? Note that an equilateral triangle counts.

10. Suppose we have two circles of radii n and $n + 1$ for integer n that are externally tangent at point P. There is another common tangent line to the circles at point Q and S respectively. Compute the minimum n for which the area of the circumcircle of $\triangle PQS$ is greater than 10000.