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LMT Spring 2026 Guts Round - Set 1

Team Name: _____

- _____ 1. [6] Find $2^0 + 2^6 - 2 - 0 - 2 + 6$.
- _____ 2. [6] Let (a, b, c, d) be a permutation of $(2, 0, 2, 6)$. Given that the distance between (a, b) and (c, d) is an integer, find the distance.
- _____ 3. [6] There are lily pads in a row numbered 1 to 67, with a frog sitting on pad 1. The frog can jump 6 pads forward or 7 pads backward if a pad exists at the target destination. Find the minimum number of jumps needed for the frog to reach pad 4.
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LMT Spring 2026 Guts Round - Set 2

Team Name: _____

- _____ 4. [8] For each positive integer n , let $f(n)$ be the sum of the n consecutive numbers beginning with n . For example, $f(2) = 2 + 3 = 5$. Find $f(2026) - f(2025)$.
- _____ 5. [8] The number 509 satisfies the property that its representation in base-4 reads the same forwards and backwards. Find the smallest number greater than 509 which also satisfies this property.
- _____ 6. [8] Inside a drawer in a dark room, there are 2023 red beads, 2024 white beads, 2025 blue beads, and 2026 yellow beads. Find the minimum number of beads that must be drawn to guarantee drawing at least 1014 beads of a single color.
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LMT Spring 2026 Guts Round - Set 3

Team Name: _____

- _____ 7. [10] A random factor of 10206 is chosen. Find the probability that it is less than 101.
- _____ 8. [10] In the addition shown below, $A, B, C, D, E, F, G,$ and H are distinct nonzero digits.

$$\begin{array}{rcccccc} & A & B & C & D & & \\ + & E & F & G & H & & \\ \hline 1 & 1 & 1 & 1 & 1 & & \end{array}$$

Find the unique nonzero digit that is not used.

- _____ 9. [10] Nonzero real numbers x and y satisfy the following system of equations:

$$\begin{aligned} x + y &= 20, \\ \frac{1}{x} + \frac{1}{y} &= \frac{1}{26}. \end{aligned}$$

Find the value of $(x + 1)(y + 1)$.

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LMT Spring 2026 Guts Round - Set 4

Team Name: _____

- _____ 10. [12] In isosceles trapezoid $ABCD$ with $AB = CD = 1$, $BC = 3$, and $AD \parallel BC$, let M be the midpoint of diagonal BD . If $\angle ABC = 120^\circ$ and lines AM and BC intersect at E , find the area of quadrilateral $ABED$.
- _____ 11. [12] A restaurant has ten dishes on its menu. Ben will select three dishes to eat, and he is allowed to select the same dish more than once. Find the number of distinct groups of dishes can Ben choose to eat. Two groups of dishes are considered distinct if and only if some dish is ordered in different quantities between the two groups.
- _____ 12. [12] Find the value of

$$N = 10497^2 \cdot 2 - 14845^2$$

given that N is between -9 and 9 , inclusive.

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LMT Spring 2026 Guts Round - Set 5

Team Name: _____

- _____ 13. [14] A circle with center O has radius 3. Segment AB , of length 8, is tangent to the circle at point A . Let M be the midpoint of AB . Let P be the intersection of segment MO and the circle. Find the area of $\triangle BMP$.
- _____ 14. [14] Let $N = 121212$. The number n is formed by replacing 3 digits of N with a 9. Find the maximum possible value of $\gcd(n, N)$.
- _____ 15. [14] Find the value of
- $$\frac{377^2 + 89^2}{144^2 + 233^2}.$$
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LMT Spring 2026 Guts Round - Set 6

Team Name: _____

- _____ 16. [16] Two distinct four digit team IDs (without leading zeros) are *similar* if two adjacent digits in one number can be swapped to become the other. For example, 1234 is similar to 1324. LMT doesn't want any pair of team IDs to be similar. Estimate the maximum number of teams LMT can have. If the true answer is A and your answer is E , you will earn $\lfloor 16 \min\left(\frac{A}{E}, \frac{E}{A}\right)^{10} \rfloor$ points.
- _____ 17. [16] Your team will pick an integer from 0 to 16 inclusive, and if you picked x , you earn $\max(x - 3t, 0)$ points, where t is the number of teams other than your team that also picked x . Your answer should be an integer between 0 and 16, inclusive.
- _____ 18. [16] A prime minister oversees 100 households in a line, each having 1 or 2 people with $\frac{1}{2}$ probability. Let M be the maximum number of consecutive regions the households can be divided into so that the population of each region is prime. Estimate the expected value of M . If the true answer is A and your answer is E , you will earn $\max(0, \lfloor 16 - 2|E - A| \rfloor)$ points.
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LMT Spring 2026 Guts Round - Set 7

Team Name: _____

- _____ 19. [18] Let a, b, c be numbers satisfying
- $$\begin{aligned} a^6 + b^{2027}c &= 67, \\ b^{2028} + ac &= 7, \\ c^2 + a^3b &= 17. \end{aligned}$$
- Find the sum of all possible values of abc .
- _____ 20. [18] In a regular 200-gon with vertices labelled $P_1P_2 \dots P_{200}$ with consecutive vertices, the lines $P_{11}P_{111}, P_7P_{77}, P_mP_n$ are distinct but concurrent lines. Find the ordered pair (m, n) , given that $m > n$.
- _____ 21. [18] Suppose a, b are integers such that $ab = 420$. Find the sum of all possible values of $\frac{a}{b}$.
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LMT Spring 2026 Guts Round - Set 8

Team Name: _____

_____ 22. [20] For every positive integer k , define

$$a_k = \sqrt{1 + \frac{1}{k^2} + \frac{1}{(k+1)^2}}.$$

Find the value of the sum

$$a_1 + a_2 + \cdots + a_{99} + a_{100}.$$

_____ 23. [20] Find the number of 7-letter words formed by the letters of JEOPARDY (repetition allowed) such that the word JERRY can be obtained by deleting exactly two letters from the words.

_____ 24. [20] The expression

$$\frac{1}{n^4} \sum_{i=1}^n \sum_{j=1}^i \sum_{k=1}^j \sum_{\ell=1}^k 1$$

approaches a real number L as n approaches infinity. Find L .

LMT Spring 2026 Guts Round - Set 9

Team Name: _____

_____ 25. [22] Find the value of

$$\sqrt{4^{2026} + \sqrt{4^{2027} + \sqrt{4^{2028} + \dots}}}$$

_____ 26. [22] Let $ABCD$ be a convex quadrilateral with $AB = CD$ and $AD < BC$. Suppose AB and CD intersect at X and the circles (XAC) and (XBD) intersect along line BC . Given that $BX = 6, CX = 7, BC = 8$, find $AB + CD$.

_____ 27. [22] An interval is formed by selecting two endpoints chosen independently and uniformly at random in the interval $(0, 1)$. Two real numbers are then selected in the interval $(0, 1)$, also independently and uniformly at random. Given that both of these numbers lie within the chosen interval, find the probability that $\frac{2}{3}$ also lies within the chosen interval.

LMT Spring 2026 Guts Round - Set 10

Team Name: _____

The following round is a cyclic round. In the following three problems, let a be the answer to the first problem, b the answer to the second problem, and c the answer to the third problem. It is given that all of these answers are positive integers.

_____ 28. [23] Find the sum of all possible real $x + y$ that satisfy the following system of equations:

$$\begin{cases} by + cx = -5b \\ (x - b)^2 + (y + c + 5)^2 = (bc)^2 \end{cases}$$

_____ 29. [23] Suppose that there is a grid with dimensions $a \times c$, where each cell is black or white. A grid is good if it can be turned into all black by repeatedly toggling 2×2 subgrids. Let N be the number of good grids. Find the sum of the exponents in the prime factorization of N .

_____ 30. [23] Let $ADMITS$ be an equiangular hexagon centered at L such that $\overline{AD} = \overline{IT} = b$ and $\overline{DM} = \overline{MI} = \overline{TS} = \overline{SA} = a$. Given that the area of triangle $\triangle LMT$ can be expressed as $x\sqrt{y}$, where y is squarefree, find $x - y$.

LMT Spring 2026 Guts Round - Set 11

Team Name: _____

- _____ 31. [24] Let P_k denote the probability that Ben will not get any duplicate values when he rolls k fair, 120-sided dice each with faces labeled using the integers from 1 to 120, inclusive. There exists an integer n such that $P_n - P_{n+1}$ is maximized. Find n .
- _____ 32. [24] Let ABC be a triangle with $AB = 1$, $BC = \sqrt{2}$, and $\angle ABC = 90^\circ$. Let point D be on the same side of line AC as B such that $\angle DAC = 90^\circ$ and $AD = AB$. Finally, let line AB intersect the circumcircle of $\triangle ADC$ at a point E different from A . Find the length of BE .
- _____ 33. [24] Find all real numbers k such that

$$20x^4 - 26x^3 + kx^2 - 26x + 20 = 0$$

has exactly three distinct real solutions in x .

LMT Spring 2026 Guts Round - Set 12

Team Name: _____

- _____ 34. [27] For a nonnegative integer n , let $f(n)$ denote the number of ordered pairs of nonnegative integers (a, b) satisfying

$$a^2 + b^2 = n.$$

Estimate the sum of the 10001 terms in the sequence

$$\{f(2026^2 - 5000), f(2026^2 - 4999), f(2026^2 - 4998), \dots, f(2026^2 + 5000)\}.$$

If the true answer is A and your answer is E , you will earn $\left\lfloor 27 \left(\frac{A}{E}, \frac{E}{A}\right)^{67} \right\rfloor$ points.

- _____ 35. [27] You have a 4×4 grid in which you can fill in numbers 1 to 8, using each number exactly twice. A downright path is considered *valid* if the sum of the numbers on the path is prime. The score of a valid path is the sum of the numbers on the path. Estimate the maximum sum of scores over all valid paths on your grid. If the true answer is A and your answer is E , you will earn $\left\lfloor 27 \min\left(\left(\frac{E}{A}\right)^{14}, \left(\frac{A}{E}\right)^{34}\right) \right\rfloor$ points
- _____ 36. [27] Estimate the number of teams that correctly answered Guts 19, of which the answer was 0. If the true answer is A and your answer is E , you will earn $\max(0, \lfloor 27 - 9|E - A| \rfloor)$ points. If you have forgotten, Guts 19 is provided below:

Let a, b, c be numbers satisfying

$$a^6 + b^{2027}c = 67,$$

$$b^{2028} + ac = 7,$$

$$c^2 + a^3b = 17.$$

Find the sum of all possible values of abc .