HMMT November

November 07, 2026

General Round

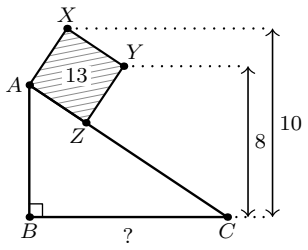
1. Each cell of the following 1×8 grid is labeled with a single-digit positive integer such that any two adjacent cells differ by either 3 or 5. Compute the sum of all eight numbers in the grid.

6	?	8	?	?	7	?	5

2. Suppose m and b are positive real numbers such that the line $y = mx + b$ intersects the parabola $y = x^2$ at two points whose x-coordinates differ by 4 and whose y-coordinates differ by 12. Compute b.

3. Eric the monkey has no bananas. Every morning, Eric may optionally go to the supermarket to buy a single bunch of exactly 5 bananas. Eric may only go to the supermarket 3 times. Every night, Eric must eat 1 banana or else he dies. Compute the number of ways Eric may survive for 15 nights.

4. Square $AXYZ$ with area 13 is placed along hypotenuse $\overline{AC}$ of right triangle ABC. Given that the distances from X and Y to $\overline{BC}$ are 10 and 8 respectively, compute BC.

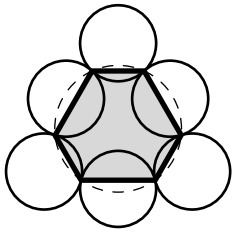


5. Let α be the unique real number such that both $\alpha + \sqrt{\frac{11}{12}}$ and $\alpha^3 + \sqrt{\frac{11}{12}}$ are positive and rational. Compute $\alpha^3 + \sqrt{\frac{11}{12}}$.

6. Let O be the circumcenter of an acute triangle ABC, and let D and E be points on side BC such that $\overline{OD}$ is parallel to $\overline{AB}$ and $\overline{OE}$ is parallel to $\overline{AC}$. Given that $BD = 7$, $DE = 6$, and $EC = 5$, compute AO.

7. In an 11×11 grid of unit squares, rows and columns are indexed consecutively with the integers from 1 to 11. Then, every cell with an even row and column index is deleted. Compute the number of ways to partition the resulting shape into rectangles with integer side lengths.

8. In the diagram, six circles of radius 3 are arranged so that each is tangent to two others. Their tangency points form the vertices of a cyclic hexagon with circumradius 5. Compute the area of this hexagon.



9. Let $a_1, a_2, \ldots$ be a sequence of positive integers such that $a_1 = a_2 = \cdots = a_7 = 1$ and

$$a_n = a_{n-1} + 10a_{n-7} \quad \text{for all } n \geq 8.$$

Compute the remainder when a_{2026} is divided by 10000.

10. The country of HMMTland has 100 cities. Engineers propose a tunnel between every pair of cities and randomly assign the distinct construction costs $1, 2, \ldots, \binom{100}{2}$ to the proposed tunnels, with every assignment equally likely. Each city funds its single cheapest incident tunnel. A tunnel is built if at least one city funds it. If more than one city funds it, it is still built only once. Compute the expected number of connected components in the resulting tunnel system.

(A *connected component* is a maximal nonempty set of cities such that every city in the set is reachable from every other city in the set by traveling through built tunnels.)

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