



Girls in Math 2025 Tiebreaker Round

Name: _____ Team: _____

1. A laser beam is fired in a reflective unit cube with vertices at $(0, 0, 0)$ and $(1, 1, 1)$ and edges along the x , y , and z axes. The laser is fired from the origin and perfectly reflects off every face and edge it hits, only stopping when it hits a vertex of the cube. It first hits a face at $(\frac{5}{7}, \frac{9}{13}, 1)$. How many times does the laser reflect until it hits a vertex?

2. Let $a_1 = 1$, then for all positive integers n , a_n is the sum of all a_m where m is a proper divisor of n or:
 $a_n = \sum_{m < n, m|n} a_m$ (Ex. $a_{12} = a_6 + a_4 + a_3 + a_2 + a_1$). How many values of $n \leq 100$ are there such that $a_n = 3$?

Indiv ID: _____

Team ID: _____

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1. _____

2. _____

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- 10 minutes
- no calculators
- positive integer answers
- ranking will be determined by score, then by time