

2025 SSMO Relay Round 2

SMO Team

RR 2 Part 1: Let (p, q, r) be the real solution to following system:

$$pq = 20$$

$$qr = 25$$

$$r + p = 9.$$

Compute $p^2 + q^2 + r^2$.

RR 2 Part 2: Let $T = TNYWR$. Let x_1, x_2, \dots, x_T be an increasing sequence of positive integers such that for every positive integer $1 \leq n \leq T$, the sum $x_1 + x_2 + \dots + x_n$ is a multiple of n . Find the smallest possible value of $x_T - x_1$.

RR 2 Part 3: Let $T = TNYWR$. Define a *multiplicative partition* of a positive integer n as the value of a product $a_1 a_2 \dots a_k$, where $a_1 + a_2 + \dots + a_k = n$ and every a_i is a positive integer. Let $f(x)$ denote the maximal possible value of a multiplicative partition of x . If the sum of all possible values of $\frac{f(x + \lfloor \sqrt{T} \rfloor)}{f(x)}$ for integers $x > 1$ can be expressed as $\frac{m}{n}$, where m and n are relatively prime positive integers, find $m + n$.