2022 SSMO Relay Round 1

SMO Team

RR 1 Part 1: Suppose a, b, c are distinct digits where $a \neq 0$ such that $\left(\overline{abc}\right)^2 = \overline{bad00}$ where $d = a + b$. Find $a + 2b$.

RR 1 Part 2: Let $T = TNYWR$. Now, let ℓ and m have equations $y = (2+\sqrt{3})x + 16$ and $y = \frac{x\sqrt{3}}{3} + 20$, respectively. Suppose that A is a point on ℓ, such that the shortest distance from A to m is T. Given that O is a point on m such that $\overline{AO} \perp m$, and P is a point on ℓ such that $PO \perp \ell$, find PO^2.

RR 1 Part 3: Let $T = TNYWR$. Now, let ABC a triangle such that $AB = T$, $AC = 100$, and $\angle ABC = 36^\circ$. Find the remainder when the product of all possible values of BC is divided by 1000.