INTEGIRLS Houston: 2022 Fall Math Contest

High School Relay Round 2

1. Anna and Joanna stand 500 meters away from each other. They start running toward each other but get tired and stop when they are 75 meters away from meeting. They then both walk to where Anna was originally standing. If Anna originally starts running at 5 meters per second and stops in 45 seconds, what distance in total do Anna and Joanna travel?

2. Let $T = TNYWR$ (The Number You Will Receive). What is the tens digit of 4^T?

3. Let $T = TNYWR$ (The Number You Will Receive). Consider that there is a set of numbers S that consists of one 1, two 2's, and three 3's, all the way up to $T-3$ of $(T-3)$'s. If the components of set S are arranged in a circle, and the probability of the two 2's being next to each other in simplest form is $\frac{a}{b}$, what is $a+b$?

4. Let $T = TNYWR$ (The Number You Will Receive). ABC is a triangle where the the median extending from A meets CB at a point M such that $\overline{\text{AM}} = \overline{\text{AB}}$. If the altitude from CB to A and segment AM trisect $\angle BAC$ such that $\angle CAM = 15°$, considering that $\overline{\text{AB}} = T \pmod{13}$ and the length of CB can be expressed as $a(\sqrt{b} - \sqrt{c})$ in simplest form, what is $a + b +$ c?