Part I.   **ALGEBRA I**   *Time Limit: 10 minutes*
The word "compute" calls for an exact answer in simplest form.

2 - 1. In a family are some boys and girls. Each boy has as many sisters as brothers. Each girl has three times as many brothers as sisters. Compute the number of children in the family.

2 - 2. Given that $x - y = 8$, $x + y = 2\sqrt{21}$, and $xy = 5$, compute the value of $x^2y - xy^2$.

Part II.   **GEOMETRY**   *Time Limit: 10 minutes*
The word "compute" calls for an exact answer in simplest form.

2 - 3. The line with equation $20x + 15y = 2016$ passes through N lattice points (points whose coordinates are both integers) in the first quadrant. Compute N.

2 - 4. A cross section of a sphere 7 cm from the center of the sphere has an area of 9π square cm. Compute the surface area of the sphere in square cm.

Part III.   **ALGEBRA II / ADVANCED TOPICS**   *Time Limit: 10 minutes*
The word "compute" calls for an exact answer in simplest form.

2 - 5. Compute the number of prime natural numbers that are 5 more than the cube of a prime.

2 - 6. Suppose $f(x, y) = x + \dfrac{1}{y}$. If $\dfrac{f(x, y)}{f(y, x)} = \dfrac{8}{5}$ and $x - y = 3$, compute the ordered pair of integers (x, y).

Contest #2.   **TEAM ROUND**   **Calculators are not permitted on this contest.**

T-1. Compute the number of positive integer factors of 2016.

T-2. Given rectangle $ABCD$ and point P in the interior of $ABCD$. If $PA = 7$, $PB = 15$, and $PC = 24$, compute PD.

T-3. In a box are 2 red stickers, 4 white stickers, and 6 blue stickers. Six stickers are chosen at random without replacement. Compute the probability that the six are 1 red, 2 white, and 3 blue.