Time limit: 15 minutes.

Instructions: This tiebreaker contains 3 short answer questions. All answers must be expressed in simplest form unless specified otherwise. You will submit answers to the problem as you solve them, and may solve problems in any order. You will not be informed whether your answer is correct until the end of the tiebreaker. You may submit multiple times for any of the problems, but **only the last submission for a given problem will be graded**. The participant who correctly answers the most problems wins the tiebreaker, with ties broken by the time of the last correct submission.

No calculators.

1. How many ways are there to choose positive integers x and y such that the lowest common multiple of x and y is 216?

2. Consider tangent circles γ_1 and γ_2 with centers O_1, O_2 and radii R, r with $r < R$, respectively. Let $\overline{AB}$ be a common external tangent of length 16. The area of ABO_1O_2 is 160. Find the ordered pair (r, R).

3. Consider the set of odd integers $S = \{1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21\}$. Let $\wp(S)$ denote the set of subsets of S. Given $T \in \wp(S)$, we define to α_T to be the sum of the elements of T. Compute $\sum_{T \in \wp(S)} \alpha_T$.