

CONNECTICUT STATE ASSOCIATION OF MATH LEAGUES
State Math Match, 2024

Please write your answers on the answer sheet provided.

Round 1: Arithmetic and Number Theory

- 1-1 For any positive integer n , let $p(n)$ be the number of distinct prime numbers that divide n . For example, $p(12) = 2$, since the only prime numbers that divide 12 are 2 and 3. Find $p(2024^2)$.
- 1-2 Annabel is on an 8-day cycle in which she works 7 consecutive days, then gets 1 rest day. Boris is on a 6-day cycle in which he works 5 consecutive days, then gets 1 rest day. There are 366 days this year. If they start working on January 1st, how many rest days will they have together this year?
- 1-3 Let $S = \{2^0, 2^1, 2^2, \dots, 2^{n-1}\}$, where $30 \leq n \leq 35$. Let T be a subset of S such that the sum of the elements of T is exactly $\frac{1}{5}$ of the sum of the elements of S . How many numbers are there in the set T ?