

MATH FIELD DAY 2017

RELAY A

A1. Find the number of real-valued solutions to the equation $x^2 + 4 = 0$.

A2. Let k be the number you receive. Find the largest two-digit number whose digits' difference equals k .

A3. Let k be the number you receive. Find the number of distinct prime factors of k .

A4. Let k be the number you receive. Find the remainder when $x^3 - 7x + 1$ is divided by $x + k$.

A5. Let k be the number you receive. Find the smallest positive integer y such that $k + y$ is a perfect square number.

B1. Find the slope of the line passing through the points $(-3, -10)$ and $(-1, 2)$.

B2. Let k be the number you receive. Find the number of negative solutions to the equation $|x + 8| = k$.

B3. Let k be the number you receive. Find the area of the triangle enclosed by the two coordinate axes and the line

$$\frac{x}{2k-1} - \frac{y}{k} = 1.$$

B4. Let k be the number you receive. Find the solution to $(k+1)^x = (3k-1)^{x+1}$.

B5. Let k be the number you receive. Find the y -intercept of the line $(k-1)x - (2k+1)y + 20 = 0$.

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RELAY C

C1. Find the greatest solution to the equation $|1 - x^2| = 8$.

C2. Let k be the number you receive. Find the smallest positive integer with exactly k different factors.

C3. Let k be the number you receive. Find the slope of the line through the points $(k - 2, k + 1)$ and $(8 - k, k^3 - 1)$.

C4. Let k be the number you receive. Find the square root of $k + 7$.

C5. Let k be the number you receive. Find the number of positive integer factors of $k + 10$.

1. 3

2. 4

3. 29

4. 6

5. 5

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RELAY D

D1. Find the cube root of 729.

D2. Let k be the number you receive. Find the number of positive solutions to the equation

$$x^2 + (7 - k)x + (73 - k^2) = 0.$$

D3. Let k be the number you receive from the front, and j be the number you receive from the back. Find the greatest solution to the equation $x^2 - (k^2 + j)x + (5k + 16) = 0$.

D4. Let j be the number you receive. Find $j^3 + 1$.

D5. Find the largest prime factor of 1024.