

MATH FIELD DAY 2007
RELAY A

- A1. Solve the equation: $\ln(x - 7) = 0$
- A2. Let k be the number you receive. Find the radius of a circle whose circumference is $k\pi$.
- A3. Let k be the number you receive. Find the number of rational solutions of the equation $x^{k-1} = 4kx$.
- A4. Let k be the number you receive. Find the slope of the line passing through the points $(k, k + 1)$ and $(k - 1, 2k)$.
- A5. Let k be the number you receive. How many prime numbers will be less than or equal to k ?

1. 8

2. 4

3. 3

4. -2

5.

0

RELAY B

- B1. Find the length of the line segment connecting two points $(2,1)$ and $(-1,-3)$.
- B2. Let k be the number you receive. Find the absolute value of the difference of the two solutions of the equation $x^2 = (k + 4)$.
- B3. Let k be the number you receive. Find the sum of all positive factors of k (including 1 and k).
- B4. Let k be the number you receive. Find the x -intercept of the line through $(k - 11, k)$ with slope 2.
- B5. Let k be the number you receive. Simplify the expression $\frac{|k - 1|}{k^2 + 2k - 9}$.

1.

5

2.

6

3.

12

4.

-5

5.

1

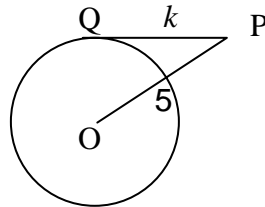
RELAY C

C1. Find x :

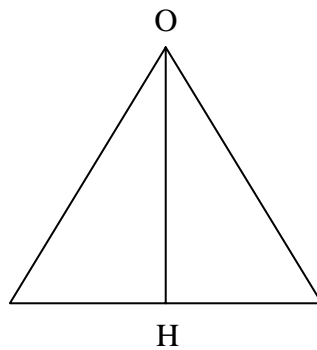
1 1 2 3 5 x 13 21

C2. Let k be the number you receive. Find the positive root of the equation
 $x(x - 2) = k$.

C3. Let k be the number you receive. Find the radius of the circle in this figure where $OP = 5$ and $PQ = k$. The circle has center O and tangent PQ .



C4. Let k be the number you receive. Find the length of a side of an equilateral triangle with height $OH = \sqrt{k}$.



C5. Let k be the number you receive. Find x :

$$\frac{1}{x} \cdot \frac{x}{y} \cdot \frac{y}{k} = \frac{1}{x^3}$$

1. 8 2. 4 3. 3 4. 2 5. $\sqrt[3]{2}$

RELAY D

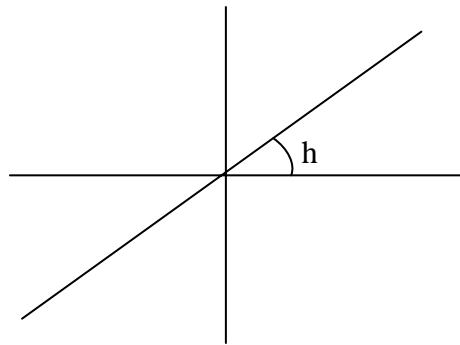
D1. Find the area of a square with diagonal $\sqrt{2}$.

D2. Let k be the number you receive. Find the k -th prime number.

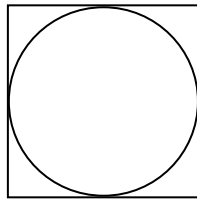
D3. Let k be the number you receive from the front, and h be the number you receive from the back. Find the positive root of the equation.

$$x(x - h) = k$$

D4. Let h be the number you receive. Find the slope of the line with the angle of inclination h radians:



D5. For the given figure, find the ratio of the area of the circle over the area of the square:



1. 1 2. 2 3. 2 4. 1 5. $\frac{\pi}{4}$