

MATH FIELD DAY 2004 RELAYS

Relay A

A1. Find the slope of the line $6x - 3y - \sqrt{2} = 0$.

A2. Let k be the number you receive. Find the sum of $12k + 11k + \cdots + 2k + k$.

A3. Let k be the number you receive. Find the largest integer n such that $4n^5 < k$.

A4. Let k be the number you receive. Find the area of the right triangle with one leg of length k and the other of length $k + 2$.

A5. Let k be the number you receive. Find the y -coordinate of the point where the line of slope k through the point $(1, 2)$ intersects the line $x = 3$.

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Relay B

B1. Find x if $\frac{4}{2^x} = 8$.

B2. Let k be the number you receive. Find the value of $(k + 2)(k^2 - 2k + 4)$.

B3. Let k be the number you receive. Find the larger of the two consecutive integers whose sum is k .

B4. Let k be the number you receive. Find the radius of a circle whose area is $k\pi$.

B5. Let k be the number you receive. Find the x -value of the solution of the system:

$$\begin{cases} 6x + 4y = k \\ y - x = 4k \end{cases}$$

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Relay C

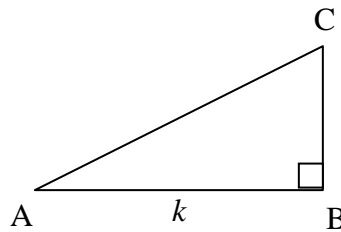
C1. In how many different ways can we arrange three objects in a row?

C2. Let k be the number you receive. Suppose there are k people, labeled with the numbers 1, 2, ..., k , sitting clockwise around a circle. If we start counting clockwise from person 1, what is the label of the 45th person counted?

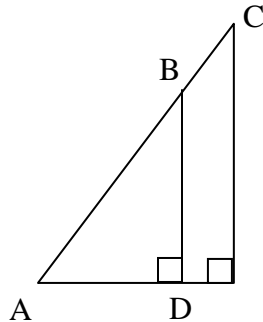
C3. Let k be the number you receive. Calculate the following:

$$\frac{\frac{1}{\frac{1}{k-1} - \frac{1}{k+1}}}{1}$$

C4. Let k be the number you receive. In the following figure, $AB = k$, $\angle ABC = 90^\circ$, and $\frac{BC}{AB} = \frac{3}{4}$. Find AC .



C5. Let k be the number you receive. In the following figure, $AB = k$, $BD = 4$, and $DE = 1$. Find CE .



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Relay D

- D1. Find the area of an isosceles right triangle whose hypotenuse has length $\sqrt{10}$.
- D2. Let k be the number you receive. If a rectangle's length is 2 more than its width and the rectangle has an area of $6k$, find the rectangle's width.
- D3. Let k be the number you receive from the front and m be the number you receive from the rear. If Fran can paint a room in k days and Ollie can paint a room of equal size in m days, how many days will it take the two of them working together to paint 5 rooms?
- D4. Let k be the number you receive. If the quadratic equation $x^2 + bx + c = 0$ has k and -11 as roots, find b .
- D5. How many CDs can you buy from an online store if you have \$100 to spend, the CDs cost \$9.99 apiece, and there is a fixed shipping cost of \$6.95 for any order?