MATH FIELD DAY 2008

Relay A

A1. Find the sum of the coordinates of the point of intersection of the lines with equations $x-2y=6$ and $x+y=5$.

A2. Let k be the number you receive. Find the area of the region that remains when a circle of radius 3 is cut out of a circle of radius $4+k$.

A3. Let k be the number you receive. Find the positive solution of the equation $(x+5)(x+6)=k/\pi$.

A4. Let k be the number you receive. Find the x-intercept of the line with equation $\frac{x}{k}+\frac{y}{2k}=1$.

A5. Let k be the number you receive. Mary is $3k$ years older than Tom. In k years, she will be twice as old as Tom is then. How many years old is Tom now?

1. 5 2. 72π 3. 3 4. 3 5. 6

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Relay B

B1. Find the y-coordinate of the point in the first quadrant where the line $x + y = 5$ intersects the parabola $y = x^2 + 2x + 1$.

B2. Let k be the number you receive. If the length of a rectangle is k more than its width and the area of the rectangle is 96, find the rectangle's width.

B3. Let k be the number you receive. Find the largest two-digit number whose digits sum to k.

B4. Let k be the number you receive. Find the smallest positive integer x such that kx is a perfect square.

B5. Let k be the number you receive. Find the area of an isosceles right triangle whose legs have length $2k$.

1. 4 2. 8 3. 80 4. 5 5. 50

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Relay C

C1. Find area of the triangle in the first quadrant whose edges lie on the coordinate axes and the line $2x+3y=6$.

C2. Let k be the number you receive. Find the negative solution of the equation $|2x+1|=k$.

C3. Let k be the number you receive. Find the x-coordinate of the vertex of the parabola with equation $y=x^2-2kx+5$.

C4. Let k be the number you receive. Simplify $\dfrac{1}{1+\dfrac{1}{k+1+\dfrac{1}{k+1}}}$

C5. Let k be the number you receive. If the area of a circle is k square units, how many units long is the radius?

1. 3 2. -2 3. -2 4. 2 5. $\sqrt{2/\pi}$

MATH FIELD DAY 2008

Relay D

D1. Given that $f(x+1) = 2x^2 + 5x - 1$, find $f(-2)$.

D2. Let k be the number you receive. Find the slope of the line passing through (1, 1) and (k, 4).

D3. Let x and y be the numbers you receive from the front and the back. Simplify $(x^{-1} + y^{-1})^{-1}$.

D4. Let k be the number you receive. Find the radius of the circle $x^2 + y^2 - 4x - 6y = 8 - k$.

D5. Find the remainder when $p(x) = x^4 + 3x^2 - x$ is divided by $x + 1$.

1. 2 2. 3 3. 12/7 4. 4 5. 5