

MATH FIELD DAY 2016
RELAY A

A1. Find the smallest positive integer x such that the square root of $480 + x$ is an integer.

A2. Let k be the number you receive. Find the larger solution to the equation

$$x^2 - x = k^2 + k.$$

A3. Let k be the number you receive. Find the product of the two zeros of the quadratic polynomial

$$x^2 - (k + 2)x + 2k.$$

A4. Let k be the number you receive. Consider the function $f(x) = x^2$ for all x . Solve for r :

$$f(r - k) = f(r).$$

A5. Let k be the number you receive. Find the largest x -coordinate of any point on the circle

$$x^2 - 2x + y^2 = k^2 - 1.$$

MATH FIELD DAY 2016
RELAY B

B1. Find the radius of the circle $x^2 + y^2 - 2y - 3 = 0$.

B2. Let k be the number you receive. If a right triangle has hypotenuse of length $k^2 + 1$ and a leg of length $k^2 - 1$, find the length of the other leg.

B3. Let k be the number you receive. Find the x -intercept of the line of slope $1 - k$ with y -intercept $k^2 - 1$.

B4. Let k be the number you receive. If 1 drok equals k yorts and $k - 2$ yorts equal a flurp, how many droks equals k flurps?

B5. Let k be the number you receive. The hypotenuse of a right triangle has length $k\sqrt{5}$ and one leg is twice the other. Find the area of the triangle.

MATH FIELD DAY 2016
RELAY C

C1. How many positive integers are factors of 154? Include 1 and 154.

C2. Let k be the number you receive. Evaluate

$$\frac{k^2 + k^{-1}}{k + k^{-2}}.$$

C3. Let k be the number you receive. Evaluate

$$||2 - k| - 2k|.$$

C4. Let k be the number you receive. A line through the point $(1, k)$ has x - and y -intercepts equal to the same positive number r . Find r .

C5. Let k be the number you receive. Find the y -coordinate of the point of intersection of the following two lines:

$$kx + (k + 1)y = 2k$$

$$x + y = 1.$$

MATH FIELD DAY 2016
RELAY D

D1. Find the largest positive integer n such that 2^n is a factor of 2016.

D2. Let k be the number you receive. If $(130 + 2k)^\circ$ and r° are two angles in an isosceles triangle, find r .

D3. Let h be the number you receive from the front, and let k be the number you receive from the back. Evaluate:

$$\frac{(h + 1)^2 - (k + 1)^2}{h - k}$$

D4. Let k be the number you receive. Find the y -coordinate of the vertex of the parabola

$$y = x^2 + 2x + k.$$

D5. Solve for x :

$$2^x = \frac{2 + 4 + 8 + 16}{\frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \frac{1}{16}}$$

1. 5 2. 20 3. 26 4. 4 5. 5