

Relay A

A1. For what digit k is the three-digit number $7k7$ evenly divisible by 9?

A2. Let k be the number you receive. For what integer r does

$$1 - \frac{1}{2} - \frac{1}{2^2} - \frac{1}{2^3} - \dots - \frac{1}{2^k} = \frac{1}{2^r}?$$

A3. Let k be the number you receive. For which integer n is the probability $\frac{1}{3}$ of drawing a yellow ball from a box with k yellow and n blue balls?

A4. Let k be the number you receive. A line has x -intercept $(k, 0)$ and y -intercept $(0, 24)$. For what number n does the line contain the point (n, n) ?

A5. Let k be the number you receive. What is the sum in degrees of the measures of the interior angles of a polygon with k sides?

1. 4

2. 4

3. 8

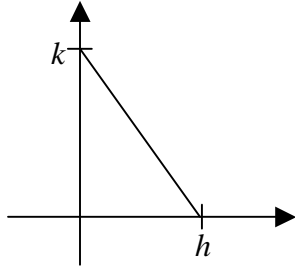
4. 6

5. 720

Relay C

C1. How many ways are there to write 96 as a product of two positive integers (counting $a \cdot b$ and $b \cdot a$ as one way)?

C2. Let k be the number you receive. The triangle shown below has an area of 12. Find h .



C3. Let k be the number you receive, and let $f(x) = \begin{cases} \sqrt{x} + 1, & \text{if } x \text{ is a perfect square} \\ x + 2, & \text{otherwise} \end{cases}$.
Find $f(k)$.

C4. Let k be the number you receive. Find the area of a circle of radius $\frac{k}{\sqrt{\pi}}$.

C5. Let k be the number you receive. Find one coordinate of the point of intersection of the two lines with equations:

$$\begin{cases} \frac{x}{k} + \frac{y}{2k} = 1 \\ \frac{x}{2k} + \frac{y}{k} = 1 \end{cases}$$

1. 6

2. 4

3. 3

4. 9

5. 6

Relay D

D1. If a dance troupe has three male and three female dancers, in how many ways can the choreographer divide up the troupe into three male/female couples?

D2. Let k be the number you receive. If a circle has circumference πk^2 , what is its radius?

D3. Let k be the number you receive from the person in front of you, and let h be the number you receive from the person behind you. Find the smallest solution of:

$$x^2 - 2hx = k^2 - h^2$$

D4. Let k be the number you receive. If a cube has sides that are $\frac{k}{2}$ long, what is its volume?

D5. A polynomial $x^3 + ax^2 + bx + c$ has value 0 at $x = 1$, $x = -2$, and $x = 3$. Find c .

1. 6

2. 18

3. 9

4. 27

5. 6