

## Polymath All-Day Sprint 2013

1. Write the number  $\log_2(256)$  (in simplified format, of course) in the box at the far right.
2. John C. Calhoun was a famous South Carolina politician in the 19th century. Under which of these US Presidents did he serve as Vice President? If it was John Quincy Adams, divide the second box from the left in half with a horizontal line. If it was Martin van Buren, divide the second box from the left in thirds with two vertical lines.
3. The first manned lunar missions were named after which Greek god? If it was Ares, divide the leftmost box below into thirds with two vertical lines. If it was Apollo, divide the leftmost box in half with a single vertical line. If it was Hermes, divide the leftmost box in half with a single horizontal line.
4. Who coined the term "radioactivity"? If it was Albert Einstein, exchange the contents of the first two boxes. If it was Marie Curie, leave them where they are.
5. Compute the matrix product:

$$\begin{pmatrix} 2 & 4 \\ 1 & 2 \end{pmatrix} \begin{pmatrix} 2 & -4 \\ -1 & 2 \end{pmatrix}$$

Does every entry in the resulting matrix have the same value? If all four values are equal, divide the second box from the right into thirds with two horizontal lines. If all four entries are not equal, divide that same box in half with a single vertical line.

6. What is Lady Gaga's real last name? If it is "Cicccone" put a 0 in the middle box below or if it is "Germanotta" put a 6 in that box.

7. What you have written in the boxes below should be a valid mathematical equation. Which of these ways to interpret it makes sense?

- Read it as an equation in base 9.
- Read it sideways so that the right side of the paper is the top.
- Read it upside-down so that the bottom of the page is the top.
- Think of it using "clock arithmetic", arithmetic mod 12.

