Chapel Hill Math Circle

Intermediate Group

In the Land of Patterns[1], Part 1

September 17, 2016

1. Find all solutions to the following cryptographic equation, where each distinct letter encodes a distinct digit.

I + HE + HE + HE + HE + HE + HE + HE + HE = US

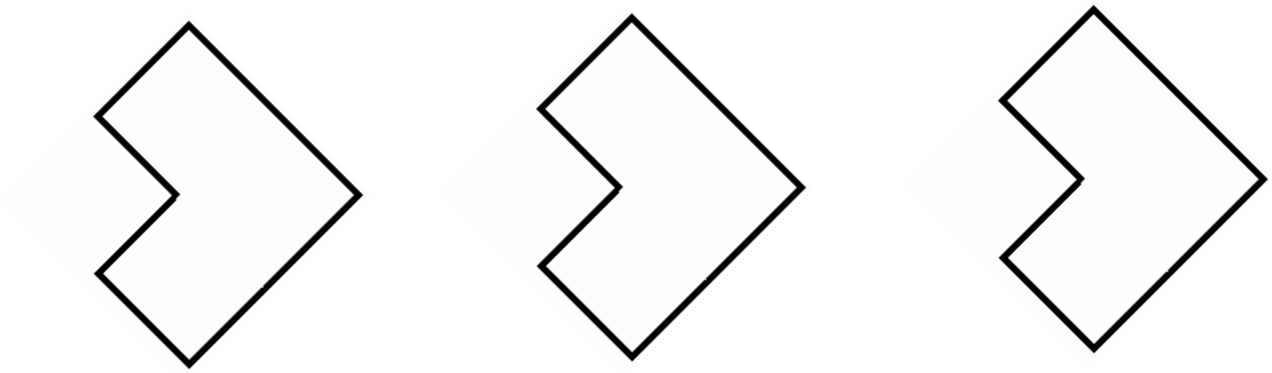
2. The book *Magic for Dummies* contains the following passage:

> *If you replace each of the distinct letters in* GLOBALHELLFRY *with distinct digits, and you get a prime number, then the world will suffer a terrible heat wave.*

Is it possible to use this to actually create a heat wave?

[1] These problems are taken from Ivan Yashchenko's *Invitation to a Mathematical Festival* from MSRI and AMS's Mathematical Circles Library. A copy is in display in the snacks room.

3. Tile one of the following figures with 8 congruent pieces. (The solution is not unique. The additional two figures are for practice.)



4. A wooden block is divided into eight smaller blocks by three cuts. In the figure, the surface areas of the seven visible blocks are labeled. What is the surface area of the eighth block?