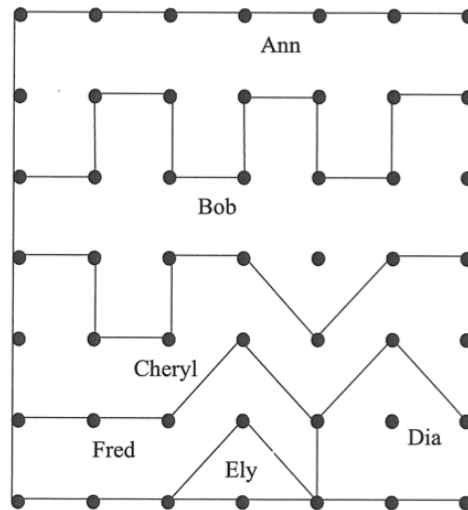


LEVEL 5 EXAMPLE

February Problem of the Month Reflection

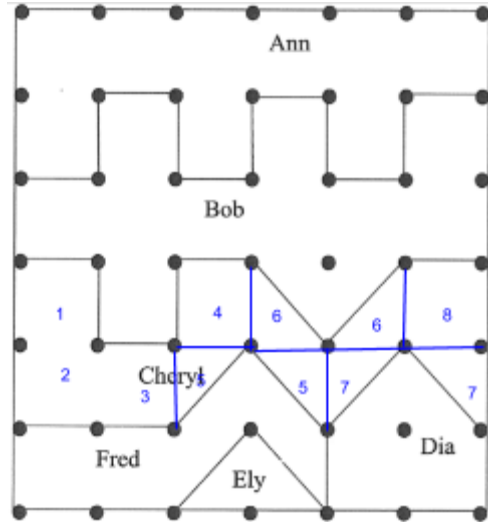
The highest level I got signed this month was Level C. The level presented you with a “map of land” that a great-uncle left to his great-nieces and nephews in his will. The plot of land was square, but the separate pieces left to each heir were not. They looked like this:



The level then asked you to find what fractional portion of land each heir got, and to explain how you found your answers.

To do this, I decided to first find what my denominator would be. I saw that I could easily measure the total area by counting each line segment between the points along the perimeter as one unit*. I counted six units along the right side, and six units along the bottom of the square. I multiplied 6 by 6 to get thirty-six square units. I then knew what my denominator should be--36.

After determining my denominator, I decided to separate each lot of land into square units. Anne's land was easily counted and found to be $\frac{9}{36}$, but the other pieces had some diagonal boundaries. I would have been in trouble, had I not realized that the squares could be divided into triangular halves. Therefore, when counting Bob's fractional piece of land, the triangle that jutted out was separated into two half-squares, and added to the rest of the squares as one, to equal $\frac{11}{36}$. To find Cheryl's inheritance, I cut the majority of her section into triangles, starting in the middle of her name, and ended up with Cheryl's section looking like this:



Her land totaled to $8/36$. Fred's land was also separated similarly, with the arrowhead-like portion split into parallelograms and added as 2 to the two boxes. I wrote down his fractional portion as $4/36$. Ely only had two triangles, which meant one square unit, and Dia had 3 once you counted the triangular "point" of her land as two halves. At that point, I had all the portions written out in my paper's margin as follows:

Ann	$9/36$
Bob	$11/36$
Cheryl	$8/36$
Fred	$4/36$
Ely	$1/36$
Dia	$3/36$

It was then I realized that the majority of these fractions could still be simplified, so by dividing both 9 and 36 by four, I reached $1/4$. $11/36$ could not be simplified, but $8/36$ could be turned into $2/9$ by dividing eight and thirty-six by 4. $4 \times 9 = 36$, so we know that $4/36$ is equal to $1/9$, and $1/36$ is as simplified as it can be. Finally, $3/36$ is equal to $1/12$, as $1 \times 3 = 3$, and $12 \times 3 = 36$.

My final answer to Level C ended as the simplified fractions and a brief explanation of what I just described in great detail. In the end, Ann got $1/4$ of the land, Bob was given $11/36$, Cheryl inherited $2/9$, Fred was bequeathed $1/9$, Ely was given $1/36$, and Dia got $1/12$ of their great-uncle's land.

While solving this problem, I relied heavily on a great amount of my mathematical understanding. My knowledge of fractions, multiplication, and division was especially important. I had to understand the idea of a fraction (in mathematical terms as opposed to its general use) to even comprehend what the level was asking me. Because I understood that the land had to be divided into equal pieces to determine the sizes of

the regions given, I was able to correctly count the areas of the land sections. Once I had found the amounts of land in thirty-sixths, I had to use multiplication and division to find equivalent fractions (a powerfully simple concept that is invaluable once grasped). I used my understanding of the concept that a fraction can be represented in different ways *together* with my multiplication and division skills in order to successfully simplify and clarify my measurements.

Another incredibly important piece of knowledge I used was the concept of *area*. Really, the whole problem was about area, just in a fractional sense. When I multiplied the lengths of the sides together, I was actually finding the total area of “Great Uncle Landowner”’s property. The reason 36 was my denominator was because it was one of the smallest values available that worked for everyone’s inheritance. In short, it was one of the best examples of how using math is really the most practical way to live.

*The problem did not specify the size of the square.