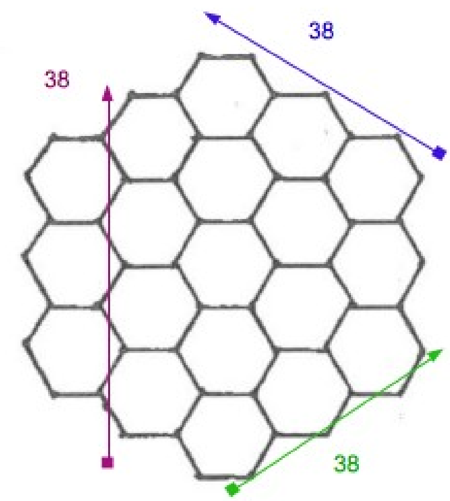
Free Think Friday: What's All This Buzz About Math? Bethany Davis

Problem Statement

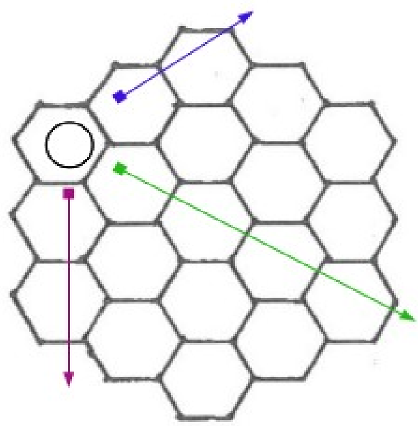
This problem asked my group, four of us total, to complete a honeycomb shaped puzzle where each row, column, and diagonal adds of to 38. However, not just any number can be used, only numbers one through nineteen. The honeycomb looked liked this:



As is visible, the numbers in each row, column, and diagonal must sum up to be thirty eight. Altogether, there are fifteen different combinations to be made.

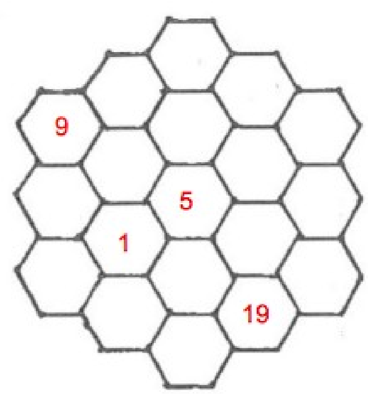
Process Description

At the beginning of the first period where we worked on this problem, we were told that we could get a singular clue to help us with our endeavor. For my group, that meant that we can ask for where a particular number was, or point to a hexagon and find out what number it was. We figured it best to start with at least one given. We all contemplated which could prove most helpful and came to the conclusion to ask for the number in the upper left corner.



We noticed how this was connected to three different lines. Two three numbered, and the larger five numbered. We were told that this hexagon held the number nine. Although, we were still dealing with the same problem, it just meant that there were a handful of numbers that could not be placed next to the nine. As a collective, we went back to the idea the problem overall. A group member stated, “It reminds me of sudoku”, another famous number puzzle. We all broke off individually to see if we could come up with, or find, a pattern for the problem. After personally having redrawn the honeycomb four times since every paper became full of numbers and smudges from my eraser, I tried to bring everyone back to see what we could gather together. As no one seemed any closer we went back to individual work with the absent minded exclamations of frustration. Everything that was tried would eventually become incompatible with a row or column beside it.

After having gotten no where the previous week, I came in and said that we should stop looking for a pattern, or any attempt to rationalize, and see if we can just perform trial and error. I may have been previously excited about my new found strategy, but my group and I soon began to continue with our face covering. Instead of looking at just nine, we thought about starting in the middle. A member was incredibly sure that it had to be the number eight, and another it was one (or some other smaller number). We sought out to see if these conjectures were true, but after some work they proved to be incorrect. However instead of only one clue being offered, this week we could receive two. We looked at one another and instantly thought we needed to know what number was in the middle. Also, still holding on for there to be a pattern, we wished to know where the numbers one and nineteen were placed (the smallest and the largest of the available numbers). Our honeycomb now looked like this:

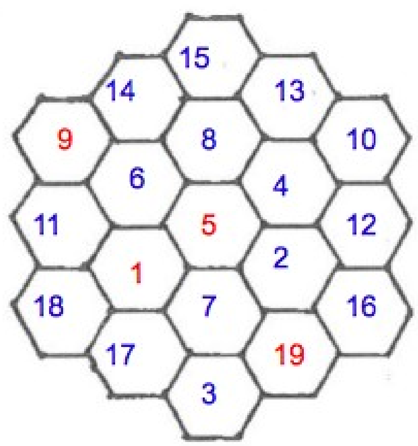


We were thoroughly disappointed that five was in the middle and that there was no pattern at all. We again returned to the notion of trial and error. I think that it was good, in a way, to go back to this simplistic form of mathematical thinking and remember how to utilize those skills along with our new found critical thinking ability.

With these new knowns, I wrote out every possible number that could fill the spots on either side of nineteen. A group member and I attempted to cancel out as many possibles as we could, while the others continued with the entire honeycomb. Neither the other group working on this problem, or us, got much closer to the solution by the end of the period, and our erasers were completely worn out. As I was determined to solve the problem and bring up morale (I was the one who stated that there probably was no pattern), I chose to spend some time after school to solve the problem. At that point, there was another hint that I vaguely remembered: the bottom hexagon had a much smaller number then we had guessed.

Solution

After some great thinking and lots of trials, the solution that we found is as followed:



We know that this is correct because each number only occurs once and each row, column, and diagonal all sum up to be thirty eight. When discussing our results with the other group who worked on this problem, we did find that there is only one answer. Their final solution may have looked different, but it was only rotated around, not a completely different answer. The methods were very similar; starting off with rationalizing, but moved on towards trial and error. They do believe that they were close at least some kind of helpful logical reasoning, and it would have been interesting to see if it worked out.

Self-Assessment and Reflection

Overall this problem helped me go back to very basic mathematical methods and principles of logical problem solving. Behind any complex problem there are more basic ideas. Although this through my group off some, I think that it was a nice mind reset from the past coursework that is much more rigorous. My group may have been made of fairly independent workers, I think that I was able to help bring everyone back and keep everyone on the same page. For this along with my own contributions, including finding the final answer, I believe I deserve a ten out of ten. I very much enjoy these types of problems and am glad that we set aside a day for them. I think that I also really engage with these problems as well.

A mathematical practice and expectation heavily used by myself and my group is to make sense of a problem and persevere in solving them. This problem definitely pushed our determination as it was very frustrating at times. I think that this particular practice is by far the most relevant to the work that I do. This also was clearly implemented in the order in which it was written for this problem. The initial reaction was to make sense of the problem. We did this by writing down knowns and treating it like a logic problem. The realization that there was not a pattern came later and the perseverance portion became much more implementable. The significance of something like this, again, pertains to the breaking down of mathematical thinking and how they bring critical thinking to the forefront. I find that understanding what the problem is actually asking you to do (hidden motives) can help create a more productive work environment and allow myself to get to a conclusion more efficiently while still comprehending the full scope of the problem.