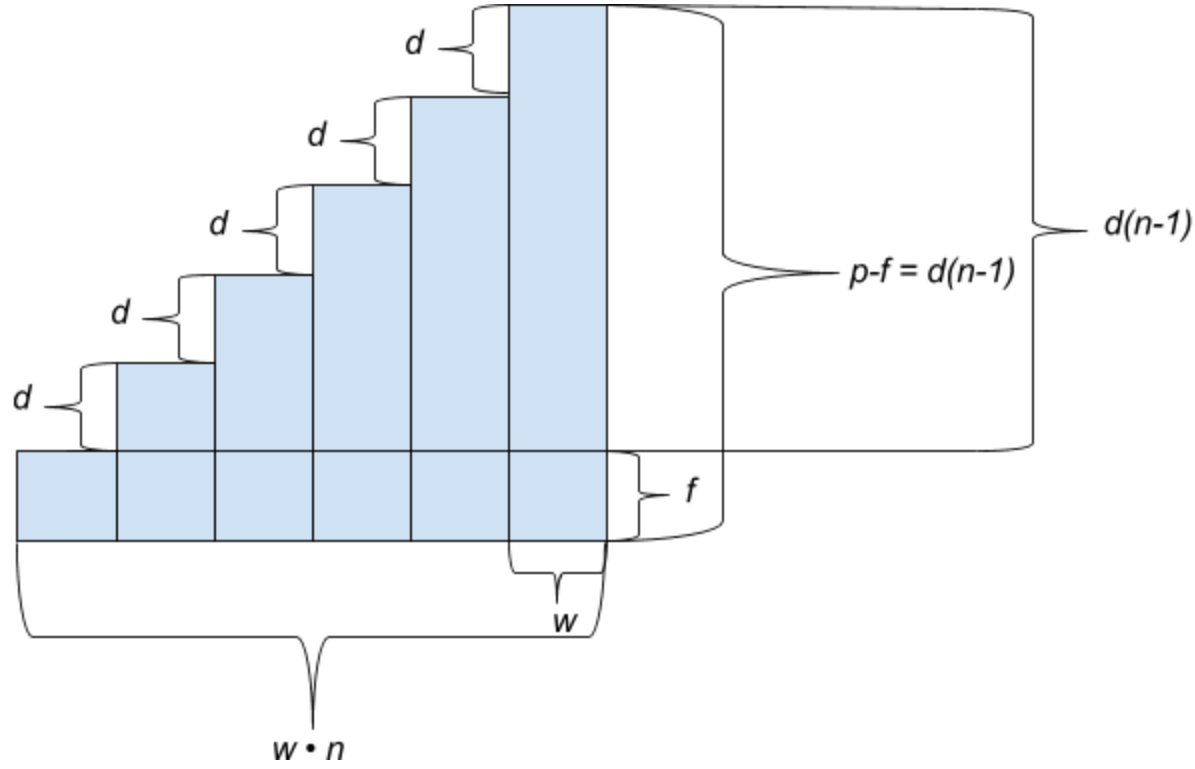
Ava Stills

POW 3: Planning the Platforms

Problem Statement:

For this problem, I am an assistant for Camilla, the person in charge of building and decorating a structure for the baton twirlers. My task is to create two formulas that I can use to find the information that Camilla needs once Kevin makes up his mind on the number of platforms and the height of the first platform. The two formulas will find the height of the tallest platform and the total length of material that she will need to decorate the platforms. The formulas will be written in terms of the number of platforms (*n*), the difference in height between adjacent platforms (*d)*, and the height of the first platform (*f*).

Visual Representation:



f=height of first platform
n=number of platforms
p=height of tallest platform
w=width of each platform
d=difference in height between platforms

Process:

For this problem we started with coming up with variables that satisfied all of the needed aspects of the formulas that we were going to make. After we found our variables, we figured out

what steps me needed to take in order to solve/create each formula. The first formula that we found was the one for the tallest platform (*p*). Our formula that we found for the tallest platform was p= *f+d(n-1)*. This formula represents the distance between platforms times the number of platforms minus one plus the height of the first platform. When you simply multiply the number of platforms by the difference in height you would get the height of the tallest platform, only if the height of the first platform was the same as the difference between platforms. The reason that you subtract *1* from *n*, is because you are compensating for *f*. By taking away *1* from the total number of platforms, multiplying by the difference, and then adding the height of the first platform, you reach you value for *p*.

The process to find the formula for the amount of material that Camilla would need was more difficult. To start we took the height of the first platform (*f*) plus the difference in height between the platforms. Since we did not know the number of platforms, the series that we created was endless. Our series repeated the pattern *(f)+(f+d)+(f+2d)+(f+3d)+*.... If we had the number of platforms, the formula would work but since the number of platforms was unknown the formula wasn't usable. After hitting a dead end with that technique of solving the second formula, Joe helped us by giving Caeley a formula and a graph. The formula he showed her was similar to that of the area of a triangle. We tested his formula and realized that it did not work. Since the idea that he gave us sounded reasonable we took his formula and began altering it slightly and checking whether our adjustments worked or not. We finally ended up with a formula that truly worked. The formula for the amount of the fabric Camilla needs ended up being; the number of platforms times the height of the tallest platform minus the height of the first platform. All of this would then be divided by two and finally added to the height of the first platform times the number of platforms. Written out the formula looked like: *f • n+((n(p-f))/2)*. We were able to simplified it to just *(n(f+p))/2*. It shows the number of platforms times the height of the first platform plus the height of the tallest platform, all divided by two. We chose to replace *p* with our formula for it, that way you would not technically need to solve for p before finding the length of material. Once we substituted it out we ended up with: *(n((f+d(n-1))+f))/2*, which we simplified to: *(n(2f+d(n-1)))/2.* This formula worked entirely until we saw that there was a flaw is the height of the first platform was different than the difference between platforms. We changed our denominator of *2* into *2w* in order to fix our issue. *W* represented the width of the platforms. This left us with the formula: *(n(2f+d(n-1)))/2w*. We decided that this was the correct formula to find the length of material needed.

Solution:

The two formulas that we found to provide Camilla with her needed information are: *p=f+d(n-1)* which will tell us the height of the tallest platform and *l=(n(2f+d(n-1)))/2* which gives us the length of the material needed to cover the platforms. We went through a process of plugging numbers into the equations to see if they proved to be true. They worked every time which is why I believe that our formulas are correct.

Evaluation:

I enjoyed this POW. I liked how instead of just solving a problem we had to come up the formulas from scratch ourselves. The second formula was the most challenging part because of the different aspects that the formula had to encompass. Even though there were many moments of trial and error I feel that this POW was very enjoyable.

Self-Assessment:

For this POW I believe that I dereve an A. While working in a group I contributed to the formula creating process often. Even though we worked together to create the formulas, I created my write up separately. I gave lots of information as to our process and my visual representation is accurate to the way I solved the problem. The work that I put into this POW is worthy of an A.