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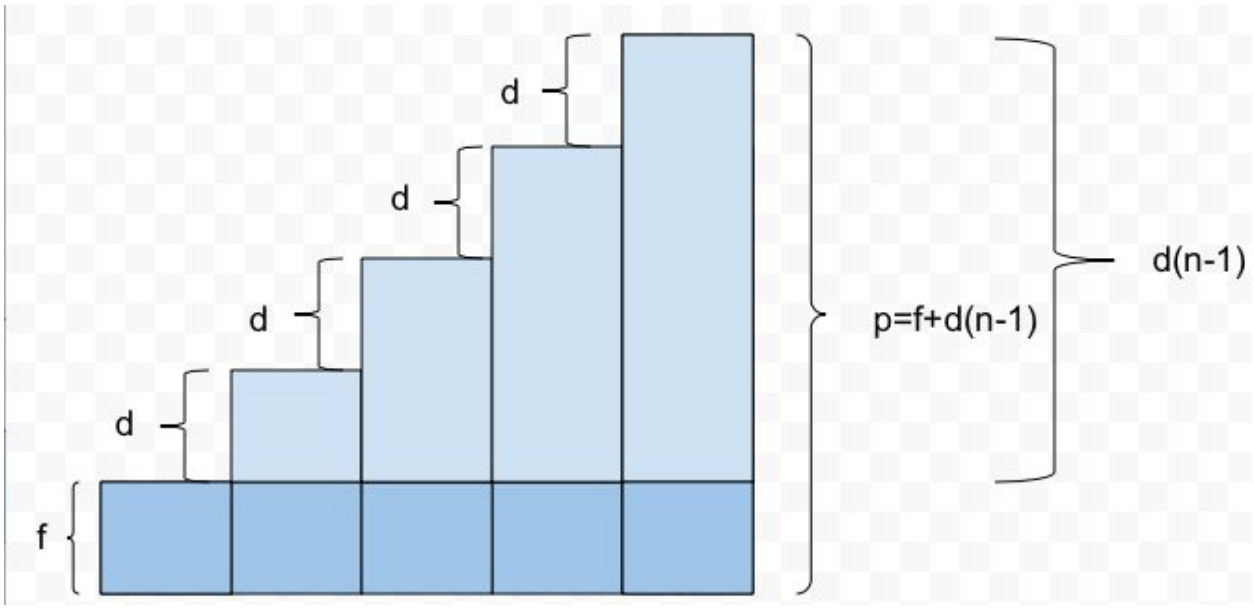
Planning the Platforms

Problem Statement:

In this problem, I am Camilla's assistant and need to create two formulas so that I can tell Camilla the information she needs once Kevin makes up his mind. The formulas will find the height of the tallest platform, and the total length of material that she will need to cover the platforms. These formulas will be in terms of the number of platforms, the height of the first platform, and the difference in height between adjacent platforms.

Visual Representation:



In the image above f= the height of the first platform, d= the difference in height between each platform, n= the number of platforms, and p= the height of the tallest platform.

Process:

In order to solve this problem we started by assigning variables to each term we needed to find. Then we found out what terms we needed for each formula. Once we did this we began to generate a formulas to see what would work. We first found the formula to find the tallest platform. In order to find the tallest platform you must add the height of the first platform to the difference in height between platforms multiplied by the number of platforms minus one. So we put variables in to represent those things, and got the formula: f+d(n-1)=p. The second formula to find the amount of material Camilla would need was more difficult to find, we started the height of the first platform plus the difference in height between the platforms. This created a series, but because we didn't know how many platforms there were we could not tell how many terms in the series we would need. The series looked like this: (f+0d)+(f+1d)+(f+2d)+(f+3d)+...

Once we had this we tried to generalize it. We came up with, the number of platforms, times the height of the first platform, plus the number of platforms, minus 1, times factorial, times the in difference in height between each platform, or nf+(n-1)!d.
Then we realized that this formula doesn't work, it worked for the one we tested it with first, but when we tried other numbers it did not work. From there Caeley talked to Joe to receive some help finding the formula. He explained it to her on a graph and gave a formula similar to one for a triangle using base times height divided by two. When trying this formula we found that it did not work but we took the formula and made small changes checking altered versions until we came upon that worked which was: the height of the first platform, times the number of platforms, plus the number of platforms, times the height of the tallest platform minus the height of the first platform, all divided by two, or fn+((n(p-f))/2). Once we had this formula that worked, we simplified it to just (n(f+p))/2, or the number of platforms, times the height of the first platform plus the height of the tallest platform, all divided by two. Then we decided to replace p with the formula we found for it so that you would not need p in order to find the length of material needed. Which gave us (n((f+d(n-1))+f))/2, then we simplified that to: (n(2f+d(n-1)))/2. This is what we believed the formula was for a while until we saw that if the height of the first platform is different than the difference then this doesn't work. So instead we must change the divided by two to divided by 2w. W being the width which leaves us with the formula: (n(2f+d(n-1)))/2w. That formula gives us the length of the material needed.

Solution:
The two formulas are what will get us the answers that Camilla needs p= f+d(n-1) will tell us the height of the tallest platform and l=(n(2f+d(n-1)))/2 will give us length of the needed material to cover the platforms. We know that these formulas work because we can plug in different numbers and find the height and length. I'm confident in this because of our process in finding the formulas we thought about them, checked them, and used all the needed variables to create them.

Evaluation:
This POW was interesting and I enjoyed the change of instead of solving it and coming up with an answer we were just looking for the formulas. I found this POW challenging in finding the second formula for length, which was good because we had one easier formula to find, as well as one harder one. It was a good amount of difficulty, and it helped me persevere and continue working when the first formulas we tried for the length of material did not work.

Self-Assessment:
I believe I should receive an A on this POW because of the perseverance I had in working on this problem and then successfully finding two formulas that work to find the needed information. As a group we worked very efficiently in class, and created good work with the time we were given

during class to do this POW. Also we took this out of class and all worked separately on the POW with our free time.