MISSON: ARMAGEDDON

Bad news guys. Earth is doomed. There are a number of very large asteroids headed our way and the only hope of saving the planet rests on a new weapon created by the military. Unfortunately, this weapon is still in the testing and development phase. Scientists still aren't sure whether it will work in time and the military needs an answer quick so they can decide whether they need to proceed with the weapon or move forward with the contingency plan.

That's where you guys come in. On Wednesday we will be running through a simulation of how the weapon works and hopefully (using your newly-gained knowledge of sequences) you guys will be able to answer the questions the military has regarding the weapon in time to save the planet.

Today we will be looking at the work of a biologist who connected his ideas about cell division to the asteroid problem and came up with the idea for the weapon. It is important that you understand the work here and the patterns that you see (since they play a fundamental role in the ideas behind the weapon.)

The data below are taken from a biologist's work on cell division. A table of the relevant data and the biologist's depiction of the division should help you answer some questions about the phenomena. Remember to look for patterns and keep in mind that these ideas are important for the future of the weapon and the future of the earth. Good luck.

Number of data points collected	Time (minutes)	Cell count	Number of cell divisions that have occurred
1	0	1	0
2	6	8	3
3	12	64	6
4	18	512	9
5	24	4,096	12
⋮	⋮	⋮	⋮

IMPORTANT QUESTIONS:

1. Can you find some arithmetic sequences?
2. Can you find some geometric sequences?
3. How many cells will we have after 33 divisions? Explain how you know.
4. How many cells will we have after 40 divisions? Explain how you know.
5. How many divisions should have happened if 300 minutes have passed? Explain how you know.
6. When data has been recorded for the 20th time how many divisions are there? How many cells are there? Explain how you know.
7. How many cells should there be if 46 minutes have passed? Explain how you know.
8. Can you think of a formula that relates the number of divisions to the amount of time that has passed? Explain how you know.
9. Can you think of a formula that relates the number of divisions to the number of cells? Explain how you know.
10. Can you think of a formula that relates the number of divisions to the number of times data has been recorded? Explain how you know.

MORE IMPORTANT QUESTIONS:

1. Will there ever be a point where there will be exactly 151 cells? If yes, say when. If no, why not? Determine the answer to this question in two ways: with algebra and in a way that someone in the military (who might be really bad at math) might understand.
2. Will there ever be a point where there will be exactly 8,192 cells? If yes, say when. If no, why not? Determine the answer to this question in two ways: with algebra and in a way that that someone in the military (who might be really bad at math) might understand.