Name: _____ Period: _____ Date: _____

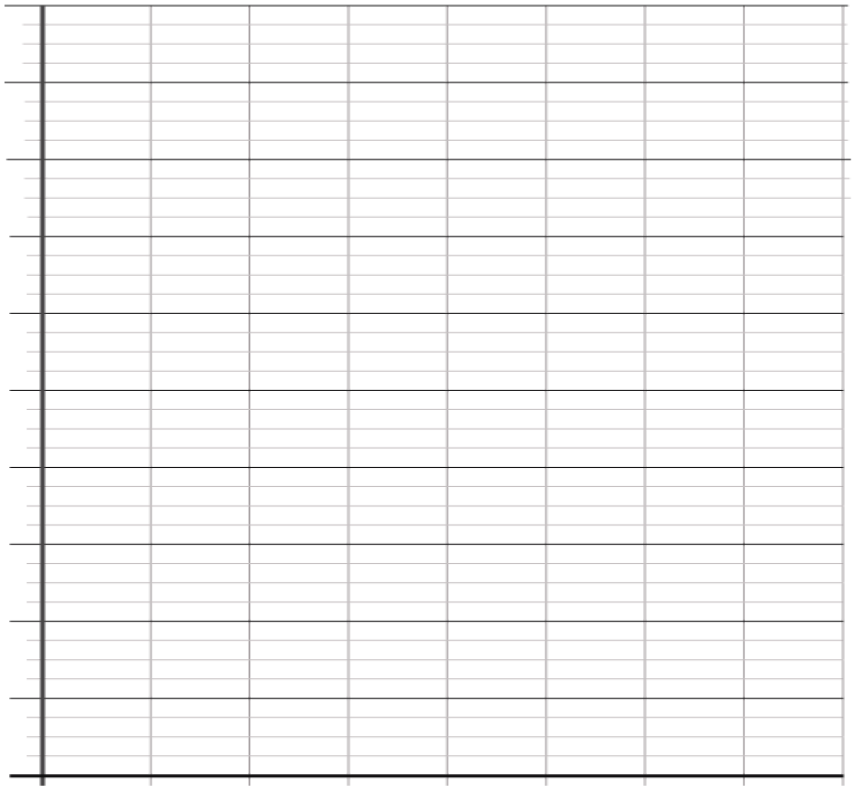
Lesson 7: How Do Bacteria Get Killed?

Investigation 1: How many doses of an antibiotic would it take to eliminate 1,000,000 bacteria if it was 90% effective?

Build a mathematical model to determine how many doses it would take to kill 1,000,000 bacteria if the antibiotic we were using was 90% effective.

Dose	# of Bacteria Before Dose	# of Bacteria Killed	# of Bacteria Alive After Dose

Construct a graph of the data in the table you made as a class of # of bacteria vs. # of antibiotic doses. Label your axes, and make sure to choose equal intervals for each axis.



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Investigation 2: How would both reproduction and repeated doses of antibiotics affect the size of a bacteria population?

Let's figure this out by building a new mathematical model to predict what would happen to the population hourly if

- we started out with an initial infection of 1,000,000 bacteria;
- took our first dose of antibiotic immediately (at hour zero);
- the antibiotic was 99.99% effective;
- any surviving bacteria continue to double every 20 minutes; and
- we took another dose every 4 hours for 24 hours.

Time (in hrs)	# of bacteria alive before dose	Antibiotic dose given?	# of bacteria alive after the dose reaches them
0		----yes --->	
1		no	
2		no	
3		no	
4		---yes --->	
5		no	
6		no	
7		no	
8		---yes --->	
9		no	
10		no	
11		no	
12		---yes --->	
13		no	
14		no	
15		no	
16		---yes --->	
17		no	
18		no	
19		no	
20		---yes --->	
21		no	
22		no	
23		no	
24		---yes --->	

Was the bacteria population eliminated 24 hours later?

_____

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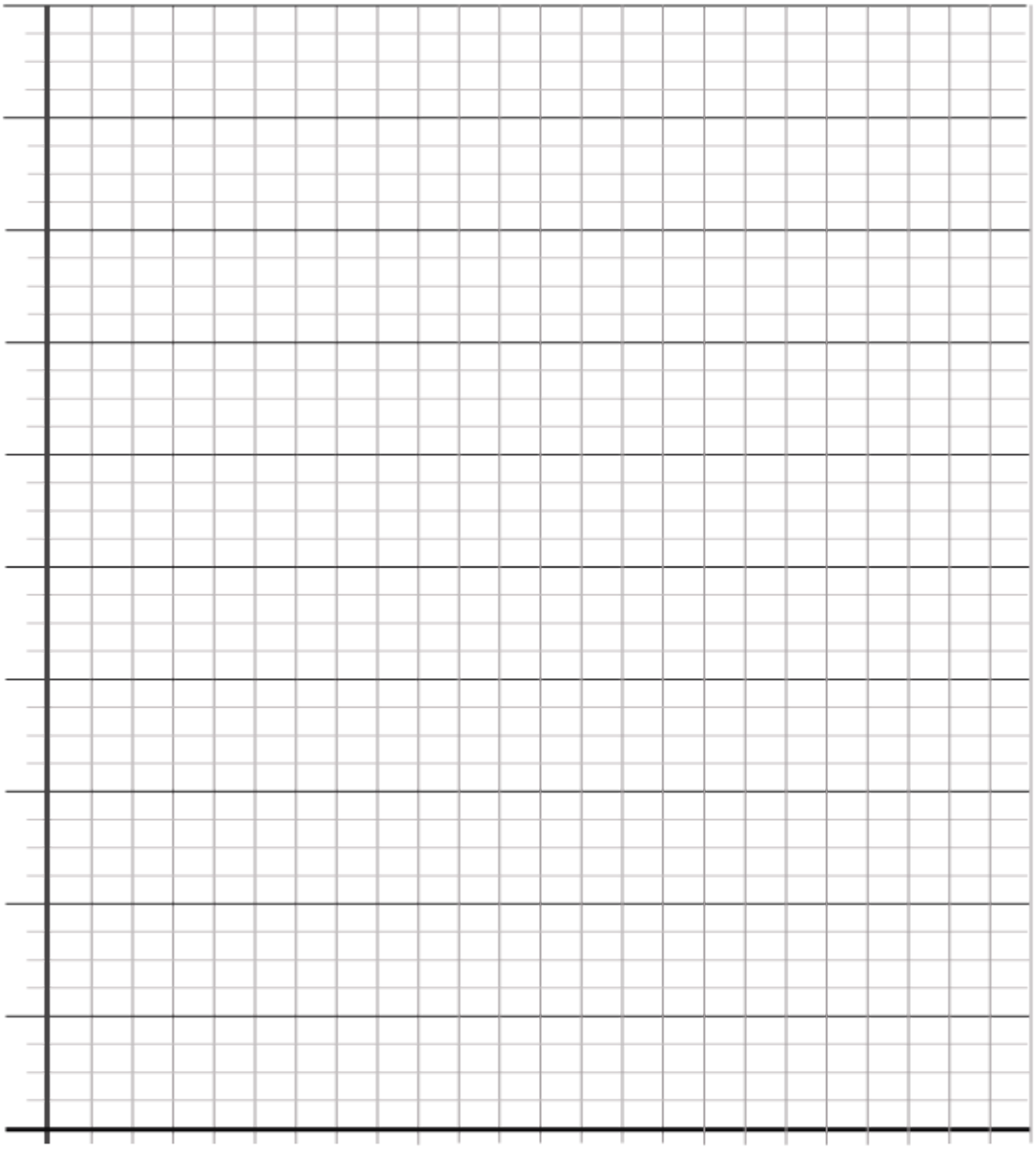
Optional: Construct a graph of # Bacteria vs. Time (in hours). Label the axes and the major intervals on both axes.



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Making Sense:

Write an explanation that tells how the mathematical model you co-constructed in class helps us understand why it is necessary to take all of the prescribed doses of antibiotics even when we are already feeling better in advance of finishing them.

How is what we discovered through this lesson relevant for explaining what might have happened in Addie?

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Next Steps:

Our model predicts some pretty complex changes in the population size over time. *But would we see these sorts of population changes happening in a real bacterial population over multiple doses of antibiotics?* How might we design a new investigation using the Petri dishes again to investigate this question? Draw or describe your ideas for that investigation below.

What ideas did your class come up with for what we should investigate in our next lesson?

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