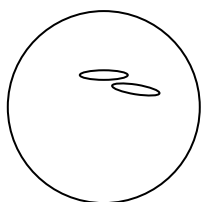


Date: _____

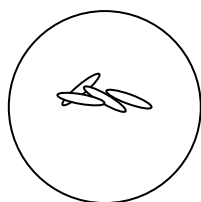
1. Two weeks ago, Lulu-Anne was diagnosed with strep throat which is caused by the bacterium *Streptococcus pyogenes*. She was treated by her family doctor with the antibiotic called amoxicillin. Soon after finishing all the doses of amoxicillin in her prescription, she felt better and most of the symptoms of the infection had disappeared. However, when she woke up in the morning a few days later, her throat was sore and her tonsils and the back of her throat were red, swollen, and dotted with white specks of pus. She also experienced chills, body aches, and a fever of 102 degrees Fahrenheit. Her mother suspected that Lulu-Anne probably had strep throat again because these symptoms matched those her daughter experienced before taking the amoxicillin. In a follow-up visit to the doctor, it was discovered that, indeed, Lulu-Anne was suffering from a recurrence of the *Streptococcus pyogenes* infection. The doctor prescribed the same dosage and number of treatments of amoxicillin as was done for her first strep infection. However, this second amoxicillin treatment was ineffective. After taking all the antibiotic in her prescription Lulu-Anne continued to have a sore throat, fever, and other symptoms of a strep infection.

This image shows a single sheet of white paper with horizontal blue or grey ruling lines. The lines are evenly spaced and run across the width of the page. There are approximately 20 lines visible. The paper has a slight shadow on the right side, suggesting it's resting on a surface.

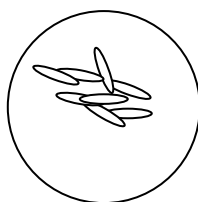
2. In a laboratory experiment, a small sample of the bacterium *Streptococcus pyogenes* and some nutrient broth were placed on a microscope slide. Bacteria cells present on the slide were observed and counted every 24 minutes for a total of 144 minutes. Ninety-six minutes after the experiment began the antibiotic amoxicillin was added to the bacteria growing on the slide. The following drawings illustrate microscopic views of the bacteria. The label below each drawing shows time (t) in minutes (min) and the number of bacteria (n) present on the slide.



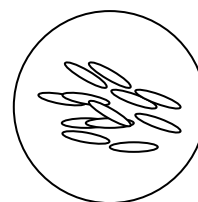
t = 0 min, n = 2



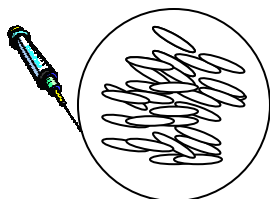
t = 24 min, n = 4



t = 48 min, n = 8



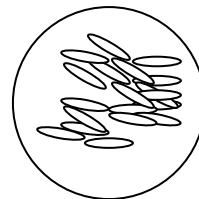
t = 72 min, n = 16



t = 96 min, n = 32

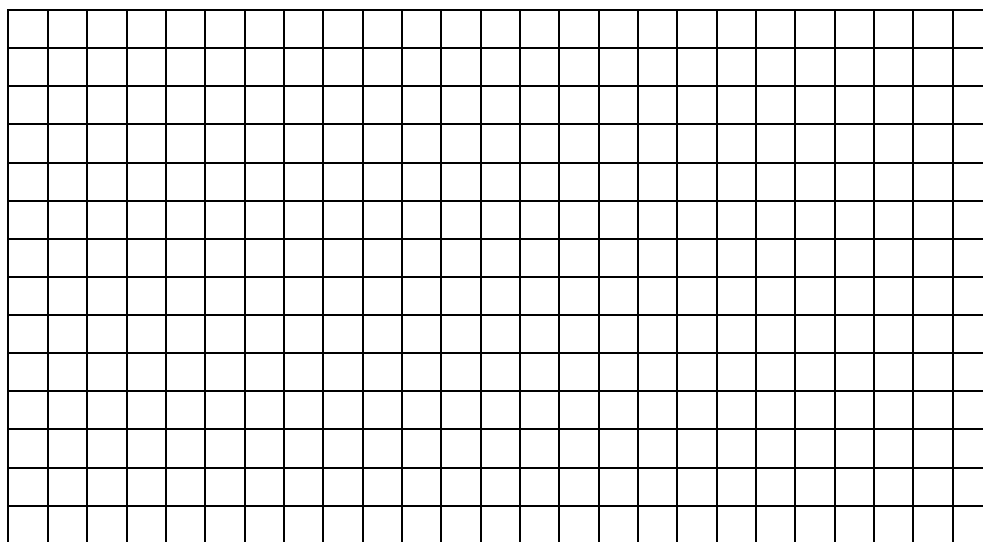


t = 120 min, n = 10



t = 144 min, n = 20

- a. Construct a connected line graph that illustrates changes in the bacteria population using data from the labeled drawings. Plot time on the X-axis and the number of bacteria on the Y-axis.



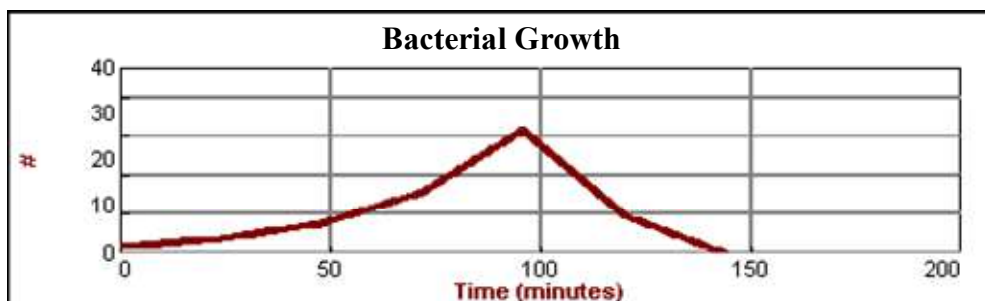
- b. Describe what happened to the size of the bacteria population after the antibiotic was added.

3. Sometimes doctors treat a patient with particular bacterial infection with several different antibiotics simultaneously. This treatment is known as a “multi-drug cocktail.”

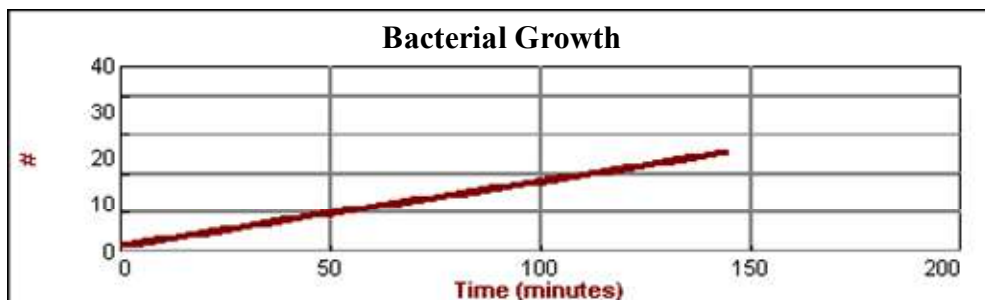
- a. What do you predict will happen to the bacteria population if a multi-drug cocktail is added (instead of amoxicillin) at 96 minutes?

- b. Of the four choices below, select the graph which best represents your prediction.

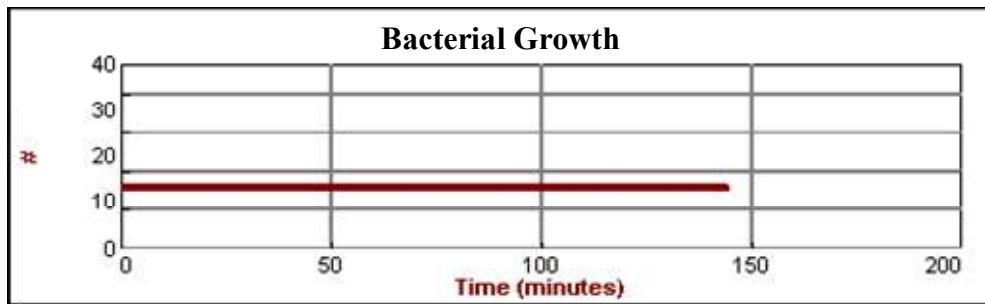
A.



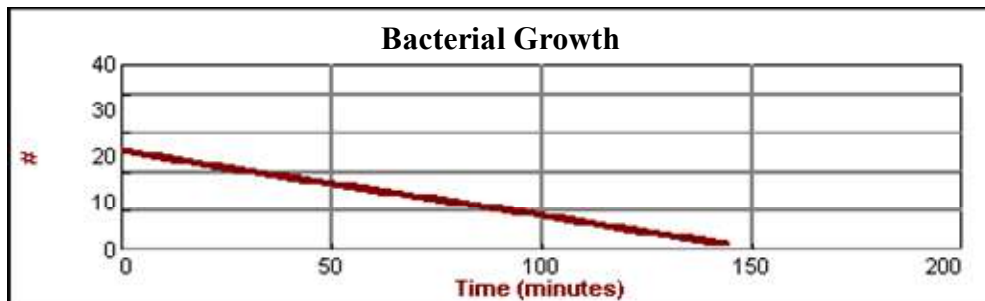
B.



C.



D.



- c. Compare your amoxicillin graph with your selected multi-drug cocktail graph. Explain what causes the difference in the bacterial population as illustrated in the graphs between $t=96$ minutes and $t=144$ minutes.
