

**Skills and Strategies**

- Processing and Analyzing
- Evaluating
- Communicating

**What You Need**

- Appendix A, Scientific Notation

**Bacteria Population Growth**

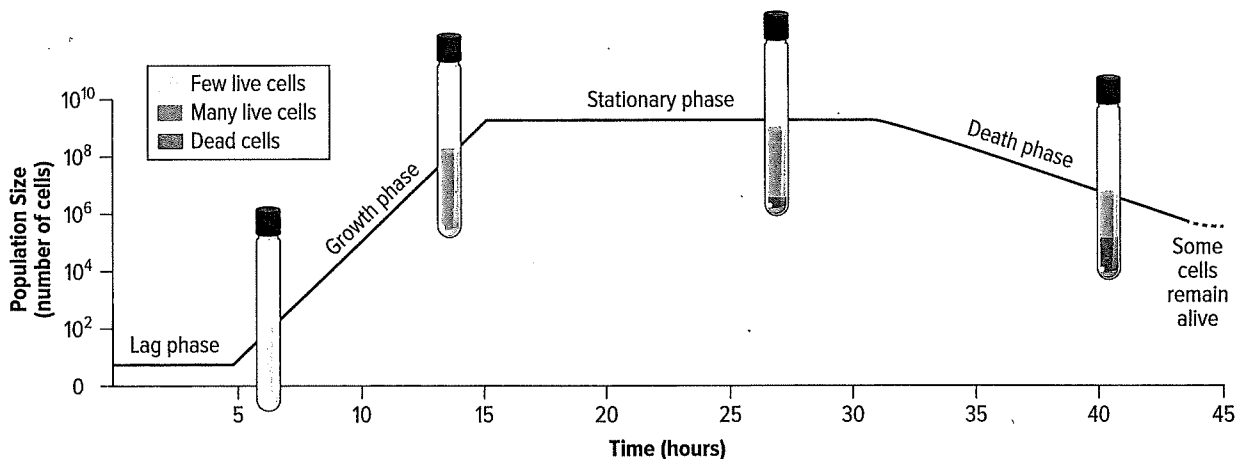
Studies of the growth of a bacteria population can be done in the laboratory. The growth of the population is monitored by measuring the number of cells over time. In this investigation, you will analyze the results of one of these studies.

**Question**

How does the growth of a population of bacteria change over time in a controlled environment?

**Procedure**

1. A scientist set up an experiment in a laboratory using this procedure.
  - A small number of bacteria were added to a liquid medium that contains nutrients for the microbes to grow and reproduce. The medium is sterile, which means that the only bacteria present are the ones added for the study.
  - The test tube containing the medium and bacteria was placed in an incubator. The incubator keeps the temperature stable at 37°C and provides the conditions bacteria need to reproduce.
  - Every hour, a small sample of the bacteria in liquid was removed and the number of cells was determined. This was done for 45 hours.
  - A graph was drawn, plotting number of live cells versus time. The graph, called a growth curve, is shown below.



## Process and Analyze

1. Study the graph on the previous page. Think about the shape of the graph at different times and the images of the test tubes and what they represent. Copy the table in your notebook. Complete it by interpreting what is happening to the bacteria population at the lag, growth, stationary, and death phases that are labelled on the graph.

Phase of Growth	Time Period (hours)	Interpretation
Lag Phase		
Growth Phase		
Stationary Phase		
Death Phase		

2. During which phases are bacteria actively reproducing? Which phase has the greatest number of bacteria reproducing? Explain your answers.
3. What is happening during the stationary phase? Why does it occur?
4. Why does a death phase occur?

## Apply and Communicate

5. Compare the number of daughter cells produced to the number of parent cells after each round of reproduction.
6. Think about the time it takes for the bacteria population to grow from approximately 100 cells to  $10^{10}$  (or 10 000 000 000) cells.
  - a) How would this relate to the importance of keeping foods refrigerated to avoid food spoilage and food poisoning?
  - b) What is a situation where rapid bacterial growth might be helpful or beneficial? Explain your answer.