Name: _____ **Date:** _____

Chapter 1 Assessment

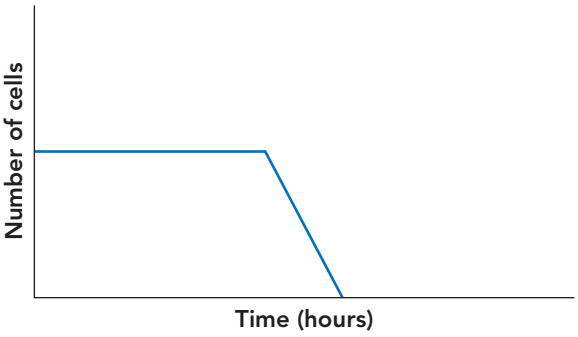
ITEM 1

1a. A scientist wants to grow some bacteria cells on agar in a petri dish. She transfers a sample of the cells to the agar and counts the number of cells in the dish over time.

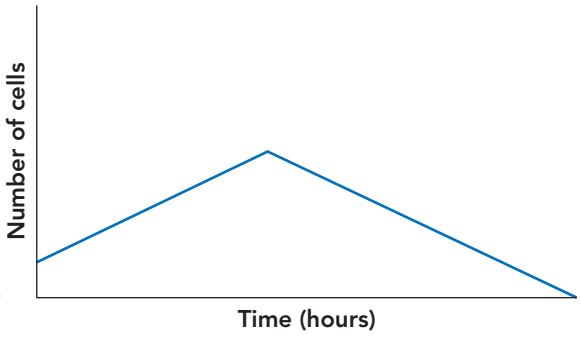
A petri dish with bacteria growing on agar.

Which graph is the best model of how the cell population will grow over time given the limited supply of food and space? Circle the letter for the graph you choose.

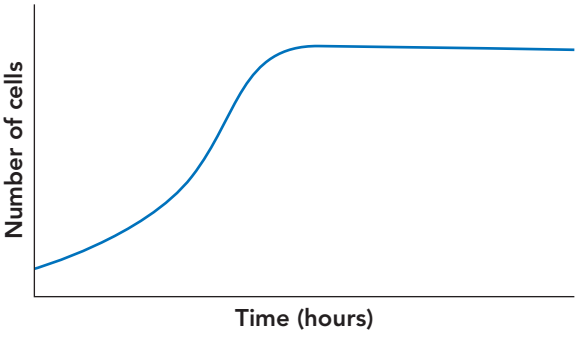
A.



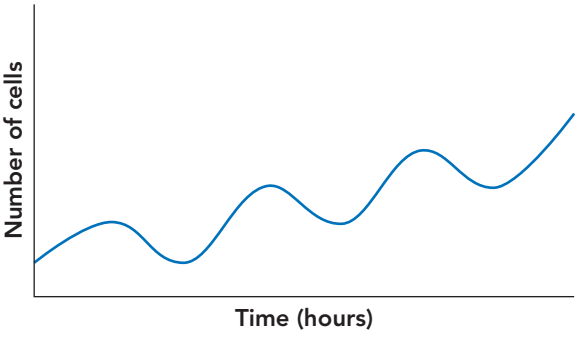
B.



C.



D.



1b. Redraw a larger copy of the graph you selected and annotate it (you may choose to use the I^2 strategy if it helps) to communicate what is happening to the cells over time. Be sure to indicate what is happening at least two different times.

- Reminder: the I^2 strategy involves writing "what I see/what it means" statements.

ITEM 2

2a. One day, an 18-year-old male was mountain climbing on a very tall mountain.

A mountain climber at the top of a mountain.

He started to experience severe pain in the left side of his stomach and a fever. He descended the mountain and went to the emergency room because he had not experienced pain like this before. The doctors scanned his abdomen and found that part of his spleen was dying. The doctors thought that it was likely that the man had the sickle cell trait. They performed a test that confirmed this diagnosis. The doctors treated him with nasal oxygen and kept him hydrated. Gradually his spleen recovered without any specific treatment or surgery.

After the man recovered, he did more research on why having the sickle cell trait caused him to have problems after mountain climbing.

Before reading his summary of what he found, set a Scientific Purpose for reading the text. Write your purpose below.

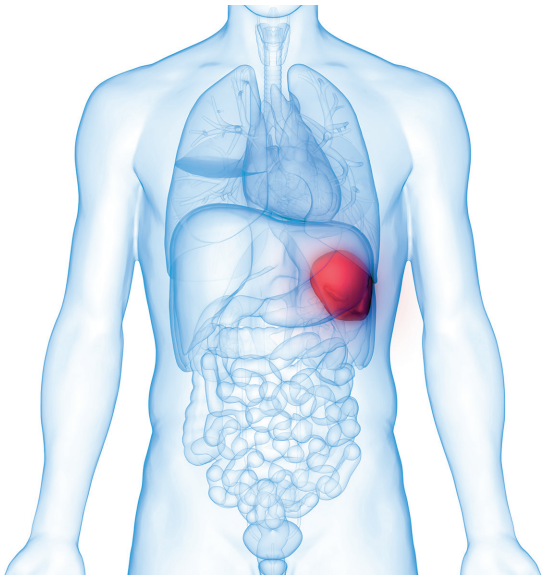


Illustration of abdominal organs showing the location of the spleen.

2b. Below is a summary of what he found. As you read, you can use the following Science Reading Annotation Stems to make annotations on the text to help you make sense of it: "What's important here is ..." "This reminds me of ..." "I wonder about ..." and "What might be true is ...."

Red blood cells serve a very important function in the human body. They are responsible for carrying oxygen throughout the body. Approximately 99% of the oxygen transported in blood is bound to the hemoglobin protein found inside the red blood cells. Normal red blood cells have a round shape. However, some of the red blood cells in people with sickle cell trait have an abnormal shape. The image below compares a normal red blood cell (right) to an abnormal red blood cell (left). The abnormal red blood cells do not work in the same way as the normal red blood cells. At low altitudes, where most people spend the majority of their time, this is not a problem because people with sickle cell trait have enough normally shaped red blood cells to transport oxygen throughout the body.

When mountain climbing, people can find themselves at very high altitudes of 11,000 feet above sea level or more. At around 7,000 feet above sea level, the percentage of oxygen in the air starts to decrease rapidly. This makes it difficult for a person to breathe at high altitudes and reduces the amount of oxygen the body has available to transport oxygen to the organs.

An abnormal red blood cell (left) and a normal red blood cell (right).

Based on the reading above, what information can the man use to explain why it is more dangerous for him to go mountain climbing than it is for a person with all normal red blood cells to go mountain climbing?

2c. If you were going to make a model to describe what happened to the man when mountain climbing, what components would you include? List the components below.

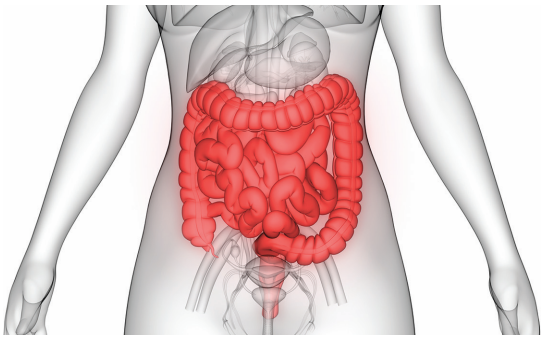
2d. What interactions between components would you include in the model? List the interactions below.

2e. What other questions would you ask to help you figure out why this man's spleen started dying after mountain climbing? List three or more questions.

ITEM 3

3. The small intestine is an organ that is part of the digestive system. It is where most of the digestion and absorption of food takes place.

All humans have bacteria cells in their small intestine to perform important functions, like helping to digest vitamins and protecting the intestine from being invaded by harmful bacteria. However, if the normal function of the intestine is compromised, potentially harmful bacteria may grow to outnumber the other types of bacteria. When this happens people tend to experience symptoms like chronic diarrhea or weight loss.



A drawing of the large and small intestines.

Based on your Class Consensus Model, draw a more specific model that could be used to explain why a person with an imbalance of bacteria in their small intestine may experience these symptoms. If it's helpful, you may build a Gotta-Have-It Checklist to ensure you are including the necessary components and interactions in your model.

Use this space for a Gotta-Have-It checklist if needed. (There is space for your model on the next page).

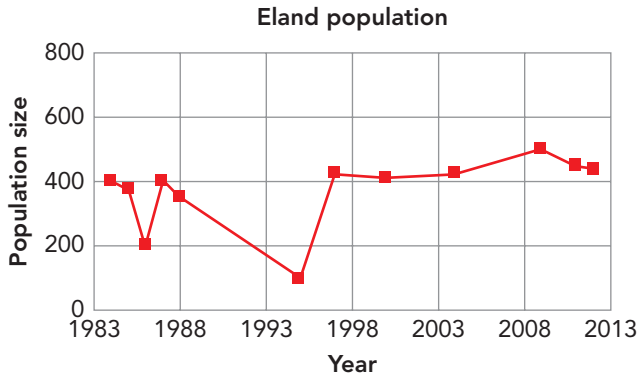
Use this space to draw your model.

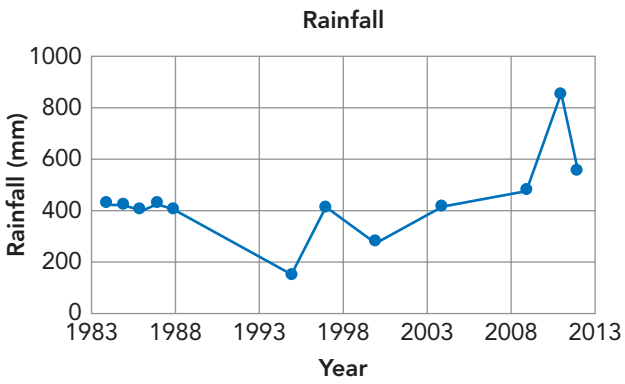
ITEM 4

4a. Elands are a type of antelope that are found in East and Southern Africa. Elands are herbivores and eat mainly grasses. They live primarily in open plains, grasslands, and foothills. They tend to form herds in groups of up to 60 elands.

Eland.

Below is a graph of the population of elands in Waterberg Plateau National Park and a graph of the precipitation in the park from 1984 to 2012. Scientists think there is a possibility that the changes in the amount of rainfall caused changes in the size of the eland population.





Make observations about the data in the graphs and annotate the graphs (you may choose to use the I^2 strategy if it helps) to help you think about what questions you would ask to gather more information about whether the changes in rainfall could be a possible cause for the changes in the eland population.

- Reminder: the I^2 strategy involves writing "what I see/what it means" statements.

4b. List three or more questions that you would ask to gather more information about whether the changes in rainfall could be a possible cause for the changes in the eland population.