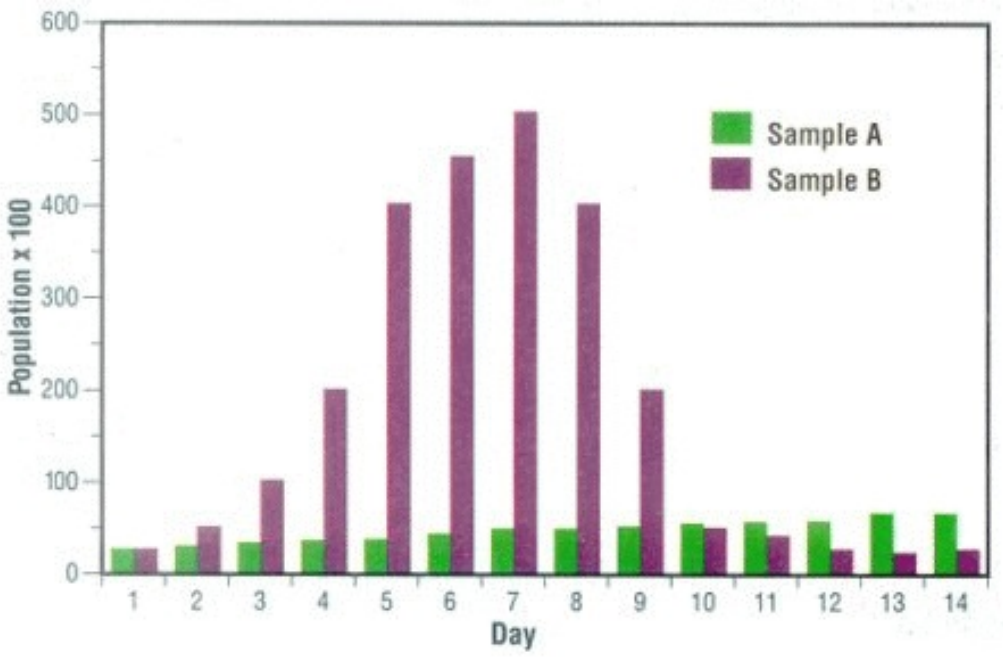
Following an Infection

Objective
This activity will let you practice evaluating an experimental design and to analyse data and draw conclusions.

Background Information
Two girls buy mascara, a cosmetic applied to the eyelashes. One develops an eye infection while using the mascara. They decide to test the mascara to determine if it might have caused the infection. You will be asked to evaluate the experimental method that the two girls used. Later you will be asked to analyse the data they gathered and to draw conclusions.

Procedure
1. Two new containers of the same brand of mascara were purchased. One of the mascara samples was labelled A and the other B.
2. A sterile swab was smeared across the eyelid of one of the women, and then placed in sample B. After the swab was introduced, sample B was closed immediately. The procedure took approximately 20 s. Sample A was opened and then closed after 20 s, but no swab was placed in the sample.
a) What purpose does sample A serve?
b) Why did the experimenters swab the eyelid of one of the women?

3. Bacteria populations were sampled every day for the next two weeks. The results are shown in the graph below.



c) Which bacterial population grew the fastest in the mascara?
d) On which day was the population greatest in sample A? In sample B?

e) What was the population size of bacteria found on day 7 in sample A? In sample B?
f) Where did the bacteria in the samples come from?

Application Questions

1. Conclusion #1: The experimenters concluded that the mascara had many essential nutrients that promoted the growth of the bacteria. Do you agree with this conclusion? Provide reasons that will support your evaluation.
2. Conclusion #2.. The experimenters concluded that the bacteria that grew on the skin reproduced faster than those found in the air. Do you agree with this conclusion? Provide reasons to support your evaluation.
3. The experimenters disagreed on the reason why the population of bacteria began to decline in sample B after day 7. Read both conclusions carefully. You will be asked to evaluate them.

a) One of the experimenters concluded that the mascara was capable of supporting a maximum number of bacteria. Once the population of bacteria reached 50 000 per gram of mascara, the population began to decline because many of the nutrients had been used up. Do you agree with this conclusion? Provide reasons to support your evaluations. What additional information would you want to collect before accepting this experimenter's conclusion?

b) The second experimenter concluded that the population in sample B decreased because the overpopulated community produced an enormous amount of wastes. Eventually the wastes began to kill many bacteria. As poisonous wastes began to accumulate, the population of bacteria began to decline. Do you agree with this conclusion? Provide reasons to support your evaluation. What additional information would you want to collect before accepting this experimenter's conclusion?