Unit 1, Worksheet 2: What factors affect population growth?

1) White-tailed deer are native to both North and South America. They can be found in many areas of the United States. They can adapt to a wide range of habitats and eat a large variety of plants, including leaves, fruit, bark from sapling trees, flowers, corn and even poison ivy. All states track the population of deer by various methods. In Ohio the population between 2000 and 2010 can be seen in Figure 1.

The main predators for deer in Ohio are human hunters and coyotes.

a) Based on the graph what might have happened to the number of deer predators between 2000-2004? Support your reasoning with evidence.

b) What is happening to the deer population between the years 2005 to 2010? Support with reasoning from our model of population growth.
c) During the same period, 2005-2010, what might have also happened to the number of deer hunting licenses during this time period? What evidence do you have to support this in terms of our model of population growth?

2) A farmer in Northern Ohio has been setting traps for years to determine what pests are on the farm as well as their approximate numbers. This allows her to determine any preventative measures she should take in the future to protect her crops.

The data table at the right shows the number of Brown Marmorated Stink Bugs that she captured over the years.

<table>
<thead>
<tr>
<th>Year</th>
<th>Average number of Brown Marmorated Stink Bugs (BMSB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011</td>
<td>150</td>
</tr>
<tr>
<td>2012</td>
<td>425</td>
</tr>
<tr>
<td>2013</td>
<td>1213</td>
</tr>
<tr>
<td>2014</td>
<td>3465</td>
</tr>
<tr>
<td>2015</td>
<td>9895</td>
</tr>
</tbody>
</table>

a) What would a graph of this situation look like?
b) Using the graph and your knowledge of the population growth model write an explanation to the farmer concerning what is happening to the BMSB population on her farm. Be sure to include any recommendations for the future.

c) If no predators for the stinkbug are found in the next few years, demonstrate in a storyboard what might happen to the population of BMSB on this farm over the next five years (from 2016-2021).

d) On the graph above demonstrate what would occur if a predator were found for the BMSB. Demonstrate by sketching a graph using a different color or a dotted line.
3) The following graph was constructed using data collected while growing E. coli on a large petri dish with unlimited food and at their optimal temperature of 37°C.

- a) Explain what factors could have produced the shape obtained and why that might be so.

- b) What would happen to the population of E. coli as time passes and the food supply becomes limited? Draw your prediction on the graph above by continuing the current line.

- c) If another student conducted a similar experiment but grew the bacteria in a larger container what would happen to the data obtained? Sketch your prediction on the graph above using a dotted line.

- d) If another student conducted a similar experiment but grew the bacteria in a container so larger that the bacteria had unlimited space in which to grow what would happen to the data collected? Sketch your prediction on the graph above using a different colored line.