HS Lesson 1 Student Worksheet B

We are going to use a computational model to generate graphs, to evaluate the factors that can affect population sizes in an ecosystem, using a simulation built to represent rabbits and wolves in a forest.

Part A

Before we collect data, make some predictions about **factors in the ecosystem** that might affect the rabbit population over a short period of time.

How will the rabbit population be affected if there is?

An Island Boundary	No Island Boundary (Mainland forest)	More Space	More Predators	Fewer Predators	Less Food

***Please note that links may connect you with an English language site. Please use your web-browsers translation services to translate. ***

Directions to collect data with the simulation:

- Go to this Rabbits and Wolves simulation website.
- Click on View/Modify Parameters.
    - Choose View/Modify Wolf Parameters.
        - Change Maximum Wolf Age to 25. Save the change.
- Return to the simulator.
- Change the forest size to **Small** and the forest border to **Island.**
- Open View Population Graph.
- Click the Step Simulation button 32 to 34 times. (It can be hard to be exact, that's okay.)
- Open the Cumulative Stats. Record the number of rabbits that are living, died, and were born.
- Make a rough sketch of the shape of the BLUE rabbit population line shown on the population graph. This is the BASELINE data for our island ecosystem.

Change the forest border to **Toroid** (to represent the mainland).

- Reset the simulation.

- Repeat the 32 clicks. Record the rabbit numbers and shape of the blue rabbit population graph. This is the Mainland data.

Change the forest border back to **Island.**
Change the size of the forest to **Huge.**

- Reset the simulation.
- Repeat the 32 clicks. Record the rabbit numbers and shape of the blue rabbit population graph. This is the More Space data.

Change the size of the forest back to **Small.**
Open the View/Modify Parameters window.
Open the Start Up Parameters.
Change the **number of wolves to 15.**

- Reset the simulation.
- Repeat the 32 clicks. Record the rabbit numbers and shape of the blue rabbit population graph. This is the More Predators data.

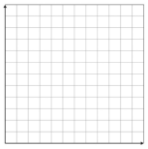
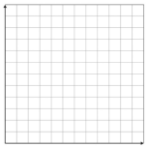
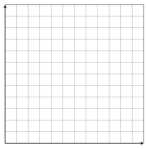
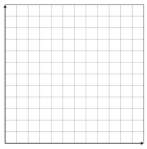
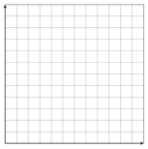
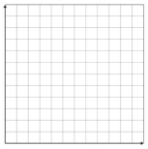
Open the View/Modify Parameters window.
Open the Start Up Parameters.
Change the **number of wolves to 0.**

- Reset the simulation.
- Repeat the 32 clicks. Record the rabbit numbers and shape of the blue rabbit population graph. This is the Fewer Predators data.

Open the View/Modify Parameters window.
Open the Start Up Parameters.
Change the number of wolves back to **5.**
Open the Miscellaneous Parameters.
Change the **Grass to 0.**

- Reset the simulation.
- Repeat the 32 clicks. Record the rabbit numbers and shape of the blue rabbit population graph. This is the Less Food data (grass is not re-growing after being eaten).

Rabbit Population Limiting Factors Data Table

Cumulative Stats: Number of Rabbits after 32 Iterations	Baseline (Small Island Ecosystem)	Mainland	More Space	More Predators	Fewer Predators	Less Food
	Island Small Forest 5 wolves	Toroid (Mainland) Small Forest 5 wolves	Island Huge Forest 5 wolves	Island Small Forest 15 wolves	Island Small Forest 0 Wolves	Island Small Forest 5 Wolves Grass does not regrow
Living						
Died						
Born						
Sketch the shape of the blue line (Rabbits) on the population graph						

Record your current observations below, then compare them to your predictions.

Which limiting factors caused changes in the rabbit population?	
Which limiting factors changed the rabbit population the most?	
In the first five factors, what was the trend shown by the shape of the blue	

line?	
Does this line shape show a population that is changing, or stable? Explain.	
In the Less Food graph, what was the trend shown by the shape of the blue line?	
Does this show a population that is changing, or stable? Explain.	

Part B

Now let's look at a small island forest, with 20 rabbits and normal grass regrowth at a larger scale (more iterations, over a longer period of time.) We are going to focus on the relationship between the rabbits and the grass, so we will set the wolves to 0.

Make a prediction:

Will the rabbit population continue to increase, or will it stabilize over time? Explain your prediction.	

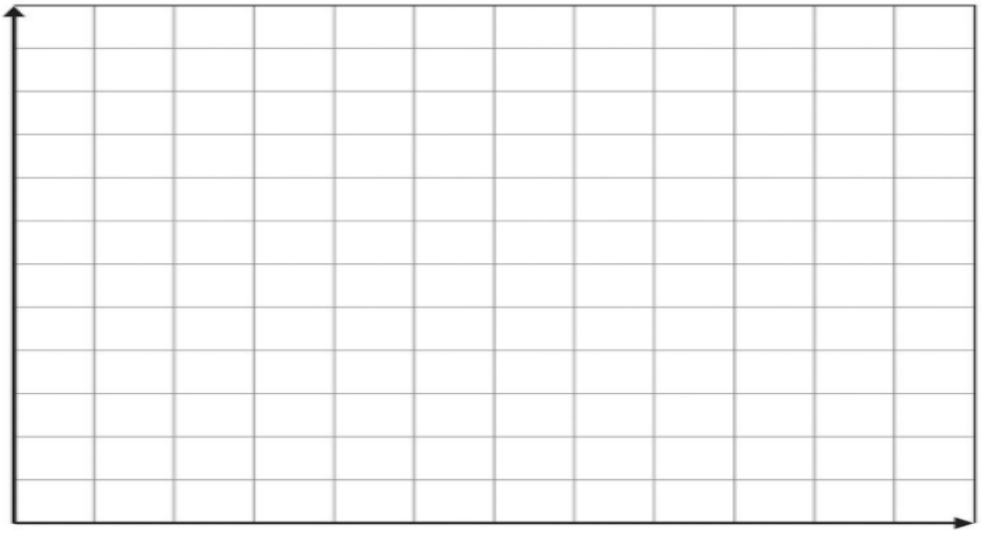
Return to the simulation here.

- Make sure that you are starting with 0 wolves and 20 rabbits in the Start Up Parameters.

- Make sure you've reset your Grass Growth to 1 in the Miscellaneous Parameters.
- Set your Forest Size to Small and your Forest Border to Island.
- Make sure you Reset the Simulation.

Now, open the Population Graph, and run the simulation for about 400 iterations. (Hint: Use the Run Simulation button - not the Step Simulation button. You can increase the speed.)

Sketch the shape of the pattern you see for rabbits and grass:



What does this tell you about the relationship between rabbits and grass?	
What is limiting the population of the rabbits?	
Compare this graph to the graphs you sketched in Part A. How does the shape of the graph change over time?	
Would you consider the rabbit population on this	

graph to be stable, or changing? Why?	