

Student Guide Sheet

The goal of this activity is for you to explore the patterns of balance and imbalance in ecosystems. You will work in small groups at a computer.

Simulation #1: Rabbits and Grass

Task 1: Observe what happens when you run Simulation #1 without making any changes.

Steps:

1. Click the Setup button.
2. Click the Go button and carefully observe what happens.
3. As a group, think about the answer to this question: What do you think is going on between the rabbits and the grass? Leave the program running while you discuss what is going on so you can see the beginning of a pattern in the simulation and graph.
4. As a group, discuss what you think the pattern means. Why are you seeing this pattern? What is happening to the rabbit population?
5. Write down your group's answers to both questions in your journals or on a separate piece of paper.

Task 2: As a group you are going to try to create different patterns by changing one slider at a time. Before you click Go you will need to write down the group's predictions for what will change about the pattern.

Steps:

1. Predict what will happen if you increase the number of rabbits. Increase the amount as much as you want.
2. Click the Setup button.
3. Make sure you write down the original number and the new number in your journal so you can reproduce your results.

4. Click the *Go* button after you change the number in the slider.
5. Observe the changes and write down what happened, and if it matches your predictions.
6. Do this again but make the number of rabbits smaller than the original number.
7. Write what the new number is in your journal so you can reproduce your results.
8. Observe the changes and write down what happened, and if it matches your predictions.
9. Now return the number value to its original amount and change the birth rate of the rabbits using the hatch-threshold slider. You can choose to increase it (the rabbits will have babies faster) or decrease it (the rabbits will have babies slower).
10. Make sure you write down your predictions and the new number.
11. Once you have finished observing the changes write down what happened, and if it matches your expectations.

Task 3: Now that you have played around with this simulated environment, you have a sense of how it works and how changes can affect the system. Try to create a balanced environment.

Steps:

1. Before you begin this experiment discuss with each other what a balanced ecosystem would look like. What does a balanced ecosystem mean to you? Come up with a group definition and write it in your journals.
2. Click the **Setup** button.
3. Play around with the sliders and see if you can create a simulation that shows your definition of a balanced ecosystem.
4. Click the **Go** button after you have changed the numbers in the sliders.
5. Write down the numbers so your simulation can be reproduced.

Before moving on to Simulation #2, your teacher will call you back together to discuss what you have learned so far.

Simulation #2: Rabbits and Foxes

Task 1: Observe what happens when you run the Simulation #2 without making any changes.

Steps:

1. Click the Setup button.
2. Click the Go button and carefully observe what happens.
3. As a group, think about the answer to this question: What do you think is going on between the rabbits and the foxes? Leave the program running while you discuss what is going on you can see the beginning of a pattern both in the simulation and in the graph.
4. As a group, discuss what you think the pattern means. Why are you seeing this pattern? What is happening to the fox population? What is happening to the rabbit population? Why?
5. Write down your groups' answers to both questions in your journals or on a separate piece of paper.

Task 2: As a group you are trying to create different patterns by changing one slider at a time. Before you click Go you will need to write down the group member's predictions of what you all think will change about the pattern.

Steps:

1. Predict what will happen if you increase the number of rabbits. Increase the amount as much as you want.
2. Click the Setup button.
3. Click the Go button after you have changed the number in the slider.
4. Discuss the results. What happened? Write a brief summary of what you think changed. Describe the new graph.
5. Click the Setup button
6. Predict what will happen if you increase the number of foxes. You can increase the amount as much as you want.
7. Click the Go button after you have changed the number in the slider.

8. Discuss the results. What happened? Write a brief summary of what you think changed. Describe the new graph.
9. Don't forget to write the new number in your journal so you can reproduce your results.
10. Observe the changes and write a brief paragraph recording your observations and predictions.

Task 3: Now that you have played around with Simulation #2, you have a sense of how it works and how changes can affect the system. Try to create a balanced environment by using the same definition of balance in an ecosystem from Simulation #1.

Steps:

1. Click the Setup button.
2. Play around with the sliders and see if you can create a simulation that shows your definition.
3. Click the Go button after you have selected the numbers on the sliders.
4. Write down the numbers so your simulation can be reproduced.
5. Write a brief paragraph discussing how hard or easy it was to create a "balance" and why you think that is.

After Simulation #2*, your teacher will call you back together for another class discussion on what you have learned.

*StarLogo v1.2.2 Developed by Mitchel Resnick, Andrew Begel, Vanessa Colella, Eric Klopfer, Molly Jones, Bill Thies, Brian Silverman, Matthew Notowidigdo, Adam Eames, Max Planck, and Sumita Kumar at the Media Laboratory, MIT, Cambridge, Massachusetts, with support from the National Science Foundation and the LEGO Group. Prior development by Monica Linden, Alice Yang, and Ankur Mehta. For use by members of the StarLogo Users Group. For information about joining the StarLogo Users Group, send email to starlogo-request@media.mit.edu. For more information, see <http://www.media.mit.edu/starlogo>. This distribution is approved by Walter Bender, Executive Director of the Media Laboratory at the Massachusetts Institute of Technology. Copyright 2001 by the Massachusetts Institute of Technology. All rights reserved.