

Name: _____ Date: _____

Gizmos: Food Chain

Vocabulary: consumer, ecosystem, equilibrium, food chain, population, predator, prey, producer

Prior Knowledge Questions (Do these BEFORE using the Gizmo.)

The *Food Chain Gizmo*™ shows a **food chain** with hawks, snakes, rabbits, and grass. In this simulation, the hawks eat snakes, the snakes eat rabbits, and the rabbits eat grass.

- Producers** are organisms that do not need to eat other organisms to obtain energy.
 - Which organism is a producer in this food chain? _____
 - Where does the producer get its energy? _____
- Consumers** must eat other organisms for energy. Which organisms are consumers in this food chain? _____

Gizmo Warm-up

The SIMULATION pane of the Gizmo shows the current **population**, or number, of each organism in the food chain.

- What are the current populations of each organism?

Hawks: _____ Snakes: _____ Rabbits: _____ Grass: _____

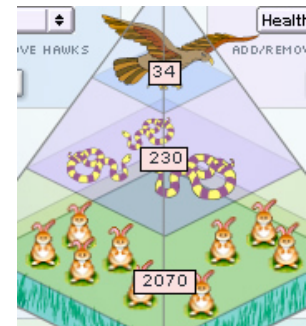
Select the BAR CHART tab.


Click **Play** (▶).

- What do you notice about each population as time goes by?

****If populations don't change very much over time, the ecosystem is in **equilibrium**.****

- Compare the equilibrium populations of the four organisms. Why do you think populations decrease at higher levels of the food chain?



Activity A: Predator-prey relationships	<u>Get the Gizmo ready:</u> <ul style="list-style-type: none"> • Click Reset (⏮). • Check that the BAR CHART tab is selected. 	
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Question: **Predators** are animals that hunt other animals, called **prey**.
How do predator and prey populations affect one another?

- Run the Gizmo with several different starting conditions. You can use the + or - buttons to add or remove organisms, or you can choose **Diseased** from the dropdown lists.

Create a Hypothesis:

1. If the population of a predator were decreased, what would happen to the prey?

2. If the population of the prey were decreased, what would happen to the predator?

3. Based on your hypothesis, predict how changing the rabbit population will affect the other organisms at first. Write "+" for increase or "-" for decrease next to each "Prediction" in the table.

Change	Grass	Snakes	Hawks
Doubling rabbit population	Prediction: Result:	Prediction: Result:	Prediction: Result:
Halving rabbit population	Prediction: Result:	Prediction: Result:	Prediction: Result:

Now, test your hypothesis:

- Add rabbits until the population is about twice as large as it was (about 5,000 rabbits).
- Click **Play**, and then **Pause** (⏸) after approximately ONE month.
- Next to each "Result" line in the table, write "Increase" or "Decrease."

4. How did doubling the rabbit population affect the grass, snakes, and hawks at first?

Click **Reset** and then halve the rabbit population (about 1,300 rabbits).

Record the results for this experiment in the table as well.

5. How did halving the rabbit population affect the grass, snakes, and hawks at first?

6. Predict how changing the snake and hawk populations will affect the other organisms within the first month. In the tables below, write your predictions.

Change	Grass	Rabbits	Hawks
Doubling snake population (about 500)	Prediction:	Prediction:	Prediction:
	Result:	Result:	Result:
Halving snake population (about 140)	Prediction:	Prediction:	Prediction:
	Result:	Result:	Result:

Change	Grass	Rabbits	Snakes
Doubling hawk population (about 100)	Prediction:	Prediction:	Prediction:
	Result:	Result:	Result:
Halving hawk population (about 20)	Prediction:	Prediction:	Prediction:
	Result:	Result:	Result:

Click **Reset**.

Try each experiment with the Gizmo. Record each result after one month.

7. How did increasing the snakes affect the grass? _____

Explain why: _____

8. How did increasing the hawks affect the rabbits? _____

Explain why: _____

9. In general, what effect did removing prey have on predators? _____

10. What effect did removing predators have on prey? _____

Extend your thinking: In North America, many top predators, such as wolves, have been driven nearly to extinction. What effect do you think this has on their main prey, deer? Write your answer on a separate sheet, and/or discuss with your classmates and teacher.
