Teacher's Notes

Prey vs. Predator—Win, Lose, or Draw?

Materials Included in Kit (for eight groups of four students each)

Multicolored wrapping paper, 2′ × 2′, 8

Seeds, 7–1 lb bags of kidney, white, black, and pinto beans

Additional Materials Needed

Blindfold (optional)

Stopwatch

Graph paper or computer graphing program

Pre-Lab Preparation

Optional: Laminate multicolored wrapping paper to increase durability.

Safety Precautions

This laboratory activity is considered nonhazardous. Remind students to wash their hands thoroughly with soap and water before leaving the laboratory.

Disposal

Please consult your current *Flinn Scientific Catalog/Reference Manual* for general guidelines and specific procedures, and review all federal, state and local regulations that may apply, before proceeding. Beans may be saved for future use or discarded according to Flinn Suggested Disposal Method #26a.

Connecting to the National Standards

This laboratory activity relates to the following National Science Education Standards (1996):

Unifying Concepts and Processes: Grades K–12

Evidence, models, and explanation

Evolution and equilibrium

Content Standards: Grades 5–8

Content Standard C: Life Science, reproduction and heredity, regulation and behavior, populations and ecosystems, diversity and adaptations of organisms

Content Standard F: Science in Personal and Social Perspectives, populations, resources, and environments

Content Standards: Grades 9–12

Content Standard C: Life Science, biological evolution, interdependence of organisms; matter, energy, and organization in living systems

Content Standard F: Science in Personal and Social Perspectives, population growth

Lab Hints

- Enough materials are provided in this kit for 32 students or eight groups of four students each. All materials are reusable. This activity may be completed in one 50 minute class period and the post-lab questions completed the day after the lab.
- Prior to beginning the activity, you may want to empty the individual bags of seed into separate containers for easier access by all members of each group. Approximately 112 g (4 oz) per student should be sufficient to complete the activity.
- If "hunting" for three seconds seems to be too much time for certain "environments," feel free to reduce "hunting" time to two seconds.
- Randomly distribute the "environments" to each group to ensure greater diversity in the overall results.
- To simulate the many different environments that are found on Earth, you may want to collect additional pieces of multicolored paper in addition to the ones included in the kit.
- Laminating the wrapping paper will preserve it for long-term use.

Teacher's Notes *continued*

- Since all groups are basically doing the same thing, at some point during the data collection give each group some environmental factor that will affect either one or both populations, i.e., a drought, flood, fire, disease, overgrazing, hunting, or trapping. Prey and/or predators should be removed or added accordingly.
- Students should record the environmental change that is given to them at the bottom of the data table and indicate when that change occurred by writing a star (*) next to a generation number in the left-hand margin.
- When all data are collected, display each group's "environment" in front of the class and write the highest number of prey survivors below it. Students will need these data to answer Discussion Questions 4*a, b,* and *c*.
- You may want to discuss the difference between linear and exponential growth rates using student's graphs.
- Take time to have student groups report and comment on their results (Questions 1–3) then, discuss the answers to Questions 4*a–c* and the four questions in the introduction:

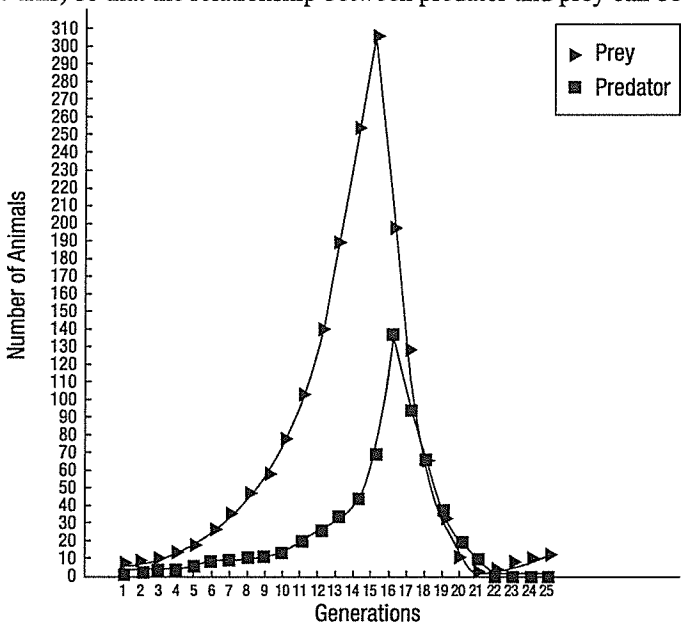
  a. How are an organism's adaptations acquired?
  b. Based on the results of this activity, what happens when something in an organism's environment changes?
  c. When environmental changes take place, do organisms leave the area, do they just die and become extinct, or do organisms develop characteristics they didn't already have to enable them to survive and reproduce?

Sample Data *(Student results may vary. Data do not include any external environmental factors.)*

Generation	Prey Type ( )	Predator Type ( )	Total Prey Eaten	Prey Survivors	Predator Deaths	Predator Survivors	Predator Offspring
1	*3*	*1*	*0*	*3*	*1*	*0*	*0*
2	*6*	*1*	*2*	*4*	*0*	*1*	*0*
3	*8*	*1*	*2*	*6*	*0*	*1*	*0*
4	*12*	*1*	*3*	*9*	*0*	*1*	*1*
5	*18*	*2*	*6*	*12*	*0*	*2*	*2*
6	*24*	*4*	*8*	*16*	*1*	*3*	*2*
7	*32*	*5*	*11*	*22*	*1*	*4*	*3*
8	*44*	*7*	*15*	*29*	*2*	*5*	*5*
9	*58*	*10*	*19*	*39*	*3*	*7*	*5*
10	*78*	*12*	*26*	*52*	*3*	*9*	*8*
11	*104*	*17*	*34*	*70*	*5*	*12*	*11*
12	*140*	*23*	*46*	*94*	*8*	*15*	*15*
13	*188*	*30*	*62*	*126*	*9*	*21*	*21*
14	*252*	*42*	*101*	*151*	*8*	*34*	*34*
15	*302*	*68*	*204*	*98*	*0*	*68*	*68*
16	*196*	*136*	*133*	*63*	*92*	*44*	*44*
17	*126*	*88*	*95*	*31*	*56*	*32*	*31*
18	*62*	*63*	*47*	*15*	*47*	*16*	*15*
19	*30*	*31*	*24*	*6*	*23*	*8*	*8*
20	*12*	*16*	*11*	*1*	*12*	*4*	*3*
21	*2*	*7*	*2*	*0*	*6*	*1*	*0*
22	*3*	*1*	*1*	*2*	*1*	*0*	*0*
23	*4*	*1*	*1*	*3*	*1*	*0*	*0*
24	*6*	*1*	*2*	*4*	*0*	*1*	*0*
25	*8*	*1*	*3*	*5*	*0*	*1*	*1*

Answers to Post-Lab Questions

1. Graph the data from the table above for all 25 generations. Place the predator and prey data (found on the first two columns) on the same axis (*x*-axis) so that the relationship between predator and prey can be easily observed.



2. Did some species of "prey" survive and produce more offspring in your group's environment than other prey in the same environment? If yes, why? If no, why not?

   Student answers will vary.

3. How did the environmental factor that was given to the group by the instructor affect the prey and/or predator populations? (Briefly describe what happened.)

   Student answers will vary.

4. After graphing the data, explain the relationship between predators and prey as shown by the graph. Be specific.

   Although the number of animals of prey and predators are different their populations mirror each other. If the prey population increases so does the predator and vice versa. If there is less prey to eat the predators start to die off as there is no food to eat.

5. *a.* Did the prey species that survived and produced the most offspring in one group's environment survive and produce the most offspring in another group's environment? Why or why not?

   Student answers will vary.

   b. How does the answer to 5*a* relate to what happens to populations of organisms in nature when their habitat is changed or destroyed?

   Student answers will vary.

   c. Does this ability to survive and produce many offspring in spite of environmental changes apply to human populations as well? Give a specific example from events in the world to explain your answer.

   Student answers will vary.

Reference

This simulation is an adaptation of a game produced many years ago by Urban Systems Inc. for use in the home. This activity may serve as an introduction to how computers are used to model real life situations.

Materials for *Prey vs. Predator—Win, Lose, or Draw? Super Value Kit* are available from Flinn Scientific, Inc.

Catalog No.	Description
FB1746	Prey vs. Predator—Win, Lose, or Draw? Super Value Kit

Consult your *Flinn Scientific Catalog/Reference Manual* for current prices.