Deer Me: A Predator/Prey Simulation

National Science Content Standards:

Life Science Standard
- Regulation and Behavior
- Populations and Ecosystems

Unifying Concepts and Processes
- Systems, order, and organization
- Evidence, Models and Explanation

Vocabulary:
Predator
Prey
Food chain/web
Population

Materials:
- About 250 Deer Cards – you may want to have extras on hand
- About 50 Wolf Cards
- Student worksheets: one per student
- Defined "forest"
- Directions for simulation for each group

Introduction:
In this activity, students will simulate the interactions between a predator population of gray wolves and a prey population of deer in a forest. After collecting the data, the students will plot the data and then extend the graph to predict the populations for several more generations. Before playing, review the definitions for food chain, population, predator, and prey.
This activity will work well either before or after playing *WolfQuest.*

Objectives:
At the end of this activity, the student will:
1. Identify predator/prey relationships and how they co-exist in nature.
2. Examine the changes that populations undergo to keep a balance in the ecosystem.
3. Create a graph illustrating population changes in a predator/prey relationship.

Procedure:
Teacher Prep:
✓ Make 250 "Deer" cards and 50 "Gray Wolf" cards per group. It is recommended to make these cards out of card stock paper and laminate them for repeated use each year.
✓ Copy one worksheet for each student.

Set up: Heterogeneous groups of 4; each with a defined "forest".

Directions:
1. Determine the size of your forest. Using your table works well but the space can be defined using masking tape, if necessary. You may also make "forests" using 2 sheets of 11x17 construction paper taped together.

2. Distribute 3 deer in the forest by tossing 3 deer cards on your "forest".

3. Toss one gray wolf card in an effort to catch a deer. (At this point in the activity there is no way that the gray wolf can catch the 3 deer that it needs to survive and reproduce. The gray wolf is not allowed to skid across the table and the deer should be distributed in the forest.)

4. Complete the data table on Activity Sheet 2 for generation #1. The gray wolf will starve and there will be no surviving gray wolf or new baby wolves.

5. At the beginning of generation #2, double the deer left at the end of generation #1 by tossing three new deer cards. A new gray wolf immigrates into the forest and is interacting with the deer by being tossed on the table to try to capture the dispersed deer.

6. Eventually the deer population increases to a level that allows the wolf to catch 3 deer in a single toss. If the wolf catches 3 deer, it not only survives but it reproduces, too. It has one baby wolf for each 3 deer that it catches. Therefore, if it catches 6 deer, it will have 2 babies. Wolves are not allowed to cheat, but they should try to be efficient. (Stupid wolves result in an overabundance of deer.)

7. As the number of wolves increases, throw each wolf card once for each wolf. Record the number of deer caught by each wolf. The simulation is more realistic if the number of new baby wolves is based on each wolf's catch rather than merely the total number of deer caught in a generation.

8. There are always at least 3 deer at the beginning of a generation. If and when the entire deer population is wiped out, then new deer immigrate into the forest.

9. Remember that the number of deer in the forest needs to be correct at all times. Remove the deer caught and add new ones as indicated by the data table.

10. Model about sixteen generations and predict nine more, or up to a total of 25 generations. Base the prediction on the pattern observed during the first sixteen generations.

DEER ME!
How does a population of predators affect a population of prey?

DIRECTIONS:

1. Determine the size of your forest. Using your table works well but the space can be defined using masking tape, if necessary.

2. Distribute 3 deer in the forest by tossing 3 deer cards on your "forest".

3. Toss one gray wolf card in an effort to catch a deer. (At this point in the activity there is no way that the gray wolf can catch the 3 deer that it needs to survive and reproduce. The gray wolf is not allowed to skid across the table and the deer should be dispersed, or spread, out in the forest.)

4. Complete the data table on your worksheet for generation #1. The gray wolf will starve and there will be no surviving gray wolf or new baby wolves.

5. At the beginning of generation #2, double the deer left at the end of generation #1 by tossing three new deer cards into your forest. A new gray wolf immigrates into the forest and is interacting with the deer by being tossed on the table to try to capture the dispersed deer.

6. Eventually the deer population increases to a level that allows the wolf to catch 3 deer in a single toss. If the wolf catches 3 deer, it not only survives but it reproduces, too. It has one baby wolf for each 3 deer that it catches. Therefore, if it catches 6 deer, it will have 2 babies. Wolves are not allowed to cheat, but they should try to be efficient. (Stupid wolves result in an overabundance of deer.)

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8. There are always at least 3 deer at the beginning of a generation. If, and when, the entire deer population is wiped out, then new deer immigrate into the forest.

9. Remember that the number of deer in the forest needs to be correct at all times. Remove the deer caught and add new ones as indicated by the data table.

10. Model sixteen generations and predict nine more for a total of 25 generations. Base your predictions on the pattern observed during the first sixteen generations. Each person should make their own predictions without the help of their group members.

OH DEER!

How does a population of predators affect a population of prey?

Follow the directions on your handout to complete your data table for generations 1-16. You will use these numbers to make predictions for the rest of the generations of deer. When you are finished, graph the number of wolves and the number of deer remaining for the 25 generations to illustrate the relationship between predators and prey.

Deer Generation	# of Wolves	# of Deer Caught	# of Wolves Starved	# of Wolves Surviving	# of Deer Offspring	# of Deer Remaining
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
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24						
25						

Using complete sentences summarize the relationship between the population size of wolves and deer. You may choose to use the words "if" and "then" to show a cause and effect relationship. Use the back side of your worksheet.

DEER	DEER	DEER	DEER
DEER	DEER	DEER	DEER
DEER	DEER	DEER	DEER
DEER	DEER	DEER	DEER
DEER	DEER	DEER	DEER
DEER	DEER	DEER	DEER
DEER	DEER	DEER	DEER
DEER	DEER	DEER	DEER

GRAY WOLF	GRAY WOLF	GRAY WOLF
GRAY WOLF	GRAY WOLF	GRAY WOLF
GRAY WOLF	GRAY WOLF	GRAY WOLF
GRAY WOLF	GRAY WOLF	GRAY WOLF
GRAY WOLF	GRAY WOLF	GRAY WOLF