Date: _____

Your Name: _____

Name(s) of Partner(s): _____

NEW ENGLAND
COMMON ASSESSMENT PROGRAM

Released Science Inquiry Task

Fox and Rabbits

2011

Grade 8

Inquiry Booklet

Science

Directions:

In this task, you and a partner will conduct a scientific investigation that explores the relationship between predator and prey species. Scientists often make models of a system to guide their investigations. In this investigation, you will use a model to investigate the relationship between a fox and a rabbit population.

The following Word Bank defines terms that you will need to understand throughout this investigation.

Word Bank

Average	a typical number for a data set; a value that is found by dividing the sum of a set of terms by the number of terms **Example:** The average of 4, 5, and 9 is $\dfrac{4 + 5 + 9}{3} = 6$.
Ecosystem	a part of ecology consisting of the environment, its living parts, and the nonliving parts that affect it
Model	a simple version of something complex; a representation
Predator	an animal that kills other animals for food **Example:** the fox
Prediction	what you think will happen based on prior knowledge and experience
Prey	animals that are caught and eaten by other animals for food **Example:** the rabbits
Shrub	a low woody plant usually with several stems **Example:** a thorny bush
Trial	each time you repeat the same experiment

Fox and Rabbits

A science class is learning how factors cause changes in ecosystems. The class watched a video of a fox hunting rabbits in a New England ecosystem. The students noticed that the rabbits ran into the shrubs when they saw the fox approaching. The teacher pointed out that the shrubs were thorny bushes. The students wondered if the size of the shrubs in the ecosystem affected the number of rabbits caught by the fox. The students decided to investigate the following research question:

What effect does the size of the shrubs in an ecosystem have on the number of rabbits caught by a fox?

The teacher told the students that they could not go outside and observe an ecosystem with a fox and rabbit population over an extended period of time, so they used a model of an ecosystem instead.

The teacher explained that the model represented a stable population of rabbits and shrubs in an ecosystem. The students used the model to show if the size of shrubs in the ecosystem affected the number of rabbits caught by a fox. The students tested four conditions: no shrubs, small shrubs, medium shrubs, and large shrubs. The teacher said that for each condition, there is the same number of shrubs and they are in approximately the same locations.

For the model, the students used a sheet of paper with rabbits printed on it to represent the rabbit population and three transparencies with small, medium, and large shrubs printed on them to represent the shrubs in each ecosystem. The students used five clear plastic circles to represent the fox's hunting areas.

The students gently dropped the plastic circles in random places on the sheet of paper with rabbits printed on it. The students counted the rabbits under or partially under the circles as caught by the fox.

To test the ecosystems with small, medium, or large shrubs, the students laid one of the transparencies with shrubs printed on them over the sheet of paper with rabbits. The students then repeated the process for each shrub size using the other transparencies. The students conducted three trials for each condition.

The inquiry task you will be doing is very similar to the process the students in the story followed.

Materials for the Investigation:
- 1 sheet of paper with rabbits printed on it
- 1 Small Shrubs transparency
- 1 Medium Shrubs transparency
- 1 Large Shrubs transparency
- 5 clear plastic circles

Safety: You will be working with plastic circles and transparencies.
- Do **not** throw the plastic circles at anyone or around the room.
- Do **not** tear or bend the transparencies.

Making a Prediction

Use the information from the story and what you know about ecosystems to make a prediction **on your own** about the students' research question:

What effect does the size of the shrubs in an ecosystem have on the number of rabbits caught by a fox?

Write your prediction.

Explain your reasoning for your prediction.

Conducting Your Investigation

You and your partner(s) will investigate what happens when the model ecosystem changes from having no shrubs, to having only small shrubs, to having only medium shrubs, to having only large shrubs.

Procedure:
Step A: Investigate the number of rabbits caught by a fox in an ecosystem with no shrubs. (For this step, you will only need the sheet of paper with the rabbits printed on it and the five clear plastic circles.)

1. One at a time, **gently** drop the five plastic circles (representing the fox's hunting areas) randomly on your sheet of paper with rabbits printed on it. Be consistent in your method for dropping the plastic circles. All the plastic circles must land completely on the sheet of paper and not overlap. **If any circle lands off the paper or overlaps another circle, drop the circle again**.

2. Count the total number of rabbits **under** or **partially under** the plastic circles. This number represents the number of rabbits caught by the fox.

3. Record the number of caught rabbits in the data table on page 5 in the **"No Shrubs"** column and the row for **Trial 1**.

4. Remove the five plastic circles and repeat steps 1 through 3 to conduct **Trial 2** and **Trial 3**. (Be sure to record your data in the rows for **Trials 2** and **3**.) The circles will likely land in different places for each trial.

5. After you have recorded all your data, calculate the average (rounded to the nearest whole number) for the three trials and record the average in the bottom row of the table.

Step B: Investigate the number of rabbits caught by a fox in an ecosystem with only small shrubs. (For this step, you will need the sheet of paper with rabbits printed on it, the Small Shrubs transparency, and the five clear plastic circles.)

1. Place the **Small Shrubs** transparency over the sheet of paper with rabbits printed on it. Line up the transparency compass points with the rabbit sheet compass points.

2. **Repeat steps 1–5 in Step A**. Drop the plastic circles on the transparency. Be sure to record your data in the **"Small Shrubs"** column of the data table on page 5. Assume rabbits hidden under the shrubs will not be caught by the fox.

3. Remove the Small Shrubs transparency.

Step C: Investigate the number of rabbits caught by a fox in an ecosystem with only medium shrubs. (For this step, you will need the sheet of paper with rabbits printed on it, the Medium Shrubs transparency, and the five clear plastic circles.)

1. Place the **Medium Shrubs** transparency over the sheet of paper with rabbits printed on it. Again, line up the compass points.

2. **Repeat steps 1–5 in Step A**. Drop the plastic circles on the transparency. Be sure to record your data in the **"Medium Shrubs"** column of the data table below. Assume rabbits hidden under the shrubs will not be caught by the fox.

3. Remove the Medium Shrubs transparency.

Step D: Investigate the number of rabbits caught by a fox in an ecosystem with only large shrubs. (For this step, you will need the sheet of paper with rabbits printed on it, the Large Shrubs transparency, and the five clear plastic circles.)

1. Place the **Large Shrubs** transparency over the sheet of paper with rabbits printed on it. Again, line up the compass points.

2. **Repeat steps 1–5 in Step A.** Drop the plastic circles on the transparency. Be sure to record your data in the **"Large Shrubs"** column of the data table below. Assume rabbits hidden under the shrubs will not be caught by the fox.

3. Remove the Large Shrubs transparency.

Data Table: Rabbits Caught by Fox

Rabbits Caught by Fox	No Shrubs	Small Shrubs	Medium Shrubs	Large Shrubs
Trial 1				
Trial 2				
Trial 3				
Average (round to nearest whole number)				

Use this area for calculations:

STOP