

## Inquiry Question

*What is the secret to bunny rabbit survival?*

Name: \_\_\_\_\_

Date: \_\_\_\_\_



How does natural selection work? Survival of a species depends on the traits present in the individuals within that population and on the environmental conditions. Are there individuals in the population that have the necessary traits to be well suited to their environment? The traits needed for survival depend upon the environment that a species is in. There are many environmental factors to consider such as the presence of predators, amount and type of food available, opportunities for camouflage. What traits may give an individual the edge? Keep in mind that it is the environment that determines which traits are the most desirable.

If there are changes in the environment, how well can a species adapt to this change? What role does genetic diversity play in the survival of a species?

This project involves using a computer simulation of a test population of bunny rabbits to see how natural selection works. It will give you a chance to see how the population changes over time depending upon the factors chosen. It shows the effect of predators on the sample population. It shows how different traits enter into a population and how having these different traits present can effect the survival of a species and how the species adapts over time.

General Instructions

The goal of this project is to gain a better understanding of how different traits and environmental factors can effect the population of a species.

**Materials you'll need:**

- the internet for the simulation program at:  
[https://phet.colorado.edu/sims/html/natural-selection/latest/natural-selection\\_en.html](https://phet.colorado.edu/sims/html/natural-selection/latest/natural-selection_en.html)
- **Bunny Rabbit Population Worksheet**

**Ideas and Hints:**

1. Use the simulation to complete the following Bunny Rabbit Population Worksheet.
2. Save your completed work.

**Project submission:**

Upload your completed worksheet to the Biology project drop box.

Name: \_\_\_\_\_

Date: \_\_\_\_\_


## Bunny Rabbit Population Worksheet

### Instructions :

Go to the simulation program at:

[https://phet.colorado.edu/sims/html/natural-selection/latest/natural-selection\\_en.html](https://phet.colorado.edu/sims/html/natural-selection/latest/natural-selection_en.html)

Click on “Intro” and familiarize yourself with the program. This simulation will be used to work through the questions below.

1. In the “Intro” section, start a new simulation by adding a mate. What happens to the bunny population without any limits on food and without predators?
2. Click on “start over” and add a mate. This time click on limited food. What happens to the bunny population after 10 generations when food supply is limited? (hint: with population chosen, click repeatedly on the “-” above where it says population on the y-axis to be able to see the entire population graph)
3. Start over again (  ) and test the effect of predators.
  - a) What happens if you add a predator early in the simulation?
  - b) What happens if predators are added after the rabbit population is well established?
  - c) Is there a way for white bunnies to survive in a world of wolves? Explain how and why. How could this be a sustainable population where they don't take over the world?
4. Start over again and this time, add a mutation of brown fur with limited food and adding wolves once the population is established.
  - a) Choose the brown fur phenotype as a dominant mutation (brown genotypes FF or Ff). Choose pedigree and click on different brown bunnies to see how they resulted. What are the different ways in which a brown bunny could result?
  - b) With the brown fur phenotype chosen as a dominant mutation, what happens to the proportion of brown to white bunnies over time in a summertime world?
  - c) If the brown fur phenotype was chosen as a recessive mutation, how does this proportion of brown to white change in a summertime world?
  - d) How would you predict these proportions of brown vs. white to change in the winter world. Why? Is this seen in the simulation?
5. Now click on “Lab” along the bottom black bar. Notice there are additional mutations of floppy ears and long teeth and an additional environmental factor of tough food.
  - a) Would you expect either floppy ears vs. straight up ears to have an advantage? How could you test this? Does your test support or disprove your hypothesis?
  - b) Under what conditions would you think that long teeth could be an advantage? How can you test this? Does your test support or disprove your hypothesis?
6. How did this simulation show the importance of genetic diversity?