Name:_____   Date:_____

Modeling Natural Selection Activity

This laboratory investigation is a simulation of natural selection. One definition of *simulation* is "the act of representing the functioning of a system or process through the use of a model." During this investigation, you will carry out activities that simulate events in nature that affect the survival of individuals in their environment. The results you and your classmates obtain can be compared to the process of natural selection.

Materials

3 cups (containers)
20 orange rotini
20 yellow rotini
20 green rotini

Procedure

1. You will work in a team of 3 or 4.

2. Obtain 3 cups, each with a different color noodle in it. Check that there are 20 noodles of each color.

3. Put all the noodles into one container and mix them up.

4. Divide your team so that two people act as the "predators" and the remaining 1 or 2 people are the "counters."

5. The Predators are asked to move away from the table. Meanwhile, the counter(s) should go outside, find a grassy area (a light, sandy area would work fine as well) away from other teams and sprinkle the 60 noodles over that area in an even distribution. The noodles are the Prey. Be sure the colors are randomly mixed and distributed.

6. Once the counter(s) is ready, they should go and tell the predators. When you get outside, the predators need to start at opposite ends of the area and start collecting the noodles (prey) and put them into the containers held by the counters. Predators are to pick up their prey noodles one at a time and drop them into the containers.

    a. This procedure simulates the killing and eating of prey and will produce accurate results.

b. Predators are to search while standing up straight, work as fast as possible, and pick up the first noodle noticed at each time. Counters should stand clear of the area to give predators room to work.

7. As the predators drop the prey into the containers, the counters are to count aloud the accumulation. When the total count of prey reaches 40, the predators are to stop.

8. Once you understand the procedure and are ready to begin, let your teacher know.

9. When the predators are finished, all team members need to pick up ALL the remaining noodles and put them in another container. Be careful not to miss any noodles.

10. Return to the classroom.

11. Arrange the survivors in horizontal rows in the order of color listed on the chart below, under Observations and Data. Draw circles on the chart to represent the number of survivors you have of each color, as shown below:

⬤ ⬤ ⬤ ⬤ ⬤ ⬤ ⬤

12. To represent reproduction of the survivors, add 3 noodles of the same color for every survivor in each row of noodles (use noodles from your container or obtain more noodles from the class supply, if necessary). Draw the offspring on your chart. At the far right, write the total number of noodles you have in each row.

13. Leave your noodles organized by rows on your table and visit other tables. Examine the results of the other teams and be prepared to answer questions about what you see.

14. Answer questions 2 and 3, in complete sentences under the Observation and Data section.

15. Before you leave, return the noodles to the containers (sort out the colors again so that you have 2 containers, each with a different color in them).

Observations and Data

1. Record of Survivors

Color	Survivors and Their Offspring	Totals
Orange		
Green		
Yellow		

2. Which color(s) had the most survivor noodles? The least?

3. How do your results compare with the other teams?

Analysis and Conclusions

1. How do the different color noodles used in the investigation represent individuals in a population?

2. How do the results of this investigation apply to the natural selection of organisms in a population?

3. Use as many of the terms as possible from the list below to write a description for the process of natural selection. Please define any of the words in the space below if you are unfamiliar with their meaning.

Word bank: environment, predator, prey, selected, advantage, survival, reproduce, variation, habitat

4. As you already know, DNA is the molecule of life. DNA codes for RNA, which ultimately codes for proteins. Proteins determine traits. Mutations in the DNA code lead to changed traits.

   - How does DNA encode the characteristics of an organism?
   - In what different ways can mutations affect an organism?
   - What does it mean to say that mutations are random?

5. Imagine the following scenario:

   - The white rotini is the "normal" color for the pasta. Imagine the DNA that codes for the white is something like: ATTCGATCC.
   - The green color of rotini is based on the 2nd A turning into a T, for example ATTCGTTCC.
   - The red color of rotini is based on the 2nd A turning into a G, for example ATTCGGTCC.

Using the above scenario, explain the two following questions: How can a simple mutation end up having a major effect on the phenotype of an organism? How does that end up changing the phenotype of a population?