

SEA BEANS ACTIVITY

This activity will allow you to model changes over time in a species of “Sea Bean.” It is important to understand in a generic sense that genetic variation within species (color patterns, shape, etc.) randomly occur. As a result, they may or may not be of benefit to individual organisms. In this activity, you and your classmates will act as predators – selecting prey – in a specific environment. Look for changes that occur over time due to your predation.

MATERIALS:

For each group:

35 Red Kidney Beans

35 Black Beans

1 Metal Dissection Pan

35 White Kidney Beans

1 Die

1 Red Solo Cup

PROCEDURE:

PART I

1. You will work in groups of 3 to 4. Assign the following roles to the members of the group:
 - The **PREDATOR** will use his/her first finger and thumb to pick up as many sea stars as possible with one hand. The other hand must be kept in a pocket or behind his/her back.
 - The **COUNTER** will count how many of each color “sea bean” remains in the pan and how many have been consumed by the predator.
 - The **RECORDER** will complement the Counter and record data on the SEA BEAN WORKSHEET.
 - The **DIE ROLLER/TIMEKEEPER** will determine how many and what type of offspring will be in successive generations, and they will place them on “habitat” (pan). They will also provide timing for each “hunting period.”
2. The dissecting pan will serve as the “habitat” of the “sea beans.” The **PREDATOR** will now face away from the habitat. The **ROLLER** will now place 35 RED KIDNEY BEANS on the habitat.
3. The **ROLLER** will direct the **PREDATOR** to turn around, now facing the habitat. Time the **PREDATOR** for 10 seconds as he/she tries to grab as many sea beans as possible. *Remember:* The **PREDATOR** may use only his/her first finger and thumb, and the other hand must be kept away from the habitat.

Just like in nature, the **PREDATOR** can “consume” only one sea bean at a time. So the **PREDATOR** may grab only one sea bean on each try and place it in the cup. The **PREDATOR** should choose the sea bean first felt or noticed.

4. The **COUNTER** then counts the number of each type of sea bean remaining on the habitat. The **RECORDER** records the information on the data sheet provided.

SEA BEANS ACTIVITY

PART II

For this part of the activity, to determine the type of color variation produced by the sea bean pairs, the **ROLLER** will roll the die. For each pair of remaining sea stars, one offspring will be produced. Genetic variation, caused by mutation within a species, is also random like the roll of the die.

If the **ROLLER** rolls a: 1 or 2 = Red offspring are produced
 3 or 4 = White offspring are produced
 5 or 6 = Black offspring are produced

Note: The color is the only thing determined by the roll of the die. For example, if your group has 15 sea beans left, that would indicate 7 pairs. The group would roll the die only once to determine the color of the 7 new sea stars. If the **ROLLER** rolls a 3 the group would add 7 white sea beans to the environment.

5. The **RECORDER** should record the number of each color sea bean that remains. For the 1st round, this would be the number of RED KIDNEY BEANS, as this is the only color with which you started.
6. The **PREDATOR** turns away from the environment indicating that reproduction may successfully occur. The **ROLLER** rolls the die for the first time to determine the offspring. The “offspring” are added to the habitat. The **ROLLER** should mingle or mix the offspring with the sea beans.

PART III

7. Repeat steps 3 through 6 ten times. Make sure to carefully track your data!
8. Clean up before your group continues to the next portion of the activity. Return all beans to their appropriate cups. Return all supplies back to the class supply station.

PART IV

9. Calculate the percentages of offspring in each generation of sea beans. Show your work on a separate sheet of paper and record the percentages in the data table. To determine the percentage:

$$\% \text{ of surviving sea beans of a color} = \frac{\# \text{ of surviving sea beans of a color}}{\text{total number of sea beans}} \times 100$$

Complete this calculation for each color of sea stars for each successive generation trial.

10. On your data sheet, create a bar graph using the percentages of red offspring.
11. What, if any, changes did you observe in the generations of offspring?

SEA BEANS ACTIVITY

12. How can you explain your results? What did the experiment show about how prey are selected by predators?
13. Which color was the most difficult to hunt? Explain.
14. What caused the differences among the offspring in this activity? How does this relate to real life?
15. What do you think would happen if the offspring colors were brown, red, and black? Why?
16. How would changing the initial environment background color to red have changed your result?
17. Try to come up with another way or ways to modify this activity. What would you hypothesize to be the result of the change(s) you propose?