

Natural Selection in Action!

Piloses Simulation Activity Guide



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How the Piloses Evolved Skinny Noses Classroom Activity Instructions

Objective: Students will discover how adaptation by natural selection affects a population of piloses when environmental changes occur. Guided by the activity, students will:

- Adopt one of the piloses
- Work together as a class to count the number of piloses in each generation
- Graph the number of wider-nosed and thinner-nosed piloses in each generation
- Find out what happens to wider-nosed and thinner-nosed piloses

Duration: Approximately 30-45 minutes, depending on class size (not including reading the book)

Materials:

- *How the Piloses Evolved Skinny Noses* storybook
- *Family Tree Worksheets* (each student will receive one of two types: wider-nosed or thinner-nosed)
- *Graphing worksheets* (one for each student)
- Coloring utensils
 - Optional: two different colors; one to graph the wider-nosed piloses and one to graph the thinner-nosed piloses

Printing Instructions:




- Print enough *Graphing Worksheet* for each student to have their own copy
- Print enough *Family Tree Worksheets* for each student to have their own copy. The number of wider-nosed sheets and thinner-nosed sheets differs based on class size. On the last page of these instructions there is a key that shows the number of wider- and thinner-nosed *Family Tree Worksheets* you will need based on class size
- The *Family Tree Worksheets* will need to be folded and there are dotted lines to guide the folding (see below for simple folding instructions)

Set-up Instructions:

1. Read the *How the Piloses Evolved Skinny Noses* book to your students. This should take about 10-15 minutes.
2. After reading the book, students should go to a place where they have a solid surface to write and color. Preferably, students will sit at tables or desks.
3. Pass out one *Graphing Worksheet* to each student.
4. Shuffle the *Family Tree Worksheets* and pass out one to each student or have the students pick the sheet themselves. You can tell the students that everyone will not

have the exact same sheet. The key for the number of worksheets you need to print is on the last page of this instruction guide.

5. Look at the pictures below. Tell each student to fold their *Family Tree Worksheet* on the dotted lines. Students can fold the sheets with instructions from you, but you may fold them for students if needed.
 - a. Flip the *Family Tree Worksheet* with the blank side facing up.
 - b. Fold the paper into thirds on the dotted lines.
 - Folding Step 1: Fold the bottom section (3rd generation) toward the middle.
 - Folding Step 2: Fold in top section (1st generation) to the middle.
 - End Result: At the end of folding, the only part facing up should be the top section labeled “1st Generation”.

Folding Step 1:	Folding Step 2:	End Result!
		

6. As the activity progresses, students will unfold the *Family Tree Worksheet* and each student will graph the total number of thinner- and wider-nosed piloses in each generation.

Activity Instructions:

1. You can begin by having students individually look at their *Family Tree Worksheet* to see whether their pilose has *wider* nose or a *thinner* nose.
2. Then explain the environmental change to the students:
 - a. **“The piloses are one large population, and each one has a different sized nose. So, each of your individual piloses--whether its nose is wider or thinner--is from the same population. Piloses do not just have two different types of nose sizes, they can have very thin noses, very wide noses, or any kind of nose shape in between.”**

- b. **“All of a sudden, the weather changed and became very hot and sunny all of the time. And the ground went from being green and soft to being dry and hard. It’s still very hot nowadays.”**
 - c. **“Because of the heat, the milli bugs went from moving about all over to moving about only underground where it was cool. Now, most of the bugs stay at the very end of thin underground tunnels.”**
 - d. **“This means that the piloses with thinner noses can reach the milli bugs underneath the ground, but the piloses with wider noses have a hard time reaching their food and can only eat the few milli bugs that sometimes roam on the surface.”**
3. Now, the class will count how many thinner- and wider-nosed piloses are in the population for the 1st generation. You can keep track of the class numbers for each generation by writing or tallying them on the board.
 - a. Have the students with wider-nosed piloses raise their hand and add up the number of wider-nosed piloses for the entire class.
 - b. Have the students with thinner-nosed piloses raise their hand and add up the number of thinner-nosed piloses for the entire class.
 - c. Students will see that in the class, there are more wider-nosed piloses in the 1st generation than thinner-nosed piloses.
4. Each student should then color in a square for each of the piloses in that generation on their own *Graphing Worksheet* with the number of wider-nosed and thinner-nosed piloses for the entire population (class).
 - a. Optional: To help students see the shift in the population of wider-nosed and thinner-nosed piloses, use two different colors for graphing. For example, use red for the thinner-nosed piloses and blue for the wider-nosed piloses.
5. Take a minute to discuss with your students what they think will happen with the next generation of piloses:
 - a. **Which piloses do you think will be healthy and have kids?**
 - b. **Which piloses might not have any children?**
 - c. **Why could the thinner-nosed piloses get a lot of food?**
 - d. **Why could the wider-nosed piloses get little to no food?**
6. After this, assign the students who have wider-nosed piloses to either an “A” or a “B”, alternating. **Tell your students: “The reason for this is that some of the wider-nosed piloses cannot get enough food to be healthy and have children before they die. Some of the others are lucky and can get enough food to have one baby before they die. Counting off will tell us which piloses with wider noses were healthy enough to have one child and which piloses with wider noses died before having any children.”**

- a. The wider-nosed piloses assigned to students with a “A” then die and will not have any children.
 - i. **Tell your students: “Since these piloses could not get enough to eat, they died before they could have any babies and so they did not have any children.”**
 - b. The wider-nosed piloses assigned to students with a “B” will live and have one child.
 - i. **Tell your students: “These piloses were lucky to get enough some food to eat so they were able to have healthy babies.”**
7. Reference the folded *Family Tree Worksheet*.
- a. Students whose wider-nosed piloses died should cross out the pilose on the sheet (because it has died of starvation) and recycle the *Family Tree Worksheet*.
 - b. Students with wider-nosed piloses that lived should fold out their worksheet to show the 2nd generation children and cross out the pilose from the 1st generation (because it has now died of old age).
 - c. Students with thinner-nosed piloses should fold out their worksheet to show the 2nd generation and cross out the pilose from the 1st generation (because it has now died of old age).
8. Now, the class will count how many thinner- and wider-nosed piloses are in the population for the 2nd generation. You can keep track of the class numbers for each generation by writing or tallying them on the board.
- a. Have the students with wider-nosed piloses raise their hand and add up the number of wider-nosed piloses for the entire class.
 - b. Have the students with thinner-nosed piloses raise their fingers to show how many they have and add up the number of thinner-nosed piloses for the entire class.
9. Each student should then color in a square for each of the piloses in that generation on their own *Graphing Worksheet* with the number of wider-nosed and thinner-nosed piloses for the entire population (class).
- a. Optional: To help students see the shift in the population of wider-nosed and thinner-nosed piloses, use two different colors for graphing. For example, use red for the thinner-nosed piloses and blue for the wider-nosed piloses.
10. After this, as in the 1st generation, assign the students who have wider-nosed piloses with either an “A” or a “B”, alternating.
- a. The wider-nosed piloses assigned to students with an “A” will live and have one child each. [Note: Like Step 6, but the meaning of an “A” and “B” is reversed to increase the sense of randomness.] **Tell your students: “These**

piloses were lucky to get enough food to eat so they were able to have healthy babies.”

- b. The wider-nosed piloses assigned to students with a “B” then die and will not have any children. **Tell your students: “Since these piloses could not get enough to eat, they died before they could have any babies and so they did not have any children.”**
11. Reference the folded *Family Tree Worksheet*.
 - a. Students whose piloses died should cross out the pilose on the sheet (because it has died of starvation) and recycle their *Family Tree Worksheet*.
 - b. Students with wider-nosed piloses that lived should fold out their worksheet to show the 3rd generation and cross out the piloses from the 2nd generation (because they have now died of old age).
 - c. Students with thinner-nosed piloses should fold out their worksheet to show the 3rd generation and cross out the piloses from the 2nd generation (because it has now died of old age).
 12. Now, the class will count how many thinner- and wider-nosed piloses are in the population for the 3rd generation. You can keep track of the class numbers for each generation by writing or tallying them on the board.
 - a. Have the students with wider-nosed piloses raise their hand and add up the number of wider-nosed piloses for the entire class.
 - b. Have the students with thinner-nosed piloses raise their fingers to show how many they have and add up the number of thinner-nosed piloses for the entire class.
 13. Each student should then color in a square for each of the piloses in that generation on their own *Graphing Worksheet* with the number of wider-nosed and thinner-nosed piloses for the entire population (class).
 - a. Optional: To help students see the shift in the population of wider-nosed and thinner-nosed piloses, use two different colors for graphing. For example, use red for the thinner-nosed piloses and blue for the wider-nosed piloses.
 14. As a class, have a discussion about what the graphs in each generation look like. Here are some examples:
 - a. **In the first generation, are there more thinner-nosed or wider-nosed piloses?**
 - b. **In the second generation, are there more thinner-nosed or wider-nosed piloses?**
 - c. **In the third generation, are there more thinner-nosed or wider-nosed piloses?**
 - d. **Did the number of piloses with thinner noses increase or decrease over time?**

e. Did the number of piloses with wider noses increase or decrease over time?

15. As a class, have a discussion about what caused the shift in the population. Here are some examples:

- a. Why are there more thinner-nosed piloses in the population nowadays, even though there used to be more wider-nosed piloses in the population before the weather changed?**
- b. What do you think would have happened to the population of piloses if the weather did not change? Would the population have changed?**
- c. How did the piloses evolve skinny noses?**

Summary of Class Activity for Teachers:

- Have students unfold their *Family Tree Worksheets* to understand how each generation of piloses either lives on or dies out.
- Have students color in the total number of wider-nosed and thinner-nosed piloses in each generation, to show how the population is changing overtime.
- Have a larger discussion with the students so they understand how the piloses evolved thinner noses!

Classroom Size	Number of Wider-Nosed <i>Family Tree Worksheets</i> to Print	Number of Thinner-Nosed <i>Family Tree Worksheets</i> to Print
10	7	3
11	8	3
12	8	4
13	9	4
14	10	4
15	10	5
16	11	5
17	12	5
18	12	6
19	13	6
20	14	6
21	14	7
22	15	7
23	16	7
24	16	8
25	17	8
26	18	8
27	18	9
28	19	9
29	20	9
30	20	10
31	21	10
32	22	10
33	22	11
34	23	11
35	24	11