Name _____ Date _____

Why Are Frogs Green?

Natural Selection Activity

Nearly all the frogs we see in our ecosystem are green. Being that frogs tend to live in green grass or in ponds full of green algae, being green gives them an advantage because it allows them to blend into their environment. But were they always green? How did having green skin develop as a common trait?

In this activity, you will simulate a likely scenario on how frogs developed the trait of having green skin.

Materials

- Piece of green card stock
- 100 blue circles
- Goggles
- Petri Dish
- 100 green circles
- 100 yellow circles
- Bubble Wrap
- 5 small containers with lids
- 100 red circles
- 100 orange circles
- Tweezers
- Timer

Ecosystem Conditions

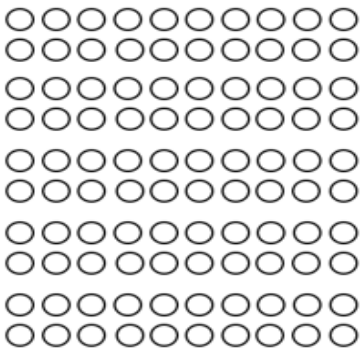
This ecosystem has a carrying capacity for 100 frogs. This means that there are only enough resources, such as food or habitat, to support 100 frogs. If the population were to exceed 100 frogs, some of the frogs would die from hunger or disease. Therefore, at no point in this stimulation can the frog population exceed 100 frogs.

Procedure

1. Place the piece of green card stock on the worktable.
2. Count out 20 circles of each color and scatter them evenly on the piece of card stock.
3. Wrap the outside of a pair of goggles with bubble wrap, one per student, and place them on your head. You should be looking through the bubble wrap, using googles to hold the bubble wrap in place. You only need to wear the googles when it is your turn to hunt for frogs.
4. For each generation, one student should set a timer for 20 seconds while another student puts on the googles and hunts for frogs by using the tweezers to remove colored circles from the green card stock and placing them in the petri dish.
5. After each generation, stop, count, and record the number of frogs removed from the ecosystem, determine how many frogs remain the ecosystem, determine how many pairs of frogs get to reproduce and determine exactly how many baby frogs can be added to the ecosystem without exceeding the carrying capacity.
6. Stop and analyze your results after 5 generations.

Generation One

1. Color in 20 circles for each color of frogs.



2. Have one student set a timer for 20 seconds, while another student, who is wearing the bubble wrapped googles, uses tweezers to pick up circles from the green stock and place them in the petri dish.
3. After 20 seconds, stop and change roles, until each student in the group gets to hunt for frogs.
4. When all the students in the group have taken a turn, stop and count the number of circles in the petri dish.

   Total Number of Frogs removed: _____

5. Since the carrying capacity for this ecosystem is 100, the number of frogs removed will be equal to the number of frogs that can replaced as the surviving frogs reproduce. But the color of the tadpoles produced must be in proportion to the color of the surviving frogs. To do this, we will need to do a bit of math.

6. First, determine the total number of frogs remaining in the ecosystem by subtracting the number of frogs removed from the initial number of frogs.

   Number of initial frogs – Number of frogs removed = Number of remaining frogs

   100 - _____ = _____

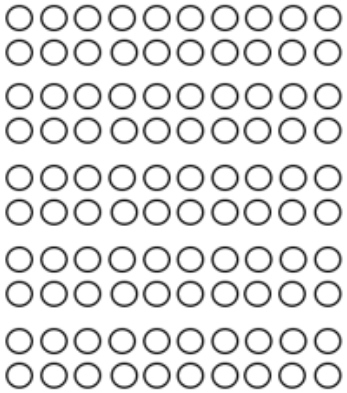
7. Separate, count, and record the number of circles removed of each color, placing the circles back in their respective color container, then complete the table to determine how many tadpoles can be added back into the ecosystem.

	Red	**Orange**	**Yellow**	**Green**	**Blue**
Initial Population	20	20	20	20	20
Number of frogs removed from the Ecosystem					
Number of frogs remaining in the Ecosystem (Subtract)					
Percentage of surviving frogs (divide the number of remaining frogs by the total number of frogs that remain and multiply by 100.)					
*Number of tadpoles produced (multiple the percentage of surviving frogs by the total number of frogs removed)					

* When the total number of tadpoles produced for each color is added together, the result should equal the total number of frogs removed. Any discrepancy should go towards the color of frogs that had the highest surviving number of frogs. If 55 frogs were removed, but the number of tadpoles produced equaled only 54, then 1 extra tadpole would be added to color of frogs that had the most survivors. The result should be that the next generation would begin with 100 frogs.

Generation Two

1. Using the number of tadpoles produced in the table for Generation One, add colored circles to the green card stock, so that this generation begins with a total of 100 frogs.
2. Color in the circles according to their respective number of frogs for each color in the ecosystem.



3. Repeat the hunting process again, having each student taking turns being the predator for 20 seconds.
4. When all the students in the group have taken a turn, stop and count the number of circles in the petri dish.

Total Number of Frogs removed: _____

5. Determine the total number of frogs remaining in the ecosystem by subtracting the number of frogs removed from the initial number of frogs.

Number of initial frogs – Number of frogs removed = Number of remaining frogs

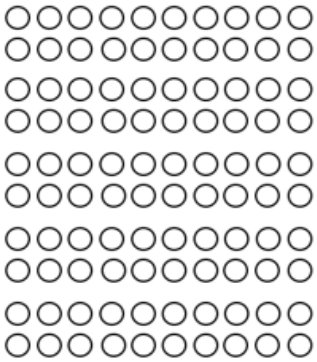
100 - _____ = _____

6. Separate, count, and record the number of circles removed of each color, placing the circles back in their respective color container, then complete the table to determine how many tadpoles can be added back into the ecosystem.

	Red	Orange	Yellow	Green	Blue
Initial Population	20	20	20	20	20
Number of frogs removed from the Ecosystem					
Number of frogs remaining in the Ecosystem (Subtract)					
Percentage of surviving frogs (divide the number of remaining frogs by the total number of frogs that remain and multiply by 100.)					
*Number of tadpoles produced (multiple the percentage of surviving frogs by the total number of frogs removed)					

Generation Three

1. Using the number of tadpoles produced in the table for Generation Two, add colored circles to the green card stock, so that this generation begins with a total of 100 frogs.
2. Color in the circles according to their respective number of frogs for each color in the ecosystem.



3. Repeat the hunting process again, having each student taking turns being the predator for 20 seconds.
4. When all the students in the group have taken a turn, stop and count the number of circles in the petri dish.

Total Number of Frogs removed: _____

5. Determine the total number of frogs remaining in the ecosystem by subtracting the number of frogs removed from the initial number of frogs.

Number of initial frogs – Number of frogs removed = Number of remaining frogs

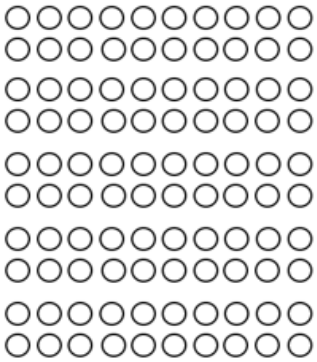
100 - _____ = _____

6. Separate, count, and record the number of circles removed of each color, placing the circles back in their respective color container, then complete the table to determine how many tadpoles can be added back into the ecosystem.

	Red	**Orange**	**Yellow**	**Green**	**Blue**
Initial Population	20	20	20	20	20
Number of frogs removed from the Ecosystem					
Number of frogs remaining in the Ecosystem (Subtract)					
Percentage of surviving frogs (divide the number of remaining frogs by the total number of frogs that remain and multiply by 100.)					
*Number of tadpoles produced (multiple the percentage of surviving frogs by the total number of frogs removed)					

Generation Four

1. Using the number of tadpoles produced in the table for Generation Three, add colored circles to the green card stock, so that this generation begins with a total of 100 frogs.
2. Color in the circles according to their respective number of frogs for each color in the ecosystem.



3. Repeat the hunting process again, having each student taking turns being the predator for 20 seconds.
4. When all the students in the group have taken a turn, stop and count the number of circles in the petri dish.

Total Number of Frogs removed: _____

5. Determine the total number of frogs remaining in the ecosystem by subtracting the number of frogs removed from the initial number of frogs.

Number of initial frogs – Number of frogs removed = Number of remaining frogs

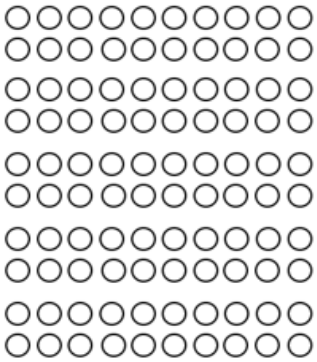
100 - _____ = _____

6. Separate, count, and record the number of circles removed of each color, placing the circles back in their respective color container, then complete the table to determine how many tadpoles can be added back into the ecosystem.

	Red	**Orange**	**Yellow**	**Green**	**Blue**
Initial Population	20	20	20	20	20
Number of frogs removed from the Ecosystem					
Number of frogs remaining in the Ecosystem (Subtract)					
Percentage of surviving frogs (divide the number of remaining frogs by the total number of frogs that remain and multiply by 100.)					
*Number of tadpoles produced (multiple the percentage of surviving frogs by the total number of frogs removed)					

Generation Five

1. Using the number of tadpoles produced in the table for Generation Four, add colored circles to the green card stock, so that this generation begins with a total of 100 frogs.
2. Color in the circles according to their respective number of frogs for each color in the ecosystem.



Analysis

1. Was there a change in the color of the frogs within the population over time?

2. What color frog is the most abundant in generation five?

3. Why do you think this color became the most abundant, over time?

4. Did the individual frogs get to choose the color of their skin?

5. How is the color of a frog's skin determined?

6. Summarize how this simulation demonstrates the theory of natural selection:

7.