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

Hour:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Bird Population Modeling**

In this activity, you will be modeling how a population of birds changes over time. You will investigate the effect (if any) that certain traits have on the survival of these birds and their ability to produce offspring.

**Materials:**

1. A food source container with 200 mL of food
2. An empty cup to act as a “stomach”
3. 2 color cards
4. 2 beak cards
5. A beak (either a fork or a spoon according to your beak cards)

**Traits:**

* 2 blue cards = Blue
* 1 blue, 1 yellow card = Blue
* 2 yellow cards = Yellow
* 2 fork cards = Fork
* 1 fork, 1 spoon card = Fork
* 2 spoon cards = Spoon

**Round 1: Everything is awesome.**

**Feeding:**

1. Get 2 color cards and 2 beak type cards to determineyour traits to start the activity. These traits will represent Generation 1.
2. Find the mass of your empty stomach cup. Record it on your data sheet.
3. During each generation, you and your partner will take turns feeding for 30 seconds. Use your “beak” to transfer as much food as you can from the food source container to your “stomach”. **You may not touch the food source container with your hand. Only your beak may contact the food or the container.**  Your other hand may hold your “stomach” still on the desk. You may not use any other method to transfer food. Any food spilled is lost and will go back into the food source container after each round.
4. After 30 seconds, you will find the mass of your stomach with food in it. Use the triple beam balance. Remember to subtract the mass of the empty cup from the total. Record your data on the data table.

**Reproduction:**

1. You and your partner will place all cards face down on the table. Keep color cards separate from beak cards.
2. Randomly pick up 1 color card of your own, and 1 color card from your partner. Do the same with the beak cards. Record your data on the table.
3. Your cards now represent your offspring. This is Generation 2.

**With new partners each time, continue the cycles of feeding and reproducing for a total of 4 generations. Record your data on the Round 1 Data Table.**

**Round 2: Did you eat enough?**

There will be 4 generations of feeding and reproducing just like the first round. In this round, however, the 2 birds that eat the LEAST in each feeding cycle will die and not reproduce. Follow the procedure above and record all data on the Round 2 Data Table.

**Round 3: Are you drought resistant?**

This round still involves the same feeding and reproducing cycles. In this round, a drought as reduced all food sources by 50%. In addition, the 6 birds that eat the least will die and be unable to reproduce. Record data on the Round 3 Data Table.

**Round 1 Data Table:**

Generation:  Color: \_\_\_\_\_\_\_ \_ Beak Type: \_\_\_\_\_\_\_\_\_\_\_

**Feeding:** Mass of cup + food - Mass of cup = Mass of food

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Reproduction** |  | **Card Drawn** | **Card Drawn** | **Traits of Offspring** |
| **Offspring 1** | Beak | Fork Spoon | Fork Spoon | Beak: |
| Color | Gold Blue | Gold Blue | Color: |
| **Offspring 2** | Beak | Fork Spoon | Fork Spoon | Beak: |
| Color | Gold Blue | Gold Blue | Color: |

Generation:  Color: \_\_\_\_\_\_\_ \_ Beak Type: \_\_\_\_\_\_\_\_\_\_\_

**Feeding:** Mass of cup + food - Mass of cup = Mass of food

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Reproduction** |  | **Card Drawn** | **Card Drawn** | **Traits of Offspring** |
| **Offspring 1** | Beak | Fork Spoon | Fork Spoon | Beak: |
| Color | Gold Blue | Gold Blue | Color: |
| **Offspring 2** | Beak | Fork Spoon | Fork Spoon | Beak: |
| Color | Gold Blue | Gold Blue | Color: |

Generation:  Color: \_\_\_\_\_\_\_ \_ Beak Type: \_\_\_\_\_\_\_\_\_\_\_

**Feeding:** Mass of cup + food - Mass of cup = Mass of food

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Reproduction** |  | **Card Drawn** | **Card Drawn** | **Traits of Offspring** |
| **Offspring 1** | Beak | Fork Spoon | Fork Spoon | Beak: |
| Color | Gold Blue | Gold Blue | Color: |
| **Offspring 2** | Beak | Fork Spoon | Fork Spoon | Beak: |
| Color | Gold Blue | Gold Blue | Color: |

Generation:  Color: \_\_\_\_\_\_\_ \_ Beak Type: \_\_\_\_\_\_\_\_\_\_\_

**Feeding:** Mass of cup + food - Mass of cup = Mass of food

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Reproduction** |  | **Card Drawn** | **Card Drawn** | **Traits of Offspring** |
| **Offspring 1** | Beak | Fork Spoon | Fork Spoon | Beak: |
| Color | Gold Blue | Gold Blue | Color: |
| **Offspring 2** | Beak | Fork Spoon | Fork Spoon | Beak: |
| Color | Gold Blue | Gold Blue | Color: |

**Round 2 Data Table:**

Generation:  Color: \_\_\_\_\_\_\_ \_ Beak Type: \_\_\_\_\_\_\_\_\_\_\_

**Feeding:** Mass of cup + food - Mass of cup = Mass of food

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Reproduction** |  | **Card Drawn** | **Card Drawn** | **Traits of Offspring** |
| **Offspring 1** | Beak | Fork Spoon | Fork Spoon | Beak: |
| Color | Gold Blue | Gold Blue | Color: |
| **Offspring 2** | Beak | Fork Spoon | Fork Spoon | Beak: |
| Color | Gold Blue | Gold Blue | Color: |

Generation:  Color: \_\_\_\_\_\_\_ \_ Beak Type: \_\_\_\_\_\_\_\_\_\_\_

**Feeding:** Mass of cup + food - Mass of cup = Mass of food

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Reproduction** |  | **Card Drawn** | **Card Drawn** | **Traits of Offspring** |
| **Offspring 1** | Beak | Fork Spoon | Fork Spoon | Beak: |
| Color | Gold Blue | Gold Blue | Color: |
| **Offspring 2** | Beak | Fork Spoon | Fork Spoon | Beak: |
| Color | Gold Blue | Gold Blue | Color: |

Generation:  Color: \_\_\_\_\_\_\_ \_ Beak Type: \_\_\_\_\_\_\_\_\_\_\_

**Feeding:** Mass of cup + food - Mass of cup = Mass of food

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| --- | --- | --- | --- | --- |
| **Reproduction** |  | **Card Drawn** | **Card Drawn** | **Traits of Offspring** |
| **Offspring 1** | Beak | Fork Spoon | Fork Spoon | Beak: |
| Color | Gold Blue | Gold Blue | Color: |
| **Offspring 2** | Beak | Fork Spoon | Fork Spoon | Beak: |
| Color | Gold Blue | Gold Blue | Color: |

Generation:  Color: \_\_\_\_\_\_\_ \_ Beak Type: \_\_\_\_\_\_\_\_\_\_\_

**Feeding:** Mass of cup + food - Mass of cup = Mass of food

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Reproduction** |  | **Card Drawn** | **Card Drawn** | **Traits of Offspring** |
| **Offspring 1** | Beak | Fork Spoon | Fork Spoon | Beak: |
| Color | Gold Blue | Gold Blue | Color: |
| **Offspring 2** | Beak | Fork Spoon | Fork Spoon | Beak: |
| Color | Gold Blue | Gold Blue | Color: |

**Round 3 Data Table:**

Generation:  Color: \_\_\_\_\_\_\_ \_ Beak Type: \_\_\_\_\_\_\_\_\_\_\_

**Feeding:** Mass of cup + food - Mass of cup = Mass of food

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Reproduction** |  | **Card Drawn** | **Card Drawn** | **Traits of Offspring** |
| **Offspring 1** | Beak | Fork Spoon | Fork Spoon | Beak: |
| Color | Gold Blue | Gold Blue | Color: |
| **Offspring 2** | Beak | Fork Spoon | Fork Spoon | Beak: |
| Color | Gold Blue | Gold Blue | Color: |

Generation:  Color: \_\_\_\_\_\_\_ \_ Beak Type: \_\_\_\_\_\_\_\_\_\_\_

**Feeding:** Mass of cup + food - Mass of cup = Mass of food

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Reproduction** |  | **Card Drawn** | **Card Drawn** | **Traits of Offspring** |
| **Offspring 1** | Beak | Fork Spoon | Fork Spoon | Beak: |
| Color | Gold Blue | Gold Blue | Color: |
| **Offspring 2** | Beak | Fork Spoon | Fork Spoon | Beak: |
| Color | Gold Blue | Gold Blue | Color: |

Generation:  Color: \_\_\_\_\_\_\_ \_ Beak Type: \_\_\_\_\_\_\_\_\_\_\_

**Feeding:** Mass of cup + food - Mass of cup = Mass of food

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Reproduction** |  | **Card Drawn** | **Card Drawn** | **Traits of Offspring** |
| **Offspring 1** | Beak | Fork Spoon | Fork Spoon | Beak: |
| Color | Gold Blue | Gold Blue | Color: |
| **Offspring 2** | Beak | Fork Spoon | Fork Spoon | Beak: |
| Color | Gold Blue | Gold Blue | Color: |

Generation:  Color: \_\_\_\_\_\_\_ \_ Beak Type: \_\_\_\_\_\_\_\_\_\_\_

**Feeding:** Mass of cup + food - Mass of cup = Mass of food

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Reproduction** |  | **Card Drawn** | **Card Drawn** | **Traits of Offspring** |
| **Offspring 1** | Beak | Fork Spoon | Fork Spoon | Beak: |
| Color | Gold Blue | Gold Blue | Color: |
| **Offspring 2** | Beak | Fork Spoon | Fork Spoon | Beak: |
| Color | Gold Blue | Gold Blue | Color: |

**Whole Class Data:**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Color** | | | **Beak Type** | | |  |
| **Generation #** | **# blue** | **# gold** | **Total #** | **# Spoon** | **# Fork** | **Total #** | **Notes (including masses, when on elimination rounds)** |
| **Round 1** | | | | | | | |
| 1 |  |  |  |  |  |  |  |
| 2 |  |  |  |  |  |  |  |
| 3 |  |  |  |  |  |  |  |
| 4 |  |  |  |  |  |  |  |
| **Round 2** | | | | | | | |
| 1 |  |  |  |  |  |  |  |
| 2 |  |  |  |  |  |  |  |
| 3 |  |  |  |  |  |  |  |
| 4 |  |  |  |  |  |  |  |
| **Round 3** | | | | | | | |
| 1 |  |  |  |  |  |  |  |
| 2 |  |  |  |  |  |  |  |
| 3 |  |  |  |  |  |  |  |
| 4 |  |  |  |  |  |  |  |

**Construct 2 bar graphs of this data on the following pages. One bar graph is for Color vs. Generation, the other is Beak Type vs. Generation.**

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**Conclusions:**

1. When did you notice the fewest changes in the population? Explain.\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  
   \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. How do limited resources, like in Round 3, affect the traits of a population? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  
   \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. Do any traits ever completely disappear? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
4. What traits are passed on with the greatest frequency – the most helpful or the least? Describe the process explaining why this happens. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  
   \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
5. Is there a need for variation of traits in a population? Why or why not? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Predict how a population of predators would change over time if the prey they hunted were able to run faster than the average predator. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_