Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Lab Partners: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

# DARWIN’S FINCH BEAK LAB

**Objective/Skills:** You are going to mimic how the variations of Darwin’s finches compete for three different types of food sources. Pretend that the different types of objects (rubber bands, paper clips and beans) are different types of food for the birds. Pretend that the different tools are different shaped finch beaks. You will simulate natural selection happening throughout the trials in this lab. Natural selection (survival of the fittest) occurs when a population changes in response to their environment.

**Materials:**

Flat-nosed tweezers

Round-nosed tweezers

scoopula

test tube tongs

50 rubber bands (in a container)

50 paper clips (in a container)

50 beans (in a container)

4 containers (stomachs)

stopwatch

**Hypothesis:**

The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_(type of tool) beak adaption will be the most fit for eating *rubber bands*.

The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_(type of tool) beak adaption will be the most fit for eating *paper clips.*

The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_(type of tool) beak adaption will be the most fit for eating *beans*.

**Procedure:**

1. There will be lab groups containing 4 students. Each group member will be assigned a different “beak adaptation” and must keep their “beak” for the entire lab (no switching between trials!).
2. Your lab groups needs to count out 50 pieces of rubber bands, 50 paper clips and 50 beans and place them into 3 individual containers (do not mix them).
3. You will have 1 minute to do each trial, there will be 3 trials (1 for each of the “food:” rubber bands, paper clips, beans).
4. Start trial #1 with 1 container of 50 “food”. Spread the “food” all over the lab desk. You and your lab partners will have 1 minute to “eat” as many “food” as you can with your “beaks” by placing them in your own collection containers.
5. At the end of 1 minute record the number of “food” you ate (these should be in your own containers) and put your data into your chart for that trial. Copy the number of “food” your lab partners ate with their “beaks” on the chart for that trial.
6. Put a circle in the data table around the number for the “beak” that collected the LEAST amount of “food” for each particular trial. Put a square in the data table around the number for the “beak” that collected the MOST “food” for each particular trial.
7. Return “food” to original containers and then repeat steps 4-6 for all 3 trials.
8. Record all data. Graph your results on three separate bar graphs.
9. Analyze your data by answering the questions listed below.

**Data Collection & Graph (20 points based on MYP Rubric Criterion C):**

Circle the LOWEST performing “beak” for each trial (this represents extinction).

Put a box around the HIGHEST performing “beak” for each trial.

**Rubber bands**

|  |  |
| --- | --- |
|  | **Number of Rubber bands Food Eaten With Each Beak Type** |
| **Trial Number** | **Flat-Nosed Tweezers** | **Scoopula** | **Round-Nosed Tweezers** | **Test Tube Tongs** |
| Trial 1 |  |  |  |  |
| Trial 2 |  |  |  |  |
| Trial 3 |  |  |  |  |
| **Average** |  |  |  |  |

**Beans**

|  |  |
| --- | --- |
|  | **Number of Beans Eaten With Each Beak Type** |
| **Trial Number** | **Flat-Nosed Tweezers** | **Scoopula** | **Round-Nosed Tweezers** | **Test Tube Tongs** |
| Trial 1 |  |  |  |  |
| Trial 2 |  |  |  |  |
| Trial 3 |  |  |  |  |
| **Average** |  |  |  |  |

**Paper Clips**

|  |  |
| --- | --- |
|  | **Number of Paper Clips Eaten With Each Beak Type** |
| **Trial Number** | **Flat-Nosed Tweezers** | **Scoopula** | **Round-Nosed Tweezers** | **Test Tube Tongs** |
| Trial 1 |  |  |  |  |
| Trial 2 |  |  |  |  |
| Trial 3 |  |  |  |  |
| **Average** |  |  |  |  |

**Graphs:** Using the attached graph paper, create three separate bar graph clusters to show the average score for each food type. Be sure to put the independent variable on the x-axis. Use a legend and colors to graph all four beak adaptations for each trial cluster.

**Analysis: Refer to your charts and bar graphs to answer the following questions.**

1. Which finch became extinct in the **rubber bands trials**? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. Why did this finch become extinct? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. Which finch was best fit for survival on this “food” type? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
4. Why was this finch best fit for survival? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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1. Which finch became extinct in the **paper clip trials**?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. Why did this finch become extinct?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. Which finch was best fit for survival on this “food” type? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
4. Why was this finch best fit for survival? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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1. Which finch became extinct in **bean trials**?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. Why did this finch become extinct?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. Which finch was best fit for survival on this “food” type? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
4. Why was this finch best fit for survival? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**By analyzing all of the trials’ collected data:**

1. Which finch “beak” performed best over all the trials?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. Did this answer match your hypothesis? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. Why did this finch “beak” perform best? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
4. Which finch “beak” performed worst over all the trials?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
5. Did this answer match your hypothesis? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
6. Why did this finch “beak” perform worst? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Conclusion (20 points based on MYP Rubric Criterion A):**

Explain and discuss evolution by natural selection, including how this lab experience and your DATA modeled it. YOU MUST REFERENCE DATA FROM YOUR ANALYSIS! During the write-up, you must use EACH of the following terms:

population, environment, competition, fitness, variation, adaptation, and extinction.

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**Graphs:** Create three separate bar graph clusters to show the average score for each food type. Put the independent variable on the x-axis. Use a legend and colors to graph all four beak adaptations.

Rubber-Bands



Beans

Paper Clips

MYP Criterion Score 🡪 Lab Grade Conversion

|  |  |  |
| --- | --- | --- |
| MYP Score |  | Traditional Score |
| 8 | 🡪 | 20pts |
| 7 | 🡪 | 19pts |
| 6 | 🡪 | 17pts |
| 5 | 🡪 | 16pts |
| 4 | 🡪 | 14pts |
| 3 | 🡪 | 12pts |
| 2 | 🡪 | 10pts |
| 1 | 🡪 | 8pts |

Each section is worth 20pts for a 40pt total

Data & Graphs: Criterion C Conclusion Essay: Criterion A

Criterion C: Processing and evaluating

**Maximum: 8**

At the end of year 5, students should be able to:

1. present collected and transformed data

|  |  |  |
| --- | --- | --- |
| **Achievement level** | **Level descriptor** | **Task-Specific Language** |
| 0 | The student does not reach a standard identified by any of the descriptors below.  | … |
| 1–2 | The student is able to: * **collect and present** data in numerical and/or visual forms
 | Data table is complete, but no graphical representation.  |
| 3–4 | The student is able to: * **correctly collect and present** data in numerical and/or visual forms
 | Data sloppy. Either erroneous or not readable. Graphs not done well/reflective of data, do not have titles/axes labeled, etc. |
| 5–6 | The student is able to: * **correctly collect, organize and present** data in numerical and/or visual forms
 | Data averaged incorrectly or reflect collecting bias/error, but graphs done at a 7-8 level. |
| 7–8 | The student is able to: * **correctly collect, organize, transform and present** data in numerical and/or visual forms
 | Your data tables are **complete**, **clearly** written and averages are **correct** (data transformation). The 3 sets of bar graphs are clearly titled, axes labeled, and keys easily distinguish between types of beaks.  |

Criterion A: Knowing and understanding

**Maximum: 8**

At the end of year 5, students should be able to:

1. explain scientific knowledge
2. ~~apply scientific knowledge and understanding to solve problems set in familiar and unfamiliar situations~~
3. analyse and evaluate information to make scientifically supported judgments.

|  |  |  |
| --- | --- | --- |
| **Achievement level** | **Level descriptor** | **Task-Specific Language** |
| 0 | The student does not reach a standard identified by any of the descriptors below.  | … |
| 1–2 | The student is able to: * **state** scientific knowledge
* **interpret** information to make **judgments**.
 | 1-2 means you defined each word independently. You cited data, but didn’t talk about how it supported what you are concluding and explaining.  |
| 3–4 | The student is able to: * **outline** scientific knowledge
* **interpret** information to make **scientifically supported judgments**.
 | 3-4 means that you defined each vocab in a sensible order, but did not interconnect it. You do not make explicit connections with your data to support your conclusion.  |
| 5–6 | The student is able to: * **describe** scientific knowledge
* **analyse** information to make **scientifically supported judgments**.
 | 5-6 means you just describe the different vocab, not weaving them together to construct an explanation of what occurred.  |
| 7–8 | The student is able to: * **explain** scientific knowledge
* **analyse** and **evaluate** information to make **scientifically supported judgments**.
 | You **used** each vocab. word to **explain** how natural selection was **applied** and **modeled** in this lab. You **analyse** and **use** your DATA (from the lab) to **support** your explanation, including an **EVALUATION** of how well the data was collected. |