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| **Lesson Title :**  **Lesson 1 – Fitness and Adaptations** | **Unit #:**  **1** | **Lesson #:**  **1** | **Activity #:**  **2** |
| **Activity Title:**  **Activity 2 – Bird Beak Lab** |

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| **Estimated Lesson Duration:** | **Approximately 3 days** |
| **Estimated Activity Duration:** | **Approximately 1.5 days** |

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| **Setting:** | **Standard Classroom, Ryle High School, Class Arranged in to Pods** |

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| **Activity Objectives:** |

Students will be able to:

* Identify adaptations and their effects on fitness.
* Infer things about an organism’s environment and niche based on its adaptations.
* Make predictions about how organisms will do over time based on their adaptations.

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| **Activity Guiding Questions:** |

How are fitness and adaptations related to natural selection?

What do adaptations say about an organism’s environment?

Can we tell how organisms will survive based on their adaptations?

| **Next Generation Science Standards (NGSS)** | |
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| **Science and Engineering Practices (Check all that apply)** | **Crosscutting Concepts (Check all that apply)** |
| ☒ Asking questions (for science) and defining problems (for engineering) | ☐ Patterns |
| ☒ Developing and using models | ☒ Cause and effect |
| ☒ Planning and carrying out investigations | ☐ Scale, proportion, and quantity |
| ☒ Analyzing and interpreting data | ☐ Systems and system models |
| ☒ Using mathematics and computational thinking | ☐ Energy and matter: Flows, cycles, and conservation |
| ☒ Constructing explanations (for science) and designing solutions (for engineering) | ☒ Structure and function. |
| ☐ Engaging in argument from evidence | ☒ Stability and change. |
| ☒ Obtaining, evaluating, and communicating information |  |

| **Ohio’s Learning Standards for Science (OLS)** |
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| **Expectations for Learning - Cognitive Demands (Check all that apply)** |
| ☐ Designing Technological/Engineering Solutions Using Science concepts **(T)** |
| ☒ Demonstrating Science Knowledge **(D)** |
| ☒ Interpreting and Communicating Science Concepts **(C)** |
| ☒ Recalling Accurate Science **(R)** |

| **Ohio’s Learning Standards for Math (OLS) and/or**  **Common Core State Standards -- Mathematics (CCSS)** | |
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| **Standards for Mathematical Practice (Check all that apply)** | |
| ☐ Make sense of problems and persevere in solving them | ☐ Useappropriate tools strategically |
| ☐ Reason abstractly and quantitatively | ☐ Attendto precision |
| ☐ Construct viable arguments and critique the reasoning of others | ☐ Look for and make use of structure |
| ☐ Model with mathematics | ☐ Look for and express regularity in repeated reasoning |

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| **Unit Academic Standards (NGSS, OLS and/or CCSS):** |

**NGSS HS-LS4-2, HS-LS4-3, HS-LS4-4, HS-LS4-5**

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| **Materials**: (Link Handouts, Power Points, Resources, Websites, Supplies) |

Bird Beak Lab instructions/Questions: [Bird Beak Lab.docx](file:///C:\Users\debbie\Downloads\Bird%20Beak%20Lab.docx)

“Beaks” – spoons, tweezers, toothpicks, forks, test tube holders, etc. will all work.

“Food” – small objects like jellybeans, marshmallows, coins, rice, popcorn kernels, etc.

Computer access – can be used for graphing portion, or

Graph paper – if you want students to graph by hand

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| **Teacher Advance Preparation:** |

Have tables arranged into pods to give students plenty of room to work, and have the beaks and food sources divided up and ready to go at each table so students can get started sooner. You will probably want to spend time discussing the rules and procedures of the activity so that everyone is doing it the same way and nobody is “cheating”.

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| **Activity Procedures:** |

Students should come in and have a seat at one of the pre-arranged pods. They will be working as a group with everyone they are sitting with. Ask students not to touch anything until you’ve gone over the instructions, and pass out the lab materials. Read through the instructions and procedures with the group, and have them make their hypothesis for the lab.

Each student in a group will be using a different “beak”, and there will be several different food types spread out in front of the group randomly. Students will be tasked with catching/eating as much of the food as they can eat in a given time limit. Some beaks are better adapted for this activity than others. As students reach the time limit, they will record how much of each type of food each beak type was able to catch. This activity should be repeated multiple times (how many can depend on the amount of time available), and students can average and graph the data at the end.

Once finished, students will create a graph showing their results. They can do this electronically or by hand with graph paper depending on what the teacher would prefer that they practice. Students can then work to answer the questions at the end of the lab sheet, and when they have completed everything they can turn it all in.

**Formative Assessments:** Link the items in the Activities that will be used as formative assessments.

* The lab activity itself
* Graph and questions at the end of the lab.

**Summative Assessments:** These are optional; there may be summative assessments at the end of a set of Activities or only at the end of the entire Unit.

N/A – found at the end of the unit

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| **Differentiation:** Describe how you modified parts of the Lesson to support the needs of different learners.  Refer to Activity Template for details. |

Students with motor difficulties may have trouble completing the lab as instructed, but modifications are fairly simple to do – using larger beaks or larger food items can make it much easier for them to complete. If needed, the teacher can even talk to the group the student is in and tell them that the larger food items are only eaten by birds with the beak that this student has, to keep them from competing for the same food. This can also help students with visual difficulties as well, making the food items easier for them to see.

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| **Reflection:** Reflect upon the successes and shortcomings of the lesson. |

I think that this lab activity went pretty well. Students were able to see how different adaptations provide advantages for different tasks/different environmental conditions, and were also able to work backwards to make inferences about an organism’s environment based on the adaptations it has as well. The hands-on nature of the lab as well as the competitiveness of it all helped engage students in the activity and ensured that everyone was participating. I also enjoyed collecting data from each group to make a class data table, demonstrating the importance of large data pools.

The only shortcoming of the lesson is that we did not have access to a few of the recommended tools to use for bird beaks, so we had to shorten it a bit. I think students were still able to grasp the main idea of the lab despite this, Still, having more tools to simulate more beaks would further drive home the point of the activity (at the cost of taking more time to work through the lab, perhaps).