



## County Implementation Award Program (CIAP) Math and Science Lesson

<b>Unit Title:</b> 4-LS1 From Molecules to Organisms: Structures and Processes
<b>Lesson Title:</b> Birds Go to School
<b>Author:</b> Beverly Black
<b>Grade Level:</b> 4
<b>Time Frame:</b> Two 60-minute sessions/1-45-minute session/several sessions to complete bird field guide
<b>Targeted Standard(s):</b> NGSS-4-LS1-1. Construct an argument that plants, and animals have internal and external structures that function to support survival, growth, behavior, and reproduction. Math-4.NBT.4 Fluently add and subtract multi-digit whole numbers using the standard algorithm. CCSS.MATH.PRACTICE.MP2 Reason abstractly and quantitatively. CCSS.MATH.PRACTICE.MP3 Construct viable arguments and critique the reasoning of others.
<b>Short Description of Targeted Phenomenon:</b> Share with students The Great Migration <a href="https://ww2.kqed.org/quest/2010/05/05/the-great-migration/">https://ww2.kqed.org/quest/2010/05/05/the-great-migration/</a> Ask students to think about how so many birds can share the same space. As they watch the video, ask them to record what they notice and wonder.  The birds we see at and around our school have internal and external structures that function to support survival, growth, behavior, and reproduction.
<b>Three Dimensions of NGSS</b>
<b>Science &amp; Engineering Practice/s (SEP):</b> <b>Engaging in Argument from Evidence</b> Engaging in argument from evidence in 3–5 builds on K–2 experiences and progresses to critiquing the scientific explanations or solutions proposed by peers by citing relevant evidence about the natural and designed world(s). § Construct an argument with evidence, data, and/or a model. (4-LS1-1)
<b>Crosscutting Concept/s (CCC):</b> Systems and System Models: A system can be described in terms of its components and their interactions.
<b>Disciplinary Core Idea/s (DCI):</b> LS1.A: Structure and Function: Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction.
<b>Language Supports:</b>

Mystery Science video- “Why do Birds have Beaks?” Visuals-photographs and pictures of birds and other animals, graphic organizers, sentence frames

**Materials needed:**

pictures of animals, glue sticks, science notebook  
Bird Beak game-yarn or hula hoop for feeding area, 1 of each beak for each team-tweezer, chopsticks, clothespin, spoon, several toothpicks, marbles, paperclips, straws-cut into 1-inch lengths

**Objective(s): Students will be able to:**

1. Determine how four different external structures of an animal helps it to survive by completing a 4-square chart.
2. Investigate how different bird beaks function in growth, survival and behavior by playing the bird beak game.
3. Construct an argument about which bird beak was most effective in the Bird Beak Game using their data to inform the argument.
4. Construct an argument that birds have internal and external structures that function to support survival, growth, behavior and reproduction by creating a field guide page on a local bird.

**How Math and Science concepts/skills/practices were integrated in this lesson:**

In playing the bird beak game, students will use mathematics and computational thinking to record data. They will analyze and interpret the data they created in order to construct an argument about which bird beak was the most effective. In creating a bird field guide page, students will observe patterns in various birds in relation to their internal and external structures and their functions.

**Possible Challenges /Misconceptions:**

When completing the bird field guide page on external structures, students don’t understand that they need to be specific on how those external structures help the bird to survive. For example, instead of writing “wings-help it to fly” they might write, “Wings-long tapering wings allow it to make quick, tight turns and dives to catch their prey in flight”

**Formative Assessment:**

Check students’ science notebook for completed 4-square chart (See pictures at the end of lesson)and have them explain what they wrote.

Check science notebook for correct data recording and graphing for “Bird Beak Game”. Students analyze their results and discuss by having a science talk.

**Lesson Opening**

**Teacher Actions**

Watch Mystery Science, grade 1, beginning video of “Why do Birds Have Beaks?”. Here is the link to ‘Mystery Science’; where you can sign up for a free trial license, thus giving you access to this video: [Mystery Science](#)  
With time included to discuss questions, it will take about 6-8 minutes. Stop at “Activity 1”.

**Student Actions**

Students discuss with their team the questions that are asked during the Mystery Science video. Students glue the animal picture they are given into their science notebook and create a 4-square chart. Students choose 4 external structures of their animal and complete their chart with information as to how that structure helps the animal survive.

<p>Mystery Science does a different bird beak game at this point in their lesson.</p> <p>Say, “I am going to give each of you a picture of an animal. Your job is to pick at least 4 of the animal’s external structures and determine how it helps them to survive.” Model by picking an animal such as a lion and make a chart with possible external structures such as <i>fur</i>, <i>teeth</i>, <i>eyes</i> and <i>claws</i>. (See examples)</p>	<p>Students explain to their team members/teacher how the different structures help the animal to survive.</p>
<p><b>Body of Lesson</b></p>	
<p><b>Teacher Actions</b></p> <p>Say, “We are going to play a game called “Bird Beak Game”. There are 4 beaks and 4 different types of food. You will use each type of beak. You have 1 minute to get as much food as you can and put it in your stomach. You hold your stomach (cup) in one hand and your beak in your other hand. You may not scoop food into your stomach. At the end of one minute, record how much food you got in the correct space.</p>	<p><b>Student Actions</b></p> <p>Students pick one beak and 1 cup. They use their beak to pick up as much food as they can in one minute. They record their results on the data sheet. They rotate the beaks so that they each have a turn with each type of beak.</p>
<p><b>Teacher Actions</b></p> <p>Collect results from the teams and share on the board so that everybody can see the different results.</p>	<p><b>Student Actions</b></p> <p>Provide the results to the teacher and observe the different results from different teams.</p>
<p><b>Teacher Actions</b></p> <p>Monitor student progress</p>	<p><b>Student Actions</b></p> <p>Students work together as a team to answer the questions on the bottom, with a particular focus on the last question, “Which bird beak would you say is the most effective? Use our class’s data to explain your reasoning.” Encourage students to reason abstractly and quantitatively and to use their data to support their answer.</p>
<p><b>Lesson Closure</b></p>	
<p><b>Teacher Actions</b></p> <p>Lead a class discussion around the last question, “Which bird beak would you say is the most effective? Use our class’s data to explain your reasoning.” Encourage students to reason abstractly and quantitatively and to use their data to support their answer.</p>	<p><b>Student Actions</b></p> <p>Students participate in class discussion by presenting their arguments and politely critiquing the arguments of others.</p>
<p><b>Summative Assessment:</b></p> <p>Students will complete a field guide page for a bird that is seen in and around their school. They will research the external structures of their bird and include the functions of those structures in their</p>	

bird field guide page. Students will draw a picture of their bird to be included on their page. Bind all the pages together to make a book. If possible, have it printed so that each student has a copy.

**Other Teaching Resources:**

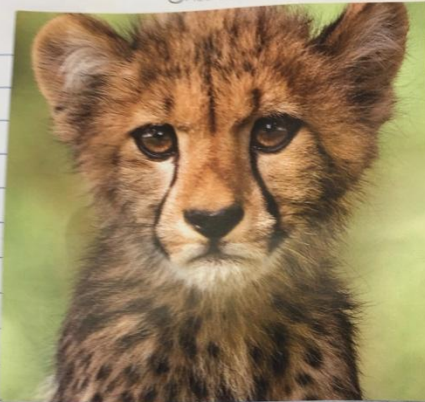
**Lab Safety:**

**Extensions (if any):**

\*Nature Journaling-free curriculum, “Opening the World through Journaling: Integrating art, science, and language arts” can be downloaded from John Muir Laws website. Lessons on drawing birds and flowers, how to make a field guide, etc.

cheetah

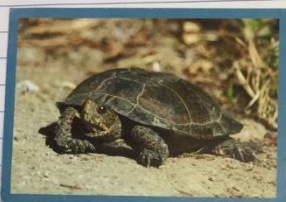
9-11-11



fur fur helps them stay warm.	Ears Ability to hear.
Eyes Ability to see	teeth To eat and hunt with

western pond turtle

9-11-11



shell they use their shells to hibernate during winter and fall.	eyes they use their eyes to see where their going.
teeth They use their teeth to eat their food.	legs turtles use their legs to walk about but their slow so it takes awhile to get where they wanna be.

Name \_\_\_\_\_ Date \_\_\_\_\_

### Bird Beak Data Sheet

Food Items	Spoonbill Bird	Clothespin Bird	Chopstick Bird	Tweezer Bird
Toothpick Worms			2	
Marble Snails		2		
Paperclip Beetles	1			
Straw Snakes				14

Was there a bird able to obtain certain types of food easily? Explain.

The tweezer bird because I got 14 straw snakes.

Was there a bird that had difficulty obtaining food? Explain.

The spoon is the hardest to get the paperclip beetles because its hard to scoop it up and putting it in the cup while holding it.

Name \_\_\_\_\_

Date \_\_\_\_\_

**Bird Beak Data Sheet**

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Marble Snails				
Paperclip Beetles				
Straw Snakes				

Was there a bird able to obtain certain types of food easily? Explain.

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Was there a bird that had difficulty obtaining food? Explain.

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Which bird beak would you say is the most effective? Use our class's data to explain your reasoning. (Use the back for more space)



## Bird Field Guide Page Template

Name:

Habitat:

Description:

Diet:

Behavior:

Interesting Fact:

## External Structure and Their Function

Beak:

Claws/Feet:

Feathers/Wings:

Other:



### Example of a bird field guide page:



**Name:** barn swallow

**Habitat:** fields, parks, roadway edges, marshes, meadows, ponds and coastal waters. Nests are under eaves or inside sheds, barns, bridges and other structures.

**Description:**

**Length:** 5.9-7.5 inches

**Weight:** 0.6-0.7 oz.

**Wingspan:** 11.4-12.6 inches

**Color:** grayish blue back, wings, and tail, and reddish/brownish/orange underparts, cinnamon-colored forehead and throat

**Shape:** cone-shaped when perched, slightly flattened head, long outer feathers give the tail a deep fork

**Diet:** flies, grasshoppers, dragonflies, beetles, moths and other flying insects

**Behavior:** They catch their prey while in flight. They fly low, just a few inches above the ground or water.

**Interesting Facts:**

\*We often see barn swallows in May and June, flying low over the field.

\*According to legend, the barn swallow got its forked tail because it stole fire from the gods to bring to people. An angry god hurled a firebrand at the swallow, singeing its middle tail feathers.

### External Structures and their Function

**Beak:**

\*thin, slender, pointed beak to eat insects

\*flattened beak has a wide gape to help scoop up insects as it flies

\*collect mud for their nests in their beak

**Feet:**

\*long, narrow toes for perching on branches, cliffs and wires.

**Wings:**

\*long, tapering wings to make quick, tight turns and dives

**Tail:**

\*elongated feathers help the swallow slow down or turn rapidly