

IS2

Grade One Instructional Segment 2: Animal Sounds

Just like baby plants, baby animals often resemble their parents. They usually have the same external structures as their parents (baby fish have fins and gills, baby crayfish have claws, etc.), but both parent and child also have certain behaviors that help the children survive. For example, babies of many animal types cry when they are hungry. Students investigate the structural similarities, the behaviors, and some of the physics behind animal noises such as crying.

GRADE ONE INSTRUCTIONAL SEGMENT 2: ANIMAL SOUNDS**Guiding Questions**

- How are parents and their children similar and different?
- How do animal parents and children interact to meet their needs?
- How do animals communicate and make sound?

Performance Expectations

Students who demonstrate understanding can do the following:

1-LS1-2. Read texts and use media to determine patterns in behavior of parents and offspring that help offspring survive. *[Clarification Statement: Examples of patterns of behaviors could include the signals that offspring make (such as crying, cheeping, and other vocalizations) and the responses of the parents (such as feeding, comforting, and protecting the offspring).]*

1-LS3-1. Make observations to construct an evidence-based account that young plants and animals are like, but not exactly like, their parents. *[Clarification Statement: Examples of patterns could include features plants or animals share. Examples of observations could include leaves from the same kind of plant are the same shape but can differ in size; and, a particular breed of dog looks like its parents but is not exactly the same.] [Assessment Boundary: Assessment does not include inheritance or animals that undergo metamorphosis or hybrids.]* (Revisited from IS1)

1-PS4-1. Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate. *[Clarification Statement: Examples of vibrating materials that make sound could include tuning forks and plucking a stretched string. Examples of how sound can make matter vibrate could include holding a piece of paper near a speaker making sound and holding an object near a vibrating tuning fork.]*

1-PS4-4. Use tools and materials to design and build a device that uses light or sound to solve the problem of communicating over a distance.* *[Clarification Statement: Examples of devices could include a light source to send signals, paper cup and string “telephones,” and a pattern of drum beats.] [Assessment Boundary: Assessment does not include technological details for how communication devices work.]*

*The performance expectations marked with an asterisk integrate traditional science content with engineering through a practice or disciplinary core idea.

GRADE ONE INSTRUCTIONAL SEGMENT 2: ANIMAL SOUNDS

The bundle of performance expectations above focuses on the following elements from the NRC document *A Framework for K–12 Science Education*:

Highlighted Science and Engineering Practices	Highlighted Disciplinary Core Ideas	Highlighted Crosscutting Concepts
[SEP-3] Planning and Carrying Out Investigations [SEP-6] Constructing Explanations (for science) and Designing Solutions (for engineering) [SEP-8] Obtaining, Evaluating, and Communicating Information	LS1.B: Growth and Development of Organisms LS3.A: Inheritance of Traits LS3.B: Variation of Traits PS4.A: Wave Properties PS4.C: Information Technologies and Instrumentation	[CCC-1] Patterns [CCC-2] Cause and Effect: Mechanism and Explanation

CA CCSS Math Connections: MP.5; 1.MD.1–2

CA CCSS for ELA/Literacy Connections: RI.1.1, 3, 7, 9, 10; W.1.2, 8; SL.1.1, 2, 4, 5

CA ELD Standards Connections: ELD.PII.1.1, 5, 6

To lay the foundation for later grades, this instructional segment introduces students to the **mental model [SEP-2]** of a family or herd as a **system [CCC-4]** of organisms within which parents behave in ways that support the survival of their offspring. Teachers should probably not introduce this language explicitly to students in grade one; students should just recognize **patterns [CCC-1]** in physical appearance that are similar between offspring and their biological parents, and patterns in behavior of adults (feeding, protecting, teaching, or playing with their children) and children (crying, observing their parents).

Teachers begin by finding local opportunities for observing animals and their offspring such as a classroom aquarium or terrarium, a field trip to a farm, duck pond, or zoo, or a webcam or video clips if physical observations are not possible. Students **communicate [SEP-8]** their observations about animal appearance and behavior to their classmates through science notebook entries or oral presentations. Teachers reinforce the notion of families through picture books and activities related to students' own families.

Opportunities for ELA/ELD Connections



To introduce the concept that young animals look like their parents, divide the class into two groups—the children and the parents. Use sets of picture cards that show an animal in the beginning of its lifespan and a matching card of the same animal in adult stage. Students need to find their matching partner by asking questions (not by showing the picture on the card), such as, my animal has fur. Does your picture have fur? If no, they can find another student to ask the question. If yes, then another categorizing question can be asked. One way to organize the students is to have inside/outside circles, with the students with parent cards on the inside and students with the children cards on the outside. Before beginning, students can brainstorm and discuss possible questions to ask each partner. Once the two pictures are paired together, students can then discuss how the parent and the children are similar and how they are different, **explaining [SEP-6]** their conclusions using sentence frames or in graphic organizers (1-LS3-1).

CA CCSS for ELA/Literacy Standards: SL.1.1, 4, 5

CA ELD Standards: ELD.PI.1.1, 6

Sample Integration of Science and ELD Standards in the Classroom



Students have been exploring how structures of plants and animals are similar between parents and young (offspring), and the teacher invites the children to explore the patterns in the behavior of parents and offspring that help offspring survive (1 LS1-2) by reading texts and using media, modeling the use of adverbials:

When animals are young, they signal their needs to their parents by calling *loudly* or *softly*, depending on how many babies there are, and the distance from their parent. *Some* animals cry, others chirp, and others make *all sorts* of sounds. *Usually* the parents feed and comfort their young. The teacher supports the students' use of adverbials in their own speaking and writing by prompting them to add information about *when*, *how*, *where*, *why*, *how much*, etc.

CA ELD Standards: ELD.PII.1.5

Source: Lagunoff et al. 2015, 238–239

As students notice the strong resemblance of parents and offspring, they can be prompted to ask questions about why certain types of animals have certain structures. The goal here is to further develop the crosscutting concept of **structure and function [CCC-6]**. For example, by studying crayfish in a classroom aquarium students can make claims supported by evidence demonstrating that different body parts of the crayfish serve different purposes for the survival of the animal. Students can also obtain evidence from texts, videos, and online resources. They can record what they learn in drawings in which body parts are

labeled and their function is identified. With teacher support, they can also create tables of information (table 3.4).

Table 3.4. Crayfish: How is the Structure of a Body Part Related to its Function?

STRUCTURE OR BEHAVIOR	FUNCTION
Mouth that opens, claws to grab	Get food
Lots of legs, body	Move
Claws	Protect/defend, dig in ground, grab/hold food
Eyes, antenna	Sensing the environment
Gills, skin	Breathe

Source: Gomez-Zwiep and Polcyn 2015

The idea that many tasks require an animal to apply a force to move or break open an object is connected to ideas they developed in kindergarten about forces. Learning about the structure and function of body parts engages students in performing simple research using books and other content-rich materials to **obtain information, evaluate if it is relevant to answer classroom questions, and communicate to each other [SEP-8]**.

Opportunities for ELA/ELD Connections



Read literature books such as *What If You Had Animal Teeth?* and *What If You Had Animal Hair?* by Sandra Markle and Howard McWilliam and *What Do You Do With a Mouth Like This?* and *What Do You Do With a Tail Like This?* by Steve Jenkins and Robin Page. Discuss and record how the different external parts and features of the animals aid in their survival and growth. Students could select one or more different parts of an animal(s) and create (or draw) a new animal. Each student should be able to explain the importance of each feature, with extra support if necessary.

CA CCSS for ELA/Literacy Standards: RI.1.1, 3, 7, 9, 10; W.1.2, 8; SL.1.2, 4, 5

CA ELD Standards: ELD.PI.1.1, 6

One common behavior of young animals is that they cry out when they need food or are in danger. How exactly do animals cry or make other sounds? Students investigate the nature of sound and perform an engineering task to create a physical model of how animals communicate (see “Sounds Wild” snapshot 3.4). The key disciplinary core idea is that sound

makes vibrations and vibrations make sound. Students can generate sounds using a rubber band stretched around the opening of a paper cup. Teachers can ask students to describe the motion of the rubber band (back and forth) and then introduce the term *vibrate* to describe what they see. They can feel the vibrations in their own throats as they talk or sing. They can further visualize the motion of an object that makes sound by gently dipping a vibrating tuning fork in a cup of water or by placing it adjacent to a lightweight ping pong ball and watching the ball move.

Grade One Snapshot 3.4: “Sounds Wild” Engineering Challenge



Mr. K, a grade one teacher, has created an interdisciplinary instructional segment called “Sounds Wild” to demonstrate to his students how animals use special parts of their bodies to make sounds. Mr. K helped his students connect what they learned about the **function [CCC-6]** of different animal body parts to how animals make sounds.

Anchoring phenomenon: Crickets make sounds with their bodies.

He engaged the students by reading two stories about crickets and the sounds they make: *I Wish I Were A Butterfly* by James Howe and *The Very Quiet Cricket* by Eric Carle. He brought in some live crickets for students to observe and students watched a video for a closer look at how crickets behave and how their body parts function. Students drew diagrams of a cricket and labeled its body parts, paying particular attention to the wings as the source of the cricket’s sound (K–2-ETS1-2).

Investigative phenomenon: When objects rub together, they make sounds.

The students used construction paper to develop a large-scale **model [SEP-2]** of a cricket and added a strip of sandpaper to the edge of a wing to simulate the chirping effect (1-PS4-1). During a music lesson, students continued exploring how sound was generated by playing scrapers, simple musical instruments that mimic the way crickets make sounds.

Everyday phenomenon: Different animals make sounds.

Mr. K presented a combination of stories, informational texts, and videos as resources for students to use as they studied the rattle of rattlesnakes, the howling of coyotes, and screech of bats. The students learned about the specific external part of the body in the

Grade One Snapshot 3.4: “Sounds Wild” Engineering Challenge

animal that vibrated to produce sound and could locate the sound-producing body part on pictures of the animal.

Investigative phenomenon: How do we create a device that simulates a baby animal crying out loud enough to communicate with its parents?

Mr. K connected music to science with an engineering design challenge: students were to design and build their own sound device emulating a baby animal. Mr. K asked students to close their eyes and makes a very quiet chirp. Would that be loud enough? Students **define their challenge [SEP-1]** by agreeing about a few guidelines: (1) instruments must be loud enough so that an imaginary parent animal on the opposite side of the playground could hear the device cry out for help, and (2) students must be able to communicate the difference between a cry of hunger and a cry of being in danger. Would they use a different pitch for each need? Or a different number of drum beats? Students needed to **develop a solution [SEP-6]** to both create the sound and use it to communicate over a long distance (1-PS4-4). The shakers, scrapers, and string instruments they created demonstrate the students’ understanding of the processes animals use to create sound and that vibrations cause sound.

Opportunities for Mathematics Connections



When students design and test their animal sound devices (or even simple paper cup and string communicators), they can measure distances on the schoolyard. Students in grade one do not use standard units of measure, but they understand the concept of reiterated units to measure length. For example, students could choose among a paper clip, a craft stick, or a yardstick as a unit of measure.

CA CCSSM: MP.5; 1.MD.1–2



Grade One Instructional Segment 3: Shadows and Light

By conducting hands-on investigations, students will build the foundation of a **model [SEP-2]** of how people see. In grade one, this model only includes the fact that light is necessary for vision and that light interacts with different objects in different ways. Since shadows are one piece of evidence of that interaction, this segment flows into IS4 during which students will notice patterns in the shadows cast by the light of the Sun.