4th Grade Mystery Science Organisms Functioning in their Environment

Lesson Alignment and Support

Salt Lake City School District 2020

Mystery Science Lesson Rationale:

Mystery Science Lessons seek to promote engagement and inspire excellence in students' mastery of science and engineering. The lessons support our vision and mission of equity and access in elementary science. The sequence of Mystery Science Full Lessons and Mini-Lesson below support fourth grade students' sense-making with respect to Organisms Functioning in their Environment using three-dimensional instruction. The sequenced Mystery Science Lessons support fourth grade teachers in implementing the new Utah SEEd Standards about organisms identified specifically in the Prioritized SEEd Pacing Guide. Lessons include a video focused on an organism-based phenomenon, a hands-on activity, and an assessment. The lessons are designed to take students approximately 60 minutes to complete. Most lessons use minimal materials, such as paper printouts and pencils. Additionally, most paper printouts can be downloaded individually from the Mystery Science Lessons websites in the form of an editable document that can be assigned through Canvas. Some lessons suggest markers, group work, or demonstrations. Teachers can make easy modifications to these lessons based on students' and teachers' resources.

Note: Use a Science Notebook or print the Mystery Science PDF Booklet for students to complete the lesson series below! You can also print individual lesson materials by following the links in the ***Materials per Student and Assessments***.

Strand 4.1: Organisms Functioning in their Environment Through the study of organisms, inferences can be made about environments both past and present. Plants and animals have both internal and external structures that serve various functions for growth, survival, behavior, and reproduction. Animals use different sense receptors specialized for particular kinds of information to understand and respond to their environment. Some kinds of plants and animals that once lived on Earth can no longer be found. However, fossils from these organisms provide evidence about the types of organisms that lived long ago and the nature of their environments. Additionally, the presence and location of certain fossil types indicate changes that have occurred in environments over time.

Standard 4.1.1: Construct an explanation from evidence that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction. Emphasize how structures support an organism's survival in its environment and how internal and external structures of plants and animals vary within the same and across multiple Utah environments. Examples of structures could include thorns on a stem to prevent predation or gills on a fish to allow it to breathe underwater. (LS1.A)

Mystery Science Life Science Lesson	Suggested Date and SEEd Alignment	Materials and Assessments	Remote Learning Modifications
Lesson 1: Why do our skeletons have so many bones? Mini-Lesson In this mini-lesson, K-5 students consider what would happen if their body didn't have bones. In	**October 5** **Disciplinary Core Ideas:** LS1.A (Structure and Function) **Science and Engineering Practice:** Constructing Explanations	Materials per Student: • Yellow, Green, Red Crayons or Colored Pencils • PDF Booklet Page 3 (Going Batty! Printout) • Skeleton Hand Discussion (can be copied and	• Send each student home with the following materials for the art activity: 1 piece of construction paper, 1 Q-tip,

the activity, Skeleton Hand, students combine science with art: they trace their hands, then add see-through bones to their picture, making their own skeleton hand. The activity includes an extension for older students to compare their hand bones to the bones of a mystery animal.	**Crosscutting Concept:** Structure and Function	pasted into an assignment): 1. How are bat wings similar to human hands? How are they different? 2. Thinking about how bats use their wings and humans use their hands, can you explain the differences in their bones? Teacher Answer Keys: • Going Batty! Answer Key • Skeleton Hand Discussion Answer Key	1 teaspoon of vegetable oil, crayons.
Lesson 2: Could a turtle live outside of its shell? Mini-Lesson Mystery Doug explores the question, "Could a turtle live outside of its shell?"	**October 12** **Disciplinary Core Ideas:** LS1.A (Structure and Function) **Science and Engineering Practice:** Constructing Explanations **Crosscutting Concept:** Structure and Function	Materials per Student: • Turtle Skeleton Discussion (can be copied and pasted into an assignment): 1. Could a turtle live outside its shell? Why do you think that? 2. What did this lesson make you curious about? What other questions do you have about turtles? 3. Bonus Activity: What would it be like to live in a shell, like a turtle? Think like an inventor! If you made a shell to live in, what would it look like? It needs to	• None.

		be made of something stiff enough to protect you, but light enough to carry around. Draw a picture of your shell invention. Label your drawing and write down what you would need to make it. If you have materials at home, try building your shell invention!	
Lesson 3: How does your heart pump blood? Mini-Lesson In this mini-lesson, students take a trip inside the body to see that the heart is a muscle, contracting and expanding to move blood through our blood vessels. In the activity, Valentine to My Heart, students make observations about their pulse and heart rate, and make an art project to show appreciation for their hard-working hearts.	**October 19** **Disciplinary Core Ideas:** LS1.A (Structure and Function) **Science and Engineering Practice:** Constructing Explanations **Crosscutting Concept:** Structure and Function	Materials per Student: • Pencil or Crayons • Scissors • Glue Stick • PDF Booklet Page 4 (Valentine Heart Printout) • PDF Booklet Page 5 (Your Heart is as Big as your Fist Printout) • Assessments: PDF Booklet Page 6 (Writing Prompt Assessment)	• None.
Lesson 4: Why do your biceps bulge? In this Mystery, students discover the mechanism by which their muscles control their bones to move their bodies. In the activity, Robot Finger, students	**October 26** **Disciplinary Core Ideas:** LS1.A (Structure and Function) **Science and Engineering Practice:** Constructing Explanations	Materials per Student: • Pencil • PDF Booklet Page 7 (Robot Finger Printout) • Assessments: PDF Booklet Page 8-9 (Why do your biceps	• Send each student home with: 1 pair of scissors, 1 index card, 2 paper clips, 1 dot sticker, 18" of string and the *Robot Finger* template (a

construct a model of a human finger and observe how pulling on a string (a model for tendons) causes it to bend at the joints.	**Crosscutting Concept:** Structure and Function	bulge? Assessment) Teacher Answer Keys: • Why do your biceps bulge? Answer Key	digital version will not work).
Lesson 5: What do people who are blind see? In this Mystery, students discover the basics of how their eyes work, and figure out some of the causes of vision problems. In the activity, Eye Model, students develop a working model of a human eye. They use a magnifying lens as a model of the cornea to explore how the structure of this lens is related to the function of our eyes.	**November 2** **Disciplinary Core Ideas:** LS1.A (Structure and Function) **Science and Engineering Practice:** Constructing Explanations **Crosscutting Concept:** Structure and Function	Materials per Student: • Pencil • Markers or Crayons • PDF Booklet Page 10 (Front of Eye Printout) • Assessments: PDF Booklet Page 11 (What do people who are blind see? Assessment) Teacher Answer Keys: • What do people who are blind see? Answer Key	• Send each student home with: 1 index card, 2 dot stickers, 1 credit card-sized magnifier and the *Front of the Eye* template (a digital version will not work).
Lesson 6: Why do we have eyebrows? Mini-Lesson Mystery Doug explores the question, "Why do we have eyebrows?" **And** Why do zebras have stripes? Mini-Lesson Mystery Doug explores the question, "Why do zebras have stripes?"	**November 9** **Disciplinary Core Ideas:** LS1.A (Structure and Function) **Science and Engineering Practice:** Constructing Explanations **Crosscutting Concept:** Structure and Function	Materials per Student: • Why do we have eyebrows? Discussion (can be copied and pasted into an Assignment): 1. Why do we have eyebrows? 2. What did this lesson make you curious about? What other questions do you have? Bonus Activity: Look in a mirror. Move your eyebrows up and down. Can you raise only	• None.

		one eyebrow? Try this challenge with a friend. Hold a piece of paper so it covers your nose and mouth. Make a face like you are excited, or angry. Can your partner tell what emotion you're showing from just your eyes and eyebrows? Ask your partner to try it on you. Can you tell what face they're making? • Why do zebras have stripes? Discussion: 1. Why do zebras have stripes? 2. What did this lesson make you curious about? What other questions do you have about zebras? Bonus Activity: No two zebras have the same stripes. And no two people have the same fingerprint! Try this. Scribble hard with a pencil on paper. Make a spot the size of a quarter. Press your fingertip in the spot. Lift your fingertip and	

		press it to the sticky side of some clear tape. Then, stick the tape to a piece of paper. That's your fingerprint! Ask friends and family to do the same. Compare your fingerprints!	
Lesson 7: How can some animals see in the dark? In this Mystery, students delve further into the workings of the eye, exploring the function of their iris and pupil. In the activity, Pupil Card, students add a smaller pupil to the eye model that they created in Mystery 2. Then they observe how the changing size of the pupil controls how much light enters the eye.	**November 16** **Disciplinary Core Ideas:** LS1.A (Structure and Function) **Science and Engineering Practice:** Constructing Explanations **Crosscutting Concept:** Structure and Function	Materials per Student: • Pencil • Markers or Crayons • PDF Booklet Page 12 (Pupil Card Printout) • Assessments: PDF Booklet Page 13 (How can some animals see in the dark? Assessment) Teacher Answer Keys: • How can some animals see in the dark? Answer Key	• Students need their eye model and the *Pupil Card* template. • Students can do the first part of the activity with a mirror in a dark room. • Students should observe their eyes as they turn the lights on and off (Step 7 shows what happens). • Students can do Steps 8 - 15 solo but need a partner for the final steps.
Lesson 8: Why are butterflies so colorful? In this mini-lesson, students discover how butterflies' colors can help them blend into their habitat or scare away predators. In the activity, Paper	**November 23** **Disciplinary Core Ideas:** LS1.A (Structure and Function) **Science and Engineering Practice:** Constructing Explanations	Materials per Student: • Pencil • Markers or Crayons • Scissors • PDF Booklet Page 14 (Butterfly Template Printout)	• None.

Butterflies, students design their own paper butterflies by choosing colors that will help the butterflies survive, then create a butterfly card for someone special.	**Crosscutting Concept:** Structure and Function	• PDF Booklet Page 15 (Butterfly Card Printout) • Assessments: PDF Booklet Page 16-17 (Writing Prompt Assessment)	
Lesson 9: Why do penguins have wings if they can't fly? Mystery Doug explores the question, "Why do penguins have wings if they can't fly?"	**November 30** **Disciplinary Core Ideas:** LS1.A (Structure and Function) **Science and Engineering Practice:** Constructing Explanations **Crosscutting Concept:** Structure and Function	Materials per Student: • Why do penguins have wings if they can't fly? Discussion (can be copied and pasted into an Assignment): 1. Why do penguins have wings if they can't fly? 2. What did this lesson make you curious about? What other questions do you have about penguins? Bonus Activity: A penguin's wings are too small for them to fly. We have arms that also don't work for flying. But we can invent machines that help us fly like birds, swim like fish, and even go to outer space! Draw or list inventions you know of that help us travel in air, water, or space. Then be	• None.

		an inventor. Invent a new way people can travel.	
Standard 4.1.2: Develop and use a model of a system to describe how animals receive different types of information from their environment through their senses, process the information in their brain, and respond to the information. Emphasize how animals are able to use their perceptions and memories to guide their actions. Examples could include models that explain how animals sense and then respond to different aspects of their environment such as sounds, temperature, or smell. (LS1.D)			
Lesson 10: How does your brain control your body? In this Mystery, students explore the brain's role in receiving information from the senses, processing that information, and controlling the muscles to enable movement. In the activity, Think Fast!, students test their reflexes with two very quick experiments and one more involved activity. They learn about how we process information in our brains and then respond to that information in different ways.	**December 7** **Disciplinary Core Ideas**: LS1.D (Information Processing) **Science and Engineering Practice:** Developing and Using Models **Crosscutting Concept:** Systems and System Models	Materials per Student: • Pencil • Ruler • Blank Scratch Paper • PDF Booklet Page 18 (Think Fast! Printout) • Assessments: PDF Booklet Page 19-20 (How does your brain control your body? Assessment) Teacher Answer Keys: • How does your brain control your body? Answer Key	• The reflex test activity requires two people.
Optional Lesson 11: Unit Summative Assessment	**December 14**	Materials per Student: • Pencil • PDF Booklet Page 21 Unit Summative Assessment Teacher Answer Keys: • Human Machine	

Standard 4.1.3: Analyze and interpret data from fossils to provide evidence of the stability and change in organisms and environments from long ago. Emphasize using the structures of fossils to make inferences about ancient organisms. Examples of fossils and environments could include comparing a trilobite with a horseshoe crab in an ocean environment or using a fossil footprint to determine the size of a dinosaur. (LS4.A)			
Lessons for this Standard coming in November!			