Lesson 2.5
Modeling Spikes
Lesson Overview

The class continues its investigation by focusing on spikes as a type of defense against a living thing being eaten. Partners browse images of animals and plants with spikes in the reference book to gather evidence about how spikes function as a defense. Students observe a video of a hedgehog and a fox to gather additional evidence about spikes as a type of defense. Next, the teacher demonstrates how to draw a model in the Investigation Notebook and use the word ring to label the drawing. Students plan how to use the available materials to create a model showing how spikes work as a defense and then draw and label their plan in their notebooks. After students share their ideas with the class, the teacher builds a class model based on their ideas. The class revisits the Models of Animal and Plant Defenses chart, adding the Spikes Model to the chart and explaining how spikes work to defend living things. The purpose of this lesson is to provide additional practice with scientific modeling as students figure out how spikes work as a type of defense to prevent living things from being eaten by other animals.

**Anchor phenomenon:** Spruce the Sea Turtle will survive in the ocean.
**Investigative phenomenon:** Animals can avoid being eaten.

**Students learn:**

- Scientists often gather more than one type of evidence to help answer their questions.
- Some animals and plants have spikes that help defend them from being eaten.
Partners browse a section of *Spikes, Spines, and Shells* to gather evidence about how spikes help animals and plants defend themselves.

**Instructional Guide**

1. **Revisit the Investigation Question.**

   We have been working as aquarium scientists to learn about animal and plant defenses. We can use what we learn to help the aquarium director explain to children visiting the aquarium how Spruce can defend herself from sharks once she is released back to the ocean.

   Point to the Investigation Question on the board.

   We are working to answer the question: *How do animals and plants defend themselves?*

   Let’s take a moment to think about how animals and plants defend themselves.
2. Project Four Living Things and prepare students to discuss in pairs.

<table>
<thead>
<tr>
<th>Four Living Things</th>
</tr>
</thead>
<tbody>
<tr>
<td>clam</td>
</tr>
<tr>
<td>thistle</td>
</tr>
<tr>
<td>antelope</td>
</tr>
<tr>
<td>octopus</td>
</tr>
</tbody>
</table>

Here are four living things: a clam, a thistle, two antelope, and an octopus.

These living things may have structures to defend themselves when animals try to eat them. We can use what we have learned to talk about these animals and their structures.

3. On-the-Fly Assessment: Pairs discuss the four organisms. Have pairs talk about each of the following questions. Observe and listen as students discuss. Invite a few students to share their ideas.

- Which of these living things has a defense that we have learned about?
- How would that structure help this living thing not be eaten? [The clam has a hard shell that could block the teeth or claws of an animal that tried to eat it.]
- Is there another living thing here that might have a different defense against being eaten?
- How do you think that structure might work as a defense? [Answers will vary. Examples: The thistle’s spikes or antelope’s horns may poke animals trying to eat it. The antelope’s legs may help it run away. The octopus’s color may help it stay hidden.]

Summarize students ideas.


We have been using this book to learn about how animals and plants use their structures to do what they need to do to survive. In our last lesson, we used this book to gather evidence about how shells and armor help animals and plants defend themselves.
This time, we will look at animals and plants that have a new structure—spikes—and think about how spikes might help animals and plants defend themselves.


Remember that this page is the Contents page. The Contents page tells readers the important sections of the book. It also tells them what pages contain the information they are looking for so that they can find it.

6. Point out the “Spikes and Spines” heading on the Contents page.

7. Turn to page 26 and read aloud to students. After reading page 26, point out how spikes, spines, and thorns are all defenses.

8. Set the purpose for browsing the “Spikes and Spines” section. Revisit the Partner Reading Guidelines as needed.


10. Distribute copies of *Spikes, Spines, and Shells*. Give one copy to each pair of students. Remind students that they are observing and discussing the spikes in the pictures.

11. Allow time for students to browse and visualize. Circulate to listen to students’ discussions while they work. As appropriate, ask them to talk about what they are noticing and visualizing.

What do you notice about the spikes on this plant/animal?
12. Gather students’ attention and invite them to share what they observed and visualized.

How do you visualize them keeping the plant/animal from being eaten?

What did you observe about the spikes on the animals and plants in the book? What were they like?
[They looked sharp. Some spikes were shorter and some spikes were longer. There were lots of spikes. The spikes were almost all over the plant or animal.]

When you visualized, how did you see the spikes keeping an animal or plant from being eaten?
[An animal tried to bite it and the spikes poked its mouth. An animal tried to touch it and the spikes hurt its paw.]

13. Highlight the need for more evidence.

We have observed pictures of spikes and have some ideas about how they might work to defend animals and plants from being eaten. We need more evidence to figure out if spikes really work the way we think they do.

Embedded Formative Assessment

On-the-Fly Assessment 8: Students’ Understanding of Defensive Structure and Function

Look for: Students’ paired discussion of the four living things is an opportunity to assess their understanding that living things have body structures that prevent animals from finding or eating them. The Chapter 2: Clipboard Assessment Tool is available as a reference for the key questions you can ask students in Activity 1. It is also a place to record notes about students’ responses. In general, at this point students should identify the clam as having a shell that can block an animal’s claws or teeth. Any speculations they make about the other organisms’ defensive structures should make reasonable connections between the observable structures and their potential functions, but they do not need to be accurate.

Now what? If you notice students who do not show evidence of understanding defensive structure and function, be sure to note which students and how many. These observations will contribute to your decision about the Critical Juncture Assessment in Lesson 2.7.

Teacher Support

Instructional Suggestion

Crosscutting Concept: Structure and Function
After students have shared structures for defense they found in the reference book, you may wish to remind students of the crosscutting concept of Structure and Function. Emphasize the properties of the structures students shared, such as sharpness and hardness. Reinforce the idea that these structures are useful for meeting the living things’ need to survive by defending themselves.

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Gathering Evidence About Spikes as a Defense

Partners browse a section of *Spikes, Spines, and Shells* to gather evidence about how spikes help animals and plants defend themselves.

**Instructional Guide**

1. **Revisit the Investigation Question.**

   Hemos estado trabajando como científicos y científicas de acuarios para aprender acerca de las defensas de los animales y las plantas. Podemos usar lo que aprendamos para ayudar a la directora del acuario a explicar a los niños que visiten el acuario cómo puede defenderse Spruce la tortuga de mar de los tiburones una vez que sea liberada al océano.

   Point to the Investigation Question on the board.

   Estamos trabajando para responder la pregunta: ¿Cómo se defienden los animales y las plantas?

   Tomemos un momento para pensar en cómo se defienden los animales y las plantas.
2. Project Four Living Things and prepare students to discuss in pairs.

![Image of four organisms: an oyster, a thistle, a gazelle, and a squid.](image)

- **Cuatro seres vivientes**: una almeja, un cardo, dos antílopes y un pulpo.

- Estos seres vivientes pueden tener estructuras para defenderse cuando los animales intentan comerlos. Podemos usar lo que hemos aprendido para hablar acerca de estos animales y sus estructuras.

3. **On-the-Fly Assessment**: Pairs discuss the four organisms. Have pairs talk about each of the following questions. Observe and listen as students discuss. Invite a few students to share their ideas.

   - ¿Cuál de estos seres vivientes tiene una defensa sobre la que hemos aprendido?
   - ¿Cómo ayudaría esa estructura a este ser viviente a no ser comido?
     - [La almeja tiene un caparazón duro que podría bloquear los dientes o las garras de un animal que intentara comerla].
   - ¿Hay otro ser viviente aquí que podría tener una defensa diferente para no ser comido?
   - ¿Cómo piensan que esa estructura podría funcionar como defensa?
     - [Las respuestas variarán. Ejemplos: Las púas del cardo o los cuernos del antílope pueden clavarse en los animales que intenten comerlo. Las patas del antílope pueden ayudarlo a escapar corriendo. El color del pulpo puede ayudarlo a mantenerse oculto].

Summarize students ideas.

Lesson 2.5
Activity 1

Animal and Plant Defenses
Lesson Guides


6. Point out the “Spikes and Spines” heading on the Contents page.

- Púas y espinas.
- Espinas es una palabra que significa casi lo mismo que púas.
- La página de Contenido muestra que puedo averiguar más sobre púas en la sección que comienza en la página 26. Voy a pasar a esa página.

7. Turn to page 26 and read aloud to students. After reading page 26, point out how spikes, spines, and thorns are all defenses.

- Trabajarán juntos para reunir evidencia acerca de cómo los seres vivientes usan púas para defenderse. Hay otras palabras para púas, como espinas y agujas, pero es importante recordar que cada una de estas defensas es puntiaguda y afilada.

8. Set the purpose for browsing the “Spikes and Spines” section. Revisit the Partner Reading Guidelines as needed.

- Trabajarán juntos para observar las imágenes de animales y plantas con púas en esta sección del libro. Tomen turnos para visualizar cómo las púas podrían evitar que el animal o la planta sea comido.


- Observo que estas púas son afiladas y delgadas. Observo púas más pequeñas creciendo de las púas más grandes.
- Estoy visualizando un animal intentando meter esta planta. Pienso que las púas se podrían clavar en la boca del animal y evitar que coma la planta.

10. Distribute copies of Spikes, Spines, and Shells. Give one copy to each pair of students. Remind students that they are observing and discussing the spikes in the pictures.

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11. **Allow time for students to browse and visualize.** Circulate to listen to students’ discussions while they work. As appropriate, ask them to talk about what they are noticing and visualizing.

- ¿Qué notan sobre las púas en esta planta/animal?

- ¿Cómo los visualizan evitando que la planta/el animal sea comido?

12. **Gather students’ attention and invite them to share what they observed and visualized.**

- ¿Qué observaron sobre las púas en los animales y las plantas en el libro? ¿Cómo eran? [Se veían afiladas. Algunas púas eran más cortas y algunas púas eran más largas. Había muchas púas. Las púas estaban casi en toda la planta o el animal].

- Cuando visualizaron, ¿cómo vieron las púas evitando que fuera comido un animal o una planta? [Un animal intentó morderlo y las púas se clavaron en su boca. Un animal intentó tocarlo y las púas lastimaron su pata].

13. **Highlight the need for more evidence.**

Hemos observado imágenes de púas y tenemos algunas ideas acerca de cómo podrían funcionar para defender a los animales y las plantas para no ser comidos. Necesitamos más evidencia para averiguar si las púas realmente funcionan de la manera que pensamos que funcionan.

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**Embedded Formative Assessment**

**On-the-Fly Assessment 8: Students’ Understanding of Defensive Structure and Function**

**Look for:** Students’ paired discussion of the four living things is an opportunity to assess their understanding that living things have body structures that prevent animals from finding or eating them. The Chapter 2: Clipboard Assessment Tool is available as a reference for the key questions you can ask students in Activity 1. It is also a place to record notes about students’ responses. In general, at this point students should identify the clam as having a shell that can block an animal’s claws or teeth. Any speculations they make about the other organisms’ defensive structures should make reasonable connections between the observable structures and their potential functions, but they do not need to be accurate.

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