Lesson 3.2
Discussing Warming Over Time
Lesson Overview

The class makes sense of their temperature data from the Warming Over Time Model investigation and from the data collected from their school playground. Students share their recorded data from the Warming Over Time Model investigation and the teacher combines this information into the Warming Over Time graph. The class shares their observations of this graph, and partners use Shared Listening to discuss their ideas about what causes a surface to get warmer over time. The teacher begins to connect the model data to ideas about Earth’s surface warming over time. Students review the morning and afternoon temperature data collected from their playground as further evidence of sunlight causing Earth’s surfaces to be warmer in the afternoon. The teacher reads aloud from the reference book about how scientists use models to investigate things that happen too fast or too slowly to observe all at once. The purpose of this lesson is for students to interpret the findings from their second investigation using a model and to learn more about how and why scientists use models.

**Anchor Phenomenon:** Students at Carver Elementary School are too cold during morning recess, while students at Woodland Elementary School are too hot during afternoon recess.  
**Investigative Phenomenon:** A rubber/foam surface gets warmer the longer a lamp shines on it.

Students learn:

- Models help scientists investigate fast and slow things.
- Scientists look for patterns and order when making observations about the world.
Reading About Models of Fast and Slow Things

The teacher reads aloud a section of the reference book.

Instructional Guide

1. Display the front cover of the *Handbook of Models* big book. Read the title aloud.

   - Remember this book is a reference book about models. The purpose of a reference book is to provide a lot of information about a topic.
   - Instead of reading the book from beginning to end, you can read parts of the book to find out about something you want to learn.

2. Turn to the contents on page 3. Point out the fifth heading on the page.

   - Models help scientists investigate fast and slow things.
   - We have been using a model to investigate sunlight shining on Earth’s surface at night, in the morning, and in the afternoon because it happens too slowly for us to investigate all at once.
   - It would take a long time for us to investigate how Earth’s surface gets warmer across a whole day.
   - Just like we are using a model to investigate something that happens slowly, other scientists also use models to investigate fast and slow things.
   - The contents show that I can find out more about how scientists use models to investigate fast and slow things on page 16. I am going to turn to that page.

3. Turn to pages 16 and 17 and read aloud to students. Invite students to share their observations of the photos on these pages. Help students see that the pairs of pictures depict a model and what it represents.
4. Turn to the model example subsection you have selected and read aloud to students. Pause at the end of the subsection and pose the following questions:

- Why did the scientists need a model?
- How is the model like the real thing?
- How is the model different from the real thing?

5. Have students talk about models in science. Point out that in their work as weather scientists, students have also used models to investigate. Ask students to talk to a partner about the following questions:

- How is our lamp model the same as the models we read about in the book?
- How is our lamp model different from the model we read about in the book?

Invite volunteers to share their ideas with the class.

6. Revisit the What Scientists Do chart. Point to the practices posted on the What Scientists Do chart as you discuss them.

- Remember that to answer their questions, scientists do different things.
- How did we work as scientists today?

Ask students to talk to a partner about how they worked as scientists in this lesson. Invite several students to share their ideas with the class.

[We communicated by sharing with partners about what happens to a surface when light shines on it for a short and long time. We read part of Handbook of Models to learn about how scientists use models to study fast and slow things. We recorded the temperatures we measured in our lamp model.]

7. Conclude the lesson. Let students know that they will continue to work as weather scientists and think about surfaces warming over time in the next few lessons.

Teacher Support

Instructional Suggestion

Going Further: Additional Reference Book Reading
If you have time, you may wish to read about both the Stream Model and the Flapping Fly Model in the reference book. After reading each section, you can prompt students to make comparisons to the lamp model using the questions in step four of this Activity.
Reading About Models of Fast and Slow Things

The teacher reads aloud a section of the reference book.

### Instructional Guide

1. **Display the front cover of the Handbook of Models big book.** Read the title aloud.

   - Recuerden que este libro es un libro de referencia sobre modelos. El propósito de un libro de referencia es proporcionar mucha información sobre un tema.

   - En vez de leer el libro desde el principio hasta el final, pueden leer partes del libro para averiguar sobre algo que quieren aprender.

2. **Turn to the contents on page 3.** Point out the fifth heading on the page.

   - Los modelos ayudan a los científicos a investigar cosas lentas y rápidas.

   - Hemos estado usando un modelo para investigar la luz del sol alumbrando la superficie de la Tierra de noche, en la mañana y en la tarde porque sucede demasiado lentamente para que lo investiguemos de una sola vez.

   - Nos tomaría mucho tiempo investigar cómo la superficie de la Tierra se calienta más a lo largo de un día entero.

   - Tal como nosotros estamos usando un modelo para investigar algo que sucede lentamente, otros científicos también usan modelos para investigar cosas rápidas y lentas.

   - Los contenidos muestran que puedo averiguar más acerca de cómo los científicos usan modelos para investigar cosas lentas y rápidas en la página 16. Voy a pasar a esa página.

3. **Turn to pages 16 and 17 and read aloud to students.** Invite students to share their observations of the photos on these pages. Help students see that the pairs of pictures depict a model and what it represents.
4. Turn to the model example subsection you have selected and read aloud to students. Pause at the end of the subsection and pose the following questions:

¿Por qué necesitaban un modelo los científicos?

¿De qué manera el modelo es como la cosa real?

¿De qué manera es diferente el modelo a la cosa real?

5. Have students talk about models in science. Point out that in their work as weather scientists, students have also used models to investigate. Ask students to talk to a partner about the following questions:

¿De qué manera nuestro modelo de la lámpara es igual a los modelos sobre los que leímos en el libro?

¿De qué manera nuestro modelo de la lámpara es diferente al modelo sobre el que leímos en el libro?

Invite volunteers to share their ideas with the class.

6. Revisit the What Scientists Do chart. Point to the practices posted on the What Scientists Do chart as you discuss them.

Recuerden que para responder sus preguntas, los científicos hacen diferentes cosas.

¿De qué manera trabajamos como científicos hoy?

Ask students to talk to a partner about how they worked as scientists in this lesson. Invite several students to share their ideas with the class.

We communicated by sharing with partners about what happens to a surface when light shines on it for a short and long time. We read part of Handbook of Models to learn about how scientists use models to study fast and slow things. We recorded the temperatures we measured in our lamp model.

7. Conclude the lesson. Let students know that they will continue to work as weather scientists and think about surfaces warming over time in the next few lessons.

Teacher Support

Instructional Suggestion

Going Further: Additional Reference Book Reading

If you have time, you may wish to read about both the Stream Model and the Flapping Fly Model in the reference book. After reading each section, you can prompt students to make comparisons to the lamp model using the questions in step four of this Activity.