Lesson 4.1
Modeling Warming of Different Surfaces
Lesson Overview

Students revisit the book *Getting Warm in the Sunlight* with a new purpose and then look for evidence to support new ideas using a familiar model. The class returns to *Getting Warm in the Sunlight* and hypothesizes that dark surfaces may get warmer than pale surfaces when sunlight shines on them for the same amount of time. Students discuss how to set up an investigation that allows them to look for evidence to support their ideas that different colors of surfaces are the cause for the effect that those surfaces heat differently after being exposed to sunlight for the same amount of time. The class discusses how to use the Warming Over Time Model to represent the sun shining on dark and pale Earth surfaces. Then, students make predictions and gather data from the model. This investigation also serves as an assessment that is designed to reveal students’ facility with the performances of Planning and Conducting Investigations and Analyzing and Interpreting Data, as well as with their understanding of unit-specific science concepts and the crosscutting concept of Cause and Effect. The purpose of this lesson is for students to gather data that will serve as evidence to support their ideas about how sunlight affects pale and dark surfaces differently.

**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:** In the desert, the rocks are warmer than the sand.

**Students learn:**

- Pale and dark surfaces heat up differently when light shines on them.
Students reread *Getting Warm in the Sunlight* and focus on the temperature and characteristics of different surfaces.

### Instructional Guide

1. **Set the purpose for returning to the book.**

   Scientists will often read a book more than once, looking for ideas they did not notice or were not looking for before.

   We are going to come back to our book, *Getting Warm in the Sunlight*. Last time, we were wondering about why surfaces get warmer and warmer during the daytime. We noticed a pattern. Each surface got warmer and warmer over time.

   This time, we are wondering about why some surfaces get warmer than others.

   We can read to see if we notice another pattern.

2. **Review making predictions when reading.** Remind students that an important way that readers learn from a book is to make a prediction.

   When you make a prediction, you use what you already know to decide what you think might happen. As you read, you can check your prediction to see if it matches what you decided before you started reading to gather new information.

   We will pause at several places in the book to make predictions about what we might read next, and then stop to check our predictions.

3. **Read through page 6 and pause for predictions.** Point out the two different surfaces.
Have students share their ideas with a partner, then call on a few to share with the class.

4. Read aloud page 7 to check predictions. Have students describe what they heard about the temperatures of the rocks and sand, and share with their partner whether what you read matched their prediction. Then, call on a few students to share with the class.

What were the temperatures of the rocks and sand? Is that the same as you predicted?

5. Read through page 10 and pause for predictions.

The surfaces are even warmer than before. Let’s make another prediction.

Last time, the pale sand was warm, and the dark rock was hot. What do you think the temperatures of the rock and sand are like now? Why do you think so?

6. Read aloud page 11 to check predictions. Have students describe what they heard about the temperatures of the rocks and sand, and share with their partner whether what you read matched their prediction. Then, call on a few students to share with the class.

What happened to the temperatures of the rocks and sand? Is that the same as you predicted?

7. Finish reading the book and invite students to reflect on patterns of warming mentioned in the book.

The book described two different surfaces, the rocks and the sand. How was the temperature of the rocks and the sand different? What was the pattern? What happened over and over again? [The rocks got warmer than the sand. The rocks were always warmer than the sand.]

How are the rocks and sand different from each other? [The rocks are dark, and the sand is pale; rocks are big chunks, and sand is made of tiny pieces.]

If necessary, reread pages 5–11 and have students look and listen for differences between the rocks and sand.

8. Return to page 10 and introduce dark and pale.

Here is a picture of the lizard moving from the rock to the sand. The book describes the rocks as dark and the sand as pale. What do you think the words dark and pale mean?

Have students share their ideas with a partner, then call on a few to share with the class.
9. Hold up the vocabulary card for dark.

   This is the word dark. Dark means closer to black than white.

   We are going to practice saying the word. Say the word after me: dark.

   Now say the word together: dark.

   Now whisper the word dark to your partner.

   Something that is dark is closer to black than white.

   Post the vocabulary card for dark to the Vocabulary section of the classroom wall.

10. Hold up the vocabulary card for pale.

   This is the word pale. Pale means closer to white than black.

   We are going to practice saying the word. Say the word after me: pale.

   Now say the word together: pale.

   Now whisper the word pale to your partner.

   Something that is pale is closer to white than black.

   Post the vocabulary card for pale to the Vocabulary section of the classroom wall.

11. Use the Warmer and Cooler movement routine to act out the temperatures of the rocks and sand.

   • Have students stand up. Separate students into two groups, one that will be the sand, another that will be the rocks.
   • Lead them in using the Warmer and Cooler movement routine actions to act out the temperatures of the two surfaces over the day.
   • Gesture toward the rock and sand groups as you refer to each one.
   • Switch the group designations, and repeat.

   When the sun was coming up, both the dark rocks and the pale sand were cold.
After sunlight was shining on the sand for a few hours, the pale sand was warm.

After sunlight was shining on the rocks for a few hours, the dark rocks were hot!

After sunlight was shining on the sand for many hours, the pale sand was hot.

After sunlight was shining on the rocks for many hours, the dark rocks were very hot!
Revisiting Getting Warm in the Sunlight

Students reread *Getting Warm in the Sunlight* and focus on the temperature and characteristics of different surfaces.

**Instructional Guide**

1. **Set the purpose for returning to the book.**

   - Los científicos a menudo leen un libro más de una vez, buscando ideas que no notaron o que no estaban buscando antes.
   - Vamos a regresar a nuestro libro, *Calentarse bajo la luz del sol*. La vez pasada, nos estábamos preguntando por qué las superficies se calientan más y más durante las horas diurnas. Notamos un patrón. Cada una de las superficies se calentó más y más con el paso del tiempo.
   - Esta vez, nos estamos preguntando por qué algunas superficies se calientan más que otras.
   - Podemos leer para ver si notamos otro patrón.

2. **Review making predictions when reading.** Remind students that an important way that readers learn from a book is to make a prediction.

   - Cuando hacen una predicción, usan lo que ya saben para decidir lo que piensan que podría pasar. Mientras leen, pueden revisar su predicción para ver si coincide con lo que decidieron antes de que empezaran a leer para reunir nueva información.
   - Haremos pausas en varios lugares en el libro para hacer predicciones acerca de qué podríamos leer a continuación, y luego nos detendremos para revisar nuestras predicciones.

3. **Read through page 6 and pause for predictions.** Point out the two different surfaces.
Las rocas y la arena se están poniendo más tibias. Las rocas y la arena son dos superficies diferentes. Hagamos una pausa para hacer una predicción.

El libro nos contó que tanto las rocas como la arena se están calentando más. ¿Las rocas y la arena tienen la misma temperatura, o una es más caliente que la otra? ¿Por qué piensan eso?

Have students share their ideas with a partner, then call on a few to share with the class.

4. **Read aloud page 7 to check predictions.** Have students describe what they heard about the temperatures of the rocks and sand, and share with their partner whether what you read matched their prediction. Then, call on a few students to share with the class.

¿Cuáles fueron las temperaturas de las rocas y la arena? ¿Es eso lo mismo que predijeron ustedes?

5. **Read through page 10 and pause for predictions.**

Las superficies están aún más tibias que antes. Hagamos otra predicción.

La vez pasada, la arena de color pálido estaba tibia, y la roca oscura estaba caliente. ¿Cómo piensan que son las temperaturas de la roca y la arena ahora? ¿Por qué piensan eso?

6. **Read aloud page 11 to check predictions.** Have students describe what they heard about the temperatures of the rocks and sand, and share with their partner whether what you read matched their prediction. Then, call on a few students to share with the class.

¿Qué les sucedió a las temperaturas de las rocas y la arena? ¿Es eso lo mismo que predijeron ustedes?

7. **Finish reading the book and invite students to reflect on patterns of warming mentioned in the book.**

El libro describía dos superficies diferentes: las rocas y la arena. ¿De qué manera era diferente la temperatura de las rocas y la arena? ¿Cuál era el patrón? ¿Qué sucedió una y otra vez?

[Las rocas se calentaron más que la arena. Las rocas siempre estuvieron más calientes que la arena].

¿De qué manera las rocas y la arena son diferentes entre sí?

[Las rocas son oscuras, y la arena es pálida; las rocas son trozos grandes, y la arena está hecha de pedazos diminutos].

If necessary, reread pages 5–11 and have students look and listen for differences between the rocks and sand.

8. **Return to page 10 and introduce dark and pale.**

Este es una imagen del lagarto moviéndose de la roca a la arena. El libro describe las rocas **como oscuras** y la arena **como pálida**. ¿Qué piensan que significan las palabras **osuro y pálido**?
Have students share their ideas with a partner, then call on a few to share with the class.

9. Hold up the vocabulary card for *dark*.

   - Oscuro y *pálido* son palabras que podemos usar para describir el color de algo. Describen si el color es más como el color negro o más como el color blanco. Las rocas son oscuras porque son más como el color negro que el blanco. La arena es pálida porque es más como el color blanco que como el color negro.

   - Esta es la palabra *oscuro*. Oscuro significa más como el color negro que como el color blanco.

   - Vamos a practicar decir la palabra. Digan la palabra después de mí: *oscuro*.

   - Ahora digan la palabra juntos: *oscuro*.

   - Ahora susurren la palabra *oscuro* a su compañero o compañera.

   - Algo oscuro es más como el color negro que como el color blanco.

   Post the vocabulary card for *dark* to the Vocabulary section of the classroom wall.

10. Hold up the vocabulary card for *pale*.

    - Esta es la palabra *pálido*. Pálido significa más como el color blanco que como el color negro.

    - Vamos a practicar decir la palabra. Digan la palabra después de mí: *pálido*.

    - Ahora digan la palabra juntos: *pálido*.

    - Ahora susurren la palabra *pálido* a su compañero o compañera.

    - Algo pálido es más como el color blanco que como el color negro.

    Post the vocabulary card for *pale* to the Vocabulary section of the classroom wall.

11. Use the Warmer and Cooler movement routine to act out the temperatures of the rocks and sand.

    - Have students stand up. Separate students into two groups, one that will be the sand, another that will be the rocks.

    - Lead them in using the Warmer and Cooler movement routine actions to act out the temperatures of the two surfaces over the day.

    - Gesture toward the rock and sand groups as you refer to each one.

    - Switch the group designations, and repeat.
Cuando el sol estaba subiendo, tanto las rocas oscuras como la arena pálida estaban frías.

Después de que la luz del sol estuvo alumbrando la arena durante unas cuantas horas, la arena pálida estaba tibia.

Después de que la luz del sol estuvo alumbrando las rocas durante unas cuantas horas, las rocas oscuras estaban calientes!

Después de que la luz del sol estuvo alumbrando la arena durante muchas horas, la arena pálida estaba caliente.

Después de que la luz del sol estuvo alumbrando las rocas durante muchas horas, las rocas oscuras estaban muy calientes!