Lesson 4.2
Reflecting on Warming of Different Surfaces
Lesson Overview

Students compare and discuss the data from their Colored Surfaces Model, read a relevant entry from the Handbook of Models, investigate dark and pale surfaces outside, and record what they’ve learned on the class chart. The teacher compiles the students’ data from the Colored Surfaces Model on two data charts, and students compare and discuss them. The class reads an entry from the Handbook of Models about how other scientists also use models to investigate one thing at a time. Students check the results from their model against the real world, going outside to compare the temperatures of the dark and pale parts of a surface in the sunlight. They document their new knowledge on the What We Know About Weather chart. The purpose of this lesson is to examine the results of the model by investigating surface color and by testing them against observations of surfaces in the real world.

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: One rubber/foam surface gets warmer than another when a lamp is shining on them. Everyday Phenomenon: Different surfaces at school are different temperatures.

Students learn:

- Dark surfaces get warmer than pale surfaces when light shines on them.
- Scientists use models to investigate just one thing at a time.
Returning to the Reference Book

Students read about scientists using models to investigate one thing at a time.

Instructional Guide

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


   - Remember that this book is a reference book about models. How do we read a reference book differently than other books? [We just read parts of it to learn about something we want to find out more about.]

3. Describe the focus of the models you will read about. Turn to the table of contents on page 3.

   - What are some reasons that we and other scientists use models instead of studying the real thing? [The real thing is really big or small, or it happens really slow or fast.]

Point out the sixth heading on the page.

   - *Models help scientists investigate one thing at a time.*

   - We have been using a model to investigate what happens when sunlight shines on Earth’s surfaces that are different colors.

   - What if we went looking for Earth’s surfaces, and we found two surfaces that are different colors, but were also made out of different stuff or materials. That is too many differences!

   - By using our model, we can be sure that the surfaces are different colors, but they are made of the same stuff—rubber/foam! Our model helps us to investigate one thing at a time: color.
Scientists also use models to investigate just one thing. I can find out more about how scientists use models to investigate just one thing on page 22.

4. Read aloud pages 22–23. Read page 22 aloud, then invite students to share their observations of the photos on page 23. Help students see that the pairs of pictures depict a model and what it represents.

5. Read aloud page 24. Invite students to share their observations of the similarities and differences between the model and the real thing based on the pictures on both pages.

6. Read aloud page 25 and discuss the water strider model.

Why did the scientists need a model?  
[Water striders have many body parts, and the scientists wanted to investigate just the legs.]

What was the one thing that scientists wanted to investigate?  
[If the water strider’s curved legs help it to jump on the water.]

How is the model like a real water strider?  
[It has long, curved legs.]

How is the model different from a real water strider?  
[It did not have legs or a body, it was not alive.]

7. Have students talk about models in science. Remind students that in the Handbook of Models, they read about models that scientists used to help investigate just one thing at a time. Ask students to talk with a partner:

Could the scientists use the same model to investigate if water striders could still jump if they had shorter legs?  
Why do you think so?  
[Yes, they could make the legs on the model shorter, and observe if it could jump.]

Could the scientists use the same model to investigate if the things that water striders eat helps them jump? Why do you think so?  
[No, the model does not eat or even have a head or body, so they couldn’t feed it different things.]

Teacher Support

Background

Science Practices: Isolating Variables
While it is not explicitly called out to students, using models to "investigate one thing at a time" is also known as isolating variables—an important part of experimental design. In most situations, many different variables interact to produce an outcome. For example, a river’s water flow is affected by the slope, its shape, and the presence of rocks and plants. Scientists often want to figure out if or how one specific variable affects an outcome, such as how the presence
of leafy plants affects the water flow in a river. In order to be sure that only the variable of interest is affecting the outcome, scientists isolate that variable by making it the only factor that changes or is present. One way they can do this is by creating models that remove the other variables, so they can focus easily on the one they are interested in.

**Instructional Suggestion**

**Providing More Experience: Reading About the River Plants Model**

If you would like to provide students with another opportunity to read about and reflect on a model that scientists used to investigate one thing at a time, you may wish to read the River Plants Model to students, and ask them the following questions: Why did the scientists need a model? What was the one thing that scientists wanted to investigate? How is the model like a real river? How is the model different from a real river? Could the scientists use the same model to investigate if water plants with bigger leaves slow down the water more? Why do you think so? Could the scientists use the same model to investigate if a winding river flows more slowly? Why do you think so? After each question, invite volunteers to share their ideas with the class.
Students read about scientists using models to investigate one thing at a time.

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. ¿Cómo leemos un libro de referencia de manera diferente que otros libros? [Solo leemos partes de él para aprender acerca de algo que queremos entender mejor].

3. Describe the focus of the models you will read about. Turn to the table of contents on page 3.

¿Cuáles son algunas razones por las que nosotros y otros científicos usan modelos en lugar de estudiar la cosa real? [La cosa real es realmente grande o pequeña, o sucede muy lento o rápido].

Point out the sixth heading on the page.

Los modelos ayudan a los científicos a investigar una cosa a la vez.

Hemos estado usando un modelo para investigar qué sucede cuando la luz del sol alumbran las superficies de la Tierra que son de diferentes colores.

¿Y si saliéramos a buscar superficies de la Tierra, y encontráramos dos superficies de diferentes colores, pero también hechas de diferentes cosas o materiales? ¡Esas son demasiadas diferencias!

Al usar nuestro modelo, podemos tener la seguridad de que las superficies son de diferentes colores, pero están hechas de la misma cosa: ¡hule! Nuestros modelos nos ayudan a investigar una cosa a la vez: el color.
Los científicos también usan modelos para investigar solo una cosa. Puedo averiguar más acerca de cómo los científicos usan modelos para investigar solo una cosa en la página 22.

4. **Read aloud pages 22–23.** Read page 22 aloud, then invite students to share their observations of the photos on page 23. Help students see that the pairs of pictures depict a model and what it represents.

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of leafy plants affects the water flow in a river. In order to be sure that only the variable of interest is affecting the outcome, scientists isolate that variable by making it the only factor that changes or is present. One way they can do this is by creating models that remove the other variables, so they can focus easily on the one they are interested in.

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If you would like to provide students with another opportunity to read about and reflect on a model that scientists used to investigate one thing at a time, you may wish to read the River Plants Model to students, and ask them the following questions: *Why did the scientists need a model? What was the one thing that scientists wanted to investigate? How is the model like a real river? How is the model different from a real river? Could the scientists use the same model to investigate if water plants with bigger leaves slow down the water more? Why do you think so? Could the scientists use the same model to investigate if a winding river flows more slowly? Why do you think so?* After each question, invite volunteers to share their ideas with the class.