Lesson 1.3
Warning: Tsunami!
Lesson Overview

Students continue to investigate waves as they read about tsunamis and connect what they read to what they have learned about the patterns of wave motion. Students read *Warning: Tsunami!*—a book that provides a clear and memorable depiction of the concept that waves are a pattern of displacement rather than the movement of matter across distances. The reading comprehension strategy of visualization is introduced. Before and during reading, students employ visualization to comprehend diagrams and to understand various characteristics of tsunami waves. At the end of the lesson, students take stock of what they have learned so far. This lesson enables students to deepen their understanding of the characteristics of waves. This prepares them to investigate sound waves in greater depth to get closer to answering the question *How does sound get from one place to another?*

**Anchor Phenomenon:** Dolphins in Blue Bay National Park communicate with one another underwater.

**Investigative Phenomenon:** Tsunamis are powerful and dangerous ocean waves.

**Students learn:**

- Tsunami waves have a pattern of up-and-down motion.
- Visualizing before and during reading helps readers better understand the ideas in a text.
- A wave is a pattern of motion that travels away from a source.
- Scientists use a variety of methods, tools, and techniques when they conduct investigations.
- Scientists use tools and technologies to make accurate measurements and observations.
- Science affects everyday life.
Students are introduced to a new book and the reading comprehension strategy of visualizing.

**Instructional Guide**

1. **Connect to the previous day’s lesson.** Remind students that in their role as marine scientists for Blue Bay National Park, they are trying to understand how the mother dolphin and her calf use sound to communicate. Remind students that they learned that sound is a wave. Point out that to understand how the sound gets from the mother to the calf, they began investigating what waves are. Have students share what they learned about waves from observing the motion of the rope and the spring toy. [Waves can move up and down or back and forth. There are different kinds of waves. A wave is a pattern of motion. Waves begin at a source.]

2. **Introduce Warning: Tsunami!** Explain to students that since they can’t see sound waves, they are using other waves, such the rope and spring toy waves, to understand how waves move. Let students know that they are going to read a book about a large water wave—a tsunami—to learn about its pattern of motion.

   ![Warning: Tsunami!]

   By reading about another type of wave—one that occurs in water—we can better understand how sound waves move, and that may help us to understand how the sound from the mother dolphin gets to her calf.

3. **Hold up a copy of Warning: Tsunami! and read the title aloud.** Ask a few students to share what they know about tsunamis.

4. **Introduce the Partner Reading Guidelines.** Let students know that they will read the book with a partner. Point out the guidelines that you posted on the wall and review them with the class. If Partner Reading is an unfamiliar activity for your students, let them know they can refer to the guidelines as they read.

5. **Introduce the reading strategy of visualizing.**

   As we read, we want to understand the pattern of motion in a tsunami. Since a book can’t show an actual tsunami, we are going to use a reading strategy called visualizing, which will help us to understand more about tsunami waves as we read about them.
We are going to try to visualize the sizes and distances that are described in the book. We’ll also try to visualize the motion described in the book.

Visualizing means to make a picture in your mind using information from different sources. When you read science text, you can use the pictures you create in your mind to help you make sense of what you are reading. You can also think about what you have already learned to help you put together a more clear and complete picture. Let’s practice using this strategy as we preview the book Warning: Tsunami!

Point out that students will use information from different sources when they visualize. Explain that source has the same meaning (the place where something comes from) as when we use it to describe how a wave starts. Explain that when students visualize, they can think about information from different sources, such as the text in the book and the information they collected during the hands-on investigation in the previous lesson.

6. Distribute and preview books. Distribute one copy of Warning: Tsunami! to each pair of students. Discuss visual representations in the book and their importance in helping students understand what they read.

Visual representations, such as diagrams, illustrations, photographs, and charts, are included in informational texts to help readers better understand the information being presented.

You’ll have a few minutes to preview the book with your partner. Pay particular attention to the visual representations on each page.

Ask students to discuss the following question with their partners as they preview the book.

What is one picture that comes to mind as you look at the visual representations in the book?

7. Have partners look through the book and share ideas with the class. After a few minutes, ask a few students to talk about the pictures they created in their minds.

8. Read the first two sections of the book as a class. Call on volunteers to read pages 5–7 aloud.

9. Discuss, model, and have students practice visualizing. Point out the four diagrams on pages 6 and 7.

When I read this section about what causes a tsunami, I found myself making a picture in my mind of the rope we used in the previous lesson. I began to visualize the motion of a tsunami wave by thinking about the motion of the rope. Let’s closely examine each of the steps in the diagrams to create a picture in our minds about what happens to the water when a tsunami occurs.

- **Discuss Diagram 1 (on page 6).** Point out that the seafloor is calm before the earthquake. Ask students to visualize the rope calm before it is lifted.

- **Discuss Diagram 2 (on page 6).** Point out that the source vibrated (an earthquake shook the seafloor). Ask students to visualize shaking the rope with their hands, then to imagine the floor of the sea shaking in a similar way. Explain that the earthquake moved the water upward, letting it fall back down, just like students’ hands moved the rope upward, letting it fall back down.
Teacher Support

Rationale

Providing More Experience: Daily Written Reflections

Daily Written Reflections are open-ended, optional prompts that you can use with students to jump-start each lesson. You can ask students to write their responses, or you can use the prompts as the basis for a discussion. Daily Written Reflections can also be used at other times in the day or as homework. The prompts encourage students to reflect on what they’ve been learning, activate prior knowledge, make connections, and practice using science vocabulary. Responses can also be a good window into students’ thinking. Let students know that for this kind of writing, it is more important to focus on recording their ideas rather than on perfect spelling or punctuation. Daily Written Reflections are meant to be brief—allow about 5–10 minutes for students to respond.

Instructional Suggestion

Providing More Experience: Today’s Daily Written Reflection

Think about examples of different waves that you have seen. How are they similar, and how are they different? This prompt (on page 8 in the Investigation Notebook) asks students to think about the observations of waves they have made up to this point in the unit. Encouraging students to respond to this prompt can help them connect their hands-on experiences to any new ideas or questions they still have. This can help you learn about students’ prior knowledge of waves. It can also serve as an anticipatory activity for reading Warning: Tsunami! in this lesson.

Background

About the Book: Warning: Tsunami!

Warning: Tsunami! explores the exciting topic of tsunamis in order to demonstrate how waves travel. Tsunamis provide a memorable depiction of the fact that waves are patterns of motion, not transporters of matter across distances. The book begins with a description of tsunamis and diagrams to show the sequence of events when a tsunami occurs. The book then explores how tsunamis are different from regular ocean waves and from sound waves. The book specifies that what actually travels in a tsunami is the energy of the wave, not the water. The conclusion explains tsunami detection and safety. Warning: Tsunami! provides students with a compelling example to help them understand that a wave is a pattern of motion. The book also helps students understand the characteristics shared by all waves.

Background

Literacy Note: Visualizing

In this unit, students learn to visualize as they read science text. This strategy supports students’ reading comprehension and science content learning. Readers of science text often create pictures in their minds to assist their comprehension. Being able to think visually is a critical strategy in science and is particularly useful in this unit, as students learn to generate mental images to make meaning from science text. Visual representations and models of waves are prevalent throughout this unit, and visualizing gives students a way to access these representations.
Students will have multiple opportunities to learn about and practice this strategy through a gradual-release model; you initially provide a high level of direction and support, and this level of support decreases over time in order to promote students’ independence.

Background

Science Note: Tsunamis
Some students may have heard of tsunamis before; others may not be familiar with them. We recommend giving students some background information before they begin reading—to build interest and to make the topic more approachable to all students. A tsunami is a type of powerful and dangerous ocean wave. Tsunamis are different from regular ocean waves that we might see at the beach. Regular ocean waves happen all the time and are caused by tides, storms, and wind. Tsunamis are most commonly caused by earthquakes and do not happen very often. In addition to earthquakes, underwater landslides, large volcanic eruptions, and meteorite impacts in the ocean can cause tsunamis. The word tsunami is a Japanese term. The word became popular in the English language about 100 years ago after National Geographic magazine published a report about a tsunami that struck Japan.

Instructional Suggestion

Providing More Experience: Examining Visual Representations
Visual representations are a vital component of science texts. Scientists often share their conceptual thinking through diagrams, so the ability to interpret diagrams is important for understanding scientific ideas. Students need to learn how to “read” diagrams—using clues such as the title, captions, colors, arrows, etc., in order to understand the science concept the author is trying to convey. To help students develop their ability to integrate the text and the diagrams, model thinking aloud as you examine the diagrams on page 6 of Warning: Tsunami! Have students turn to page 6 and point to the calm seafloor, then point to the diagram of the seafloor during the earthquake. Read aloud the text on page 6 and point out how the diagrams show in pictures what is also stated in words. Point out how the caption and labels also help you to understand this idea. Continue with the remaining diagrams on page 7, inviting students to contribute ideas about how the supportive features of the visual representations help them visualize what causes a tsunami. Engaging in this kind of careful reading of visual representations supports students in visualizing how a tsunami is formed and will help them in future lessons as they engage with increasingly complex visual representations of waves.
Partner Reading

Partners read *Warning: Tsunami!* and employ the reading strategy of visualizing to think about the measurements in the book.

Instructional Guide

1. **Project notebook page.** Have students turn to page 10, Visualizing While Reading *Warning: Tsunami!*, in their notebooks. Let students know that they should complete this page as they read with their partners.

   We practiced using visualizing to connect our experiences to what we read and to help us to better understand some of the visual representations in the book. The book also contains many scientific measurements that we can understand better if we make pictures in our minds that connect the measurements to things that are familiar to us.

   As you read the remainder of the book with your partner, I’d like you to think of everyday examples that are similar in size to the measurements that you read about. Let’s complete one together.

2. **Have students visualize the measurement on page 8 of *Warning: Tsunami!*** Ask a student to read page 8 aloud.

   The text states that tsunami waves are not always very high, and that most are just a few centimeters (a couple of inches) high. What everyday objects are about the size of a tsunami wave? Everyone take a moment to create a picture in your mind.

   Call on students to share their ideas. As students share what they visualized, record their ideas in the “What I think of when I visualize this measurement” column on the projected notebook page. Have students record their own ideas in their notebooks.

3. **Emphasize the purpose of the reading strategy.**

   By visualizing the measurements as you read, you can better understand the characteristics of tsunamis.

4. **Review the reading task.**
I would like you and your partner to visualize each of the measurements mentioned on pages 9–13 of the book. When you read about the measurement, stop and make a picture in your mind that helps you to understand the measurements that you are reading about. Then, record your ideas on page 10 in your own notebook.

5. **Prompt partners to start reading.** Remind students to begin reading on page 8. Circulate among pairs as they read the remainder of *Warning: Tsunami!*

6. **On-the-Fly Assessment: Students visualize while reading.** As you circulate, make note of how students are applying the reading strategy of visualizing.

7. **With notebook page 10 projected, ask students to share some of the visualizations they recorded.** Record students’ ideas on the projected notebook page.

8. **Conclude the activity.** Draw students’ attention to the rightmost column on projected notebook page 10 and, referring to students’ visualizations, restate some of the characteristics of tsunamis. For example, you might say something like *A wavelength can be greater than 60 miles. Tony shared that he walks 1 mile to school, and he visualized doing his walk 60 times—that is a really long distance!*

9. **Collect all copies of *Warning: Tsunami!***

---

**Embedded Formative Assessment**

## On-the-Fly Assessment 2: Reading with a Purpose

**Look for:** This lesson serves as an introduction to the reading strategy of visualizing. It is also students’ first opportunity to employ the strategy during reading as a tool to support comprehension. As you circulate, note how students are beginning to use visualizing. Are they talking with their partners and connecting what they read in the book to their everyday experiences with different measurements? Throughout the unit, students will have the opportunity to apply the strategy of visualizing as they read and as they engage in firsthand science investigations.

**Now what?** If students seem to need more support employing the reading strategy, provide additional modeling to pairs as you circulate. You may wish to guide students through visualizing a second measurement. For example, you might say “Tsunami waves can travel as fast as 800 kilometers per hour (about 500 miles per hour). Can you think of anything that travels that quickly?” Let students know that that’s about as fast as an airplane travels. Then, you can encourage students to visualize energy moving through the ocean at the speed of an airplane. Depending on how many students need this support, you could provide it for students in pairs, for a small group, or for the whole class.
Teacher Support

Rationale

Literacy Note: Partner Reading
Throughout this unit, we suggest that students read the books with a partner. This allows students time to apply and practice the reading strategies they’re learning, keeps them focused on the task at hand, and provides opportunities for them to assist each other with reading. You can use any effective reading procedures you’ve already established with your class. Before reading this first book in the unit, you may wish to work with a student volunteer to model how to read effectively with a partner, following the Partner Reading Guidelines. Establishing procedures takes time at first, but will pay off in terms of student learning and management of the lessons. Over time, students gain practice working together and will need fewer reminders about reading together effectively.

Instructional Suggestion

Going Further: Mathematical Thinking
Ask students to refer to the map on page 11 of Warning: Tsunami! and challenge them to calculate what time a tsunami would hit different locations based on when an earthquake happened in Alaska. Let students know that the red dot with the “Earthquake happened here” label indicates the location of the earthquake for each scenario. Ask students the following questions:

- “If the earthquake happened at 1:30 a.m., what time would it be in Alaska when the tsunami wave hits the southern tip of the Baja California Peninsula?” [9:30 a.m.]
- “If the earthquake happened at 1:30 a.m., what time would it be in Alaska when the tsunami wave hits the southern tip of South America?” [9:30 p.m.]
- “If the earthquake happened at 8:44 p.m., what time would it be in Alaska when the tsunami wave hits the farthest islands off the tip of that state?” [11:44 p.m.]
- “If the earthquake happened at 8:44 p.m., what time would it be in Alaska when the tsunami wave hits Hawaii?” [Sometime between 2:44 a.m. and 3:44 a.m.]

Depending on how students interpret the lines that mark the hours on the map on page 11, their answers may be 1 hour more or less than what is indicated in this note.

Rationale

Pedagogical Goals: Understanding the Nature of Science
One goal set forth by the Next Generation Science Standards (NGSS) is for students to understand the nature of science as a discipline and how scientific knowledge develops over time. The NGSS calls out eight understandings about the nature of science that are woven throughout the Amplify Science curriculum. This unit gives students an opportunity to experience three understandings about the nature of science: that Scientific Investigations Use a Variety of Methods, that Scientific Knowledge Is Based on Empirical Evidence, and that Science Is a Human Endeavor. The book Warning: Tsunami! describes how scientists use a tsunameter to collect and analyze data to detect tsunamis and predict when and where they will occur. Students read about how scientific understanding of the characteristics of
tsunami waves helps us to prepare for tsunamis and save lives. Collectively, this text illustrates the ideas that scientists use different ways to study the world, scientists use different tools and technologies in order to create scientific knowledge, and science is connected to our everyday life.

Possible Responses

Investigation Notebook
Visualizing While Reading *Warning: Tsunami!* (page 10)

Answers will vary.

Examples for third column of the table:
Row 1: my finger is a few centimeters long
Row 2: my grandma lives about that far away
Row 3: a jet plane flying really fast
Row 4: almost a whole day
Row 5: the distance across the country
Visualizing While Reading Warning: Tsunami!

1. Visualizing means making a picture in your mind using information from different sources.

2. As you continue to read Warning: Tsunami!, visualize each of the measurements from the book, using what you know.

3. Draw or write what you visualize in the third column of the table below.

<table>
<thead>
<tr>
<th>Page number</th>
<th>What the book says</th>
<th>What I think of when I visualize this measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>Tsunamis are often just a few centimeters (a couple of inches) high as they travel across the ocean.</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>A wavelength is the distance between two peaks of a wave. For a tsunami wave, this distance can be greater than 100 kilometers (about 60 miles)!</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Tsunami waves can travel as fast as 800 kilometers per hour (about 500 miles per hour) across huge distances.</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>A tsunami wave reached here in 20 hours.</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>An earthquake near Alaska can cause a tsunami that devastates Hawaii, about 4,600 kilometers (almost 3,000 miles) away.</td>
<td></td>
</tr>
</tbody>
</table>
Students are introduced to a new book and the reading comprehension strategy of visualizing.

Instructional Guide

1. **Connect to the previous day’s lesson.** Remind students that in their role as marine scientists for Blue Bay National Park, they are trying to understand how the mother dolphin and her calf use sound to communicate. Remind students that they learned that sound is a wave. Point out that to understand how the sound gets from the mother to the calf, they began investigating what waves are. Have students share what they learned about waves from observing the motion of the rope and the spring toy. [Waves can move up and down or back and forth. There are different kinds of waves. A wave is a pattern of motion. Waves begin at a source.]

2. **Introduce Warning: Tsunami!** Explain to students that since they can’t see sound waves, they are using other waves, such the rope and spring toy waves, to understand how waves move. Let students know that they are going to read a book about a large water wave—a tsunami—to learn about its pattern of motion. Al leer sobre otro tipo de onda, una que ocurre en el agua, podemos entender mejor cómo se mueven las ondas de sonido, y eso puede ayudarnos a entender cómo llega el sonido desde la madre delfín hasta la cría.

3. **Hold up a copy of Warning: Tsunami! and read the title aloud.** Ask a few students to share what they know about tsunamis. Mientras leemos, queremos entender el patrón del movimiento en un tsunami. Como un libro no puede mostrar un tsunami real, vamos a usar una estrategia llamada visualizar, la cual nos ayudará a entender más acerca de las ondas de tsunami mientras leemos sobre ellas.

4. **Introduce the Partner Reading Guidelines.** Let students know that they will read the book with a partner. Point out the guidelines that you posted on the wall and review them with the class. If Partner Reading is an unfamiliar activity for your students, let them know they can refer to the guidelines as they read.

5. **Introduce the reading strategy of visualizing.**
Point out that students will use information from different sources when they visualize. Explain that source has the same meaning (the place where something comes from) as when we use it to describe how a wave starts. Explain that when students visualize, they can think about information from different sources, such as the text in the book and the information they collected during the hands-on investigation in the previous lesson.

6. Distribute and preview books. Distribute one copy of Warning: Tsunami! to each pair of students. Discuss visual representations in the book and their importance in helping students understand what they read.

Ask students to discuss the following question with their partners as they preview the book.

7. Have partners look through the book and share ideas with the class. After a few minutes, ask a few students to talk about the pictures they created in their minds.

8. Read the first two sections of the book as a class. Call on volunteers to read pages 5–7 aloud.

9. Discuss, model, and have students practice visualizing. Point out the four diagrams on pages 6 and 7.

- Discuss Diagram 1 (on page 6). Point out that the seafloor is calm before the earthquake. Ask students to visualize the rope calm before it is lifted.

- Discuss Diagram 2 (on page 6). Point out that the source vibrated (an earthquake shook the seafloor). Ask students to visualize shaking the rope with their hands, then to imagine the floor of the sea shaking in a similar way. Explain that the earthquake moved the water upward, letting it fall back down, just like students’ hands moved the rope upward, letting it fall back down.
• Discuss Diagrams 3 and 4 (on page 7). Ask students “In which direction do the tsunami waves travel?” [Outward in all directions.] Ask students if this is the same as, or different from, the rope [Different; with the rope, the wave started at one end and traveled to the other end.] Now have students visualize the movement of water in each of the two diagrams. Then have them share with a partner the mental pictures that they created of the movement of water.

Teacher Support

Rationale

Providing More Experience: Daily Written Reflections

Daily Written Reflections are open-ended, optional prompts that you can use with students to jump-start each lesson. You can ask students to write their responses, or you can use the prompts as the basis for a discussion. Daily Written Reflections can also be used at other times in the day or as homework. The prompts encourage students to reflect on what they’ve been learning, activate prior knowledge, make connections, and practice using science vocabulary. Responses can also be a good window into students’ thinking. Let students know that for this kind of writing, it is more important to focus on recording their ideas rather than on perfect spelling or punctuation. Daily Written Reflections are meant to be brief—allow about 5–10 minutes for students to respond.

Instructional Suggestion

Providing More Experience: Today’s Daily Written Reflection

Think about examples of different waves that you have seen. How are they similar, and how are they different? This prompt (on page 8 in the Investigation Notebook) asks students to think about the observations of waves they have made up to this point in the unit. Encouraging students to respond to this prompt can help them connect their hands-on experiences to any new ideas or questions they still have. This can help you learn about students’ prior knowledge of waves. It can also serve as an anticipatory activity for reading Warning: Tsunami! in this lesson.

Background

About the Book: Warning: Tsunami!

Warning: Tsunami! explores the exciting topic of tsunamis in order to demonstrate how waves travel. Tsunamis provide a memorable depiction of the fact that waves are patterns of motion, not transporters of matter across distances. The book begins with a description of tsunamis and diagrams to show the sequence of events when a tsunami occurs. The book then explores how tsunamis are different from regular ocean waves and from sound waves. The book specifies that what actually travels in a tsunami is the energy of the wave, not the water. The conclusion explains tsunami detection and safety. Warning: Tsunami! provides students with a compelling example to help them understand that a wave is a pattern of motion. The book also helps students understand the characteristics shared by all waves.

Background

Literacy Note: Visualizing

In this unit, students learn to visualize as they read science text. This strategy supports students’ reading comprehension and science content learning. Readers of science text often create pictures in their minds to assist their comprehension. Being able to think visually is a critical strategy in science and is particularly useful in this unit, as students learn to generate mental images to make meaning from science text. Visual representations and models of waves are prevalent throughout this unit, and visualizing gives students a way to access these representations.
Students will have multiple opportunities to learn about and practice this strategy through a gradual-release model; you initially provide a high level of direction and support, and this level of support decreases over time in order to promote students’ independence.

Background

Science Note: Tsunamis
Some students may have heard of tsunamis before; others may not be familiar with them. We recommend giving students some background information before they begin reading—to build interest and to make the topic more approachable to all students. A tsunami is a type of powerful and dangerous ocean wave. Tsunamis are different from regular ocean waves that we might see at the beach. Regular ocean waves happen all the time and are caused by tides, storms, and wind. Tsunamis are most commonly caused by earthquakes and do not happen very often. In addition to earthquakes, underwater landslides, large volcanic eruptions, and meteorite impacts in the ocean can cause tsunamis. The word tsunami is a Japanese term. The word became popular in the English language about 100 years ago after National Geographic magazine published a report about a tsunami that struck Japan.

Instructional Suggestion

Providing More Experience: Examining Visual Representations
Visual representations are a vital component of science texts. Scientists often share their conceptual thinking through diagrams, so the ability to interpret diagrams is important for understanding scientific ideas. Students need to learn how to “read” diagrams—using clues such as the title, captions, colors, arrows, etc., in order to understand the science concept the author is trying to convey. To help students develop their ability to integrate the text and the diagrams, model thinking aloud as you examine the diagrams on page 6 of Warning: Tsunami! Have students turn to page 6 and point to the calm seafloor, then point to the diagram of the seafloor during the earthquake. Read aloud the text on page 6 and point out how the diagrams show in pictures what is also stated in words. Point out how the caption and labels also help you to understand this idea. Continue with the remaining diagrams on page 7, inviting students to contribute ideas about how the supportive features of the visual representations help them visualize what causes a tsunami. Engaging in this kind of careful reading of visual representations supports students in visualizing how a tsunami is formed and will help them in future lessons as they engage with increasingly complex visual representations of waves.
Partner Reading

Partners read *Warning: Tsunami!* and employ the reading strategy of visualizing to think about the measurements in the book.

Instructional Guide

1. **Project notebook page.** Have students turn to page 10, Visualizing While Reading *Warning: Tsunami!* in their notebooks. Let students know that they should complete this page as they read with their partners.

   Practicamos usar la visualización para conectar nuestras experiencias con lo que leemos y para ayudarnos a entender mejor algunas de las representaciones visuales en el libro. El libro también contiene muchas medidas científicas que podemos entender mejor si hacemos imágenes en nuestra mente que conecten las medidas con cosas que son familiares para nosotros.

   Mientras leen el resto del libro en parejas, me gustaría que pensaran en ejemplos cotidianos que sean similares en tamaño a las medidas sobre las que leyeron. Completemos uno juntos.

2. **Have students visualize the measurement on page 8 of *Warning: Tsunami!*** Ask a student to read page 8 aloud.

   El texto expresa que las ondas de tsunami no siempre son muy altas, y que la mayoría miden solo unos cuantos centímetros (un par de pulgadas) de alto. ¿Qué objetos cotidianos tienen el tamaño aproximado de una onda de tsunami? Todos tomen un momento para crear una imagen en su mente.

   Call on students to share their ideas. As students share what they visualized, record their ideas in the “What I think of when I visualize this measurement” column on the projected notebook page. Have students record their own ideas in their notebooks.

3. **Emphasize the purpose of the reading strategy.**

   Al visualizar las medidas mientras leen, pueden entender mejor las características de los tsunamis.

4. **Review the reading task.**
5. **Prompt partners to start reading.** Remind students to begin reading on page 8. Circulate among pairs as they read the remainder of *Warning: Tsunami!*

6. **On-the-Fly Assessment: Students visualize while reading.** As you circulate, make note of how students are applying the reading strategy of visualizing.

7. **With notebook page 10 projected, ask students to share some of the visualizations they recorded.** Record students’ ideas on the projected notebook page.

8. **Conclude the activity.** Draw students’ attention to the rightmost column on projected notebook page 10 and, referring to students’ visualizations, restate some of the characteristics of tsunamis. For example, you might say something like *A wavelength can be greater than 60 miles. Tony shared that he walks 1 mile to school, and he visualized doing his walk 60 times—that is a really long distance!*

9. **Collect all copies of *Warning: Tsunami!***

---

**Embedded Formative Assessment**

**On-the-Fly Assessment 2: Reading with a Purpose**

**Look for:** This lesson serves as an introduction to the reading strategy of visualizing. It is also students’ first opportunity to employ the strategy during reading as a tool to support comprehension. As you circulate, note how students are beginning to use visualizing. Are they talking with their partners and connecting what they read in the book to their everyday experiences with different measurements? Throughout the unit, students will have the opportunity to apply the strategy of visualizing as they read and as they engage in firsthand science investigations.

**Now what?** If students seem to need more support employing the reading strategy, provide additional modeling to pairs as you circulate. You may wish to guide students through visualizing a second measurement. For example, you might say “Tsunami waves can travel as fast as 800 kilometers per hour (about 500 miles per hour). Can you think of anything that travels that quickly?” Let students know that that’s about as fast as an airplane travels. Then, you can encourage students to visualize energy moving through the ocean at the speed of an airplane. Depending on how many students need this support, you could provide it for students in pairs, for a small group, or for the whole class.
Teacher Support

Rationale

Literacy Note: Partner Reading
Throughout this unit, we suggest that students read the books with a partner. This allows students time to apply and practice the reading strategies they’re learning, keeps them focused on the task at hand, and provides opportunities for them to assist each other with reading. You can use any effective reading procedures you’ve already established with your class. Before reading this first book in the unit, you may wish to work with a student volunteer to model how to read effectively with a partner, following the Partner Reading Guidelines. Establishing procedures takes time at first, but will pay off in terms of student learning and management of the lessons. Over time, students gain practice working together and will need fewer reminders about reading together effectively.

Instructional Suggestion

Going Further: Mathematical Thinking
Ask students to refer to the map on page 11 of Warning: Tsunami! and challenge them to calculate what time a tsunami would hit different locations based on when an earthquake happened in Alaska. Let students know that the red dot with the “Earthquake happened here” label indicates the location of the earthquake for each scenario. Ask students the following questions:

• “If the earthquake happened at 1:30 a.m., what time would it be in Alaska when the tsunami wave hits the southern tip of the Baja California Peninsula?” [9:30 a.m.]
• “If the earthquake happened at 1:30 a.m., what time would it be in Alaska when the tsunami wave hits the southern tip of South America?” [9:30 p.m.]
• “If the earthquake happened at 8:44 p.m., what time would it be in Alaska when the tsunami wave hits the farthest islands off the tip of that state?” [11:44 p.m.]
• “If the earthquake happened at 8:44 p.m., what time would it be in Alaska when the tsunami wave hits Hawaii?” [Sometime between 2:44 a.m. and 3:44 a.m.]

Depending on how students interpret the lines that mark the hours on the map on page 11, their answers may be 1 hour more or less than what is indicated in this note.

Rationale

Pedagogical Goals: Understanding the Nature of Science
One goal set forth by the Next Generation Science Standards (NGSS) is for students to understand the nature of science as a discipline and how scientific knowledge develops over time. The NGSS calls out eight understandings about the nature of science that are woven throughout the Amplify Science curriculum. This unit gives students an opportunity to experience three understandings about the nature of science: that Scientific Investigations Use a Variety of Methods, that Scientific Knowledge Is Based on Empirical Evidence, and that Science Is a Human Endeavor. The book Warning: Tsunami! describes how scientists use a tsunameter to collect and analyze data to detect tsunamis and predict when and where they will occur. Students read about how scientific understanding of the characteristics of
tsunami waves helps us to prepare for tsunamis and save lives. Collectively, this text illustrates the ideas that scientists use different ways to study the world, scientists use different tools and technologies in order to create scientific knowledge, and science is connected to our everyday life.

Possible Responses

Investigation Notebook
Visualizing While Reading *Warning: Tsunami!* (page 10)

Answers will vary.

Examples for third column of the table:
Row 1: my finger is a few centimeters long
Row 2: my grandma lives about that far away
Row 3: a jet plane flying really fast
Row 4: almost a whole day
Row 5: the distance across the country
Visualizar mientras lees Peligro: ¡tsunami!

1. Visualizar significa hacer una imagen en tu mente usando información de diferentes fuentes.

2. A medida que continúas leyendo Peligro: ¡tsunami!, visualiza cada una de las mediciones en el libro, usando lo que ya sabes.

3. Dibuja o escribe lo que visualices en la tercera columna de la tabla debajo.

<table>
<thead>
<tr>
<th>Número de página</th>
<th>Lo que dice el libro</th>
<th>Lo que pienso cuando visualizo esta medición</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>A menudo los tsunamis tienen solo unos pocos centímetros (un par de pulgadas) de altura mientras viajan por el océano.</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Se llama longitud de onda a la distancia entre dos picos de una onda. ¡En una onda de tsunami, esta distancia puede ser de más de 100 kilómetros (alrededor de 60 millas)!</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Las ondas de los tsunamis... pueden alcanzar velocidades de 800 kilómetros por hora (alrededor de 500 millas por hora) atravesando enormes distancias.</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Una onda de tsunami llegó hasta aquí en 20 horas.</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Un terremoto cerca de Alaska puede causar un tsunami que devaste a Hawái, aproximadamente a 4,600 kilómetros (alrededor de 3,000 millas) de distancia.</td>
<td></td>
</tr>
</tbody>
</table>