



Stackable Instructionally- embedded Portable Science (SIPS) Assessments Project

Grade 8 Science Unit 4 Sample Lesson “What is a Wave?” Providing Solutions to Problems Using Simple Wave Properties August 2023

The SIPS Grade 8 Science Unit 4 Sample Lesson “What is a Wave?”, Providing Solutions to Problems Using Simple Wave Properties was developed with funding from the U.S. Department of Education under the Competitive Grants for State Assessments Program, CFDA 84.368A. The contents of this paper do not represent the policy of the U.S. Department of Education, and no assumption of endorsement by the Federal government should be made.

All rights reserved. Any or all portions of this document may be reproduced and distributed without prior permission, provided the source is cited as: Stackable Instructionally-embedded Portable Science (SIPS) Assessments Project. (2023). SIPS Grade 8 Science Unit 4 Sample Lesson “What is a Wave?”, Providing Solutions to Problems Using Simple Wave Properties. Lincoln, NE: Nebraska Department of Education.



Science Grade 5

Unit 4: Providing Solutions to Problems Using Simple Wave Properties

Sample Lesson: What is a Wave?

Suggested Time to Complete: 150 minutes

Purpose & Use Statement: This sample lesson was developed for state and local administrators and teacher leaders (e.g., curriculum directors, instructional facilitators, professional learning specialists) to (1) illustrate an example of an instructional lesson developed using a principled design approach, and (2) support accompanying process documentation about how to use the SIPS unit as an instructional framework to intentionally design high-quality lessons in an aligned curriculum, instruction, and assessment system. This sample lesson should be evaluated and refined, as necessary, to align appropriately with a standards-based curriculum, instruction, and assessment system prior to its use. Additionally, teachers should refine this lesson to meet the local, cultural, and individual needs of the students.

Desired Results

Overview of the Learning Goals

In this lesson, “What is a Wave?”, students develop and use models to describe and identify the properties of waves, including the wavelength, frequency, and amplitude of a wave. Students utilize hands-on activities and models to manipulate waves and adjust wave properties to describe how the wavelength, frequency, and amplitude do not change for a given wave and how changing wave properties results in new waves.

Connections to Prior Learning

DCIs – PS4.A (from NGSS Appendix E: DCI Progression within NGSS)

- **Prior learning from 3-5 (NRC Framework)**

- Waves of the same type can differ in amplitude (height of the wave) and wavelength (spacing between wave peaks). Waves can add or cancel one another as they cross, depending on their relative phase (i.e., relative position of peaks and troughs of the waves), but they emerge unaffected by each other. (Boundary: The discussion at this grade level is qualitative only; it can be based on the fact that two different sounds can pass a location in different directions without getting mixed up.)

CCC - Patterns

- **Prior learning from 3-5:** Students identify similarities and differences, identify patterns related to time, and use patterns to make predictions and categorizations.
 - Ten PEs in 3-5 use this CCC. Some uses are similar to the elements of the CCC used in this unit’s two PEs with the Patterns CCC (e.g., 3-PS2-2 involves making a prediction, which is possible because of cause-and-effect relationships; 5-ESS1-2 involves representing data in graphical displays to reveal patterns).
- **Prior learning from this grade band (e.g., Grades 6 & 7):** Students are expected to use graphs, charts, and images to identify patterns in data. They are also expected to use cause-and-effect relationships to identify patterns in data (Appendix G)
 - Multiple MS PEs use this CCC, so students will likely have some experience with the MS CCC elements before starting Grade 8 Unit 4.

CCC – Systems and System Models

- **Prior learning from 3-5:** Students are expected to understand that a system is composed of components that interact with one another and that the system can do things that depend on the different components, which may each have a unique function, and that the components operating together can enable the system to carry out functions that individual parts cannot.

Science Grade 5

Unit 4: Providing Solutions to Problems Using Simple Wave Properties

Sample Lesson: What is a Wave?

Suggested Time to Complete: 150 minutes

- **Prior learning from this grade band (e.g., Grades 6 & 7):** Students are expected to develop additional sophistication in identifying the way that components of a system interact with one another and with the environment (surroundings) of the system.
 - Multiple MS PEs use this CCC, so students will likely have some experience with the MS CCC elements before starting Grade 8 Unit 4.

SEP - Developing and Using Models

- **Prior learning from 3-5:** Students continue developing their modeling skills and abilities by developing and revising different types of models, along with beginning to consider that models can have limitations. [Appendix G]
 - PE 4-PS4-2 is an example of a 3-5 grade band PE that uses a Developing and Using Models SEP element, which is very similar to the SEP element used in this unit.
- **Prior learning from this grade band (e.g., Grades 6 & 7):** Students develop, use, and revise models to describe, test, and predict more abstract phenomena and to design systems.
 - Multiple MS PEs use this SEP, so students will likely have some experience with the MS SEP elements before starting Grade 8 Unit 4. MS-PS2-3 is an example MS PE that uses the same SEP element as this unit's PE (MS-PS4-2).

Key Vocabulary

Students build conceptual meaning with and use key tier II and tier III vocabulary terms as they make sense of phenomena and phenomena-based design problems. This is not an exhaustive list of terms, and should be reviewed and modified by educators, as appropriate.

- | | | |
|-------------|---------------|---------------------|
| • Pulse | • Crest | • Vibration |
| • Wave | • Wavelength | • Standing Wave |
| • Frequency | • Compression | • Transverse Wave |
| • Amplitude | • Medium | • Longitudinal Wave |
| • Trough | | |

Targeted Stage 1 Learning Goals

Acquisition Goals (AG)

A3: Use the models to describe how wavelength, frequency, and amplitude of a wave do not change and can be repeated in a given time.

A4: Develop and use a model to describe and identify the wavelength, frequency, and amplitude of a wave.

A7*: Plan and carry out investigations to answer scientific questions about the longitudinal and/or transverse nature of waves.

Common Core State Standards (CCSS):

RST.6-8.1

WHST.6-8.8

Enduring Understandings (EU)/ Essential Questions (EQ):

EU1/EQ1

EU2/EQ2

Science Grade 5

Unit 4: Providing Solutions to Problems Using Simple Wave Properties

Sample Lesson: What is a Wave?

Suggested Time to Complete: 150 minutes

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
<input type="checkbox"/> Analyze & Interpret Data <input type="checkbox"/> Ask Questions <input type="checkbox"/> Construct Explanations <input type="checkbox"/> Define Problems <input type="checkbox"/> Design Solutions <input checked="" type="checkbox"/> Develop & Use Models <input type="checkbox"/> Engage in Argument from Evidence <input type="checkbox"/> Mathematics & Computational Thinking <input type="checkbox"/> Obtain, Evaluate, & Communicate Information <input type="checkbox"/> Plan & Carry Out Investigations	<input checked="" type="checkbox"/> PS4.A: Wave Properties <ul style="list-style-type: none"> • A simple wave has a repeating pattern with a specific wavelength, frequency, and amplitude. (MS-PS4-1) • A sound wave needs a medium through which it is transmitted. (MS-PS4-2) 	<input type="checkbox"/> Cause & Effect <input type="checkbox"/> Energy & Matter <input checked="" type="checkbox"/> Patterns <input type="checkbox"/> Scale, Proportion, & Quantity <input type="checkbox"/> Stability & Change <input type="checkbox"/> Structure & Function <input checked="" type="checkbox"/> Systems & System Models

Formative Assessment Opportunities

Monitoring	Success Criteria	Possible Instructional Adjustments
<ul style="list-style-type: none"> • Student responses explain which video is better at the start of the lesson, which provides an opportunity for the teacher to check for prior knowledge and initial understanding. • As students develop their definitions for terms, the teacher can listen and monitor group work and peer-to-peer discussions to listen for students' understanding and any misconceptions. • Using a reading strategy where students create resources related to vocabulary provides the teacher a chance for a formal assessment, which can be used to inform lessons on days two and three. 	<p>Students can:</p> <ul style="list-style-type: none"> • Accurately define and identify on a diagram the wave properties of wavelength, frequency, amplitude, wave, trough, crest, compression, and medium for a particular wave. • Apply the simple mathematical wave model to a physical system or phenomenon to identify how a wave is a repeating pattern of motion that transfers energy from place to place. 	<ul style="list-style-type: none"> • The teacher supports students who may feel frustrated with the opening question of determining which is a good example of a wave, because they may not have prior knowledge. The teacher can do this by encouraging them to persevere and reminding them that they will revisit this question at the end of the lesson to see how their thinking has changed. • The teacher utilizes heterogeneous groupings and places students in positions where they will be successful. • There are multiple literacy strategies listed on both Reading Rockets

Science Grade 5

Unit 4: Providing Solutions to Problems Using Simple Wave Properties

Sample Lesson: What is a Wave?

Suggested Time to Complete: 150 minutes

and the SERP websites (see *Materials & Set-Up*) for the teacher to consider, such as a Frayer Model, other Word Map, or Possible Sentences. The teacher may want to provide students with different strategies to help them focus on individual challenges with literacy.

- | | | |
|---|---|--|
| <ul style="list-style-type: none">• As students share what they notice about waves during the demonstration, the teacher listens for students' prior knowledge and misconceptions to allow for opportunities for additional teaching and support during the hands-on activity.• The teacher monitors student discussions and responses as they explore the hands-on activity for misconceptions and use probing questions to challenge student thinking.• The teacher encourages students to share their questions after the Slinky lab and utilize the questions to help modify the last day of the lesson to meet the needs of the students.• As students work together to create waves, the teacher may want to ask additional probing questions that encourage students to think deeply about wave properties and that encourage students to build on each other's thinking. | <p>Students can:</p> <ul style="list-style-type: none">• Compare and contrast transverse and longitudinal waves.• Model longitudinal and transverse waves using tactile resources.• Connect changes in waves to changes in wave properties.• Compare and contrast models of waves.• Accurately describe how a simple wave has a repeating pattern of specific wavelength, frequency, and amplitude.• Accurately describe how a simple mathematical wave model corresponds to the properties of a physical phenomenon.• Accurately apply the simple mathematical wave model to a physical system or phenomenon to identify how the wave model characteristics correspond with physical observations. | <ul style="list-style-type: none">• The teacher places students in groups with the purpose of giving them the best opportunity to be successful with the hands-on activity.• The teacher cuts the hands-on activity handout into smaller pieces for students who may be overwhelmed by longer activities.• The teacher provides wait times for class discussions to allow students to consider changes to the class wave.• The teacher uses probing questions and sub-questions to support students in comparing and contrasting the different models of waves. |
|---|---|--|

Science Grade 5

Unit 4: Providing Solutions to Problems Using Simple Wave Properties

Sample Lesson: What is a Wave?

Suggested Time to Complete: 150 minutes

- As students examine the wave models in small groups, the teacher should continue to monitor student thinking for understanding and misconceptions.
- The teacher reviews student responses to prompts explaining different model simulations' wave properties and their reasoning on the variations between the movement of objects on waves.

Instructional Plan

Lesson Overview

This lesson is timed at approximately 150 minutes or 3 days. Daily endpoints are indicated to help guide the teacher on pacing. These are suggested points and should be modified based on individual classroom needs.

In this lesson, students examine the movement of water and use new vocabulary terms to describe how water moves in waves. Next, small groups of students with Slinkys create longitudinal and transverse waves and observations which they record in their science notebooks. Finally, to support retention and check for understanding, the class reviews some of the key takeaways related to wave properties, particularly the differences between longitudinal and transverse waves, and then explains why an example of rocks dropping in a pond is a better example of wave motion than water flowing over rocks in a stream.

Materials & Set-Up

- A computer and projector to display resources from:
 - [A Wave with Words](https://serpmedia.org/scigen/e4.2.html)
[https://serpmedia.org/scigen/e4.2.html]
 - [Modeling Mechanical Waves](https://serpmedia.org/scigen/e4.3.html)
[https://serpmedia.org/scigen/e4.3.html]
 - Student access to digital resources from:
 - [A Wave with Words](https://serpmedia.org/scigen/e4.2.html)
[https://serpmedia.org/scigen/e4.2.html]
 - [Modeling Mechanical Waves](https://serpmedia.org/scigen/e4.3.html)
[https://serpmedia.org/scigen/e4.3.html]
 - Large coil springs similar to Slinky brand toys
-

Science Grade 5


Unit 4: Providing Solutions to Problems Using Simple Wave Properties

Sample Lesson: What is a Wave?

Suggested Time to Complete: 150 minutes

Anchor or Investigative Phenomenon: To anchor this lesson, students are presented with two video clips: one of rocks being dropped into a pond, and one of water flowing over rocks. Students are asked to decide which one is a good example of waves. They revisit these videos at the end of the lesson to write an explanation for which is a better example of a wave.

Driving Question: Which of these examples is a better example of a water wave flowing over rocks or water rippling away from a splash? Why?

	Teacher Does	Students Do
Engage <ul style="list-style-type: none">☑ Introduce object, event, phenomenon, problem, or question☑ Build background knowledge☑ Facilitate connections	<p>To open the lesson, the teacher shows the students two videos of water and asks them, “Only one of the videos is a good example of waves. Which one and why?” Students record their thinking in their scientific notebooks. As students write down their thinking, the teacher walks around the room and looks at answers to gather information on students’ prior knowledge. Then, the teacher facilitates a discussion as a whole group where students share their thinking about the examples, without explaining which is a better example or otherwise answering the question.</p> <p>The teacher shares with students the goal for the lesson; that over the next couple of days, they explore resources related to waves and wave properties. This helps them answer the lesson’s anchoring question and helps them understand the science behind light and sound for their design challenge (or other unit anchor utilized to meet the needs of the students).</p> <p>Next, the teacher introduces students to a list of vocabulary terms related to waves and</p>	<p>Students look at two clips/GIFs of water. One is flowing, one has ripples, and they are asked to explain which is a better example of a wave. Students either submit their responses to the teacher or engage in a class discussion about their thinking, using their prior knowledge about water and waves to justify their responses.</p> <p> Working in pairs, students explore resources about waves that provide key definitions of wave properties and add these definitions to their science notebooks.</p> <p>To close the class, students use a drawing of a wave to identify the wave properties of that wave and submit their responses to the teacher.</p>

Science Grade 5

Unit 4: Providing Solutions to Problems Using Simple Wave Properties

Sample Lesson: What is a Wave?

Suggested Time to Complete: 150 minutes

wave properties by sharing an image of a wave with a [list of initial terms](#). Students work with a partner to explore the vocabulary terms.

Depending on the needs of the students, the teacher may want students to engage in a vocabulary strategy to develop academic vocabulary, such as one from [Reading Rockets Strategies](#) or [SERP Reading Strategies](#).

To close the first day:

After students have reviewed the vocabulary, they return to the image of a wave and use what they have learned to label the [diagram](#). Students draw the image of the standing wave and then add their labels to the diagram. For those not represented on the diagram (frequency and compression), students add a drawing that visualizes these two terms.

Explore

- Explore object, event, phenomenon, problem, or question
- Guided exploration with hands-on activities

To open day two:

The teacher demonstrates transverse and longitudinal waves on a Slinky, without telling the students the names of the two waves. As the teacher demonstrates them, the teacher asks the students to draw the Slinky and to record observations of what they notice during each demonstration.

The teacher places students into small groups and provides each group of students with a Slinky to experiment with. Students manipulate the Slinky

Students watch a demonstration of transverse and longitudinal waves, record observations, and draw pictures of what they see during the demonstration.



Next, students work in small groups to explore waves using coiled springs such as Slinky brand toys. Students use the coiled springs to create wave pulses, standing waves, and to manipulate the waves to see changes in the wave properties. Students record observations and responses to questions as they explore with the resource before coming

Science Grade 5

Unit 4: Providing Solutions to Problems Using Simple Wave Properties

Sample Lesson: What is a Wave?

Suggested Time to Complete: 150 minutes

to create transverse and longitudinal waves and explore wave characteristics and interactions. The teacher may want to utilize a guide for this activity such as [Slinky Lab](#). As students work on the different activities, the teacher moves between groups to check for understanding, listens and observes students sharing their thinking with peers, and informally assesses student understanding.

To close day two:

After students have explored the lab resources, they write down what questions they still have about waves, wave properties, and wave types.

Day three:

Students review the questions they recorded the day before. The teacher asks if they have any additional questions to add. Then, the teacher shares with students that the goal today is to finalize the list of wave properties and to make sure there are agreed-upon definitions before moving forward.

The teacher shows students the two wave [models](#), A and B, and asks them to determine which model represented which kind of wave they saw from the day before and provide evidence and reasoning to support their thinking. (Teachers may want to review the [lesson idea](#) for additional guidance on the two models.)

back together as a class to consider what questions they still have.

After identifying more questions, students explore additional models of waves to gather information about waves and wave properties. Students engage in kinesthetic learning practices and revisit concepts from prior activities, which provides opportunities to reteach and deepen understanding. Working as a class, students recreate waves and different changes in wave properties on a whole class wave.



Students explore additional model representations of waves to observe how waves do not move matter but do move energy. Then, they compare and contrast different wave models and consider how different models can show different information related to the same concept.

Science Grade 5

Unit 4: Providing Solutions to Problems Using Simple Wave Properties

Sample Lesson: What is a Wave?

Suggested Time to Complete: 150 minutes

The class discusses the two types of waves, transverse and mechanical, and creates an agreed definition for the two terms.

To check for understanding and provide an additional reteaching opportunity, the teacher takes the class out into the hallway or other open space and has students line up in a single line. The teacher challenges students to make a wave similar to one at a sporting event. The teacher asks students to do a turn-and-talk to answer if the stadium wave is transverse or longitudinal and to explain their thinking to their partner.

Then, the class creates waves with different characteristics such as suggested in [Lesson: Modeling Mechanical Waves \(serpmedia.org\)](#). As students create the different waves, the teacher asks them to explain their thinking and justify the characteristics of the wave. (E.g., students create a wave with a high frequency; to do so they have to move up and down quickly.) The teacher also asks students to share what they notice about other wave characteristics and how they change when they make other adjustments. (E.g., higher frequency results in a shorter wavelength.)

Next, students work in pairs to examine a simplified wave [model](#) and answer the following questions:

Science Grade 5

Unit 4: Providing Solutions to Problems Using Simple Wave Properties

Sample Lesson: What is a Wave?

Suggested Time to Complete: 150 minutes

1. Explain using evidence from the model and earlier learning if the water wave model shows a transverse or longitudinal wave.
2. Observe and record what happens when the beach ball is on the wave.
3. Observe and record what happens when the surfer is on the wave.
4. Working together with your partner, explain why the beach ball and surfer have different movements.

After everyone has had enough time to explore the model and come up with their ideas, the teacher encourages students to share their thinking for the last question and ideas that may conflict with each other to build on others' thinking and to make connections across ideas during the discussion.

The teacher shares with students additional examples of wave models: [Lesson: Modeling Mechanical Waves | Slide E \(serpmedia.org\)](#) and [Lesson: Modeling Mechanical Waves | Slide F \(serpmedia.org\)](#).

Students first observe the models and make notes of what they notice about them. Then, students compare and contrast the models and other models they have used to explore waves. The class discusses the models, how they simplify waves, and how they represent different parts of waves.

Students consider the advantages and disadvantages

Science Grade 5

Unit 4: Providing Solutions to Problems Using Simple Wave Properties

Sample Lesson: What is a Wave?

Suggested Time to Complete: 150 minutes

of the different models and what each model is “best” for teaching about waves.

Explain

- Explain understanding of concepts and processes
 - Introduce new concepts and skills to seek conceptual clarity
-

Elaborate

- Build on or extend understanding and skill
 - Apply concepts in new or related contexts
-

Evaluate

- Self-assess knowledge, skills, and abilities
 - Evaluate student development and lesson effectiveness
-

Closing

Students revisit the [opening videos](#) and write scientific explanations which explain which video is a good example of waves, using key terminology and information about wave properties.

Differentiation Strategies and Resources

“Universal Design for Learning (UDL) is a framework to improve and optimize teaching and learning for all people based on scientific insights into how humans learn” (CAST, 2022). Taking time to reflect on prior instruction when planning for accessible, differentiated, and culturally responsive instruction for diverse learners and culturally diverse classrooms serves to identify ways to improve future instructional practices. The UDL Guidelines provide a framework for this reflection. The guidelines include three principles as ways to focus on variety and flexibility in instructional practices:



Multiple Means of Engagement



Multiple Means of Representation



Multiple Means of Action & Expression




By examining instruction and instructional materials through the lens of each of these principles, teachers can identify and thus reduce or remove barriers to diverse learners.

Science Grade 5

Unit 4: Providing Solutions to Problems Using Simple Wave Properties

Sample Lesson: What is a Wave?

Suggested Time to Complete: 150 minutes


Learning Opportunities	UDL Principle	Example Differentiation Strategies & Resources
Engage		
<p><i>Students explore resources to learn about key vocabulary terms used for describing the properties of waves.</i></p>		<ul style="list-style-type: none"> • Use flexible ways to present information. <ul style="list-style-type: none"> ○ Present example models of sound and light waves using multimedia so it can easily be enlarged, increase contrast between text and the background, described using alternative text, etc. ○ Tactually enhance materials. ○ Wait time between a question and a person’s reply varies across cultures. Therefore, during brainstorming activities (e.g., how does light interact with different materials?) or classroom discussions (e.g., creating definitions for vocabulary words that describe properties of light rays), be aware of this and ensure everyone has the opportunity to contribute. • Describe the meaning of vocabulary and symbols. <ul style="list-style-type: none"> ○ Frontload vocabulary using a word wall or a glossary for science and academic terms such as reflected, absorbed, transmitted, refracted, medium, etc. ○ Pair vocabulary (e.g., vibration, medium, wavelength, refraction, reflection, etc.) by using pictures or diagrams. ○ Speak slowly and clearly combined with gestures or acting out words, phrases, and directions to help English Learners and students with developing science vocabulary. ○ Describe the meaning, “You can see through something that is transparent.” vs. a formal definition, “transmitting light; able to be seen through with clarity.”
		<ul style="list-style-type: none"> • Provide options for accessing instructional activities and materials. <ul style="list-style-type: none"> ○ Provide tactile models or have students create tactile models illustrating features of waves. ○ Allow for differences in rate, timing, speed, and range of motion (e.g., Allow enough time for all students to process the question and formulate their responses; Allow enough time for all students to move from one activity to the next, or to perform a task.).
Explore		
<p><i>Students experiment with coil springs to</i></p>		<ul style="list-style-type: none"> • Describe the meaning of vocabulary and symbols.

Science Grade 5

Unit 4: Providing Solutions to Problems Using Simple Wave Properties

Sample Lesson: What is a Wave?

Suggested Time to Complete: 150 minutes

<i>manipulate properties of waves.</i>		<ul style="list-style-type: none">○ Pair vocabulary (e.g., vibration, medium, wavelength, refraction, reflection, etc.) by using pictures or diagrams.● Support transfer and generalization of skills and knowledge.<ul style="list-style-type: none">○ Include opportunities to review and practice prior knowledge and skills along with new knowledge and skills.○ Make explicit connections between concepts of sound and light waves and their properties using a concept map.
<i>Students explore resources and models on waves, wave properties, and the movement of particles as waves pass through.</i>		<ul style="list-style-type: none">● Describe the meaning of vocabulary and symbols.<ul style="list-style-type: none">○ Pair vocabulary (e.g., vibration, medium, wavelength, refraction, reflection, etc.) by using pictures or diagrams.○ Speak slowly and clearly combined with gestures or acting out words, phrases, and directions to help English Learners and students with developing science vocabulary.○ Describe the meaning, “You can see through something that is transparent.” vs. a formal definition, “transmitting light; able to be seen through with clarity.”

Resources

- SERP: [A Wave with Words](https://serpmedia.org/scigen/e4.2.html)
[https://serpmedia.org/scigen/e4.2.html]
- SERP: [Modeling Mechanical Waves](https://serpmedia.org/scigen/e4.3.html)
[https://serpmedia.org/scigen/e4.3.html]
- [Engage Vocabulary Diagram](https://serpmedia.org/scigen/e4.2b.html)
[https://serpmedia.org/scigen/e4.2b.html]
- [Reading Rockets Strategies](https://www.readingrockets.org/strategies)
[https://www.readingrockets.org/strategies]
- [SERP Reading Strategies](https://www.serpminstitute.org/reading-science/classroom-strategies)
[https://www.serpminstitute.org/reading-science/classroom-strategies].
- [Slinky Lab](https://www.eriesd.org/cms/lib02/PA01001942/Centricity/Domain/1397/L11-slinky_lab.pdf)
[https://www.eriesd.org/cms/lib02/PA01001942/Centricity/Domain/1397/L11-slinky_lab.pdf]
- [Wave Model A and B](https://serpmedia.org/scigen/e4.3a.html)
[https://serpmedia.org/scigen/e4.3a.html]
- [Water Wave Model](https://serpmedia.org/scigen/e4.3d.html)
[https://serpmedia.org/scigen/e4.3d.html]
- [Professor Russell’s Water Wave Model](https://serpmedia.org/scigen/e4.3e.html)
[https://serpmedia.org/scigen/e4.3e.html]
- [Professor Russell’s Longitudinal and Transverse Wave Models](https://serpmedia.org/scigen/e4.3f.html)
[https://serpmedia.org/scigen/e4.3f.html]

Science Grade 5

Unit 4: Providing Solutions to Problems Using Simple Wave Properties

Sample Lesson: What is a Wave?

Suggested Time to Complete: 150 minutes

-
- [Closing Videos With Instructions](#)

[<https://serpmedia.org/scigen/e4.3g.html>]

Core Text Connections

- [Kahn Academy: Wave Properties](#)

[<https://www.khanacademy.org/science/ms-physics/x1baed5db7c1bb50b:waves/x1baed5db7c1bb50b:wave-properties/a/wave-properties>]

- [BBC: Transverse vs. Longitudinal Waves](#)

[<https://www.bbc.co.uk/bitesize/guides/zs86v9q/revision/2>]

- [MooMooMath and Science: Wave Basics](#)

[https://youtu.be/mXpjwC_9LU4]
