# NGSS Lesson Planning: Fourth Grade-Wavelength and Amplitude “Simon Says”

<table>
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<tr>
<th>Grade: 4th</th>
<th>Topic: Waves</th>
<th>Lesson: Wavelength and Amplitude “Simon Says”</th>
</tr>
</thead>
</table>

## Brief Lesson Description:
Students will learn about wavelength and amplitude and model wave patterns through movement.

## Performance Expectation(s):
4-PS4-1. Develop a model of waves to describe patterns in terms of amplitude and wavelength and that waves can cause objects to move.

## Specific Learning Outcomes:
Students will be introduced to and develop a better understanding wavelength and amplitude, by using movements.

## Narrative / Background Information
Wavelength is the distance between waves. Amplitude is the height of the wave.

## Prior Student Knowledge:
How does sound and light travel?

## Science & Engineering Practices:
- Asking questions (science) and defining problems (engineering)
- Developing and using models
- Planning and carrying out investigations
- Analyzing and interpreting data
- Using mathematics and computational thinking
- Constructing explanations (science) and designing solutions (engineering)
- Engaging in argument from evidence
- Obtaining, evaluating, and communicating information

## Disciplinary Core Ideas:
**PS4.A: Wave Properties**
- Waves, which are regular patterns of motion, can be made in water by disturbing the surface. When waves move across the surface of deep water, the water goes up and down in place; there is no net motion in the direction of the wave except when the water meets a beach. *(Note: This grade band endpoint was moved from K–2.)* (4-PS4-1)
- Waves of the same type can differ in amplitude (height of the wave) and wavelength (spacing between wave peaks). (4-PS4-1)

## Crosscutting Concepts:
- Patterns
- Cause and effect: Mechanism and explanation
- Scale, proportion, and quantity
- Systems and system models
- Energy and matter: Flows, cycles, and conservation
- Structure and function
- Stability and change

## Possible Preconceptions/Misconceptions

## LESSON PLAN – 5-E Model

### ENGAGE: Opening Activity – Access Prior Learning / Stimulate Interest / Generate Questions
In first grade you learned about light and sound. Both of these travel from one point to the next through waves. Today we are going to delve into how waves move. You will do some research and practice showing wave movements with walking.

### EXPLORE: Lesson Description – Materials Needed / Probing or Clarifying Questions
Take the students to the lab and allow them to do some research. The students should bring their journals with them and record their own definition for wavelength and amplitude. Students can use the following sites to help.
Once the students have had a chance to explore the web page and have their definitions recorded, they work in groups of three or four to demonstrate wavelength and amplitude through walking.

**EXPLAIN: Concepts Explained and Vocabulary Defined**

Bring the class back together and demonstrate what students have discovered. Allow them to use their own words to describe their findings. Open the websites above and show the students wavelength and amplitude. Remind the class of different student examples of showing wavelength and amplitude. Wavelength should be the distance of the student's gate. A larger wavelength should be a bigger step, smaller wavelength is a smaller step. Amplitude should be jumping and ducking down. The larger the amplitude the bigger the jump and duck. The smaller the amplitude the smaller the jump and duck.

**ELABORATE: Applications and Extensions**

After discussing the information above, the students are given a task. We will be playing a game of Simon Says. Using the gym or going outside would probably be best. Here are some examples of things you could say:
- "Simon says...walk with a really big wavelength." (They should be taking large steps).
- "Simon says...jump with a tiny amplitude." (They should be taking tiny jumps).
- "Simon says...walk with a small wavelength and a big amplitude." (They should be taking tiny steps, with a lot of head bobbing or jumping.)

Do a variety of different commands to see if the students have an understanding of wavelength and amplitude. At the end of the game the students should write a reflection of their experience that includes a model of waves that is labeled with wavelength and amplitude.

**EVALUATE:**

**Formative Monitoring (Questioning / Discussion):**

**Summative Assessment (Quiz / Project / Report):**

Students will turn in their notes from the day with a write up of their findings. The diagrams in the notebooks and their explanation of what they learned will help to show student understanding. Teacher also has the chance to move around the room to evaluate the learning. Watch video: [www.ndps.us](http://www.ndps.us)
Materials Required for This Lesson/Activity

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<thead>
<tr>
<th>Quantity</th>
<th>Description</th>
<th>Potential Supplier (item #)</th>
<th>Estimated Price</th>
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<tbody>
<tr>
<td>12</td>
<td>plastic jump ropes</td>
<td>on line supplier</td>
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<td>or</td>
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<tr>
<td></td>
<td>plastic coated clothesline</td>
<td>Knot and Rope on-line supplier</td>
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