### MS-PS4-1 ❶

**Students who demonstrate understanding:**

Qualitatively and quantitatively describe a simple model for waves that includes how the amplitude of a wave is related to the energy in a wave**.**

**Clarification Statement:** Examples can include waves modeled with a jump rope, slinky, water, seismic activity, and sound. **❷**

**Assessment Boundary:** Assessment does not include electromagnetic waves and is limited to standard repeating waves. **❸**

The performance expectations above were developed using the following elements from the NRC document *A Framework for K-12 Science Education.*

| **Science and Engineering Practices** | **Disciplinary Core Concepts** | **Crosscutting Concepts** |
| --- | --- | --- |
| **Using Mathematics and Computational Thinking*** Use mathematical representations to describe and/or support scientific conclusions and design solutions.

**Connections to Nature of Science ❹****Scientific Knowledge is Based on Empirical Evidence*** Science knowledge is based upon logical and conceptual connections between evidence and explanations.
 | **PS4.A: Wave Properties*** A simple wave has a repeating pattern with a specific wavelength, frequency, and amplitude.
 | **Patterns*** Graphs and charts can be used to identify patterns in data.
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**❶** Performance Expectation (PE) Code

**❷** Clarification Statements provide additional clarification to the PE

**❸** Assessment Boundaries clarify limits to large-scale assessments

**❹** Connections to the Nature of Science concepts can be found in either the practices or crosscutting concepts foundation boxes.