SCILLSS Classroom Science Assessment Workshop

**Grade 8 SCILLSS Model Unpacking Tools**

## Grade 8 SCILLSS Model Unpacking Tool for MS-PS4-1

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Grade:** | 8 | | | |
| **NGSS Performance Expectation: MS-PS4-1.** Use mathematical representations to describe a simple model for waves that includes how the amplitude of a wave is related to the energy in a wave. [Clarification Statement: Emphasis is on describing waves with both qualitative and quantitative thinking.] [*Assessment Boundary: Assessment does not include electromagnetic waves and is limited to standard repeating waves.*] | | | | |
|  | **Science and Engineering Practices (SEP)** | **Disciplinary Core Ideas (DCI)** | **Crosscutting Concepts**  **(CCC)** | |
| **Foundations** | **SEP: Using Mathematics and Computational Thinking**  Use mathematical representations to describe and/or support scientific conclusions and design solutions. | **PS4.A: Wave Properties**  A simple wave has a repeating pattern with a specific wavelength, frequency, and amplitude. | **CCC: Patterns**  Graphs and charts can be used to identify patterns in data. | |
| **Key Aspects** | * Use mathematical representations to describe scientific conclusions * Use mathematical representations to support scientific conclusions * Use mathematical representations to describe design solutions * Use mathematical representations to support design solutions | * A simple wave has a repeating pattern * A simple wave has a specific wavelength * A simple wave has a specific frequency * A simple wave has a specific amplitude * The wavelength and frequency of a wave are related to one another by the speed of travel of the wave * The higher the frequency of the wave the shorter the wavelength * The lower the frequency of the wave the longer the wavelength * The higher the frequency of the wave the higher the amplitude * The lower the frequency of the wave the lower the amplitude | * Use graphs to represent and identify patterns * Use charts to represent and identify patterns * Identify the presence of patterns in phenomena or data * Characterize the strength, direction, or nature of patterns in phenomena or data | |
| **Prior Knowledge** | * Knowledge of units and unit conversions * Knowledge of ratio relationships * Ability to interpret qualitative data * Ability to represent proportional relationships * Knowledge of linear relationships | * Waves can cause objects to move * Waves of the same type can differ in amplitude (height of the wave) and wavelength (spacing between wave peaks) | **Relationships to SEPs** | * Explanations address how and why particular patterns occur * Models describe observed patterns or predict patterns * Data analysis serves to identify and characterize patterns |

## Grade 8 SCILLSS Model Unpacking Tool for MS-PS4-2

|  |  |
| --- | --- |
| **Grade:** | 8 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **NGSS Performance Expectation: MS-PS4-2.** Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials. [Clarification Statement: Emphasis is on both light and mechanical waves. Examples of models could include drawings, simulations, and written descriptions.] [Assessment Boundary: Assessment is limited to qualitative applications pertaining to light and mechanical waves.] | | | | |
|  | **Science and Engineering Practices (SEP)** | **Disciplinary Core Ideas (DCI)** | **Crosscutting Concepts (CCC)** | |
| **Foundations** | **SEP: Developing and Using Models**  Develop and use a model to describe phenomena. | **PS4.A: Wave Properties**  A sound wave needs a medium through which it is transmitted. | **CCC: Structure and Function**  Structures can be designed to serve particular functions by taking into account properties of different materials, and how materials can be shaped and use. | |
| **Key**  **Aspects** | * Develop a model to predict phenomena. * Develop a model to describe phenomena. * Identify appropriate aspects of a given phenomenon to include in a model. * Explain the relationships among the components of a model. * Specify or identify the limitations of the model and describe why these limitations exist. | * Sound waves need a medium (air, water, or solid material) to travel through. | * Design structures to serve different functions. * Design structures based on the properties of its materials. * The shape and stability of structures of natural and designed objects are related to their function(s). | |
| **Prior Knowledge** | * Knowledge of units and unit conversions * Knowledge of ratio relationships * Ability to interpret qualitative data * Ability to represent proportional relationships * Knowledge of linear relationships | * Waves can cause objects to move. * Waves of the same type can differ in amplitude (height of the wave) and wavelength (spacing between wave peaks). | **Relationships to SEPs** | * A sense of scale is necessary in order to know what properties and what aspects of shape or material are relevant at a particular magnitude or in investigating particular phenomena. * Data analysis serves to demonstrate the relative magnitude of some properties or processes. |

These model unpacking tools were developed with funding from the US Department of Education under Enhanced Assessment Grants Program CFDA 84.368A. The contents do not necessarily represent the policy of the US 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: Strengthening Claims-based Interpretations and Uses of Local and Large-scale Science Assessment Scores Project (SCILLSS). (2020). *SCILLSS Classroom Science Assessment Workshop: Grade 8 SCILLSS Model Unpacking Tools*. Lincoln, NE: Nebraska Department of Education.