SCILLSS Classroom Science Assessment Workshop

**Grade 8 SCILLSS Model Task Specifications Tools**

## Grade 8 SCILLSS Model Task Specifications Tool for MS-PS4-1

| Element | | Description |
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| 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. | |
| Knowledge, Skills, & Abilities (KSAs) | **KSA1:** Create a representation that describes a simple wave has a repeating pattern.  **KSA2:** Use models and mathematical thinking to demonstrate understanding of wave properties.  **KSA3:** Identify patterns as an organizing concept for understanding wave properties.  **KSA4:** 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. | |
| Student Demonstration of Learning | * Model accurately represents the observable phenomena * Model accurately captures all mechanistic features of the observable phenomena * Model accurately shows relationships among wave properties * Applies correctly a simple mathematical wave model to a physical system or phenomenon to identify how the wave model characteristics correspond with physical observations * Predicts correctly the change in the energy of the wave if any one of the parameters of the wave is changed * Identiﬁes relevant or meaningful patterns that address a scientiﬁc question * Identifies and describes relevant relationships between components of the model * Shows patterns in waves that accurately interpret the relationship between frequency and wavelength | |
| Work Product | * Draw a model * Complete a model * Mathematical representations * Constructed-response | |
| Task Features | * All tasks require evidence of qualitative or quantitative thinking. * All tasks must prompt students to make connections between observed phenomenon or evidence and reasoning underlying the observation/evidence (e.g., related to standard repeating waves). * All tasks must elicit core ideas as defined in the PE. * All tasks must include elements from at least two dimensions of the NGSS. | |
| Aspects of an assessment task that can be varied to shift complexity or focus | * Complexity of scientific concept(s) to be represented * Function of the representation:   + to explain a mechanism underlying a phenomenon;   + to predict future outcomes;   + to describe a phenomenon;   + to generate data to inform how the world works * The representation may be provided for revision or one that is created from scratch * What type of wave is being modeled * Use or purpose of the representation * Type of representation (e.g., mathematical/picture) * Core idea targeted (e.g., sound sources, the medium, deformation, and vibration of an instrument’s string) | |
| Assessment Boundaries | * Assessment does not include electromagnetic waves and is limited to standard repeating waves. * Assessment should be limited to qualitative applications pertaining to light and mechanical waves. | |

## Grade 8 SCILLSS Model Task Specifications Tool for MS-PS4-2

| Element | Description |
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| Performance Expectation | **MS-PS4-2.** Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various material. |
| The Knowledge, Skills, & Abilities (KSAs) | **KSA1:** Develop a model to describe the transmission of waves.  **KSA2:** Use a model to make sense of given phenomena involving reflection, absorption, or transmission properties of light and matter waves.  **KSA3:** Identify characteristics of the wave after it has interacted with a material (e.g., frequency, amplitude, wavelength).  **KSA4:** Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various material. |
| Student Demonstration of Learning | * Model accurately represents the observable phenomena * Model accurately captures all mechanistic features of the observable phenomena * Model accurately shows the transmission of waves * Describes correctly how waves transmit energy * Describes accurately that vibrations in materials set up wavelike disturbances that spread away from the source, such as sound waves * Describes correctly whether the model shows how waves are reflected, absorbed, or transmitted through a material |
| Work Product | * Draw a model * Complete a model * Constructed-response * Short-response |
| Task Features | * All tasks require evidence of qualitative and quantitative thinking. * All tasks must prompt students to make connections between observed phenomenon or evidence and reasoning underlying the observation/evidence. * Students use scientific reasoning and process skills in observational (nonexperimental) investigations. * All tasks must elicit core ideas as defined in the PE. * All tasks must include elements from at least two dimensions of the NGSS. |
| Aspects of an assessment task that can be varied to shift complexity or focus | * Type of wave presented (e.g., sound, electromagnetic, mechanical, light) * Format of "real-world" phenomenon under investigation: image, data, text, combination * Standard units used (e.g., grams, liters) * Use or purpose of the model * Type of model (e.g., physical/virtual) * Core idea targeted in model (e.g., light sources, the materials, polarization of light, ray diagrams) |
| Assessment Boundaries | * Assessment is limited to qualitative applications pertaining to mechanical waves. * Assessment is limited to standard repeating waves and should not include electromagnetic waves. * Assessment should be limited to qualitative applications pertaining to light and mechanical waves. |

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