HS.Waves and Electromagnetic Radiation

Students who demonstrate understanding can:

**HS-PS4-1.** Use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves traveling in various media. [Clarification Statement: Examples of data could include electromagnetic radiation traveling in a vacuum and glass, sound waves traveling through air and water, and seismic waves traveling through the Earth.] [Assessment Boundary: Assessment is limited to algebraic relationships and describing those relationships qualitatively.]

**HS-PS4-2.** Evaluate the advantages of using digital transmission and storage of information. [Clarification Statement: Examples of advantages could include that digital information is stable because it can be stored reliably in computer memory, transferred easily, and copied and shared rapidly. Disadvantages could include issues of easy deletion, security, and theft.]

**HS-PS4-3.** Evaluate the claims, evidence, and reasoning behind the idea that electromagnetic radiation can be described either by a wave model or a particle model, and that for some situations one model is more useful than the other. [Clarification Statement: Emphasis is on the idea that different frequencies of light have different energies, and the damage to living tissue from electromagnetic radiation depends on the energy of the radiation. Examples of published materials could include trade books, magazines, web resources, videos, and other passages that may reflect bias.] [Assessment Boundary: Assessment is limited to qualitative descriptions.]

**HS-PS4-4.** Evaluate the validity and reliability of claims in published materials of the effects that different frequencies of electromagnetic radiation have when absorbed by matter. [Clarification Statement: Emphasis is on the idea that different frequencies of light have different energies, and the damage to living tissue from electromagnetic radiation depends on the energy of the radiation. Examples of published materials could include trade books, magazines, web resources, videos, and other passages that may reflect bias.] [Assessment Boundary: Assessment is limited to qualitative descriptions.]
### HS.Waves and Electromagnetic Radiation

<table>
<thead>
<tr>
<th>Science Practice</th>
<th>Mathematics Practice</th>
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<tbody>
<tr>
<td>Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. (HS-PS4-2),(HS-PS4-3),(HS-PS4-4)</td>
<td>Reason abstractly and quantitatively. (HS-PS4-1),(HS-PS4-3)</td>
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<td>Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem. (HS-PS4-1),(HS-PS4-4)</td>
<td>Model with mathematics. (HS-PS4-1)</td>
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<td>Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem. (HS-PS4-2),(HS-PS4-3),(HS-PS4-4)</td>
<td>Interpret expressions that represent a quantity in terms of its context. (HS-PS4-1),(HS-PS4-3)</td>
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<td>Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. (HS-PS4-2),(HS-PS4-3),(HS-PS4-4)</td>
<td>Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. (HS-PS4-1),(HS-PS4-3)</td>
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<td>Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. (HS-PS4-5)</td>
<td>Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. (HS-PS4-1),(HS-PS4-3)</td>
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**Common Core State Standards Connections:**

- **ELA/Literacy**
  - **RST.11-12.1**
  - **RST.11-12.7**
  - **RST.9-10.8**
  - **RST.11-12.8**
  - **WHST.9-12.2**
  - **WHST.11-12.8**

- **Mathematics**
  - **MP.2**
  - **MP.4**
  - **HSA-SSE.A.1**
  - **HSA-SSE.B.3**
  - **HSA.CED.A.4**

*The performance expectations marked with an asterisk integrate traditional science content with engineering through a Practice or Disciplinary Core Idea.*

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