**HS-PS4 Waves and Their Applications in Technologies for Information Transfer**

**HS-PS4-1 Use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves traveling in various media.**

Further explanation: 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. Examples include rainbows and how to aim when spearfishing.

Using Mathematics and Computational Thinking, Wave Properties, Cause and Effect

**HS-PS4-2 Evaluate questions about the advantages of using a digital transmission and storage of information.**

Further explanation: 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.

Asking Questions and Defining Problems, Wave Properties, Stability and Change

**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.**

Further explanation: Emphasis is on how the experimental evidence supports the claim and how a theory is generally modified in light of new evidence. Examples of a phenomenon could include resonance, interference, diffraction, and photoelectric effect.

Engaging in Argument from Evidence, Wave Properties, Systems and System Models

**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.**

Further explanation: Emphasis is on the idea that photons associated with 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. Arguments around evidence could be made for dangers of cell phone usage or living near high voltage power lines.

Obtaining, Evaluating, and Communicating Information, Electromagnetic Radiation, Cause and Effect

**HS-PS4-5 Communicate technical information about how some technological devices use the principles of wave behavior and wave interactions with matter to transmit and capture information and energy.**

Further explanation: Examples could include solar cells capturing light and converting it to electricity; medical imaging; and communications technology.

Obtaining, Evaluating, and Communicating Information, Wave Properties, Electromagnetic Radiation, Information Technologies and Instrumentation, Cause and Effect