MS. Waves and Electromagnetic Radiation

A Performance Expectations MS.PS4.WER

1 Develop a model and use mathematical representations to describe waves that includes frequency, wavelength, and how the amplitude of a wave is related to the energy in a wave. MS.PS4.1

2 Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials. MS.PS4.2

3 Integrate qualitative scientific and technical information to support the claim that digitized signals are a more reliable way to encode and transmit information than analog signals. MS.PS4.3

B Science and Engineering Practices MS.WER.SEP

1 Developing and Using Models MS.WER.SEP.1

a Develop a model to describe phenomena. (MS-PS4-2) MS.WER.SEP.1A

2 Using Mathematics and Computational Thinking MS.WER.SEP.2

a Use mathematical representations to describe and/or support scientific conclusions and design solutions. (MSPS4-1) MS.WER.SEP.2A

3 Obtaining, Evaluating, and Communicating Information MS.WER.SEP.3

a Integrate qualitative scientific and technical information in written text with that contained in media and visual displays to clarify claims and findings. (MS-PS4-3) MS.WER.SEP.3A

4 Scientific Knowledge is Based on Empirical Evidence MS.WER.SEP.4

a Science knowledge is based upon logical and conceptual connections between evidence and explanations (MS-PS4-1) MS.WER.SEP.4A

C Disciplinary Core Ideas MS.WER.DCI

1. PS4.A: Wave Properties MS.WER.DCI.PS4.A
   - a. A simple wave has a repeating pattern with a specific wavelength, frequency, and amplitude. (MS-PS4-1) MS.WER.DCI.PS4.A.1
   - b. A sound wave needs a medium through which it is transmitted. (MS-PS4-2) MS.WER.DCI.PS4.A.2
2. PS4.B: Electromagnetic Radiation MS.WER.DCI.PS4.B
   - a. When light shines on an object, it is reflected, absorbed, or transmitted through the object, depending on the object's material and the frequency (color) of the light. (MS-PS4-2) MS.WER.DCI.PS4.B.1
   - b. (NYSED) The path that light travels can be traced as straight lines, except when it hits a surface between different transparent materials (e.g., air and water, air and glass) obliquely where the light path bends. (MS-PS4-2) MS.WER.DCI.PS4.B.2
   - c. A wave model of light is useful for explaining brightness, color, and the frequency-dependent bending of light at a surface between media. (MS-PS4-2) MS.WER.DCI.PS4.B.3
   - d. (NYSED) However, because light can travel through space, it cannot be a mechanical wave, like sound or water waves. (MS-PS4-2) MS.WER.DCI.PS4.B.4
3. PS4.C: Information Technologies and Instrumentation MS.WER.DCI.PS4.C
   - a. Digitized signals (sent as wave pulses) are a more reliable way to encode and transmit information. (MS-PS4-3) MS.WER.DCI.PS4.C.1

D Crosscutting Concepts MS.WER.CC

1. Patterns MS.WER.CC.1
   - a. Graphs and charts can be used to identify patterns in data. (MS-PS4-1) MS.WER.CC.1A
2. Structure and Function MS.WER.CC.2
   - a. Structures can be designed to serve particular functions by taking into account properties of different materials, and how materials can be shaped and used. (MS-PS4-2) MS.WER.CC.2A
   - b. Structures can be designed to serve particular functions. (MS-PS4-3) MS.WER.CC.2B
3. Influence of Science, Engineering, and Technology on Society and the Natural World MS.WER.CC.3
   - a. Technologies extend the measurement, exploration, modeling, and computational capacity of scientific investigations. (MS-PS4-3) MS.WER.CC.3A
4. Science is a Human Endeavor MS.WER.CC.4
   - a. Advances in technology influence the progress of science and science has influenced advances in technology. (MSPS4-3) MS.WER.CC.4A