

## Waves (4 Science)

4.0	<p>The student will:</p> <ul style="list-style-type: none"> <li>Investigate waves in the real world (for example, research the relationship between a sound wave's amplitude and wavelength and its volume and pitch or how seismic waves move through the Earth).</li> </ul>
3.5	In addition to score 3.0 performance, partial success at score 4.0 content
3.0	<p>The student will:</p> <p><b>W1—Identify patterns related to a wave's amplitude and wavelength</b> (for example, model waves to determine how changes to period, amplitude, frequency, wavelength, and speed affect movement and explain how the disturbances that cause waves determine amplitude and wavelength).</p> <p><b>W2—Explain how waves can cause objects to move</b> (for example, compare the movement of particles within transverse, longitudinal, and ocean waves to explain how particles within a wave oscillate but do not travel over a distance).</p>
2.5	No major errors or omissions regarding score 2.0 content, and partial success at score 3.0 content
2.0	<p><b>W1</b>—The student will recognize or recall specific vocabulary (for example, <i>amplitude, crest, disturbance, energy, frequency, gas, intensity, light, liquid, longitudinal wave, mass, matter, medium, midline, pattern, period, repeat, seismic wave, size, solid, sound wave, speed, time, transverse wave, trough, volume, wave, wave cycle, wavelength, x-axis, y-axis</i>) and perform basic processes such as:</p> <ul style="list-style-type: none"> <li>Explain a wave as a disturbance that carries energy, but not matter, from place to place.</li> <li>Identify different types of waves (seismic, sound, light).</li> <li>Identify different types of media that waves can travel through (solid, liquid, gas; for example, the earth, water, or air).</li> <li>Compare the movement of transverse and longitudinal waves.</li> <li>Diagram a wave on an x- and y-axis.</li> <li>Identify different parts of a wave (crest, trough, midline).</li> <li>Explain how to determine the period of a wave.</li> <li>Explain how to determine the amplitude of a wave.</li> <li>Explain how to determine the frequency of a wave.</li> <li>Explain how to determine the wavelength of a wave.</li> <li>Explain how to determine the speed of a wave.</li> <li>Make observations about the relationship between wavelength and frequency.</li> <li>Compare different wave cycles from the same wave to show that waves are repeating patterns of motion.</li> <li>Create and observe waves in a medium (for example, create disturbances in pots of water to see how the location, intensity, and size of the disturbances affects waves).</li> <li>Explain factors that affect the amplitude and wavelength of a wave (for example, the intensity and mass or volume of a disturbance).</li> </ul> <p><b>W2</b>—The student will recognize or recall specific vocabulary (for example, <i>crest, disturbance, energy, gas, intensity, liquid, location, longitudinal wave, mass, matter, medium, midline, movement, oscillate, seismic wave, size, solid, transverse wave, trough, volume, wave, x-axis, y-axis</i>) and perform basic processes such as:</p> <ul style="list-style-type: none"> <li>Explain a wave as a disturbance that carries energy, but not matter, from place to place.</li> <li>Identify different types of waves (seismic, sound, light).</li> <li>Identify different types of media that waves can travel through (solid, liquid, gas; for example, the earth, water, or air).</li> </ul>

	<ul style="list-style-type: none"> <li>• Create and observe waves in a medium (for example, create disturbances in pots of water to see how the location, intensity, and size of the disturbances affects waves).</li> <li>• Diagram a wave on an <math>x</math>- and <math>y</math>-axis.</li> <li>• Identify different parts of a wave (crest, trough, midline).</li> <li>• Compare the movement of transverse and longitudinal waves.</li> <li>• Model how a particle in a wave oscillates but does not travel (for example, particles in transverse waves move up and down, particles in longitudinal waves move side to side).</li> <li>• Explain how ocean waves are a combination of transverse and longitudinal waves.</li> <li>• Model the movement of an object floating at sea (that is, an object floating on a wave moves repeatedly in a circular motion).</li> </ul>
1.5	Partial success at score 2.0 content, and major errors or omissions regarding score 3.0 content
1.0	With help, partial success at score 2.0 content and score 3.0 content
0.5	With help, partial success at score 2.0 content but not at score 3.0 content
0.0	Even with help, no success