



# Grade 5 Science - Unit 1 - Properties of Light & Sound

## Unit Focus

This Grade 5 unit explores the properties of light and sound through engaging, hands-on phenomena and inquiry-based learning. Students develop foundational understanding of wave properties and the interactions of waves with materials. Through activities such as using lenses to focus sunlight, building models of the eye, and experimenting with prisms and mirrors, students examine how light behaves—including concepts of reflection, refraction, and the visible spectrum. The unit includes lessons on vision and optical tools, helping students connect how human eyes perceive light and how lenses can correct vision. Students investigate the difference between convex and concave lenses, build eye models, and apply their learning to real-world problems through a transfer task on optometry.

The sound portion of the unit emphasizes how vibrations create sound waves, how sound travels through different materials, and how humans and devices can encode and decode information using sound patterns. Students conduct experiments with cup telephones, visual and auditory codes, and wave modeling with ropes to understand how frequency and amplitude affect pitch and volume. Through NGSS-aligned Mystery Science lessons and custom-designed activities, students also investigate sound in space, the role of air in vibration transmission, and resonance phenomena. By the end of the unit, students can model and explain how light and sound travel, how they interact with matter, and how technologies leverage wave properties for communication and problem-solving.

## Stage 1: Desired Results - Key Understandings

| Standard(s)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Transfer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                          |
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| <b>Next Generation Science Standards</b><br>Cross Cutting Concepts: 4 <ul style="list-style-type: none"><li>Energy can be transferred in various ways and between objects. (4-PS3-1), (4-PS3-2), (4-PS3-3), (4-PS3-4) (4.E.CC.2.1)</li><li>Engineers improve existing technologies or develop new ones. (4-PS3-4) (4.E.CC.4.2)</li><li>Most scientists and engineers work in teams. (4-PS3-4) (4.E.CC.5.1)</li><li>Science affects everyday life. (4-PS3-4) (4.E.CC.5.2)</li><li>Similarities and differences in patterns can be used to sort and classify natural phenomena. (4-PS4-1) (4.W.CC.1.1)</li><li>Cause and effect relationships are routinely identified. (4-PS4-2) (4.SFIP.CC.1.1)</li></ul><br>Disciplinary Core Ideas: 4 <ul style="list-style-type: none"><li>Energy can be moved from place to place by moving objects or through sound, light, or electric currents. (4-PS3-2), (4-PS3-3) (4.PS3.A.2)</li><li>Energy is present whenever there are moving objects, sound, light, or heat. When objects collide, energy can be transferred from one object to another, thereby changing their motion. In such collisions, some energy is typically also transferred to the surrounding air; as a result, the air gets heated and sound is produced. (4-PS3-2), (4-PS3-3) (4.PS3.B.1)</li><li>Light also transfers energy from place to place. (4-PS3-2) (4.PS3.B.2)</li><li>Energy can also be transferred from place to place by electric currents, which can then be used locally to produce motion, sound, heat, or light. The currents may have been</li></ul> | <i>Students will be able to independently use their learning to...</i><br><b>T1</b> Create models to explore complex systems, show mastery of key science concepts, and/or develop solutions through creation of a product open to testing and redesign.<br><b>T2</b> Analyze qualitative and quantitative data to interpret patterns, draw conclusions, and/or make predictions.                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                          |
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| <p>produced to begin with by transforming the energy of motion into electrical energy. (4-PS3-2),(4- PS3-4) (4.PS3.B.3)</p> <ul style="list-style-type: none"> <li>The expression “produce energy” typically refers to the conversion of stored energy into a desired form for practical use. (4- PS3-4) (4.PS3.D.1)</li> <li>Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account. (secondary to 4-PS3-4) (4.ETS1.A.1)</li> <li>Waves, which are regular patterns of motion, can be made in water by disturbing the surface. When waves move across the surface of deep water, the water goes up and down in place; there is no net motion in the direction of the wave except when the water meets a beach. (Note: This grade band endpoint was moved from K–2). (4- PS4-1) (4.PS4.A.1)</li> <li>Waves of the same type can differ in amplitude (height of the wave) and wavelength (spacing between wave peaks). (4-PS4-1) (4.PS4.A.2)</li> <li>An object can be seen when light reflected from its surface enters the eyes. (4-PS4-2) (4.PS4.B.1)</li> </ul> <p>Performance Expectations: 4</p> <ul style="list-style-type: none"> <li>Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents. (4-PS3-2)</li> <li>Apply scientific ideas to design, test, and refine a device that converts energy from one form to another. (4-PS3-4)</li> <li>Develop a model of waves to describe patterns in terms of amplitude and wavelength and that waves can cause objects to move. (4-PS4-1)</li> <li>Develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen. (4-PS4-2)</li> </ul> <p>Science and Engineering Practices: 4</p> <ul style="list-style-type: none"> <li>Make observations to produce data to serve as the basis for evidence for an explanation of a phenomenon or test a design solution. (4-PS3-2 (4.E.SEP.2.1)</li> <li>Apply scientific ideas to solve design problems. (4- PS3-4) (4.E.SEP.3.2)</li> <li>Develop a model using an analogy, example, or abstract representation to describe a scientific principle. (4-PS4- 1) (4.W.SEP.1.1)</li> <li>Science findings are based on recognizing patterns. (4- PS4-1) (4.W.SEP.3.1)</li> <li>Develop a model to describe phenomena. (4- PS4-2) (4.SFIP.SEP.1.1)</li> </ul> <p><b>Madison Public Schools Profile of a Graduate</b><br/>Design: Engaging in a process to refine a product for an intended audience and purpose. (POG.2.2)</p> | Acquisition of Knowledge and Skill                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
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