Grade 4 Physical Science Unit 1 - Energy	Links
Standard: **4-PS3-1. Use evidence to construct an explanation relating the speed of an object to the energy of that object.** [*Assessment Boundary: Assessment does not include quantitative measures of changes in the speed of an object or on any precise or quantitative definition of energy.* **4-PS3-2. Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents.** [*Assessment Boundary: Assessment does not include quantitative measurements of energy.*] **4-PS3-3. Ask questions and predict outcomes about the changes in energy that occur when objects collide.** [Clarification Statement: Emphasis is on the change in the energy due to the change in speed, not on the forces, as objects interact.] [*Assessment Boundary: Assessment does not include quantitative measurements of energy.*] **4-PS3-4. Apply scientific ideas to design, test, and refine a device that converts energy from one form to another.*** [Clarification Statement: Examples of devices could include electric circuits that convert electrical energy into motion energy of a vehicle, light, or sound; and, a passive solar heater that converts light into heat. Examples of constraints could include the materials, cost, or time to design the device.] [*Assessment Boundary: Devices should be limited to those that convert motion energy to electric energy or use stored energy to cause motion or produce light or sound.*]	Energy
21st Century Learning Expectations: • Hinsdale students will communicate through various means • Hinsdale students will be able to solve problems	Link for 21st Century Learning Expectations
Enduring Understandings (cross cutting concepts)	

Cause and effect relationships are routinely identified and used to explain change. (4-ESS3-1) Energy can be transferred in various ways and between objects. (4-PS3-1), (4-PS3-2), (4-PS3-3), (4-PS3-4)	
Learning Competencies (engineering practices) *Students will be able to: (NGSS Science and Engineering practices)* • Use evidence (e.g., measurements, observations, patterns) to construct an explanation. • Make observations to produce data to serve as the basis for evidence for an explanation of a phenomenon or test a design solution. • Ask questions that can be investigated and predict reasonable outcomes based on patterns such as cause and effect relationships. • Apply scientific ideas to solve design problems.	**Essential Questions (core ideas)** **What is energy, how is it transferred, and why is it important to us?** **EQ based on these core ideas:** The faster a given object is moving, the more energy it possesses. (4-PS3-1) Energy can be moved from place to place by moving objects or through sound, light, or electric currents. (4-PS3-2), (4-PS3-3) 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) Light also transfers energy from place to place. (4-PS3-2)

	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 produced to begin with by transforming the energy of motion into electrical energy. (4-PS3-2), (4-PS3-4) When objects collide, the contact forces transfer energy so as to change the objects' motions. (4-PS3-3) The expression "produce energy" typically refers to the conversion of stored energy into a desired form for practical use. (4-PS3-4) Energy and fuels that humans use are derived from natural sources, and their use affects the environment in multiple ways. Some resources are renewable over time, and others are not. (4-ESS3-1) 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)*
Performance Task Sample: Hot Wheels	

4th Physical Science Unit 2 - Waves and Their Applications in Technologies for Information Transfer	
Standard: **4-PS4-1.** Develop a model of waves to describe patterns in terms of amplitude and wavelength and that waves can cause objects to move. [Clarification Statement: Examples of models could include diagrams, analogies, and physical models using wire to illustrate wavelength and amplitude of waves.] [*Assessment Boundary: Assessment does not include interference effects, electromagnetic waves, non-periodic waves, or quantitative models of amplitude and wavelength.*] **4-PS4-2**Develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen. [*Assessment Boundary: Assessment does not include knowledge of specific colors reflected and seen, the cellular mechanisms of vision, or how the retina works.*] **4-PS4-3.** Generate and compare multiple solutions that use patterns to transfer information.* [Clarification Statement: Examples of solutions could include drums sending coded information through sound waves, using a grid of 1's and 0's representing black and white to send information about a picture, and using Morse code to send text.]	Waves and Their Applications in Technologies for Information Transfer
21st Century Learning Expectations: • Hinsdale students will communicate through various means • Hinsdale students will be able to solve problems	

Enduring Understandings (cross cutting concepts):	
• Similarities and differences in patterns can be used to sort, classify, and analyze simple rates of change for natural phenomena. (4-PS4-1) • Similarities and differences in patterns can be used to sort and classify designed products. (4-PS4-3) • Cause and effect relationships are routinely identified. (4-PS4-2) • Knowledge of relevant scientific concepts and research findings is important in engineering. (4-PS4-3)	
Learning Competencies (engineering practices)	**Essential Questions (core ideas)**
Students will be able to: (NGSS Science and Engineering practices) • Develop a model using an analogy, example, or abstract representation to describe a scientific principle. (4-PS4-1) • Develop a model to describe phenomena. (4-PS4-2) • Generate and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design solution. (4-PS4-3)	What are the properties of waves? Based on these core ideas: • 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) • Waves of the same type can differ in amplitude (height of the wave) and wavelength (spacing between wave peaks). (4-PS4-1) • An object can be seen when light reflected from its surface enters the eyes. (4-PS4-2) • Digitized information can be transmitted over long distances without significant degradation. High-tech

	devices, such as computers or cell phones, can receive and decode information—convert it from digitized form to voice—and vice versa. (4-PS4-3) • Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints. *(secondary to 4-PS4-3)*
Performance Task Sample: Waves-Sound Also Lessons in the Foss Science Kit - Sound	