Big Idea: How can scientific ideas be applied to design, test, and refine a device that converts energy from one form to another?
Guiding Questions: How can scientific ideas be applied to design, test, and refine a device that converts energy from one form to another?

Folder with additional resources

DCI (Disciplinary Core Ideas)	Science and Engineering Practices	Cross Cutting Concepts	Student Learning Objectives	Differentiated Activities (Consider the 5 Es)	Resources/Technology	Formative Assessments	Benchmark Assessment
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-PS3-4)	Apply scientific ideas to solve design problems. (4-PS3-4)	Energy can be transferred in various ways and between objects. (4-PS3-4) Engineers improve existing technologies or develop new ones. (4-PS3-4) Most scientists and engineers work in teams. (4-PS3-4) Science affects everyday life. (4-PS3-4)	SWBAT apply scientific ideas to design, test, and refine a device that converts energy from one form to another. SWBATl build solar ovens to demonstrate how light energy is transferred into heat energy.	Newton's Cradle in Physical Lab Energy & Waves-Golf Balls/Ping Pong Energy & Waves-Light Bulbs Energy & Waves-Solar Oven Energy & Waves-Wheeled Vechicle	Newton's Cradle in Physical Who does a ball bounce? Explaining an Electrical Circuit Build your own Solar Oven Pizza Box-Solar Oven Video	Wheeled Vechicle Assessment WSs/Lab Notebook Facilitation Grid	Energy Test
When objects collide, the contact forces transfer energy so as to change the objects' motions. (4-PS3-3)			SWBAT collect and use evidence to prove that when two objects collide, the transfer of energy changes the objects' motions.	Energy & Waves-Marbles Collide Pendulum Lab Energy & Waves-Moving Densies Energy & Waves-Golf Ball/Ping Pong Energy & Waves-Sports Collision	Energy Bill Nye on Energy Part 1 Newton's Cradle in Physical Lab Who does a ball bounce?	WSs/Lab Notebook	
The expression "produce energy" typically refers to the conversion of stored energy into a desired form for practical use. (4-PS3-4)	Apply scientific ideas to solve design problems. (4-PS3-4)	Energy can be transferred in various ways and between objects. (4-PS3-4) Engineers improve existing technologies or develop new ones. (4-PS3-4) Most scientists and engineers work in teams. (4-PS3-4) Science affects everyday life. (4-PS3-4)	SWBAT demonstrate how energy can be transferred between objects SWBAT apply scientific ideas to design problems like scientists.	Energy & Waves-Light Bulbs Energy & Waves-Golf Balls/Ping Pong	Circuit Video Newton's Cradle in Physical Lab	WSs/Lab Notebook	
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. (3-5-ETS1-1)	Define a simple design problem that can be solved through the development of an object, tool, process, or system and includes several criteria for success and constraints on materials, time, or cost. (3-5-ETS1-1)	People's needs and wants change over time, as do their demands for new and improved technologies. (3-5-ETS1-1)	SWBAT design, test and refine a device that can launch the ping pong ball across the room.	Energy & Waves-Catapults	Types of Catapults	WSs/Lab Notebook	
Research on a problem should be carried out before beginning to design a solution. Testing a solution involves investigating how well it performs under a range of likely conditions. (3-5-ETS1-2)	Generate and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design problem. (3-5-ETS1-2)	Engineers improve existing technologies or develop new ones to increase their benefits, decrease known risks, and meet societal demands. (3-5-ETS1-2)	SWBAT create and answer questions about happens with energy when objects collide.	Sports and Collisions	Energy Transformation Video	Sports and Collisions WS	
At whatever stage, communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs. (3-5-ETS1-2)	Generate and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design problem. (3-5-ETS1-2)	Engineers improve existing technologies or develop new ones to increase their benefits, decrease known risks, and meet societal demands. (3-5-ETS1-2)	SWBAT improve and design solutions of collisions.	Sports and Collisions	Energy Transformation Video	Sports and Collisions WS	
Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved. (3-5-ETS1-3)	Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence, using fair tests in which variables are controlled and the number of trials considered. (3-5-ETS1-3)		SWBAT design and test a variety of vehicles that demonstrate how energy can be transferred from one place to another. They will be able to identify how the energy changes forms and how with more energy there is a greater speed.	Energy & Waves, Wheeled Vehicles		Weeled Vehicle Lab	
Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints. (3-5-ETS1-3)	Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence, using fair tests in which variables are controlled and the number of trials considered. (3-5-ETS1-3)		SWBAT plan and conduct investigations to colelct data to use as evidence	Energy & Waves, Wheeled Vehicles		Weeled Vehicle Lab	