Standard	Description	STAR Camp Lesson	Lesson Description
K.1	Weather is the combination of sunlight, wind, snow or rain, and temperature in a particular region at a particular time. People measure these conditions to describe and record the weather to identify patterns over time. Weather scientists forecast severe weather so that communities can prepare for and respond to these events. Sunlight warms Earth's surface.	The Sun is Hot!	Students will carry out an investigation, using the five senses, to determine the effect of sunlight on different surfaces and materials. Students will then design a solution that will reduce the warming effect of sunlight on an area.
K.3	The motion of objects can be observed and described. Pushing or pulling on an object can change the speed or direction of an object's motion and can start or stop it. Pushes and pulls can have different strengths and different directions. A bigger push or pull makes things go faster and when objects touch or collide, they push on one another and can change motion.	Newton's Laws	Students will carry out investigations that provide evidence of the effects of balanced and unbalanced forces; explain that gravitational forces exerted by the earth cause objects to be directed downward; observe and predict patterns of motion.
Strand 1.1	Seasonal patterns of motion of the Sun, Moon, and stars can be observed, described, and predicted. These patterns may vary depending on the region, location, or time of year.	Earth, Sun, Moon, Stars	Students will obtain information about the movement of the Sun, Moon, and stars, and evaluate predictable patterns. Students will build models of the sun, moon, earth movements, and design a device to track the patterns of daylight.
Strand 1.3	Sound can make matter vibrate, and vibrating matter can make sound. Objects can only be seen when light is available to illuminate them. Some objects give off their own light. Some materials allow light to pass through them, others allow only some light to pass through them, and still others block light and create a dark shadow on the surface beyond them where the light cannot reach. Mirrors can be used to redirect light. People use a variety of devices that may include sound and light to communicate over long distances.	Lights, Camera, Refraction!	Students will carry out investigations to determine the effect of materials in the path of a beam of light, emphasizing that light responds differently to different materials. Students will model the effect of lights on objects.
		The Sound of Matter	Students will investigate the cause and effect relationship between sound and vibrating matter. Students will investigate and model how sound moves through matter.
Strand 2.1	Earth has an ancient history of slow and gradual surface changes, punctuated with quick but powerful geologic events like volcanic eruptions, flooding, and earthquakes. Water and wind play a significant role in changing Earth's surface. The effects of wind and water can cause both slow and quick changes to the surface of the Earth. Scientists and engineers design solutions to slow or prevent wind or water from changing the land.	The Earth Moves	Students will develop and use models illustrating the patterns of landforms and water on earth. Students will design a solution to slow or prevent wind and water from changing the shape of the land.
Strand 2.3	All things are made of matter which exists with different forms and properties. Matter can be described and classified by its observable properties. Materials with certain properties are well-suited for specific uses. Heating or cooling some types of matter may or may not irreversibly change their properties.	Where's the Matter?	Students will obtain, evaluate, and model changes in matter caused by heating and cooling, including reversible and irreversible changes in matter.
Strand 3.1	Weather is a minute-by-minute, day-by-day variation of the atmosphere's condition on a local scale. Scientists record patterns of weather across different times and areas so that they can make weather forecasts. Climate describes a range of an area's typical weather conditions and the extent to which those conditions vary over a long period of time. A variety of weatherrelated hazards result from natural processes. While humans cannot eliminate natural hazards, they can take steps to reduce their impact.	Ask the Weather Guy!	Students will obtain data on different weather patterns (sunny, cloudy, rainy, etc.). After briefly discussing the effect of these weather patterns on humans, students will design (sketch) and build (physical model) a solution for protecting humans in any given climate.
Strand 3.3	Forces act on objects and have both a strength and a direction. An object at rest typically has multiple forces acting on it, but they are balanced, resulting in a zero net force on the object. Forces that are unbalanced can cause changes in an object's speed or direction of motion. The patterns of an object's motion in various situations can be observed, measured, and used to predict future motion. Forces are exerted when objects come in contact with each other; however, some forces can act on objects that are not in contact. The gravitational force of Earth, acting on an object near Earth's surface, pulls that object toward the planet's center. Electric and magnetic forces between a pair of objects can act at a distance. The strength of these non-contact forces depends on the properties of the objects and the distance between the objects	Newton's Laws	Students will carry out investigations that provide evidence of the effects of balanced and unbalanced forces; explain that gravitational forces exerted by the earth cause objects to be directed downward; observe and predict patterns of motion.
		Principles of Flight	Within the context of flight, students will carry out investigations that provide evidence of the effects of balanced and unbalanced forces; explain that gravitational forces exerted by the earth cause objects to be directed downward; observe and predict patterns of motion.
Strand 4.2	Energy is present whenever there are moving objects, sound, light, or	Engineering Challenge: Rube Goldberg	Students will plan and carry out an investigation to gather evidence from observations that energy can be transferred from place to place by sound, light, heat, and electrical currents. Students will then design a device that converts energy from one form to another. Students will communicate their discoveries.
		Engineering Challenge: Twisty, Curvy, Topsy, Turvy	See: Engineering Challenges

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	Energy is present whenever there are moving objects, sound, light, or heat. The faster a given object is moving, the more energy it possesses. When objects collide, energy can be transferred from one object to another causing the objects' motions to change. Energy can also be transferred from place to place by electrical currents, heat, sound, or light. Devices can be designed to convert energy from one form to another.	Lights, Camera, Refraction	Students will carry out investigations to gather evidence that energy can be transferred from place to place by light.
		The Sound of Matter	Students will carry out investigations to gather evidence that energy can be transferred from place to place by sound.
Strand 4.3	Waves are regular patterns of motion that transfer energy and have properties such as amplitude (height of the wave) and wavelength (spacing between wave peaks). Waves in water can be directly observed. Light waves cause objects to be seen when light reflected from objects enters the eye. Humans use waves and other patterns to transfer information.	The Sound of Matter	Students will carry out investigations to gather evidence that energy can be transferred from place to place by sound.
Strand 4.4	The Sun is a star that appears larger and brighter than other stars because it is closer to Earth. The rotation of Earth on its axis and orbit of Earth around the Sun cause observable patterns. These include day and night; daily changes in the length and direction of shadows; and different positions of the Sun and stars at different times of the day, month, and year.	Earth, Sun, Moon, and Stars	Students will obtain information about the movement of the Sun, Moon, and stars, and evaluate predictable patterns. Students will build human models of the sun, moon, earth movements, and design a device to track the patterns of daylight.
Strand 5.1	Earth's major systems are the geosphere (solid and molten rock, soil, and sediments), the hydrosphere (water and ice), the atmosphere (air), and the biosphere (living things, including humans). Within these systems, the location of Earth's land and water can be described. Also, these systems interact in multiple ways. Weathering and erosion are examples of interactions between Earth's systems. Some interactions cause landslides, earthquakes, and volcanic eruptions that impact humans and other organisms. Humans cannot eliminate natural hazards, but solutions can be designed to reduce their impact.	Elemental Spheres	Students will analyze and interpret data to describe patterns of Earth's features, including the use of maps and models. Students will develop models and demonstrate the interactions between Earth's systems including the geosphere, biosphere, hydrosphere, and atmosphere.
Strand 5.2	All substances are composed of matter. Matter is made of particles that are too small to be seen but still exist and can be detected by other means. Substances have specific properties by which they can be identified. When two or more different substances are combined a new substance with different properties may be formed. Whether a change results in a new substance or not, the total amount of matter is always conserved.	Where's the Matter?	Students will develop a model to describe that matter is made of particles and observe changes in those particles between states of matter. Students will carry out investigations to determine the effect of combining two or more substances.
Strand 6.1	The solar system consists of the Sun, planets, and other objects within Sun's gravitational influence. Gravity is the force of attraction between masses. The Sun-Earth-Moon system provides an opportunity to study interactions between objects in the solar system that influence phenomena observed from Earth. Scientists use data from many sources to determine the scale and properties of objects in our solar system.	Solar System Sleuthing	Using an interactive model and computational thinking, students will analyze data to determine the scale and properties of objects in the solar system, including size, distance, and surface characteristics.
		Earth, Sun, Moon, Stars	Students will obtain information about the movement of the Sun, Moon, and stars, and evaluate predictable patterns. Students will build human models of the sun, moon, earth movements, and design a device to track the patterns of daylight.
Strand 6.2	Matter and energy are fundamental components of the universe. Matter is anything that has mass and takes up space. Transfer of energy creates change in matter. Changes between general states of matter can occur through the transfer of energy. Density describes how closely matter is packed together. Substances with a higher density have more matter in a given space than substances with a lower density. Changes in heat energy can alter the density of a material. Insulators resist the transfer of heat energy, while conductors easily transfer heat energy. These differences in energy flow can be used to design products to meet the needs of society.	Engineering: Turn up the Heat	Students will design an object that minimizes heat energy transfer. Students will be immersed in the design process, as they identify criteria and constraints, develop a prototype for iterative testing, analyze data from testing, and propose and present modifications for optimizingthe design solution.
Engineering Challenges	Students will be immersed in the engineering design process, as they discover classroom-sized solutions to life-size problems. Students will identify criteria and constraints, develop a prototype for iterative testing, analyze data from testing, and propose and present modifications for optimizingthe design solution. Teachers will see a model of how engineering principles can be applied to scientific concepts.	Turn up the Heat!	**Real world:** NASA is working to send astronauts to the Moon and then Mars. But how do we get the astronauts back safely, when the outside of the spacecraft reaches temperatures of nearly 5,000 deg. F?
			Classroom Level: Mrs. Farnsworth is a busy human! She's got to eat her breakfast while doing her hair if she wants to make it to school on time! Design a thermal protection system to eliminate the temperature change of Mrs. F's marshmallow, exposed to the heat of a hair dryer for 30 seconds, at a distance of 4 inches.
			Real World: More than 70% of the Earth's surface is covered in oceans and seas. For thousands of years, mankind has built ships of all shapes and sizes to transport people and cargo across the water.

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		Swiss Family Robinson	**Classroom Level:** You have been shipwrecked! You must build a raft, using only the materials found on board, to get your family of four to shore. The water is freezing. The family cannot swim, and they must stay dry. The sharks are hungry and the sun is about to set. You must get the raft across the water as quickly as possible.
		Storm the Castle	**Real World:** During the middle ages, rulers kept their kingdoms in order by ruling from central castles. A siege is a military blockade of a fortress, like these castles, with the intent of conquering through a well-planned assault. How could the attackers launch an assault, while staying out of range of the arrows and other weapons fired from the castle?
			Classroom Level: You have been transported back to the year 1304, during the siege on Stirling Castle. You must create a device that can take out the wall of the castle to break down the external defenses. You must be able to fire your ball from a distance that is out of the range of the castle's archers (6 ft), and hit the most vulnerable spot on the wall (center of target). You only have two chances to get it right.
		Twisty, Curvy, Topsy, Turvy	Real world: Engineers must design amusement park rides that are fun, exciting, and unique. Even with an increasing demand for higher and faster and more exhilirating experiences, these rides must remain SAFE.
			Classroom Level: You are a ride engineer, commissioned to build a new ride for Lagoon. The ride must include an energy source, and be safe for your targeted audience (kids, adults, or both).
		Bridge the Gap	Real World: A bridge is a structure built to span physical obstacles without closing the way underneath such as a body of water, valley, or road, for the purpose of providing passage over the obstacle, usually something that can be detrimental to cross otherwise.
			Classroom Level: You are a bridge builder. Your task is to build a bridge that will span a river, joining two small cities. A two lane road must be built atop the bridge. The bridge must span between the banks, unsupported by you, the river bank, or your team. Your resources are limited--the bridge must be built with no more than four of the provided materials.
		Rube Goldberg	An exercise exploring energy transfer through the collision of moving objects