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Space, Time and Matter

(Physical Science)

Essential Question: What are different forms of energy and how do they behave?

Enduring Knowledge	Science Concepts	GE	Evidence of Understanding
<u>Motion:</u> Everything is constantly moving; motion is relative, but the motion of an object can be described and predicted by tracing and measuring its position over time.	a. Speed indicates the rate at which an object is traveling. b. Speed is a relationship between the distance an object travels and time elapsed.	19	Measuring and calculating speed (the distance an object moves over a measured amount of time)
<u>Motion:</u> Everything is constantly moving; motion is relative, but the motion of an object can be described and predicted by tracing and measuring its position over time.	a. Inertia is the tendency of an object that depends on the object's mass. The inertia (mass) of an object resists change in the object's motion. (Stationary objects remain stationary; moving objects continue moving: Newton's First Law).	20	Investigating and identifying evidence of an object's inertia and explaining their observation in terms of the object's tendency to resist a change in motion
<u>Force:</u> Force is an influence that can change the motion of an object.	a. A force applied to a moving object will change the object's speed, direction, or both. b. Friction is a force that often opposes motion. c. Gravity and magnetism are examples of long-range forces that do not require contact of the interacting objects.	21	Investigating variables that change an object's speed, direction, or both, and identifying and describing the forces that cause the change in motion
<u>Force:</u> Force is an influence that can change the motion of an object.	a. Gravity is the force that holds objects to the Earth's surface, keeps planets in orbit around the sun and governs the rest of the motion in the solar system. b. The force of gravity pulls toward the center of mass of an object.	22	Predicting the effect of gravitational forces between pairs of objects (i.e., Earth and objects on the surface, Earth and Moon, Earth and Sun)
<u>Energy:</u> Energy is necessary for change to occur. It is the ability of matter to bring about change. - There are many forms of energy. - The total energy in the universe is constant. - Energy can be transformed and transferred, but not destroyed. (Conservation of Energy) - Energy transfers and transformations exhibit the characteristics of systems with inputs, processes and outputs as well as connections to other systems.	a. Light travels from an energy source (such as the Sun) in straight lines. b. When light hits an object, it is absorbed, reflected, transmitted or some combination. c. Objects can be seen only when light waves are emitted from or reflected off the object and enter into the eye.	28	Designing demonstrations that represent the characteristics of light energy transfer
<u>Energy:</u> Energy is necessary for change to occur. It is the ability of matter to bring about change. - There are many forms of energy. - The total energy in the universe is constant. - Energy can be transformed and transferred, but not destroyed. (Conservation of Energy) - Energy transfers and transformations exhibit the characteristics of systems with inputs, processes and outputs as well as connections to other systems.	a. Sound is produced by vibrations in materials that set up wavelike disturbances that spread away from the source.	29	Generating a sound and identifying the path of vibration from the source to the ear

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Focusing Questions	Potential Inquiries/Activities	Resources/Notes
<p>How can speed be calculated and represented?</p> <ul style="list-style-type: none"> - Speed = Distance/Time - Speed can be represented on a graph. 	<p>What moves the fastest (student, ball, model school bus) and how do you know? At what speed does a hamster on a wheel run and how do you know?</p>	
<p>What effect does inertia have on an object?</p> <ul style="list-style-type: none"> - Objects have mass. - A moving object that is not being subjected to a force will continue to move at a constant speed and in a straight line. 	<p>Using a ramp, one rolling mass (marble, model car, etc.) and an object with a mass you can change, show how the rolling mass affects the distance the variable object moves.</p>	
<p>What can cause an object to change speed or direction?</p> <ul style="list-style-type: none"> - Changes in speed or direction of motion are caused by forces. - An object that is not being subjected to a force will continue to move at a constant speed and direction. - The greater a force, the greater the change in motion will be. - Friction is caused by an object/substance rubbing against, or coming into contact with another object/substance. - Magnetism is a force that can attract or repel. - Gravity is a force that pulls one object toward another. - On Earth gravity pulls toward the Earth's center. 	<p>Using objects of your choice, show how a force can affect its speed or direction. (i.e., rolling balls in a gym). How do different surfaces affect the distance an object moves (i.e., a car/ball rolled down a ramp over carpet/tile, etc.). How does the size, type, or orientation of a magnet affect the distance from which an object (paperclip, magnet, etc.) will be attracted or repelled?</p>	
<p>What are the effects of gravity within the solar system?</p> <ul style="list-style-type: none"> - The Moon revolves around the Earth. - The Earth and other planets revolve around the Sun. 		
<p>What is light and how does it behave?</p> <ul style="list-style-type: none"> - Light is a form of energy. - Energy is transformed in many ways. - Color is caused by refraction of light. - Light enters the eye. - Light rays travel in a straight line until they are reflected, refracted or absorbed. 	<p>How does a prism refract light? How would our lives be affected without light? Using a light source, a thermometer, and a material such as water, sand, different colored construction paper, show how light energy can be absorbed. Show how you can tell light travels in a straight line. Can you identify objects of different colors in a darkened room?</p>	
<p>What is sound?</p> <ul style="list-style-type: none"> - Sound is a form of energy. - Sound is caused by vibrations. <p>How does sound move?</p> <ul style="list-style-type: none"> - Sound travels in waves in all directions from its source. - Sound moves through air and other matter. 	<p>Place students at intervals in lines radiating from a central point in a playing field. Make a loud sound and have students examine movement of sound.</p>	