

## ADVENT TERM 2

### SCIENCE – Year 5 - Medium Term Planning – PHYSICS: FORCES

<u>LESSON 1</u>	<u>LESSON 2</u>	<u>LESSON 3</u>
<p><b>Asking Enquiry Questions</b></p> <p><b>LEARNING INTENTION:</b> To know that a force is a push or a pull that makes something move, change speed or change shape. (Y3 recap)</p> <p>To know that gravity is a force of attraction.</p> <p><b>Disciplinary Knowledge:</b></p> <ul style="list-style-type: none"> <li>Plan scientific enquiries to answer questions.</li> </ul> <p><b>Aim:</b> Develop understanding of the nature, processes and methods of science through different types of science enquiries that help them to answer scientific questions about the world around them.</p>	<p><b>Communicating Results</b></p> <p><b>LEARNING INTENTION:</b> To know that friction is a contact force which opposes motion and slow objects down.</p> <p><b>Disciplinary Knowledge:</b></p> <ul style="list-style-type: none"> <li>Report and present findings from enquiries, including conclusions, in oral and written forms such as displays and other presentations.</li> </ul> <p><b>Aim:</b> Develop understanding of the nature, processes and methods of science through different types of science enquiries that help them to answer scientific questions about the world around them.</p>	<p><b>Asking Enquiry Questions</b></p> <p><b>LEARNING INTENTION:</b> To know that air resistance is a type of friction.</p> <p><b>Disciplinary Knowledge:</b></p> <ul style="list-style-type: none"> <li>Plan scientific enquiries to answer questions.</li> </ul> <p><b>Aim:</b> Are equipped with the scientific knowledge required to understand the uses and implications of science, today and for the future.</p>
<p><b>Key Vocabulary:</b> <b>force</b>, contact force, <b>non-contact force</b>, <b>gravity</b>, <b>mass</b>, weight, forcemeter, newton, measurement, investigation</p>	<p><b>Key Vocabulary:</b> <b>force</b>, <b>friction</b>, movement, <b>opposite</b>, increased, <b>decreased</b></p>	<p><b>Key Vocabulary:</b> <b>air resistance</b>, <b>friction</b>, <b>air</b>, <b>particles</b>, increase, decrease, <b>streamlined</b>, large, small, <b>surface area</b></p>
<p><b>Recap &amp; retrieval:</b></p>	<p><b>Recall &amp; retrieval:</b></p> <ul style="list-style-type: none"> <li>Gravity keeps objects on the surface of the Earth and pulls all unsupported objects to the ground.</li> <li>Gravity is a non-contact, pulling force which attracts two objects that have mass.</li> </ul>	<p><b>Recall &amp; retrieval:</b></p> <ul style="list-style-type: none"> <li>Gravity keeps objects on the surface of the Earth and pulls all unsupported objects to the ground.</li> <li>Gravity is a non-contact, pulling force which attracts two objects that have mass.</li> <li>Friction is in all places where two surfaces meet.</li> </ul>

		<ul style="list-style-type: none"> <li>It acts in the opposite direction to movement and always slows an object down.</li> </ul>
<p><b>Key Knowledge:</b></p> <p><b>Child:</b></p> <ul style="list-style-type: none"> <li>A contact force is a force that acts between two objects that touch.</li> <li>A non-contact force acts between two objects that do not touch.</li> <li>Gravity is a force of attraction.</li> <li>All objects have gravity because all objects have mass.</li> <li>Gravity keeps objects on the surface of the Earth and pulls all unsupported objects to the ground.</li> <li>Gravity is a non-contact, pulling force which attracts two objects that have mass.</li> <li>Earth's gravity pulls objects towards its centre. Earth's gravitational force is strong because Earth has a large mass.</li> </ul> <p><b>Teacher:</b></p> <ul style="list-style-type: none"> <li>Forces act in pairs that oppose each other.</li> <li>A force can be either a contact force or a non-contact force.</li> <li>Contact forces include friction, air resistance and water resistance.</li> <li>Non-contact forces include magnetism and gravitational force.</li> <li>Usually, the gravitational force between two objects is very weak because the objects are small. Gravitational force becomes larger as an object's mass increases.</li> <li>Gravity gives an object weight.</li> </ul>	<p><b>Key Knowledge:</b></p> <p><b>Child:</b></p> <ul style="list-style-type: none"> <li>Friction is in all places where two surfaces meet.</li> <li>It acts in the opposite direction to movement and always slows an object down.</li> <li>Smooth, flat surfaces exert a smaller frictional force than rough, bumpy surfaces.</li> <li>Moving objects will travel further on surfaces with less friction.</li> </ul> <p><b>Teacher:</b></p> <ul style="list-style-type: none"> <li>Different surfaces create different amounts of friction.</li> <li>The amount of friction depends on the materials from which the surfaces are made.</li> <li>Friction can be increased by adding tread patterns to tyres and the soles of shoes.</li> <li>Friction can be decreased by smoothing surfaces or using a lubricant, such as oil.</li> </ul>	<p><b>Key Knowledge:</b></p> <p><b>Child:</b></p> <ul style="list-style-type: none"> <li>Air resistance is a type of friction that always acts against the direction of movement.</li> <li>It is a contact force that acts when an object moves through air.</li> <li>It is caused by air particles hitting an object and slowing it down.</li> <li>Some objects are designed to increase air resistance.</li> <li>Some objects are designed to decrease air resistance.</li> </ul> <p><b>Teacher:</b></p> <ul style="list-style-type: none"> <li>Objects with a large surface area will hit more particles, and therefore have more air resistance, than objects with a smaller surface area.</li> <li>Parachute canopies have a large surface area, which increases air resistance and slows down the parachutist's descent.</li> <li>A fighter jet has a small surface area and a streamlined shape which decreases air resistance and allows the plane to move quickly through the air.</li> </ul>

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| <ul style="list-style-type: none"><li>• Mass is the amount of matter that an object or substance contains.</li><li>• It can never be zero and is the same wherever it is, even in space.</li><li>• Mass is measured in grams (g) or kilograms (kg) using a scale or the kg scale on a force meter.</li><li>• Weight is a measure of gravitational force.</li><li>• The weight of an object can vary depending on where it is.</li><li>• For example, gravitational force on the Moon is less than that on Earth, so an object weighs less on the Moon.</li><li>• Weight is measured in newtons (N) using a force meter.</li></ul> |  |  |
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### SCIENCE – Year 5 - Medium Term Planning – PHYSICS: FORCES

<u>LESSON 4</u>	<u>LESSON 5</u>	<u>LESSON 6</u>
<p><b>Observing and Measuring</b></p> <p><b>LEARNING INTENTION:</b> To know that water resistance is a type of friction.</p> <p><b>Disciplinary Knowledge:</b></p> <ul style="list-style-type: none"> <li>Take measurements, using a range of scientific equipment, with increasing accuracy and precision.</li> </ul> <p><b>Aim:</b> Are equipped with the scientific knowledge required to understand the uses and implications of science, today and for the future.</p>	<p><b>LEARNING INTENTION:</b> To know that levers and pulleys are mechanisms which give a mechanical advantage.</p> <p><b>Disciplinary Knowledge:</b></p> <ul style="list-style-type: none"> <li>Recognise that some mechanisms including levers, pulleys and gears allow a smaller force to have a greater effect.</li> </ul> <p><b>Aim:</b> Are equipped with the scientific knowledge required to understand the uses and implications of science, today and for the future.</p>	<p><b>LEARNING INTENTION:</b> To know that gears are mechanisms which give a mechanical advantage.</p> <p><b>Disciplinary Knowledge:</b></p> <ul style="list-style-type: none"> <li>Recognise that some mechanisms including levers, pulleys and gears allow a smaller force to have a greater effect.</li> </ul> <p><b>Aim:</b> Are equipped with the scientific knowledge required to understand the uses and implications of science, today and for the future.</p>
<p><b>Key Vocabulary:</b> water resistance, water, particles, increase, reduce, streamlined</p>	<p><b>Key Vocabulary:</b> lever, pulley, mechanism, arm, fulcrum, load, effort force, mechanical advantage</p>	<p><b>Key Vocabulary:</b> gears, linked, interlinked, toothed, wheels, rotate, mechanical advantage</p>
<p><b>Recall &amp; retrieval:</b></p> <ul style="list-style-type: none"> <li>Gravity keeps objects on the surface of the Earth and pulls all unsupported objects to the ground.</li> <li>Gravity is a non-contact, pulling force which attracts two objects that have mass.</li> <li>Friction is in all places where two surfaces meet.</li> <li>It acts in the opposite direction to movement and always slows an object down.</li> <li>Air resistance is a type of friction that always acts against the direction of movement.</li> <li>It is caused by air particles hitting an object and slowing it down.</li> </ul>	<p><b>Recall &amp; retrieval:</b></p> <ul style="list-style-type: none"> <li>Gravity keeps objects on the surface of the Earth and pulls all unsupported objects to the ground.</li> <li>Gravity is a non-contact, pulling force which attracts two objects that have mass.</li> <li>Friction is in all places where two surfaces meet.</li> <li>It acts in the opposite direction to movement and always slows an object down.</li> <li>Air resistance is a type of friction that always acts against the direction of movement.</li> <li>It is caused by air particles hitting an object and slowing it down.</li> <li>Water resistance is a type of friction that always acts against the direction of movement.</li> <li>It is caused by water particles hitting an object and slowing it down.</li> </ul>	<p><b>Recall &amp; retrieval:</b></p> <ul style="list-style-type: none"> <li>Gravity keeps objects on the surface of the Earth and pulls all unsupported objects to the ground.</li> <li>Gravity is a non-contact, pulling force which attracts two objects that have mass.</li> <li>Friction is in all places where two surfaces meet.</li> <li>It acts in the opposite direction to movement and always slows an object down.</li> <li>Air resistance is a type of friction that always acts against the direction of movement.</li> <li>It is caused by air particles hitting an object and slowing it down.</li> <li>Water resistance is a type of friction that always acts against the direction of movement.</li> <li>It is caused by water particles hitting an object and slowing it down.</li> </ul>

		<ul style="list-style-type: none"> <li>Levers and pulleys are simple machines that can be used to make it easier to lift a load.</li> </ul>
<p><b>Key Knowledge:</b></p> <p><b>Child:</b></p> <ul style="list-style-type: none"> <li>Water resistance is a type of friction that always acts against the direction of movement.</li> <li>It is caused by water particles hitting an object and slowing it down.</li> </ul> <p><b>Teacher:</b></p> <ul style="list-style-type: none"> <li>Objects with a large surface area will hit more particles, and therefore have more water resistance, than objects with a smaller surface area.</li> <li>Scuba flippers have a large surface area to increase water resistance as the diver pushes against the water to move forward.</li> <li>The front of a submarine has a small surface area and is streamlined to reduce water resistance.</li> <li>Decreasing the surface area at the front of an object reduces the amount of water resistance. The more streamlined an object, the faster it will fall through water.</li> </ul>	<p><b>Key Knowledge:</b></p> <p><b>Child:</b></p> <ul style="list-style-type: none"> <li>Levers and pulleys are simple machines that can be used to make it easier to lift a load.</li> <li>Pulleys consist of a lever arm, a fulcrum, a load to lift and an effort force.</li> <li>Pulleys consist of one or more grooved wheels and a rope.</li> </ul> <p><b>Teacher:</b></p> <ul style="list-style-type: none"> <li>A mechanical advantage is a measurement of how much a simple machine multiplies the force that we put in.</li> <li>The bigger the mechanical advantage, the less force we need to apply.</li> <li>For example, if the distance between the fulcrum and the effort is double the distance between the fulcrum and the load, the effort needed will be halved.</li> <li>Pulleys make it easier to lift a load. For example, when two wheels are used in a pulley, the force needed to lift the load halves.</li> <li>At the same time, the length of rope needed to lift the load 1m off the ground doubles to 2m.</li> </ul>	<p><b>Key Knowledge:</b></p> <p><b>Child:</b></p> <ul style="list-style-type: none"> <li>Gears are toothed, interlocking wheels that can be place together to make a mechanism that provides a mechanical advantage.</li> <li>They can also be connected by a chain to turn in the same direction.</li> <li>Linking gears of the same size does not provide a mechanical advantage.</li> <li>Linking different sized gears does create a mechanical advantage</li> </ul> <p><b>Teacher:</b></p> <ul style="list-style-type: none"> <li>In a mechanism made with a large gear with 12 teeth and a small gear with 6 teeth, the small gear will rotate twice as fast as the large gear but with half the amount of force.</li> <li>Smaller gears rotate more quickly and are easier to turn but do not provide much force.</li> <li>Larger gears rotate more slowly and are harder to turn but provide more force.</li> <li>Gears are used in bicycles to make it easier to cycle uphill and faster to cycle on the flat.</li> </ul>
<p><b>Assessment</b> Cumulative quiz. Retrieval practice.</p>		