**Year 5 Science Curriculum – Autumn 1**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Theme: Forces and mechanisms** | | | | | | | | | |
| **Curriculum objectives** | | | **Vocabulary** | | | | | | **Links across the curriculum** |
| Identify the effects of [air resistance, water resistance and] friction, that act between moving surfaces.  Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object.  Recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect. | | | **Anticlockwise** | Moving in the opposite direction to the hands on a clock. | **Clockwise** | | Moving in the same direction as the hands on a clock. | | DT:   * Design and make a pulley system   Maths:   * Interpretation and creation of results from graphs and tables   English:   * Oracy for presentation and debate |
| **System** | A group of things or parts that work together. | **accuracy** | | Shows how close to the true answer readings are and is improved by taking repeat readings and keeping variables the same. | |
| **Dependent variable** | The variable that is being measured. | **Independent variable** | | The thing that is being changed. | |
| **Line graph** | A type of chart that displays data points connected by a line. | **Air resistance** | | A contact force acting on all objects that are moving through air, whether this is falling, moving along or rising. | |
| **Force meter** | A piece of equipment that measures a force. | **Friction** | | A contact force that makes it harder to move an object across a surface or slows down an object moving over a surface. | |
| **Tier 3 vocabulary:** [SNAP23\_Y5\_M1\_forces\_ms.docx (live.com)](https://view.officeapps.live.com/op/view.aspx?src=https%3A%2F%2Fstatic.collins.rhapsode.com%2FSnap_Science%2FTeaching_Science%2FYear_5%2FSNAP23_Y5_M1_forces_ms.docx&wdOrigin=BROWSELINK) | | | | | |
| **Prior knowledge:** *What specifically have pupils learned that is relevant to this unit that they are building upon?* | | | | | | **Future knowledge:** *What specifically will pupils learn in the future that is relevant to this unit?* | | | |
| Children have previously learnt:  ● How things move on different surfaces (Year 3 Physics – Forces and magnets).  ● That magnets attract magnetic materials, and that they have two poles which attract or repel each other (Year 3 Physics – Forces and magnets).  ● That some forces need contact between two objects, but magnetic forces can act at a distance (Year 3 Physics – Forces and magnets). | | | | | | This prepares children for later learning:  ● Drawing force diagrams (Key Stage 3 Physics – Forces).  ● About the turning effect of forces (Key Stage 3 Physics – Forces).  ● Measuring forces (Key Stage 3 Physics – Forces).  As children will learn more about measuring forces in Key Stage 3, they are just introduced to this in this module. They do not need to be introduced to drawing force diagrams. The difference between mass and weight is a difficult concept and should be avoided. Also avoid changing the weight of a falling object as the results this produces are often contrary to the science and reinforce the misconception that heavier objects fall more quickly. | | | |
| **Lesson Sequence** | | **Key Knowledge** | | | | **Key Skills** | | | |
| What is the friction between different surfaces? | | * Friction is a force that makes it more difficult to move an object across a surface or slows down an object moving over a surface. * The rougher the surface, the greater the friction. * Force meters measure a force. The unit of measurement is Newtons, named after Sir Isaac Newton. This is abbreviated to N. * Identify the independent variable – the thing they are changing (the material the box is moving over) – and the dependent variable – the thing they are measuring (the force of the friction). | | | | Working scientifically:  ● Using test results to make predictions to set up further comparative and fair tests.  ● Taking measurements, using a range of scientific equipment, with increasing [accuracy and] precision, taking repeat readings when appropriate.  Scientific enquiry type:  ● comparative testing | | | |
| Why do some objects fall faster than others? | | * Gravity is a force that pulls all objects towards the centre of the Earth. * Air resistance is a force that slows down an object that is moving through air. * It is air resistance, not an object’s mass, that affects how quickly it falls. * Identify independent and dependent variables and use these to write scientific enquiry questions. | | | | Working scientifically:  ● Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary.  ● Identifying scientific evidence that has been used to support or refute ideas or arguments.  Scientific enquiry type:  ● Comparative and fair testing. | | | |
| How does the size of the canopy affect the time it takes a parachute to fall? | | * Air resistance increases as the surface area of the object moving through the air gets larger. * Identify which line graph matches their prediction. * Use a stopwatch to time how long a parachute takes to reach the floor. * Learn to use repeat readings to increase the accuracy of measurements. | | | | Working scientifically:  ● Taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate.  ● Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations.  Scientific enquiry type:  ● Comparative and fair testing. | | | |
| How does the shape of an object affect its movement in water? | | * When an object is moving through water, a force called water resistance slows the object down or makes it harder to move. * Water resistance is a force that opposes any movement through or on the surface of water. It can be defined as the force of the water pushing back against an object moving through it. * Find either the mean or median average. | | | | Working scientifically:  ● Using test results to make predictions to set up further comparative and fair tests.  ● Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations.  Scientific enquiry type:  ● Comparative testing. | | | |
| How does the number of pulleys affect the force needed to lift a load? | | * A mechanism is a device that makes it easier to move something. For example think about moving a heavy load, such as a packed suitcase. * A pulley is a mechanism used for lifting a heavy object (a load) by applying pulling force at one end of rope which passes over a wheel. * As the number of pulleys increases, the force required to lift the load decreases. | | | | Working scientifically:  ● Using test results to make predictions [to set up further comparative and fair tests].  ● Reporting and presenting findings from enquiries, including conclusions, causal relationships [and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations].  Scientific enquiry type:  ● Comparative testing. | | | |
| How does the length of the lever affect the force needed to lift a load? | | * A lever is another simple mechanism which makes it easier to move a load. * A fulcrum of a lever is the point about which it turns. * As the length of the lever increases, the force required to lift the load decreases. | | | | Working scientifically:  ● Recording data and results of increasing complexity using scientific diagrams and labels, [classification keys, tables, scatter graphs, bar] and line graphs.  ● Reporting and presenting findings from enquiries, including conclusions, causal relationships [and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations].  Scientific enquiry type:  ● Fair testing. | | | |
| How do gears work? | | * Gears are wheels with teeth that can change the direction of movement and the force required to move something. * Adjacent gears turn in opposite directions, smaller gears turn faster than larger gears, and that a smaller force is needed to turn a smaller gear than a larger gear. | | | | Working scientifically:  ● Reporting and presenting findings from enquiries, including conclusions, causal relationships [and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations]. | | | |
|  | |  | | | |  | | | |
| **Themes and links** | | | | | | | | | |
| **Themes (types of enquiry)** | **Where these are covered:** | | | | | | | **Links across the science curriculum** | |
| **Observation over time** |  | | | | | | | |  |  | | --- | --- | | **EYFS** |  | | **1** | Seasons | | **2** | Growing | | **3** |  | | **4** | Electricity | | **5** | Materials | | **6** | Classification of living things | | |
| **Research** |  | | | | | | |
| **Pattern seeking** |  | | | | | | |
| **Comparative and fair testing** | * Lesson 1 * Lesson 2 * Lesson 3 * Lesson 4 * Lesson 5 | | | | | | |
| **Identifying, classifying and grouping** |  | | | | | | |  | |