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| **What should I already know?** | | **What will I know by the end of the unit?** | |
| * Know what a **force** is and be able to explain that a push and pull are types of **forces.** * That when **forces** are applied to an object they allow them to move or stop moving. * The strength of the **force** determines how far and fast an object moves. * **Friction** is the **resistance** of **motion** when there is contact between two **surfaces** * The **force** that causes objects to move downwards towards the ground is **gravity**. * That **magnets** have poles, and that opposite poles **attract**, while similar poles **repel.** | | **What are forces?** | * **Forces** are pushes and pulls. * These **forces** change the **motion** of an object. * They will make it start to move or speed up, slow it down or even make it stop. * For example, when a cyclist pushes down on the pedals of a bike, it begins to move. The harder the cyclist pedals, the faster the bike moves. * When the cyclist pulls the brakes, the bike slows down and eventually stops. * **Friction** is a **force** - it is the **resistance** of **motion** when one object rubs against another.      * Other **forces** that create **resistance** of **motion** include **water resistance** and **air resistance.** |
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| **Vocabulary** | |
| attract | If one object **attracts** another object, it causes the second object to move towards it |
| friction | the **resistance** of **motion** when one object rubs against another |
| force | the **pulling** or **pushing** effect that something has on something else |
| gear | a part of a machine that causes another part to move because of teeth which connect the two moving parts | **What is gravity and air resistance?** | * **Gravity is** the **force** that pulls objects to the centre of the Earth. * Air **resistance** pushes up on the parachute, **opposing** the force of **gravity .** This makes the parachute land more slowly. |
| gravity | the **force** which causes things to drop to the ground |
| lever | a basic tool used to lift or pry things open |
| motion | the activity of changing position or moving from one place to another |
| opposite | **Opposite** is used to describe things of the same kind which are completely different in a particular way. For example, north and south are **opposite** directions |
| pulley | a simple machine that makes lifting something easi- er. A pulley has a wheel or set of wheels with grooves that a rope or chain can be pulled over |
| repel | When a magnetic pole **repels** another magnetic pole, it gives out a **force** that pushes the other pole away | **What is water resistance?** | * Water **resistance** is the **friction** that is created between water and an object that is moving through it. * Some objects can move through water with less **resistance** if they are **streamlined.** |
| resistance | a **force** which slows down a moving object or vehicle |
| spring | a spiral of wire which returns to its original shape after it is pressed or pulled |
| streamlined | A **streamlined** vehicle, animal, or object has a shape that allows it to move quickly or efficiently through air or water |
| surface | th[e flat top p](https://www.collinsdictionary.com/dictionary/english/flat)art of something or the outside of it |

**Procedural Knowledge – ‘I Can’ Statements**

* - Investigate the amount of **friction** created by different **surfaces**. - Use measures (such as length and time) to show how far or fast and object travels.
* Draw diagrams to show how objects move down ramps, through the air and through water, using arrows to show the direction of the **forces.**
* Explore the effects of **friction** on **motion** and find out how it slows or stops moving objects, for example, by observing the effects of a brake on a bicycle wheel - Provide examples of when **friction** is useful.
* - Investigate how **surface area** affects **air resistance** and explain the relationship between them.
* - Make parachutes to investigate how **air resistance** works. - Ensure that only one variable is changed while other variables stay the same. Variables may include the objects attached to the parachute, shape of parachute, size of parachute, length of string attached to the object, height of drop, material of parachute. Explain why this is necessary in an experiment.
* Explore **resistance** in water by making and testing boats of different shapes

Design and make products that use **levers**, **pulleys**, **gears** and/or **springs** and explore their effects.