**Forces (Y5)**

**NC Statutory Guidance**

Pupils should be taught to:

* explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object
* identify the effects of air resistance, water resistance and friction, that act between moving surfaces
* recognise that some mechanisms including levers, pulleys and gears allow a smaller force to have a greater effect

**Working Scientifically**

During years 5 and 6, pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:

* planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary
* taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate
* recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs
* 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 a degree of trust in results, in oral and written forms such as displays and other presentations
* identifying scientific evidence that has been used to support or refute ideas or arguments

**Resources**

Twinkl PlanIt to be adapted.

**Lesson Overview (Statutory in Bold)**

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| WALT | Knowledge to be Taught | Skills to be Taught and Investigations | Vocabulary |
| Identify forces acting on objects. | Forces are often referred to as pushes and pulls.  Forces affect the movement or shape of an object. They can make an object start to move, stop moving, move faster or move more slowly. They could also make an object change its shape or cause a moving object to change direction.  Examples of different forces in action. | **To explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object** | Gravity  Air resistance  Friction  Water resistance  Buoyancy  Upthrust |
| Explore the effect gravity has on objects and how gravity was discovered. | **Gravity** is the force that means that objects are pulled towards the centre of the Earth.  All objects exert a **gravitational pull**. However, the strength of an object's gravitational pull depends on its **mass**. The Earth is a huge object with an extremely high mass, so its gravitational pull is very strong.  The force of gravity keeps us on the ground. Gravity also causes objects to fall down if they are dropped.  Isaac Newton famously developed his theory of gravity when he saw an apple fall to the ground from an apple tree.  The **weight** of an object is caused by **gravity** pulling it down. Objects with more **mass** have a greater weight, as the force of gravity pulls them down more strongly. | **To explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object**  Investigate weight using a Newtonmeter and mass using electronic scales. See if there is a link between the two. Focus on accurate measuring. | Gravity  Gravitational pull  Mass  Weight  Newtons  Kilograms |
| Investigate effects of air resistance. | Galileo Galilei’s ball drop experiment and the hammer and feather on the moon experiment.  There is **no air** on the Moon.  **Air** pushes against any object moving through it. This is known as **air resistance**.  On Earth, air resistance acts on both objects. The feather has a large surface area in comparison to its mass. The hammer has a small surface area in comparison to its mass. Air resistance therefore has a greater upwards force on the feather.  Since there is no air on the Moon, there is no **air resistance** to push against the feather, so the two objects fall at the **same speed**. | **To identify the effects of air resistance.**  Investigate how different variables affect air resistance by designing paper clip parachutes. Children to choose their own variables to change. | Air resistance  Surface area |
| Explore effects of water resistance. | It is possible to reduce the effects of water and air resistance.  Objects that do not experience much water or air resistance are described as **streamlined**. | **To identify the effects of water resistance.**  Investigate how quickly different shapes fall through water.  Investigate streamlined shapes when making paper boats. | Water resistance  Upthrust  Buoyancy  Streamlined |
| Investigate effects of friction. | Friction slows moving objects down.  All surfaces create friction on an object moving over them.  Friction causes heat. | **To identify the effects of friction.**  Investigate effects of friction on moving wheel using different materials. Design investigation using toy cars on a ramp; pupils to plan how to measure variables. | Friction  Rough  Smooth |
| Explore and design mechanisms. | A **mechanism** is a device that changes an **input force or** **motion** into a different **output force** **or motion**.  Some mechanisms make work **easier** to do by allowing a **smaller force** to have a **greater effect**. | **To recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect.** | Mechanisms  Levers  Pulleys  Gears |