

Knowledge Organiser  
**Subject: Science    Unit: Forces**

**Overview:**

During this sequence of learning, pupils will be able to explain that unsupported objects fall to the Earth because of gravity. Pupils will also know that air resistance, water resistance and friction act between moving surfaces and that levers, pulleys and gears allow a smaller force to have a greater effect.

**What should I already know?**

- A force can be thought of as a push or a pull.
- As objects move across a surface there is friction when they rub against each other and that sometimes this friction is larger or smaller.
- Applying forces to objects can change their shape.
- The roughness of a material is an example of a property.
- There are three types of contact force: impact forces (when two surfaces collide), frictional forces (when two surfaces are already in contact) and strain forces (when an elastic material is stretched or squashed).
- Objects move differently on rough and smooth surfaces; objects resist movement more on rough surfaces because there is higher friction as the object moves.

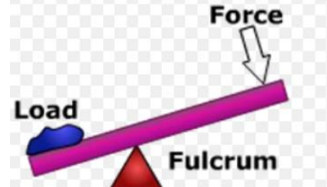
**What will I know by the end of the unit?**

- A force is measured in a unit called Newtons, named after a British scientist called Sir Isaac Newton who discovered lots about gravity and how planets move.
- Pull forces can be measured using a device called a force meter.
- The amount of matter (stuff) in an object is its mass.
- Gravity is a force that acts between all objects in the universe, but it acts much more strongly between objects that have more mass and that are close together.
- Unsupported objects are pulled towards the Earth by the force of gravity.
- Acceleration is a change in speed and unbalanced forces acting on an object cause it to accelerate.
- Air resistance is a force felt by an object as it moves through the air; it is caused by the object bumping into the gas particles that make up air; the quicker an object moves, the more gas particles it bumps into and the more air resistance it experiences.
- A falling object will accelerate until its air resistance matches the gravitational force pulling it down; at this point, the object will continue to move at this speed (called its terminal velocity) without getting any quicker or slowing down.
- A parachute's shape increases the air resistance that a falling object experiences, giving it a much lower terminal velocity.

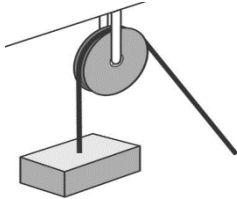
**Vocabulary:**

acceleration	An increase in speed.
air resistance	A type of friction between air and another material.
buoyancy	The ability of something to float in water or another fluid.
effort	A force exerted by a machine or in a process.
force meter	A device used to measure forces. Also sometimes called a Newton Meter.
fulcrum	The point at which a lever is placed or supported.
gravity	A force that attracts an object to Earth.
load	A weight or source of pressure borne by something.
mass	The quantity of matter of something (often confused with weight).
Newton	The standard unit of force. Named after Sir Isaac Newton.
pivot	The central point, pin or shaft on which a mechanism turns.
rigid	Unable to bend or be forced out of shape. The opposite of flexible.
streamlined	A design that provides very little air resistance which increases the speed and ease of movement of the object.

- Water resistance is a force felt by an object as it moves through water; it is caused by the object bumping into the water particles.
- The shape of an object determines how much air resistance or water resistance it experiences; shapes of object that experience little air resistance or water resistance are described as streamlined.
- How to draw a force diagram with arrows representing the different forces acting on an object.
- A lever is a rigid length pivoting around a fulcrum.



- A pulley is a wheel with a fulcrum that supports a moving cable or belt.



- A gear is a rotating wheel with cut teeth that mesh with the teeth of another gear so that turning one gear turns an adjacent gear in the opposite direction.
- Gears, levers and pulleys are simple machines that are used to allow a smaller force to have a greater effect; they do this by moving a smaller force over a longer distance at one end of the machine, which the machine turns into a larger force over a small distance at the other end.



terminal velocity

A constant speed that a falling object reaches when the resistance prevents further acceleration.

unsupported

When something is not physically supported.

water resistance

A force which is often called 'drag' which acts in the water, slowing things down.

weight

The name of the force exerted on an object due to gravity.

