

Previous Knowledge

Forces work from Y3 on how things move on different surfaces.

Project Hook or 'Wow' memory

Hands on experiments

The key skills we want pupils to use during this topic:

Decide variables to be changed and measured in fair tests, and observe measure and record

Construct and use a range of representations, including tables and graphs, to represent and describe observations, patterns or relationships in data

Reflect on and suggest improvements to scientific investigations

Learning Steps

Key Knowledge (answers)

What is a force?
Force is a push or a pull. Identify the effects of air resistance, water resistance, friction, buoyancy, human force as all ways that forces can act on an object. Complete Bingo cards to check children's understanding. Explain that there are opposing forces that can slow down, speed up or keep an object stationary.

What is gravity?
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. **Mass** is a measure of the amount of 'stuff' inside an object, and is measured in **kilograms**

What is air resistance?
Air resistance pushes up, on a parachute opposing the force of gravity and making things fall slowly. This is a useful effect. But air resistance pushes the back, opposing the a cyclist's force from them pedalling the bicycle and making the bicycle travel more slowly. This is an unhelpful effect.

What is water resistance?
Water resistance is the force that pushes against objects as they pass through the water. The shape of an object dictates how much water resistance it will meet as it moves through the water. This is why boats and fish are able to move easily through water. Their shapes are **STREAMLINED**. This means they encounter little resistance.

What is friction?
Friction is the resistance that one surface or object encounters when moving over another. The action of one surface or object rubbing against another. When an object moves across another surface there is sometimes lots of friction (high friction) and sometimes very little friction (low friction).

How do mechanisms work?
A **pulley** could be used to lift the rock. Pulleys are useful because they make it easier to lift objects. Belt pulleys today have motors that use a small amount of force to lift or move very heavy things. Levers work by increasing the amount of force. A **beam** is attached to a **hinge** or placed over a **fulcrum**. The position of the fulcrum affects how much the force is increased or decreased.

Key vocabulary

friction	A force that acts between two surfaces or objects that are moving, or trying to move, across each other.
air resistance	A type of friction caused by air pushing against any moving object.
water resistance	A type of friction caused by water pushing against any moving object
buoyancy	An object is buoyant if it floats. This is because the weight of the object is equal to the upthrust.
upthrust	A force that pushes objects up, usually in water
streamlined	When an object is shaped to minimise the effects of air or water resistance.

Statutory Requirements

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.

