



Forces

1. Can I explain why unsupported objects fall towards the Earth due to gravity?

- **Prior Learning (Year 3 Spring 1—Forces and Magnets):** explored pushes and pulls
- **Vocab:** Force(s), gravity, weight
- Know that gravity is a force that pulls objects towards the centre of the Earth.
- Know that unsupported objects fall because of the force of gravity acting between the Earth and the object.
- Know that gravity acts on all objects, but its effects can be observed more clearly when objects are falling.
- Know that scientific ideas about gravity have developed over time using evidence, (e.g. the work of Isaac Newton helped explain why objects fall to Earth).

(note for teachers – suggested task: drop a variety of objects (e.g. ball, paper, book) and ask children to observe what happens, then discuss why they fall. Introduce the idea of gravity and link to simple demonstrations such as comparing how objects fall in a vacuum (video) vs air.)

- **Identifying scientific evidence that has been used to support or refute ideas or arguments**

2. Can I plan and carry out a fair test to investigate how air resistance affects falling objects?

- **Prior Learning (last lesson):** explored why objects fall due to gravity
- **Vocab:** investigate, air resistance, variable, surface
- Know that air resistance is a force that acts against moving objects as they travel through the air.
- Know that air resistance can slow objects down as they fall.
- Know that the shape and surface area of an object affect the amount of air resistance it experiences, (e.g. a parachute falls more slowly than a compact object).
- Know that a fair test involves changing one variable (e.g. size or shape of parachute) while keeping others the same.
- Know that taking repeat measurements improves the accuracy and reliability of results.

(note for teachers – suggested task: children design and test parachutes using different materials or sizes, measure the time taken to fall, repeat trials, and record results in a table to identify patterns.)

- **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**

3. Can I investigate how water resistance and friction affect movement using evidence from tests?

- **Prior Learning (last lesson):** investigated how air resistance affects falling objects
- **Vocab:** Friction, water resistance, surface
- Know that friction is a force between two surfaces that slows down or stops movement. Know that water resistance is a force that acts against objects moving through water.
- Know that rougher surfaces create more friction, while smoother surfaces create less friction.
- Know that the shape of an object can affect water resistance, (e.g. streamlined shapes move more easily through water).
- Know that results from investigations can be used to identify patterns and make predictions about how objects will move.

(note for teachers – suggested task: children investigate friction by moving objects across different surfaces (e.g. carpet, wood) and measure distance or time, then test water resistance by moving objects through water or testing boat shapes, recording results and identifying patterns.)

- **Taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate**
- **Using test results to make predictions to set up further comparative and fair tests**

5. Can I use evidence to explain how scientists developed our understanding of gravity?

- **Prior Learning (last lesson):**
- **Vocab:** gravity, theory, evidence,
- Know that scientific ideas about gravity have changed over time as new evidence has been discovered.
- Know that earlier scientists, such as Galileo, carried out experiments to understand how objects fall.
- Know that Isaac Newton developed the theory of gravity to explain why objects are pulled towards the Earth.
- Know scientific theories are based on evidence and can be improved/changed over time.

(note for teachers – suggested task: present simple scenarios (e.g. dropping objects of different weights) and discuss what early scientists observed, then introduce Galileo and Newton, asking children to explain how evidence helped develop ideas about gravity.)

- **Identifying scientific evidence that is used to support or refute ideas or arguments**

4. Can I explain how levers, pulleys and gears allow a smaller force to have a greater effect?

- **Prior Learning (last lesson):** investigated how friction and water affect movement
- **Vocab:** lever, pulley, gear, force
- Know that mechanisms are devices that make work easier by changing the size or direction of a force.
- Know that levers can increase the effect of a force depending on where the pivot (fulcrum) is placed.
- Know that pulleys can make lifting easier by changing the direction of a force.
- Know that gears can transfer force and change speed or direction of movement.
- Know that these mechanisms allow a smaller force to have a greater effect.

(note for teachers – suggested task: simple equipment (e.g. rulers as levers, string and wheels as pulleys, basic gear sets) and ask children to test how changing the setup affects effort, then present findings explaining how each mechanism makes work easier.)

- **Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms**