

## Science – Year 5

### Forces

#### *How do we know forces exist when we cannot see them?*

NC objectives - areas of study	End point of area of study	Vocabulary		
<p>explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object</p> <p>identify the effects of air resistance, water resistance and friction, that act between moving surfaces</p> <p>recognise that some mechanisms including levers, pulleys and gears allow a smaller force to have a greater effect</p>	<p>Children are able to identify different forces at work in the world around them. They name forces correctly and explain how they work.</p> <p>Children explore levers, pulleys and gears and are able to explain how they work with a small force creating a greater effect.</p>	Basic	Adventurous	Technical
		<p>Earth, water resistance, friction, mechanisms, simple machines, levers, pulleys, gears</p>		<p>Force, gravity, resistance, air resistance, Newton,</p>

### Knowledge

Substantive Knowledge	Disciplinary Knowledge
<ul style="list-style-type: none"> <li>● Retrieval of magnetic forces in y3.</li> <li>● Previous work as physicists in y3- light and magnetic force, Y4- electricity and sound.</li> <li>●</li> <li>● Lesson 1</li> <li>● LO To know that there are three different types of force.</li> <li>●</li> <li>● <b>Force, resistance,</b></li> <li>● Know that a force can be thought of as a push or a pull</li> <li>● Know that 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).</li> <li>● Lesson 2</li> </ul>	<p><b>Working as physicists and astronomers they are able to explore the effect of forces in the world around them.</b></p> <p><b>Similarities and differences</b>                      Children work to identify different forces and can explain their similarities and differences to how other forces work. They explore the gravitational pull of different objects measuring using force meters correctly. Exploring different surfaces, they are able to talk about the similarities and differences of the friction of different surfaces.</p> <p><b>Use of evidence</b></p>

- LO To know the effects of friction.

- friction, Force, gravity, resistance,

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- Know that objects move differently on rough and smooth surfaces; objects resist movement more on rough surfaces because there is higher friction as the object moves

- Use of newton meters to pull objects over different surfaces.

- Know that pull forces can be measured using a device called a force meter

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- Lesson 3

- LO To know what Sir Isaac Newton discovered about gravity.

- Force, gravity, Newton,

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- Know that 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

- Know that Newton was undoubtedly one of the greatest scientists who ever lived, a genius who discovered a great deal about forces, including gravity, mathematics and light.

Appreciate what we wouldn't know without scientists.

- Lesson 4

- LO To know that gravity is a force that acts between all objects.

- Earth, friction, Force, gravity, resistance, air resistance,

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- Know that the amount of matter (stuff) in an object is its mass

- Know that gravity is a force that acts between all objects in the universe, but that it acts much more strongly between objects that have more mass and that are close together

- Know that unsupported objects are pulled towards the Earth by the force of gravity.

Reflect on what our world would be like without gravity.

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- Lesson 5

- LO To know the effects of air resistance.

Through first hand experiences and research, children measure using newton meters with accuracy and are able to explain their findings. Using their conclusions they formulate other questions to explore and answer.

They record data and results of increasing complexity using scientific diagrams and labels, tables, and bar and line graphs explaining the evidence they have gained using the correct scientific vocabulary.

Through research about famous scientists, Newton, they identify scientific evidence that has been used to support or refute ideas or arguments.

- **friction, Force, gravity, resistance, air resistance,**

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- Know that acceleration is a change in speed and that unbalanced forces acting on an object cause it to accelerate
- Know that 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
- Know that 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
- Know how to draw a force diagram with arrows representing the different forces acting on an object
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- Know that a parachute's shape increases the air resistance that a falling object experiences, giving it a much lower terminal velocity
- Pupils make parachutes and explore their differences.

### Lesson 6

#### LO To know the effects of water resistance.

- **water resistance, friction, mechanisms,**

- Know that 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
- Know how to draw a force diagram with arrows representing the different forces acting on an object
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- Know that 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
- **Lesson 7**
- **LO To know some mechanisms allow a smaller force to have a greater effect.**
- **friction, mechanisms, simple machines, levers, pulleys, gears, Force,**

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- Know that a lever is a rigid length pivoting around a fulcrum
- Know that a pulley is a wheel with a fulcrum that supports a moving cable or belt
- Know that 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
- Know that 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

### Concepts

**Biology**

**Chemistry**

**Physics**

### SKILLS

1. Compare

2. Explore

3. Identify

4. describe

5. classify

6. Question

7. observe

8. test

9. record

10. research

### ASSESSMENT

**KNOW MORE, REMEMBER MORE, DO MORE...**

In this unit of learning, progress has been made when a learner knows more. This 'distance travelled' from the starting point is evidenced through them remembering more and doing more: in books, low stakes quizzes, retrieval, use of mind maps, answering the big question and being able to feel more confident about this unit.