Forces

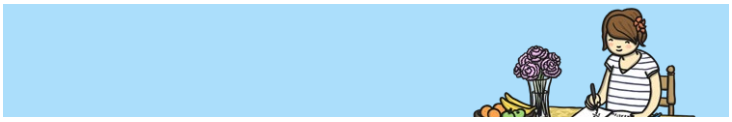
Science | Year 5 | Unit Overview

About the Topic

This 'Forces' unit will teach your class about types of forces such as gravity, friction, water resistance and air resistance. Children will also learn about the use of mechanisms such as levers, gears and pulleys. The children will identify forces and find out about Isaac Newton and his discoveries about gravity, completing a comprehension about his life and his work. The children will look for patterns and links between the mass and weight of objects, using newton meters to measure the force of gravity. They will also work collaboratively to investigate air and water resistance, participating in challenges to design the best parachute and boat. They will have the opportunity to work in a hands-on way to explore friction, developing their own brake pad for a tricycle or scooter. During some of the practical science work, the children will discuss how variables other than the one being tested can be kept the same to help make a test fair. Finally, they will find out about different mechanisms, including levers, gears and pulleys, and will design their own marvellous machine.

Health & Safety (including food allergies)

Ensure that children do not stand on an unstable surface when dropping their parachutes in Lesson 3. Also take care that they do not drop them from too high a height. You may wish to have an adult drop all of the parachutes. In Lesson 4, ensure that only a small battery powered fan is used to move the boats, not an electrical fan. When children test their own brake pads in Lesson 5, remind them not to touch the tricycle or scooter's spinning wheel with their fingers. Ensure that the wheel they use does not have pedals. When carrying out investigations ensure children are aware of how to use the equipment safely.



Home Learning

Forces Crossword: In this activity, children have the opportunity to use their knowledge of forces to solve a fun crossword puzzle.

Paper Helicopter Investigation: In this activity, children are challenged to use their understanding of air resistance and gravity to create a paper helicopter that will fall as slowly as possible.

Assessment Statements

By the end of this unit...

...all children should be able to:

- identify forces as pushes and pulls;
- explain gravity as a force that pulls objects down;
- identify Isaac Newton's discoveries;
- explain the effects of friction, including air and water resistance, on moving objects;
- identify different mechanisms;
- recognise that there are different variables in an investigation;
- predict what will happen in an investigation;
- make observations.

...most children will be able to:

- identify and explain the different forces acting on objects;
- explain Newton's role in discovering gravity;
- accurately measure an object's weight and mass;
- explain how to increase the effects of air resistance;
- explain Galileo's 'Tower of Pisa' experiment into gravity and air resistance;
- identify streamlined shapes;
- explain how friction is used in brake pads;
- investigate the effects of friction;
- explain how different mechanisms work;
- design their own mechanism to achieve a given purpose;
- identify the variables in an investigation;
- make observations and conclusions;
- be able to answer questions based on their learning.

...some children will be able to:

- identify and explain balanced and unbalanced forces;
- explain the difference between weight and mass;
- explain the link between the weight and mass of an object;
- make generalisations about how to increase the effects of air resistance;
- explain the conclusions and implications of Galileo's 'Tower of Pisa' experiment;
- explain how to minimise the effects of water resistance;
- make generalisations about the properties of materials that create the most friction;
- explain how a mechanism they have designed alters force and motion to achieve a purpose;
- identify dependent, independent and controlled variables;
- set up reliable and accurate investigations;
- make and explain predictions;
- make and record accurate observations;
- use scientific language to explain their findings;
- use their results to make generalisations and further predictions;
- be able to ask and answer questions based on their learning using scientific language.

To look at all the resources in the Forces unit _____

Lesson Breakdown

1. Fabulous Forces

To explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object by identifying forces acting on objects.

To identify the effects of air resistance, water resistance and friction by identifying forces acting on objects.

- To identify forces acting on objects.

2. Gravity

To explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object by measuring the force of gravity pulling on objects.

- To explore the effect gravity has on objects and how gravity was discovered.

3. Air Resistance

To identify the effects of air resistance by investigating the best parachute to slow a person down.

- To investigate the effects of air resistance.

4. Water Resistance

To identify the effects of water resistance by creating and racing streamlined boats.

- To explore the effects of water resistance.

5. Friction

To identify the effects of friction by investigating brakes.

- To investigate the effects of friction.

6. Marvellous Mechanisms

To recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect by exploring and designing a simple mechanism.

- To explore and design mechanisms.

Resources

- Highlighters or crayons

- Newton meters
- Weighing scales
- Objects to be measured
- Clear bags with handles

- Plastic sheets, such as bin bags or plastic bags
- Paper
- Card
- String
- Sticky tape
- Objects to attach to the parachutes e.g. paper clips, toy figures or modelling clay
- Measuring sticks
- Stopwatch

- Modelling clay
- Three identical measuring cylinders per group
- Water
- Junk modelling materials
- Large water tray
- Battery powered handheld fan
- Stopwatch

- Tricycles or scooters - one per group, if possible. The lesson does not require these to be ridden.
- Thick card cut into playing card sized pieces
- Five different materials to test (e.g. carpet, vinyl flooring, tin foil, towels, bubble wrap, plastic)
- Stopwatch

To look at all the resources in the Forces unit