

Calcot Schools Knowledge Organiser- Science

Topic: Forces

Phase: Key Stage 2 Year 5

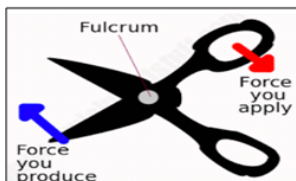
Strand: Physics

Prior knowledge from previous year groups:

Things move differently on different surfaces.
Magnets have two poles and they attract and repel materials.
Forces are pushes and pulls.
Most forces need contact between objects, but magnets can act at a distance.
Magnets are made of materials that create a magnetic field (the area in space where the force of magnets can be detected).
Forces are shown by arrows in diagrams. The bigger the arrow, the bigger the force.
When forces are unbalanced, objects can speed up, slow down, or change direction.

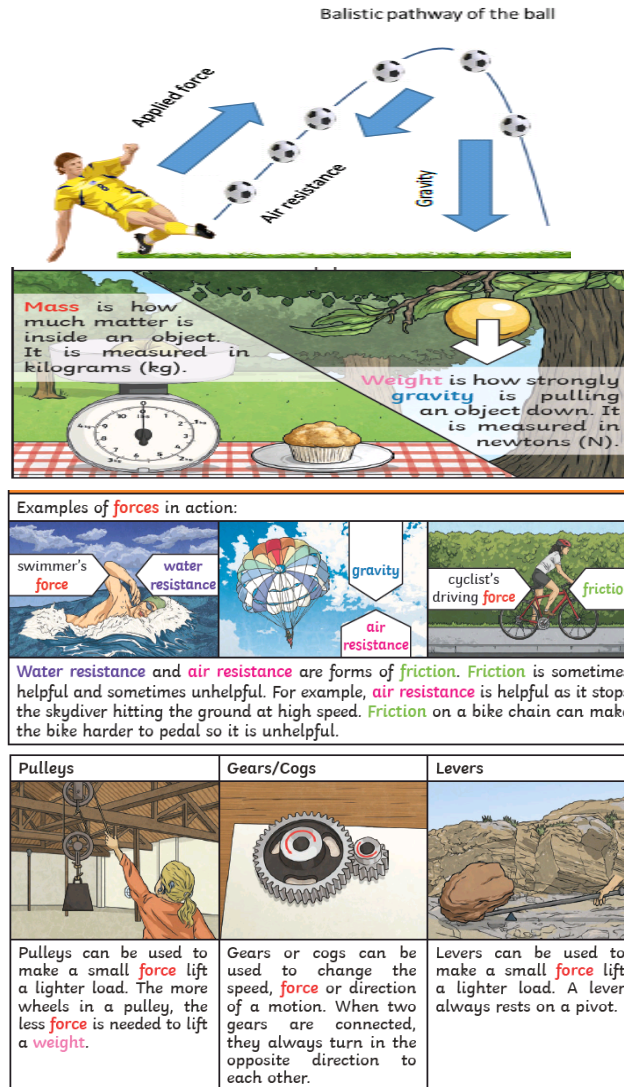
What will the children know by the end of the unit?

What is force ?	Forces are pushes and pulls which make things move and stop moving. When forces are unbalanced , objects can speed up, slow down, change shape or change direction. There are a number of different forces that affect us in our daily lives: Applied force: The force placed on an object by a living creature.
What is gravity and who discovered the theory ?	Gravity attracts all matter towards each other. The bigger an object's mass, the more gravity it will have. The smaller the mass of an object, the less gravity it will be subject to. The force of gravity acting between the Earth and an unsupported object with a smaller mass causes the object to fall to the Earth. (towards the Earth's centre/ core) The moon's gravity causes our ocean tides on Earth. The Sun's gravity keeps Earth in orbit around the Sun. We don't actually "feel" gravity. We only feel the effects of trying to overcome it by jumping or when we fall. Sir Isaac Newton discovered gravity around 300 years ago. The tale is that he saw an apple fall from a tree, and wondered what force made it fall to the ground.
What is the effect of friction on movement?	Friction is a force that acts when an object moves over another.
What are the effects of air resistance ?	Air resistance is a type of friction force that pulls against an object travelling through the air. Some objects are more 'streamlined', meaning that the air pulls on them less, and they travel faster.
What are the effects of water resistance ?	Water resistance is the friction force on objects floating or moving in water. Some objects are more 'streamlined', meaning that the water pulls on them less, and they travel faster.
How is movement affected by levers, pulleys and gears?	Some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect.



Levers give us extra pushing or pulling force and help us lift greater weights.
Gears are different sized cogs which work together to give a machine extra force.
Pulleys are wheels and ropes that work together to lift heavy objects.

Diagrams



Opportunities for cross-curricular links.

Literacy	Making a Prediction – what will be the outcome of an experiment Forming a Hypothesis - Forming an opinion and justifying own views (APE response) Non-chronological report on a scientist
Maths	Creating tables for results.
D&T	Design and possibly make products that use levers, pulleys, gears and/or springs and explore their effects.
History	Research how scientists, for example, Galileo Galilei and Isaac Newton helped to develop the theory of gravitation. Also a link to work in previous unit on Space

Vocabulary

air resistance:	This force is also known as drag. It is the force that acts on objects as they fall through the air.
area:	The size of a surface.
balanced force:	This happens when two forces are of the same size but are acting in opposite directions.
compression:	The squashing of particles. Gases can be easily compressed because there are spaces between the particles.
drag:	A type of force which acts on an object that is moving through air or water.
equilibrium:	Balanced.
extension:	This is the increase in length when something like a spring or elastic band stretches.
force:	A push, pull or twist. Measured in newtons (N).
friction:	This occurs when two objects move past each other. Friction slows objects down.
gravity:	The force of gravity prevents everything from floating away from earth.
Hooke's law:	A law that states that if you double the force of an object, the extension will also double.
lubrication:	Oil is a good lubricator - it reduces the effect of friction.
magnetic field:	The area around a magnet.
mass:	The amount of stuff (matter) something is made of. Measured in kg.
moment:	This is a turning force.
newton:	Unit of force, symbol N.
newton metre:	An instrument used to measure the force acting on an object.
parachute:	Used when jumping out of an aeroplane to slow the fall down. The forces acting on a parachute are often used in exam questions.
Pascals:	The unit of pressure (Pa).
pressure:	How much force in a certain area. Equation: pressure = force ÷ area.
streamlined:	Shaped to travel through air or water with as little resistance as possible.
unbalanced:	When two forces are acting on an object and one of the forces is greater than the other.
water resistance:	Acts on an object as it moves through water.
weight: resistance:	This is a force acting on an object's mass. Weight is measured in newtons (N).

Investigate!

- Discuss what we know about forces and **what a force is**.
- Identify the force acting on an object and label **diagrams** with the appropriate names of forces.
- Discover the difference between **weight and mass**. Use Newton metres to measure the mass of objects and compare this to their weight.
- Investigate the **theory** gravity and **Sir Isaac Newton** - answer comprehension questions.
- Use an experiment about **friction** to make a hypothesis and predictions about **surfaces, friction** and **distance travelled**.
- Conduct an investigation to **compare materials** used to make a parachute. Observe how **air resistance** can have an **effect on parachute design and effectiveness**.
- Design, make** and **test** a boat to assess the **effect of water resistance** on movement.
- Research and explore simple mechanisms in order to design a machine using pulleys, gears and levers.

Machines and Mechanisms

Scissors Wheelbarrows Fishing rods Shovels Boat Oars Well Exercise Equipment Elevators Window Blinds Brooms

Working scientifically, scientific skills and enquiry

Pupils might work scientifically by: carrying out tests to answer questions, for example, 'Which materials would be the most effective for making a warm jacket, for wrapping ice cream to stop it melting, or for making blackout curtains?' They might compare materials in order to make a switch in a circuit. They could observe and compare the changes that take place, for example, when burning different materials or baking bread or cakes. They might research and discuss how chemical changes have an impact on our lives, for example, cooking, and discuss the creative use of new materials such as polymers, super-sticky and super-thin materials.

Pupils should build a more systematic understanding of materials by exploring and comparing the properties of a broad range of materials, including relating these to what they learnt about magnetism in year 3 and about electricity in year 4. They should explore reversible changes, including, evaporating, filtering, sieving, melting and dissolving, recognising that melting and dissolving are different processes. Pupils should explore changes that are difficult to reverse, for example, burning, rusting and other reactions, for example, vinegar with bicarbonate of soda. They should find out about how chemists create new materials, for example, Spencer Silver, who invented the glue for sticky notes or Ruth Benerito, who invented wrinkle-free cotton.