

Year: 5

Term: Spring

FORCES

Prior Knowledge

Compare how things move on different surfaces. (Y3 - Forces and magnets)
 Notice that some forces need contact between two objects, but magnetic forces can act at a distance. (Y3 - Forces and magnets)
 Observe how magnets attract or repel each other and attract some materials and not others. (Y3 - Forces and magnets)
 Compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials. (Y3 - Forces and magnets)
 Describe magnets as having two poles. (Y3 - Forces and magnets)
 Predict whether two magnets will attract or repel each other, depending on which poles are facing. (Y3 - Forces and magnets)

Key Knowledge

What is a force? A force is either a push or a pull

Forces can make things:

- Speed up
- Slow down
- Change shape
- Change direction

A force is something that speeds something up.

Example: when a child is pushing a car to speed it up.

A force that changes the direction of something

Example: when a ball is hit with the racket, it will change direction.

Types of force

Magnetism

Magnets attract or repel each other or other objects

North and South attract. But North and North or South and South will repel.



Air Resistance

- Air Resistance slows down moving objects, because air slows you down as you move through it
- To travel faster through the air, things need to be streamlined.

Water Resistance

- Water resistance slows down moving objects, because water slows you down as you move through it
- To travel faster through the water, things need to be streamlined

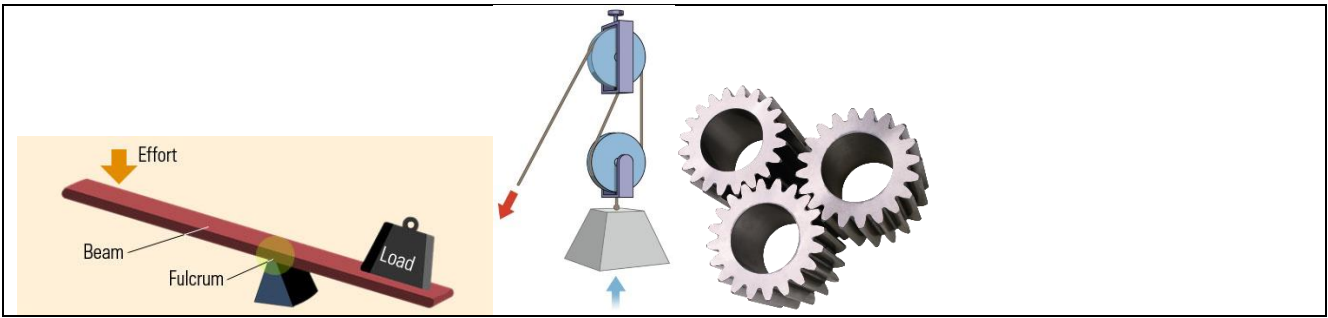
Friction

- Friction happens when two surfaces touch each other.
- Friction gives us grip.
- Friction produces heat.
- Rougher surfaces slow things down a lot.
- Smoother surfaces don't slow things down as much.

Gravity

- Gravity is the forces that **pulls** objects **down** towards the centre of the Earth.
- Gravity stops things from floating away into space.
- When things go into the air (like a football) gravity pulls them back down.

Recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect:



Key Vocabulary

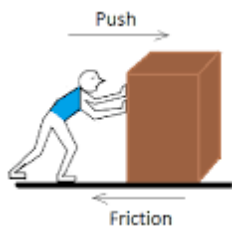
Prior vocabulary – Movement, surfaces, force, contact, objects, magnetic forces, attract, strength, properties, predict, compare, contrast, opposite, non-magnetic, poles, repel, energy, metal, material, friction, rough, smooth, north, south, sliding friction, static friction, resist, air resistance, water resistance

Working scientifically vocabulary – prediction, measurement, enquiry, dependent variable, independent variable, fair test, similar, theory, hypothesis, line graph, relationship, outlier

Gravity	The force that pulls something towards the centre of the earth.
Grip	To have a good connection with a surface
Streamlined	A shape that presents less resistance.
Mechanism	The working or moving part of a machine that causes a result.
Pulley	A simple machine that makes lifting something easier.
Gears	A part of a machine that causes another part to move because of teeth which connect the two moving parts
Lever	A handle used to control or set the position of a part in the machine
Acceleration	The process of moving more quickly or increasing speed.
Upthrust	A movement in an upward direction

Diagrams and Symbols

Diagrams of forces in action



Gravity pulls us towards the centre of the Earth.

<p>Key skills</p> <ul style="list-style-type: none"> • 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.
<p>Future Learning</p> <p>Forces as pushes or pulls, arising from the interaction between two objects. (KS3)</p> <p>Using force arrows in diagrams, adding forces in one dimension, balanced and unbalanced forces. (KS3)</p> <p>Moment as the turning effect of a force. (KS3)</p> <p>Forces: associated with deforming objects; stretching and squashing – springs; with rubbing and friction between surfaces, with pushing things out of the way; resistance to motion of air and water. (KS3)</p> <p>Forces measured in Newtons, measurements of stretch or compression as force is changed. (KS3)</p>
<p style="text-align: center;"><u>Key Outcomes</u></p> <p>1. Who were Sir Isaac Newton and Galileo Galilei and what did they do for science? <i>Children will research Galilei and Newton, present their findings on their discoveries, and work on the theory of gravitation.</i></p> <p>2. How does the surface area of a parachute affect its speed? <i>Children will explore gravity and air resistance through planning and conducting a fair scientific enquiry, controlling variables, into air resistance e.g. the impact the size of a parachute has on the speed at which it falls. e.g. plot a scatter graph of speed/size of parachute)</i></p> <p>3. Can I investigate the effects of water resistance and friction? <i>Children will investigate the effects of water resistance in a range of contexts e.g. dropping shapes through water and pulling shapes, such as boats, along the surface of water and explain the results of their investigations in terms of the force. They will show a good understanding that as the object tries to move through the water, the particles in the water slow it down.</i></p> <p>4. Can I investigate friction? <i>Children will investigate the effect of friction in a range of contexts e.g. trainers, bathmats, mats for a helter-skelter and then investigate friction ramps with different surface materials measuring the height of the movement of the toy sliding down it. Children will produce graphs to show their results.</i></p> <p>5. How can I move an object more easily? <i>Children will explore the effects of levers, pulleys and simple machines on movement e.g. make a series of gears to connect together to make a transmission or a pulley system. They will demonstrate clearly the effects of using levers, pulleys and gears (DT links).</i></p> <p>6. Can I use my knowledge to support or refute ideas about forces? <i>Children will use their knowledge from their investigations to explain how they support or refute the theories posed by Galilei and Sir Isaac Newton and statements provided about other real life scenarios involving friction, air and water resistance.</i></p>
<p><u>Deepening and broadening the knowledge and understanding for GDS learners:</u></p> <ul style="list-style-type: none"> • knows that most forces usually occur in pairs • knows that all objects 'pull' other things to themselves but heavier objects have a bigger 'pull' • knows that falling objects increase their speed as they fall because their weight (the force of gravity) pulls them to Earth • explains that gravity acts upon mass and gives objects weight • knows that all objects free fall at the same rate of acceleration regardless of their mass • explains why supported objects do not fall to the ground and refers to balanced forces • compares and contrasts gravity on different planets • knows that whilst there is no air in space there is gravity (keeping the planets in orbit) • talks about objects as having a 'centre of gravity' and can demonstrate this by balancing, e.g. a ruler on their finger

- knows that when friction occurs, energy is lost to the surroundings as heat
- knows that friction can generate static electricity
- talks about friction in everyday life and says whether the friction is helpful or unhelpful
- knows that levers, pulleys and gears are simple machines
- gives more everyday examples of gears, pulleys and levers and explains their purpose