| Colney Heath School - Science | | |
|---|---|---|
| **Topic: Forces** | **Year: 5** | **Physics** |

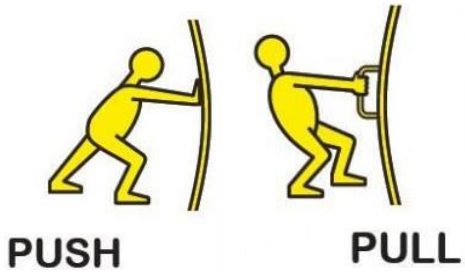
## What should I already know?

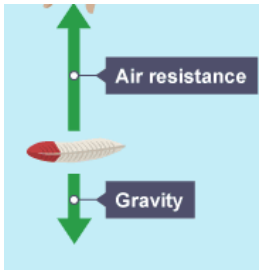
- Forces are pushes and pulls which make things move and stop moving.
- Most forces need contact between objects, but magnets can act at a distance.
- Magnets are made of materials that create a magnetic field (the area in space where the force of magnets can be detected).
- Forces are shown by arrows in diagrams. The bigger the arrow, the bigger the force.
- When forces are unbalanced, objects can speed up, slow down, or change direction.

## Vocabulary

| | |
|---|---|
| Gravity | The force that attracts a body towards the centre of the Earth. |
| Mass | The weight measured by an objects acceleration under a given force or by the force exerted on it by gravity. |
| Acceleration | Is the change in speed or velocity of an object over a certain time. |
| Gears | A toothed wheel that works with others to alter the relation between the speed of a driving mechanism (e.g. engine) and the speed of the driven parts (e.g. the wheels). |
| Levers | A rigid bar resting on a pivot that is used to move a heavy or firmly fixed load. |
| Pulleys | A wheel with a grooved rim around that changes the direction of a force applied to the cord. |

## Diagrams




**Balanced Force**


**Unbalanced Force**


## Vocabulary

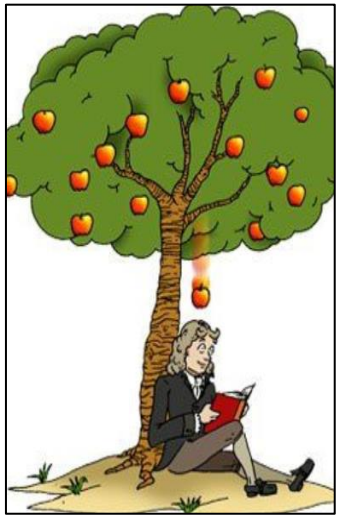
| | |
|---|---|
| Force | A push or pull upon an object resulting from its interaction with another object. |
| Friction | The resistance that one surface or object encounters when moving over another. |
| Pull force | To draw or haul towards oneself or itself, in a particular direction. |
| Push force | To move something in a specific way by exerting force. |
| Air resistance | A force that is caused by air with the force acting in the opposite direction to an object moving through the air. |
| Water resistance | A force that is caused by water with the force acting in the opposite direction to an object moving through the water. |
| Matter | |
| | |

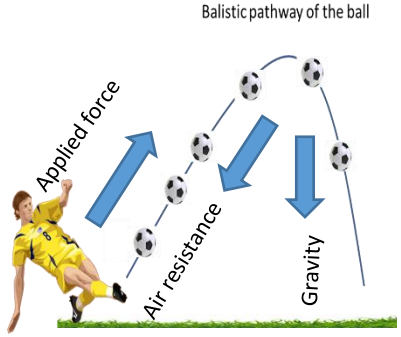
## The Big Picture

### Gravity

Gravity attracts all matter towards each other.

- It has been around since the beginning of the Universe, and applies to all matter in the Universe.
- 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.
- Without gravity we would fly right off the planet! 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.






### Definitions of Forces

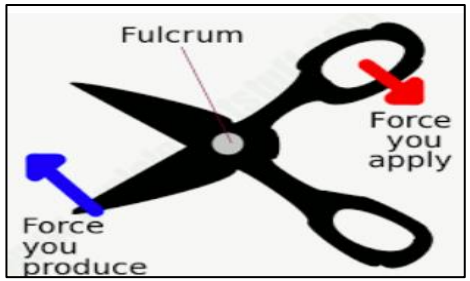
There are a number of different forces that affect us in our daily lives:

- Applied force: The force placed on an object by a living creature.
- Friction: the 'sticking' force that occurs when an object moves over another.
- 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.
- Water resistance is the friction force on objects floating or moving in water.
- Surface resistance is the friction force of objects moving across a surface.

### Machines and Mechanisms

- Simple machines and mechanisms include pulleys, gears and levers. They can be used to turn a small force into larger forces. This means that we can use these machines to accomplish things more easily.

- 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 life heavy objects.




## By the end of our project we will 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. Pull forces can be measured using a device called a force meter. The amount of matter (stuff) in an object is its mass. Gravity is a force that acts between all objects in the universe, but it acts much more strongly between objects that have more mass and that are close together. Unsupported objects are pulled towards the Earth by the force of gravity. Know that acceleration is a change in speed and that unbalanced forces acting on an object cause it to accelerate. 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. 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. A parachute's shape increases the air resistance that a falling object experiences, giving it a much lower terminal velocity. 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. 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. Draw a force diagram with arrows representing the different forces acting on an object. A lever is a rigid length pivoting around a fulcrum. A pulley is a wheel with a fulcrum that supports a moving cable or belt. 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. Gears, levers and pulleys are simple machines used to allow a smaller force to have a greater effect.

Physics

P1: The universe follows unbreakable rules that are all about forces, matter and energy.

P2: Forces are different kinds of pushes and pulls that act on all the matter that is in the universe. Matter is all the stuff, or mass, in the universe.

P3: Energy, which cannot be created or destroyed, comes in many different forms and tends to move away from objects that have lots of it.