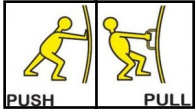


Knowledge Organiser - Year 5 - Science: Forces



Force - A push or pull upon an object resulting from its interaction with another object. It has magnitude and direction.

Key Vocabulary

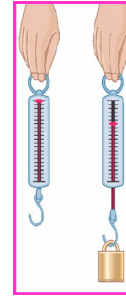
Air resistance	A force that is caused by air, with the force acting in the opposite direction to an object moving through the air.
Friction	The resistance that one surface or object encounters when moving over another. Otherwise known as grip.
Fulcrum	The point against which a lever is placed to get grip, or on which it turns or is supported.
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).
Gravity	The force that attracts a body towards the centre of the Earth.
Lever	A rigid bar resting on a pivot that is used to move a heavy or firmly fixed load.
Mass	Is the amount of matter in an object. Mass is usually measured in grams (g) or kilograms (kg). ... An object's mass is constant in all circumstances;
Newtonmeter	A device for measuring force in Newtons—a common design for a Newton meter is a cylinder containing a spring inside. You can attach objects to the spring by a hook.
Pivot	The central point, pin, or shaft on which a mechanism turns or oscillates.
Pull force	To draw or haul towards oneself or itself, in a particular direction.
Pulleys	A wheel with a grooved rim around that changes the direction of a force applied to the cord and is used to raise heavy weights.
Push force	To move something away from you in a specific way by exerting force.
Streamlined	Aerodynamic—very little resistance to a flow of air or water, increasing speed and ease of movement.
Water resistance	A force that is caused by water with the force acting in the opposite direction to an object moving through the water. Also called drag.
Weight	The weight of an object is the amount of force acting on the object due to gravity.

Working Scientifically

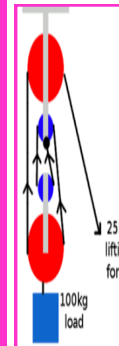
Explore ideas and raise different kinds of questions; select and plan the most appropriate type of scientific enquiry to use to answer scientific questions; recognise when and how to set up comparative and fair tests and explain which variables need to be controlled and why. They should make their own decisions about what observations to make, what measurements to use and how long to make them for, and whether to repeat them; choose the most appropriate equipment to make measurements and explain how to use it accurately. They should decide how to record data from a choice of familiar approaches; look for different causal relationships in their data and identify evidence that refutes or supports their ideas. They should use their results to identify when further tests and observations might be needed; They should use relevant scientific language and illustrations to discuss, communicate and justify their scientific ideas and should talk about how scientific ideas have developed over time.

Key Question: What forces are acting on us?

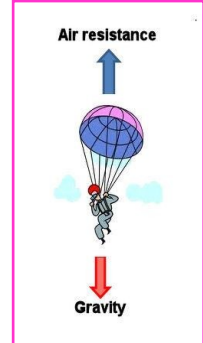
A forcemeter measures force in Newtons. A mass of 100 grams will exert a force (weight) of 1 Newton (1N). Newtonmeters have an internal spring and these vary in strength so you need to think about the suitability of your meter to the task.



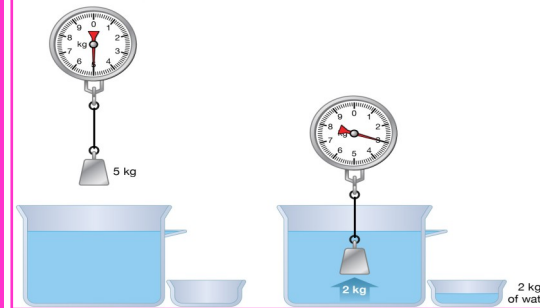
Isaac Newton (1642-1727) became famous for his work on gravity and his three laws of motion. He was also well known for his work on light and colour, and what is now called calculus (a branch of mathematics). The famous story of an apple falling to the ground from a tree illustrates how Newton's work on gravity was inspired by things he observed in the world around him.



If you want to lift a really heavy weight, there's only so much force your muscles can supply, even if you are the world's strongest man! But use a simple pulley (wheels and rope) and you can effectively multiply the force your body produces. Levers are also really useful and before we had machines, this is what we had to rely on. Think about Stone Henge and The Pyramids - They were huge stones!



Archimedes' principle



Archimedes was a Greek mathematician, physicist, engineer, inventor, and astronomer. He discovered that when something is put in water, the water exerts a force pushing the object back up, reducing its weight (the force of gravity working on it). This force is called upthrust.

In the picture to the right you have a tug of war! Both teams are using a pulling force. In the top picture the forces are equal and therefore no one is moving, but when the team on the left exert a greater force, the team on the right are pulled towards them. Forces must be balanced for objects to be still, when they are unbalanced, there is movement.

Air resistance is a force that happens when an object is moving through air. There is always an opposite force, in the direction of the movement. It's not enough to stop the object, but the air resistance will slow down the speed of the movement. In this case a parachute is slowing down the vertical fall of a skydiver so air resistance is working upwards.

A car driving on a rough surface has a force working against the wheels. This is friction (grip) and stops the car from skidding. Imagine driving on ice or snow! You need to increase friction to do this using snow chains.

