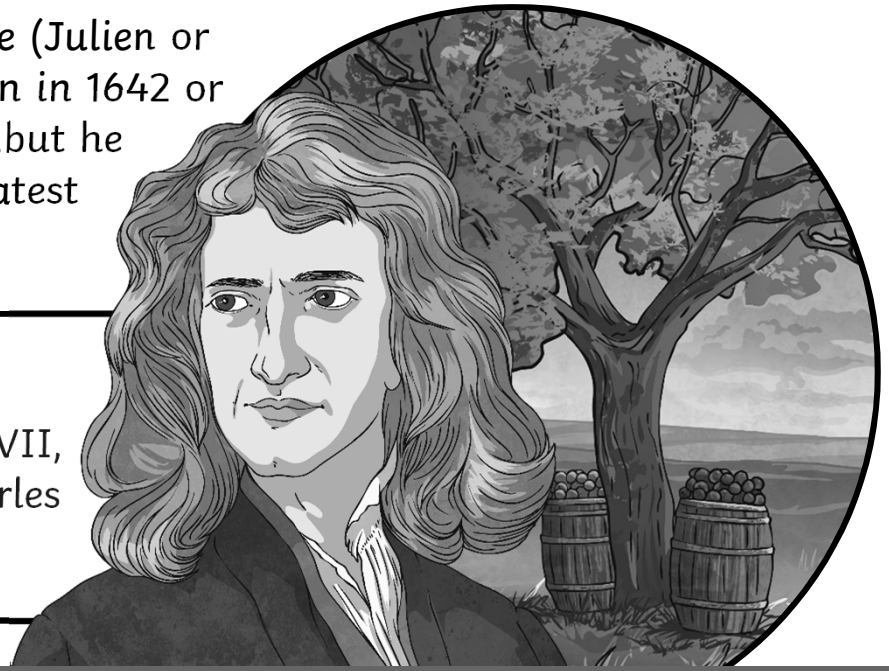
Sir Isaac Newton

The man behind it all...

Depending on which calendar you use (Julien or Gregorian) Sir Isaac Newton was born in 1642 or 1643 and wasn't expected to survive...but he did and went on to be one of our greatest scientists.

He died in 1727 and was buried in Westminster Abbey alongside Henry VII, Elizabeth I, Charles Dickens and Charles Darwin.



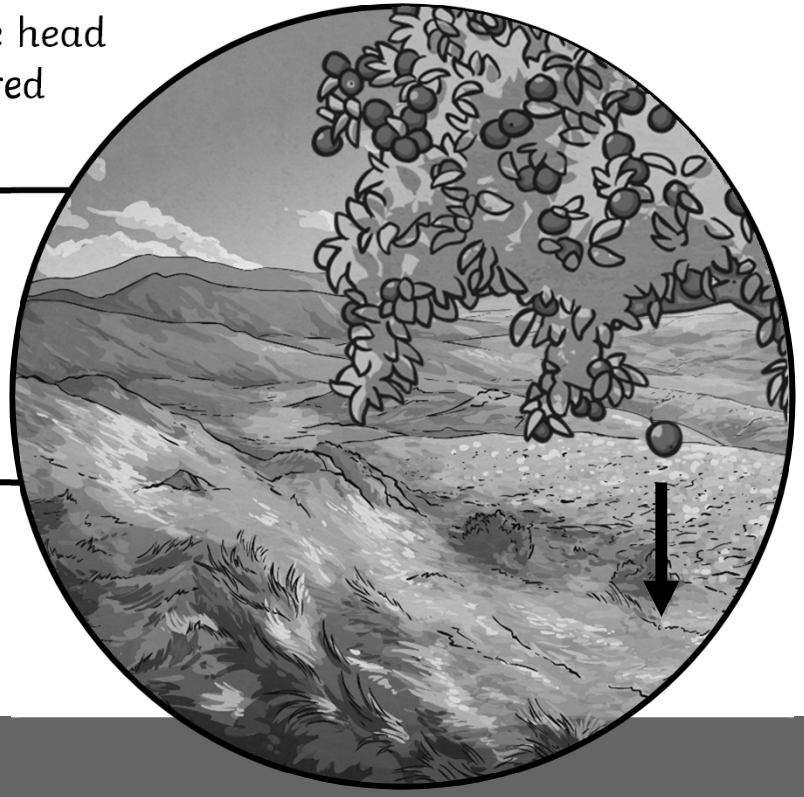
Did you know?
The Royal Society is the oldest scientific institution in the world and many key discoveries have been made there.

The Apple from the Tree

The eureka moment....

Legend has it, that Newton was hit on the head with an apple and that is how he discovered gravity. This isn't quite true...

He did see an apple fall from a tree, but rather than hitting him on the head, it got him thinking and that's how he worked out that gravity must exist.



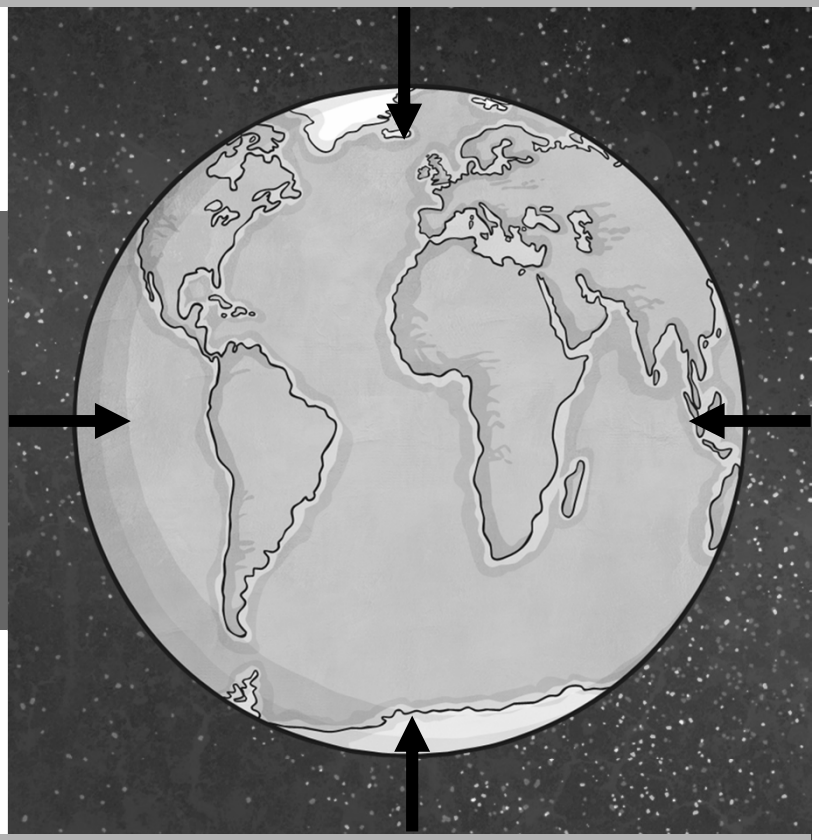
Did you know?
This is why the weight of 1 Newton is approximately the same as one apple.

Gravity is a Force

Gravity is an invisible force that pulls everything towards the centre of Earth.

It feels like it is pulling 'down' but that's because wherever you are on Earth, it is pulling you 'down' towards Earth. Your feet are still on the ground in Australia and, because of gravity, 'down' feels the same wherever you are on Earth.

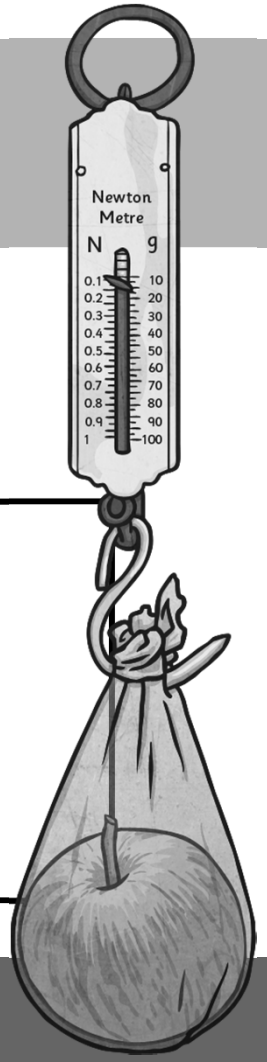
Gravity is measured in metres per second squared (m/s^2).



What is Earth's gravity?

Earth's gravity is $9.8 m/s^2$.

Weight and Mass



Mass is a measure of how much matter or 'stuff' is in an object. Small objects may contain a lot of matter, like a metal ball. Larger objects may contain very little matter, like a polystyrene block.

Weight is the mass of an object, affected by how strong the gravity is.

So, weight is also a force. Weight is the force of a mass pushing down (by gravity) on the surface on which it is standing.

Weight is measured in Newtons.

Did you know?
When you measure weight in kilograms you are actually measuring in kilogram-force, meaning the mass (kg) multiplied by the force of gravity ($9.8 m/s^2$).

Everything Has Gravity

Every object has gravity...an invisible force that pulls things towards its centre.

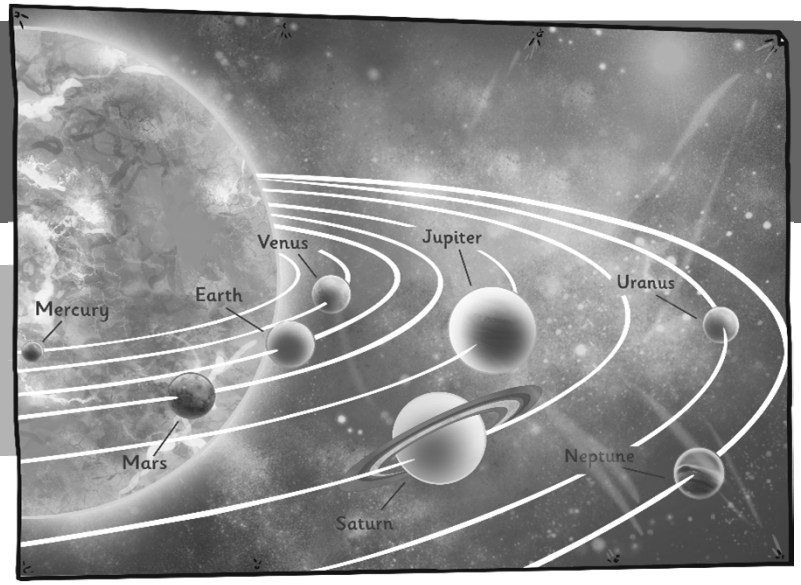
The bigger the object, the bigger the gravity.

The Sun is huge, so its gravity keeps the planets in our Solar System orbiting it.

Earth's Moon has its own gravity but it is smaller than Earth so Earth's gravity keeps the Moon in orbit around Earth.

What is the Sun's gravity?

The Sun's gravity is 274 m/s^2

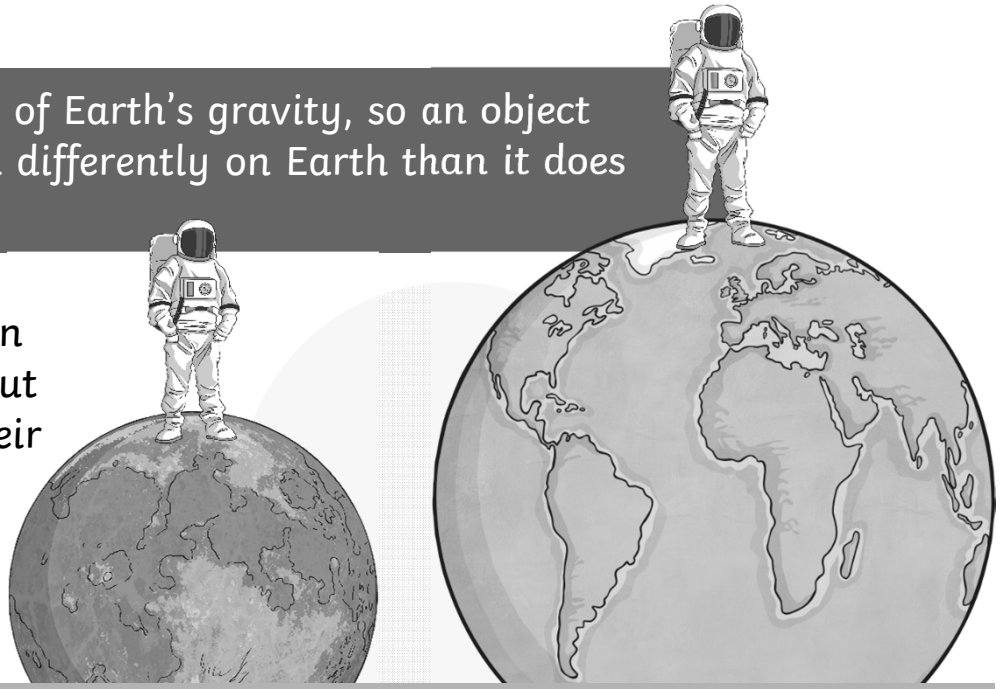


Earth and Moon

We know that Earth's gravity is stronger than the Moon's gravity because Earth is bigger than the Moon.

The Moon's gravity is one sixth of Earth's gravity, so an object with the same mass will weigh differently on Earth than it does on the Moon.

This astronaut weights 120kg on Earth. Even though the astronaut doesn't change size or mass, their weight on the Moon would be just 20kg.



What is the Moon's gravity?

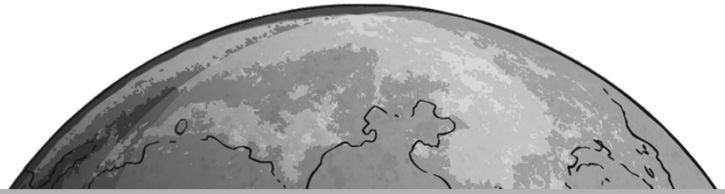
The Moon's gravity is $1.6 m/s^2$

Gravity and Jumping

When we jump we forget that it's gravity making us fall back down to the ground.

On Earth, we are used to knowing what a jump feels like, but on the Moon the pull of gravity is much weaker so we fall back down to the ground much slower leading to the floating effect astronauts experience on the Moon.

On a planet with twice as much gravity as Earth you would find it hard to jump at all...not only that, your legs would have to be stronger just to hold you up!



What about Jupiter's gravity?

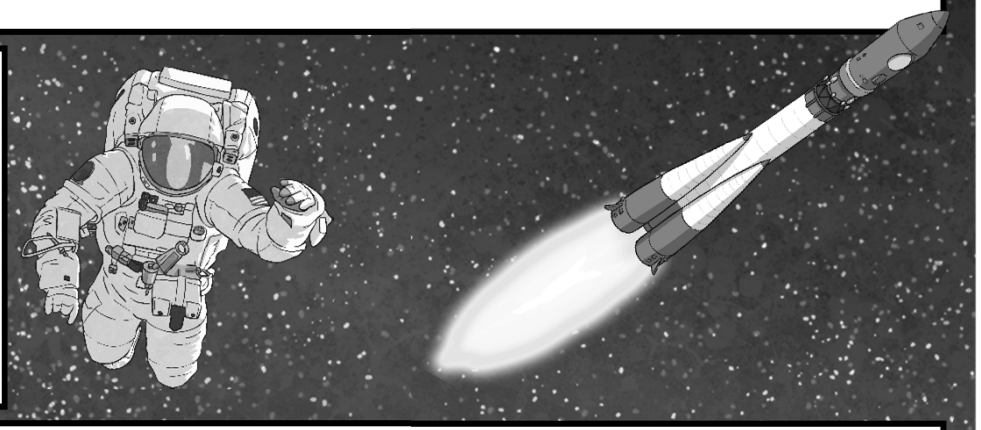
Jupiter's gravity is 24.8m/s^2!

What Is Zero Gravity?

Actually, there is no such thing...

Even when astronauts are in space they are still being affected by gravity from the Sun and planets. There's a tiny bit of gravity everywhere in space.

Zero gravity is not quite the correct explanation for this...it is actually microgravity – meaning that there is a tiny bit, but not none at all.



When things, including astronauts, are far enough away from a planet they are only affected a tiny little bit by gravity from that planet. This means that they float around and are not dragged back to the surface of the planet as the gravity isn't strong enough from that distance.

What Is Zero Gravity?

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Why do astronauts float in orbit inside the space station?

Astronauts are actually experiencing 'weightlessness' which is due to the speed they are travelling. It's more like being in freefall. You know that moment when you reach the top of a fair ground ride or the top of a trampoline bounce before you start coming down? Well, that's a moment of weightlessness.

What Have We Learnt?

What can you remember? Chat with a friend ...

What were the main points?

Sir Isaac Newton discovered gravity.

There's no such thing as zero gravity, just microgravity.

Every object has gravity and it is a force pulling things towards its centre.

Moon's gravity is only $\frac{1}{6}$ of Earth's gravity.

Mass is measured in kg, gravity is measured in m/s^2 and weight is measured in Newtons.