

Gravity

Gravity is a force, which we don't think a lot about. It is gravity that holds things to the Earth's surface and prevents things from floating off into the atmosphere.

Isaac Newton was one of the first scientists to write about this force. There is a story that Isaac Newton was sitting under an apple tree in his garden when an apple fell downwards onto his head. "Why didn't it float up into the sky?" he thought. Isaac Newton realised that there is a strong force, which pulls things towards the Earth that is called gravity, We measure the force of gravity in units called newtons, named after Isaac Newton.

When you jump up into the air, your energy pushes your body off the ground but the force of gravity pulls you back down again. An aeroplane needs powerful engines to launch it into the air, and then the shape of the wings keeps it up.

There is gravity on the moon but it is much weaker than Earth's gravity. When the American astronauts landed on the moon in 1969, they could leap and jump higher and more easily than on the Earth because the pull of gravity was less strong. The effect of Earth's gravity gets weaker further out into space. Astronauts feel this change as their spacecraft leaves the Earth's atmosphere. Slowly and gradually, the pull of the Earth's gravity becomes less strong and, as the spacecraft gets nearer to the moon's gravity starts to be felt. However, the strength of the moon's gravitational pull is only about one sixth of the Earth's.

Questions

1. Gravity is a _____ .
2. _____ pulls things to the Earth's surface.
3. _____ was one of the first scientists to find out about this force.
4. An _____ fell downwards onto the scientist's head.
5. The units, we use measure the force of gravity in, are called _____ .
6. Your _____ helps you to jump up into the air, but the force of _____ pulls you back down again.
7. An aeroplane needs _____ _____ to take off.
8. Gravity on the Moon is _____ than gravity on the Earth.

Gravity SEN

Gravity is a force, which we don't think a lot about. It is gravity that holds things to the Earth's surface and prevents things from floating off into space.

Isaac Newton was one of the first people to write about this force. Isaac Newton was sitting under an apple tree in his garden when an apple fell downwards onto his head. "Why didn't it float up into the sky?" he thought. Isaac Newton knew that there is a strong force, which pulls things towards the Earth called gravity, We measure the force of gravity in units called newtons.

When you jump up into the air, your energy pushes your body off the ground but the force of gravity pulls you back down again. An aeroplane needs powerful engines to get it into the air.

Gravity on the moon is much weaker than gravity on Earth. American astronauts landed on the moon in 1969. They could jump higher and more easily than on the Earth because the pull of gravity was less strong. The strength of the moon's gravity is only about one sixth of the Earth's.

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Answers (in the wrong order)

Force	Isaac Newton	Energy	Gravity
Apple	Powerful engines	less	Newtons
Gravity			

Flight

Which do you think will hit the ground first ?	Why ?
A leaf or twig ?	
A feather or chicken a bone ?	
50p coin or a £5 note ?	
A flat or a crumpled piece of paper ?	

Describe how will these things fall ?	Prediction	Right/wrong
horizontal piece of paper		
Vertical piece of paper		
Slanted piece of paper		
horizontal piece of paper with penny in centre		
horizontal piece of paper with penny on middle edge		
horizontal piece of paper with penny in corner		

The Space Capsule Problem (Something to try at home)

Use a yoghurt pot for a capsule – a plastic bag for a parachute – connect with cotton, tape & paper clip

Can you make it land safely ? Put some astronauts in the capsule !

Did you know ?

- The first ever parachutist was a dog ! - a French balloonist (Monsieur Blanchard) dropped it safely to Earth in 1785.
- The first ever animal in space was a dog ! - In 1957 the Russians put Laika into orbit and it survived !
- Gliding is a popular pastime. Men & women have learned to ride on currents of air. These currents are called thermals. They are often found over motorways and towns. Birds use them too ! Glider pilots look out for seagulls soaring and try to join them. Sometimes seagulls do the same with gliders !
- Parachutists free fall at about 50m per second - but a parachute slows them down to about 5m per second.
- The force of gravity pulls down to Earth. Falling objects must push through the air but the air resists - it pushes back ! This is called air resistance. If the falling object is light, or has a large area, the air resistance has a bigger effect. All objects are affected - but some more than others are. Air resistance is sometimes called DRAG !
- Hot-air balloons rise for similar reasons to why balls float in water - the upward force is greater than its weight.
- The first passengers in a hot-air balloon took off over 200years ago in France. The inventors, the Montgolfier brothers, sent a sheep, a duck and a cockerel up first. Human beings followed later, on a 5-mile trip over Paris. The balloons were made of silk and beautifully decorated. At first, the hot-air came from fires on the ground. Later balloons carried a fire in a metal basket. Today's balloons are made from nylon and carry propane gas in cylinders. The gas is lit for short periods of time. It quickly heats the huge amount of air inside the balloon, and gives it LIFT !

Hot-air ballooning is a growing sport. They have little control over the direction they take, and go mainly where the wind carries them. The pilot can only control how high they can go.

Starting and Stopping

1. What makes a jet plane move forward ? **jet engine**
2. What makes a plane stop on an aircraft carrier ? **bands**
3. What makes a skateboard start ? **a push from your leg**
4. What makes a skateboard fast or slow ? **friction on the wheels/ air resistance on your body**
5. What makes a skateboard stop ? **your leg**
6. What people go up or down ? **astronauts, deep-sea divers, sky divers.**
7. GRAVITY is the force you feel pulling you down to Earth. Without gravity you would have no **weight.**
8. LIFT is the force you feel pushing up eg **a ball in a bucket of water**
9. What activity would you do to feel both GRAVITY and LIFT eg **a seesaw or a trampoline**

The Falling Problem (Something to try at home)

Test to see if weight affects the speed in which things fall – Blu-tac ? a stone ? a coin ?

- Try sitting on the floor, in the hall, whilst pushing with a brush against a set of bathroom scales lent against the wall. The reading on the scales, at the moment you move is the measurement of THRUST.
- Try it again whilst sitting on a piece of carpet, a newspaper, a rubber mat, cardboard or a skate board !

PE

1. Simon Says : "Fast forward ! Stop ! Slow reverse ! Lift off ! Crash Land !" (Last one out)
2. Which use upthrust and Gravity ? **lift off and crash land**
3. Pupils make up sequences and teams follow suit.

Name that force !

A	What kind of force is used for the following activities	Answer
	1. Moving a supermarket trolley ?	
	2. A tug of war ?	
	3. Steering a bicycle ?	
B	1. How can a force change shape ?	Chest expander
	2. An example of changing something's direction	Tennis ball
	3. An example of force changing speed	brakes
C	1. Why is it easier to roll a log than drag it ?	
	2. An example of water pushing upwards (upthrust)	An apple in water
	3. What materials are affected by a magnetic force ?	Iron

Electrostatic force (Something to try at home)

Rub a plastic pen with a cloth and try to pick up small pieces of paper with the electrostatic force now in the pen !