Space Science

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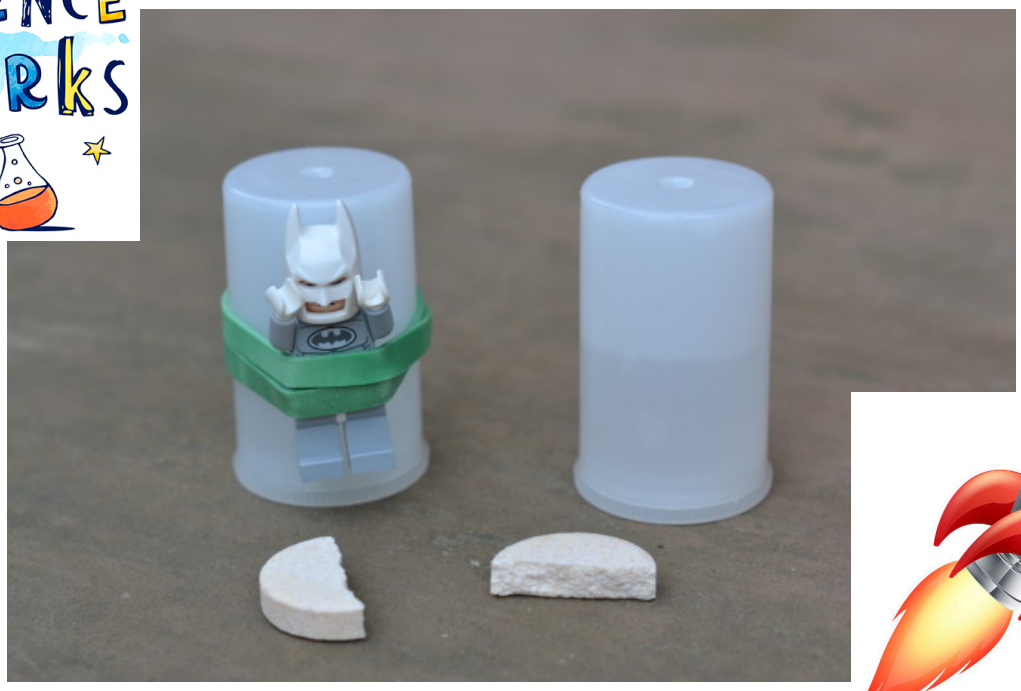
Film Canister Rockets



A film canister rocket is a great example of Newton's Third Law of Motion – the action of the gas being forced out of the lid (at the bottom) exerts a force in the opposite direction on the canister making it fly.

Resources

Film Canister

Effervescent Vitamin Tablet

Water

Method

Fill a film canister about one third full with water.

Add half an effervescent vitamin tablet, place the lid firmly back on the film canister and place on a flat surface lid down.

Stand well back as the canister shoots upwards quickly.

Why does this happen?

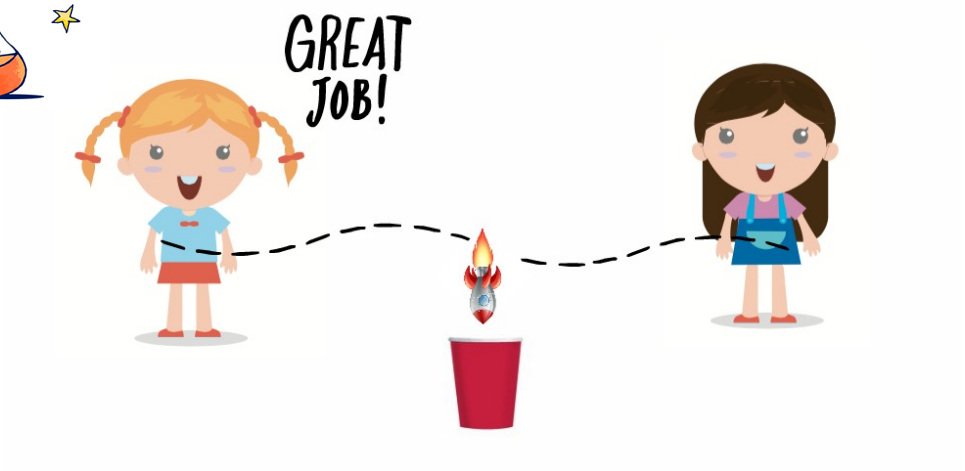
When the vitamin tablet reacts with the water it releases carbon dioxide (a gas). The carbon dioxide builds up inside the canister, increasing the air pressure so much that the gas is forced out at the weakest point – (the lid) in one direction (downwards) while the rest of the canister moves upwards.

Extension Tasks

Try adding more and less water and compare the time taken for the canister to pop.

Investigate what happens if you add weight to the canister.

Lets Dock with the ISS



The Mission

To work in pairs to manoeuvre a rocket into a paper cup, without knocking the cup over.

Resources

String/rope

Small LEGO rocket

Paper Cup

Method

Place the string around the waist of your volunteers and hang a small rocket from the centre.

Place the cup near the volunteers and ask them to work as a team to guide the rocket into the cup without knocking it over.

Why does this happen?

This activity aims to encourage children to think about the effect of their movements on the movement of an object.

Extension Tasks

Volunteers should try moving backwards and forwards, closer together and bending their knees to work out which is the best solution.

Top Tip – if it's too hard, try a shorter string

Orbit Activity

This activity demonstrates the basic orbit

of the ISS in relation to the Earth and Moon.

Resources

Earth, Moon and ISS signs

Three helpers

Method

Each volunteer is given a sign and should try to work out who orbits whom.

Why does this happen?

The Earth should stand in the centre with the ISS orbiting the Earth and the Moon orbiting both.

Extension Tasks

Remember the ISS orbits Earth 16 times a day and the Moon once every 27 days!!

Try adding the Sun, is it harder to work out who needs to orbit whom?

Squeezy Bottle Rockets

Challenge

To build a mini rocket which can be launched using a water bottle.

Resources

Squeezy water bottle with a sports cap

Two straws – one should fit inside the other.

Scissors

Sellotape

Blu Tack / Plasticine

Cardboard rocket

Method

Place a small segment of the smaller straw into the centre of the sports cap and seal around it with blu-tack/plasticine.

Seal one end of a segment of the larger straw and sellotape it to a cardboard rocket.

Place the rocket straw onto the bottle and squeeze hard.

Why does this happen?

The air in the bottle is forced out of the straw in the cap (if your seal is good enough) which pushes the straw rocket into the air.

Extension Tasks

Try using a straw instead of a bottle and blowing the rocket.

Try adding extra weight to your rocket, what effect does the weight have on how far the rocket travels?

Model of the Soyuz

Challenge

To build a model of the Soyuz rocket using junk.

Resources

Aluminium foil

Polystyrene ball

Scissors

Sellotape

Cardboard

Pens

Method

The Soyuz is made off three distinct parts

A spheroid orbital module which provides accommodation for the crew during their mission.

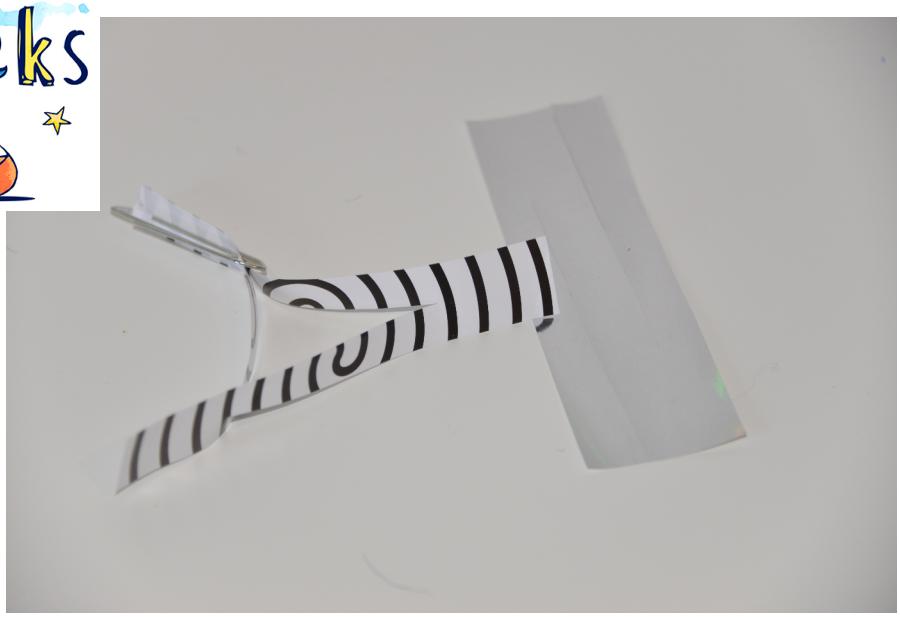
A small aerodynamic re-entry module, which returns the crew to Earth.

A cylindrical service module with solar panels attached, which contains the instruments and engines.

Extension Tasks

Can the model be built so the three modules can be separated?

Paper Spinners



Challenge

Who can build the slowest paper spinner?

Resources

Thin paper

Paper clip

Scissors

Method

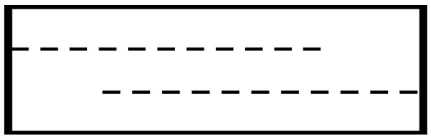
Create a spinner and fasten the two loose ends with a paper clip.

Hold the spinner in the air and drop paper clip end down.

Why does this happen?

The spinning slows the rate at which the spinners fall thanks to the extra air resistance it creates.

The more air resistance the slower an object falls.

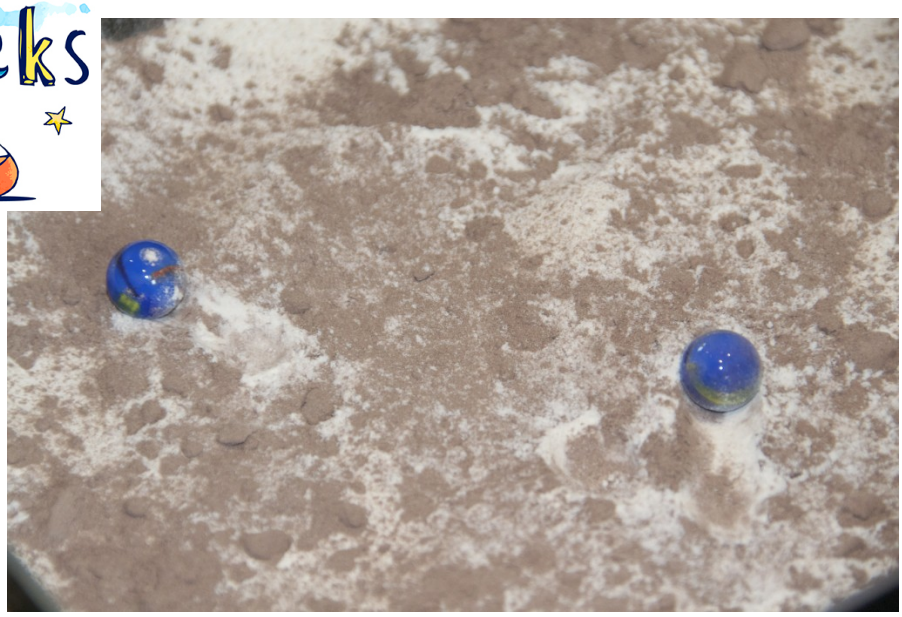


Extension Tasks

Encourage children to think about all the factors which might affect how fast the spinner falls, type of paper, number of paper clips, size of spinner, height dropped from etc.

Design a fair test to investigate how one factor affects the time taken for the spinner to fall. Try working in pairs and drop two spinners at the same time.

Making Craters



Challenge

To learn about how craters form, and to predict and test the effect

of using bigger/heavier/lighter and smaller balls as asteroids.

Resources

Shallow metal pan

Plain white flour

Drinking chocolate

Marbles and small balls

Method

Fill the pan about 2cm deep with flour and lightly sprinkle with drinking chocolate to cover the entire surface.

Drop the marbles (asteroids) into the pan.

Make craters using different size balls and compare the difference

Why does this happen?

Notice how the soil below the surface (white flour) is brought to the surface.

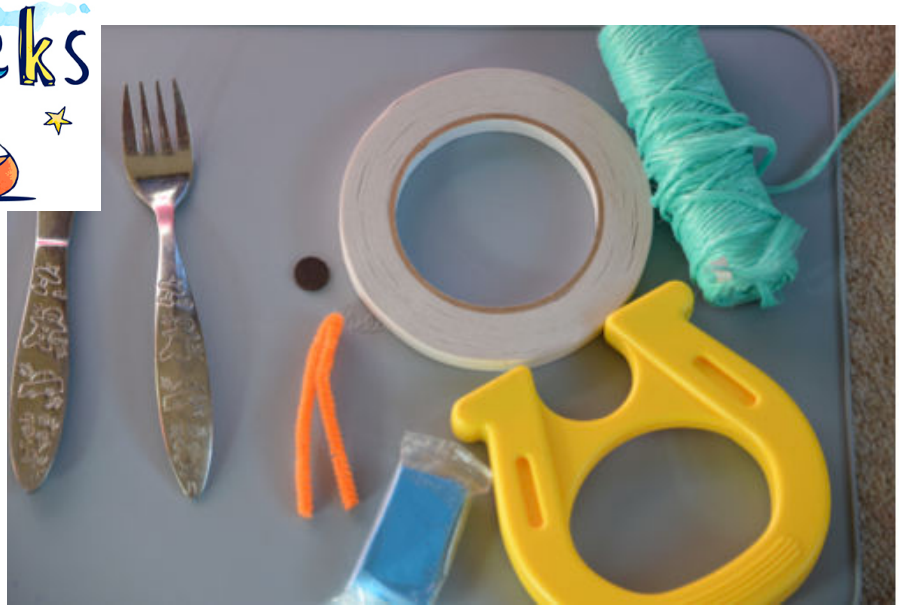
If two of the same size marbles are dropped from different heights, children should find that the marvle which has furthest to fall will make the biggest crater as it has the most energy.

Extension Tasks

Encourage children to first predict which marble or ball will make the biggest crater and then devise a fair investigation to test their results.

Only one variable should be changed, for example, size of marble or height dropped from, not both.

Cutlery Challenge



Challenge

Can you help the astronauts aboard the ISS by finding

a way to stop their cutlery flying around?

You can use

Sellotape

Magnets

Plasticine

Pipe cleaners

In space, astronauts do not walk on the floor like people on Earth do. They float around inside their spacecraft because there is very little gravity in space. We call this microgravity.

Gravity is the force that pulls objects towards the centre of the Earth, when we jump it is gravity that pulls us back down to the ground.