

GET READY FOR SCIENCE

British Science Week 11-20 March 2016



**RESOURCE
PACK ONE**
www.britishtimeeweek.org



SCIENCE IN SPACES RESOURCE PACK ONE



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GET READY FOR BRITISH SCIENCE WEEK 2016



This resource pack is aimed at supporting you during British Science Week, but can be used at any time of year. Feel free to adapt/extend the activities to suit your students' needs and the curriculum you are delivering.

In addition to the activities in this pack, there are lots of other ways to enthuse and engage your students throughout the week:



British Science Week events

You can either create your own club, class or school event or search for things happening near you on our website. Last year, there were over 5,000 events reaching more than 1 million people. Help us make British Science Week 2016 even bigger and better!

www.britishecienceweek.org

Poster competition

The theme for this year's competition links with this year's activity pack theme of 'spaces'. Any of the activities could be followed up by designing a poster. For more info on the competition and how to enter, go to

www.britishecienceweek.org/plan-your-activities/poster-competition/

The British Science Week 2016 digital badges

All the activities in this pack, as well as attending events/ entering the poster competition can enable you and your students to achieve special British Science Week (BSW) 2016 digital badges. Register for free at

www.makewav.es/britishecienceweek and students can upload evidence of their BSW activities to gain the badges. It's a great way to quickly evidence and reward everyone's hard work.

CREST Star Awards

Many of the activities can count towards CREST Star Awards. Further CREST Star resources can be downloaded for free from www.britishecienceassociation.org/crest-star

Mix it up

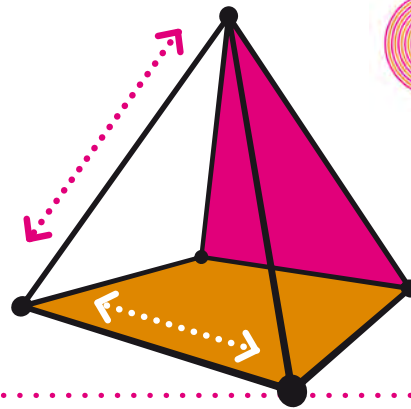
British Science Week is a great time to showcase the role that science and engineering play in all areas of life and to put school science into context. It's an ideal opportunity to link up science, arts and humanities in a meaningful way. We have a special 'arts collaborator' digital badge to recognise and celebrate cross-curricular British Science Week activities.

The British Science Association is an Artsmark supporter and are encouraging schools to use British Science Week activities as a way to achieve the quality principles laid out in the new Artsmark. To find out more about Artsmark, go to www.artsmark.org.uk/about-artsmark



BUILDING A PYRAMID

WITH MP FUTURES



WHAT YOU'LL NEED

- ✓ Building materials – e.g. card, paper, wood, plastic
- ✓ Scissors, glue, tape and blue tack
- ✓ Weights - to test the strength of your pyramid
- ✓ A fan - to test how your pyramid stands up to wind

BACKGROUND

The Ancient Egyptians are famous for building pyramids. They built their pyramids without lots of the tools, building equipment and technology we have now. The pyramids were important buildings with deep significance to the communities and the rulers who built them.

In this activity, you'll work in a team of 2-4 people to build two different pyramids. Once you've built your pyramids you're going to test them.

FIND OUT MORE

For more activities on building and materials, check out our CREST Star resource pages at www.britishecienceassociation.org/crest-star. This activity was adapted from www.britishecienceassociation.org/Pages/FAQs/Category/crest-mpfutures

Part 1 Pyramid design

Before you can build your pyramids, you need to decide and plan what they're going to look like and how you're going to make them.

You're going to design **two different pyramids**. **How will they be different from each other? Here are some ideas:**

- 1 Make them from different materials like plastic, cardboard or wood
- 2 Use different shapes and sizes like making one wider or taller
- 3 One solid and one hollow on the inside
- 4 Different sticking methods like glue, tape and blu-tack.

Part 2 Build your pyramids

It's time to put your plans into action and build your pyramids. Before you can make a start you need to make sure that everyone knows what they are going to do.

Do you want to work together to build your pyramids or do you want to split up the work and build one pyramid each? How will you make sure you stick to your designs?

Part 3 Pyramid testing

Once you've built two different pyramids with two different designs you need to test them to decide which one is best. Before you start doing tests, you need to decide how you're going to write down your results.

Here are some ideas for how to test your pyramids:

- ? How strong is it? Use weights
- ? How good will it be in the wind? Use a fan
- ? Does it look good?
- ? How much can you store inside it?
- ? How easy was it to build?

Part 4 Which pyramid?

Have a look at your results. What do you think of each of your pyramids?

Is one of the pyramids better than the other? Or would they both be good for different things? Think of some ideas about what your two different pyramids might be useful for.

mp-futures

ACCIDENT INVESTIGATORS



Be really careful when you're doing these experiments – some things can be sharp when they break! Always make sure you have an adult with you during these tests.

WHAT YOU'LL NEED

- ✓ Some thin sheets of different materials – card, plastic, wood
- ✓ A set of weights or heavy objects which can be stacked
- ✓ A pair of scissors

BACKGROUND

There are lots of different ways that things can break. Some things break through wear and tear, some things break because of a sudden force like falling over, some things are broken deliberately like being cut or sliced.

Sometimes we need to work out how something was broken and we can do that by investigating the broken pieces.

You're going to do some experiments on different materials to see if they break, how they break and what they look like when they are broken. This activity is a great starting point for a Bronze CREST Award. www.britishscienceassociation.org/crest-awards

FIND OUT MORE

To take your experiments further or find other ideas, check out the CREST Accident Investigators project ideas. www.britishscienceassociation.org/Pages/FAQs/Category/crest-project-ideas

Part 1

Planning your experiments

Find your materials. You will be able to test 1, 2 or 3 different materials to see how they break.

Here are some ideas of materials you could use:

- 🔍 Cardboard
- 🔍 Thin sheets of wood
- 🔍 Thin sheets of plastic

Plan out how you'll try to break these materials before you start.



Make sure you have an adult with you when you're doing these tests

Here are some different ways you can try:

- 1 Gradually increasing the weight by piling on more and more weights
- 2 Suddenly increasing the weight by dropping a weight on to the material
- 3 Cutting with scissors



In your plans, you need to include how you're going to make the activity safe

Part 2

Experimenting with breakages

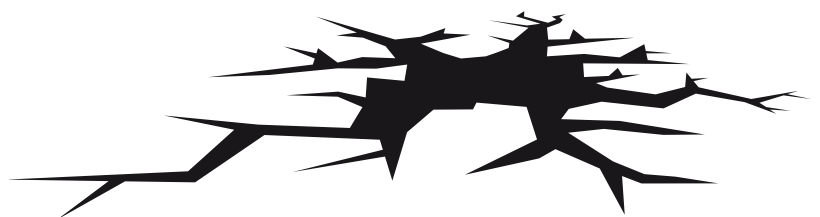
Once you've planned, you can start experimenting with your materials.

How will you record your results? You could describe if the material broke, how it broke and what it looked like afterwards. You could also draw the broken materials or take photos.

Make some observations. For example:

- 🔍 did it break at all?
- 🔍 did it snap in half?
- 🔍 did it bend?
- 🔍 did it make a hole?

A good way to record your results might be in a table.



BE A WILDLIFE EXPLORER

WITH WILDLIFE WATCH

BACKGROUND

No two schools, homes or areas are exactly the same, so everybody has different wildlife on their doorstep.

What wildlife can you find in the spaces near your home or school? Why do they live there?

FIND OUT MORE

To make your own spotting sheet, find out more about the wildlife and places that are close to you, or to browse through wildlife activity sheet, visit the Wildlife Watch website – the junior branch of The Wildlife Trust.

www.wildlifewatch.org.uk



**wildlife
watch**

Part 1 Investigating your local wildlife

Investigate the area around your school or home. What wildlife can you find there? This includes trees, plants and animals.

Try and work out what kinds of plants and animals you can see. You can use the **Wildlife Watch Spotting Sheets** to help you work out which plants and animals these are.

The wildlife around us changes when the seasons are different. Try looking for **Signs of Spring, Spring Flowers** or **Spring Trees**.

If you live in a built up area you could look for **Urban Wildlife**.

Do you have a pond nearby? Maybe you can spot some **Pond Wildlife**.

Are you near a woodland area so you can spot some **Minibeasts**?

Part 2 Finding out about your wildlife

Pick one plant or animal which you have seen in your investigation. Imagine you're holding an exhibition and you're going to tell your visitors all about this plant or animal and where it lives.

Why does it live here? You can think about:

- ❓ What is the weather like?
- ❓ Is it high up or low down?
- ❓ Is there lots of open space or are there lots of places to hide?
- ❓ Is it warm or cold?
- ❓ Does it live near other plants and animals?
- ❓ Is there anything dangerous or risky about where they live?





WHAT YOU'LL NEED

- ✓ **Den-making materials – think twigs, leaves, stones and other similar materials OR craft materials such as card, paper and string**
- ✓ **Scissors, glue and tape**
- ✓ **Information about different British animals and how they stay warm during the winter**

BACKGROUND

It gets very cold during winter, and some animals hibernate to stay warm. Only three British mammals hibernate: hedgehogs, dormice and bats. But all animals need somewhere warm to go, even if they don't hibernate, and many of Britain's woodland animals stay nice and cosy in their dens. In this activity, you're going to make a den to help an animal stay warm in winter.

FIND OUT MORE

For more information and lots more activities, check out the Nature Detectives website: woodlandtrust.org.uk/naturedetectives



Part 1

Planning your den

Look at different animal dens. Can you build somewhere an animal can stay in winter? How will you build a den that will last the whole season?

What animal are you going to build a den for?

- ❓ Does the animal live alone or in pairs or groups?
- ❓ How big is the animal?
- ❓ Do they like to move around a lot?

What will you use to build your den? Think about:

- ❓ Which materials are best for den building?
- ❓ Will you use natural materials you can find outside, or craft materials?
- ❓ Why will these be good for making your animal den?
- ❓ Are the materials strong? Flexible? Good at sticking together? Colourful?

How will you build your den? Think about:

- ❓ Making a plan
- ❓ Drawing a picture of how you think your den will look
- ❓ Why did you design it like this?

Part 2

Building your den

Once you've planned your den, it's time to get building! Make sure you know which bits you need to do first.

Part 3

Your completed den

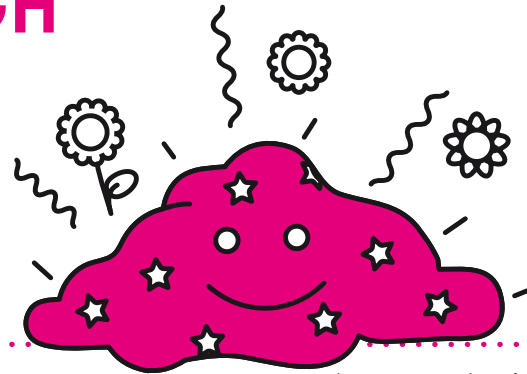
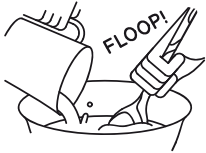
Once you've made your den, you can see how similar it is to all your plans.

Was it easier or harder to make than you thought it would be? Do you think it was a good design?



ELECTRO DOUGH

WITH TECHNOLOGY WILL SAVE US



WHAT YOU'LL NEED

To make the dough:

- ✓ 160g flour
- ✓ 160g salt
- ✓ 230ml water
- ✓ 9 tbsp lemon juice
- ✓ 1 tbsp vegetable oil
- ✓ Food colouring
- ✓ Hob
- ✓ Saucepan
- ✓ Wooden spoon

To make the circuits (all available in the DIY Electric Dough Kit by Technology Will Save Us):

- ✓ 4 AA battery pack with switch
- ✓ 4 AA batteries
- ✓ LEDs
- ✓ Piezo buzzer
- ✓ Crocodile clips
- ✓ Tilt switch

BACKGROUND

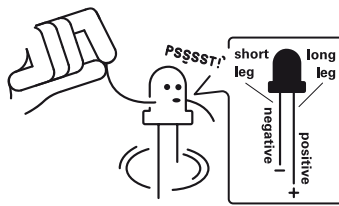
In this activity, you will make some Electro Dough, and then use it to create some circuits. Once you've investigated how to make circuits, you can shape your dough however you like. Make some exciting creations and make them light up and buzz!

Part 1 Making dough

With an adult helper, cook all ingredients over a medium heat until it forms into a kneadable dough.

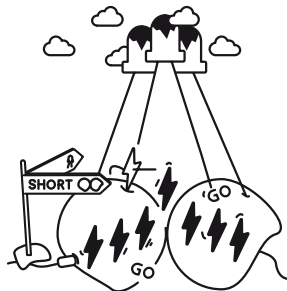
Let it cool, practice kneading and shaping it, and then you're ready to make your circuits

Part 2 Building circuits



The first, simple circuits you'll build use LEDs. An LED is a Light Emitting Diode. When electricity flows through it, it glows. This is how you'll light up your creations!

LEDs have polarity and must be placed in the circuit with the long leg on the red, positive side of the battery pack. If your LED doesn't light, try flipping it round.



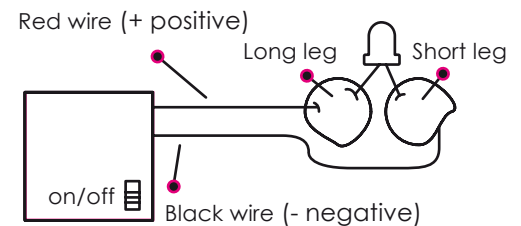
Electricity will always choose the shortest route back to the power source, even if this is through the dough and not the LED. Touching

two separate pieces of dough creates a short circuit.

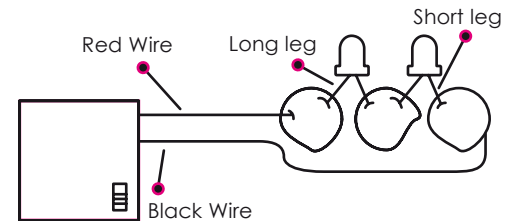
To make a circuit, an electric current must flow in an unbroken path. By placing LEDs or a buzzer in this path we create light and sound. Putting a switch in the circuit will break the path, giving you a way to turn your circuit on and off.

Try creating some circuits to light your LEDs, use the pictures below to help you

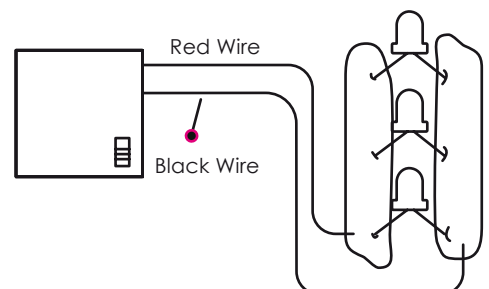
1. Light 1 LED

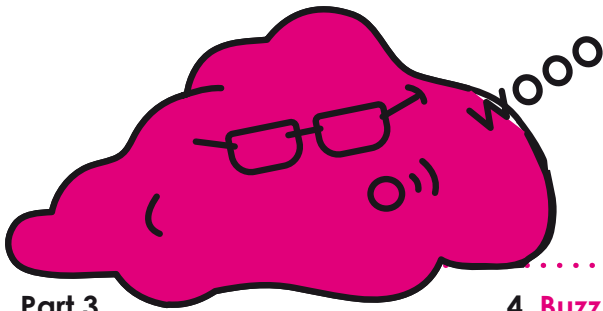


2. Light 2 LEDs



3. Light loads of LEDs



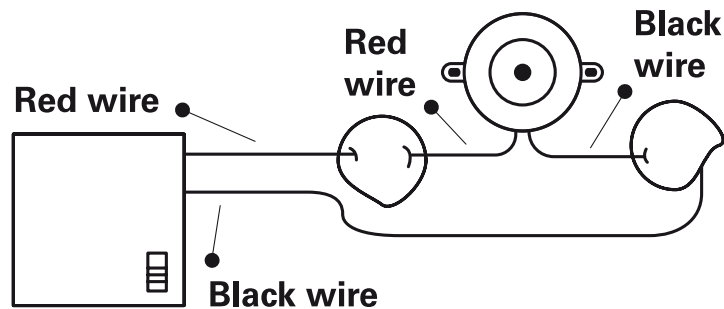


Don't forget to take a picture of your creations and share them with us on Twitter!
#futureinventors #BSW16

Part 3
Adding more parts

Once you've worked out how to create a circuit, you can start adding more parts. Try adding a buzzer or a tilt switch into your circuit or make a button using your dough.

4. Buzz a buzzer

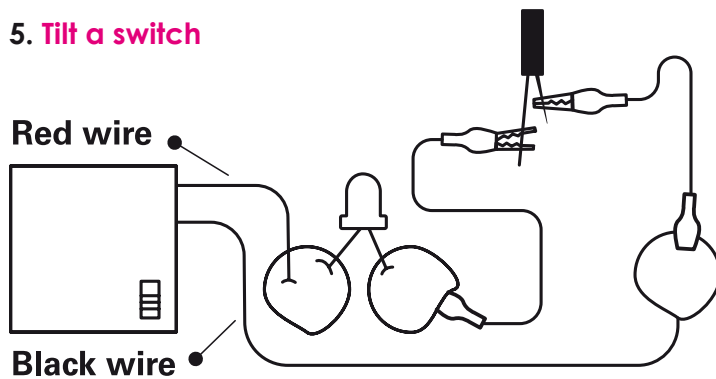


Part 4
Getting creative

Now you've practiced making lots of different circuits, you can get creative!

What Electro Dough inventions will you make next? You can add parts to your circuit, take parts away, and shape and reshape your dough however you like.

5. Tilt a switch



FIND OUT MORE

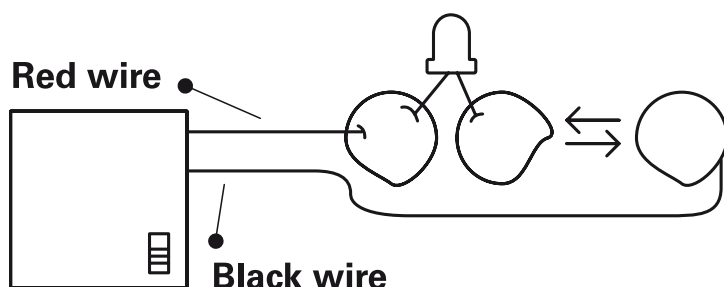
Technology Will Save Us have lots of different exciting projects you can build, make and get creative with.

www.techwillsaveus.com/



TECHNOLOGY WILL SAVE US.

6. Make a button



EXPERIMENTS WITH BLUETOOTH

WHAT YOU'LL NEED

- ✓ A smartphone with a camera and bluetooth capability
- ✓ A bluetooth button

BACKGROUND

Computers, robots and other digital devices need to communicate with each other. They do this in lots of different ways for example through wires, through Wi-Fi or through Bluetooth.

Smartphones can be controlled by Bluetooth. Some selfie sticks use a Bluetooth button so you can take a photo remotely - without touching the phone.

FIND OUT MORE

For more ideas of experimental science projects you can do, read about CREST Discovery. www.britishtscienceassociation.org/crest-discovery-day

Part 1

Bluetooth communication

Do some experiments to find out about the connection between the Bluetooth button and the phone.

First set up the button so that when you press it the phone takes a photo, you might need some help with this part

Now you're ready to investigate! Try and answer these questions:

How far away from the phone can you go and still take a photo with the Bluetooth button?

Does it make a difference if you're outside or inside?

Can the Bluetooth signal travel through different materials?

Here are some ideas:

- 📱 Through a brick wall
- 📱 Through a glass window
- 📱 Through metal (try putting the phone in a clean biscuit tin)
- 📱 Through a plastic bag or box
- 📱 Through paper or cardboard

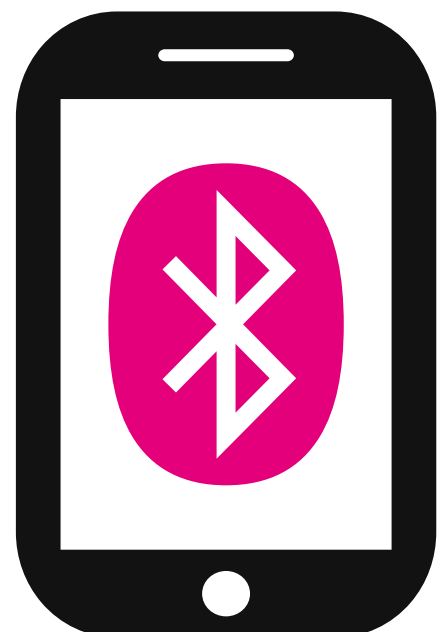
Part 2

Getting creative

Now you've investigated what you can and can't do using the Bluetooth button, it's time to see what photos or videos you can take.

Try and think of a photo you wouldn't be able to take without using the Bluetooth button. For example, can you take a photo of the inside of somewhere? Can you take a photo from up really high? Can you attach the phone to something that's moving and take a video?

Share with us on Twitter the cool and creative photos you've taken [@BSW16 @ScienceWeekUK](https://twitter.com/BSW16)



FOOD CHAIN ANIMATION

WITH COMPUTERXPLOERS



WHAT YOU'LL NEED

- ✓ A computer with internet access
- ✓ A login for Scratch Editor (free online)

BACKGROUND

Everything living needs food to survive. Plants use light energy from the sun to make their own food in their leaves. They are then eaten by insects and animals. These animals then become food for other animals, creating a food chain.

In this activity, you'll create an animation programmed in Scratch that shows an example of a food chain.

If you need help in this activity, you can see an example animation and see the programming involved at <https://scratch.mit.edu/projects/91366161/#editor>

FIND OUT MORE

For more information on how ComputerXplorers can help you learn programming on our free 'Programming for Primaries Day' on 11 March 2016 see www.computerexplorers.co.uk



Part 1

Do some research about food chains. Discuss and plan out a food chain starting with the sun and featuring plants, an insect, a bird that eats insects and an animal that eats birds. Watch the BBC Bitesize Food Chain Video to give you more ideas www.bbc.co.uk/education/clips/zjshfg8.



Part 2

Go to <http://scratch.mit.edu>. If you don't already have an account, sign up for one – it's free! **If you are under 13 you must have permission from a parent or guardian and use their email address to register for an account.** You may already have an account at school, so check what the login details are.

Click 'Create' to start making your animation. In the 'Stage' area, add an appropriate natural backdrop – there are quite a few to choose from in the 'Backdrop Library' or you could paint your own.

Add or create sprites for:

- 1 the sun
- 2 a plant
- 3 an insect, such as a beetle or caterpillar
- 4 a bird, such as a crow or blackbird
- 5 an animal, such as a cat or fox
- 6 four arrows

Arrange the sprites into the correct order for the food chain.

Part 3

Program all the sprites to hide when the Green flag is clicked. For each sprite use a wait block after each hide command and a show block to gradually reveal the chain in order. Think carefully about the timings and test it out as you make your animation.

Part 4

If you have time, you could try to make your animation more fun by adding and programming sounds for each of the animals or recording an explanation of the food chain. Remember if you add sounds you will need to change the timings for the animation to be revealed.

INVESTIGATING COLOURFUL SPACE



WHAT YOU'LL NEED

For part 1:

- ✓ Collage making materials – magazines, newspapers and printed images
- ✓ Paper, scissors and glue

For part 2:

- ✓ 5 different coloured sheets of plastic or card
- ✓ 5 ice cubes
- ✓ A stopwatch

BACKGROUND

The place where you live is a very important space. What colours are in your home? How does this place make you feel? Different colours can affect your mood in different ways.

Part 1

Mood and colour

Using paper, pens and pictures create a collage of different colours and how these colours make you feel. **To get you started, think about the following words:**

- ❓ Warm
- ❓ Cold
- ❓ Happy
- ❓ Sleepy
- ❓ Natural

Which are your favourite colours and how do they make you feel?

What colours do you think would be best for painting your room or your home?

Part 2

Which is the warmest colour?

Now you're going to test which colour is the warmest using ice cubes.

Place five different coloured pieces of card or plastic in a sunny place. Put an ice cube on each of the cards and time how long it takes for the ice cube to melt on each different colour.

Make sure you record your results. Which ice cube melted the fastest? Does this mean it's the warmest colour or the coldest?

Put your colours in order from which was the warmest to which was the coldest. What can you notice about this pattern?

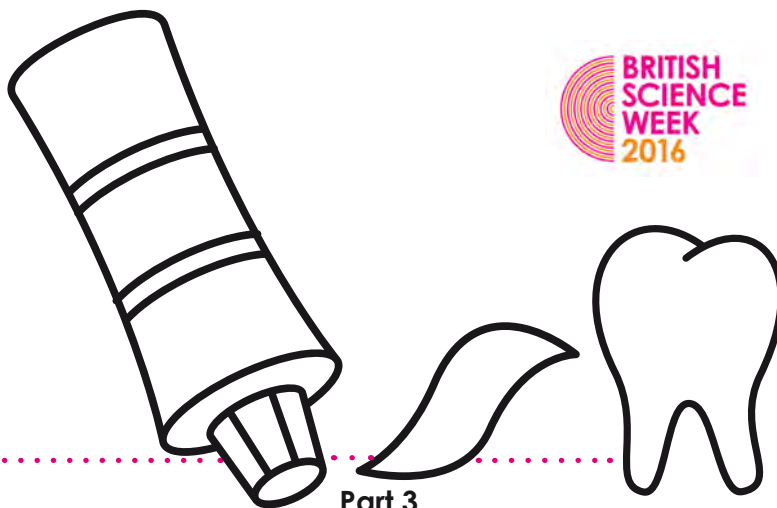
Part 3

Comparing

Have a look at which colour(s) were the warmest and which were the coldest in the two different parts of the activity. Were they the same? Why do you think they were the same or different?

PERSONAL SPACE TERRIFIC TEETH

WITH CREST MEGASTAR



WHAT YOU'LL NEED

For the basic toothpaste recipe:

- ✓ 3 teaspoons of baking soda (not baking powder)
- ✓ 1 teaspoon of cornflour
- ✓ ½ teaspoon of salt
- ✓ 3 teaspoons of glycerine
- ✓ 1-2 teaspoons of peppermint essence
- ✓ ½ teaspoon of food colouring (optional)
- ✓ 2-3 teaspoons of water

BACKGROUND

Using toothpaste and brushing your teeth is really important to stay healthy. There are four important things for a good toothpaste:

- 1 It removes plaque and stains from teeth
- 1 It has a pleasant smell and gives you fresh breath
- 1 It stays on the toothbrush
- 1 It has an attractive colour

In this experiment, you'll investigate different recipes to decide what the best recipe for toothpaste is. **You can't try the toothpaste on your own teeth**, but you can test it in different ways.

Part 1 Making toothpaste

First you're going to make some toothpaste. This is how you do it:

- 1 Mix together the baking soda, cornflour and salt in a container
- 2 Add glycerine and peppermint flavouring, mix to form a paste
- 3 Add water a few drops at a time until your mixture is the correct thickness

Add colouring (if you like).

Part 2 Testing toothpaste

Decide how to test your toothpaste. Remember you can't test it on your own teeth, so you've got to be more inventive!

Here are some ideas:

- ? Does it remove plaque? Draw with a permanent marker on a plate or tile, does your toothpaste remove the mark? Can you think of a way to measure how easy it is?
- ? Does it smell nice and give you fresh breath? Can you describe how it smells? How strong is the smell?
- ? How well does it stay on the brush? What about if you shake it? Can you think of a way to measure this?
- ? Does it have an attractive colour? Would you use it? Could you decide on a way to rate how it looks?

Part 3 Investigating toothpaste recipes

Now you need to decide what you're going to investigate.

Choose one of the toothpaste ingredients. You're going to change something about this ingredient in the recipe and see how it affects your toothpaste.

You might want to use more of this ingredient than in your first recipe, or maybe use less. You might want to swap it for a different ingredient.

When you make your second toothpaste, you can then do the same tests on it as you did on the first one.

How will you record your results?

Part 4 Comparing recipes

Once you've tested both toothpastes, you can compare your results and decide which one you think is the best toothpaste recipe.

If you've got time, you could try changing the recipe in a different way.

FIND OUT MORE

Investigate more about toothpaste and find more fun CREST MegaStar activities on our website.

www.britishsociety.org/crest-megastar-activities

FROM THE GROUND AND FROM THE SKY

WITH THE UK SPACE AGENCY



BACKGROUND

Earth looks very different from space than it does from Earth!

In this activity, you'll match pairs of a picture of the same place, one taken from the ground and one taken from space.

FIND OUT MORE

One person with good views of Earth from space is British Astronaut Tim Peake, who's currently aboard the International Space Station. Find out more about his mission and how you can get involved by visiting the Principia website <https://principia.org.uk/get-involved/#activities> or the ESERO www.esero.org.uk



Part 1

Pictures from the ground

There are six different pictures of six different types of place:

- 1 Mountains
- 2 A desert
- 3 An island
- 4 A city
- 5 A lake
- 6 A river

Which picture is which? Pick which picture shows which type of place.

How do you know which is which?

Part 2

Pictures from space

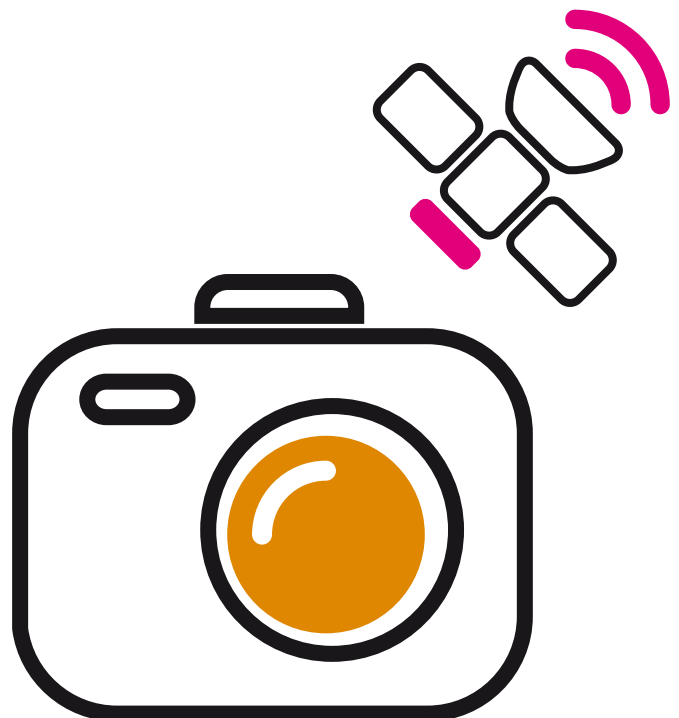
Now it's time to match the pictures from space to the pictures from the ground.

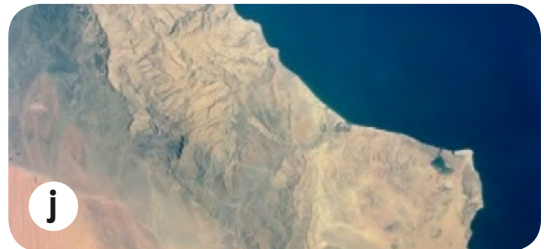
What clues in the pictures can you use to help you match them up?

Part 3

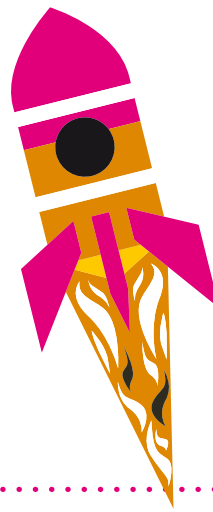
From the ground and from the sky

- ? What things can you see in both pictures?
- ? What things can you only see in one of the pictures?
- ? Which type of picture do you think is best? Why?





DO YOU HAVE ASTRONAUT SKILLS?



WHAT YOU'LL NEED

- ✓ An activity to test dexterity – e.g. shoelaces, LEGO bricks, a jigsaw puzzle
- ✓ A pair of normal gloves
- ✓ Oven gloves
- ✓ Equipment for a physical test – e.g. trainers and sports kit

BACKGROUND

To be an astronaut you need to be fit and healthy and you need lots of different skills. Some are mental skills and some are physical skills.

Do you think you'd make a good astronaut? Try out some different tests for skills that astronauts need.

FIND OUT MORE

For some great ideas to test your astronaut skills and find out how to train like an astronaut, have a look at Mission X.
<http://trainlikean astronaut.org/>

Part 1

Testing your dexterity

Someone who has good dexterity is good at doing fiddly jobs with their hands.

Astronauts need good dexterity for working with their delicate tools and equipment, and lots of the time they need to do this while wearing big, bulky spacesuit gloves!

Other things that require dexterity apart from working on a spaceship include **using a knife and fork**, **building a LEGO model** or **tying your shoelaces**.

Pick a simple task to do that requires dexterity (you could use one of the examples above) and time how long it takes you to do it.

Then try putting on a **pair of gloves** and then time yourself doing the same task.

After you had tried it wearing gloves, try and do the same task again wearing **oven gloves**.

- ? Which one was harder?
- ? Which one took longer?
- ? Why do you think that was?

Part 2

Testing your physical fitness

It's really important for an astronaut to be strong and fit too.

Can you design a simple exercise test for your team of astronauts?

Here are some examples:

- ? How many star jumps can you do in one minute?
- ? How many times can you run across the school playground in one minute?
- ? How many press ups can you do in 30 seconds (you can try this one with your knees on the floor if it's too hard!)?

Do you think your test would be easier or harder if you're wearing a space suit?

Can you think of a way you might be able to test this? Maybe you could get a really big coat to wear, or try and make a space suit from craft equipment.

