



PRIMARY RESOURCE PACK

British Science Week
10 - 19 March 2017

www.britishtscienceweek.org



This resource pack aims to be your ‘one-stop-shop’ for supporting you during British Science Week (BSW), but can be used at any time. Feel free to adapt or 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 2017 even bigger and better! britishscienceweek.org

CREST Star Awards

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

The British Science Week 2017 digital badges

All the activities in this pack, as well as attending events, can enable you and your students to achieve a special British Science Week 2017 digital badge. Register for free at makewav.es/britishscienceweek and students can upload evidence of their activities to gain the badge. It's a great way to quickly evidence and reward everyone's hard work.



Poster competition

Some of the activities could be followed up by designing a poster, simply look out for the paintbrush symbol above. The theme for this year's competition links with this year's activity pack theme of 'change'. For more information on the competition and how to enter, read on further in the activity pack or visit britishscienceweek.org/plan-your-activities/poster-competition



The British Science Week 2017 digital badges



Demo Day

Taking place on Thursday 16 March, Demo Day is an annual campaign held during British Science Week that aims to inspire school teachers and technicians to explore new concepts, provoke discussions and generate excitement through running science demonstrations. Many activities found in this pack are suited to Demo Day, simply look for the 'Wow' symbol above. Share what you got up to on Demo Day by using the hashtag #DemoDay on social media. Stories, photos and videos – the more visual the better!

The theme for this year's British Science Week is "Change", encouraging young people to think about and investigate the changes happening in the world all around us; from seasons and climate, to materials and energy. It is also a chance for young people to consider the changes they can enact to have a positive impact on the future.

1 BRAINTEASERS AND SHORT CHALLENGE ACTIVITIES

2 CHANGING COLOURS

- Nature's colour palette
- Catch a rainbow
- Flowers to dye for

3 CHANGING STATES

- Oobleck slime
- Kitchen chemistry
- Alka-seltzer rocket
- Changing states: solids, liquids, gases

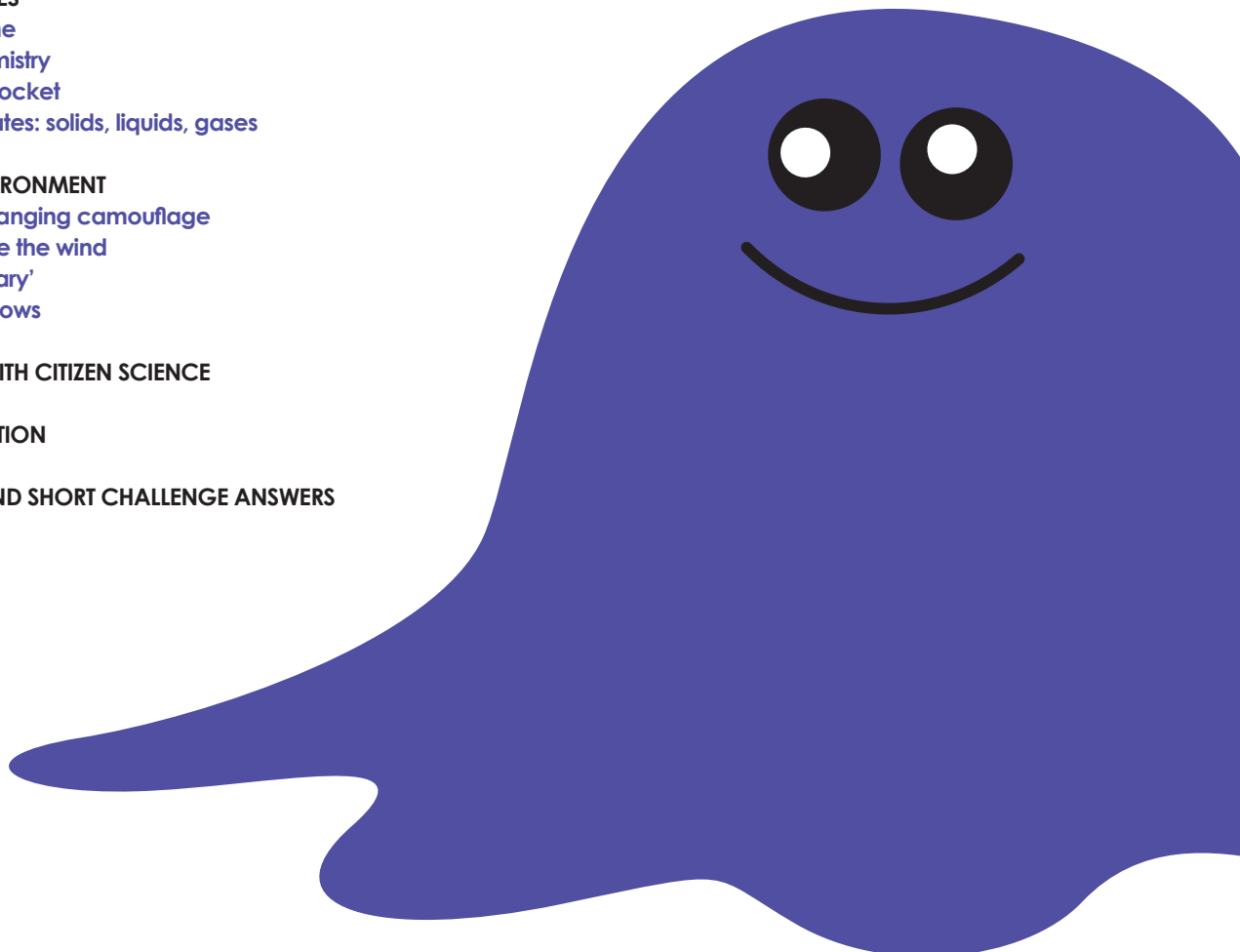
4 CHANGING ENVIRONMENT

- Evolution: changing camouflage
- Changing like the wind
- My 'Moon Diary'
- Moving shadows

5 GET INVOLVED WITH CITIZEN SCIENCE

6 POSTER COMPETITION

7 BRAINTEASERS AND SHORT CHALLENGE ANSWERS



CHALLENGES
WORD SEARCH

Solve the word search full of words related to change. Remember words can be up, down, diagonal and even backwards!

Words:

Climate change Irreversible Environment
Slime Weather Evolution Reversible

E	I	G	L	C	E	E	R	P	E	Y	F	R
T	G	W	K	M	G	L	E	V	K	O	R	F
T	L	N	I	T	E	B	H	O	G	X	G	U
R	N	L	A	N	H	I	T	L	K	J	Q	B
E	S	V	O	H	T	S	A	W	J	Q	W	P
V	X	V	D	P	C	R	E	Y	R	R	U	A
E	W	J	H	D	F	E	W	L	Y	W	D	M
R	M	J	E	U	Q	V	T	X	T	V	O	I
S	I	A	N	A	S	E	T	A	Y	C	P	R
I	N	E	N	V	I	R	O	N	M	E	N	T
B	U	O	C	T	Z	R	V	X	M	I	F	X
L	O	D	U	Z	G	I	Q	C	W	K	L	A
E	K	N	O	I	T	U	L	O	V	E	X	C



CHALLENGES
CATEGORIES

Find the words that fit together best in groups of four, and then give the group a name.

Words:

Einstein	Flooding	Summer	Winter
Humboldt	Earthquake	Gentoo	Newton
Emperor	Hawking	Drought	Rockhopper
Autumn	Spring	Eruption	Darwin

Example 

chocolate bars	Dairy Milk	Crunchie	Mars	Snickers

Tip:

if you're struggling to see all the groups in the words above, write down the ones you find first, and see if you can work out what groups are in the words that are left.



CHALLENGES

ODD ONE OUT

Which of the following do you think is the odd one out?

Example 

Note: as long as you can give a clear reason to support your idea, then your answer is correct.



Wood



Paper



Rock

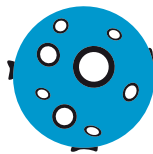
List your reasons

Because it is the only man-made thing.

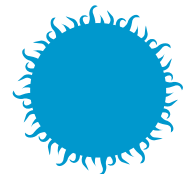
It is the only thing that cannot be burnt.



Earth



Moon

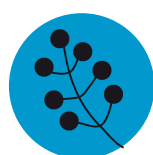


Sun

List your reasons



Shell



Plant



Rock

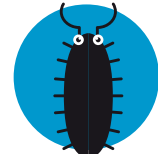
List your reasons



Worm



Snake



Centipede

List your reasons

CHANGING COLOURS

NATURE'S COLOUR PALETTE

WITH THE EDEN PROJECT

Toolkit



- Thin white card
- Double-sided sticky tape

About this activity



Nature is full of a wonderful array of colours that change over the course of the year through the four seasons. From the green buds showing new life in Spring, the bright colours of Summer, the golden browns and rusty oranges in Autumn to the bleaker shades of Winter, our environment is constantly changing.

This simple outdoor activity involves collecting coloured items from the environment to create a colour palette, with options to extend the activity by writing poems and creating displays.

Watch out!



Ensure that you are aware of your safety when working outdoors and are supervised at all times. You must wash your hands thoroughly after this activity. Ensure your supervisor checks the area for broken glass, dog mess, plants with toxic seeds and plants that might cause irritation and make sure you avoid them.



Take a photo of your colourful creation and enter it into our poster competition.

Part 1 Create your colour palette

To make your colour palette, use a thin piece of white card, and stick some double-sided sticky tape on it.

Your task is to collect as wide a range of natural colours as you can find in a given area, sticking tiny bits of different colours to the palette. By looking closely, you will be able to find a surprising amount of colour – even in unpromising locations or at seemingly less colourful times of year.

How are you going to make your colour palette? Think about:

- Look at the edges, under and around the back of things
- Use both natural and unnatural objects
- Be considerate about limiting damage to plants by collecting only tiny bits

Part 2 Discuss the changing seasons

Think about which colours are easiest to collect, and why. Can you work out what the colours will be like at different times of the year?

Why do leaves change colour in Autumn, and why do they fall from the trees?

Part 3 Get creative

Now you've got an eye for the colours in your landscape, make use of your skills to create some landscape art. Why not try crafting a picture such as a face, house, or landscape scene out of the materials you found in the environment?

Create a poem using your colour palette as inspiration. Pick an eye-catching colour from your palette and write a short phrase describing it onto a post-it; using amazing adjectives, spot-on similes, magnificent metaphors (or whatever else you happen to be working on in literacy). Gather in a group with other students to share and combine your lines in order to create a collaborative colour poem. You could use big chalks to write your finished poem on the playground tarmac, or create a poster.

Next steps

For more information and lots more activities, have a look at the Eden Project website
edenproject.com/schools

This activity links with our Rainbow Colour Collectors CREST Star activity
crestawards.org/project-resources



CHANGING COLOURS

CATCH A RAINBOW

Toolkit



- Washing up liquid
- Shallow bowl
- Different colours of food colouring

About this activity



Some very unusual interactions take place when you mix a little milk, food colouring, and a drop of washing up liquid. This artsy activity will help you discover the scientific secrets of soap and create a beautiful explosion of colours at the same time.

Watch out!



This experiment can get rather messy so ensure your workspace and clothes are well protected. Afterwards, make sure you wash the bowl thoroughly and wipe up any spills carefully.

Part 1 Get colourful

Pour a cup of milk into a shallow bowl and carefully put three drops of one colouring into one side. About a third of the way around put three drops of another food colouring and another third of the way around put three drops of a different food colouring. Do this very carefully, without moving the bowl, so that the three colours do not mix.

Next, squeeze a drop of washing up liquid into the centre of the bowl and record what you see. What happens to the colours?

Part 2 Mix it up

You could try repeating the experiment using water in place of milk. Observe whether you get the same eruption of colour or not.

You could also test out different types of milk (but never unpasteurised) and explore which percentage of fat produces the best swirling of colour? Semi-skimmed or full-fat – which is better?

Next steps

For more ideas of experimental science projects you can do, read about CREST crestawards.org/crest-star



Take a photo of your colourful creation and enter it into our poster competition.

CHANGING COLOURS FLOWERS TO DYE FOR

Toolkit



- White flowers
- Water
- Food colouring
- Vase

About this activity



This colourful activity demonstrates how plants absorb water through their roots and up their stems. Add a little food colouring to the vase in order to transform white flowers into different colours.

Watch out!



This experiment can get rather messy so ensure your workspace and clothes are well protected.



Take a photo of your colourful creation and enter it into our poster competition.

Part 1 Get colourful

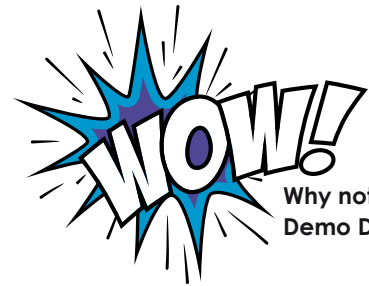
Fill your vase with water and add a few drops of food colouring. Cut the bottom off the stems of your flowers and place them in the vase. Leave your flowers in the coloured water for a few hours and observe what happens.

It should take between 6 – 12 hours to get the best results, so perhaps check again at the end of the day.

Try splitting the stem of your flower in half and putting each half in water dyed a different colour. What do you think will happen?

Next steps

For more ideas of experimental science projects you can do, read about CREST crestawards.org/crest-star



Why not try this for Demo Day?



CHANGING STATES

OUBLECK SLIME

Toolkit



- Large mixing bowl
- Measuring jug
- Cornflour
- Water
- Spoon
- Clear re-sealable storage bag
- Eggs (optional)

About this activity



Fancy making a weird slimy concoction that acts like a liquid but behaves like a solid when you hit it? Most liquids behave in a predictable manner, but oobleck slime does not stick to the rules and acts in a very curious way. This activity is hands-on and rather messy, so make sure you're not wearing your best clothes!

Watch out!



When you've finished, do not pour the slime down the sink as this could clog the pipes, instead spoon the mixture into a zip-lock bag, fasten it tightly and dispose of it in a bin. Ensure you only use eggs with the 'British Lion Quality' stamp as these should be salmonella free.



Why not try this for Demo Day?

Part 1 Make some slime

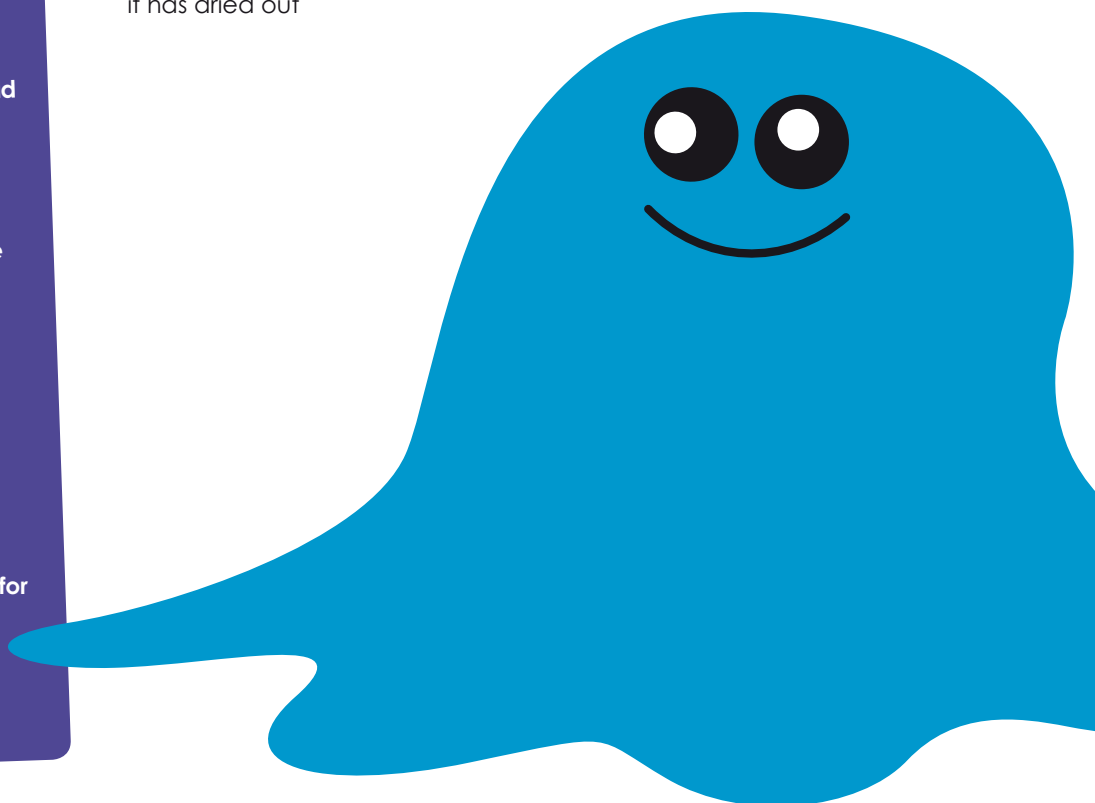
Place some cornflour into a large mixing bowl and little by little, add water and use your hands to mix it into the cornflour. Keep mixing until the cornflour and water have blended together and the slime is the consistency of thick honey. Make sure you add the water slowly and carefully.

Part 2 Put the slime to the test

Once you've made your slime, try out a few experiments to see how your slime reacts. Do you think your slime is a liquid or a solid?

Why not try the following? Test out:

- Spooning some of the slime into a re-sealable storage bag until its two-thirds full, and then gently pushing an egg or another delicate object (e.g. a biscuit) into the mixture. Then try dropping the bag from a tall height (around 2-3m) and see how high you can drop it from before the object breaks
 - Making your slime 'dance' by placing some on a plastic plate over the top of speaker set to a low frequency sound
- Next steps**
For more ideas of experimental science projects you can do, read about CREST crestawards.org/crest-star
- Punching the slime and drawing back your hand quickly
 - Scooping some of the slime into your hand and rolling it into a ball between your palms
 - Leaving your slime out over a few days/overnight and seeing if you can make it slimy again once it has dried out



Toolkit



You'll need to measure and mix this set of ingredients five times to complete all five tests:

- ⦿ 300g strong white flour
- ⦿ 1/2 a tsp of salt
- ⦿ 15g margarine
- ⦿ 1 sachet quick acting yeast (7g)
- ⦿ 200ml warm water
- ⦿ Milk for glazing
- ⦿ A different type of flour

Also: weighing scale, measuring jug, sieve, measuring spoons, mixing bowl, mixing spoon, timer, loaf tin, cooling rack

About this activity



Get your bake-on and try your hand at making some bread. Baking is often thought of as an exact science: with precise measurements, temperatures and timings resulting in a tasty transformation. But what do all the ingredients do? What happens if we change the recipe and a key ingredient is missed out?

Watch out!



Ensure health and safety precautions are taken when working with raw ingredients and a heated oven. Check for any food allergies prior to undertaking this activity. Do not do food-related experiments in school labs if you intend to eat the results. Ensure that appropriate hygiene and cleanliness precautions are in place.

Part 1 Get baking

Preheat the oven to 220 degrees Celsius before getting started and grease/line the baking tray.

Sieve the flour and salt into the mixing bowl and rub in the margarine. Stir in the yeast. Make a well in the middle of the flour, add the water, and mix until you form a soft dough.

Next, place the dough on a lightly floured work surface and knead for 10 minutes. Divide into 8 equal pieces and shape each piece into a roll. Brush bread rolls with a little milk, if desired.

Bake in the oven for 10-15 minutes until the rolls sound hollow when tapped on the base. Then remove them and allow the rolls to cool on a rack!



Part 2 Alter the recipe

Now experiment what happens when you change the recipe. Try to:

- ⦿ Bake your rolls without the salt
- ⦿ Bake your rolls without the yeast
- ⦿ Bake your rolls without the margarine
- ⦿ Bake rolls with a different type of flour – brown, plain, white, etc

Part 3 Sample your creations

Observe the differences in size, texture and appearance, and if you're allowed, also have a taste to see which is the best:

- ⦿ How and why is each loaf of bread different?
- ⦿ What might be the purpose of each ingredient in bread?

Next steps

If you liked trying out some kitchen chemistry, check out the Food Teachers Centre for a wide variety of resources foodteacherscentre.co.uk



ALKA-SELTZER ROCKET

WITH THE INSTITUTE OF PHYSICS

Toolkit



- 15g empty film canister
- Alka-seltzer tablet
- Water
- Coloured paper/card and decorating materials (optional)

About this activity



Turn simple household ingredients into an awesome rocket which can shoot up in the air.

Watch out!



You, and anyone watching, need to stand well back when your rocket launches.



Why not try this for
Demo Day?

Part 1 Make your rocket

Break the Alka-seltzer tablet in half and place half in the empty film canister. Add around 1cm depth of water and then fit the lid onto the canister, ensuring the seal is tight (otherwise you will only get a disappointing 'fizz').

Turn the canister upside-down and place it on a flat surface, stand back and wait for blast-off.

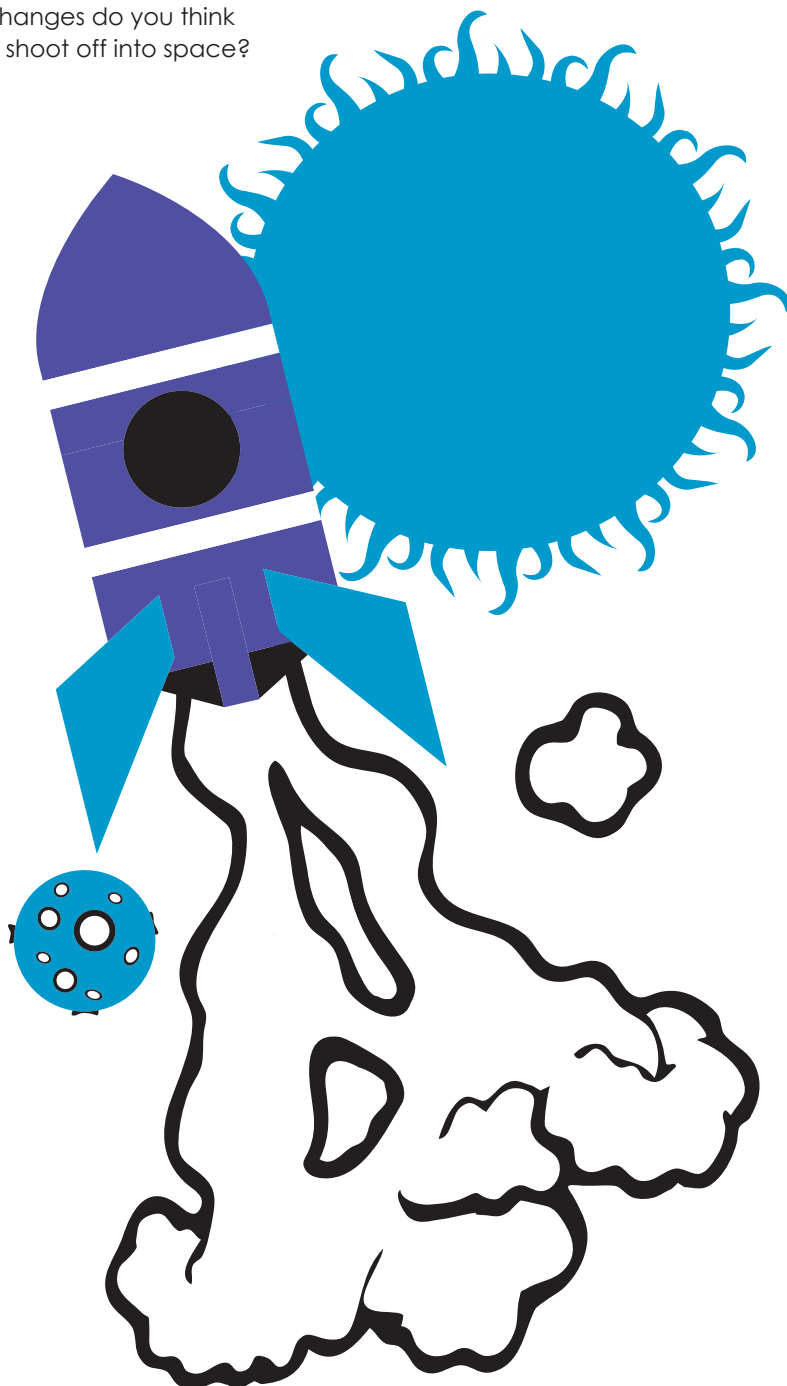
What chemical changes do you think makes the rocket shoot off into space?

Part 2 Get decorative

If you wanted to, you could decorate your rocket with coloured paper/card and colouring pens to make it look like a real rocket.

Next steps

Find more activities and resources on the Institute of Physics website physics.org/discover



MAKING A RUBBER BALL

WITH THE WORSHIPFUL COMPANY OF HORNERS

Toolkit



- Rubber latex solution (can be sourced from craft shops like Hobbycraft or online)
- Lemon juice or vinegar
- Small container
- Tea spoon
- Vinyl protective gloves
- Eye protection
- Drying up cloth
- Bowl of cold water
- Sodium bicarbonate (optional)

About this activity



Natural rubber latex is the elastic hydrocarbon polymer liquid obtained from rubber trees. Synthetic rubber can also be made.

Change liquid rubber to a solid rubber ball, simply by adding an acid such as lemon juice or vinegar! Observe the chemical reaction that takes place, called cross linking, where individual chains in the liquid become linked to one another.

Watch out!



Rubber latex solution may cause a skin allergy for some people so avoid skin contact; eye protection and vinyl gloves should be worn when handling. Rubber latex solution contains a small amount of ammonia so do not sniff the solution. Once the rubber is solid it is unlikely that there will be an allergic response so the rubber ball can be handled normally.

WOW!

Why not try this for Demo Day?

Part 1

Make the rubber ball

Place a small amount of rubber latex solution in the small container and add a small amount of lemon juice or vinegar. Stir with a teaspoon until a solid rubber is formed. Next, place the solid rubber in the large bowl of water and mould it into a ball shape using your hands. Finally dry the ball using the cloth.

Part 2

Test the rubber ball

Put your rubber ball to the test and investigate its 'bounciness'. Measure by dropping the ball from different heights and see how far up it bounces. Why not try comparing your rubber ball to other material balls such as a ping pong ball, or tennis ball?

Part 3

Make a foam rubber ball

Foam rubber is made in the same way as rubber, except carbon dioxide needs to be added during the creation process.

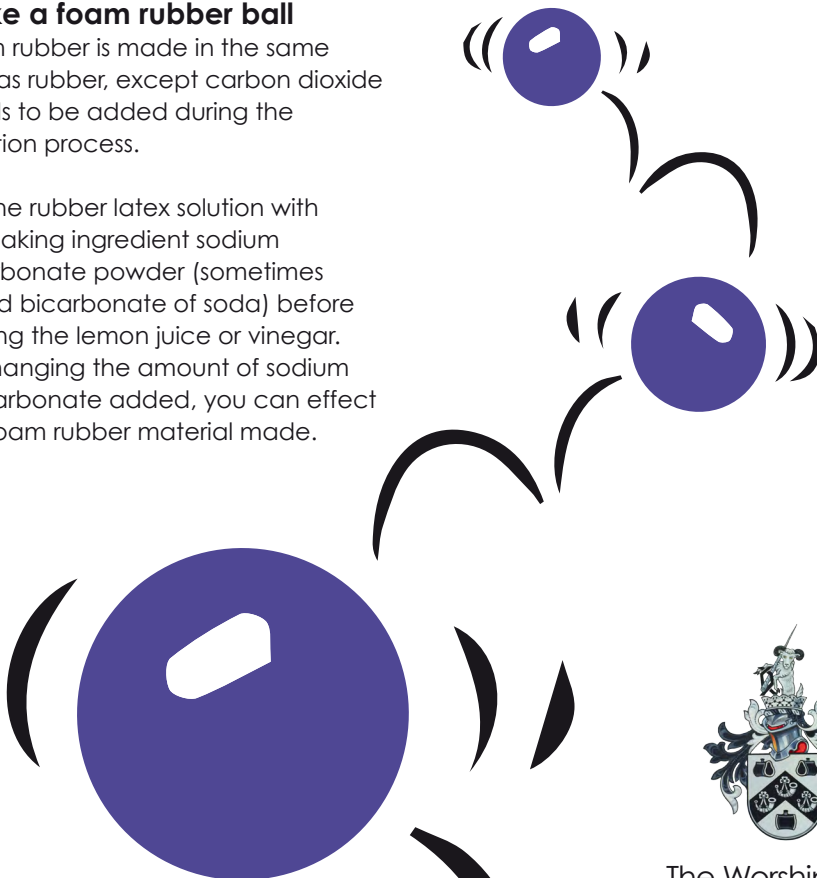
Mix the rubber latex solution with the baking ingredient sodium bicarbonate powder (sometimes called bicarbonate of soda) before adding the lemon juice or vinegar. By changing the amount of sodium bicarbonate added, you can effect the foam rubber material made.

Next steps

Rubber bands can also be made from the same ingredients used to make the rubber ball. More information and tests that can be carried out on the rubber bands plus other polymer based activities can be found in Gatsby Science Enhancement Programme booklet "Fantastic Plastic"

stem.org.uk/elibrary/resource/27273

This activity is based on the Fantastic Plastic booklet and acknowledges the Gatsby Science Enhancement Programme.



The Worshipful
Company of Horners

Toolkit



- Yourself and some friends/classmates
- Some space to move around in (a classroom, hall, playground)

About this activity



This team-building activity will help you to understand and explain the structures of solids, liquids and gases, whilst getting creative and active.

Watch out!



Ensure that you are aware of your safety when working outdoors and are supervised at all times. Choose an area of open ground, a safe distance from roads or private property.



Part 1 Representing the states of matter

Imagine you and your fellow classmates are all molecules.

Consider how you might represent the different states of matter:

Solid

Freeze in place near one another, and try to link up/touch the person nearest to you. Like a table or a chair or a block of ice, solids don't look like they are moving on the outside. Molecules in a solid are rigid and still (at least, compared to those in a liquid or gas).

Liquid

Wave your arms in the air and walk slowly about, as if you are floating in a pool. Liquids, like water or juice or soup, flow.

Gas

Throw your arms about and wriggle and wobble and shake (without harming anyone close by) and run around gently bouncing off of one another. In a gas, the molecules have so much energy that they zip around like crazy!

Consider movements you might create to represent:

Evaporation

A liquid changing to a gas

Melting

A solid changing to a liquid

Freezing

A liquid changing to a solid

Condensation

A gas changing to a liquid

Part 2 Play a 'Solid, Liquid... Gas!' game

Play 'Solid, Liquid... Gas!', a game you might recognise as "Red Light, Yellow Light, Green Light". Solid is Red (freeze in place); Liquid is Yellow (walk); and Gas is Green (run).

You and your classmates must start in a line at one end of the hall/playground and a designated 'caller' will shout out prompts. The aim of the game is to all race to the finish line whilst following the prompts. Those who do not follow the prompt are sent back to the starting line.

To make the game trickier, start using different words. Instead of Solid, use "Table", "Basketball", "Train". Instead of Liquid, use "Lemonade", "Strawberry Milk", "Smoothie". Instead of Gas, use "Air inside a tyre" and "What you breathe". Slowly transition into more difficult prompts as the game progresses.

The first to the finish line becomes the new 'caller'.

Next steps

Find more resources on the Association of Science Education's resource bank ase.org.uk/resources

Toolkit



- ⦿ 100 pieces of equal-length wool or string in 5 different colours - blue, green, brown, red and yellow (20 pieces of each colour)
- ⦿ Tape measure
- ⦿ 2 strips of double-sided tape
- ⦿ Board/flip chart stand

About this activity



This activity aims to explain the importance of camouflage as part of animal and plant adaptation for survival in different environments and how adaptation may lead to evolution.

Watch out!



Ensure that you are aware of your safety when working outdoors and are supervised at all times. Choose an area of open ground, a safe distance from roads or private property, free from broken glass and not contaminated with dog mess.

Part 1 Preparations

Mark an outdoor area of 12m by 12m using the tape measure – this can be in a meadow, or woodland area or the school playing field. Have one person spread the 100 strands of coloured wool/string randomly over the marked out space. These pieces of wool/string are 'worms'.

Place two strips of double sided tape vertically about 30cm apart on the board or flip chart stand.

Part 2 Hunt for worms

Divide yourself into two teams and line up on either side of the board or flipchart. One at a time, pretend to be a bird and fly/run to the marked area and bring back the first worm you see on the ground. Return and stick the worm on the tape starting at the top and work down in order of collection.

Keep playing the game until everyone involved has returned with a worm and pause the game to analyse the results. Alternatively, get competitive where each team continues to take turns to search, as a race to see who collects most worms. After 5 minutes stop the game and analyse the results.

Part 3 Get analysing

Have a look at your results and think about the following questions:

- ⦿ Which colours have been collected?
- ⦿ Which coloured worm has been collected the most? Why do you think this is?
- ⦿ How many worms has each team collected?

Consider the impact of the worm's colour on evolution:

- ⦿ Which colour worm has the best camouflage?
- ⦿ What colour are the real worms you've seen?
- ⦿ How might this protect them from predators?
- ⦿ Could worms be any other colour and still survive?
- ⦿ What colours might we see in other locations in the environment, e.g. a desert, a river etc?
- ⦿ What animals do you know of with excellent camouflage?

Next steps

Find more activities on The Inland Waterways Association website
waterways.org.uk/wow



This activity links with our Clever Camouflaged Creatures CREST Star activity crestawards.org/project-resources



CHANGING ENVIRONMENT CHANGING LIKE THE WIND

WITH THE ROYAL METEOROLOGICAL SOCIETY

Toolkit



- Bubble blowing kit
- Compass or compass app
- Measuring tape
- Watch or stopwatch

About this activity



Whether it's a gentle breeze or blowing a gale, explore how the wind changes using bubbles to measure both direction and speed.

Watch out!



Ensure that you are aware of your safety when working outdoors and are supervised at all times. Choose an area of open ground, a safe distance from roads or private property.

Part 1 Track the wind direction

Place a marker at your start location, and then blow some bubbles and pick one to follow. Chase your chosen bubble, without getting in its way, until it pops or floats somewhere you cannot follow.

Blow another bubble from where you end up and follow that one. Repeat this up to ten times if possible. Wherever you end up, look back at where you have come from.

Now use your compass to work out the direction back to the starting point. This will give you the average wind direction, because wind direction refers to where the wind is blowing from.

Part 2 Work out the wind speed

Assign someone to be a 'blower' and another as a 'timer'.

Place a marker at your start location and another marker 10 metres away (roughly ten paces), in the general direction the wind will carry the bubbles. This will be your bubble 'racecourse'.

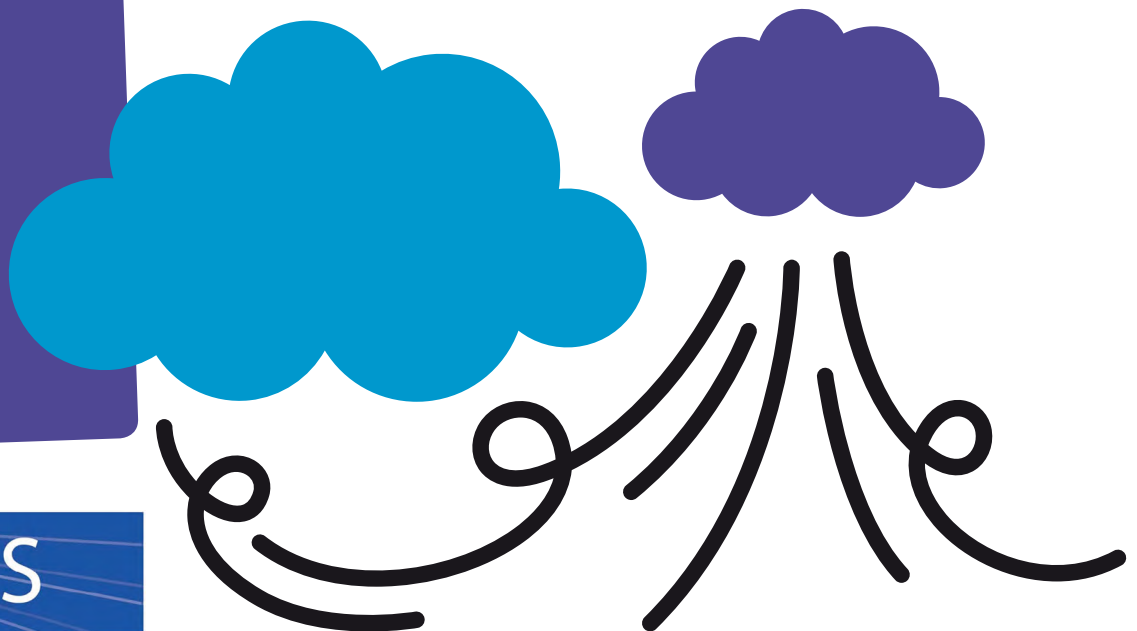
Have the 'blower' blow some bubbles, and the 'timer' pick one to follow. The 'timer' uses the watch/stopwatch to measure how long it takes the bubble to reach the finishing line. By knowing the time it took to travel 10 meters, you can calculate the wind speed.

$$\text{Speed} = \text{distance}/\text{time}$$

Is the wind speed and direction the same everywhere, or can you find differences, for example as you move around a building?

Next steps

For more activities from the Royal Meteorological Society, take a look on their website metlink.org



CHANGING ENVIRONMENT

MY 'MOON DIARY'

WITH BBC TERRIFIC SCIENTIFIC

Toolkit

- Pen/pencil
- Notebook



About this activity



Our Moon is beautiful and we've been staring at it for ages! It is said we know more about the surface of the Moon than we do about the depths of our oceans. But what if we can't see it? Can we see the same amount of the Moon every night?

This activity will show you how differently we see the Moon over time by keeping a diary, and help you come up with ideas as to why this is.

Watch out!



If you can't see the Moon from your house, you might need to go outside. Make sure you have a parent or guardian to go with you at all times if you do!

STARGAZING
LIVE

Part 1 Start your 'Moon Diary'

To start your 'Moon Diary', write the date in your notebook and leave a space next to it for your drawing of the Moon.

Part 2 Look for the Moon

You might not be able to see the Moon every evening, depending on the day you start your diary. Why could this be? If it is very cloudy and you can see light from the Moon but not the shape it appears to be, don't worry! Write this down and try again tomorrow.

Part 3 Draw the Moon

Draw the Moon each night for a month. Consider whether the Moon looked the same yesterday as it did today? What about two weeks ago? Why do you think this could be?

If you cannot see the Moon, sketch the shape of the light coming from it, by drawing a circle and colouring it in, so the bits left blank are what you can see in the sky.

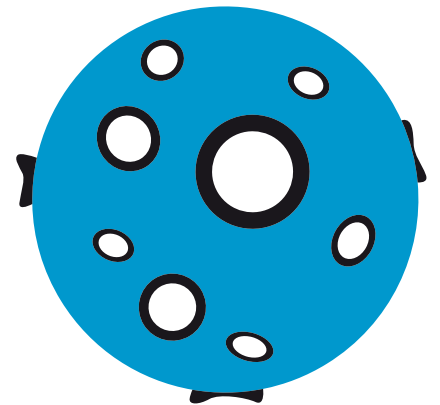
Part 4 Learn how the Moon moves

Make sure you check out the BBC Terrific Scientific website to learn more about the Earth and how the Moon moves around it, go to bbc.co.uk/terrificscientific

Next steps

If you liked this activity, be sure to check out the BBC Terrific Scientific website bbc.co.uk/terrificscientific/sections/terrific-stuff where you'll find many more fun things to do!

This activity links to the Terrific Scientific Time Investigation, which your school can take part in. Make sure your teacher has signed up for this exciting mass investigation and find out more at bbc.co.uk/terrificscientific/sections/teachers or bbc.co.uk/terrificscientific/sections/cymraeg



Toolkit



- Chalk (jumbo outdoor chalk would be ideal, and water-soluble)
- A willing volunteer who can stand still for a minute or two
- Enough sunshine to cast a shadow!

About this activity



For thousands of years, we have been using the Sun to tell the time. Sundials cast shadows which could be used to tell what time it was during the day. But how do they work? And can anything be a sundial?

In this activity, you will become a human sundial! By looking at the shadows you cast during the day, you'll be able to see how helpful the Sun is in telling the time.

Watch out!



You'll need to go outside for this activity, so make sure you have a parent or guardian to go with you at all times. They can help you draw your shadow and you can do theirs too!

STARGAZING
LIVE

BBC

TERRIFIC
SCIENTIFIC

Part 1 What are shadows?

Think and discuss in groups about what you already know about shadows:

- What are shadows?
- When do you have a shadow?
- Can you pick up a shadow?
- Can your shadow become detached from you? If so, how?
- Can you ever have more than one shadow? How?

Part 2 Head outside

Go outside with your friend/parent/guardian and look for a concrete floor which gets lots of sunshine. Ideal places to use are your school playground, the closest park and areas away from tall buildings, fences and trees that would block the sunlight from reaching the ground.

With your chalk, draw an 'x' on the ground where you, the human sundial, are going to stand, and mark the direction you are facing on the ground also. Ask your friend/parent/guardian to use the chalk to draw around the shadow you are casting. You can then swap places and draw around their shadow too!

Come back to the same spot every hour or so, face the same direction and draw your shadows again. Repeat as many times over the course of the day as you'd like.

Part 3 Examine your human sundial

At the end of the day, go and look at your human sundial. What do you notice about your shadows? Are they in the same place now as they were when you first drew them? Are they the same size? What's changed?

Consider the whole Earth, and whether the same pattern of shadows would be seen everywhere else in the world? How does the rotation of the Earth affect sunlight across the world?

Part 4 Learn how the Earth moves around the Sun

Make sure you check out the BBC Terrific Scientific website to learn more about the Earth and how it moves around the Sun at bbc.co.uk/terrificscientific

Next steps

If you liked this activity, be sure to check out the BBC Terrific Scientific website bbc.co.uk/terrificscientific/sections/terrific-stuff where you'll find many more fun things to do!

This activity links to the Terrific Scientific Time Investigation, which your school can take part in. Make sure your teacher has signed up for this exciting mass investigation and find out more at bbc.co.uk/terrificscientific/sections/teachers or bbc.co.uk/terrificscientific/sections/cymraeg.



PENGUIN WATCH: CITIZEN SCIENCE

WITH ZOONIVERSE AND PENGUIN LIFELINES

Toolkit



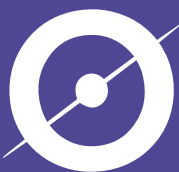
- A computer/laptop or mobile/tablet
- Internet access
- A keen eye

About this activity



Climate change is having many negative effects around the world, and one area feeling it more than others is the cold icy region of Antarctica. Many wonderful wildlife species are in decline from changes to their food supply and habitat, and there is a huge gap in our understanding of the Antarctic ecosystem. As a result, Penguin Lifelines has teamed up with citizen science organisation Zooniverse to help measure changes to penguin populations.

Penguin Watch is a citizen science website that is trying to understand the lives of penguins. To do this, scientists have travelled to some of the coldest areas on the planet to learn more about penguin populations. However, they need your help to examine hundreds of thousands of images of wildlife in Antarctica and the Southern Ocean that have been taken over the past three years. Get involved and be a part of the conservation effort!



ZOONIVERSE

Part 1 Get online

Head to penguinwatch.org register an account and log-in.

If you want your school to sign up, and you want to adopt a specific colony, register as normal and then contact the organisation.

Part 2 Pick out a penguin

This online activity involves you individually marking adult penguins, chicks, and eggs in the image presented to you on the screen.

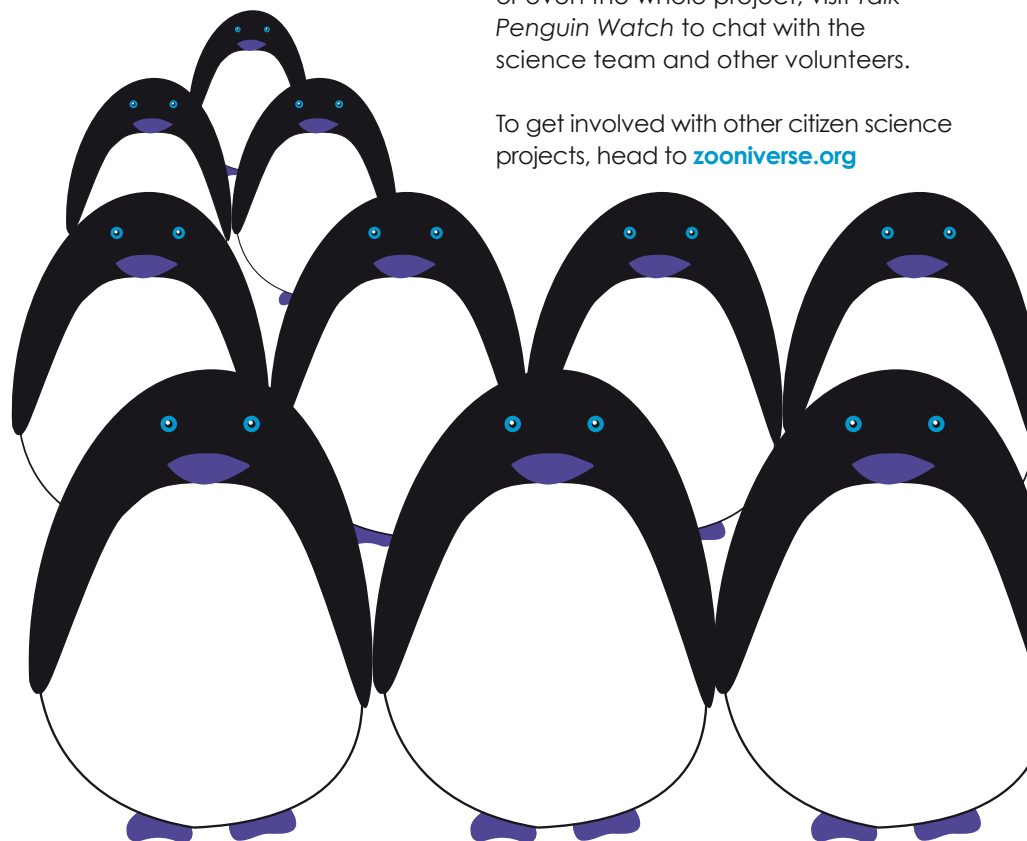
How does it work?

- Choose whether an individual is an 'adult', 'chick', 'egg' or 'other', then click and drag the marker to its centre
- Remove any accidental marks using the black-and-white cross
- If the penguins are too small to count or too far in the background, don't worry, simply mark any in the foreground and then click "Too many penguins to mark"
- Bad weather? Just click "I can't tell"
- Partially obscured? Click as many penguins as you can
- Mark any other animals you see in the image too, so the scientists can see how often they are found near the penguins' nests

Next steps

If after picking out your penguins, you want to discuss a specific image or even the whole project, visit *Talk Penguin Watch* to chat with the science team and other volunteers.

To get involved with other citizen science projects, head to zooniverse.org



CHALLENGES

POSTER COMPETITION

Toolkit



- Paper (A4 or A3)
- Creative materials such as pens, pencils, scissors, glue, watercolours, paint, colouring crayons, glitter, pipe cleaners, felt, thread, wool, foil, clay, straws, string, beads, stamps, googly eyes, foam, sequins, pom poms

About this activity



Get creative and enter the British Science Association's annual poster competition. You can make your poster about whatever type of change you like, and enter into our UK-wide competition with the chance to win an array of prizes!



Many activities found in this pack could also be entered into the poster competition, simply look for the paintbrush symbol above. Or you can use them to serve as a source of inspiration to get you started.

Part 1 Research your poster

Investigate or imagine the different types of changes occurring in science and the natural world around you. Choose a topic for your poster and do some research around the idea:

- What different types of change can we examine in nature?
- Carry out a science experiment and investigate the changes.
- How has our world changed over the years?
- Think about how you might change the world in the future.

Part 2 Make your poster

Once you've done your research, it's time to get creative!

Your poster must be:

- 2D (flat) – if you make a model, you need to just send us a photo of it
- On A4 or A3 paper

You can use pop up pictures, pull out tabs or use materials such as paint, drawing pencils, crayons and paper.

Part 3 Send us your poster

Posters will be judged on how creative and well-researched the ideas are and how well the poster has been made or drawn.

Once your poster is complete, write all your information on the back, have your teacher, leader or parent/guardian fill in the online registration form, and then post your entry to us.

Next steps

Celebrate! Whether you win a prize or not, you can join makewav.es/britishscienceweek for free, and upload a picture of your poster to get a special BSW2017 digital badge.

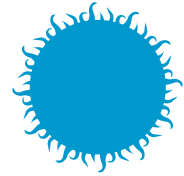
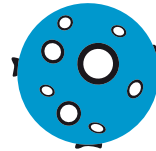
For more details, along with the full set of rules and tips for educators, check out our website britishscienceweek.org/plan-your-activities/poster-competition/



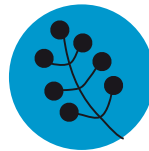
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Species of penguin	Rockhopper	Humboldt	Emperor	Gentoo
Natural disasters	Earthquake	Drought	Eruption	Flooding
Seasons	Spring	Summer	Autumn	Winter
Famous scientists	Einstein	Newton	Darwin	Hawking

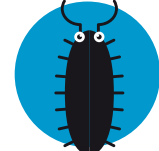
CHALLENGES
ANSWER SHEET



List your reasons	Known to have life	Is significantly smaller	Star/ball of gas
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List your reasons	Was part of an animal	Living	Has never been alive
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List your reasons	Lives underground	Not an invertebrate	Has legs/appendages
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