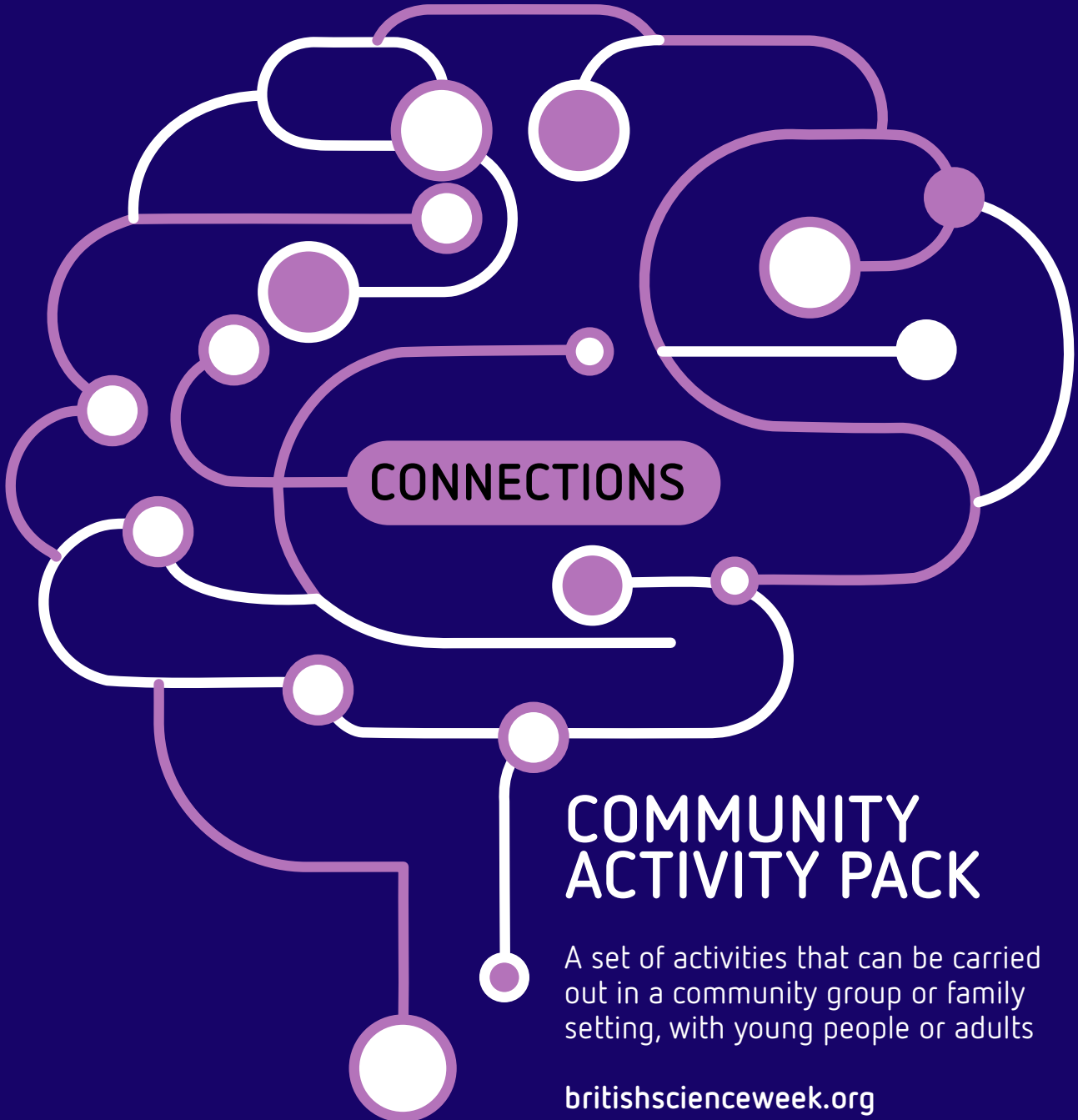




10-19 March 2023



COMMUNITY ACTIVITY PACK

A set of activities that can be carried out in a community group or family setting, with young people or adults

britishscienceweek.org

Delivered by



Supported by





BRITISH SCIENCE WEEK

10-19 March 2023

This activity pack is a one-stop shop to support you during British Science Week, but you can use it all year round!

British Science Week is a ten-day celebration of science, technology, engineering and maths. Feel free to adapt any of the activities to suit your audience's needs – we've chosen a selection of ideas to suit various age groups, abilities and settings.

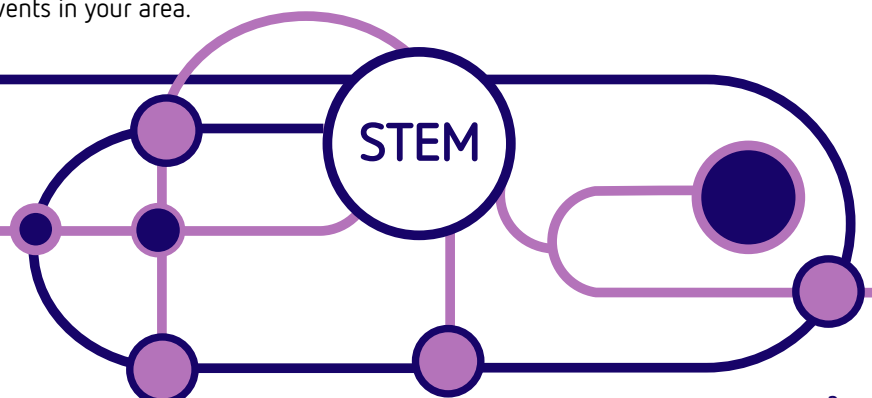
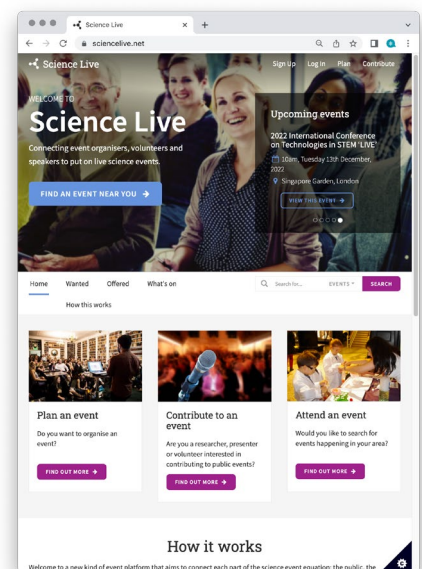
When developing this pack, we looked for activities which promote learning and discovery, and that break down the stereotypes surrounding science, technology, engineering and maths (STEM). We therefore encourage you to use British Science Week as an opportunity to link science to other topics relevant to your audience, including their own backgrounds, lives and interests.

The activities can be run as part of a community group, as a family, with friends or by yourself. You can do them at community events, clubs, or even at home.

Share your brilliant activities, vlogs or images on social media! Join the conversation or see what's happening during the Week by tagging the British Science Week (@ScienceWeekUK 🐦) and using the hashtag #BSW23.

Find an activity near you

British Science Week is a nationwide event – there are events and activities taking place all around the UK! You can create your own activity and see what activities are happening near you. Visit sciencelive.net 🐭 to find out about all sorts of science-related events in your area.



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We want to hear from you!
Tell us what you think of the
activities using our survey...



Visit bsa.sc/activitypacksurvey 

INTRODUCING THE THEME

CONNECTIONS

The theme this year for the British Science Week activity packs is 'Connections'! With unlimited opportunities and interpretations, 'Connections' can be linked to multiple science, technology, engineering and maths topics.

There are examples of connections all around us, making it an excellent starting point for a celebration of science! You can use your own ideas to create your event. Here are some topics to inspire you:

- Evolution and how all animals are connected in an ancient family tree.
- Construction and how building materials connect to create magnificent structures.
- Human connections and how people work collaboratively to innovate.
- Communication and how global connections have been made through inventions like the telephone and internet.

We'd love to find out what 'Connections' means to you and how you'd like to see that reflected in our events and activities, so please do get in touch and let us know what you think here: bsa.sc/activitypacksurvey ✨.

Introduce this theme to your audience in a fun, imaginative way to get them excited for the week ahead! Check out some ideas below:

- If you're working with young people as part of your British Science Week celebrations, why not challenge them to design a poster based on the theme of 'Connections', using the activities in this pack? You can then enter it into our poster competition. Simply look out for the activities marked with the paintbrush symbol shown below. Find more information on how to enter on [page 23](#) ✨ and at britishscienceweek.org/plan-your-activities/poster-competition ✨.
- Try a game, give an audio-visual presentation, explore a mystery or special object, or create a pop-up display which communicates the theme of 'Connections'. These activities are great to use as fun warm-ups, and are a fantastic way to start British Science Week.

- Engage your audience by discussing how connections are a part of people, plants, animals, materials, countries and other things in their everyday lives. What are good examples of connections?
- Invite a special guest or someone from the community to share with your audience their own experience of connection (for example, how they started their career and connected with other scientists. [See page 5](#) ✨ for information on how to get volunteers.

Here are some other ideas to include to start the week:

- Tell your audience about the plan for the Week and give them a challenge related to the theme. If you are sending home an experiment, maybe you could introduce or demonstrate it at your setting first.
- Connections are all around us. Where has the topic of connections appeared in the news or your local area? What are examples of good or bad connections? Is there any way you can encourage conversations about this with your audience?

MAKING THE MOST OF VOLUNTEERS



Face-to-face activities and events are a great way to engage your audience, and volunteers and presenters are keen to support these activities.

Don't forget that there are still opportunities to get volunteers and presenters to interact and be part of your British Science Week celebrations online as well.

STEM Ambassadors are volunteers who offer their time and enthusiasm to help bring science and technology subjects to life. It is now possible to request both in-person and remote STEM Ambassador support, meaning that Ambassadors from across the UK can inspire people wherever they are.

Find out more and make a request for STEM Ambassador support here: stem.org.uk/stem-ambassadors/find-a-stem-ambassador ✨.

You can also look for presenters and volunteers via Science Live (sciencelive.net ✨), or why not ask members of your community group if they, or someone they know, work in STEM-related jobs, and if so to describe what they do in more detail.

You could also try some of the following things.

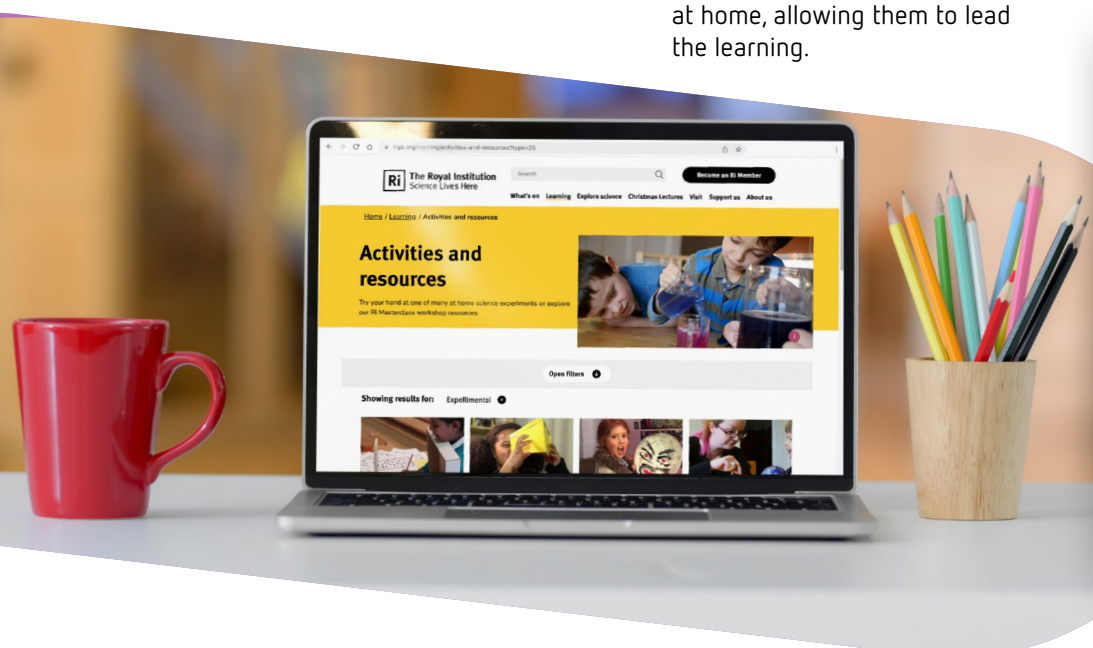
- Schedule two or three different guests for open conversations and discussions during the Week, if possible, to get your audience anticipating who the next guest will be and what they do. Consider your audience and how to make it engaging, fun, accessible, and include an element of audience participation. These sorts of experiences can be intimidating if your audience isn't comfortable speaking to an expert on a particular subject – so giving them a bit of advance warning can help. It's also worth briefing your speakers in advance too – to make sure they know what to expect and to encourage them to be as inspiring, open, honest and inclusive as they can be.
- STEM volunteers can also help you develop your activities, bringing new ideas and learnings. If you already have activities in mind, why not see if a local researcher or other STEM volunteer can support you in developing them further?
- Where available, choose volunteers/Ambassadors who challenge stereotypes your audience might have of science or scientists, in order to promote a more positive attitude towards the subject. Let the volunteers/Ambassadors share what inspires them and how their job is making a difference in the world, or an anecdote of a science activity they really enjoy.
- Book your volunteers early, as many people get booked up during British Science Week. Have a clear idea of what you want them to do and communicate this with them ahead of time.

Volunteers come from a range of careers and experiences, from engineers, designers and architects to scientists and technicians, so get your audience looking forward to inspirational sessions which broaden their horizons and make them question their own preconceptions about science!

BRITISH SCIENCE WEEK AT HOME

Do you want to help your audience carry on participating in British Science Week at home, but are not sure how? Here are our top tips for engaging them with the Week.

- Let your audience know at least a month in advance about the Week, what you have planned, and how you'd like them to be involved. They might be able to collect or donate materials for use during the Week, and if you want them to get involved in any experiments at home they may need time to plan and collect materials themselves.
- If you're working with young people, many of the British Science Association's CREST activities are quick and easy to do as fun challenges: collectionslibrary.crestawards.org.
- Send an experiment idea home during the Week to perhaps spark mealtime discussions around science. Try to make it as low-resource as possible. It can help if it's something your audience have tried or seen first so that they feel like the 'experts' when they do it at home, allowing them to lead the learning.
- In addition to this pack, there are lots of other useful ideas for take-home activities from series such as this one from the Royal Institution: www.rigb.org/families/experimental.





BRITISH
SCIENCE
WEEK
2023

UNLOCKING SKILLS



A fantastic way to encourage your audience to take an interest in STEM is to introduce them to the transferable skills used by those working in STEM-related jobs.

By highlighting that many of your audience already have the skills, it will hopefully strengthen positive attitudes and reduce the stereotypes often applied to those working in STEM.

You could, for example, engage your group in this **STEM Person of the Week** ✨ activity from NUSTEM at Northumbria University. Ask your audience to identify what attributes people working in STEM need. These might include being observant, creative, patient, good at communication, or curious. Look out for the Skills unlocked for each activity in this pack.

See the table below for the complete list of skills developed by NUSTEM to use as a talking point or to share with other groups.

Get your audience leading the way

A great way to encourage your audience's interest in STEM is by letting them lead the way. Here's how you can help them along:


- Encourage your audience to run their own activities during British Science Week. They could either run activities for other members of the group or run some activities with family or friends, taking photos to present back to your group.

- Ask your audience to research how connections have influenced the way we live our lives today and then write a report for the group's newsletter or website.
- Encourage your audience to design and create their own display, such as a display of scientists through time. This could be a photo exhibit that emphasises the diversity of scientists, and which helps to overcome the 'scientist in a white lab coat' stereotype.

Observant	Open-minded	Committed	Curious	Logical
Creative	Imaginative	Patient	Self-motivated	Collaborative
Resilient	Communicator	Passionate	Hard-working	Organised

IMMUNOTHERAPY DARTS

This activity aims to demonstrate how cancer immunotherapy works. Immunotherapy is a cancer treatment that uses the power of the body's immune system to prevent, control, and get rid of cancer. Immunotherapy targets only cancer cells by taking advantage of how the immune system recognises different cells in the body through different shaped molecules on their surface.

 30 mins

Skills unlocked: Careful, Patient

Kit list

Magnetic dartboard/
noticeboard

Magnetic darts

Different cells of
different shapes
made of paper stuck
on the dartboard/
noticeboard
(see next page)

Double sided tape
or blu tack

A way of keeping
score

Scissors

Instructions

- 1 Print off the worksheet. Cut out the cells and stick them to your dartboard. Healthy cells (pink) should be evenly spread across the dartboard. Cancer cells (green) are found less frequently and are harder to hit. Cancer cells should be placed close to healthy cells.
- 2 Use the darts to try and hit as many cancer cells as you can. But watch out, if you hit healthy cells, you'll lose points.
- 3 Cancer cells are worth 100 points, healthy cells are -20 points. Make sure you keep score and add up your points at the end of your turn.
- 4 Did you find that hard or easy? There are ways we can boost our immune system, through immunotherapy. Move closer to the board and try again. Does that make it easier?

Watch out

- Make sure the dartboard is secure and won't fall down when hit with darts.
- Make sure you do this activity in a safe area where you can't hit anyone or anything which might be knocked over!
- Ensure no one is standing near the dartboard when darts are being thrown.
- Use scissors carefully.

Next steps

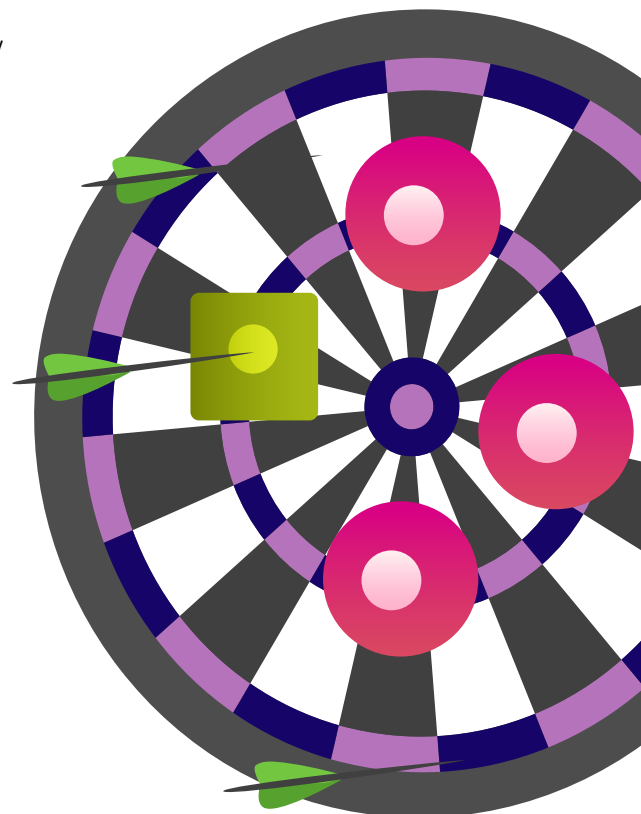
If you enjoyed this activity, take a look at the British Society for Immunology's activities: www.immunology.org/public-information/immunology-related-activities-and-resources/cancer-immunotherapy ✨

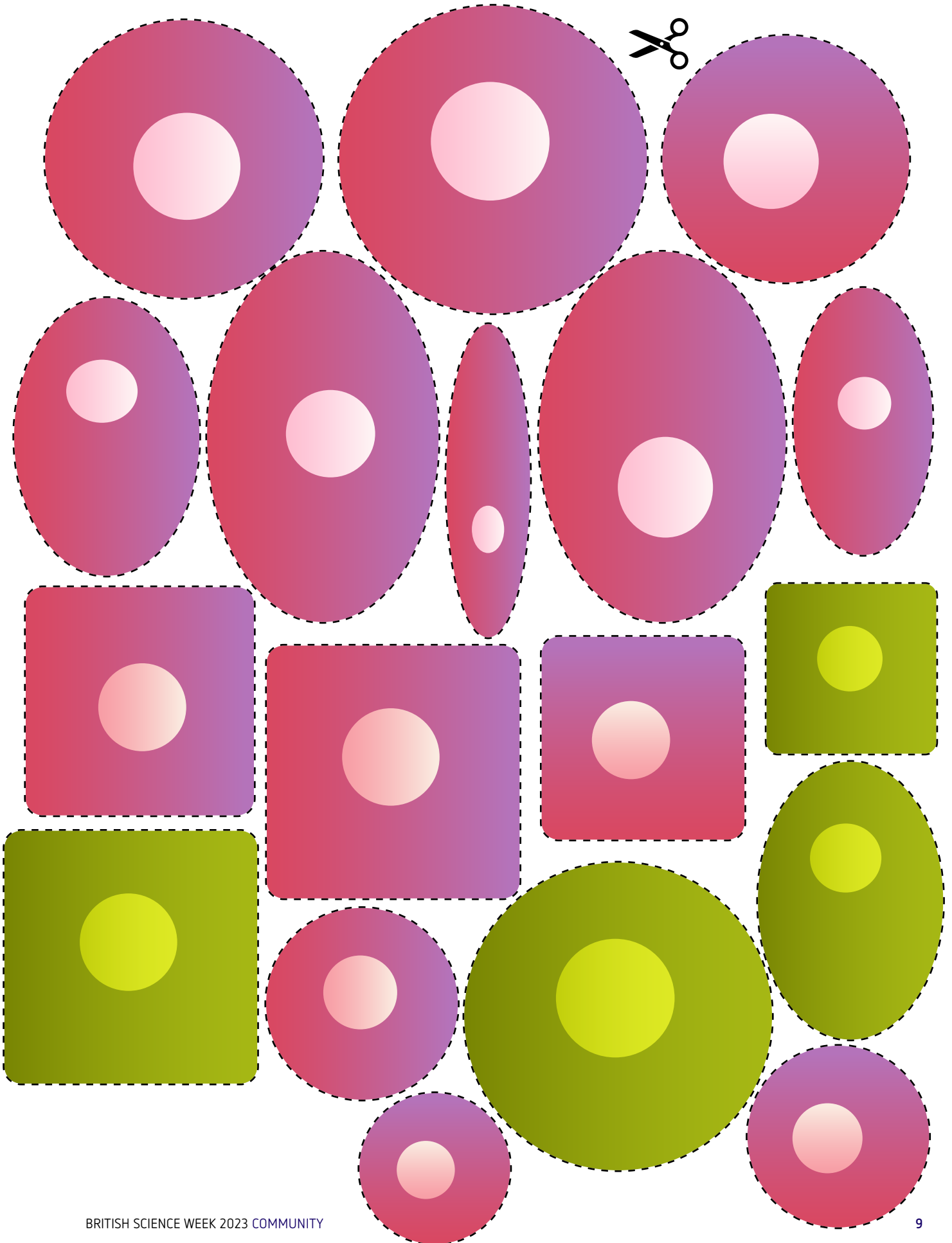
At home

Do you know that cells of the immune system interact with many other diseases? Can you find out more about the immune system and these diseases?

Career options

- Immunologists study the immune system, which helps us understand how to treat lots of different health issues. Many immunologists work in a laboratory focusing on research, such as developing immunotherapies against cancer, and others are "clinical immunologists" – doctors who diagnose and manage diseases of the immune system.





HOW CLEAN IS OUR AIR?



Air contains elements we need for life: oxygen, nitrogen and carbon dioxide. However, particulate matter, nitrogen dioxide and carbon monoxide are also present. Changes in the balance of air's 'ingredients' affects living organisms. Different ways of travelling contribute to these changes.

🕒 30 minutes during British Science Week, plus a session in the following week for a follow-up activity

Skills unlocked: Collaborative, Logical, Creative, Problem solving

Kit list

Internet connection

Computer, laptop, tablet or smartphone

Find out about travel habits in your community, and compare them with others across the country. Think about ways to help improve air quality by changing these habits.

Instructions

- 1 Start by watching this short video on the causes, effects and solutions of air pollution: bsa.sc/Air-pollution-video 📺
- 2 Read this information sheet to learn a little about pollutants emitted by different types of transport: bsa.sc/Air-pollution-info-sheet 📄
- 3 Complete the survey (forms.gle/ArVDczk2K2ktRXSWA 📄).
- 4 Access the current up to date results here: bit.ly/bsw-community-responses 📄
- 5 Follow the instructions opposite to filter for your local postcode and for your region.
- 6 Add a sticky note to our promise wall here: bit.ly/BSW-Community-Promise-Wall 📄 to show one thing you will do to help reduce traffic related air pollution.

Instructions for filtering results in Google Sheets

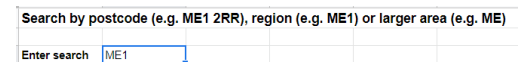
- 1 Open the spreadsheet - bsa.sc/community-transport-survey 📄
British Science Week - Air Quality - Community Transport Survey (Responses).



- 2 Open the second sheet (Filter by area).



- 3 Enter either the postcode of your nearest school (e.g. ME1 2RA), or the first part of your local postcode (e.g. ME1) or just the area code (e.g. ME) to show just the responses in that area.



- 4 Open the third sheet (Dashboard) to see some charts for the filtered results.



Next steps

- After this activity you might want to think about how you could help to raise awareness of the issues around air quality.
- Various resources are available to create awareness of climate change, starting with those aimed at a younger audience:
- Video about Smokey and air pollution: www.youtube.com/watch?v=t7Q7y_xjR5E 📺
- An older audience may find these resources informative:
 - climatekids.nasa.gov/menu/atmosphere 📄
 - bsa.sc/bbc-bitesize-transport-sustainability 📄

EXTRACTING DNA FROM A STRAWBERRY

Four chemical coding blocks in our DNA connect all living organisms! DNA (deoxyribonucleic acid) is a long spiral-shaped chemical that contains all our genetic information. The four building blocks combine in different permutations to code a set of instructions for our growth, development, and reproduction. In this activity you will be extracting DNA from strawberries.

 30 minutes

Skills unlocked: Observant, Curious, Logical.

Kit list

100ml alcohol hand
sanitiser (70%+
alcohol content)

200g strawberries

Potato masher or
large fork

Washing up liquid

Table salt

Measuring jug

Teaspoon

Large bowl

Cling film

Washing up basin

Sieve

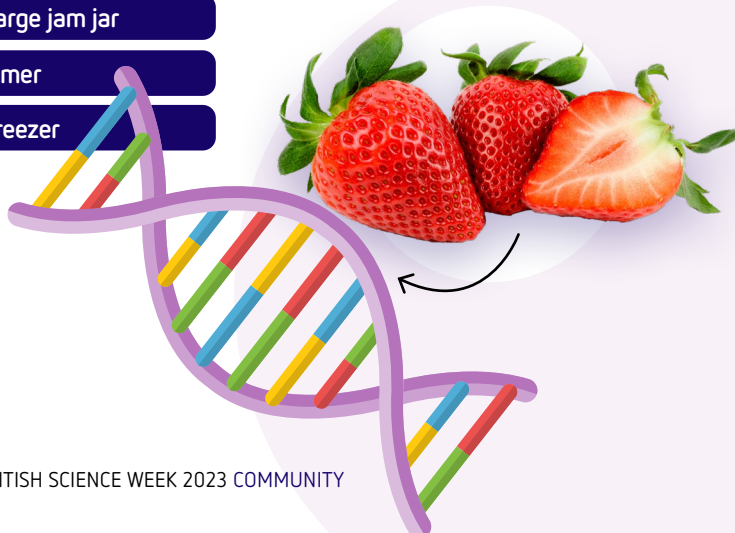
Large jam jar

Timer

Freezer

Instructions

- 1 Cool the alcohol hand sanitiser in a freezer for 30 minutes before starting.
- 2 Mash the strawberries in a bowl with a potato masher.
- 3 Add one teaspoon of washing-up liquid and one teaspoon of salt to 100ml of water and stir slowly until dissolved.
- 4 Add this liquid to the mashed-up strawberry and continue to mash until the mixture is very runny.
- 5 Pour the mashed-up strawberry mixture slowly through a sieve into the jam jar to filter off any lumps of material.
- 6 Pour all the ice-cold alcohol hand sanitiser down the side of the jam jar. You will see that a clear layer forms on top of the strawberry mixture.
- 7 Where the alcohol meets the strawberry mixture, a white jelly-like substance forms and this is the DNA!



Get everyone involved

Younger children - DNA can be extracted from lots of different fruits and vegetables. Why not try extracting DNA from a kiwi fruit or an onion? A gene is a short section of DNA that contains the genetic code to control a characteristic such as how we look, how we function and some aspects of our health. Genes are passed from parents to their children. Discuss what characteristics are influenced by the genes in our DNA – for instance eye colour, hair colour, and height.

Older children - Find out how DNA is used to solve crimes, and how much DNA humans have in common with other humans, chimpanzees, mice and strawberries.

Adults - Find out more about how mutations in our DNA can cause inherited conditions such as some cancers, other conditions and colour blindness.

Watch out

Strawberry juice may stain, so keep away from fabrics and furniture! Ask an adult to handle hot liquids. Only use alcohol hand sanitiser/gel in a well-ventilated space and away from naked flames. To avoid any known food allergens, you can use alternatives to strawberries such as a kiwi fruit or a medium sized onion. This activity should be supervised at all times.

Next steps

The Salters' Institute Experiment of the Month brings chemistry and science to life for the whole family. See the whole collection at www.saltersinstitute.org/resources. From 'Erupting Lemons' to 'Brilliant Bubbles', there is something for every budding chemist and scientist!

Career options

DNA extraction and identification techniques are widely applied in the biochemical industry. Job opportunities are available in fields such as: archaeology, anthropology, epidemiology, forensics, food technology, genetics, horticulture, medicine, veterinary medicine and wildlife conservation. Jobs are also based in different locations, for example in a lab, clinical setting or in the field.

CONNECTING THROUGH DEBATE

Being able to give your opinion clearly and listen to the opinions of others is what connects us. It's how ideas flow and how people solve problems.

Members of your group will take on different roles to encourage a lively, healthy debate.

🕒 15 minutes

Skills unlocked: Open-minded



Kit list

A watch or timer

Instructions

Step 1: Choose a very important topic to debate from our list:

- cats verses dogs
- football verses playing video games
- the beach verses the park
- chips verses pizza
- books verses TV.

Step 2: Assign people to each side of the argument. Toss a coin if it's tricky.

If you have enough people, you can have a team of observers, who can decide which team to support at the end.

Someone could also keep time.

Step 3: Come up with a 1-2 minute argument that makes the case for your side.

Confer with your team.

- If you have time, you could research some facts on the internet to support your pitch.
- Who will present?
- How will you get other people to connect with what you are saying?

Step 4: Each side presents their argument. Good listening is key.

- Do you have any follow up questions for each other?
- Who do the team of observers think were most persuasive?
- Has anyone been persuaded to swap teams?

Step 5: Let's switch it up. Get back into your huddles and this time list the things you have in common with the other side. Who can come up with the biggest list? Compare them!

Next steps

- What were the things that were most persuasive when people were presenting?
- What didn't work so well?
- Was it easy to find things in common?
- When might these debating skills be useful in real life?

Career options

There are lots of scientific jobs within government. Many involve taking a problem and listening to all the available options before making an important decision about which way to act.



CONNECTIONS BETWEEN FOOD AND CLIMATE CHANGE

Did you know that food production contributes 30% of all greenhouse gas emissions, and the production of different foods cause very different amounts of emissions? For example, a portion of beef causes 10 times more emissions than a portion of baked beans, on average. This means our food choices can make a difference!

🕒 30 minutes

Skills unlocked: Curious, Logical, Observant

📋 Kit list

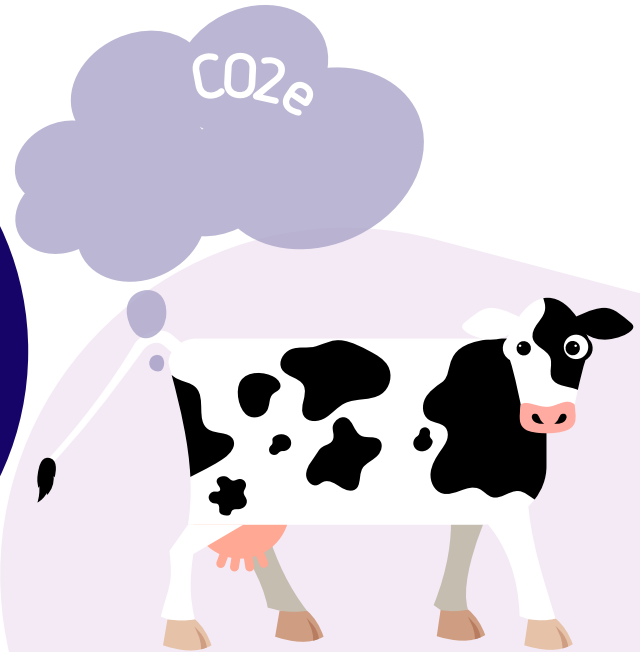
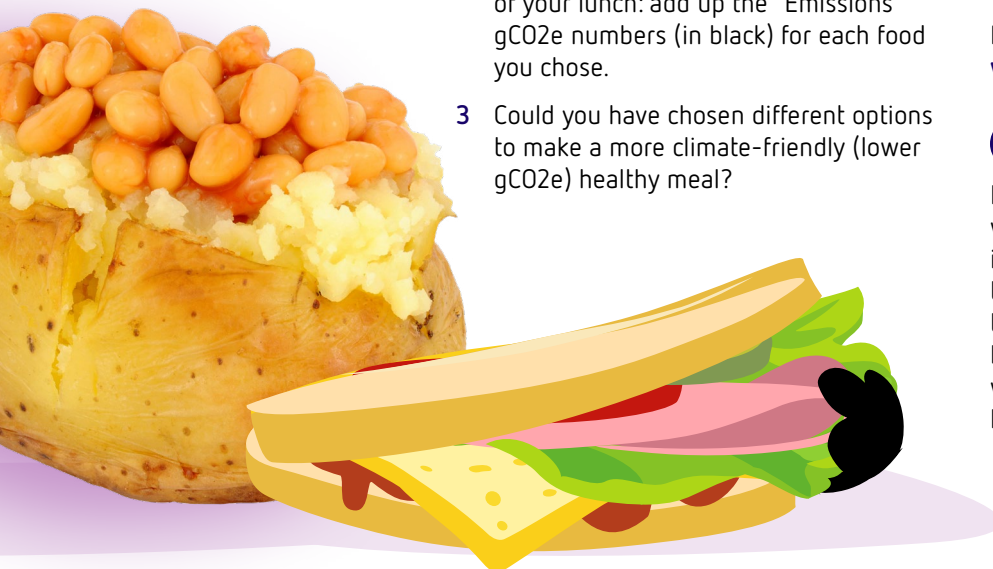
Pencil

Paper

📖 Instructions

On the following page, you can find information about climate impacts, water use and health benefits of some foods. The impacts were calculated by adding up the different processes to produce the food e.g. for toast this includes producing and applying fertiliser to the wheat, milling and cooking the bread, and toasting it; for steak it includes methane from cow burps and poo, as well as the impact of growing food for the cow.

- 1 First, look at the ingredients to build your own lunch in the "Setting up your lunch" box below. Choose one bread, one protein, one salad item and one fruit.
- 2 Now, use the information on each food card to calculate the total climate impact of your lunch: add up the "Emissions" gCO₂e numbers (in black) for each food you chose.
- 3 Could you have chosen different options to make a more climate-friendly (lower gCO₂e) healthy meal?



➤ Next steps

- You can watch a colleague at Take a Bite out of Climate Change doing the activity here youtu.be/j2t-WNuplqo 🌟
- Perhaps you prefer different foods? You can download the full set of Climate Food Flashcards here: www.takeabitecc.org/flashcards.html 🌟
- Find more activities here: www.takeabitecc.org/athome.html 🌟 and information: www.takeabitecc.org 🌟

🏠 At home

Can you find out the ingredients of your favourite dish and use the flashcards to calculate their climate impact?

Flashcards available here: www.takeabitecc.org/flashcards.html 🌟

↔ Career options

In the UK more than 1 in every 20 people work to get food onto our plates. Roles include those in farming, improving technology for automated farming systems, turning harvested crops into the food we buy, cooking food in canteens, and dieticians who help people understand how to make healthier choices.


CONNECTIONS BETWEEN FOOD AND CLIMATE CHANGE SETTING UP YOUR LUNCH



Flashcards available here:
www.takeabitecc.org/flashcards.html

CHOOSE ONE CARBOHYDRATE OPTION


Toast
Two slices (64g)



CO₂e
0.5
minutes driving

Emissions	90 gCO ₂ e
Water	30 litres
Fibre	5 g
Calories	190 kCal
Protein	6 g

Bread
Two slices (80g)




CO₂e
0.4
minutes driving

Emissions	60 gCO ₂ e
Water	30 litres
Fibre	6 g
Calories	190 kCal
Protein	7 g

CHOOSE ONE PROTEIN OPTION


Baked beans
From a can (200g)



CO₂e
3
minutes driving

Emissions	430 gCO ₂ e
Water	115 litres
Fibre	25 g
Calories	162 kCal
Protein	10 g


Cheese
Three slices (100g)



CO₂e
10
minutes driving

Emissions	1590 gCO ₂ e
Water	139 litres
Fibre	0 g
Calories	416 kCal
Protein	25 g

Steak
Portion, fried (100g)



CO₂e
29
minutes driving

Emissions	4723 gCO ₂ e
Water	668 litres
Fibre	0 g
Calories	242 kCal
Protein	30 g

CHOOSE ONE VEGETABLE OPTION


Tomato
Heated greenhouse (80g)



CO₂e
6
minutes driving

Emissions	1002 gCO ₂ e
Water	0.8 litres
Fibre	3 g
Calories	11 kCal
Protein	0 g


Tomato
Seasonal, medium (80g)



CO₂e
0.1
minutes driving

Emissions	13 gCO ₂ e
Water	0.8 litres
Fibre	3 g
Calories	11 kCal
Protein	0 g

Lettuce
Seasonal (30g)




CO₂e
0.3
minutes driving

Emissions	44 gCO ₂ e
Water	4 litres
Fibre	1 g
Calories	3 kCal
Protein	0 g

CHOOSE ONE FRUIT OPTION


Strawberries
Seasonal, handful (80g)



CO₂e
1
minutes driving

Emissions	136 gCO ₂ e
Water	17 litres
Fibre	3 g
Calories	24 kCal
Protein	0 g


Strawberries
By air, handful (80g)



CO₂e
2
minutes driving

Emissions	408 gCO ₂ e
Water	14 litres
Fibre	3 g
Calories	24 kCal
Protein	0 g

Banana
Small (80g)



CO₂e
0.3
minutes driving

Emissions	55 gCO ₂ e
Water	43 litres
Fibre	2 g
Calories	65 kCal
Protein	1 g

PLANT YOUR PANTS!

Humans are connected to soil; we depend on soil for food (for us and other animals), plant-based fibres like cotton and linen, for some buildings and even for medicines. Healthy soil locks up carbon, holds water and is full of life. Use your senses to explore soil and discover what it can do!

🕒 30 minutes plus 8 weeks waiting

Skills unlocked: Curiosity

Kit list

Spade or trowel or even a spoon

2 trays

Water

2 pairs of cotton underpants or other 100% natural fibre clothing or material

Colouring pencils

Instructions

- 1 Choose two locations where you think the soil will be different.
- 2 Remove the surface layer of soil with a spade, trowel or spoon, and then lift a spadeful of the soil underneath into a tray.
- 3 Inspect both soils. Describe:
 - The colour and appearance
 - Any treasures (roots, stones, bugs, seeds)?
 - The smell
 - The sound (rub a little between your fingers)
- 4 Add a little water and roll into a ball. Does it keep its shape or does it fall apart?
- 5 Soil-dwelling creatures digest food (other creatures and plant matter) in the soil. Good soil has more life in it. To find out how much life there is in your two soils, you are going to bury some pants!
 - Take a photo of what you are burying.
 - Bury the material in each location. Put a marker in so you can find them later!
- 6 After you've waited 8 weeks, carefully dig up your material, and move onto the Hands in the Soil worksheet.



Get everyone involved

Younger children – Play with some soil and water. Can they make a model house or other shape? Does it keep its shape or does it crumble?

Older children – Think about everything that started its life in the soil. Find food and clothes at home, look at ingredient lists and clothes labels. What would life be like without soil? If you found any bugs in the soil can you find out what they are? What do they do?

Adults – Discuss whether you think the buried material will change while in the soil. How might it change? Why? Put a reminder in your calendar to dig up the material in eight weeks' time.

Watch out

- Dig carefully.
- Wash your hands after touching soil.
- Look out for any litter, glass or sharp items in the soil.
- Ask for permission before you dig up lawns and playing fields.
- Once you have dug up your underpants at the end of the 8 weeks, dispose of them in non-recycling rubbish.

Next steps

Think about how farmers and growers need to look after soil so they can grow good food. What could they do?

To find out how to record and share your findings, when to dig up your pants, and other 'plant your pants' worksheets and activities, go to countrytrust.org.uk/plantyourpants ✨

Soil is a mixture of rock minerals, fungi, millions of tiny living creatures (from bacteria to earthworms), dead and decaying organic matter, air and water. Different soils have different amounts of each of these. Get your hands in the soil and explore it with your senses to see if you can work out what makes soil good and healthy.

	Soil location 1	Soil location 2
<p>Describe the location</p> <p>Is it sheltered or in the open? Is anything growing there? Do people regularly tread on it?</p>		
<p>Colour</p> <p>Colour in the box to show the colour of the soil.</p>		
<p>Treasures</p> <p>What is in the soil? e.g. roots, stones, mini-beasts, earthworm, leaves, pine needles, seeds</p>		
<p>Smell</p> <p>e.g. fresh, damp, sweet, sour, mouldy, earthy</p>		
<p>Appearance</p> <p>e.g. gritty, clumpy, fine, coarse, lumpy, stony, shiny, dry wet, sparkly, soft, hard</p>		
<p>Sound</p> <p>Rub a little of the soil between your fingers next to your ear. e.g. silent, quiet, gritty, squeaky, loud, crunchy</p>		
<p>Texture</p> <p>Add a little water and roll the soil into a ball. e.g. sandy, clay, chalky, spongey, slippery, soapy</p>		

BUILD YOUR OWN BAROMETER!

Antarctica is known as 'the Earth's barometer' because what happens there tells us how the world's climate will change. The equipment we use to monitor the climate has changed a lot. In this activity you'll create your own weather station and carry out research to see how the weather changes where you live.

🕒 1 hour per challenge,
plus as much follow-up as you like!

Skills unlocked: Observant, Creative, Collaborative

🛒 Kit list

A 2-litre see-through plastic water bottle (empty)

Clear plastic tubing (approx. 50 cm)

Ruler and pen

Sticky tape and blu tack

Water

Food colouring

Scissors

📖 Instructions

A barometer is used to measure atmospheric pressure. Air pressure influences how moisture moves in the atmosphere. Changes in circulation can alter rainfall, temperature, winds and storminess. The readings made in Antarctica tell us about the future of the climate on our planet. In this activity you will make your own barometer and use it to measure the atmosphere around you.

- 1 Look at these photos of weather stations in Antarctica and the equipment that was used in the past to monitor the weather. Can you guess which one is the barometer? Visit the UKAHT website to find out more about these pieces of equipment. [Please note we are working on a dedicated webpage that this task can point to.]
- 2 Now it's time to build your own barometer:
 - Cut off the curved upper part and neck of the bottle.
 - Fix the ruler on the inside with the numbers going up.
 - Tape the tube inside the bottle a few centimetres from the bottom to allow water to be sucked through it. Secure the tube near the top of the bottle using tape making it in line with the ruler. The rest can be left to hang loose.

- Fill the bottle up to the halfway mark with water and add food colouring to make it easier to see.
- Now choose one person to suck water halfway up the tube and trap it with their tongue. Use the blue tack to seal the end of the tube and lock the water in. You are now ready to get measuring.

- 3 The water level will rise and fall depending on the air pressure. When there is higher pressure, the water will rise. This means there is increased chance of clear weather. When air pressure lowers, the water will fall. This means there is increased likelihood of clouds and rain. Monitor the changes for a set period of time – this could be a week, a month or 3 months. Make a note of what the weather was like following the reading. How good is your barometer at predicting changes in the weather?

⚠️ Watch out

- Reasonable care should be taken when using materials, particularly when cutting the plastic bottle.
- Use appropriate glues and tapes with care.
- Ensure the equipment you make is used safely and responsibly.
- In the interests of hygiene, choose one person to suck water through the tube rather than passing this around.
- Store somewhere it won't get knocked over.

➤ Next steps

The UK Antarctic Heritage Trust (UKAHT) is a unique charity working to help everyone discover, understand, value and protect Antarctica. They care for six historic bases on the Antarctic Peninsula representing the birthplace of British climate science on the continent. Find out more at www.ukaht.org 🌟



>> BUILD YOUR OWN BAROMETER

🏠 At home

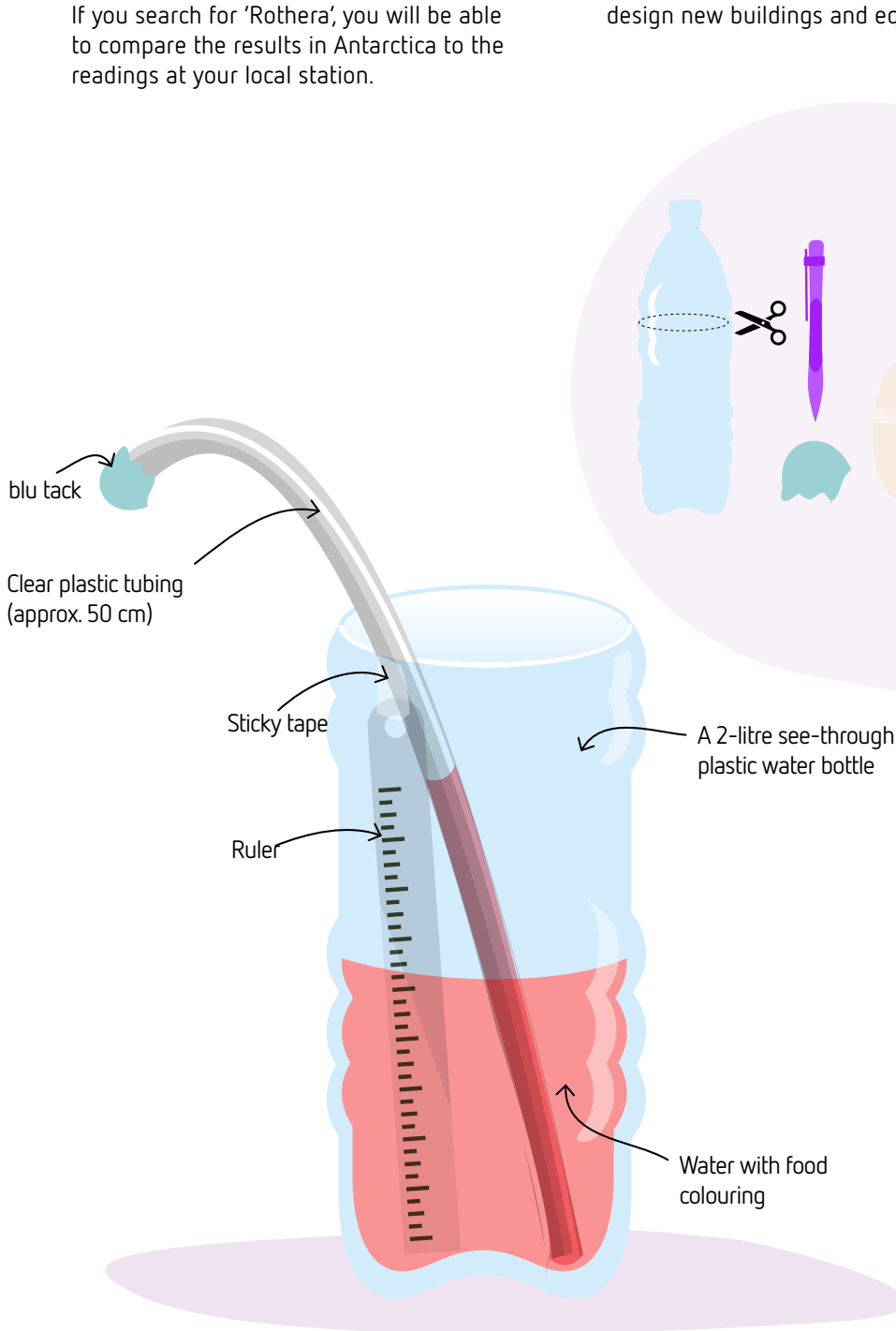
You can make your own barometer and carry out your own weather monitoring at home. Do you get different measurements at home compared to school? What might be the reasons for this?

You can find out the official measurements for your area here: www.metoffice.gov.uk/weather/learn-about/how-forecasts-are-made/observations/weather-stations. If you search for 'Rothera', you will be able to compare the results in Antarctica to the readings at your local station.

↔ Career options

Lots of different types of people are needed to monitor and protect the climate in Antarctica:

- Biologists, geologists and meteorologists to collect and study data.
- Conservators, carpenters and electricians look after the historic bases.
- Architects, engineers and inventors to design new buildings and equipment.



SEASONAL SENSORY MANDALAS



A mandala is a geometric shape that means 'circle' in Sanskrit. In some cultures, it represents the universe and life, with the circular design expressing the concept that everything is connected to life. This is a great activity to do all year round in different seasons with different natural materials.

🕒 Approximately 15 minutes

Skills unlocked: Observant, Creative, Logical



🧰 Kit list

A peaceful place out in nature

Natural seasonal items of different sizes, textures and colours e.g. twigs, leaves, grasses, flowers, berries, acorns – whatever you can find lying around!

📖 Instructions

- 1 Find a quiet, flat surface out in a natural wild space.
- 2 Gather your natural materials – be careful not to damage any animal habitats and only pick items that are loose on the ground.
- 3 Place one item to be the centre of your mandala e.g. an acorn.
- 4 Use the other items to start forming circles around your centre, moving outward from the centre until you have created a circular design.
- 5 Continue making patterns until your items are all used up.

⚠️ Watch out

- Be careful with any sharp items including twigs and thistles.
- Wash your hands after this activity.
- Check the area before starting for dangerous items like broken glass or animal faeces.
- Be aware of poisonous plants/fungi-if you are unsure then don't touch it.

➤➤ Next steps

Send your sensory mandala to feature on the VICTA virtual science fair:
www.victa.org.uk/victa-science-fair ✨

↔️ Career options

- There are many diverse career options if you are passionate about nature and seasonal changes. For example, geologists specialise in researching nature and visiting places all over the world to study materials that make up the earth.
- Horticulture is the science of growing plants. Horticulturalists research different plant species, and often grow plants, fruits and vegetables for study. This role also has a focus on environmental sustainability, with some research focussing on plant conservation and preservation.

Key learnings

Mandalas provide a multitude of opportunities for learning. A mandala can be created in every season; different seasons will make different natural materials available and so a mandala will represent the season it was created in. Mandalas also give the opportunity to be creative mathematically. A mandala can be designed with a variety of geometric shapes and often make use of symmetry.



SAWSTITCH: STITCHING SELF-AVOIDING WALKS

The world is made up of all sorts of networks and we live in them every day: social, biological, physical, digital... but have you ever thought about how networks form and their impact on our day-to-day life? This activity encourages you to think about networks using self-avoiding walks through hand embroidery.

🕒 30 minutes

Skills unlocked: Creative, Observant, Curious

🛒 Kit list

Cross stitch fabric

Needle

Thread

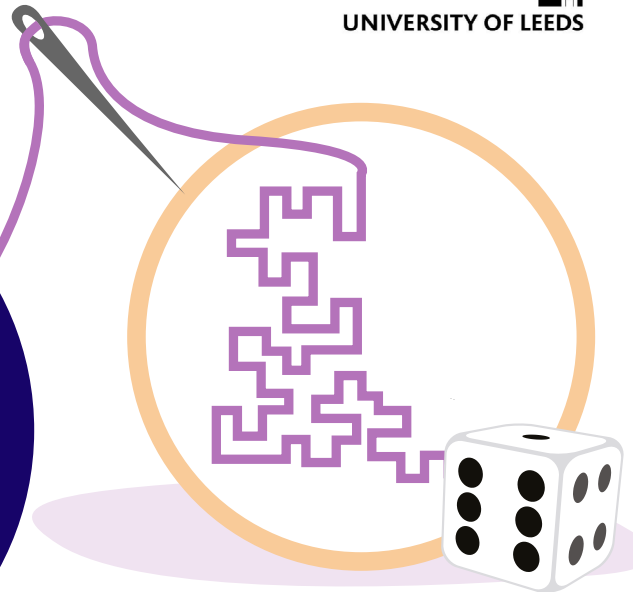
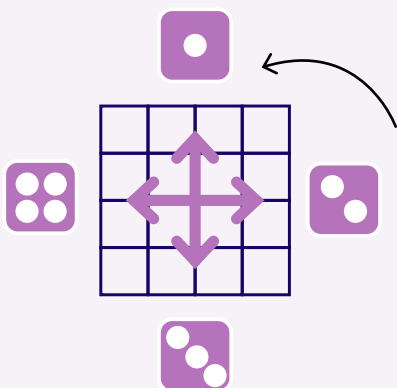
Dice or a dice app

Optional:
An embroidery hoop

📖 Instructions

A self-avoiding walk (SAW) is a sequence of moves on a grid that does not visit the same point more than once. You can find out more about SAWs here: www.creatematerialsinnovation.com/post/self-avoiding-random-walks ✨ and here: www.youtube.com/watch?v=4xIPc9hzivY ✨

- 1 Place your fabric in the embroidery hoop (📺 [how to mount fabric in a hoop](#) ✨).
- 2 Thread your needle and tie a knot at the end (📺 [how to thread a needle](#) ✨).
- 3 Use the needle to insert the thread into a hole in the centre of hoop from the back into the front of the work so that the knot is on the backside.
- 4 Make one stitch in the fabric using 'backstitch' (📺 [how to do backstitch](#) ✨).
- 5 Roll the dice to determine the direction of the next stitch. Each dice number has a direction on the fabric:
 - 1 (up),
 - 2 (right),
 - 3 (down),
 - 4 (left),
 - 5 and 6 (ignore) and ignore any rolls of the die that would lead to the stitch overlapping with the pattern.



- 6 Keep going until you reach an edge or have no options to move because of surrounding stitches.

⚠️ Watch out

- ⚠️ Be careful when poking the needle through the fabric, as the end is sharp.
- ⚠️ Do not leave needles lying around as people may stand or sit on them accidentally.

➡️ Next steps

You could share a photo of your self-avoiding walk on social media and use #SAWstitch.

You can read more about the #SAWstitch collaborative project here: [Self-avoiding walks \(creatematerialsinnovation.com\)](http://Self-avoiding-walks.creatematerialsinnovation.com) ✨

🏠 At home

Next time you go for a walk, could you use a SAW to find a new route?

↔️ Career options

- ⚠️ Scientists explore the pathways and networks formed by nanoscale molecules and use this information to create new materials that improve our lives.



READING SPARKS MAKING CONNECTIONS

At Reading Sparks, they love making connections between books and STEM. In this activity you will help younger children get excited about both books and STEM by creating some exciting media.

🕒 3 or 4 x 30 min sessions

Skills unlocked: Imaginative, Creative

📦 Kit list

Recording equipment – this could be a tablet, microphone or camera

Access to a library

Prep activity

This activity asks your group to select themes from books – you may wish to do this in advance, and provide them with pre-selected themes and formats, to speed up the activity process.

📖 Instructions

- 1 Your first task is to find a book suitable for someone in primary school. You might find something at home or local library. It can be a story, non-fiction, or picture book. Whatever you choose, the book will need to have some sort of STEM topic, such as: such as nature, space and inventions.
- 2 Read the book and have a think about some of the themes it explores.
You will now be making some media to help engage a reader with one of the themes you've identified. This could be a film, podcast, song, or something else. If you are stuck for inspiration, then have a look at what Reading Sparks young people's groups have created at www.readingsparks.org.uk ✨.
- 3 When you have made your media, you can share it with your library, younger family members or group members or the local primary school alongside the books you used.

⚠️ Watch out

- Make sure you are careful when creating your media piece - be aware of your surroundings such as tripping hazards and traffic.

➤ Next steps

Why don't you share your work with your local librarians and STEM Ambassadors? See what they think of your creative exploration of books and their STEM themes.

🏠 At home

Visit your local library and see what else you can find – there's more besides books, and is a great place to meet friends.

↔️ Career options

There are lots of roles in media production:

- Directors have the creative overview.
- Producers manage the production.

Other production roles include screenwriters, set designers, camera operators, sounds recordists, make-up artists and post-production editors.

When you look through your book, you might identify lots of different themes. For example, a book about animals might include themes such as different habitats, if they migrate or travel, their appearance such as different coloured fur or feathers, or what sort of shelter they build.

Now take one theme you've identified and see how it would fit with the creative formats in the table opposite. Write down your ideas beside each format. Try it again with a different theme. Do any work particularly well?

Pick one idea from your list opposite to work with and get creative – we look forward to seeing or hearing what you produce!



Theme	
<p>1. Observational</p> <p>A very simple observation-type film or presentation – a description of something, such as looking closely at an object, or pointing something out on a walk.</p>	
<p>2. Quiz style</p> <p>Something that asks questions, either to the viewer or someone on screen.</p>	
<p>3. Drama</p> <p>Acting, fiction, off-the-wall ideas!</p>	
<p>4. Instructional</p> <p>Doing and making – giving a demonstration on how to create something, such as making an origami animal.</p>	
<p>5. Animation</p> <p>Instead of using people in your video, you can try animating objects. Or design a flip book.</p>	
<p>6. Music and song</p> <p>Can you make up a song about your theme?</p>	

POSTER COMPETITION



If you're working with young people aged 3 to 14, why not challenge them to get creative and enter British Science Week's annual, UK-wide poster competition! They can make a poster about any version of 'Connections' they like 'Connections' that you like and be in with the chance of winning an array of prizes. Each group or organisation can enter the 5 best posters.

Kit list

Paper (A4 or A3)

Creative materials, such as:
pens
pencils
scissors
glue
watercolours
paints
crayons
felt
thread
wool
foil
clay
string
beads
stamps
foam
pompoms

Instructions

Encourage your group to think about different areas of 'Connections' so they can come up with ideas to include in their poster. Here are some points and questions to get you going:

- Get them thinking about their personal experience of connections – from learning how eco-friendly behaviour can lead to a greener planet, to building strong connections with those around them! How has it helped them to become stronger, braver, kinder or more accomplished?
- What do they think about how the world is connected? You could help them to consider how atoms connect, evolution, internet connections or even how their own body parts are connected. What are examples of good connections?
- Can they think of people who they connect with who have helped or inspired them? Perhaps they could create a portrait of them to show this?

From the learning of new skills to the development of places and ideas that enable us to do things more efficiently in our everyday lives, connections are everywhere!

Making the poster

Once they've done the thinking, it's time to get creative! Posters must be A4 or A3 in size and you'll need to be able to take a photograph of each one so it can be sent to us online for judging. You can use pop-up pictures, pull out tabs or use materials such as pencils, paints, crayons and paper to create your posters.

Submitting the poster

Posters will be judged on creativity, how well they fit the theme and how well they have been made or drawn, and how engaging they are. Once a poster is complete, take a photo of it and complete the online form to submit it as an entry.

Next steps

Celebrate! For more details, along with the full set of poster competition rules and tips, check out our website: [britishscienceweek.org/plan-your-activities/poster-competition](https://www.britishscienceweek.org/plan-your-activities/poster-competition) ✨

Look out for the activities in the pack marked with a paintbrush symbol, they can be a source of inspiration!



The 2022 Secondary winner



We want to hear from you!
Tell us what you think of the
activities using our survey...



Visit bsa.sc/activitypacksurvey 

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