



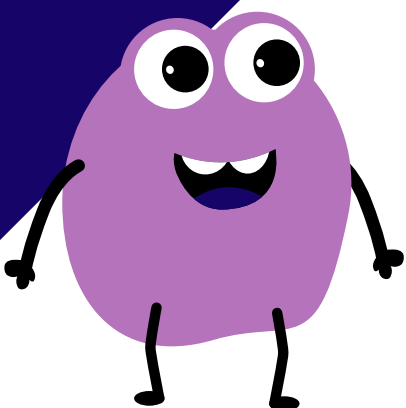
GROWTH

COMMUNITY ACTIVITY PACK

11-20 March 2022

britishscienceweek.org

A set of activities that can be delivered as
part of a community group setting,
with young people or adults



Delivered by



Principal Partners



This activity pack is a one-stop shop to support you with creating activities to run during **British Science Week**, but you can use it all year round! Feel free to adapt or extend 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.

We've looked for activities which promote learning and discovery that breaks down the stereotypes surrounding science, technology, engineering and maths (STEM). We 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.

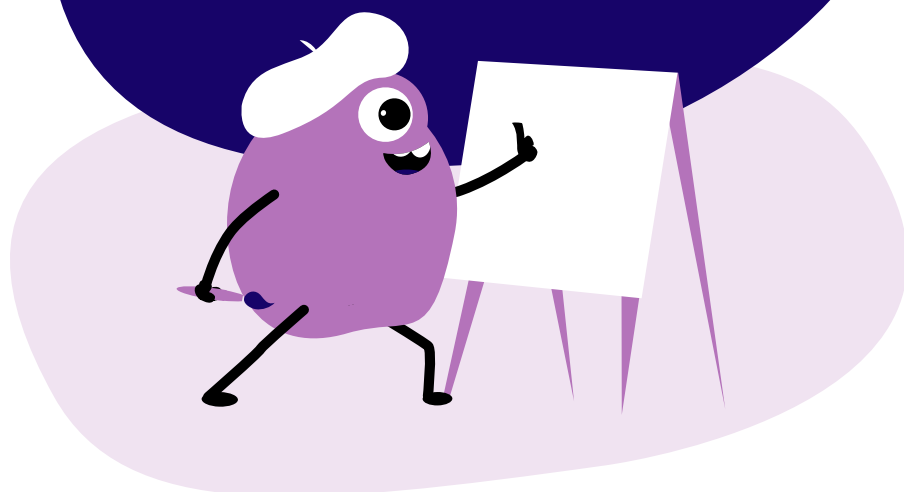
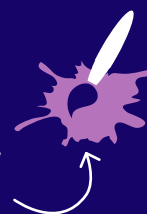
Find an activity near you:

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](https://www.sciencelive.net) to find out about all sorts of science-related events in your area.

Enter our poster competition

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 activities in this pack and enter it into our poster competition? Simply look out for the activities marked with the paintbrush symbol shown opposite! The theme for this year's poster competition is 'Growth', and you can find more information on how to enter on [page 20](#) and at britishscienceweek.org/plan-your-activities/poster-competition.

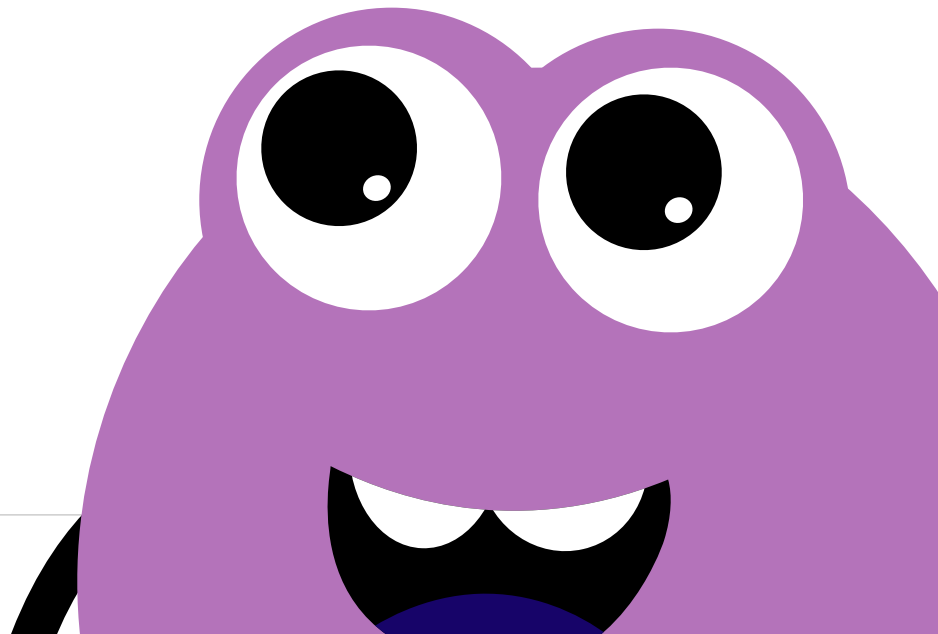




BRITISH
SCIENCE
WEEK
2022

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INTRODUCING THE THEME

The theme this year for British Science Week is 'Growth'! A fitting theme for what has been a turbulent time for all of us, 'Growth' links with multiple areas across science, technology, engineering and maths. Whether you decide to explore plant growth in your window box or discuss the impacts of economic growth on our society, or even consider your own personal growth over the last 12 months, 'Growth' offers a huge range of topics to delve into as part of your British Science Week 2022 activities.

Population growth and urban development could be a fantastic topic to explore in our poster competition. Or how about the evolution of construction and engineering – have you seen how quickly a skyscraper can grow with modern building methods?

Human growth is another area that offers endless opportunities for investigation. Why not use the human lifecycle as a topic for a group discussion, or create a poster which explores the building blocks of life?

We can find examples of growth within all subjects and all around us, making it an excellent starting point for a celebration of science! The theme is to give you inspiration, you can also use your own ideas to create your event.

We'd love to find out what 'Growth' 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!

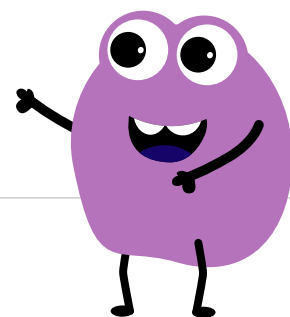
We recommend that you introduce the theme to your audience in a fun, imaginative way at the start of your activity, to get them excited about the week ahead! Check out some ideas below:

- **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 Association (@ScienceWeekUK 🌟) and using the hashtag #BSW22.
- **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 'Growth'. These are great to use as fun warm-up activities and are a fantastic way to start British Science Week.
- **Encourage your audience** to come up with an acrostic poem for GROWTH by asking them what comes to mind when they hear it. You can even turn their acrostic poem into a jingle which you can sing with them throughout the Week to help them remember their ideas.
- **Engage your audience** by discussing how growth is part of people, plants, animals, materials, countries and other things in their everyday lives. What are good examples of growth?
- **Invite a special guest** or someone from the community to share with your audience their own experience of growth (for example, how they started their career and gained their expertise), showing how great things can start from small beginnings. [See page 5](#) 🌟 for information on how to get volunteers.

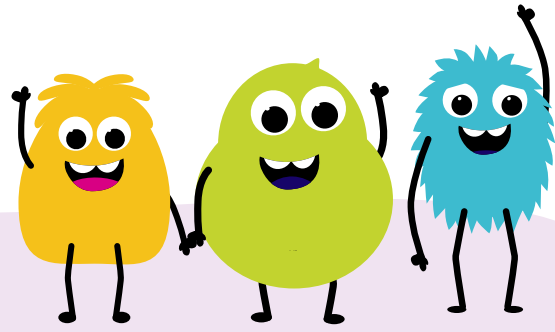
Here are some other ideas to include to start the week:

- **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 demo it at your setting first.
- **Growth is all around us.** Where has the topic of growth been in the news or your local area? In which case can growth be good or bad? Is there any way you can encourage conversations about this with your audience?
- **If you're working with young people,** then encourage them to get involved in the annual poster competition. [See page 20](#) 🌟 of this pack for more details.

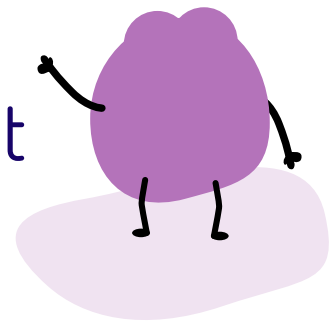
GROWTH



MAKING THE MOST OF VOLUNTEERS



While face-to-face activities and events are now possible, don't forget that there are still opportunities to get volunteers and presenters to engage with your audience online.



STEM Ambassadors are volunteers who offer their time and enthusiasm to help bring science and technology subjects to life, and to demonstrate their value to young people. It is now possible to request both in-person and remote STEM Ambassador support, meaning that Ambassadors from across the UK can inspire young 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 work in STEM-related jobs to describe what they do in more detail, or know anyone who does.

You could also try some of the following things:

- **Kick off British Science Week** with a career talk or demo from an inspiring volunteer to engage

your audience. The volunteer could highlight how they grew to be an expert in their field, or what significant contributions they have made to bring about that growth.

- **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 grilling 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.

- **Where available, choose volunteers/ambassadors** who challenge stereotypes your

audience might have about 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 visitors early** (as many speakers 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 talks which broaden their horizons and make them question their own preconceptions about science!

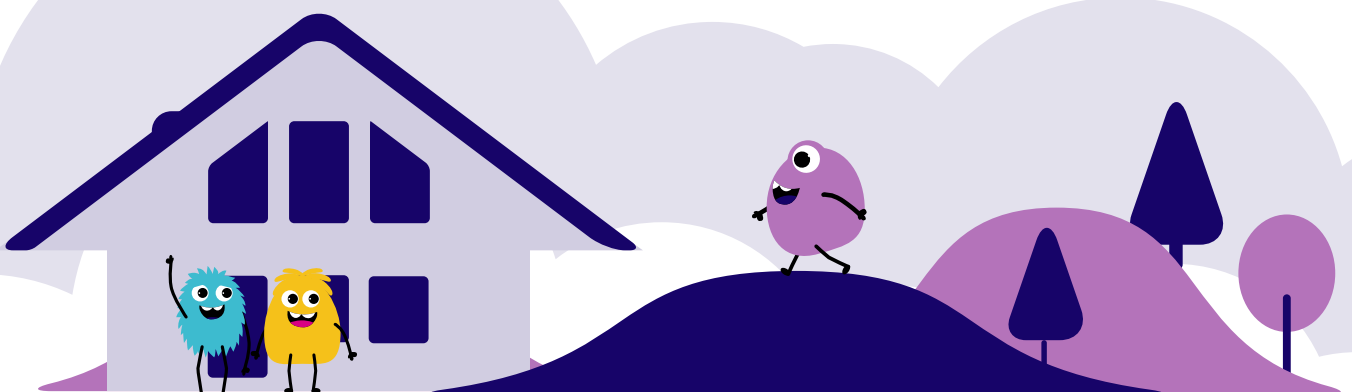
Visit the Inspiring the Future website (inspiringthefuture.org ✨) for some helpful ideas for using volunteers, some of which may be transferable when using remote engagement.

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.

- **Make the most of chat group and text messaging services** if you have them. Let your audience know at least a month in advance of 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.
- **Encourage exploring outdoors**, in the community or in local cultural spots. This could be anything from going on a nature walk around local parks to spotting STEM in action in the neighbourhood.
- **If you're working with young people**, many of the BSA's CREST activities are quick and easy to do as fun outdoor activities. Find them here: collectionslibrary.crestawards.org ✨.
- **Send an experiment idea home** during the Week to perhaps spark mealttime 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 with family, 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: rigb.org/families/experimental ✨.



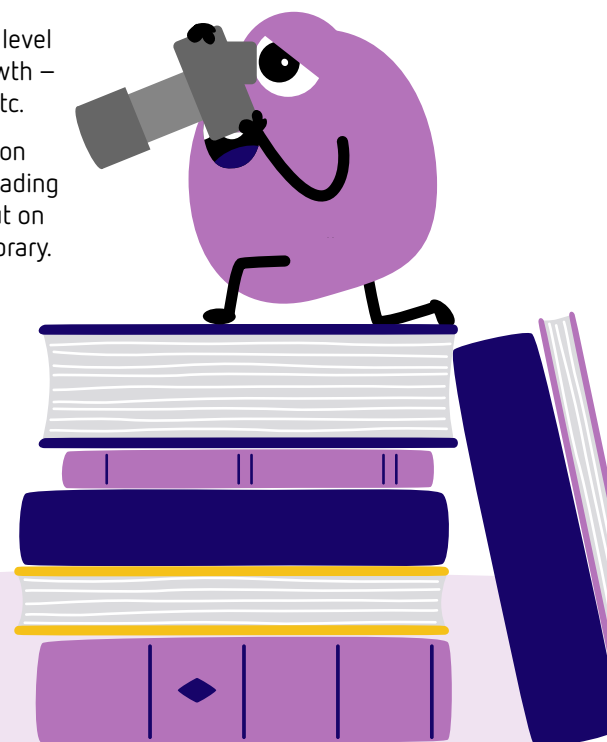
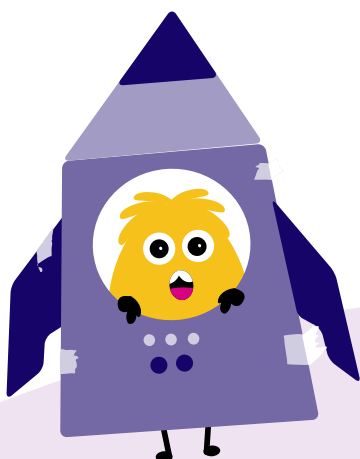
GATHERING RESOURCES IN ADVANCE OF THE WEEK

Running activities as part of British Science Week needn't be expensive. In fact, there's lots of ways to gather resources, which are low-cost and sustainable – although you might need to do a bit of prep in advance!

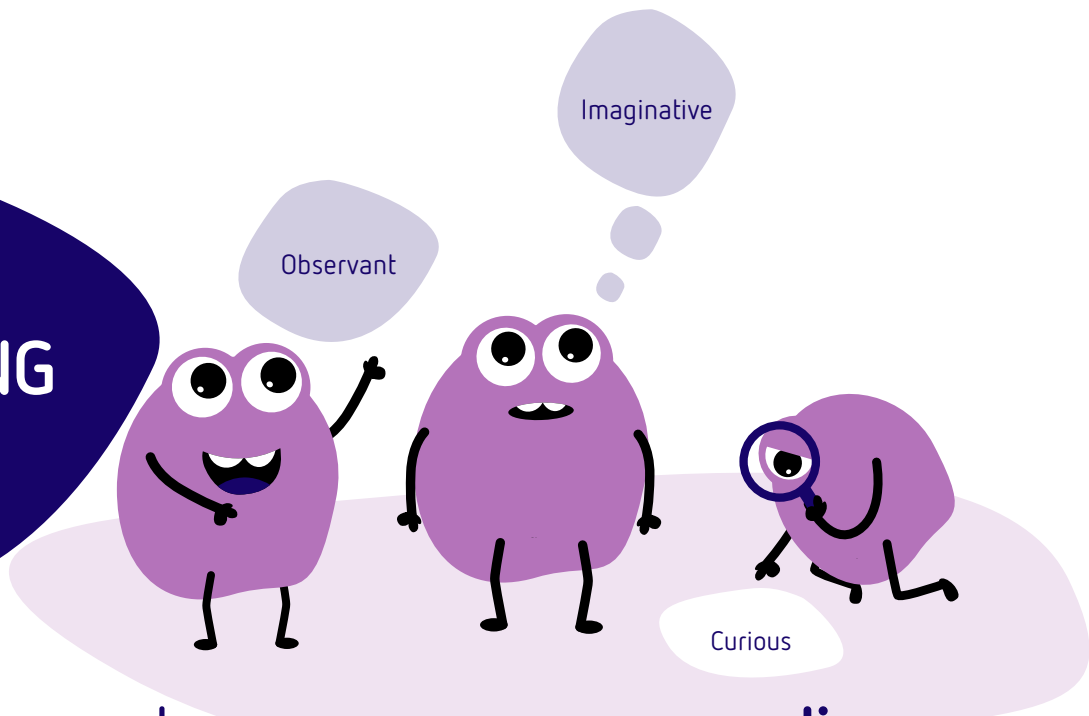
If you can, try to collect materials all year round that can be cleaned for use during British Science Week. We have designed our activities to be easy to run at home, so they don't need lots of fancy equipment! You could also check to see whether there is a scrap shop/store/club open in your local area. These shops are often membership based and are a brilliant, inexpensive or free resource for card, plastic, bits of material – all sorts. These things can be turned into rockets,

cars, or spaceships! Look at childrensscrapstore.co.uk to find a UK directory of scrap stores.

- **Take photographs** when out and about and share these with your audience to encourage conversation and raise their level of understanding about growth – plants, building structures, etc.
- **Collect reference books**, fiction books and other resources leading to the theme 'Growth' and put on display to create a themed library.



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 lots of these skills are shared amongst your audience, it will hopefully strengthen positive attitudes and reduce the stereotypes often applied to those working in the field.

You could, for example, engage your audience in this STEM Person of the Week (nustem.uk/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 communicator, or curious. Look out for the skills set tags 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. Or, as a little bit of motivation, why not award each of your audience with a certificate for a STEM skill which they demonstrate very well during the Week?

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 their family, taking photos to present back to your group.
- **Ask your audience to research** how growth has 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	Tenacious
Creative	Imaginative	Patient	Collaborative
Resilient	Communicator	Passionate	Organised
Curious	Self-motivated	Hard-working	Logical

WeCount TO GET ABOUT

This activity allows members of your group to understand what climate change is and the impact of road transport on emissions. Members of your group will zoom in on how their journeys can impact emissions. Will there be growth in the number of people who walk, cycle and scoot their way around their towns and cities in the near future?

🕒 1 hour

Skill set: Committed, imaginative, observant

🧰 Kit list

Printed Google maps of your community centre and surrounding roads on an A4 piece of paper.

Allow space around the map for a key and beneath the map to write your challenges.

A tally chart on a flipchart/whiteboard with separate columns for cars, pedestrians, cyclists and heavy vehicles.

📄 Instructions

- 1 Start by reflecting on what climate change is, and what activities you are aware of that contribute to it? How might we reduce the emissions we produce? Read and share the fact sheet on the next page to find out more.
- 2 Using your maps, draw your own route to your location, including any obstacles that made your journey longer or more dangerous. Include a key and write any challenges you faced on the route. Discuss with the rest of the group the different ways you travelled to your location.
- 3 Watch this video bsa.sc/YouTube-traffic-survey 🌟. Count the number of pedestrians, cyclists, cars and heavy vehicles. Nominate one member to tally the answers, as the rest of the group calls out the transport mode.
- 4 **Head to: telraam.net/en** 🌟. Zoom out to Europe to show the number of active sensors. Zoom in to a particular location (an active street near your town/city if possible) and click 'more data'.
 - Which type of transport is the highest for this street?
 - How might the street design affect this?
- 5 Scroll down to 'overview per day'.
 - What day(s) have the most amounts of traffic?
 - What times of day are busiest? Why might that be?

- What changes do you think need to be made on this street to make them more people-,bike-, and scooter-friendly?

- 6 Brainstorm solutions per group and write on a poster: "How can we help people walk or cycle more locally?" Share your solutions with the wider group.

➤➤ Get everyone involved

Younger ones: Make a poster of your idea on how to make your street more people-, bike-, and scooter-friendly. You could submit this as an entry to the British Science Week poster competition, or stick them on your front window to inspire others.

Older children: Choose a few people you could interview and ask: Would you like fewer cars on the road, and why? For example, you could ask your parents, grandparents, teachers or local shopkeepers: What solutions could you come up with to reduce cars on the road based on the results? Write up your answers, ready to share the following week.

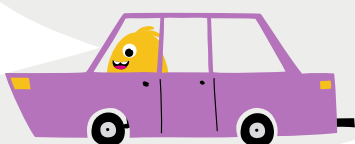
Adults: By completing this activity, your group could be working towards Modeshift STARS accreditation. Find out more and sign up at: modeshiftstars.org/education 🌟.

➤➤ Next steps

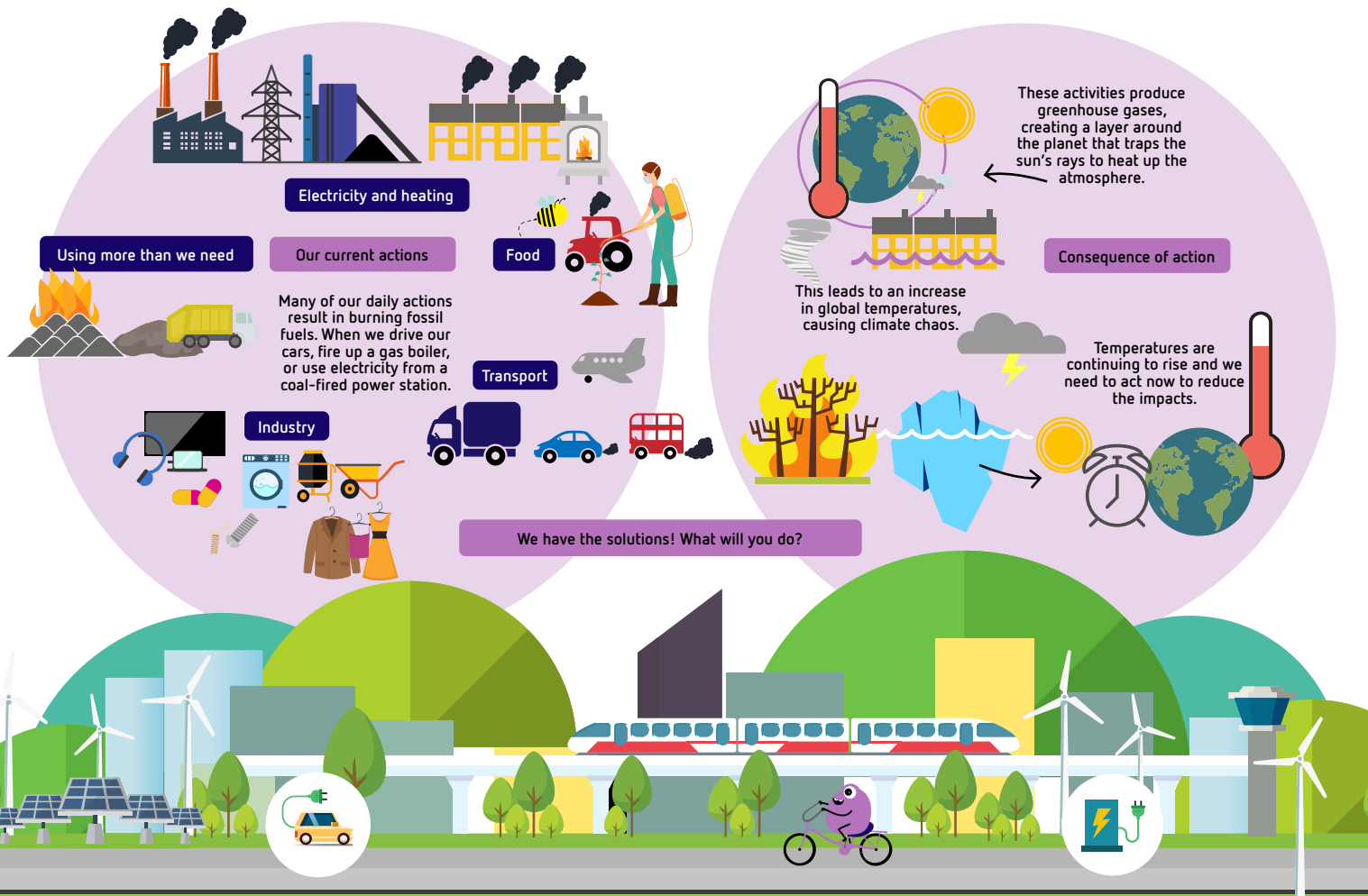
- WeCount is a Horizon2020 funded citizen science project under grant agreement 872743. Find out more at: we-count.net 🌟.
- The initiative for Digital Engineering Technology and Innovation (DETI) aims to show how digital technology can be used to engineer a better world. Find out more at: digitaltrailblazers.co.uk/about 🌟.

➤➤ Career options

Engineers find solutions to problems. We now understand that we need to reduce car travel, but some street designs do not help people feel safe to walk or cycle. Maybe you would like to be a traffic engineer who monitors our journeys to see how they can improve the design of our streets, to make it easier for us to get about safely?



WE COUNT TO GET ABOUT CLIMATE CHANGE: THE CONSEQUENCES OF OUR ACTIONS



Above:
Image adapted from original by ClairCity Project

claircity.eu/wp-content/uploads/2020/05/CC-infographic.png ✨



Climate change is caused by greenhouse gases trapping heat in the world. The greenhouse gases are released when fossil fuels are burnt and produce emissions. For more resources, visit: together-for-our-planet.ukcop26.org/schools-pack-resources ✨

About a quarter (27%) of the UK's carbon emissions come from transport, as well as being the main source of toxic air pollution. And our car use has doubled since the 1980s. To reduce the impact of climate change, we need to reduce our emissions. So we need to shrink our car use, and grow how much we walk and cycle about. Think about transport – how we get about from our

homes and to our schools – and solutions to reducing emissions.

Technology can help us better collect traffic data – this is digital engineering. Speed cameras for example, measure vehicle speeds. Some sensors measure air pollution particles in the air, while others count the number of different types of transport, like pedestrians, cars and bikes. People across Europe are currently counting traffic from their homes so they can use this evidence to reduce the number of cars and increase the number of cyclists, scooters and pedestrians.

How can we help people walk or cycle more locally?

GROWING SPAGHETTI TOWERS

There is an increase in the construction of skyscrapers and high-rise buildings to accommodate the growing population and rapid urbanisation in most cities. This activity will introduce the basic design and engineering principles mainly used in constructing buildings. How tall can you build your building?

🕒 15 -20 minutes

Skill set Collaborative, creative, tenacious

Kit list

A packet of dried spaghetti

A packet of mini marshmallows for each pair/group

Paper

Pencils for sketching designs

Optional tower decoration

Instructions

- 1 Work in pairs or small groups to design and build the tallest tower out of dried spaghetti and marshmallows. Think about the 'building materials' you have been given. What are the properties of the spaghetti and the marshmallows? What could they be used for?
- 2 Roughly sketch a design for your tower – how will you ensure the tower is strong enough to grow tall? Think about strong shapes such as triangles, how will you reinforce your structure?
- 3 Once you have agreed on your design, start building! Did you need to make any modifications to your design once you started construction?
- 4 If you have time, you may like to add paper decoration to your tower. Once complete, the tower will need to stand for at least 30 seconds. You can break the spaghetti and/or marshmallows into smaller pieces if that helps your design.
- 5 Take a deep breath and admire your spaghetti tower construction!

Get everyone involved

Younger ones: Make paper decorations for the tower. Share your ideas to help build the final design.

Older children: Work together and discuss your designs. Investigate the best way you can make the tower stand for more than 30 seconds.

Adults: Supervise the activity and give everyone time to share ideas about building the tower.

Watch out

- The marshmallows can get sticky. Wash your hands after construction.
- Spaghetti can be sharp. Be careful when using it to avoid any injuries e.g. eye injury.
- Do not eat the marshmallows in this activity.

Next steps

We would love to see your spaghetti towers. Please take a photo of your tower and email the image to spaghetti@petroc.ac.uk, then log onto our website petroc.ac.uk to see the towers built by others during British Science Week 2022. Or you could share it on Twitter at #BSW22.

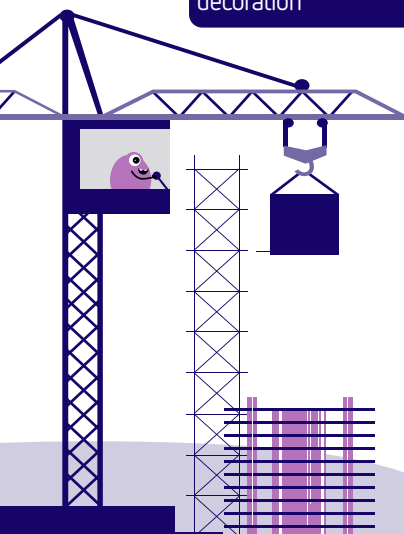
At home

Think about the buildings you pass on your way to/from school, work or when going to the shops.

- How are the buildings reinforced?
- What makes them strong?
- How are they designed? How are they built?
- How are tall buildings able to stay upright?

Career options

You can take a number of qualifications or higher-level apprenticeships if you wish to pursue a career in this area, for example an Higher National Certificate in construction. There are a huge number of jobs available such as architectural technologist, building surveyor or structural engineer.

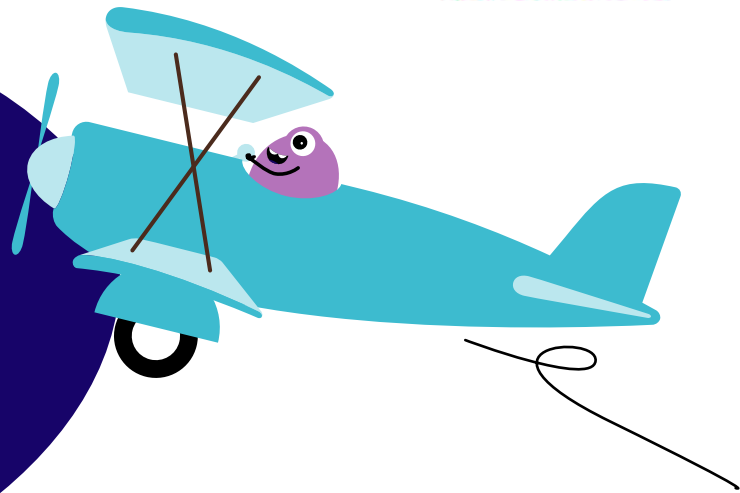


AVIATION CREATION

Design and build your very own aeroplane while discovering the huge growth in technology and innovation from early aeroplanes to modern jets. This activity will encourage you to be curious about flight and get creative working on a project with family and friends. If you're working with a group of people, then why not create your own fleet of aircraft?

🕒 1 Hour

Skill set Creative, curious, imaginative



🧰 Kit list

Pencils or pens

Paper

Computer (optional)

Scissors

Glue

Tape

Junk modelling material – cardboard, paper, plastic, whatever you can find!

Natural materials – sticks, leaves, stones etc.

📖 Instructions

- 1 Research the changes in aeroplane design using the RAF Museum activity pack (rafmuseum.org.uk/london/schools/family-resources ✨).
- 2 Choose a task or job that you would like an aeroplane to do for you. Think about the different features of the planes you've researched and which would be most suitable for your task.
- 3 Draw up a design for your aeroplane. You can sketch it out or use a computer. Don't forget to think about the task you've selected.
- 4 Make your aeroplane! Use materials from around the house, or head out and find materials in your local area. Get some friends or family to help you.
- 5 When you have collected your materials, it's time to assemble your plane. You will need to help each other out.
- 6 When you have finished, think and talk about:
 - Which jobs/tasks are aeroplanes used for?
 - Why are aeroplanes different shapes and sizes?
 - Do you think more modern aeroplanes are always better?
 - How can we reduce the emissions of aeroplanes or improve their impact on the environment?

➤➤ Get everyone involved

Younger ones: Help with the aeroplane decoration! Tell everyone why you chose that decoration. Why not also design a special logo, like an RAF roundel to put on your aircraft and share your idea?

Older children: When the group has come up with the design, list down all the features of your aeroplane and what they are used for. You can make a table of the features, or a poster of your aircraft labelling the parts and what they are used for.

Adults: While the children are completing their aviation creations, see if you can find a box that can be used as the backdrop for the plane/s. Cut out the front panel so that the box becomes a stage, with the sides forming the sky, and the base of the box the airfield.

⚠ Watch out

- Be careful if using scissors to create your aeroplane, and wear an apron to protect clothing if using glue.
- Be careful when gathering your materials and make sure young people and children are not left unattended when looking for materials in your local area.

➤➤ Next steps

- When you've made your aircraft, share your designs! Make a backdrop to display your aeroplane against, including information about what it will be used for.
- Share it with friends, family and with the RAF Museum on social media, they would love to see your creations! @RAFMUSEUM ✨

ENGINEER AN ECOSYSTEM

A terrarium is like a miniature greenhouse providing the plants inside with everything they need to grow. The soil in the bottom provides nutrients and the plants produce water that condenses on the walls of the terrarium where it flows back into the soil to be used again.

🕒 30 minutes

Skill set Creative, logical, organised



stay healthy inside your terrarium. Is this the same for all plants? Consider what light, heat and water they might need. Why not watch this video from RHS on creating your first terrarium: [bsa.sc/YouTube-Your-first-terrarium-Houseplant-101-RHS](https://www.bsa.sc/YouTube-Your-first-terrarium-Houseplant-101-RHS) ✨

Adults: Give everyone the chance to talk about their plans to keep the plants healthy inside the terrarium. Check out the **Houseplant 101 (bsa.sc/YouTube-Your-first-terrarium-Houseplant-101-RHS)** ✨ with the RHS for some guidance before you start your activity. Get everyone to help tidy up and clean after the activity as this can be messy.

🛒 Kit list

Three or four plants suited to the same environment

Clean glass jar, medium size

Small rocks

Compost (use shop-bought compost that is heat treated/sterilised - don't use garden soil or homemade compost)

Watering can or sprayer

Activated charcoal (optional)

Small decorations (optional)

📖 Instructions

- 1 Look up the type of plants you want to grow and check what type of environment they need [gardenersworld.com/search/plants](https://www.gardenersworld.com/search/plants) ✨. Make sure you choose ones that like the same conditions. Succulents are an easy option as they don't need much water.
- 2 Add a layer of small stones about three stones deep to the bottom of the glass jar. This allows water to drain from the soil.
- 3 If you're using activated charcoal, add this layer now. This reduces the growth of bacteria and absorbs excess moisture. You need just enough to cover the stones.
- 4 Add a layer of soil so the jar is about half full.
- 5 Finally, add your little plants so they fit neatly and spray with water.
- 6 If your plants prefer a humid environment, place a lid on the terrarium to retain moisture. Your terrarium will mostly look after itself, but may need a little extra water if the soil looks or feels dry.

⚠️ Watch out

- The soil should be sterilised to reduce the growth of bacteria and other microorganisms that might harm the plants, so make sure you buy compost and don't use garden soil, or home-made compost.
- Avoid leaving the terrarium in direct sunlight, and don't over water it!
- Don't forget to trim the plants if they grow too tall, and carefully remove any brown or yellow leaves.
- This activity can be messy, make sure that you cover the areas that you will be making your terrarium on so that you don't get soil everywhere!

➡ Next steps

Salters' Institute Experiment of the Month, created in collaboration with Science Sparks, brings chemistry and science to life for the whole family. See the whole collection at [saltersinstitute.co.uk](https://www.saltersinstitute.co.uk) ✨. From Erupting Lemons to Brilliant Bubbles, we have something for every scientist!

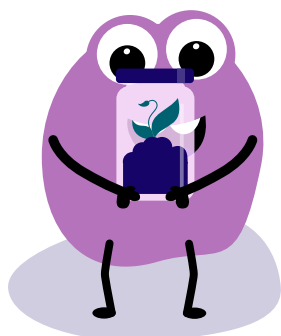
➡ Career options

Keeping plants healthy is not easy. Different plants need different amounts of water, light and humidity. Agriculture and Horticultural scientists specialise in growing plants and crops, solving problems relating to the environment, including dealing with pests and conservation and even developing new plants!

➡ Get everyone involved

Younger ones: Decorate your terrarium by adding small decorations such as toy toadstools, pine cones or decorated rocks.

Older children: Discuss what conditions you need to maintain to make sure your plants



INGENIOUS GENTOOOS

Can you build your own nest like a gentoo penguin, and test the strength and stability of the nest under windy and rainy conditions?

🕒 30 minutes

Skill set: Collaborative, committed, patient



🧰 Kit list

An outside environment e.g. playground, school field, shrubby area

Nest building material e.g. pebbles, feathers, stones, twigs

Pretend beaks chopsticks, pegs, or folded card

A watering can

A strong fan

Located on a tiny island just off the Antarctic Peninsula is a small museum and post office, and many years ago they were the birthplace of climate science as we know it today.

Antarctica is warming, and this has implications for many species.

The island is home to a particularly loud colony of gentoo penguins, and for the species to survive and thrive in this changing environment, they have adjusted their habitat and food choices, adapting to the impacts of climate change.

📖 Instructions

- 1 Share or read the fact sheet about gentoos. See the penguins in action at penguinwatch.org 🌐. Can you build a nest like a gentoo?
- 2 Get into pairs and gather your equipment. You will be using the equipment to build a nest and then test it in the 'rain' and 'wind'.
- 3 Discuss these ideas:
 - What materials will you use?
 - How will you fix your nest together?
 - How will you record your results?
- 4 Collect your pretend beak and practice using it.

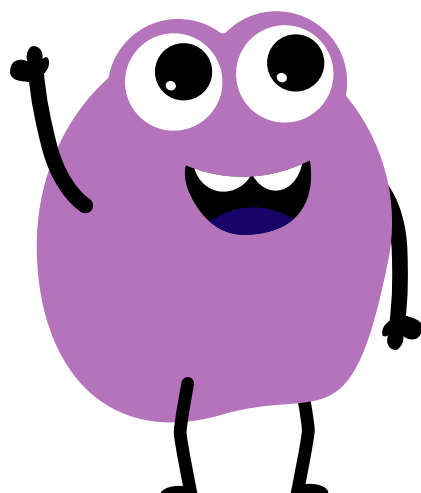
- 5 Once all the nests are built, test how they would hold together in different weathers.
 - What will happen to your nest on a windy day?
 - What will happen to your nest in rainy weather?
 - What works well and what could be improved?
 - Can you think of any other threats to the nests? e.g. stone poaching, skua dive bombing, heavy snowfall, sneaky sheathbills, careless trampling by seals or people?
- 6 Make a record of your results. You could take photographs or make drawings.
- 7 Present your findings. Be as creative in your presentation as you want!

➤➤ Get everyone involved

Younger ones: Discuss what you learned about gentoo penguins. Describe your favourite fact about them and why. You can even draw a penguin colony and their environment and send them to info@ukaht.org 🌐.

Older children: Design a postcard to send to a friend to tell them about the gentoo penguins. Draw and colour a picture on one side and write your favourite interesting fact about them on the other.

Adults: Try a mix of older and younger children in pairs. Make it a timed challenge and supervise the final testing of the nests.



»» INGENIOUS GENTOOS

Allow time so that everyone can discuss what was successful and what didn't work. Older members can also take turns in reading aloud each section from the fact sheet to the group. Make a quiz before or after building the nests to keep the members of the group engaged.

Watch out

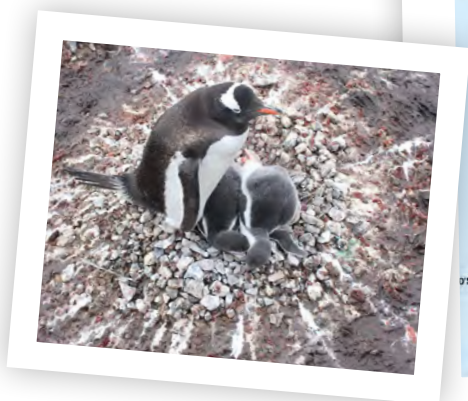
- Listen to an adult about doing outdoor work safely.
- Check that the area is free of unsuitable materials e.g. animal faeces, broken glass or tin cans, and hazardous plants such as stinging nettles.
- Do not put the beaks in your mouths.
- Wash hands after working outdoors and handling nest building materials.

»» Next steps

Research how you think gentoo penguins adapt to climate change compared to other penguin species.

»» Career options

The UK Antarctic Heritage Trust (UKAHT) delivers public programmes to engage and inspire people of all ages with 250 years of British human endeavour in Antarctica. They work with artefact experts, climate scientists, explorers, data scientists to name a few that contributed to what we know of Antarctica today. Learn more about them at ukaht.org .



>> INGENIOUS GENTOOS FACT SHEET

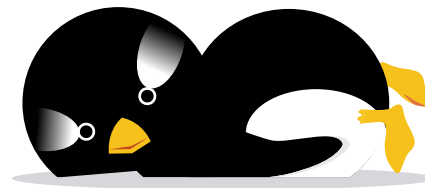
Species: *Pygoscelis papua*

Height: 30in (76cm)

Breeding season: November to March

Total breeding population: 314,000 pairs

Favourite food: Krill, fish, shrimp, crustaceans



Did you know?

- Gentoos have streamlined bodies and strong flippers. They can propel themselves underwater at up to 22 miles an hour, faster than any other penguin.
- Penguins have excellent eyesight both on land and at sea.
- We're seeing gentoo penguins increasing their range/spreading southward towards the pole as their environment changes in recent decades. They can be an inspiration on how we respond to our warming planet.
- UKAHT's base in Port Lockroy has other visitors! Adelie and Chinstrap penguins often come to Port Lockroy, they sometimes see King and Emperor penguins too.

Appearance & behaviour



Gentoo penguins are black with a white tummy, a distinctive white patch above each eye and a bright orange bill. They have pink webbed feet and prominent 'brush' tails. They are quite shy and laid back, and spend most of their day hunting and venture to far off places in search of food.

Breeding



Gentoos often return to the same spot each year to breed. Their nests are made from pebbles, bones and feathers and can contain as many as 1,700 individual stones! Gentoos normally lay two eggs which are incubated by both parents for around 35 days. Once hatched, chicks are guarded before they leave the nest and form crèches - a protective group of baby penguins. They continue to be fed by both parents until they fledge on their own at almost three months.

Habitat



Gentoos are found in the Southern Hemisphere and their favourite place to live is the Antarctic Peninsula and sub-Antarctic Islands. Whilst they spend lots of time in water, they like to nest in rocky areas free of snow and ice, which is why Goudier Island (where the post office in Port Lockroy is located) is the perfect location.

Predators & threats



Gentoos have a number of predators including skuas, sheathbills and leopard seals. The leopard seals can be found in the waters around Port Lockroy and are seen more regularly at the end of the season as the chicks begin to move into the water. In 2007 the gentoo species received a near-threatened status by the International Union for Conservation of Nature (IUCN). Following a reappraisal of population trends, the gentoo penguin is currently designated as "Least Concern" the IUCN.

Moulting



After breeding, the parents moult for around 15-20 days. The old feathers are replaced by new ones. Penguins remain ashore during the entire moult period and therefore cannot feed (waterproofing effect of feathers is lost until new feathers have fully grown). Consequently, all penguins undergo an intense, pre-moult food foraging period in which they increase their body weight by up to 70%!



WAKE ME UP BEFORE YOU GROW-GROW

Studies have shown that playing music to plants can promote faster growth. In this activity, you will compare the growth of at least two different bean plants, with one being played music and one without music. If you use more plants, try different music genres to see if this also has an effect on growth.

🕒 30 minutes a day

📌 Skill set Observant, organised, patient



📦 Kit list

Music source

Two bean plant pots (this can be more if you want to explore different genres of music)

📌 Instructions

- 1 Place your bean plants in separate rooms ideally with similar conditions e.g. same amount of daylight.
- 2 Measure your plants and record their heights before you start playing music.
- 3 Play music to one of your bean plants for at least 30 minutes a day. Make sure the genre of music remains the same.
- 4 Water and look after each plant in the same way – the only variable is the music being played to one of the plants with one plant having no music at all.
- 5 After a length of time of your choice (two weeks, a month) measure the heights of your plants.

➤ Get everyone involved

Younger ones: Water the plants with care and choose the music. As an extension of this experiment, you can use this activity to develop observational skills and appreciation of the natural world. As well as thinking about what sounds help plants to grow. Think about what sounds plants make? Draw your own sound map of the sounds you can hear outside using this guide: schoolgardening.rhs.org.uk/Resources/Activity/Draw-a-Sound-Map ✨

Older children: Design a table to record the heights over time. Will you choose to measure the height every day or once a week?

Adults: Ensure the conditions of the rooms that each plant are in remain as similar as possible.

⚠ Watch out

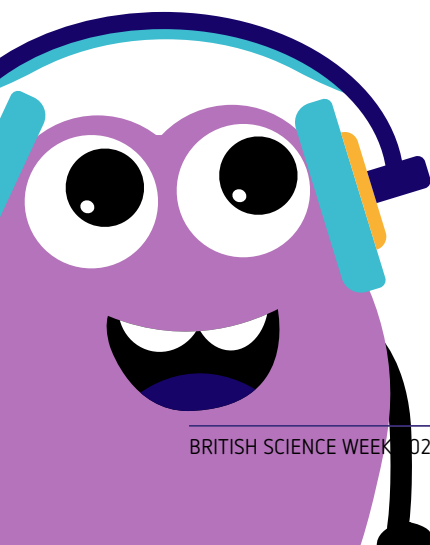
- ✎ Make sure the bean plants are placed somewhere that they can't be easily knocked over.
- ✎ Wash your hands after handling the soil or the plants.

➤ Next steps

Read about some of the research and experiments that have explored how music has an effect on plant growth: dengarden.com/gardening/the-effect-of-music-on-plant-growth ✨

➤ Career options

There are many diverse career options if you are passionate about plants. You can specialise in lots of different areas depending on your interests. For example, botanical science, horticulture, plant videographer, ecologist, forestry work or soil science.



MAKING MICROSCOPIC MACHINES

Your body contains thousands of tiny machines, called proteins. Proteins are made of smaller building blocks, called amino acids that form long chains. Their order and shape makes them 'bind' with other molecules and this determines how they work. In this activity, you will build your own tiny machines and think about how their sequence and shape matters.

🕒 30 minutes

Skill set: Logical, organised, patient

🧰 Kit list

Scissors

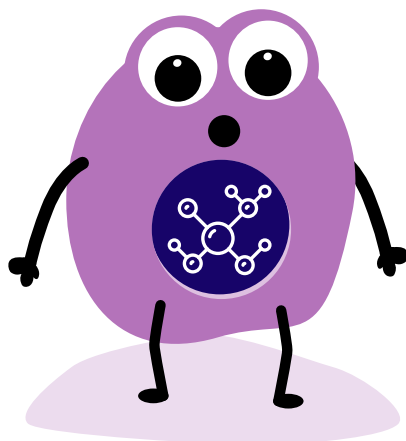
Pen

Paper

Printed cut out sheet

📖 Instructions

- 1 Cut out the amino acid shapes and two molecules provided on [page 19](#) ✨. There are 20 different amino acids that have different properties and shapes. We have five amino acids here. What are the differences between these amino acids?
- 2 Amino acids join to form a ribbon, and their order makes the ribbon bend into a shape (called a protein). The different shaped ribbons are different proteins. Some proteins, called enzymes, carry out chemical reactions on molecules.
- 3 Make a protein with the sequence "ABCDE". Proteins bind molecules like a jigsaw. Does this protein fit with either molecule?
- 4 Look at figure 1 on [page 19](#) ✨, can you work out the letters of each amino acid from only looking at the shapes?
- 5 Which sequence of amino acids fits molecule 2?
- 6 Make a random four amino acid sequence. Compare your sequence to others. Does anyone have the same? How many different sequences do you think you can make?



👤 Get everyone involved

Younger ones: You can take turns in binding one protein at a time to the molecule. Discuss why you chose that protein and how it fits the molecule.

Older children: You can work by yourself or, if there are larger numbers you can make teams and mixed groups. Record different sequences you can make in one minute – the one with most sequences written in a minute wins.

Adults: You can cut the amino acid shapes ahead of time and keep the answers away. Be encouraging as it can take time to get the answers right. Adults can help out with the tricky bits. They can be time-keepers if the group decides to adapt the activity as a game where the one with the most different sequences written in one minute wins.

⚠️ Watch out

Be careful when cutting out the amino acid and molecule shapes.

➡️ Next steps

A DNA mutation may change an amino acid in a protein. Does the 'ABBDE' protein fit molecule 1 as well as ABCDE? How about ACCDE? Do you think the protein still works? Look up common causes for DNA mutations.

➡️ Go further

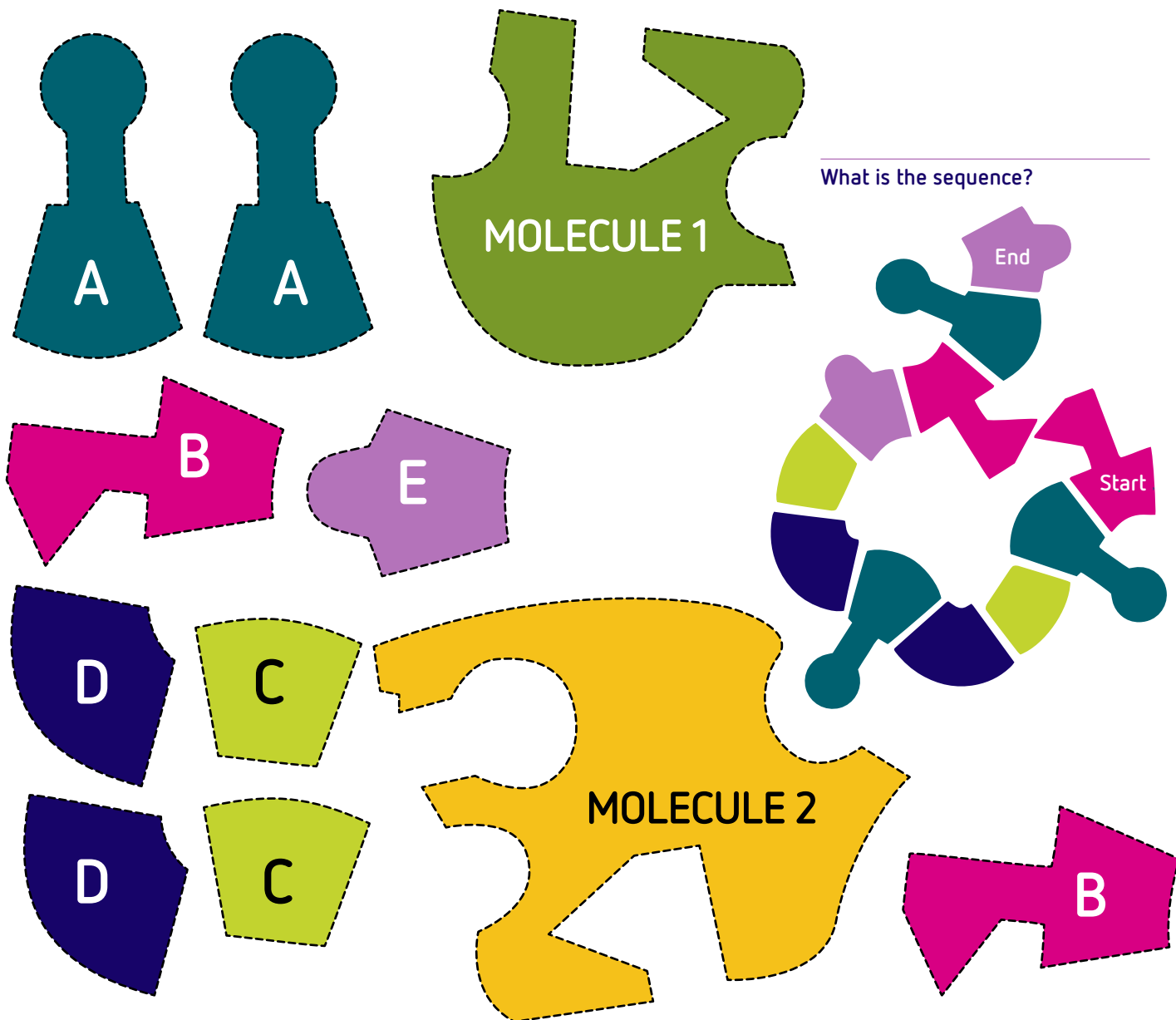
Enzymes can help digest food. A potato crisp will start tasting sweet when chewed. Research which enzyme is responsible. For more information about how enzymes work visit: bbc.co.uk/bitesize/topics/zf339j6/articles/zs9dkty ✨.

➡️ Career options

There are lots of jobs studying proteins and changing how they work. Proteins are also used in new and better medicines, washing powders, food production, genetic research and chemical industries. Lateral flow tests use protein antibodies to detect COVID-19 spike protein, and new vaccines are simply instructions to make protein sequences.

>> MAKING MICROSCOPIC MACHINES CUT OUT SHEET

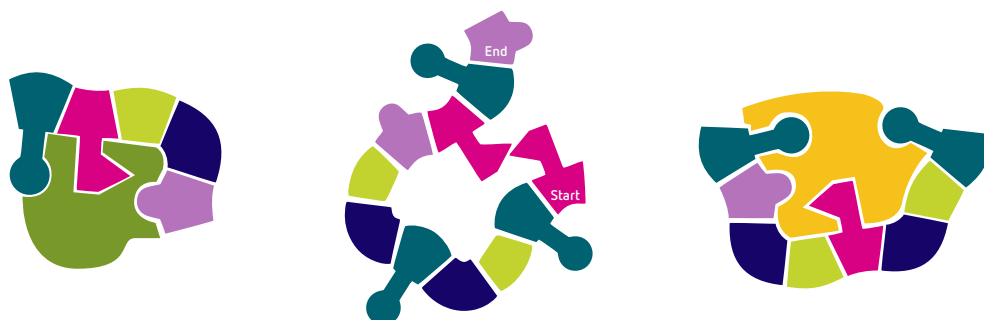
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What is the sequence?

Answers

BACDADCEBAE

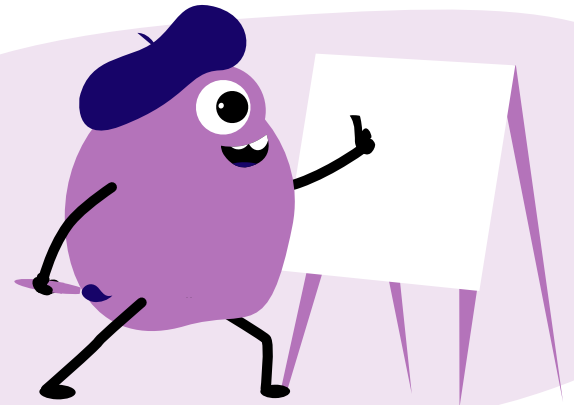




BRITISH
SCIENCE
WEEK
2022

POSTER COMPETITION

If you're working with young people, why not challenge them to get creative and enter the British Science Association's annual, UK-wide poster competition! Make a poster about any version of 'Growth' that you like and be in with the chance of winning an array of prizes. The activities found in this pack, marked with a paintbrush symbol, could all be used as a source of inspiration to get you started.



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 children to think about different areas of growth so they can come up with ideas to include in their poster. Here are some points and questions to get you going.

- **Get children to think about their personal experience of growth** – from growing their own cress plants to overcoming a challenge that they thought they could not do! How has it helped them to become stronger, braver, kinder, or more accomplished?
- **How do children think the world has grown?** You could help them to consider population growth, plant growth, economic growth or even the growth of cities and society. What is an example of good growth?
- **Can children think of people who have helped or inspired them to grow?** 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, growth is everywhere!

Making the poster

Once they've done the thinking, it's time for children 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. Children can use pop-up pictures, pull out tabs or use materials such as pencils, paints, crayons and paper to create their 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. Once a child's 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 ✨