



PRIMARY ACTIVITY PACK

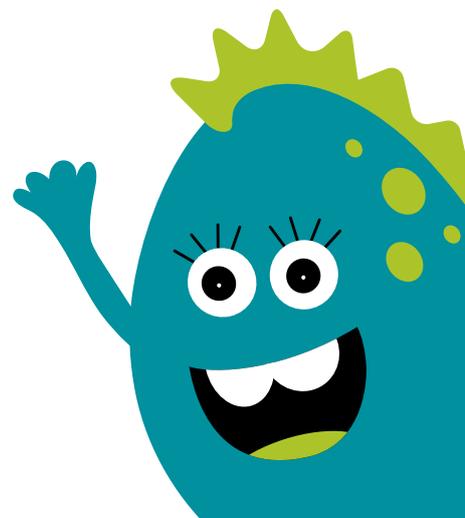
6 – 15 March 2020
britishscienceweek.org



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This resource pack is your 'one-stop shop' for supporting you during **British Science Week**, but it can be used at any time. Feel free to adapt or extend the activities to suit your children's needs and the curriculum you are delivering.

In addition to the activities in this pack, there are lots of other ways to enthuse and engage your children throughout British Science Week. In developing this pack, we have looked for activities which break down the stereotypes surrounding science, technology, engineering and maths (STEM) and that promote cross-curricular learning. We encourage you to use British Science Week as an opportunity to link STEM to other curriculum subjects and to your children's own backgrounds, lives and interests.

This year, we've got some fantastic activities to complete in school, plus some designed for students to take part in at home with their families.

Events

You can either create your own club, class or school event, or search for things happening near you. Last year we reached more than 180,000 people. Help us make British Science Week 2020 even bigger and better! Visit britishscienceweek.org



This year our activity pack theme is 'Our Diverse Planet' - celebrating the amazing diversity we see across the world. From biodiversity to cultural and societal diversity, from the diversity of knowledge to STEM careers and subjects. There are lots of ways to explore this theme - we'd love to hear some of your ideas too!

#BSW20



Poster competition

Look out for the paintbrush symbol at the top right corner of the page for activities that could be used to make your poster.

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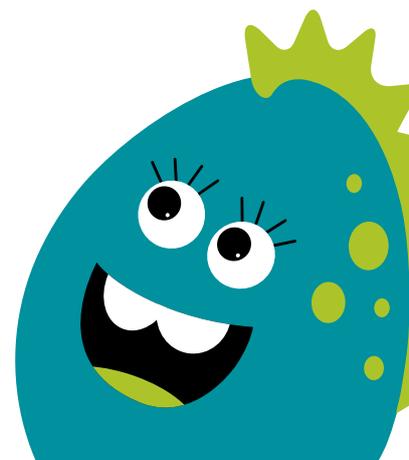
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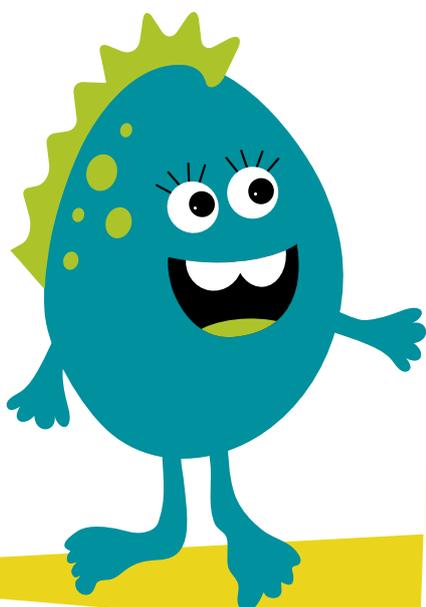
Making the most of volunteers

Volunteers could be a wonderful asset to your British Science Week adventures. Volunteers like STEM Ambassadors offer their time and enthusiasm to help bring STEM subjects to life, demonstrating their value in life and careers. The *Inspiring the Future* website can match you up with someone who has the skills you're looking for.

Volunteers come from a range of careers and experiences, from engineers, designers and architects to scientists and technicians – be sure to take advantage of this so students can see all the options available to them in the future!

Check out *STEM Learning's* website for some handy tips on how to get a STEM Ambassador:
stem.org.uk/stem-ambassadors/find-a-stem-ambassador

Visit *Inspiring the Future's* website for some helpful ideas of events you can use volunteers at:
inspiringthefuture.org/schools-and-colleges/resources-and-guides



Here are some ideas and tips on how you could utilise volunteers this British Science Week:

- ✓ Kick off with a volunteer-led talk/demo, to get the children excited about taking part in the rest of the Week.
- ✓ Invite a different visitor each day to keep children engaged throughout.
- ✓ Where available, choose volunteers/ambassadors who go against stereotypes the children might have of people who work in or engage with science, e.g. female engineers.
- ✓ Reserve visitors early (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 with a brief.

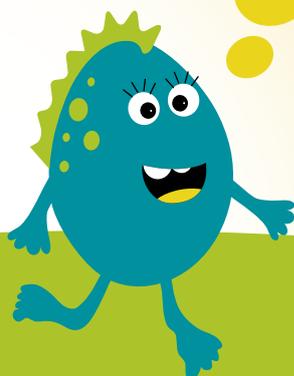
British Science Week at home



Want your children to enjoy British Science Week at home, but not sure how? Here are our top tips for engaging parents and carers so the fun doesn't stop at school.

- 1 Make the most of your parent newsletters, the Parent Teacher Association (PTA) and text messaging services, if you have them. Let parents know what you have planned and how you'd like them to be involved in advance of the Week (at least a month before). They might be able to collect/donate materials for use during the Week, and if you want them to try any experiments at home, they may need time to plan and collect materials for themselves. The PTA may be able to support you financially to run the Week or help drum up parent volunteers.
- 2 Get parents thinking about how their own jobs might link to science and technology subjects and encourage them to chat with their children about this. You could do this via a newsletter.
- 3 Encourage exploring the outdoors in the community or in local cultural spots. This could be anything from local parks to the streets around children's homes. Parents and families can get involved by going on a nature walk, exploring science related events and activities in their local area, or visiting places such as museums or science centres. Many of our CREST activities are quick and easy to do as fun outdoor challenges too: library.crestawards.org
- 4 If you know that parents may struggle to engage with British Science Week at home, invite them on school trips or use resources such as: <http://bsa.sc/oxford-sparks>
- 5 Send an experiment idea home during the Week which may spark mealtime discussions around STEM. Try and make it as easy as possible. It can help if it's something the children have tried or seen at school first, so they feel like 'experts' when they do it at home with family, allowing them to lead the learning. Crafty Rafts from our SuperStar resources is ideal for this: primarylibrary.crestawards.org/all-superstar-challenges/61747644 Or you could use the 'Camouflaged creatures' activity on page 10 of this pack.

As well as this pack, there are always lots of other useful downloads for take-home activities, such as: rigb.org/families/experimental



Gathering resources for your classroom or home

- ✓ Try to collect materials all year round: empty bottles, toilet rolls, cereal boxes, elastic bands, newspapers, etc. This way you will have lots of great things to use during your British Science Week.
- ✓ Alternatively, check whether there is a scrap shop/store/club in your local area. These shops are often membership-based and can provide a brilliant, inexpensive or free resource for card, plastic, bits of material – all sorts. These things can be turned into rockets, cars, spaceships; you name it, the kids will think of it!
- ✓ Look at childrensscrapstore.co.uk to find a UK directory of scrap stores, or, use Google to find your nearest.
- ✓ Look out for the 'At home' tasks in this pack for more ideas.



Beyond the Week

The exploration and curiosities don't need to stop once British Science Week is over!

Below are some ideas of how you can continue the fun in the future.

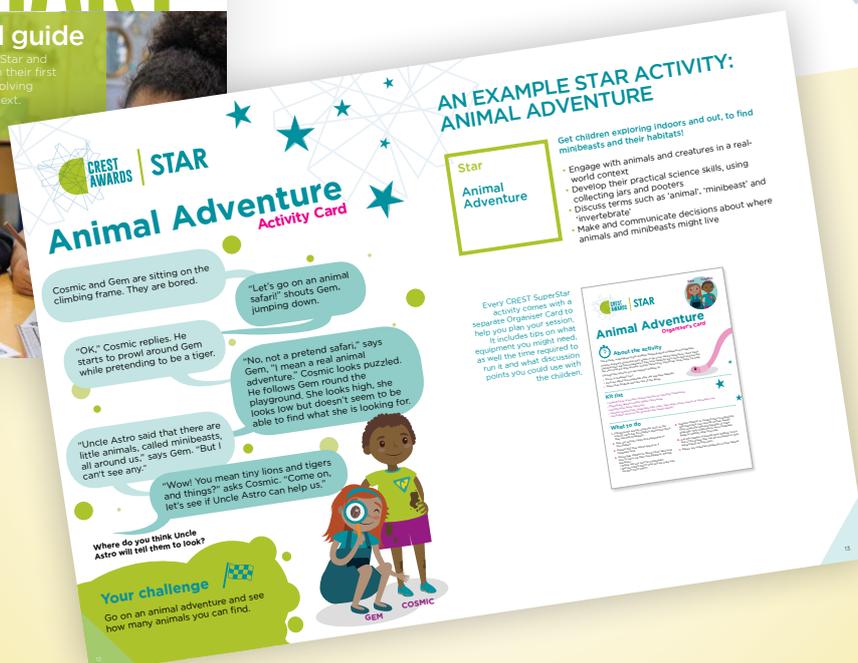
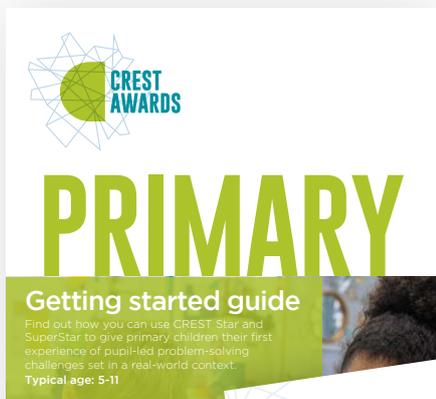
- ✓ Set up a STEM club or run a Curiosity Lab once a month during science class.

- ✓ Children could take part in a CREST Award, spending anywhere between five and 10 hours on a project that they lead, on a topic they're interested in. For more information, take a look at the different CREST levels available: crestawards.org/which-level

- ✓ Older students could run a CREST Star Award with younger children, and work on their communication skills. Learn more about CREST Star here: crestawards.org/crest-star

- ✓ Think about incorporating the Science Capital teaching approach into your methods: ucl.ac.uk/ioe/departments-and-centres/departments/education-practice-and-society/science-capital-research/science-capital-teaching-approach

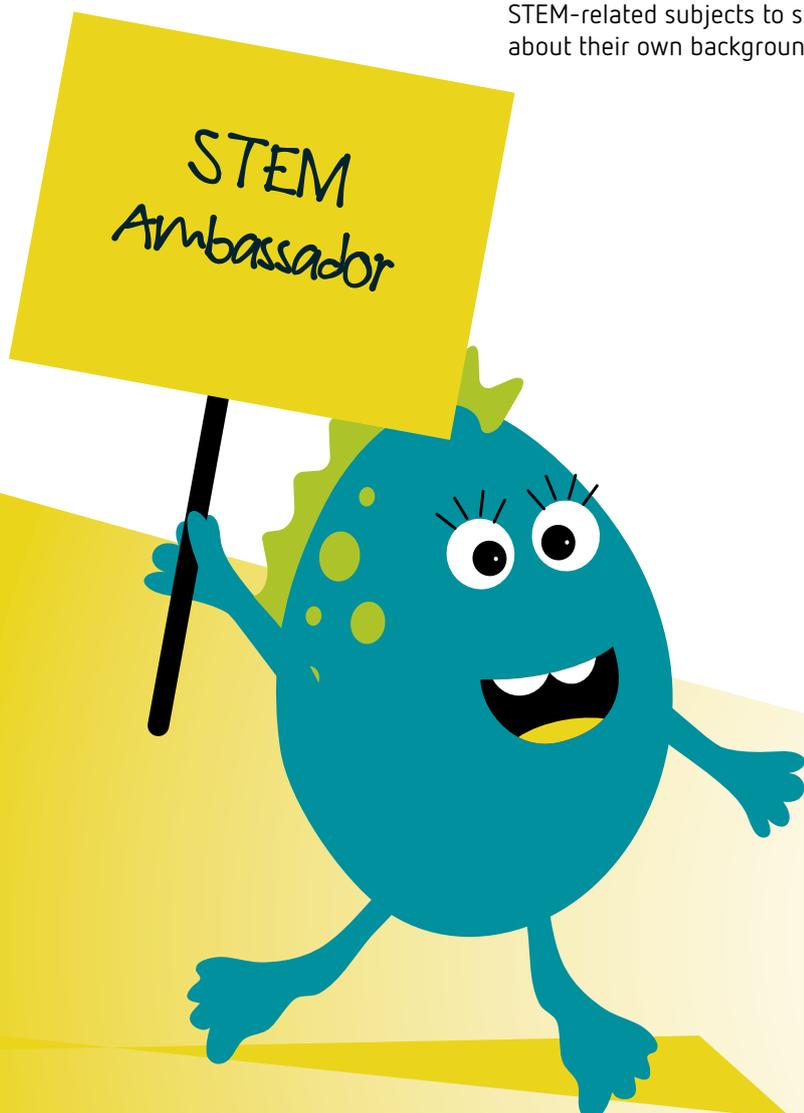
- ✓ Keep an eye out for the 'Next steps' tasks in this pack for more ideas.



Get children leading the way

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

- ✓ Encourage children to run their own events during British Science Week. They could recruit STEM Ambassadors or *Inspiring the Future* volunteers to come in and present in class or at an assembly, or ask classmates' parents with knowledge and experience of any STEM-related subjects to speak about their own backgrounds.
- ✓ The children could research events or programmes happening in your community, particularly those that at first don't seem to be obviously science related. Take a look at some of the community groups we work with during British Science Week for inspiration on where to start: britishscienceweek.org/plan-your-activities/support-us/community-grant-case-studies/
- ✓ Get children running their own CREST projects and use this as inspiration for a science fair or other related event. We have lots of handy CREST resources on our website: library.crestawards.org



Diverse places

Journey to Antarctica

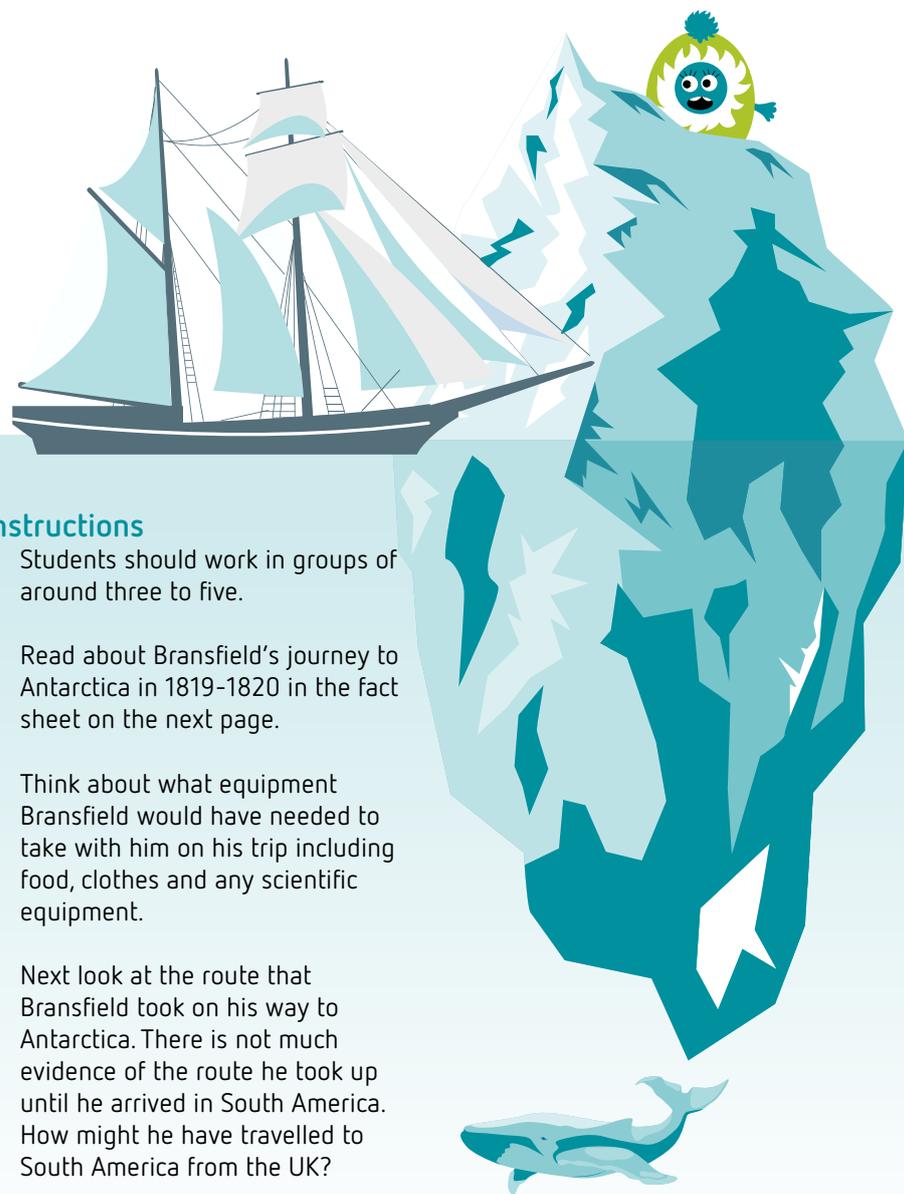
About this activity

2020 marks the 200th anniversary of the first sighting of Antarctica. Since then it has been a destination for explorers and scientists whose voyages help inform us of the role this continent plays in our world. In this activity you will write a diary based on what you know about the explorer Bransfield's journey to Antarctica.

Kit list

- ✓ Pens and pencils
- ✓ Paper
- ✓ Access to the internet (optional)

Time: 1 hour



Instructions

- 1 Students should work in groups of around three to five.
- 2 Read about Bransfield's journey to Antarctica in 1819-1820 in the fact sheet on the next page.
- 3 Think about what equipment Bransfield would have needed to take with him on his trip including food, clothes and any scientific equipment.
- 4 Next look at the route that Bransfield took on his way to Antarctica. There is not much evidence of the route he took up until he arrived in South America. How might he have travelled to South America from the UK?
- 5 Think about the wildlife that Bransfield might have seen on his journey to Antarctica.
coolantarctica.com
- 6 Use the information you have learned about Bransfield's journey to write a diary of his travels to Antarctica, making it as accurate as possible. Think about the kind of entries he would have included and anything else he may have seen on his way there, and even while he was in Antarctica too.

Next steps

Why not take a look at more recent adventures to Antarctica? For example, British group Expedition Ice Maiden became the first all-female team to use muscle power alone to ski coast-to-coast across Antarctica: excemaider.com How might their trip be different to Bransfield's?
excemaider.com

For more facts on Antarctica visit ukaht.org

Antarctica is a continent like no other. It was the last to be discovered, the only continent without a human population and is the coldest, windiest and driest place on Earth.

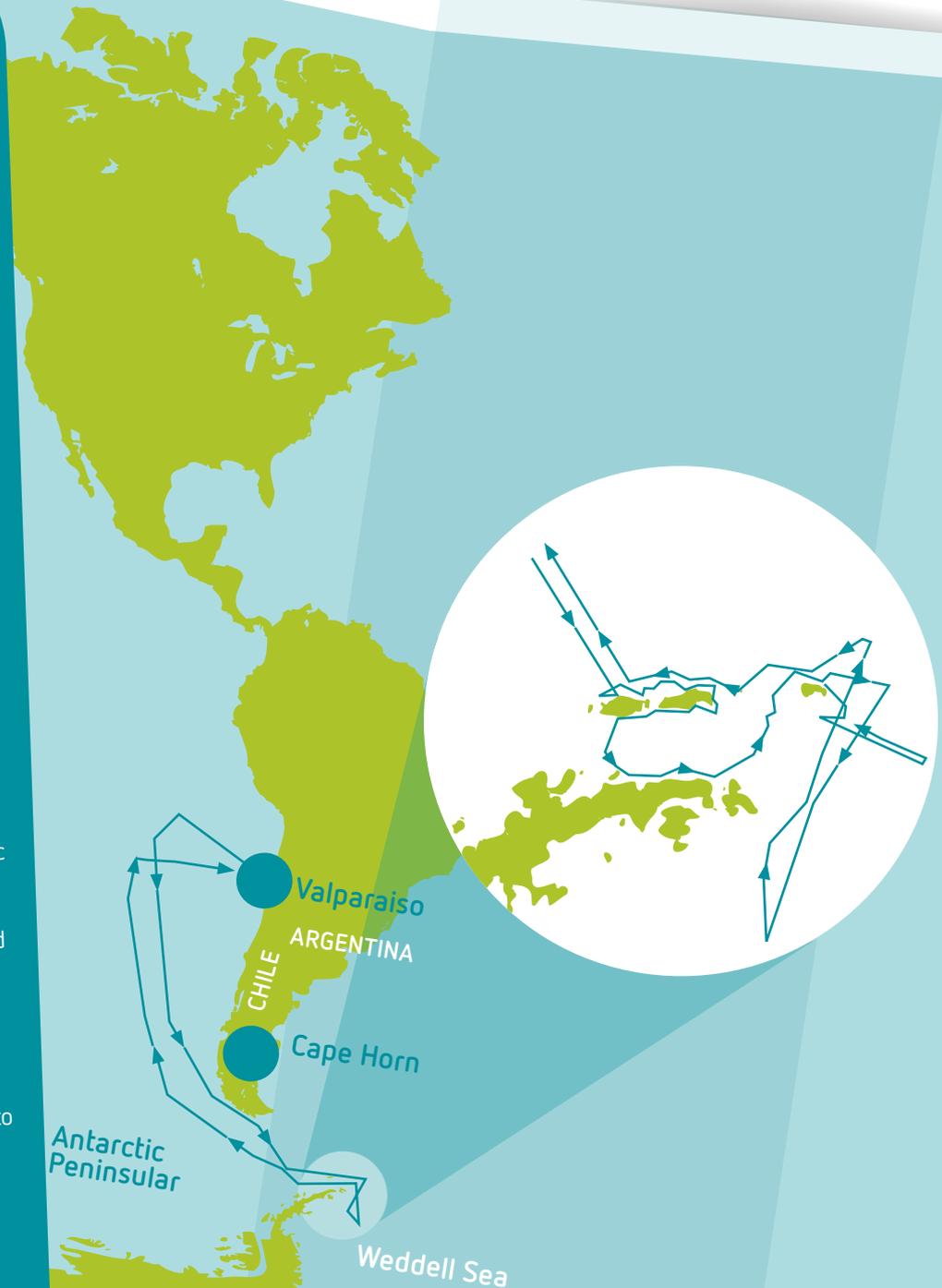
Edward Bransfield sighted Trinity Peninsula, the northernmost point of the Antarctic mainland, in January 1820. At the same time, a Russian expedition spied an ice cliff in another part of the continent.

The journey was fraught with danger – the small vessel had not been strengthened against the ice and had sailed without a support ship in notoriously turbulent seas, where cross currents, high winds and ice were a constant threat.

Ernest Shackleton led a famous expedition in 1914 when his ship became stuck in ice in the Weddell Sea and was eventually lost. Shackleton rescued all his marooned men after a courageous journey to South Georgia in a small boat.

Today, ships are a vital part of scientific research and exploration. Research ships like the newly-built RRS Sir David Attenborough are well equipped to survive in these harsh conditions and explore parts of Antarctica few have ever visited. A recent British and American expedition to West Antarctica involved three ships installing a new science programme to study the Thwaites Glacier.

For more facts on Antarctica visit ukah.org



Diverse places

Surviving Antarctica

About this activity

Antarctica is one of the most extreme environments on Earth. A satellite recently recorded a temperature of -98°C . At the National Maritime Museum, there are letters by polar explorer Ernest Shackleton describing the Antarctic winter. He says that on a warm day, the temperature reached the equivalent of -17°C which is about as cold as a freezer. What can explorers dress themselves in to stay warm in such conditions? You will be designing a prototype of a coat to be worn in Antarctica.

Kit list

- ✓ Hot (but not boiling) water
- ✓ Freezer (or a fridge or coolbox)
- ✓ Matching plastic beakers with lids (ensure these have screw tops)
- ✓ Stopwatches
- ✓ Elastic bands
- ✓ Tray
- ✓ Wool
- ✓ Thermometers
- ✓ Measuring cylinder
- ✓ Cloth/fabric
- ✓ Cotton wool
- ✓ Corrugated card
- ✓ Tissue paper
- ✓ Bubble wrap
- ✓ Cling film

Time: 2 hours

Watch out!

Be careful with hot water.

- 1 Your aim is to find out what material is the best thermal insulator. Split into groups, each equipped with at least one beaker (ideally two or three) and potential insulation materials.
- 2 Wrap identical screw top beakers in different materials.
- 3 Give beakers to your teacher to be filled with hot (not boiling) water from the tap, making sure their lids are screwed on.
- 4 Place beakers in a freezer (or in a cool box filled with ice). To ensure a fair test, you must leave equal space between the beakers.
- 5 After an hour your teacher should collect the beakers and return them to your group, removing the lid.
- 6 As a group, use your thermometer to record the temperature of your water and identify which material kept the water the warmest. Your teachers can show you how to do this and how to record your findings.
- 7 As a class you should share your results and select three materials to make your coat from.
- 8 Design a prototype of your coat using your chosen materials. Think about what else the coat may need:
 - ✓ Should it be waterproof?
 - ✓ Might it need pockets or a hood?
 - ✓ Discuss what problems there might be using these materials to keep a person warm.

Next steps

- ✓ What difference does it make if your materials get wet before you put them around the beaker (Use cold tap water rather than hot water for this)?
- ✓ What factors do you need to consider to ensure a fair test?



Diverse places

Don't tip the ship!

About this activity

Cargo ships have been around for thousands of years, transporting goods around the world. The *Cutty Sark* was built in 1869 to bring tea from China to London. In this activity, you will build boats and investigate how much weight can be added to the boats before they sink.

Kit list

- ✓ 1cm² paper
- ✓ Ice cream tub, or any tub or tank
- ✓ Small weights or coins
- ✓ Sellotape
- ✓ Scissors
- ✓ Cloth to mop up spills quickly
- ✓ Optional extra materials for boat building e.g. foam, foil, plasticine

Time: 1 hour

Instructions

- 1 Fill a tub or tank with water. Place it on a mat or tray so your surfaces don't get slippery with spilled water.
- 2 Take a piece of squared paper. Create a rectangle of 6 x 7 squares. Cut this out as shown on the next page.
- 3 Fold up the four sides (shown in green). Tape the corners together to make it watertight.
- 4 Count the number of squares in the base of the boat.
- 5 Gently place the boat in the tub of water - it will float!
- 6 Add weights one after the other until the boat sinks. For best results, place the weights equally and in a balanced way around the boat. On a real ship the weight is carefully spread across it to prevent it from tipping.
- 7 Repeat the experiment and compare your results with other groups.
- 8 Now try different designs. Does the size or shape of the boat change how many weights it can hold? The only limit is the size of the tub!
- 9 Discuss your results as a class.

Next steps

Why not use different materials to make and test your boats?

Find out more about the *Cutty Sark* and how to visit at rmg.co.uk/cuttysark

Watch out!

Quickly mop up any water that you spill – wet floors are slippery and can cause accidents.



	1	2	3	4	
	5	6	7	8	
	9	10	11	12	
	13	14	15	16	
	17	18	19	20	

Diverse people

Playground games



About this activity

Get thinking about disabilities and creating games that are accessible and inclusive to everyone.

Kit list

- ✓ Games equipment such as bean bags, balls, cones, poles, etc.
- ✓ Bells and other noisy things
- ✓ Torches and other lights
- ✓ Ear plugs
- ✓ Low-vision simulation glasses (accessible online via: inclusivedesigntoolkit.com/csg/csg.html)

Time: 45 minutes



- 5 Try out one or more of the games you've researched or invented, considering:
 - ✓ What games can you play outdoors?
 - ✓ Are there any markings for games?
 - ✓ What could you do so that other children can join in?
 - ✓ What new games can you create?
 - ✓ What rules will your games have?
 - ✓ How will you make sure your games are safe?
- 6 Now test your game. How accessible is it? If you do not have a disability, you may need to try your games by using low-vision simulation glasses, earmuffs, sitting in a chair, and so on. Decide how you will know if the game is a success.

Instructions

- 1 Try bowling while wearing low-vision simulation glasses. What difference does it make if you can't see very well? What ways can you change the game to make it easier for everyone to play together?
- 2 Discuss what it is like/might be like having a disability such as low vision. How do you think this would affect you when joining in with games and play?
- 3 Think about what you can do to understand more about how certain games might limit access to people with disabilities.
- 4 Think about how well outdoor games are designed for children who have low vision or difficulty hearing, have limited movement or use a wheelchair. You could do some research on games that people with disabilities play, for example goalball.

Next steps

This activity can be put towards a CREST SuperStar Award and there are plenty more online activities you could try for free. For more information, follow this link: crestawards.org/crest-superstar

At home

Create a plan of your ideal playground with games marked on it. You could share it with adults – they may like to use your ideas!

Watch out!

Before restricting sight, hearing or movement, ensure the children are in a safe space and have appropriate support.

Watch out for any children showing signs of distress.

Follow your organisation's guidelines for outdoor work.

Make sure that any alterations made to sports equipment are safe.

Diverse people

Build your body clock

About this activity

Did you know that your body has its own built in clock? Your body uses chemical messengers called hormones to decide when to do things. It tells your body when to wake up, when to sleep, when to eat and when you are full. Different hormones increase and decrease in waves throughout the day.

Kit list

- ✓ Clock template
- ✓ Scissors to cut out the clock template
- ✓ A green pencil
- ✓ A blue pencil
- ✓ A normal pencil
- ✓ A green, red, yellow and blue felt-tip pen or small stickers

Time: 30 minutes



Instructions

- 1 Cut out the clock template on the following page..
- 2 What time do you wake up and what time do you go to sleep? Use a ruler to draw lines showing these times. Colour in your 'awake' time with a green pencil and your 'asleep time' with a blue pencil – using pencils means you can draw things on top!
- 3 What time of day do you feel most hungry? Draw a picture on your clock of your favourite food at the time you get most hungry.
- 4 The more of a hormone there is in our blood, the bigger the effect it has. Read the descriptions of the following hormones. For each hormone, mark on your clock when you think there is going to be a lot of it in your blood. (Use a different colour for each hormone):

a. **Cortisol**
made and released by glands in our kidney. Cortisol helps

control when we wake up.

- b. **Ghrelin**
Made by our stomachs, ghrelin tells our brain when we are hungry.
- c. **Leptin**
Made by fat cells, this hormone tells our body when we are full.
- d. **Melatonin**
Made by a tiny gland in our brain which releases more melatonin as it gets dark. This hormone makes our body feel sleepy.

Next steps

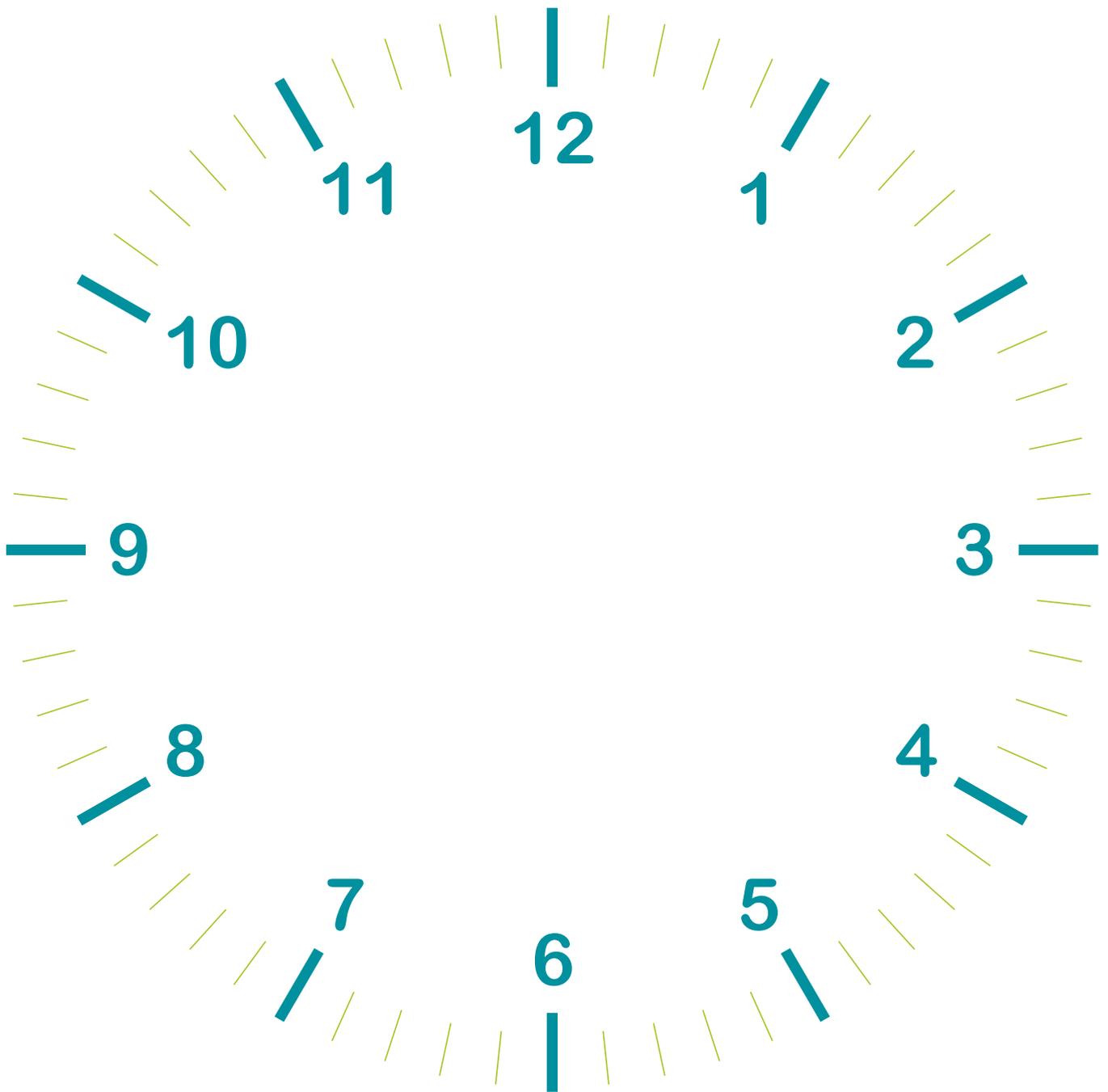
Hormones play lots of different roles in our bodies. As well as the ones you've learned about today, there are other hormones which help you grow, let you feel love or help you run away if you get scared. Visit yourhormones.info to find out more about hormones.

At home

Adults and children's body clocks run on different times. Ask your parents about their body clock and see how it is different from yours.

Watch out!

Be careful cutting out your template.



Diverse people

Is everyone's body the same?

About this activity

Have you noticed that although our bodies are alike in some ways, there is no one else in the world who looks quite the same as you? We are all different! In this activity we will think about and compare different parts of our bodies to see what makes us unique.

Advance activity for teachers

Ensure that you have access to adequate space (e.g. school hall) to carry out the drawings for this activity and have an area ready for display.

Be alert to the possibility of children acting inappropriately, and make sure pupils treat each other with respect.

Kit list

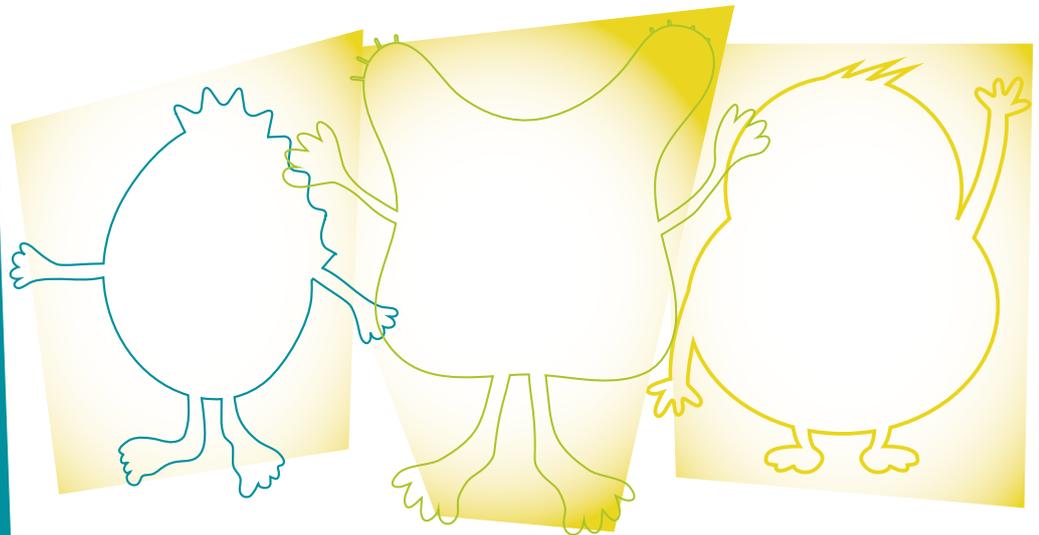
- ✓ Mirrors
- ✓ Large sheets of paper or a roll of lining paper
- ✓ Coloured chalks or wax crayons
- ✓ Tape or wall fixing

Time: 1.5 hours

Watch out!

Show respect to your partner when drawing their outline and make sure you have enough space around you.

Make sure all body types are respected.



Instructions

- 1 Play 'Simon says...' with your classmates, taking turns to give instructions. Which parts of your body can you name?
- 2 Find a partner and compare different body parts. Remember that everyone's body is different, and that is something to be celebrated! For example:
 - ✓ Who has the longest legs?
 - ✓ Who has the biggest hands?
 - ✓ Use a mirror to look carefully at your face. Have you both got the same colour eyes? Have you both got freckles?
 - ✓ What else do you notice?
- 3 Create a life-size drawing of 'you'. Lie down on the floor on a large piece of paper and ask your partner to draw carefully around the outline of your body. Work together to draw in details like your hair, eyes and fingernails (don't forget to use a mirror to help you). Then work together to draw your partner.
- 4 Stick your picture up on the wall next to your classmates to create a life-size gallery of bodies.
- 5 Look carefully at your pictures. Does everybody have brown hair? Are you all the same height? Are your arms the same length? What other questions can you ask to compare your bodies? Use your gallery to answer as many questions as you can. What makes you unique?

Next steps

Visit collins.co.uk/SnapScience for more information and fun activities.

At home

Think about the similarities and differences between you and the other members of your family. You can do this together. Do you look alike? How are you unique?

What kind of taster are you?

About this activity

Are you a supertaster? Supertasters experience bitter tastes more strongly than other people; this is because they have a higher number of taste receptors within the fungiform papillae. These are the big pink bumps on your tongue that contain your taste buds and enable you to taste. In this activity, you will determine whether you are a supertaster, taster or non-taster.

Kit list

- ✓ Bottle of natural blue food dye
- ✓ Cotton buds
- ✓ Disposable 'mini cups'
- ✓ A4 card
- ✓ Hole punch
- ✓ Scissors
- ✓ Damp cloth
- ✓ Cup or bag on each table for waste
- ✓ Anti-bacterial surface cleaner
- ✓ Torches (optional)
- ✓ Magnifying glass (optional)

Advance teacher activity

- ✓ Cut the A4 card in to 16 strips and punch a hole in the end of each strip. Ensure you have enough for each child to have their own strip.
- ✓ Split class into groups of three.
- ✓ Pour a little food dye into the mini cups so that each group has one cup.

Time: 1 hour

Watch out!

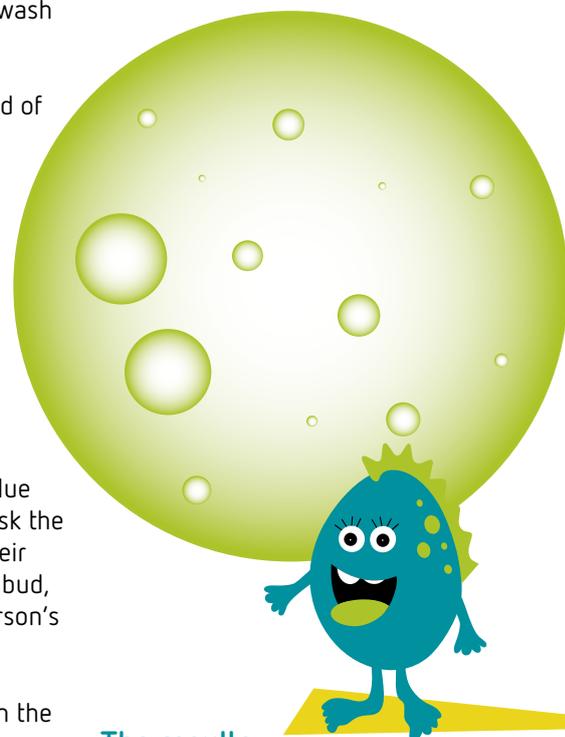
See page 19 for details.

Instructions

- 1 Everyone taking part should wash their hands.
- 2 Look at the glossary at the end of this activity to make sure you understand what all of the words mean.
- 3 The person who is going to have their fungiform papillae (pink bumps) counted first needs to sit down with their elbows on the table, supporting their chin.
- 4 Place a cotton bud into the blue food dye until it is covered. Ask the person taking part to stick their tongue out. Using the cotton bud, coat the front third of the person's tongue with the dye.

NB: Only dip the cotton bud in the food dye once. Place the cotton bud in a container such as a plastic bag which will then be thrown away.

- 5 The blue dye will stain the tongue but slide off the fungiform papillae. Did you know that each bump contains three to five taste buds?
- 6 Next, ask the person to carefully place a hole-punched card on their tongue over the blue food dye.
- 7 Looking through the hole in the strip of paper/card, someone in your group should count how many pink bumps they can see on the tongue inside the hole.
- 8 Count the number of fungiform papillae twice to find an average amount. Record your results on the student sheet (See page 19). When you have finished with the card, throw it away like you did with the cotton bud.



The results

- 9 Look at the chart at the end of this activity and see how your classmates' sense of taste compare to the rest of the nation! Use the chart on page 19 to collate your class results.
- 10 What percentage of your class fits into each category?
- 11 Does your class follow the national distribution for each category?
- 12 Did you observe a pattern between the number and density of fungiform papillae?

Next steps

Find more exciting activities by visiting bbc.co.uk/teach/terrific-scientific

At home

Why not try this activity at home, with family or friends? You could see how compare to your classmates.

Glossary

What kind of taster are you?

Fungiform papillae Scientific name for the big, round pink bumps on the tongue which contain taste buds.

Taster chart A chart used to indicate whether a person is a supertaster or not.

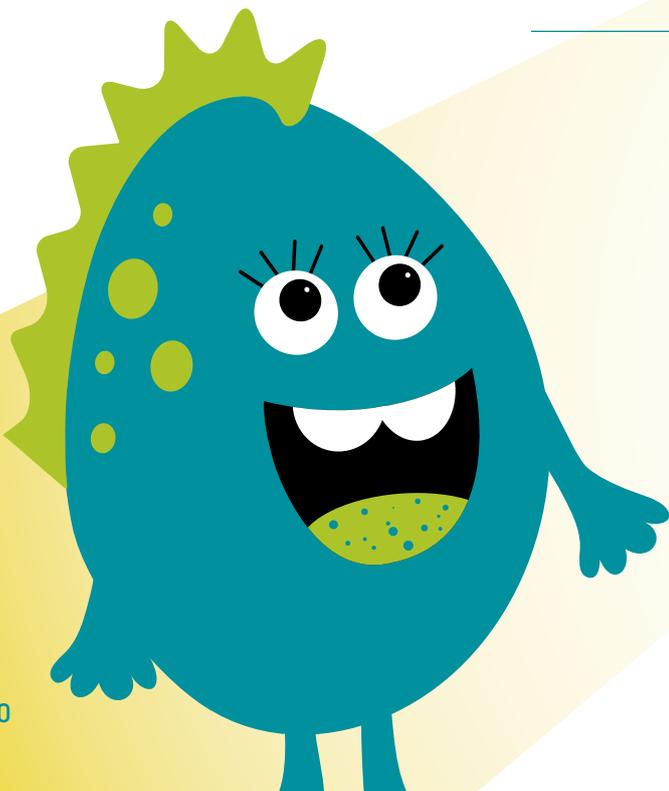
Non-tasters A percentage of the population that has fewer fungiform papillae (pink bumps) on their tongues than most and are less sensitive to bitter tastes.

Tasters A percentage of the population that has an average amount of fungiform papillae (pink bumps) on their tongues.

Supertasters A percentage of the population that has more fungiform papillae (pink bumps) on their tongues than most and are more sensitive to bitter tastes.

Cotton bud A small wad of cotton wrapped around one or both ends of a short rod.

Taste Sense which helps us experience salt, sweet, sour, bitter and umami flavours with our tongues.



Clever camouflaged creatures



About this activity

This activity will get you thinking about creature adaptations and understanding the diverse world around them.

Kit list

- ✓ Butterfly shapes cut out of brown or grey paper (sugar paper or wrapping paper is fine)
- ✓ Crayons, scissors, pencils and / or felt tip pens
- ✓ Blu-Tack
- ✓ Objects to 'hide':
 - ✓ A piece of brightly coloured wool or pipe cleaner
 - ✓ Plastic animals in their natural colours
 - ✓ A square white sheet of paper (6 cm x 6 cm approx) and some patterned wrapping paper
 - ✓ Any other objects (optional)

Time: 45 mins

Did you know?

- ✓ In 2019, the Wallace's giant bee was rediscovered as the **Largest species of bee**, females can reach up to 4.5 cm long – 4 times longer than the average honeybee!
- ✓ Found only in the plains of Kenya and Ethiopia, the Grevy's zebra is the **Rarest species of zebra** with a population of only 2,680 (as of 2016).

Find out more from:

kids.guinnessworldrecords.com

Watch out!

Do not climb on anything to hide your creatures.



Instructions

- 1 Use the cut-out paper butterflies to explore camouflage by finding ways to hide them around the room. Talk about how camouflage works.
- 2 How easy is it to hide creatures that are a plain colour? Some animals, such as snakes, use patterns to hide. Others, like stick insects, use their shape to try to stay hidden. There are other ways of camouflaging as well.
- 3 Take it in turns to hide the other objects as quickly as you can. You are not allowed to cover them up. Think about:

- ✓ Where are they difficult to see? Why do you think that is?
- ✓ Where can they be seen very easily? Why do you think that is?
- ✓ Can you do other things to help to camouflage them?

Next steps

This activity can be put towards a CREST SuperStar Award and there are plenty more online activities you could try for free. For more information, follow this link: crestawards.org/crest-superstar

Why not take photos and make a collage of lots of different creatures that often use camouflage? Use the facts below to do some research, if you like.

- 1 Animals such as big cats have spots or stripes to blend with their surroundings. Zebras' stripes make it difficult for a predator to know where one animal ends and the other begins.
- 2 Some animals have special skin that can change colour. Chameleons are the most famous of these.
- 3 Female animals are sometimes better camouflaged than the males (e.g. pheasant). This is so that they are not seen when sitting on the nest or looking after young.

- ✓ Which object do you think will be easiest to hide? Why do you think this?
- ✓ Where will it be best to hide them?
- ✓ Will anyone be able to find them?
- ✓ What if you change the colour of things?
- ✓ What about their shape? Can you see a pattern that might help?
- ✓ Do you think some places are better for hiding the objects? Why do you think this is?
- ✓ Try putting each of them in different places.

The world around us

Which metal?

About this activity

In this activity you will investigate how some metals rust when exposed to oxygen in the air and water. You will learn about some metals that do not change, corrode or rust easily and so have special uses, particularly in reducing gas emissions on highly polluted roads.

Kit list

- ✓ Range of common objects made from different metals
- ✓ Saucers or petri dishes containing water
- ✓ Fine steel wool pads
- ✓ Extra things you might need could include mild white vinegar, lemon juice or salt
- ✓ Magnet (optional)

Time: 2 to 3 hours

with ongoing observations over several days

Watch out!

Be particularly careful when handling metal objects because they may have sharp corners or edges. A few metals, especially lead, are toxic but can be handled briefly if hands are well washed afterwards.

Protect your eyes from acidic solutions such as vinegar by wearing safety goggles.

Wash hands thoroughly after completing the investigations and clean up responsibly.



Instructions

- 1 Carry out a 'rust hunt' to observe how some metals change colour and become weaker (corrode) when they react to substances in the environment.
- 2 Investigate which metals rust by placing everyday metal objects in saucers of shallow water. Over several days, observe which objects start to show signs of rust and which do not. Steel wool pads can be used to test for signs of rusting.
- 3 Begin to form conclusions about which metals rust and what causes

this to happen. You could use a magnet to identify metal items that contain iron or steel.

- 4 Think of your own 'rusting' enquiry questions, such as: can iron or steel rust when there is no water? Does salt speed up rusting? Can I prevent rusting? Plan and carry out your investigation; you can ask for extra 'kit' if you need it.
- 5 Research how some metals, such as gold, silver, platinum and palladium, are unique because they do not react easily, change or corrode. These 'precious metals' are often used to make jewellery as well as catalysts which are fitted to car exhaust systems to turn harmful gases produced in the engine into safe gases.

Next steps

This activity is taken from CIEC's **Sustainable stories and solutions for our planet**, which contains two introductory activities and four further main activities with industry stories to help young children develop an understanding of sustainability. Thank you to Thomas Swan and Co. Ltd for funding the development of this publication, which can be downloaded for free at ciec.org.uk/sustainability

At home

Find out if corrosion can be removed from metal by rubbing old coins with acidic substances, such as vinegar, lemon juice or even cola.



JM Johnson Matthey
Inspiring science, enhancing life

Companies such as **Johnson Matthey** in England are world leaders in making catalysts. Their scientists and engineers use precious metals to help make the air cleaner and reduce pollution. To find out more visit matthey.com/STEM

How can we grow mushrooms?

About this activity

Consider the benefits of following a more sustainable diet as an alternative to obtaining meat from animals as a source of protein. You will be challenged to grow a crop of mushrooms as a sustainable food source before learning about one company's solution to producing protein-rich food in a sustainable way.

Kit list

- ✓ Commercially available mushroom growing kit
- ✓ Without a growing kit, a comprehensive guide and list of equipment can be found at grocycle.com/how-to-grow-oyster-mushrooms (check the health and safety section to ensure you source any mushrooms safely)

Time: 1 to 2 hours

with ongoing observations over several weeks.

Watch out!

Some fungi are very poisonous so make sure you obtain the spawn from a reliable source – do not be tempted to gather your own from the countryside.

Before and after working with mushrooms, spawn or growing material, you must follow strict hygiene rules by cleaning your hands well with hot soapy water and wiping down all surfaces you are working on with a cleaning spray.

You should not eat during the activity or handle items such as notepads.

We do not advise cooking and eating the mushrooms you have grown. If you do you should follow the guidelines in The ASE booklet *Be safe!* (4th edition), which has a safety code for food hygiene.



Instructions

- 1 It is important to consider the 'sustainability' of the diets we eat. This means that when food is produced it uses a limited amount of land and water and creates little or no greenhouse gases.
- 2 Many people believe that a healthy, sustainable diet today should include lots of plant-based foods which can be grown with less impact on the environment, as well as mushrooms, which are a type of fungi from the group of living things called microorganisms.
- 3 Grow your own mushrooms using a ready-made growing kit. The mushrooms often take two to four weeks to grow and then the growing cycle can be repeated twice more.
- 4 Keep a growth journal over a few weeks; this could include scientific diagrams, photographs or time lapse video, measurements and written explanations.
- 5 Think about how scientists and engineers are finding more sustainable ways to produce sources of food.

Next steps

This activity is taken from CIEC's [Sustainable stories and solutions for our planet](http://ciec.org.uk/sustainability), which contains two introductory activities and four further main activities with industry stories to help young children develop an understanding of sustainability. Thank you to Thomas Swan and Co. Ltd for funding the development of this publication, which can be downloaded for free at ciec.org.uk/sustainability



Companies like **Quorn** in England produce a sustainable protein from fungi. Many people say that it looks like meat and tastes like meat and so is an excellent substitute made in a more environmentally friendly way.

The world around us

Start your own farm

About this activity

Around 70% of Britain is farmland. Farmers work hard every day to produce the food we eat but how do they choose what they are going to grow? In this activity, you are going to become a farmer and investigate which crops would be ideal for your new farm!

Kit list

- ✓ Seeds (check the 'Watch out!' section to make sure seeds are handled safely). Suitable examples could be:
 - ✓ Sugar snap seeds
 - ✓ Radish seeds
 - ✓ Beans
 - ✓ Cress
 - ✓ Peas
 - ✓ Sweetcorn
 - ✓ Mungbean
- ✓ Compost (check the 'Watch out!' section to make sure compost is handled safely)
- ✓ Biodegradable or recycled pots
- ✓ Small watering can
- ✓ Pencil

Time: 30 minutes

Watch out!

Remember to wash your hands after handling compost.

Ensure all pupils wash their hands thoroughly after handling any seeds.

Some seeds are very poisonous, e.g. castor oil and laburnum. French beans or red kidney beans are poisonous unless cooked.

If using compost from your school compost heap, be aware of the possibility of releasing huge numbers of fungal spores which could provoke an asthma attack.

Instructions

- 1 Today you are going to become a farmer. When choosing which crop to grow, you need to think about four things:
- 2 Think about all four of these factors and then choose the seed of the fruit or vegetable you'd like to grow.

Climate: what weather conditions does your plant need to grow in? Tropical fruits like bananas need warm temperatures and lots of sun. What is the weather like in Britain? Which fruits and vegetables grow well in this climate?

Seasonality: different crops grow at different times of the year. Which crop seeds can be sown at this time of year?

Demand: it's important to find out what other people like to eat so you can grow something people want. Carry out a survey in your class. Create a bar chart or pictogram to show which crops have the highest demand.

Plant life cycles: some plants take a very long time before they bear fruit whereas others grow quickly. For this project, we want something we can harvest as soon as possible.

- 3 Fill the pot with compost, poke a small hole in it and add your seed.

- 4 What do plants need to be able to grow? Cover it over with a little more compost, water it and leave it in a sunny place. Water it regularly.

- 5 Watch and see how your crop grows.

Next steps

Why not use your ingredients to start your own farm shop business? Visit <https://education.nfuonline.com/stemterprise> and gain your CREST Discovery Award.

Do you want to try and speed up your plant growth? You can design and make your own propagator: farmvention.com

At home

When you visit the supermarket, check the fruit and vegetables. Where have they come from? Could they have been grown in Britain instead?



The world around us

Invertebrate hotel

About this activity

Our amazing planet is home to a variety of different animals. Within their habitats, all living things have an important role. Learn about nearby habitats and help protect creatures found there by designing and building an invertebrate hotel – an ideal place for your favourite minibeast.

Kit list

- ✓ Paper
- ✓ Pencils
- ✓ Natural materials such as logs, twigs, leaves, bark, rocks, soil
- ✓ Water
- ✓ Structural materials such as cardboard, string, tape, scissors
- ✓ Spot the invertebrate worksheet

Time: 1 hour

Watch out!

All living things are important and need to be treated with care and respect.

Avoid areas where there is broken glass, fouling by cats or dogs and similar hazards.

After the activity everything should be left exactly as you found it outside.

Wash your hands thoroughly after working with natural materials from outside.

Instructions

- 1 Go on a tour of your school grounds and make a note of which creatures can be found and what the environment is like there, e.g. was it dark or bright? Was it damp or dry? You can use the worksheet overleaf to record your findings.
- 2 In the classroom, choose a creature you found and list the type of environment this creature would love to live in. Use books or websites to find out more about what it eats and what places it likes. You can see an image gallery with examples of different designs in STEM Connect, linked on next steps.
- 3 Design an invertebrate hotel for your creature. Label its key features and the materials used to make it. Make sure these are all easy to find.
- 4 Find a place outside where your hotel will be unlikely to get knocked over or damaged and won't need to be moved. The area should not be contaminated by broken glass or cat and dog fouling and similar hazards.
- 5 Using natural materials and structural materials, build your invertebrate hotel in your chosen safe place outside.

- 6 After two weeks, visit your invertebrate hotel to observe if any creatures have decided to stay in it.

Optional extras

Write a delicious room service menu for your invertebrate, including all its favourite things to eat.

Film an advert for your hotel, showing why the invertebrate would love to stay there.

Next steps

For a powerful video on habitats, why we need to protect them and an introduction to the invertebrate hotel challenge, head to STEM Connect and look at the 'Helping local habitats' unit.

Find out more at:

www.discoveryeducation.co.uk/STEMConnect

The 'Invertebrate hotels' image gallery on STEM Connect also shows examples of invertebrate hotels to use as inspiration.

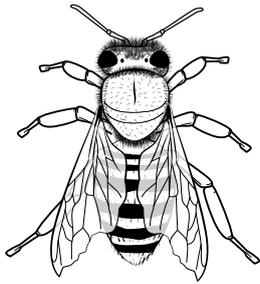
At home

Think of your favourite mammal, bird or reptile and design a hotel that would be perfect for it, including a dinner menu.

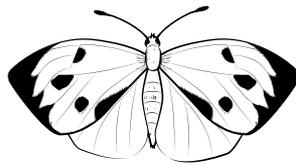


Our Diverse Planet worksheet

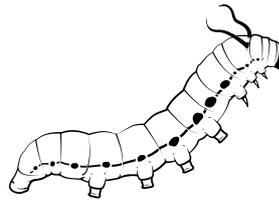
Spot the invertebrate



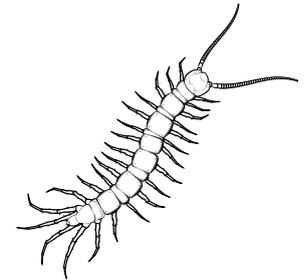
Bee



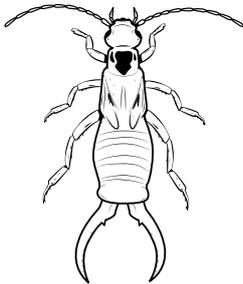
Butterfly



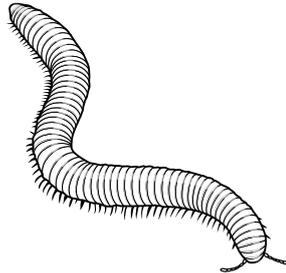
Caterpillar



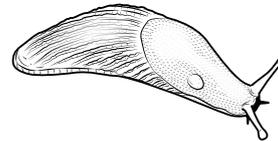
Centipede



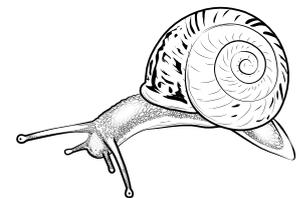
Earwig



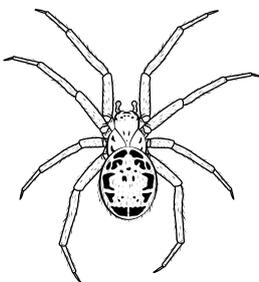
Millipede



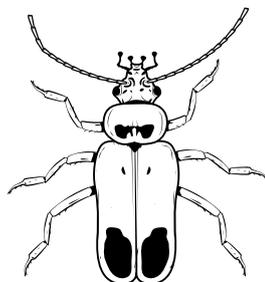
Slug



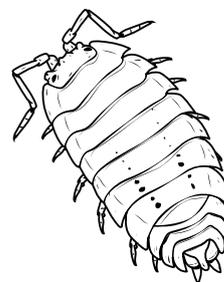
Snail



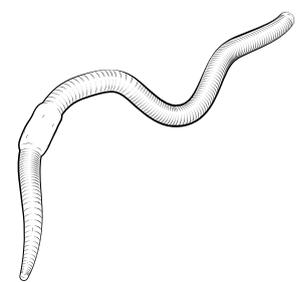
Spider



Beetle



Woodlouse



Worm

Assembly ideas

Why not start British Science Week off with a bang by holding an assembly to get your children excited about the Week ahead? Tell the British Science Association about your assembly ideas by tweeting or sharing images with the hashtag: **#BSW20**

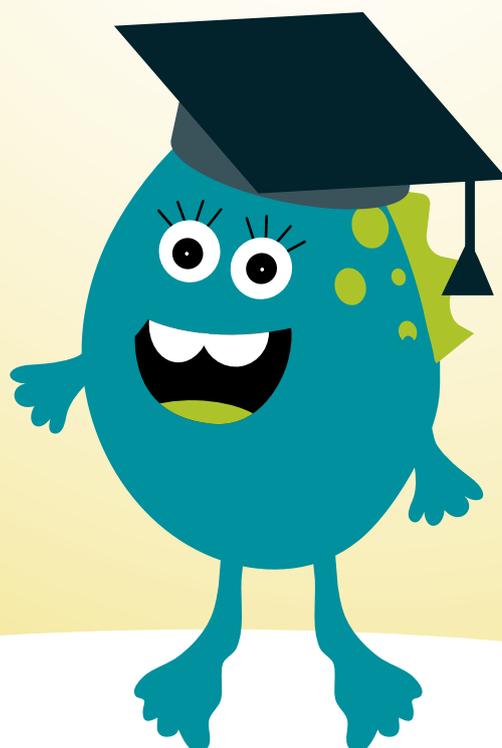
Kick start an assembly with a simple but impressive demo. Make a cloud in a bottle britishscienceweek.org/cloud-in-a-bottle

Remember, a demo is a good way to get children's attention, but it shouldn't be the whole focus of the assembly.

- ✔ You could reflect on important scientific discoveries or inventions in the last century, with a special focus on the diversity and range of both subjects and the people who discovered or invented them. Try focusing on people from underrepresented backgrounds, whose work may have been overshadowed at the time. See if there is anyone from your area who fits this bill.
- ✔ Profile a specific person who has contributed in some way to the diversity of a STEM field; from opening doors for underrepresented communities, to contributing new ideas, understanding or knowledge.
- ✔ Invite a special guest or someone from the school community to come talk about a related topic. See page 3 for information on how to get volunteers.
- ✔ Get the children thinking about how diversity is a part of people, materials, animals, nature or anything else in their everyday lives.

Here are some other ideas to include during your assembly:

- ✔ Tell your children about the plan for British Science Week and give them a challenge related to the theme. If you are sending home a family experiment, maybe you could introduce/demo it during the assembly
- ✔ Where has the topic of diversity been in the news? Is there any way you can discuss this in an assembly?
- ✔ Launch the poster competition (see page 28 of this pack)



Our Diverse Planet

Poster competition



About this activity

Get creative and enter the British Science Association's annual poster competition. You can make your poster about whatever version of 'Our diverse planet' you like and enter our UK-wide competition with the chance to win some exciting prizes. You can enter one of the activities found in this pack for the poster competition - simply look for the paintbrush symbol. Or you can use them as inspiration to get you started.

Kit list

- ✓ Paper (A4 or A3)
- ✓ Creative materials, e.g. pens, pencils, scissors, glue, watercolours, paint, colouring crayons, pipe cleaners, felt, thread, wool, foil, clay, string, beads, stamps, foam, pompoms.

N.B. try to avoid using straws or glitter - these plastics can damage our planet and harm the diverse creatures and ecosystem that live there.

Guinness World Records are proud to sponsor this year's poster competition.

There are many forms of discovery in the world which go hand in hand with records, such as exploring uncharted terrain, but 'discovery' comes in many forms - there are no limits on how you 'discover your world'!

Find record-breaking inspiration for your poster entry here: guinnessworldrecords.com/records/hall-of-fame

Research your poster

Investigate and imagine 'Our diverse planet' and everything that makes it special. Here are some topic ideas to get you started:

- ✓ Why not think about biodiversity? From the diversity in your own garden, to the diversity at the very bottom of the ocean, research all the amazing creatures and organisms that live on our planet.
- ✓ The diversity of science and STEM subjects. Have a think about all the diverse ways that science affects our lives and who you know that uses science every day. Is there science in baking and cooking? What about making a film or taking a picture? Or how about operating planes and cars? Remember that science is everywhere, you just have to look for it!
- ✓ Think about the other kinds of diversity our planet contains - from the variety of the molecules that make up essential parts of life, to the different ways our towns and cities are built, and the variation of people's tastes and interests.
- ✓ Our planet is unique, but why not investigate what makes it different from the other planets in our solar system?

Make your poster

Once you've done your research, it's time to get creative! Your poster must be:

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

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

Send us your poster

Posters will be judged on creativity, how well they fit the theme and how well the poster has been made or drawn.

Once the poster is complete, write your children's information on the back, fill in the online registration form, and then post your entry to us at:

**British Science Week Poster Competition,
British Science Association,
165 Queens Gate, London, SW7 5HD**

Next steps

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