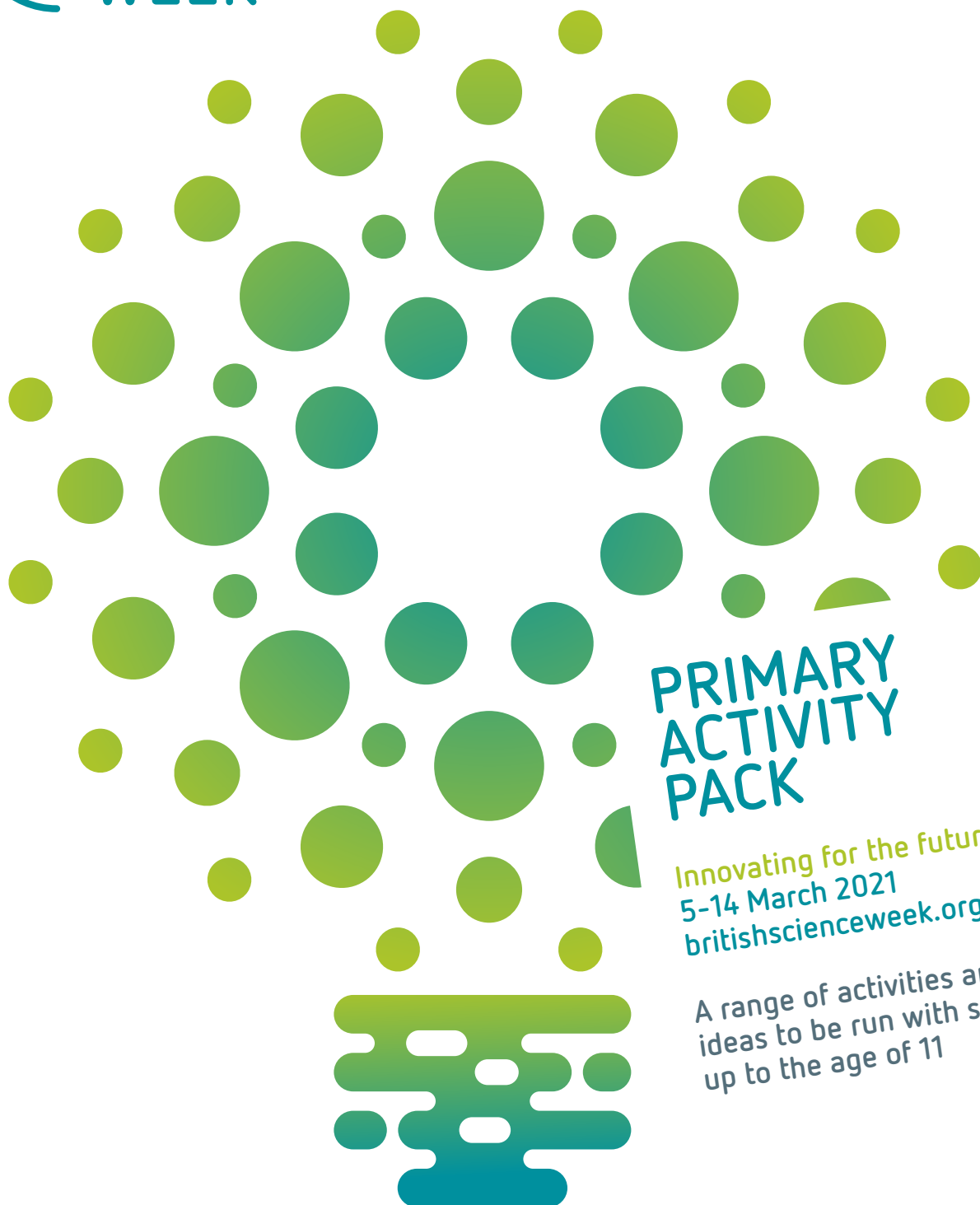




PRIMARY ACTIVITY PACK

Innovating for the future
5-14 March 2021
britishscienceweek.org

A range of activities and
ideas to be run with students
up to the age of 11

Delivered by

Major Partner: Innovation

Supported by





This activity 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 pupils' 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 pupils 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 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 pupils' own backgrounds, lives and interests.

We understand that this academic year is quite different for schools and we've adapted this pack to best support you for British Science Week 2021.

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

Please feel free to further adapt activities within the pack to suit to your setting, taking into consideration any quarantine of resources, working in bubbles and social distancing needed.

We have also added in some suggestions on remote engagement if you are unable to accommodate visitors within your school.

Find an activity near you:

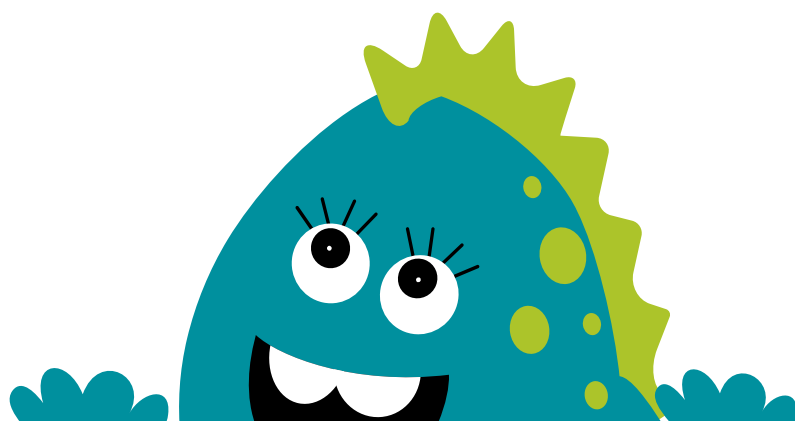
You can either create your own activity in your class or setting, or see what activities are happening near you. Last year we reached more than 180,000 people. Help us make British Science Week 2021 even bigger and better! Visit [sciencelive.net](https://www.sciencelive.net)



Enter our competition:

Some of the activities in this pack could be followed up by designing a poster; simply look out for the paintbrush symbol shown above. The theme for this year's poster competition is 'Innovating for the future'. For more information on the competition and how to enter, read on further in the activity pack or visit [britishscienceweek.org](https://www.britishscienceweek.org).

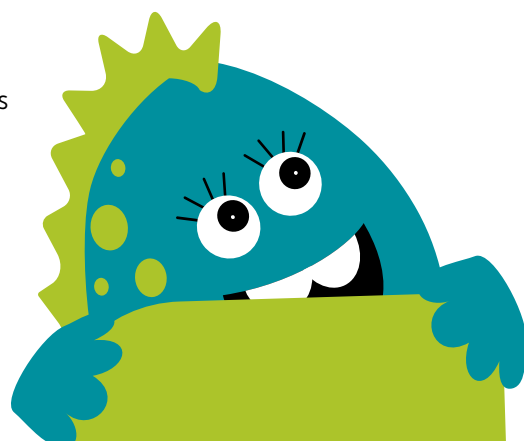
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Introducing the theme

Why not start British Science Week off with a bang, by introducing parents and pupils to the theme 'Innovating for the future' in a fun way to get them excited about the Week ahead?

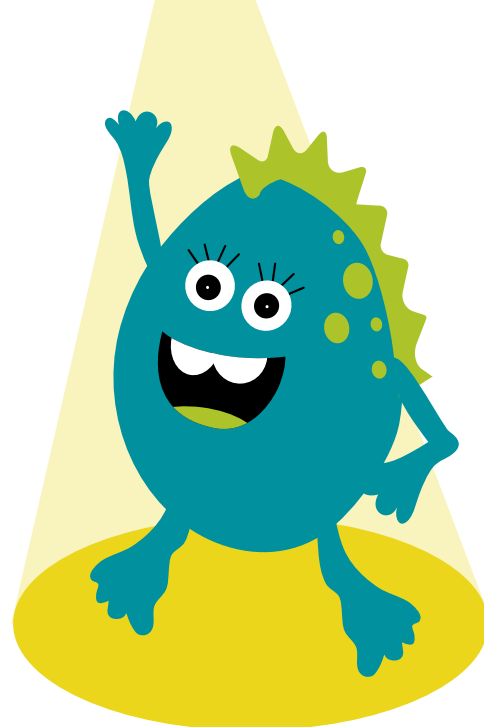
- ✓ Post your brilliant activity ideas or share images online tagging the British Science Association on Twitter - @ScienceWeekUK - and using the hashtag #BSW21
- ✓ Kick start the week with a simple but impressive demo. Try a game, an audio-visual presentation, a mystery or special object, an inventor's box or a pop-up display which communicates the theme 'Innovating for the future.'
- ✓ Here is a video featuring the Rube Goldberg machine which you can show the pupils. Anything that inspires their inquisitive minds is an epic start.
- ✓ Get the pupils to put on their thinking caps and experience **INNOVATION** by asking them to come up with machines they would like to invent from readily available scrap or craft materials in the classroom or setting.
- ✓ Encourage the pupils to come up with an acrostic poem for **INNOVATION** 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 remember their own ideas about innovation.
- ✓ Engage pupils into sharing how innovation is a part of people, materials, animals, nature or anything else in their everyday lives.
- ✓ Invite a special guest or someone from the school community to engage the children with their experience of an innovation. They could highlight a special tool that they use in their job and demonstrate how it makes their work more efficient, or they could feature their favourite innovation. See Page 5 for information on how to get volunteers.



Here are some other ideas to start the week:

- ✓ Tell the pupils 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 at your setting first.
- ✓ Innovation is around us. Where has the topic of innovation been in the news or your local area? Can you give an example of innovation? Is there any way you can encourage conversations with pupils about this?
- ✓ Launch the poster competition and let parents know about this (see Page 36 of this pack).

Making the most of volunteers



Opportunities for face-to-face engagement with external visitors may be limited this year, but there are opportunities for getting volunteers and presenters to engage your pupils online.

STEM Ambassadors offer their time and enthusiasm to help bring science and technology subjects to life and demonstrate the value of them in life and careers.

The STEM Ambassador website has recently been updated to enable teachers to request online STEM Ambassador support. Any activity created has an 'online' check box as well as a place to enter a link to a video conferencing call if required. STEM Ambassadors from across the UK can respond to any online activity request. Find out more and make a request here: www.stem.org.uk

You can also look for presenters and volunteers via Science Live (sciencelive.net) or ask parents if they work in STEM related jobs to describe what they do in more detail.

Things that work well are to:

- 1 Kick off British Science Week with a career talk/demo from one of these inspiring volunteers to engage the pupils for the rest of the week. The volunteer can highlight a useful tool or innovation which they use in their jobs and how it makes their job easier. Or, the volunteer can highlight their favourite innovation to share what and why that is.
- 2 Schedule two or three different guests for a career talk throughout the week if you can. This will keep children excited and anticipating who the next guest will be, and what they do. Opportunities like this will likely inspire them about what they want to be in the future. Remember, they are never too young to explore their career options.
- 3 Where available, choose volunteers/ambassadors who challenge stereotypes the pupils might have and promote positive attitudes towards science -

e.g. female engineers. Let the volunteers/ambassadors share in a simplified talk how their job is making a difference in the world (or an anecdote of what science activity they loved to do as a child).

- 4 Book your visitors early (many speakers get booked up during 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 children excited about inspirational career talks, broaden their choices and develop their interest in these careers!

Visit Inspiring the Future's website for some helpful ideas for using volunteers, some of which may be transferable when using remote engagement.

inspiringthefuture.org

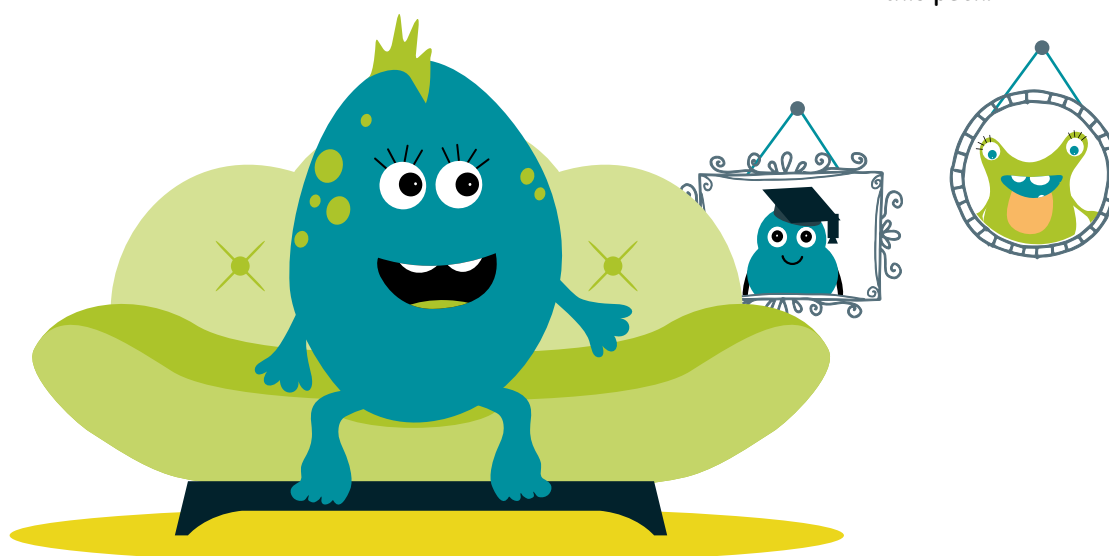
British Science Week at home

Want the pupils to get involved in British Science Week at home, but not sure how? Here are our top tips for engaging parents and carers in the Week:

- 1 Make the most of your parent newsletters, the Parent-Teacher Association (PTA), chat group and text messaging services if you have them. Let all the parents know in advance of the Week (at least a month) what you have planned, and how you'd like them to be involved. They might be able to collect/donate materials and store them 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. 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 STEM subjects and encourage them to chat with their children about this. You could do this via a newsletter or send pupils home with activities they can do with their parents, which may then lead onto further conversations. (See Page 12 for a great take-home activity.)
- 3 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 on the streets around pupils' houses. Why not try out some of the CREST Award activities which are quick and easy to do as fun, outdoor challenges too: library.crestawards.org
- 4 Send an experiment idea home during the Week which might spark mealtime discussions around STEM.
- 5 Try and make it as low-resource as possible. It can help if it's something the pupils have tried or seen at school first so that they feel like the 'experts' when they do it at home with family, allowing them to lead the learning.

Crafty rafts from the CREST SuperStar resources is ideal for this: primarylibrary.crestawards.org.

Why not try these fun science-based activities from the CREST at home Star collection (collectionslibrary.crestawards.org) which can be completed at home with few resources? You could also use the 'Which plastic' activity on Page 25 of this pack.



Gathering resources for your classroom or home

- ✓ If you can, try to collect materials all year round that can be cleaned and stored for use during British Science Week.
- ✓ Alternatively, check to see whether there is a scrap shop/store/club open in your local area. These shops are often membership based and can be a brilliant, inexpensive or free resource for card, plastic, bits of material – all sorts. These things can be turned into forests, cars or model people; you name it, the kids will think of it!
- ✓ Look at childrensscrapstore.co.uk to find a UK directory of scrap stores.
- ✓ Take photographs when out and about and share these with the pupils to foster discussion and raise their level of understanding about innovation – machines, materials, building structures, etc. The more colorful, the better. You can also use these photos for an innovation version of the guessing game 'I spy' where you can describe what the innovation is used for and the pupils will attempt to guess it.
- ✓ Collect story books and reference books linking to the theme 'Innovating for the future' ahead of time to create a themed library. You can even organise a read-aloud session of a related story book for circle or carpet time.



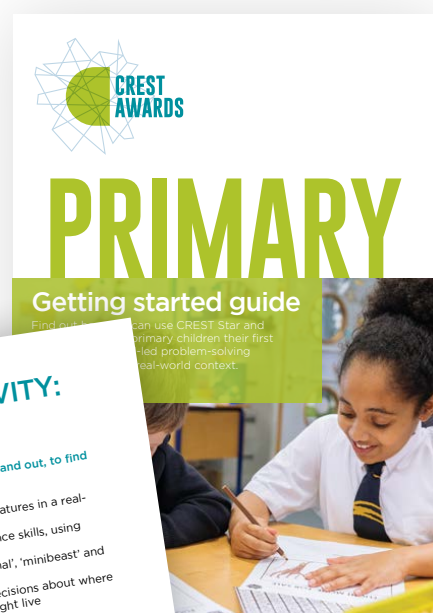


Beyond the Week

Once British Science Week is over, this doesn't mean the exploration and curiosity have to stop!

Some ideas for keeping students engaged include:

- ✓ Pupils could take part in a CREST Award. CREST is a scheme that encourages young people to think and behave like scientists and engineers. Pupils can complete eight activities to achieve a Star or SuperStar Award which includes a certificate and badge.
- ✓ If there are older children at your school or in a school nearby they could earn a higher level of CREST too. For more information, take a look at the different CREST levels available: crestawards.org/which-level
- ✓ Consider sharing your British Science Week learnings by running a CPD session for other teachers in your school or, where relevant, academy chain. Think about incorporating the Science Capital teaching approach into your methods: ucl.ac.uk
- ✓ If you have the opportunity, then you could consider running a STEM club or curiosity lab within science class or school. Find supporting resources at www.stem.org.uk.



Unlocking skills

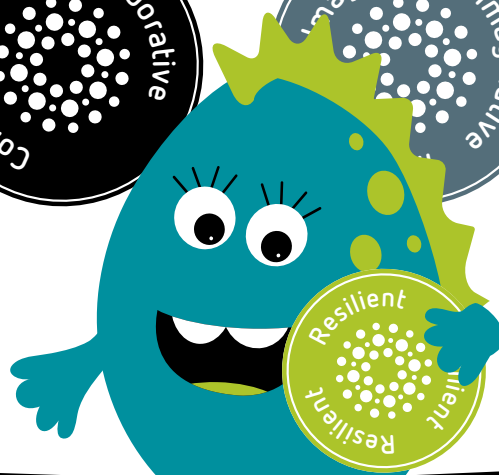
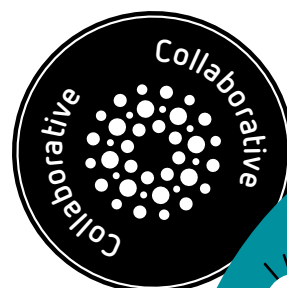
A fantastic way to encourage STEM interest in pupils is to introduce transferable skills used by those working in STEM jobs. These skills will strengthen positive attitudes towards STEM and reduce their stereotypes of those working in the field.

You could engage the pupils in this STEM Person of the Week activity from NUSTEM at Northumbria University (nustem.uk).

Ask the pupils to identify what attributes people working in STEM need. It might include being observant, creative, patient, a good communicator, or curious.

See the table below for the complete list developed by NUSTEM.

As an alternative and a little bit of motivation, why not award each of the pupils with a sticker or certificate for a STEM skill which they identify with very well during the Week?

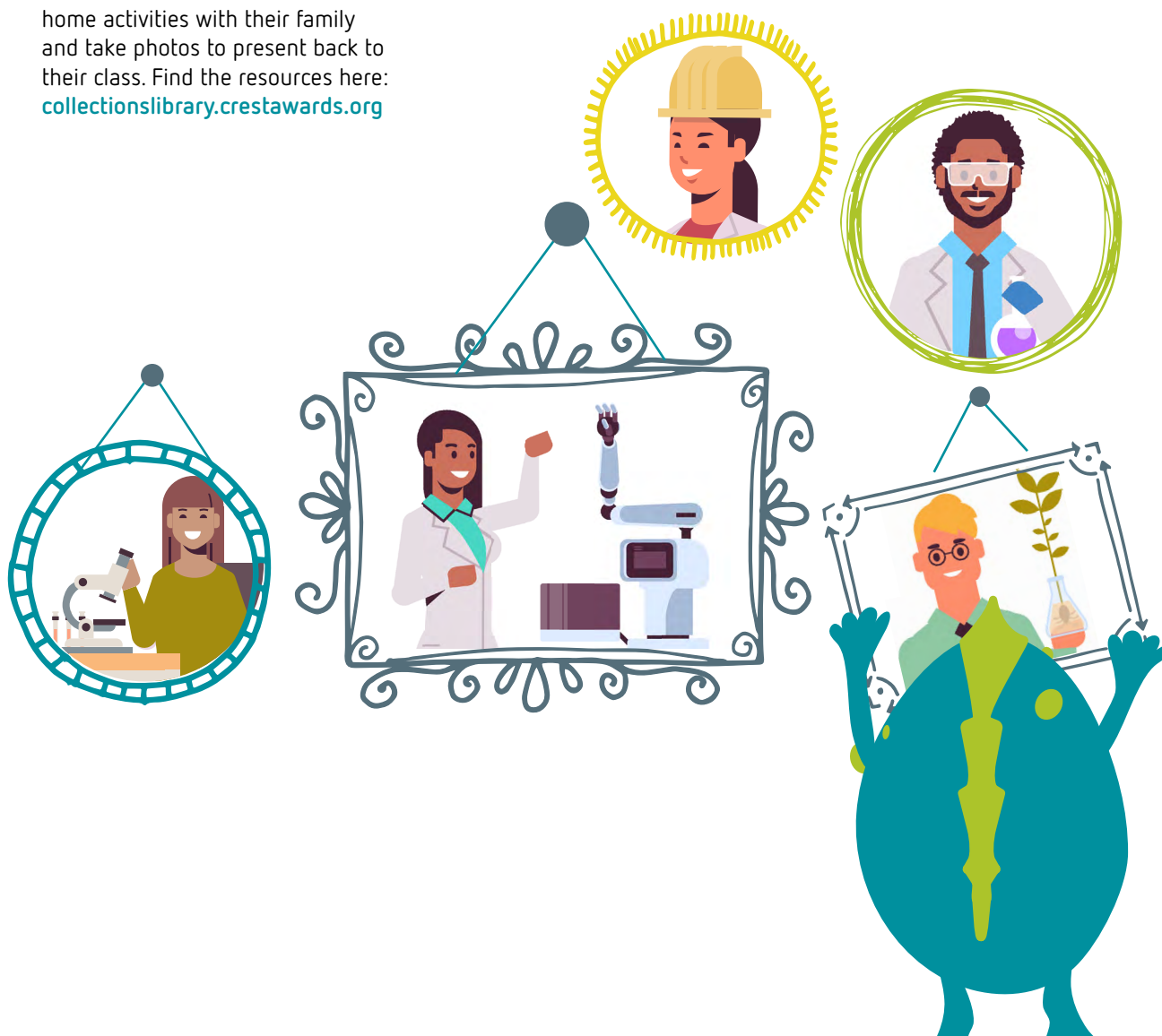


Observant	Open-minded	Committed	Tenacious
Creative	Imaginative	Patient	Collaborative
Resilient	Communicator	Passionate	Organised
Curious	Self-motivated	Hard-working	Logical

Get children leading the way

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

- ✓ Encourage pupils to run their own activities during British Science Week. They could either run activities for other members of the class or run some CREST at home activities with their family and take photos to present back to their class. Find the resources here: collectionslibrary.crestawards.org
- ✓ Get pupils running their own CREST projects and share what they've done through posters or show and tell.
- ✓ Ask pupils to research an invention and how this influenced how we live our lives today and then write a report for the school newsletter or website.
- ✓ Encourage pupils to design and create their own display of scientists through time – a photo exhibit of scientists who changed the world with their discoveries, inventions and innovations.



Innovating for the future

Terrific Scientific

About this activity

How much electricity does your school use and how can you reduce that amount? By recording electricity usage over a period of days, you will learn about how electricity is used, how it is wasted and what you can do to reduce this waste.

Time

1 hour to get started, then you'll need 10-15 minutes observation time every day for 2 weeks.

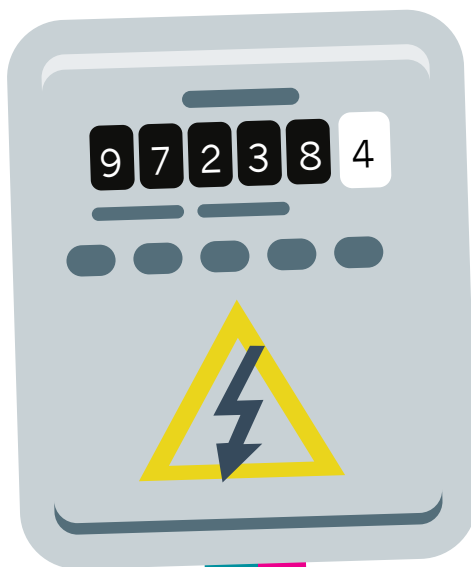
Kit list

- ✓ Clipboard
- ✓ Pen/Pencil
- ✓ Thermometer (handle with care!)
- ✓ Computer to access the following resources via bbc.co.uk/teach/terrific-scientific/KS2/z6bnrj6
- ✓ Electric Detective Worksheet
- ✓ Power Health Check Table
- ✓ Electricity Record Sheet

Next steps

There are several interactive activities to try on the Terrific Scientific website [here](#).

We also have tailored SEND resources available [here](#).



Watch out!

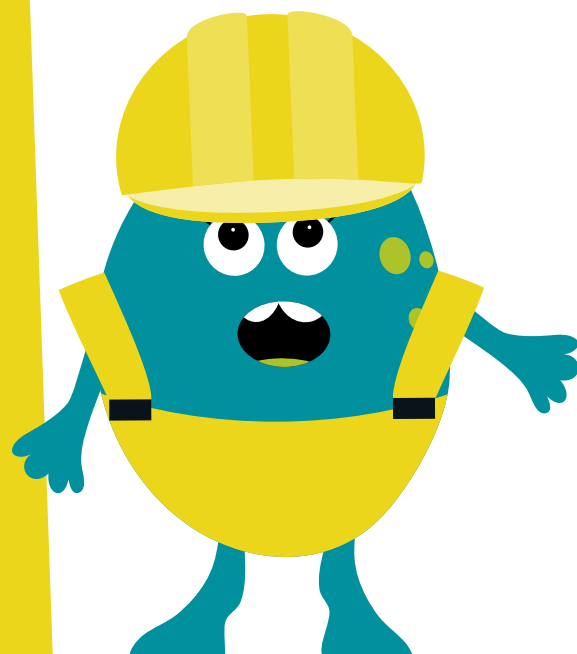
- ⚠ Use caution when handling thermometers as they are fragile.
- ⚠ This investigation assumes that all electrical equipment has been tested and passed as safe. Make sure your school has carried out a risk assessment for this activity before you get started.
- ⚠ Do not touch electrical equipment without a teacher's permission or an adult present, and do not switch off any equipment without an adult's permission.
- ⚠ Get an adult to supervise you when you read the electricity meter. If it's unsafe for you to read the meter, get an adult to take a photograph of it for you.
- ⚠ Follow your school's policy on social distancing when moving around the school to help reduce the risk of Covid-19 transmission.
- ⚠ When you're recording outside weather conditions, make sure you don't stare at the sun.

Instructions

This activity takes place over 2 weeks. In week 1, you'll discover how much electricity your school uses. In week 2, you'll find ways to save electricity.

Week 1

- 1 Watch the introductory video online: bbc.co.uk
- 2 In your class, talk about how your school uses electricity. Which devices use electricity? Where are they? List as many of them as you can.
- 3 In small groups, choose different areas of school and complete the Electric Detective worksheet for devices that use electricity in that area. Are these devices on, off, or on standby? Do they need to be on? Is power being wasted? Are there windows open? Are hot taps left running?
- 4 Using information from your Electric Detectives worksheet, fill in the Power Health Check table and work out how energy efficient your school is.



- 5 With an adult, read your school's electricity meter twice every weekday – once in the morning, and once in the afternoon. Complete the Power Record sheet, subtracting the morning reading from the afternoon reading to calculate how much electricity your school used that day. Also record the temperature inside and outside and the amount of cloud cover to assess how weather affects electricity usage. If the meter is not accessible, ask an adult to take a photo of it at the same times each day.

Week 2

- 1 Discuss what changes your school could make to save electricity. Which devices could be switched off? Could lights be switched off?
- 2 Start to make these changes around the school and continue to take twice daily readings of the school's electricity meter and record your data on the Power Record Sheet. Make sure you don't switch off any electrical equipment without permission from an adult!
- 3 At the end of week 2, when you have completed 10 days of meter readings, you are ready to calculate your school's power readings once more. Have you reduced the amount of electricity your school uses?

At home

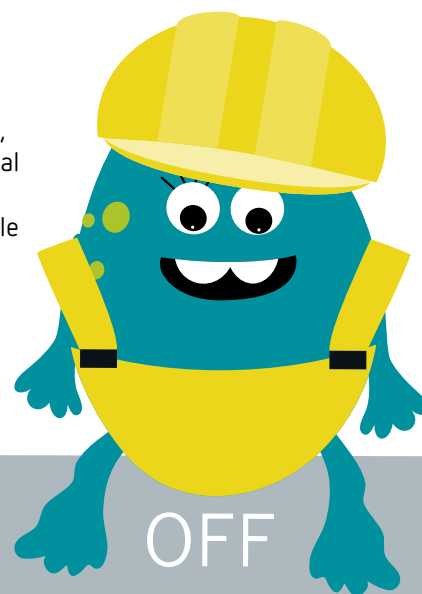
You could try this activity at home to discover ways of reducing electricity use, saving money and helping the environment. You should always ask an adult should before operating electrical equipment or accessing the electricity meter.

Skills set

Observant, Collaborative, Curious

Career options

There are many careers in the real world that link to this activity, including Energy Engineer, Energy Manager, Environmental Scientist, Environmental Education Officer, Environmental Engineer, Environmental Manager, Electrician, Electricity Network Planner, Electrical Engineer, Sustainability Consultant, Nature Conservation, and Renewable Technology Engineer/Consultant. Check out more job profiles on our [BBC Bitesize careers site](#).



Innovating for the future

Herd Immunity Jenga

About this activity

Vaccines train your immune system to fight off bacteria and viruses and prevent you from getting ill. Vaccines changed our world by stopping the spread of deadly diseases and improving global health. Discover how vaccines not only protect you but everyone in your community.

Time

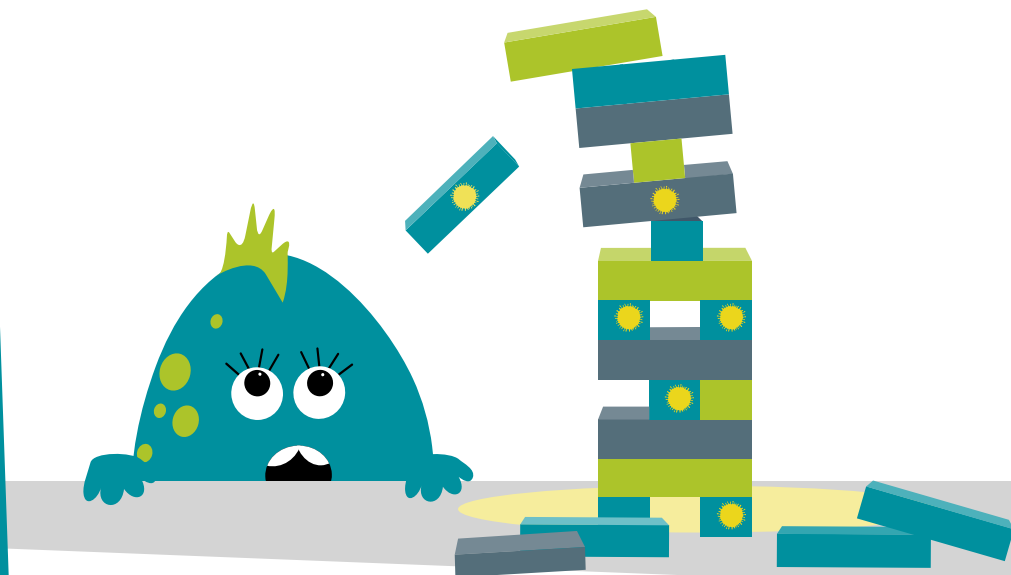
25 minutes

Kit list

- ✓ Jenga set
- ✓ Pack of 50 dot stickers

Next steps

- ✓ The first tower fell down quickly because not enough blocks were protected by vaccination, so too many were infected and removed. The second tower should stay standing, because when most people in a community are protected by vaccination, it makes it difficult for the disease to spread. This is called **herd immunity**. Herd immunity is crucial to protect those who are unable to receive vaccines, including people who have a health condition that impairs the function of their immune system.
- ✓ Find out more about how vaccines work and the importance of herd immunity at celebratevaccines.com



Instructions

- 1 Place stickers on the ends of 10 random blocks then stack all the blocks to build a tower.
- 2 The tower of blocks represents a group of people like the community you live in. You will act as an infectious disease, spreading through the community and infecting people. The stickered blocks are people who have been vaccinated against the disease and are protected from infection.
- 3 'Infect' the community by, one by one, removing the blocks with no stickers. Each block that is removed is a person that has become infected. The stickered blocks (vaccinated people) cannot be removed. What happens to your tower? Why?
- 4 What happens if you 'vaccinate' more people in the community? Place stickers on 35 more blocks so that most of the blocks now represent vaccinated people. Build another tower with your blocks. Again, 'infect' people by removing blocks with no stickers from the tower. What happens to your tower? Why?

At home

If you have blocks at home, you could try this activity at home with people you live with.

You could also ask an adult to help you find out about which diseases vaccines can protect you against. What do you know about these diseases?

There are millions of children around the world that do not have access to the vaccines they need. Can you find any charities working to change this?

Skills set

Curious, Observant, Logical

Career options

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

How can we make our food better?

About this activity

Have you ever noticed how all the cows in a farmer's field look identical? Although they may look the same, there are actually many different species of cows, and a meat farmer might want a very different breed to a dairy farmer. So why is this? In this activity, you will learn about selective breeding for food, as well as its advantages and disadvantages. You will think about how selective breeding can benefit humans and why some people disagree with it.

Time

1 hour

Kit list

- ✓ One set of debate character cards per group of 6 (see pages 15-16 of this pack)
- ✓ Access to video on **selective breeding**
- ✓ Space to sit in small groups for discussion
- ✓ Copies of debate framework (See pages 17-19 of this pack)

Next steps

Do some more research to find out more about the different perspectives of the characters. You can join up to the free NFU scheme 'Farmer Time' which connects classrooms with a farmer via video chat to regularly chat about their work and answer their questions.

Instructions

- 1 Ask your teacher to help you find out about and discuss the differences between wild and farmed food products, for example wild and farmed strawberries or a wild boar and a farmed pig.
- 2 Watch the selective breeding video and discuss the following questions:
 - ✓ If two muscular cows breed will all their offspring be as muscular as each other?
 - ✓ Why does the farmer have to breed the offspring many times to get the best cows?
- 3 Look at your debate character card and think about which side of the debate your character might be on. Make some notes about what you think they would want to say.
- 4 In your group, take turns to present the opinions of your characters and use the debate framework to think about these. Remember to try and be sensitive and understanding of other people's points of view when debating.
- 5 Discuss how the debate went, thinking about the why the characters felt the way they did.
- ✓ Which point in your arguments were the strongest and what made them strong argument points?
 - ✓ Were there any characters that didn't have a very strong argument?
 - ✓ Do you think the characters you have been told about could ever agree with the other side of the debate?
 - ✓ Have you heard any arguments today that have changed your mind?
- 6 Vote on the best argument as a class or group.

At home

Share the views of the character you had with family members. Do they agree or disagree with your character?

Skills set

Open-minded, Curious, Communicator

Career options

There are lots of careers linked to food production, such as farmer, chef, working in genetic modification, or perhaps food taster for large companies such as Cadbury or Sainsbury's. A career in Biotechnology might be of interest, working in a laboratory to test food products before they are declared fit for human consumption.



Debate Character Cards

Read about the person on the card that your group has been given.

Be prepared to role-play this person, saying who you are and what you think about selective breeding.

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Worksheet

How can we make
our food better?



Character 1

Adam is a dairy farmer.

He uses selective breeding to produce cows that deliver a greater amount of milk than normal cows. This means George can make more money from his farm.



Character 2

Rachel is a scientist.

She is worried that selective breeding produces populations of plants and animals that all have the same characteristics. This means that if some deadly disease was introduced to the population, it would affect all the animals or all the plants, not just a few individuals.



Character 3

François works for a company that sells a book called *The selective breeding handbook*, which tells farmers how to carry out selective breeding. His boss has told him to sell as many copies of the book as he possibly can.



Debate Character Cards

Character 4

Lou works for a charity. He helps people in developing countries to breed cereal crops that produce more grain per stem. This means that more food can be produced in a smaller area of land.



Character 5

Holly works for the RSPCA. She has seen that selective breeding can lead to deformities and disease in domestic animals such as dogs. She thinks it would be better for animals if there was a law against selective breeding.



Character 6

Lee works for a vegetarian magazine. He feels very strongly that eating meat is wrong. He wants to stop all farmers breeding any animals for meat.



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Worksheet

How can we make
our food better?



Debate Framework

After each group has spoken,
record their strongest argument.
Give each presentation a mark
(quite good, good or very good).

When the debate is finished, fill in
the last row as a group.

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Worksheet

How can we make
our food better?



	Reason why selective breeding is negative	Debate mark Quite good argument: ✓ Good argument: ✓✓ Very good argument: ✓✓✓
Adam		
Lou		
François		

Debate
Framework

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Worksheet

How can we make
our food better?



Reason why selective breeding is negative		Debate mark Quite good argument: ✓ Good argument: ✓✓ Very good argument: ✓✓✓
Lee		
Holly		
Rachel		

Debate Framework

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Who had the strongest argument? (You cannot vote for yourself!)

Why?

Do you think selective breeding is a good idea or not?

Why?

Worksheet

How can we make
our food better?



Split light into different colours

About this activity

Spectrography is an incredibly useful process for astronomers and other scientists. It allows them to investigate the chemicals in objects found trillions of miles from our planet. The atoms of different elements have their own distinct patterns, and by observing these patterns scientists can determine what objects such as stars or planets are made of.

Spectrography is not just about observing space, it also has numerous applications in the laboratory or in your very own home. In this activity, you will investigate light and study it on an atomic level with your very own spectroscope.

Kit list

- ✓ Kitchen roll tube
- ✓ Two pieces of A4 black card
- ✓ Transparent CD
- ✓ Roll of packing tape
- ✓ Pencil
- ✓ Glue
- ✓ Pair of scissors

Next steps

How It Works is the action-packed magazine that's bursting with the answers to your curious questions - every issue is jam-packed with the most exciting advances in science and technology and features everything you need to know about how the world around you - and the universe - works. **Exclusive offer for schools and students!** Get *How It Works* for 6 months for £9.99 plus other great offers over on: magazinesdirect.com/bsw2021 or telephone 0330 333 1113 and quote 89AA. Offer ends 30 September 2021.

Instructions

- 1 Take your kitchen roll tube and insert the black card so that it lines the inside. Then carefully cut off any excess and tape it in place.
- 2 Take the remaining piece of black card and place the kitchen roll tube upright on top of it. Draw and cut out a circle that is 1cm wider than the end of the tube.
- 3 Cut out a rectangle in the middle of your circle then stick the circle to one end of the kitchen roll tube. Next, taking the remaining card, cut two smaller rectangles and tape them either side of the central rectangle so that only a narrow slit is left open. It's very important that the final slit is straight and level at either side.
- 4 Take your CD and stick it onto the other end of the kitchen roll tube so that you can look through the transparent part and into the tube.
- 5 Check that everything is secure and there are no gaps in your spectroscope, then hold it up to a fluorescent light while looking

through the CD end of the tube. Do not put your eye directly to the CD, keep a distance of at least 15 cm. You should see a colourful, rainbow-like spectrum on the transparent surface of the disc. This works especially well if you cover one of your eyes.

The spectroscope is splitting the light into the colours of the rainbow. The CD screen bends the light as it passes through, filtering the wavelengths of the white light so that you can see all the colours of the spectrum. Try looking at different light sources like the TV, computer screen, or LED displays and see whether the spectrum of colours you can see is any different.

Skills set

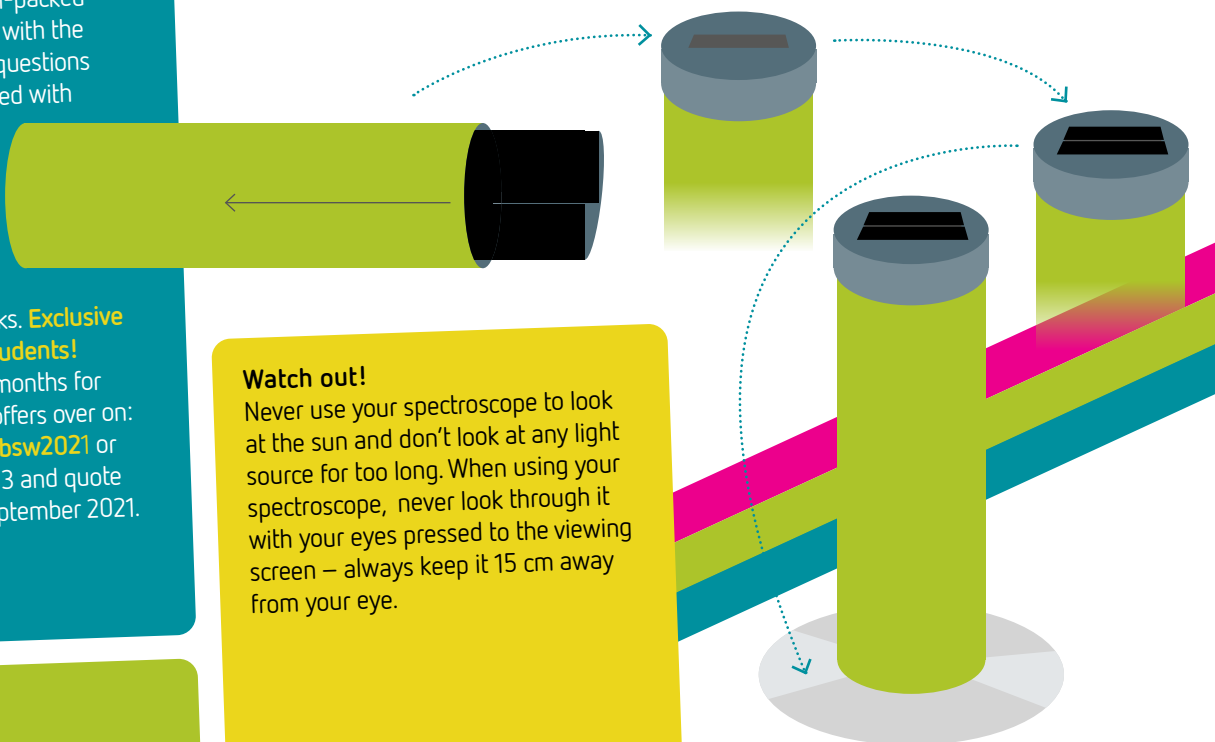
Logical, Creative, Observant

Career options

There are several career options that you could take that involve making use of the splitting of light: optometry. You can even use it in the manufacture of telescopes, binoculars, cameras and spectacles, amongst others.

Watch out!

Never use your spectroscope to look at the sun and don't look at any light source for too long. When using your spectroscope, never look through it with your eyes pressed to the viewing screen - always keep it 15 cm away from your eye.



Visualising classrooms of the future

About this activity

Want to learn about the world of film? Want to stretch your **design and technology** skills and visualise a classroom for the future? In this fun activity developed by Into Film you'll learn about a key VFX job role and get the chance to make your own film.

Time

1.5 – 2 hours

Kit list

- ✓ Pencils, pens, crayons
- ✓ A phone or tablet that can record video

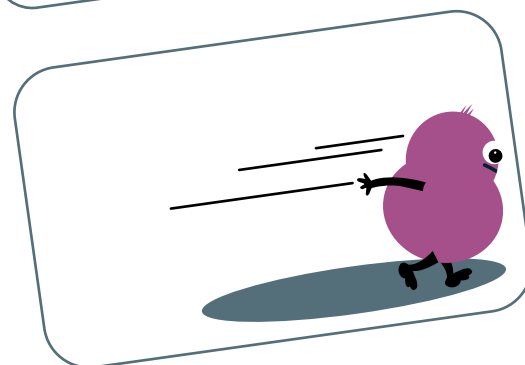
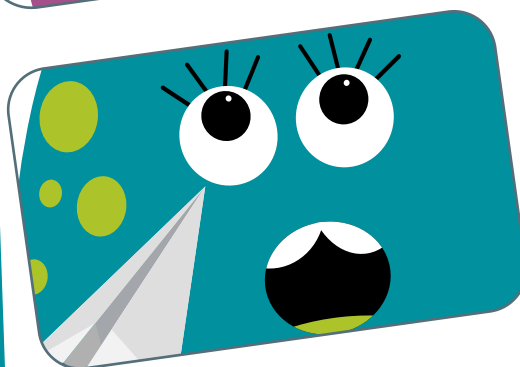
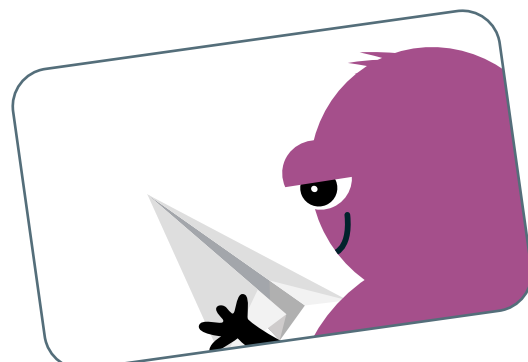
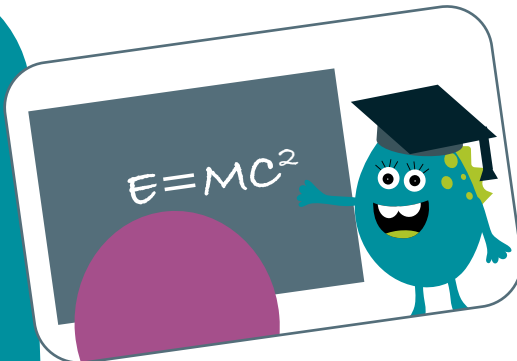
Next steps

Learn more about a being a pre-vis Supervisor by watching the video of industry professional Faraz Hameed at intofilm.org/Britishscienceweek2021

Additional worksheet
on page 17

Watch out!

If you go on to film your storyboard, make sure the only images you show are those that you have drawn.



Instructions

- 1 Read about what a **pre-vis supervisor** does to help make a film.
- 2 Discuss what you think the '**pre-vis**' part of the job might mean (hint: pre means before). Explain what you think might be exciting about this career.
- 3 Think about what classrooms might have looked like in the past. You could ask grandparents or older people in your community about what classrooms were like when they were kids.
- 4 Draw a picture to show what teaching and learning was like in the past. You might want to draw a **close-up** of an object or a **wider shot** of a whole classroom.
- 5 Based on your own experience, draw another picture to represent your experience of 'lockdown' learning. Think of objects or places that could represent what it was like to learn at home.
- 6 Get creative and draw a picture of how you imagine teaching and learning might look like in the future.
- 7 Label your images with any instructions a Director might need to turn your pictures into a film.
- 8 Present your pictures to each other and explain the story behind each image.

At home

Create a film showing your three images that includes a voice-over of you explaining the story each image tells.

Skill set

Imaginative, Creative, Logical

Career options

Storyboarding is a useful skill to many job roles in the film industry. A pre-vis supervisor works in the visual effects side of filmmaking. Following the director's vision and style, they plan and develop the look and feel of a film by creating 3D models and virtual storyboards.

You're the pre-vis supervisor on a new film; a documentary called *Lockdown Learning: Schools for the future*.

Your job is to storyboard three filming locations that tell a story about the changes in learning and teaching in your community.

A pre-vis supervisor works in the visual effects side of filmmaking. Following the film Director's vision and style, they plan and develop the look and feel of a film by creating 3D models and virtual storyboards.

In the boxes opposite, draw three images that will help the director and film crew visualise this new story.

1 Teaching and learning in the past.

2 'Lockdown' learning

3 Teaching and learning in the future

Worksheet

Visualising Class-rooms of the Future



Does the appearance of food affect how it tastes?

About this activity

Use your taste buds to investigate the taste of irregularly shaped fruits and vegetables and find out whether the way food looks affects how it tastes.

Time

30 minutes

Kit list

- ✓ Three samples of at least one kind of (washed) fruit/vegetable, some more irregularly shaped than others
- ✓ Pencil and paper for recording results
- ✓ Clean knives, peelers and chopping boards for preparing tasting samples

Next steps

Now that you have started thinking about how to keep both your body and your planet healthy, why not find out other ways that farmers are working to save the environment. Take a virtual tour of a farm and access more exciting investigations like this one at [farmvention.com](https://www.farmvention.com) to become a climate superhero. Submit your ideas to be in with the chance to present your project in Parliament!

Watch out!

Wash your hands thoroughly before handling food you are going to eat.

Ensure the work surface and tools are clean before use.

Make sure you ask an adult for help when using knives and peelers to prepare your vegetable samples.

Instructions

1 Think about these questions:

- ✓ Where do fruit and vegetables come from?
- ✓ Have you ever been to a farm? What did you see?
- ✓ What are your favourite fruits and vegetables? Can these be grown in the UK?

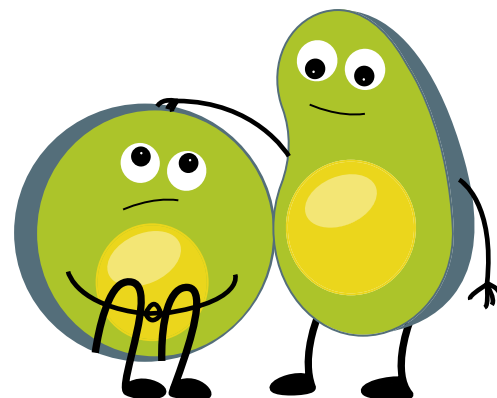
2 Examine the regularly and irregularly shaped vegetables that you have chosen. Which do you think will taste better? Why?

3 Did you know that lots of fruit and vegetables are thrown away each day because they are unusually shaped? What impact do you think this has on the environment?

4 Your challenge is to investigate whether the regular-shaped food tastes better than the irregular-shaped food and decide whether the unusual-looking food is worth saving.

5 When planning your investigation, think about these questions:

- ✓ Which sense and sense organ will you use?
- ✓ How will you make sure you are not judging the food by the way it looks?



6 You could mark your chosen vegetables as vegetable A, B, C and rank them on which you think looks the tastiest and write this down.

7 Next, cover your eyes and taste a sample of both the regular and irregularly shaped vegetables. Make notes on which one was the tastiest.

8 Compare your results: did the appearance of the vegetables affect how they tasted? Were you able to work out which vegetables were irregularly shaped just by tasting them? Have your views about irregularly shaped vegetables changed?

At home

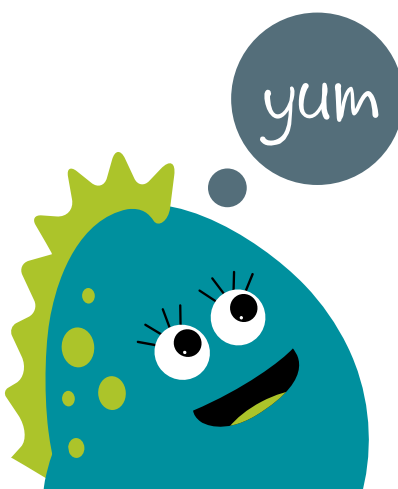
Why not repeat this investigation with your family at home? Ask them to complete the same steps and see if their views on irregularly shaped vegetables change.

Skills set

Observant, Open-minded, Curious

Career options:

The diverse and rapidly changing world of food and farming has thousands of fantastic STEM career opportunities. Whether you are interested in robotics, animal welfare, engineering, horticulture, business or food technology, there is a career for you. Visit: fginsight.com/thisisagriculture



Innovating for the future

Who invented blue?

About this activity

Where does the colour in paint come from? Paint is made from pigments and all of these pigments used to come from natural materials. Black was made from burning bones, and the most expensive pigments were made from rare and precious materials. For example, ultramarine blue was made from precious stones that came from a mountain in Afghanistan. For centuries, artists have experimented with making their own pigments from the materials around them.

In this activity, you will learn about where colours come from and how to make your own paint from natural materials. You will discover what happens when you grind, filter and dissolve leaves, plants and soil to create pigments.

Time

30 minutes

Kit list

- ✓ Pestle and mortar (if you don't have one you could use any hard, unbreakable bowl like an ordinary kitchen bowl or a solid work surface. You could use the end of a rolling pin, or a smooth pebble that fits in your hand as a pestle)
- ✓ Dust mask
- ✓ Apron
- ✓ Small bowl
- ✓ Measuring jug

1 of 2 pages

Instructions

In this activity you will make your own pigment for paint by experimenting with natural materials. You will collect materials, crush them to make a paste powder, add them to water, filter and dehydrate them, then finally grind to a fine pigment.

Watch out!

When mixing paints with any sort of powdered ingredients, it's best not to breathe in the powder while mixing. If needed, cover your nose with a mask or your shirt while mixing paints.

Wear an apron to protect your clothes.

Be careful to avoid plants that sting or cause irritation to the skin.

Be careful to collect soil samples or leaves that are NOT contaminated.

If you dry out your powder mix on a stove or the oven, make sure an adult is supervising.

- 1 Collect your materials – have a look around and see what is in the park or garden or kitchen cupboard. Here are some suggestions: flower petals, berries, green plants and vegetable leaves, charcoal, sand, soil, or clay.
- 2 Choose one of your materials and put a small handful into your mortar bowl. Use your pestle to grind your material. Keep working on it until you have made a paste or powder.
- 3 Scrape out your paste or powder from the bowl into a measuring jug and add water – about the same as if you were making a glass of orange squash. Give it a good stir and let the particles settle.
- 4 When the larger particles have settled, pour the liquid into a shallow bowl, put it in a warm sunny place and leave it to dry out completely. You could speed this up by heating it gently in a pan lined with tin foil over a low heat or putting it into a tray lined with foil and leaving it in a warm oven until the water has evaporated.

Innovating for the future

Who invented blue?

Next steps

- ✓ Now you have pigment, you are ready to make your own paint. Add your powder pigment to different 'binders' to make paint. You can try adding it to PVA glue, water, vegetable oil, egg yolks, glycerin or honey. Which binder works best? Experiment with different materials to make a range of colours and then use them to make your own artworks.
- ✓ More ideas and inspiration can be found in our special art and science edition of **AD magazine** – issue 25.

- 5 When all the water has evaporated, you will be left with a dry powder. Put it back into your mortar and grind it again until you have a very smooth powder.
- 6 Take a small pinch of your pigment and mix it with a drop of water into a smooth paste. Congratulations! You have made your own pigment – and who knows, you may have even invented a new colour!
- 7 Discuss which materials made the strongest colours. Think about why artists might spend so much money on pigments made from rare materials like Mexican lice, or precious stones from the Kokcha River valley of Badakhshan?

At home

Rembrandt is a painter who lived in the 1600s. When we look at his paintings today, they look very dark and use lots of grey and brown. We

can't see any blue in his paintings but we know that Rembrandt did use a lot of blue when he made these works of art. He couldn't afford ultramarine, so instead used a pigment called 'smalt'. Do some research to find out what has happened to the blue in Rembrandt's painting and why it disappeared. What other colours have disappeared from his work?

Skills set

Creative, Imaginative, Curious

Career Options

Theatre, film and television employ many artists, makers and designers to create the costumes, sets and special effects that we see on the stage and screen. Make-up artists work with colour and pigment to create illusions and special effects. Costume and textile designers and makers work with dye and print processes to create fabrics and textiles for costumes and sets.



Build your own gut microbiome

About this activity

When you eat, your food goes on an incredible journey. After leaving your stomach it enters the intestines, a tube 6-times longer than your height! Here, with the help of microbes, your food is digested to release the goodness into your body. In this activity you will build a model intestine with resident microbes, known collectively as the gut microbiome.

Time

20 minutes

Kit list

- ✓ A washed 1L carton of milk or juice. (You could paint it beforehand if you want to.)
- ✓ Scissors
- ✓ Sticky tape
- ✓ Cotton wool (or toilet roll would do)
- ✓ Small food items like raisins, a piece of cheese and a biscuit

Next steps

- ✓ To download a free teachers' pack with three classroom activities, videos and quizzes please visit guardiansofthegut.org.

- ✓ For more info on our research please see quadram.ac.uk

Additional worksheets
on [page 22 - 23](#)

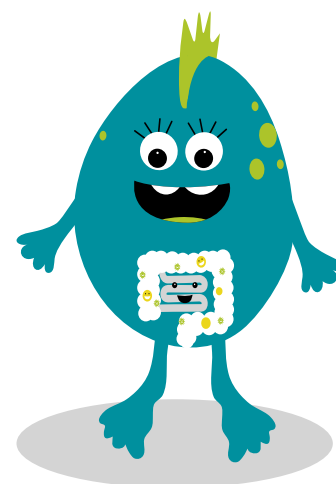
Watch out!

Do not eat the food used in the activity.

Be careful when cutting out your villi and bacteria templates.

Instructions

- 1 Cut the top off your milk or juice carton (this will be your gut tube) and cut a "viewing door" in one side. Attach a folded piece of sticky tape to add a handle to the door.
- 2 Your gut has lots of folds in it called villi. Carefully cut out the villi template, tape it to the cut end of your gut tube and fold them over to create a cross section of your intestine! Add cotton wool to the inside of your tube to represent the villi along the tube.
- 3 Now what bacteria might be in your intestines? Carefully cut out and add the following bacteria to your "microbiome" tube:
 - ✓ Bifidobacterium: good for your immune system
 - ✓ Bacteroides: able to digest complex foods
 - ✓ Lactobacillus: fights off pathogens that could make you sick (curious fact: this one can also be used to make cheese)
 - ✓ Roseburia: helps keep your gut cells strong
 - ✓ Clostridium: when there are too many of these it can make you very gassy!
 - ✓ Salmonella: a bad bacteria found in some undercooked food that can give you an upset tummy.
- 4 Add some small food items like raisins, a biscuit or cheese. Do you think they are healthy or less healthy?



- 5 What happens when you're ill and need antibiotics? Take out everything except the cotton wool. Antibiotics can remove your resident microbes. How do you think we can replace them?

At home

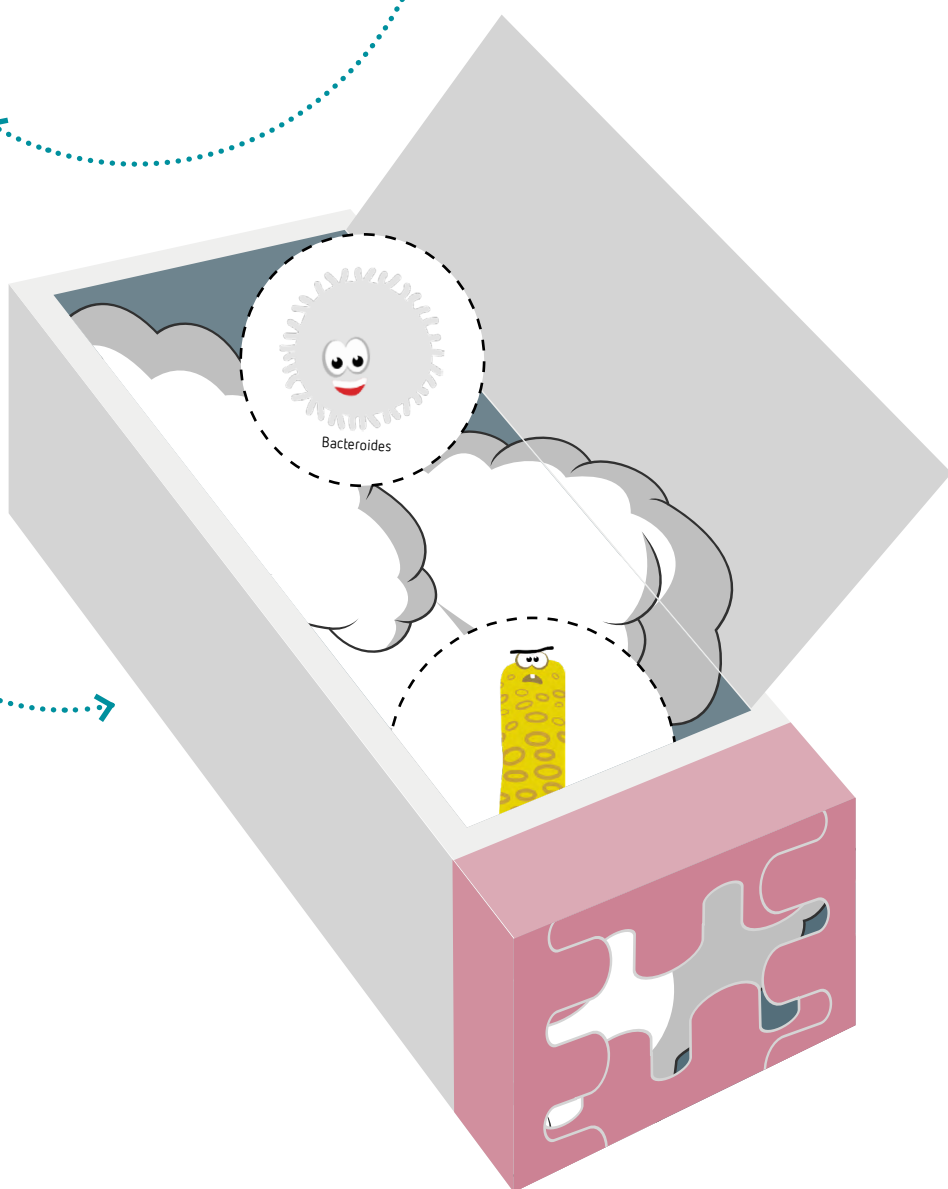
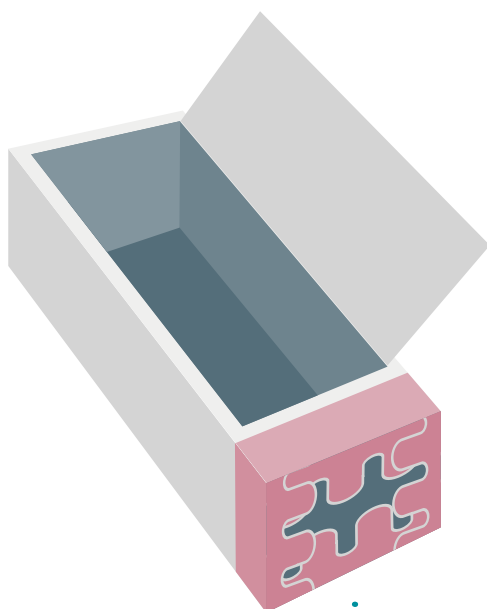
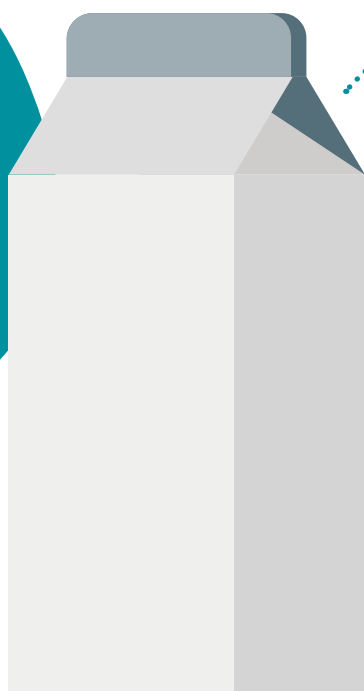
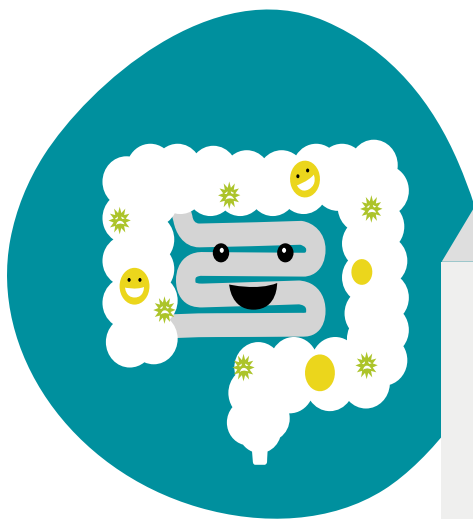
Try making a food diary by writing down everything you eat and drink for one day. Do you think your gut microbiome is happy with the fuel you have sent it?

Skills set

Open-minded, Curious, Logical

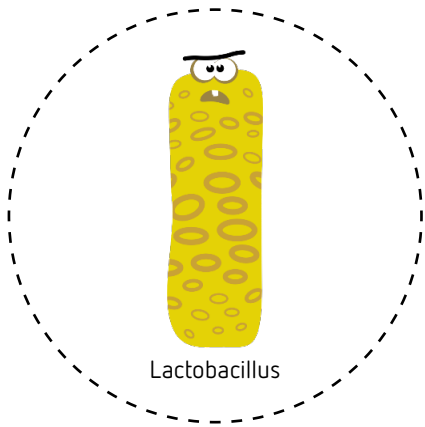
Career options

Quadram Institute Scientists are developing new foods and improving our understanding of how we can tailor nutritional intake for health. We are also developing new ways of diagnosing and treating infections when they happen, as well as performing cutting edge research that is revealing how maintaining a healthy gut microbiome is critical to reducing the chances of developing conditions such as cancer and dementia.

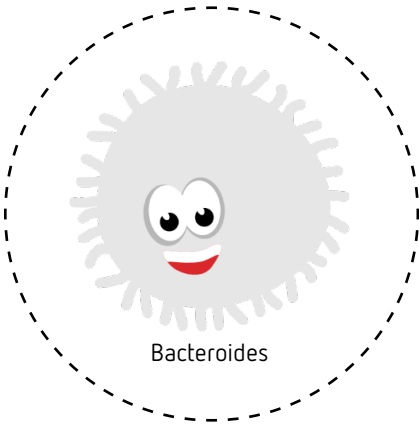


Worksheet
Build your own
gut microbiome

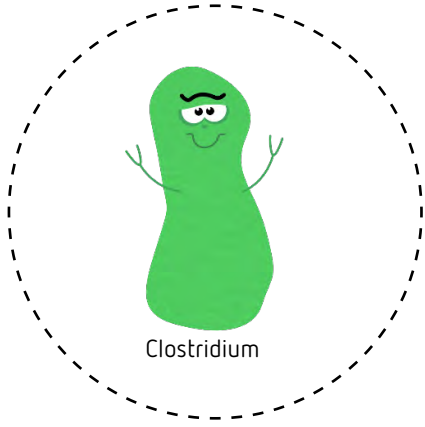




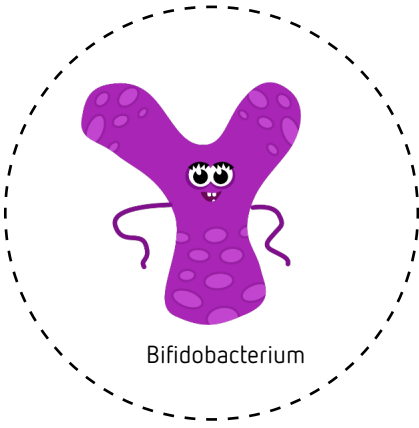
Lactobacillus



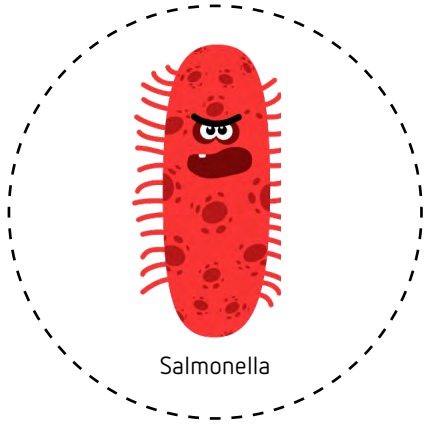
Bacteroides



Clostridium



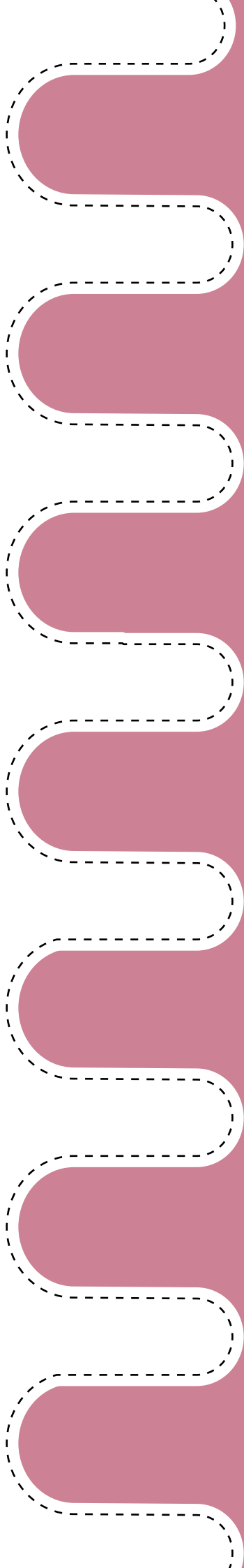
Bifidobacterium



Salmonella



Roseburia



Fold here

Worksheet
Build your own
gut microbiome



Innovating for the future

Going on a fact hunt

About this activity

Through exploration, experiments and examination, scientists gather information and facts about the world around us. From the tiniest microbes in our bodies to the massive planets in our universe, their work provides us with endlessly fascinating facts, which you might find in your favourite TV show, magazine or book.

Time

1 hour

Kit list

- ✓ Books containing science facts, you can find some brilliant examples through the Young People's Book Prize shortlist [here](#)
- ✓ Optional: access to the Internet
- ✓ Poster paper
- ✓ Arts and crafts materials

Next steps

This activity is inspired by the Royal Society Young People's Book Prize. For more information about the Prize, and how your school can get involved, go to royalsociety.org

Instructions

- 1 Just because a statement might appear as a fact, it might not be true, so checking sources such as books, articles or other scientific evidence to prove this is important.
- 2 What is the most incredible fact you know? If you can't think of one you could use one of the mind-blowing facts below (taken from *Cats React to Science Facts* by Izzi Howell):
 - ✓ Pancakes are always round because of gravity pulling down on the batter evenly, making a circular shape.
 - ✓ The peregrine falcon's streamlined shape allows it to move over 300km/h which is as fast as a Formula 1 car.
 - ✓ Pure water is an electrical insulator but tap water is an electrical conductor.
- 3 Now, consider how you might go about checking your fact and how true, or accurate, it is.
- 4 Create a poster or presentation to show your class how you checked and confirmed the fact, the sources you used and any other related facts you may have learned along the way. Also consider what experiments or investigations you might carry out to prove the fact.

At home

Think about a science topic that you find interesting and research some amazing facts about this that you can share with your friends and family.

Skills set

Curious, Communicator, Self-motivated

Career options

Many careers, both in science and not, involve gathering facts for different purposes. For example, you could be a forensic scientist who collects and analyses evidence to solve crimes, or a journalist who researches and writes articles on different topics or breaking new stories for publications, like magazines or websites.



Innovating for the future

Which plastic?

About this activity

Different types of plastic are used to make many everyday objects but do you know which plastic is which? Learn how to help the environment as you carry out simple tests and use a chart to identify different plastics for recycling. You will also find out how one company supports a recycling scheme to reduce the amount of single-use plastic sent to landfill sites.

Time

1 hour

Kit list

- ✓ Ask an adult to cut out four plastic samples (approximately 6cm by 2cm) and number them 1 to 4 with a permanent marker. Use the following items:

Sample 1:
shower gel bottle.

Sample 2:
clear packaging used for greeting card multi-packs or gift sets.

Sample 3:
white foam container used for takeaway food

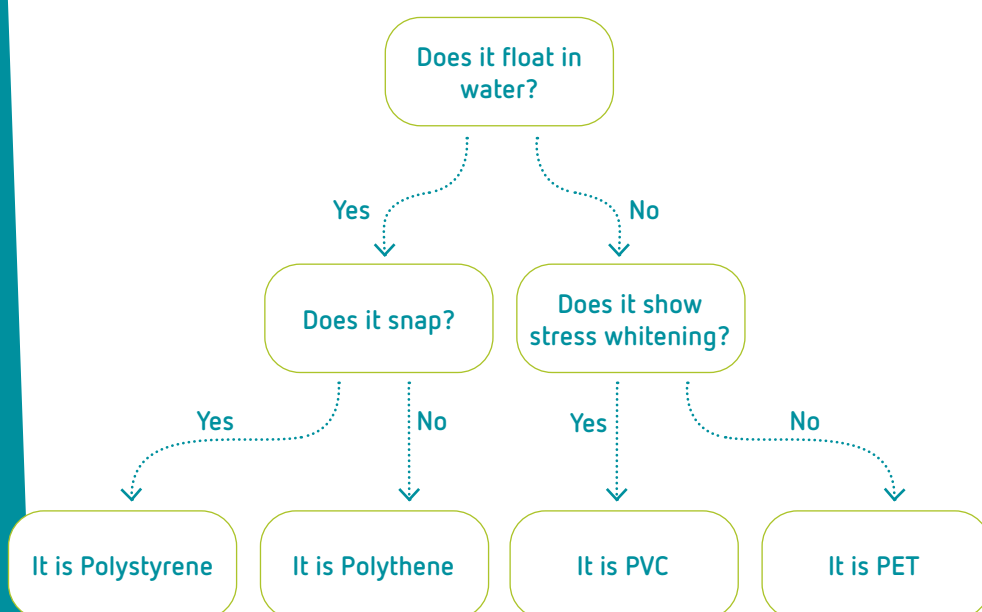
Sample 4:
clear fizzy drinks bottle

- ✓ 1 litre bowl or container filled with ½ litre of cold water
- ✓ Identification chart included in the instructions

Instructions

- 1 Think about the objects you use every day that are made from plastic. Did you know that there are many different types of plastic, each one useful for different things?
- 2 Share with a partner what you know about how plastics are made from materials found in fossil fuels formed millions of years ago from the remains of living things. Plastic is often thrown away after one use and this can have a negative effect on our environment by ending up in landfill sites or as litter pollution.
- 3 Consider the 'sustainability' of plastics; in other words, how often they can be reused and recycled so that we can keep using them for longer.
- 4 Gather your numbered plastic samples.
- 5 Half fill your container with water and place sample 1 under the water before letting it go. Do the same for the rest of the samples. Observe and record which plastics float and which sink.
- 6 Using the same samples (removed from the water) fold each piece of plastic backwards and forwards to see what happens - some plastics snap under pressure; others simply fold into a crease whilst some plastics show a white line called stress whitening.
- 7 Record your results.
- 8 Use this classification key to identify which type of plastic is which:

Can you identify and sort four different types of plastic in order to send any waste materials to the correct recycling centres?



Innovating for the future Which plastic?

Next steps

This activity is taken from CIEC's free-to-download 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: ciec.org.uk/sustainability.html

Watch out!

Make sure you get an adult to cut out your plastic samples from the items suggested in the kit list.

Take extra care during the 'crease test' as small pieces may splinter off the plastic when under stress. You could use safety glasses if you have them or sunglasses to protect your eyes.

Gloves are optional but could prevent cuts from sharp edges.

Recycle all the pieces of plastic if possible (do not pour down the drain).

- 9 Find out about how scientists and engineers are helping to develop plastic waste recycling systems, for example: old plastic window frames can be cleaned, made into tiny pellets and melted to be reformed into new window and door frames or other products. Thanks to companies like INOVYN at Newton Aycliffe in England, PVC-U is no longer a single-use material and is much more sustainable. Nothing goes to waste and, more importantly, nothing is deliberately thrown away to find its way into drains, rivers and the ocean.

At home

Many plastic items that can be recycled have a symbol similar to the one shown here:



Find recycling information on plastic items in your home and research what the letters or numbers might mean. You could also find out which materials and types of plastics can be recycled near to where you live.

Skills set

Observant, Curious, Logical.

Career options

Watch the 2-minute video [youtube.com/watch?v=3eD1-iGf-J4](https://www.youtube.com/watch?v=3eD1-iGf-J4) of Eve Davison, an engineer at a car factory in the north-east of England talk about plastics, and introduce this activity. Eve needs to know which car parts are made from which types of plastic so she can send any waste materials, after production, to the correct recycling centres.

More about INOVYN and INEOS

INOVYN is part of a bigger company called INEOS, the people who work there are committed to saving our planet's resources. They have begun to use renewable materials from biomass (organic waste from things like wood, straw and manure) instead of fossil fuels to make PVC. This produces over 90% less greenhouse gas emissions and a much reduced impact on the environment.

INEOS is also a world leader in producing useful new materials from previously waste plastic. Plans are now in place for an 'advanced recycling' plant that will transform unrecyclable plastic for use as medical products, food packaging, lightweight vehicle parts and pipes for safe water transportation.



Design your own Robo-bug

About this activity

Insects have evolved loads of fascinating features to help them survive in almost every habitat on Earth. These amazing abilities have inspired robots used for things like rescue missions and even space exploration! In this activity you will design robots inspired by insects to help solve challenges like these.

Time

30 mins – 1 hour

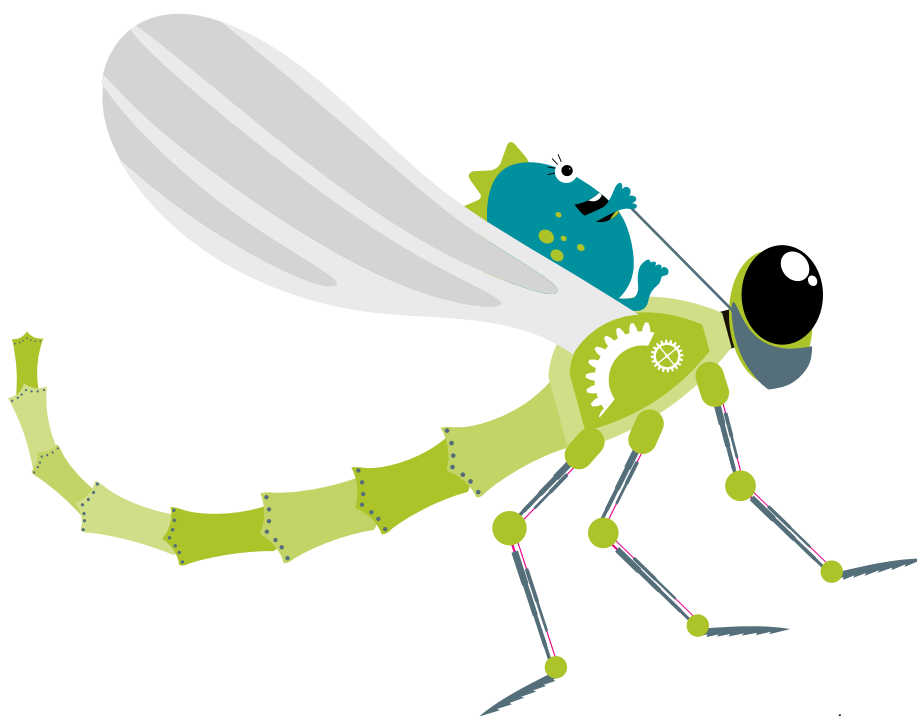
Kit list

- ✓ Pens and pencils
- ✓ Paper
- ✓ Access to the internet (optional)
- ✓ Modelling material such as playdoh / plasticine / modelling clay (optional)

Next steps

Visit [MyLearning.org](https://www.mylearning.org) and type 'insects' into the search bar to discover even more about all the amazing ways insects survive, and how scientists are building robots inspired by these insect abilities to tackle loads of exciting and important challenges.

Additional worksheets on page 28-29



Instructions

- 1 Choose a goal from the table and read the **challenges** that need solving to be successful. You could also think of your own goal and list 2-3 challenges that might need to be solved for that instead!
- 2 Discover the different insects and their **abilities and adaptations**.
- 3 Think about the challenge you're trying to solve, and which insect features are the best for solving it e.g. rescue robots might need to be good at crawling over rough ground, while ocean-exploring robots might need powerful eyes for spotting interesting things in the deep-sea.
- 4 Draw your new robot on some paper, start with the body and then add on the insect-inspired bits you want your robot to have.
- 5 Colour your robo-bug in (colours might be an important part of your design, depending on what you want your robot to be doing).
- 6 Label the robot's features and show how they help solve the challenges for the goal you chose earlier.
- 7 You can also create a 3D robo-bug using modelling material. Place it on a piece of paper and draw arrows to label all the features.

At home

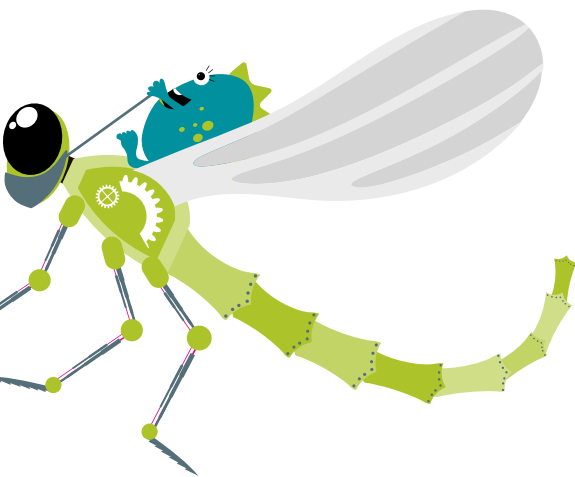
Find an insect (inside or outside) and watch it closely. What features does it have that help it survive? Remember not to harm the insect and return it as quickly as possible to where you found it.

Skills set

Observant, Imaginative, Logical

Career Options

Scientists, engineers, computer programmers, rescue crews and sometimes even pilots are all needed to research, design, build and control the kinds of robots you designed in this activity.



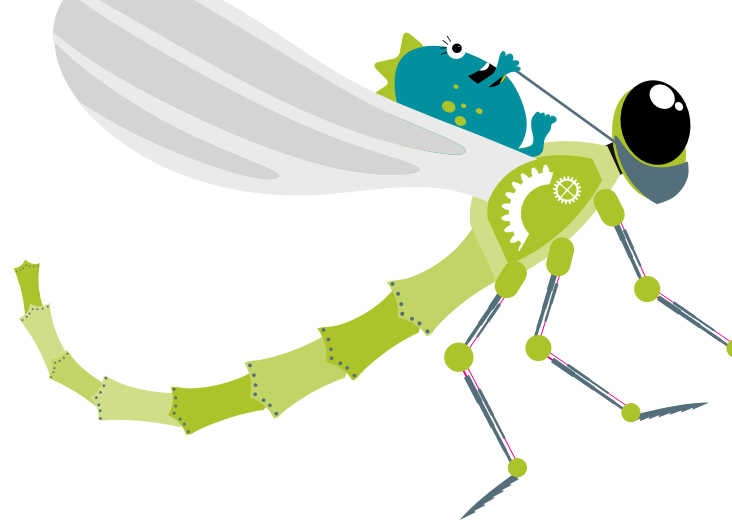
Goal	Challenges
Search and Rescue	✓ Uneven ground ✓ Detecting survivors or dangers ✓ Showing others where survivors are trapped so they can be rescued
Exploration (space, oceans, volcanoes etc.)	✓ Movement through environment (space, water, rocky mountains etc.) ✓ Observing and showing surroundings to pilots and scientists ✓ Collecting things to bring back to base for studying more.
Construction	✓ Carrying heavy objects ✓ Easy to see, for safety ✓ Able to work in a group of robots
Your own idea here:	✓ ✓ ✓

Insects	Abilities
Bees	✓ Pollen baskets for collecting pollen ✓ Great communicators
Ants	✓ Incredible teamwork ✓ Strong (lifting and carrying objects)
Dragonflies	✓ Powerful compound eyes ✓ Agile fliers
Crickets	✓ Powerful legs for jumping ✓ Loud calls for signalling
Butterflies & Moths	✓ Caterpillars spin silk ✓ Can have bright, vibrant wing markings or be masters of camouflage
Katydid & Stick insects	✓ Impressive camouflage
Beetles	✓ Hard, protective exoskeleton ✓ Can crawl through tight gaps and rough undergrowth

Worksheet

Design your own Robo-bug





Agile fliers -
Dragonfly



Armour -
Rhino beetle



Camouflage -
Dead leaf butterfly



Camouflage -
Leaf katydid



Burrowing -
Scarab



Bright patterning -
Leopard butterfly



Camouflage -
Walking leaf



Material collection -
Carpenter Bee



Bright patterning -
Sloan's urania



Bright patterning -
Swallowtail



Bumble bee -
Swarm teamwork



Powerful eyes -
Dragonfly



Powerful legs -
Grasshopper

Worksheet
Design your own
Robo-bug



About this activity

You already share many of the characteristics of people working in STEM fields; they have the same skills and attributes that you already have. Creating a STEM Person of the Week card will allow you to explore the huge range of exciting STEM jobs, learn about the people who work in STEM and find out which skills you share with them.

Kit list

- ✓ A computer/laptop/tablet with internet access
- ✓ Pens and colouring pencils

Next steps

On the second page of the template, there's space for you to write down things that you've done to show how you have the same attributes as your STEM person. Make notes in the boxes each time you do something that demonstrates the attributes.

For more examples of STEM Person of the Week cards have a look at the sets at nustem.uk/stem-person-of-the-week.

**Additional worksheets
on page 36-37**

Instructions

- 1 Take a look at a STEM Person of the Week card, each card is made up of different sections:
 - ✓ The person's name
 - ✓ Their job title
 - ✓ A short description about what they do and how they show their three attributes
- 2 Now you need to find your own STEM Person who you'd like to showcase. Try thinking about the following things:
 - ✓ Diversity - search for engineers and scientists from all over the world.
 - ✓ Try to find current, working scientists and engineers instead of the ones you might usually find in textbooks. You could do an internet search, or you can visit the I'm a Scientist website to find someone interesting to feature: imascientist.org.uk
 - ✓ You might even find your STEM person in real life, perhaps you or your family knows someone who works at a local STEM firm, or maybe one of your family or friends already works in STEM - you could ask them to be your STEM Person.

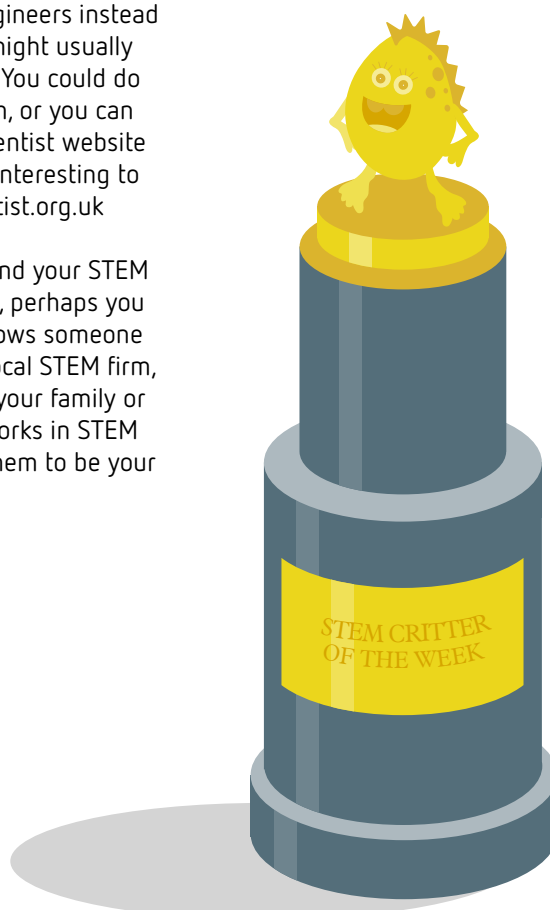
- 3 Use the template on the next page to make your own STEM Person of the Week card, you'll need to add their name and a photo if you can find one. Then you can write your description about them, saying who they are and what they do. Make sure you mention three attributes that they use in their STEM role (you can use the table to find out about the different STEM attributes and what they mean).

Skills set

Curious, Open-minded, Communicator

Career options

Get everyone in the class to present their STEM Person of the Week to find out about some of the many different jobs and careers that are linked to STEM.



STEM PERSON OF THE WEEK

Name

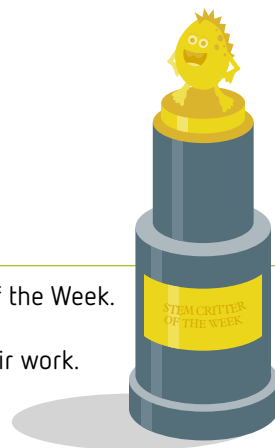
Job Title

Attribute 1

Attribute 2

Attribute 3

Use this space to write about your STEM Person of the Week. Try to describe what they do and include three of the attributes that you think are best suited to their work.



nustem



Worksheet
STEM Person
of the Week



- ✓ **Open-minded** people are willing to listen to new ideas and respect other people's views and opinions.
- ✓ If you are **tenacious**, you are able to stick with something difficult until it is finished.
- ✓ **Creative** people make new things and have original ideas.
- ✓ If you show **commitment**, you stick with an activity and try your hardest to make it happen.
- ✓ **Passionate** people have strong feelings about things that interest them.
- ✓ **Self-motivated** people like to do things for themselves without being told how to do them.
- ✓ If you are **observant** you are quick to see things, you are able to spot fine details and are you good at paying attention.
- ✓ **Communicators** are good at sharing information and ideas with other people.
- ✓ **Hard-working** people put all of their effort into finishing things.
- ✓ **Collaborative** people work together to do things.
- ✓ **Resilient** people can quickly recover from difficult or challenging things.
- ✓ **Logical** people can solve problems by thinking through them in a sensible order. They understand how one action can lead to another.
- ✓ If you are **imaginative**, you can think of new and interesting ideas.
- ✓ If you are **patient**, you are able to stay calm when faced with problems.
- ✓ **Organised** people are good at planning to make sure they finish things.
- ✓ If you are **curious**, you want to learn new things.

STEM PERSON OF THE WEEK

Name

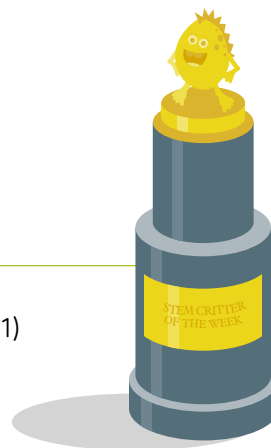
Job Title

Like

I am

Attribute 1:

(Use this space to explain how you show attribute 1)



Attribute 2:

(Use this space to explain how you show attribute 2)

Attribute 3:

(Use this space to explain how you show attribute 3)

nustem



Worksheet
STEM Person
of the Week



Innovating for the future

I'm a scientist

About this activity

What makes humans laugh? How do you measure the size of the universe? How do we use science every day? Ask real-life scientists your questions, connect with them through our online chat, and then vote for your favourite scientist to win £500!

Time

30 minutes to read about the scientists you're going to chat to and prepare your questions

40 minutes for the live chat

Kit list

- ✓ A computer / laptop / tablet with internet access
- ✓ A login card from your teacher

Next steps

Head to imascientist.org.uk for further information, including how you can ask questions and vote for your favourite scientist. You could also choose one of the scientists you chat with and use them to do the STEM Person of the Week activity!

Watch out!

Our chats are safe and secure with our friendly moderators, but never give out personal information, even your social media handles or gamer tags, online!



Instructions

- 1 Got a login card? Log into imascientist.org.uk/login with your username and password.
- 2 Click 'Meet the Scientists' in the menu bar and read through some of the scientists' profiles. What are they working on? Do you have anything in common with them? What would they spend the prize money on?
- 3 Prepare 2-3 questions for the scientists in your chat. You can see which scientists have signed up on your dashboard.

When it's time for your chat

- 4 Your teacher will tell you when to log in. Click 'Chat' at the top of the page to join the chat session!
- 5 Ask your questions and chat with the scientists - they're excited to answer your questions!
- 6 Have fun!

At home

Get the grownups at home involved with our fantastic evening chats! Safe, secure and moderated online chats take place every Thursday 7-8pm for some homework you'll definitely look forward to.

Skills set

Curious, Collaborative, Open-minded

Career options

Forget the school textbooks and just ask our scientists questions about what YOU are interested in. You might be surprised by how much science touches our everyday lives without us even noticing. Science is all around us and we benefit from science everyday... even if you don't become a scientist!

Innovating for the future

Bringing data to life

About this activity

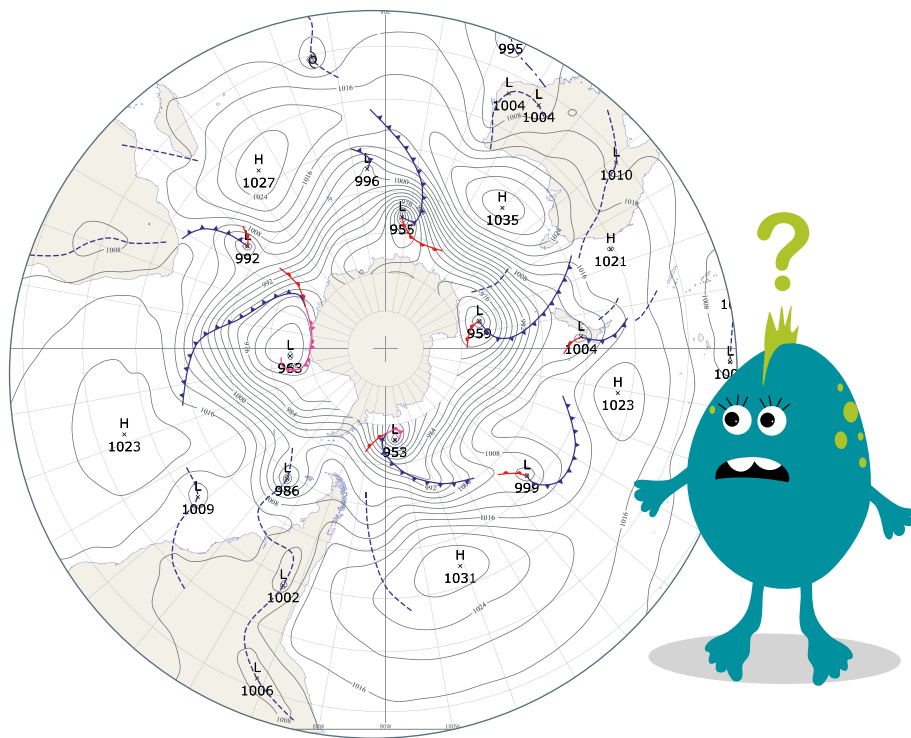
In this activity, you'll explore how people at the Met Office use their creativity to understand and show information about the weather. You'll make your own weather station to capture data about rainfall, then finish up by thinking outside the box to present your data in an interesting and creative way!

Time

45 minutes

Kit list

- ✓ An empty plastic bottle (2 litre fizzy drink bottle would be ideal)
- ✓ Scissors
- ✓ Sticky tape
- ✓ Ruler
- ✓ Paper and pencil
- ✓ Internet access
- ✓ Jelly, 3 or 4 cubes made up as directed on the packet
- ✓ Excel/Google Sheets to record data
- ✓ Craft materials (whatever you want – get creative!)



Instructions

In this activity, you're going to put yourself in the shoes of someone like Stephen, having a go at capturing, measuring and visualising your own data!

- 1 Build a weather station: follow the steps found [here](#) to build a rain gauge and collect data on precipitation (rainfall).
- 2 Collect your data: check your rain gauge and log findings every day for 7+ days. Are you collecting data at the same time every day to make it fair? Could you collect any other data to combine with your rainfall measurements?
- 3 Now, visualise your data: try and present your data in a creative way e.g. with pictures, graphs, maps or animations. Or you could use Minecraft, Lego, building blocks, a stop-motion video, even a 3D model or stacked food cans!

Meet Stephen,
Scientific
Software
Engineer at the
Met Office



"We have so much data at the Met Office that one of our big challenges is finding the right pieces of information for the right people based on what their objectives are. It's important that this data is presented in a clear way to help individuals and organisations make the right decisions. One way of doing this is **visualisation**. Through pictures, graphs and maps, we can quickly see and understand new information about the weather. It's a great combination of art and science!"

At home

Stephen, our Scientific Software Engineer, loves gardening. And this might seem very different from his job, but they both involve doing small tasks that help you create and achieve something new.

Innovating for the future Bringing data to life

Next steps

To find out more about data visualisation, coding and the future of weather, check out our other activities here.

The Met Office provides free education content to support young people aged 7-14 to be prepared for the effects of weather and climate change on them and their communities.

Find out more at
www.metoffice.gov.uk/schools

For example, re-potting and pulling up weeds helps you get to know what's in your garden, what else to plant, where you need to improve your soil... and the same goes for coding! Stephen's work at the Met Office often starts with lots of little jobs like copying data or checking code for errors. Doing these small tasks first helps him understand the data and improves the end result.

Which of your interests might help you? Maybe you're arty, a good problem-solver... or a keen gardener like Stephen!

Skills set

Observant, Creative, Imaginative

Career Options

This activity also links to the following subjects:

✓ Computer science

✓ Maths

✓ Art and design

Watch out!

- ✓ Make sure any spilt water is mopped up to avoid slipping.
- ✓ Be careful with scissors or ask an adult to help you.
- ✓ When digging a hole for your rain gauge make sure it's out of the way, so that no-one trips over it.



Innovating for the future

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 'Innovating for the future' you like and enter our UK-wide competition with the chance to win an array of prizes. The activities found in this pack could be entered into the poster competition, simply look for the paintbrush symbol. Or you can use them to serve as a source of inspiration to get you started.



Kit list

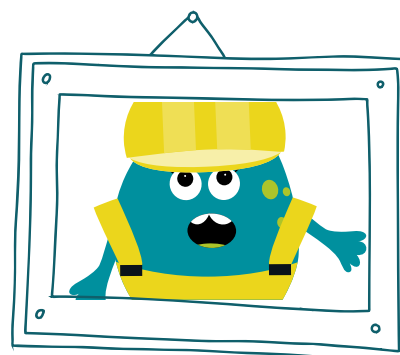
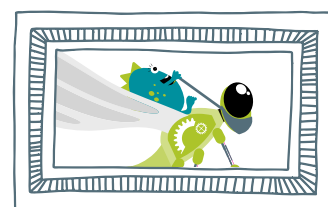
- ✓ Paper (A4 or A3)
- ✓ Creative materials, e.g. pens, pencils, scissors, glue, watercolours, paint, colouring crayons, pipe cleaners, felt, thread, wool, foil, clay, string, beads, stamps, foam, pompoms



Research your poster

Investigate and imagine 'Innovating for the future' and everything that makes it special. Here are some topic ideas to get you started:

- 1 Think about your own innovation – from inventing your own toy that you want to share with your friends to a useful machine that will help your family or the whole world! How will it change the ways of play, sports and leisure, entertainment, communications, work, or even school?
- 2 Feeling futuristic and global? Why not think about an innovation – new ideas, inventions, products or services we have never heard before that would make the world a better place?
- 3 Do you know someone who is an awesome innovator? Try to showcase their innovations and reflect on how this person's innovations impacted the lives of many.
- 4 Everyday innovations can be easily overlooked. Identify common innovations that you use daily and give a thought on how your life would be without them.



Make your poster

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

- ✓ A4 or A3 size and you need to be able to take a photo of it to send to us online for judging.
- ✓ You can use pop up pictures, pull out tabs or use 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, scan or take a photo and go to britishscienceweek.org for details on how to send in your entry.

Next steps

Celebrate! For more details, along with the full set of rules and tips for educators, check out our website britishscienceweek.org