BRITISH SCIENCE WEEK

SECONDARY RESOURCE PACK

British Science Week
8 – 17 March 2019
britishscienceweek.org

Managed by

BRITISH SCIENCE ASSOCIATION

Supported by

Department for Business, Energy & Industrial Strategy

EUROTUNNEL le shuttle

BRITISH SCIENCE WEEK

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 students' needs and the curriculum you are delivering.

In addition to the activities in this pack, there are lots of other ways to enthuse and engage your students throughout British Science Week.

In developing this pack, we have looked for activities which break down the stereotypes surrounding 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 childrens' own backgrounds, lives and interests.

Events

You can create your own club, class or school event or search for things happening near you. Last year, there were over 2,700 events reaching more than 750,000 people. Help us make British Science Week 2019 even bigger and better! Visit britishscienceweek.org

Poster competition

Some of the activities could be followed up by designing a poster for our annual poster competition; simply look out for the paintbrush symbol shown to the right. The theme for this year's competition links with this year's activity pack theme of 'journeys'. For more information on the competition and how to enter, read on further in the activity pack or visit britishscienceweek.org/planyouractivities/postercompetition

CREST Awards

Many of the activities in this pack can count towards a CREST Award.

Further CREST resources can be downloaded for free from our library at library.crestawards.org

Why not use British Science Week to launch CREST in your school? You can set up a free account and log in through the CREST website to keep track of pupil progress and order certificates; visit crestawards.org/sign-in

Get 10% off CREST Discovery or Bronze Awards from 1 March until 30 April 2019 with the code BSWACTIVITY10

CREST AWARDS

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Eurotunnel

2019 marks the 25th anniversary of the opening of the Channel Tunnel, which links Folkestone in Kent with Coquelles, Pas-de-Calais in France.

In celebration of this special anniversary milestone, Eurotunnel has partnered with the British Science Association on British Science Week, to explore the theme of 'journeys'.

At 37.9km (23.5miles), the Tunnel still holds the record for the world's longest under-sea tunnel. The project took five years to complete and involved over 13,000 engineers, technicians and workers. However, its journey started over 100 years before that; the first design for a cross-Channel tunnel was produced in 1802 and the first attempt at a tunnel excavation was in 1880.

In 2019, we want to share the knowledge and excitement of this ambitious engineering project with a new generation. The British Science Week activity packs feature activities relating to rock layering, tunnels and signals, and time and speed. Beyond these topics, the Eurotunnel story involves archaeology, nature and logistics.

We hope that you will enjoy this pack and that it will inspire you and your students to find out more about the making and everyday working of this wonder of the modern world. You can download our infographic poster, which is jam-packed with fascinating facts, here: eurotunnel.com/build

BRITISH SCIENCE WEEK

The theme for this year's British Science Week is 'journeys', encouraging young people to think about the different scientific journeys that happen every day and how they can discover science through their own lives and experiences. It is also a chance for young people to consider how journeys can help us experience more of the world around us.

Contents

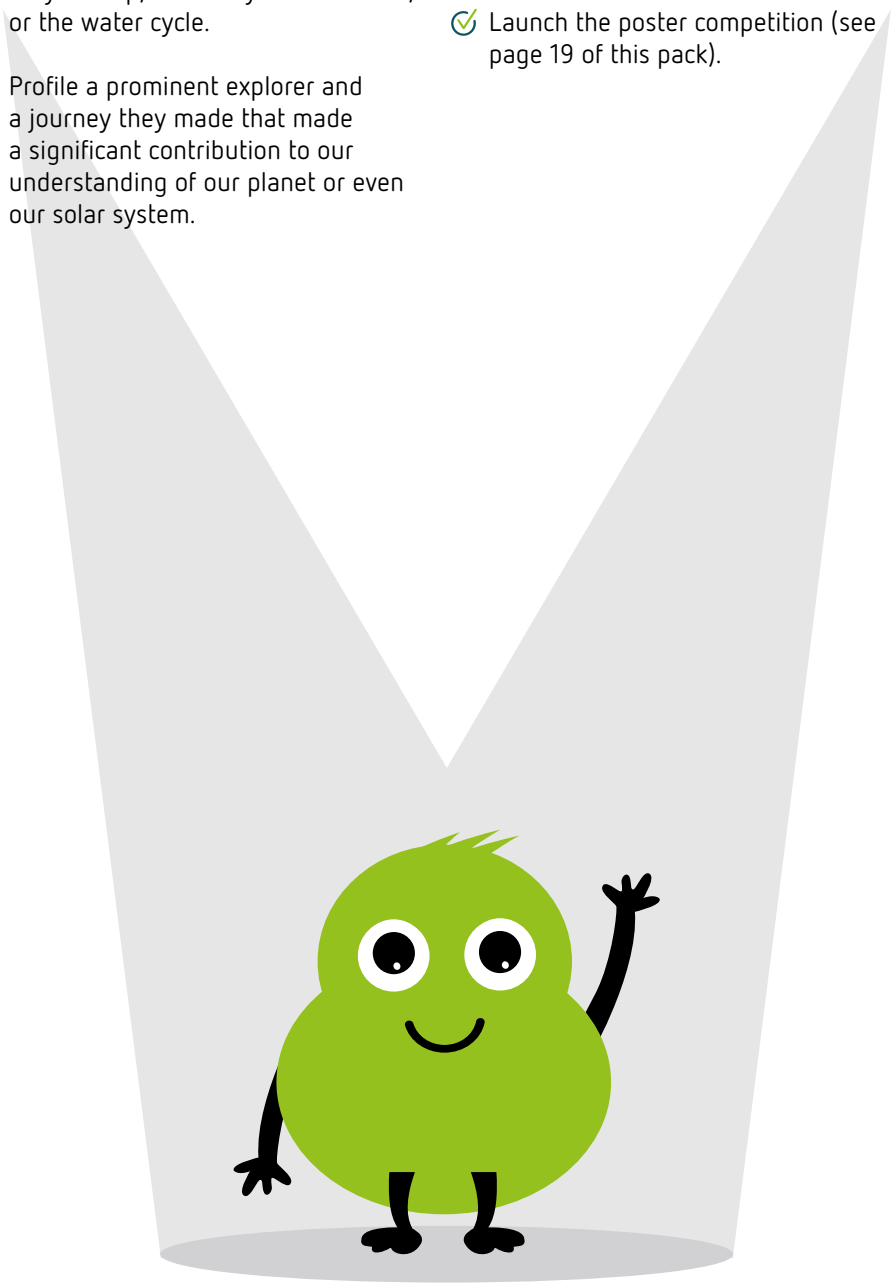
BRITISH SCIENCE WEEK

Assembly ideas

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

#BSW19

- You could reflect on important scientific journeys undertaken in the last century, with a special focus on people from your area. Note, a journey does not necessarily need to be a physical journey; think also about journeys of knowledge.
- Get the students thinking about how journeys affect objects, animals or nature in their everyday lives, e.g. how objects are made and where they end up; the life cycle of animals; or the water cycle.
- Profile a prominent explorer and a journey they made that made a significant contribution to our understanding of our planet or even our solar system.
- Invite a special guest or someone from the school community to come talk about a related topic. To connect with a range of speakers and volunteers visit:
  sciencelive.net
  inspiringthefuture.org
  stem.org.uk/stem-ambassadors
- Tell your students about the plan for British Science Week and give them a challenge related to the theme.
- Launch the poster competition (see page 19 of this pack).



BRITISH SCIENCE WEEK

INVESTIGATING AND EXPLORING JOURNEYS

Headline figures

About this activity

There are big numbers in the building and running of the Eurotunnel, some of them record breaking.

Big numbers can be tricky to picture. Can you transform some of these facts into infographics using familiar examples to help visualise them?

Kit list

- Paper
- Pens
- Other creative materials

Instructions:

Create an infographic to communicate the Eurotunnel stats in a visual and engaging way.

Choose a fascinating fact from this page. Think of an equivalent number, size, weight, distance or length of time which makes it easier for people to understand. Use local and personal examples that mean something to you. For example, how many times bigger than your school is that? How many times further than your journey to school is that? How many times bigger than your favourite sports pitch is it?

37.9km (23.5miles): it's the longest under-sea tunnel in the world.

Eurotunnel has carried more than 26 million trucks since it opened in 1994.

Dinosaurs were wandering the Earth when the chalk layer that the tunnel cuts through was deposited during the Cretacious period, 66 million years ago.

380,000,000 tonnes of freight have been transported via the Tunnel since it opened.

Over 2 million dogs and cats have travelled with Eurotunnel since it opened, representing 80% of all pets crossing the Channel.

11 boring machines were used to make the Tunnel. In total they weighed 12,000 tonnes.

185 million passengers have travelled through the Tunnel since 1994.

4.9 million cubic metres of Chalk Marl were excavated during construction and used to create Samphire Hoe in Kent and a hill at Le Fond Pignon in France.

13,000 engineers, technicians and workers helped construct the Tunnel.

80 million vehicles have boarded the Shuttle since it opened.

26 million roses are delivered through the Tunnel each day.

1 million express delivery parcels travel through the Tunnel each day.

EUROTUNNEL le shuttle

BRITISH SCIENCE WEEK

INVESTIGATING AND EXPLORING JOURNEYS

Tunnel challenge

About this activity

Your challenge is to build a tunnel and train system to transport cars between two points. Once you have constructed the tunnel and your train, you will need to move the cars from one end to the other and back to their 'home'. The better your construction is and the more organised your loading and unloading, the smoother the train service will be.

Time

45 minutes

Kit list

Per group:

- 10 cardboard tubes, e.g. toilet rolls
- 1 A5 sheet of card
- String
- Sticky tape
- Safety scissors
- Wrapped sweets or Lego bricks, 10 x 2 colours to represent cars
- Measuring tape
- Clock or timer
- Pen

Watch out!

- Ensure each group has enough space
- Clear away waste materials before testing your model
- Do not eat any of the sweets

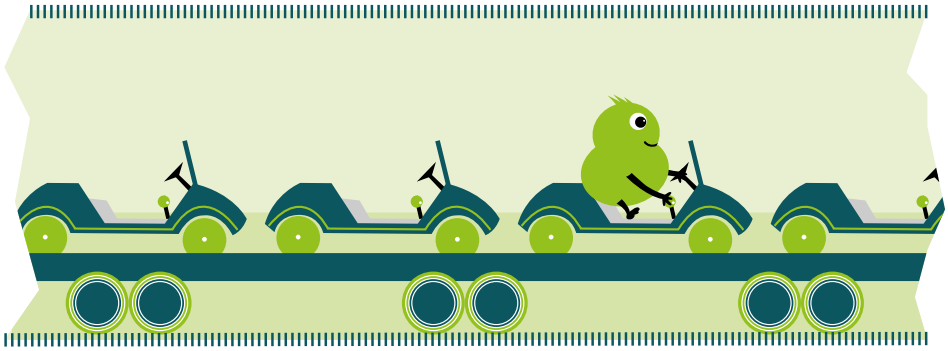
Instructions:

1. First, make your tunnel by taping together the cardboard tubes in a line to make one long tube of at least 100cm long. The neater it is, the faster the journey will be for your train.
2. Now, make your train using the piece of card and tape. This needs to be narrow enough to fit through the tunnel easily but wide enough to hold the "cars". Make sure they can't fall out during the journey!
3. Next, attach a piece of string to each end of your train and feed one end through the tunnel. Tip: Each piece of string needs to be longer than the tunnel itself. Pull the string from one end to move the train through the tunnel. Secure the tunnel to the table or floor.
4. Test your train with the "cars". Does it run smoothly? How easy is it to load the train? Make some adjustments to your design if necessary.
5. Place one colour of "car" at one end of the tunnel and the other colour at the other end. Load the train at one end and start the clock.
6. Move the "cars" though the tunnel, then unload and reload the second colour. Stop the clock when all the "cars" have been through the tunnel and returned to their "home".
7. The trains can only leave on the minute. If you miss the time you will need to wait another minute before a train can depart.

Did you know?

- Did you know it's 25 years since the Channel Tunnel opened?
- An average of 350 cars travel through the Tunnel every day, up to 120 on each train.
- The entire Tunnel is 50.5km (31.4 miles) long and the journey takes just 35 minutes.

Discover more at:
eurotunnel.com/uk/build



EUROTUNNEL le shuttle

BRITISH SCIENCE WEEK

INVESTIGATING AND EXPLORING JOURNEYS

Wind-up car

About this activity

This activity is taken from Robert Winston's new book, *Science Lab,* and during it you will learn how to use energy to move a vehicle by building a wind-up car. You'll discover that energy cannot be created or destroyed, it can only be transferred.

Time

30 minutes

Kit list

- 15 x 8cm rectangle of cardboard
- 2 x 11cm of garden stick
- A4 piece of paper (cut into two 3cm x 29.7cm strips and a 15cm x 29.7cm strip)
- Double-sided tape
- Four plastic bottle tops
- Pencil
- Glue
- Adhesive putty to protect your fingers (optional)
- Ruler (optional)
- Safety scissors

Watch out!

- Be careful when using scissors
- Use adhesive putty to protect the table and your fingers when making holes in the bottle tops
- If you decorate your car, make sure to put down newspaper when painting
- If you are making the hole by pushing a pointed object through the lid, you should NEVER point the object towards any part of your body. Put the lid on a hard surface and press down with pointed object

Instructions:
Make the chassis:

1 Do some research on key 'car' terms. E.g. 'chassis', 'axle' and 'bearing'.

2 On the rectangle, draw two dots at one end, 2cm in from the end and sides. Join the dots with a line.

3 Draw two 5cm lines from each dot at right angles from the first line. Cut along the lines to create a flap.

4 At the other end, draw two lines, 1 and 7cm from the short edge.

5 Along the 1 cm line mark two dots 2cm in from each of the long edges

6 Connect the dots to the ends of the 7cm line with a curved line. Cut along the curve and discard the pieces.

The bearings:

7 Roll the 15cm x 29.7cm strip of paper lengthways to make a tube. Seal the tube with tape.

8 Cut into two 1cm pieces and one 4cm piece. These are your bearings.

The spring:

9 Stick the two long strips of paper together using tape to make one 3cm x 29.7cm piece.

10 Tape one end of the long paper strip to the middle of one piece of garden stick. Coil the paper tightly around it (but don't secure it with tape).

Assembling the car:

11 Lift the flap in the chassis. Place the spring over the hole. Turn the chassis upside down and pull the spring through, then fix the end of the spring to the chassis.

12 Turn the chassis over. Place a 1 cm bearing over each end of the axle so there is one on each side of the flap.

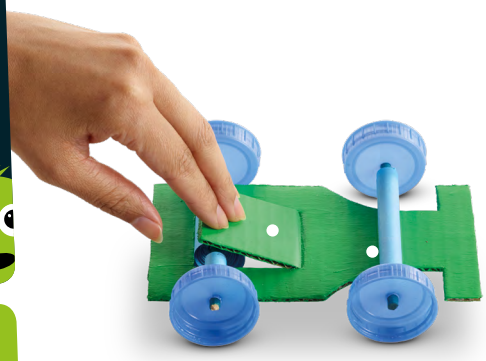
13 Put the other garden stick into the 4 cm bearing. Glue the bearing to the front of the chassis. Leave it to dry.

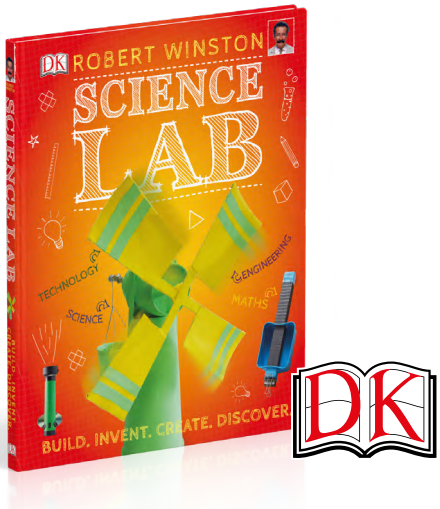
14 Carefully make the wheels: insert a small hole in each of the bottle tops and put them onto the ends of the garden sticks.

15 Wind up the spring by pulling the car backwards and then let go!

Next steps:

- Enjoy more fun and educational experiments with DK's books and downloadable activity sheets. Please visit dk.com/britishscienceweek





BRITISH SCIENCE WEEK

INVESTIGATING AND EXPLORING JOURNEYS

Sole searching

About this activity

Shoeprints are marks left by shoes when you journey across a surface. These are often valuable pieces of evidence at crime scenes. We are investigating shoeprints and we want you to help us find out what marks are made by different shoes as people move and journey in different ways.

You might want to try this activity outside or on a surface that is easily cleaned. A flat surface will make the best prints.

Time

1 hour

Kit list

- Olive, rapeseed or vegetable oil
- Hot chocolate powder
- A small paintbrush
- A4 paper
- A 30cm and 10cm ruler (approx.) – tape these together so that you make an 'L' shape that is 30cm x 10cm
- Camera
- Dishcloth or paper towels

Watch out!

- There is a risk of slipping during the activity. Make sure you do the activity on a flat surface and tape the test paper down where possible. Clean shoes after making the footwear marks

Instructions:

1. Take photos of the sole of your shoe, each side of the shoe and the top of the shoe.
2. Lightly paint the bottom of your shoe sole with the oil – don't use too much. You might get a clearer print if you stand on a scrap piece of paper to remove excess oil.
3. Put on your shoe and stand on the paper to make a single shoeprint. Try and get the shoeprint all onto one page.
4. If you can't see the mark then brush some of the hot chocolate powder onto the print and that may help show it clearly. Blow away any excess powder.
5. Put your ruler down beside the shoeprint so that it is framed within the 'L' shape of the ruler.
6. Take photographs of the shoeprints and the ruler (do this by standing above the print and holding the camera straight over the print so that it is at 90 degrees).
7. Make different shoeprint marks by jumping, running and walking on the paper (use a new piece of paper each time).
8. Repeat each shoeprint for each condition 6 times so that you can see variations that may happen, even with the same shoe. Make sure you write on the paper with the print which one is which (for example, Jumping 1, Jumping 2). Use the Activity sheet to keep track of your repeat shoe prints.
9. Don't forget to clean your shoes! Take pictures of all your prints (one picture per print).
10. Are your shoeprints always the same? Do the marks that you see look different across the 6 repeats for each activity (walking, standing, running, jumping)?
11. Can you identify the shoes that made the shoeprints from the picture of the sole of the shoe?
12. Look at your shoeprint impression to see if you can identify characteristics in the sole patterns.
13. Can you see any other characteristics, such as cuts or wear marks, on your shoe soles? Try this activity with other kinds of shoes to see the difference. Do all your shoes show the same wear characteristics?

Next steps:

- If you want to, the Leverhulme Research Centre would love for you to contribute to their work by sending them your photographs. To do this visit: **uod.ac.uk/leverhulme**
- Let Leverhulme Research Centre know you're participating on Twitter **@LRCFS #forensicshoeprints** and **facebook.com/lrcfs.**

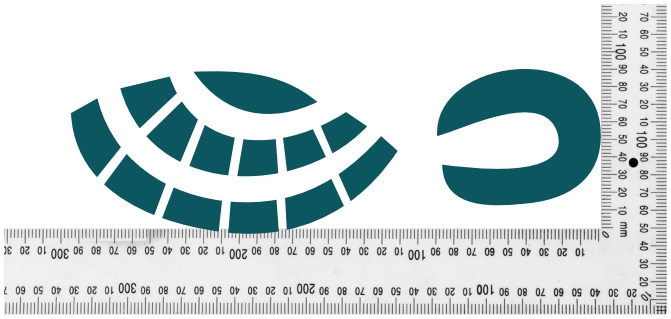
Leverhulme Research Centre for Forensic Science
University of Dundee

LEVERHULME TRUST

BRITISH SCIENCE WEEK

ACTIVITY SHEET

Sole searching



1 Nearest town or city:

2 Make of shoe:

3 Shoe size:

4 Age of the shoe (approx):

Use this table to help you keep track of your repeat show prints. Cross off a number each time you create a print.

Activity:	Experiment repeat number					
◯ Standing	1	2	3	4	5	6
◯ Walking	1	2	3	4	5	6
◯ Running	1	2	3	4	5	6
◯ Jumping	1	2	3	4	5	6

Leverhulme Research Centre for Forensic Science University of Dundee

LEVERHULME TRUST

BRITISH SCIENCE WEEK

INVESTIGATING AND EXPLORING JOURNEYS

How do rockets work?

About this activity

In this activity, you will study how rockets are propelled by building and testing your own water rocket.

Time

2+ hours

Kit list

For the water rocket:

- One 2 litre plastic fizzy drink bottle
- A wine cork
- A valve from a bicycle inner tube, the longer the valve the better
- A pump that fits the valve, e.g. hand pump
- Something that can hold the bottle, neck down, at an angle to the ground – the handle of a garden fork works well but branches, bits of wood or plant pots will all work as a launch pad
- Tapwater

General equipment:

- Stopwatch
- Tape measure
- UK Rocketry Safety Code ukra.org.uk/safetycode

Instructions:

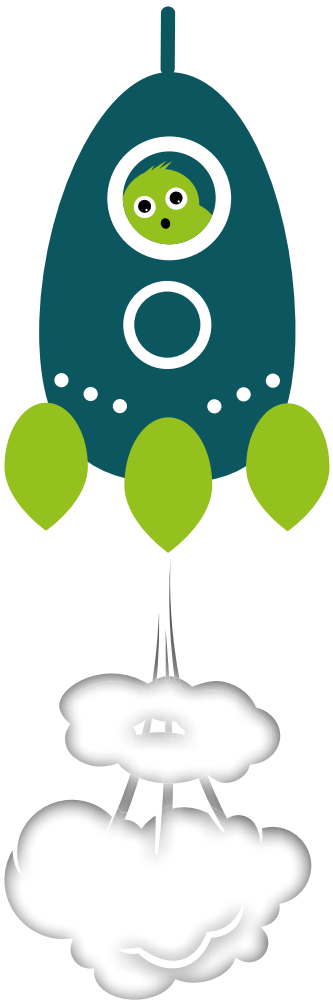
1. See the *Watch out!* section to make sure you are launching your rocket safely
2. To build the rocket, start by checking the cork fits suitably into the neck of the bottle.
3. Check that the valve can fit through the cork and come out the other side enough to attach the pump.
4. An adult should make a hole through the cork to let the valve through, using a drill or other equipment.
5. Make a launchpad that holds the bottle with the neck downwards, lets you attach the pump and stand behind the bottle.
6. Fill the bottle up a quarter of the way and seal with the cork and valve.
7. Launch the rocket by pumping air into the bottle until it flies away.

Watch out!

- Check the UK Rocketry Safety Code to ensure you are launching safely ukra.org.uk/safetycode
- Only an adult should use a drill to make a hole in the cork
- Make sure the launch pad is clear before launching your rocket
- Choose your launch site carefully. Launching where the rocket might land on a road is very dangerous
- The bottle must be made entirely of plastic, it must have no sharp points and it must be for a fizzy drink, so that the plastic is designed to hold pressure inside it

Next steps:

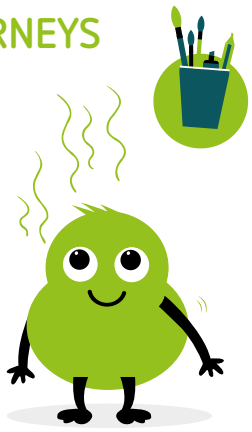
- Try changing the power of the rocket by increasing or decreasing the amount of water in the rocket.
- Try different launchpads to see if this makes a difference.
- You could measure the flight time and distance the rocket travels - a calm day is essential for this.
- This activity can be put towards a CREST Bronze Award and there are plenty more online activities you could try for free. For more information, follow this link: crestawards.org/crest-bronze



BRITISH SCIENCE WEEK

INVESTIGATING AND EXPLORING JOURNEYS

Perfume making



About this activity

Throughout history, people have found ways to make perfumes. Perfume making was particularly popular in the golden age of Muslim civilisation. In this activity, you will make a perfume from essential oils adapted from a recipe from over a thousand years ago.

The essential oils are mixed together with almond oil/olive oil, which acts as a 'carrier' to move the fragrance to the skin. The perfume can also be mixed with water and sprayed as an air freshener using a spray bottle.

Time

45 minutes

Kit list

- Small bottles with lids for the perfume (1 per person or group)
- Almond oil/olive oil
- Jasmine oil
- Orange oil
- Thyme oil
- Sandalwood oil
- Vanilla extract
- Teat Pipettes/droppers

Watch out!

- Make sure no one has any allergies e.g. to the almond oil
- Avoid contact between any essential oils and eyes. Rinse thoroughly if accidental contact occurs
- Wash hands after this activity

Instructions:

1. Each person/group should add 60 drops of almond oil into their bottle.
2. Then add '5 drops of vanilla extract per bottle.
3. Pass round each of the other oil bottles – jasmine, orange, thyme and sandalwood – and put 1 drop of each oil into each bottle
4. Put the lid on each bottle and shake the perfume vigorously.
5. Anyone who wants to can dab the perfume onto their skin.

Did you know?

- For centuries, people used primitive apparatus to distil (separate out) plant essences for perfumes.
- Over a thousand years ago in Iraq, a chemist called Jabir ibn Hayyan felt sure he could improve on the process. After much experimentation, he developed the alembic still – this still extracted the essences far more effectively than primitive apparatus.
- Over the two hundred years which followed, physicians and scientists such as al-Kindi, al-Razi and al-Zahrawi perfected the alembic still. As well as extracting essences for perfume, they used it to distill alcohol as a hospital disinfectant, extract essences for new medicines and separate lamp oil from crude black oil.
- Al-Kindi even wrote a book on the chemistry of perfumes. It contained 107 different recipes for scents using many essential plant oils which can still be extracted through distillation today.

Next steps:

- Take it further and use the orange oil to complete an experiment using distillation. It's a process still used today and was first refined and perfected in the golden age of Muslim civilisation. You can extract orange oil through steam distillation in much the same way as scientists a thousand years ago would have done. The peel of oranges is boiled in water and the oil produced (limonene) is distilled in steam at a temperature just below 100°C, which is well below its normal boiling point. The immiscible oil can then be separated. Direct extraction by heating would result in decomposition, whereas steam distillation does not destroy the chemicals involved.
- This activity is part of *1001 Inventions: Journeys from Alchemy to Chemistry* - a new global initiative produced by 1001 Inventions, in partnership with UNESCO, to celebrate the United Nations proclaimed International Year of the Periodic Table of Chemical Elements (IYPT2019). For more information, visit: 1001inventions.com and iypt2019.org

United Nations Educational, Scientific and Cultural Organization · International Year of the Periodic Table of Chemical Elements · 1001 Inventions Organisation

BRITISH SCIENCE WEEK

JOURNEYS OF THE BODY

Recreate a face

About this activity

Scientists can use archaeological remains and DNA evidence to more accurately work out what people from the past looked like. They can also use DNA to show where humans originated and how they have migrated over time. In this activity, you will be looking at DNA clues that can help us work out what people from the past looked like. You will create your own character from the past, write their DNA profile and then recreate their face, just like an archaeologist would.

Time

45 minutes

Kit list

- Thick card or papier-mâché mask (one per pupil)
- Wool of various natural hair colours
- Sticky tape or glue
- Safety scissors
- Ping pong balls, polystyrene balls or newspaper rolled into a ball for eyes
- Coloured poster paints or pens

Watch out!

- Clear up craft materials to avoid slips and trips
- Always be careful when using scissors

Why do you think some people look alike and some people look different? Do you share any features with members of your family, for example same hair colour or eye colour? Eye colour, skin tone and face shape can all be determined by our DNA. We inherit our DNA from our biological parents so features such as eye colour, hair colour and even ear shape can be passed down from generation to generation. If the only evidence is bones and DNA, could we find out or guess what people looked like from these?

Instructions:

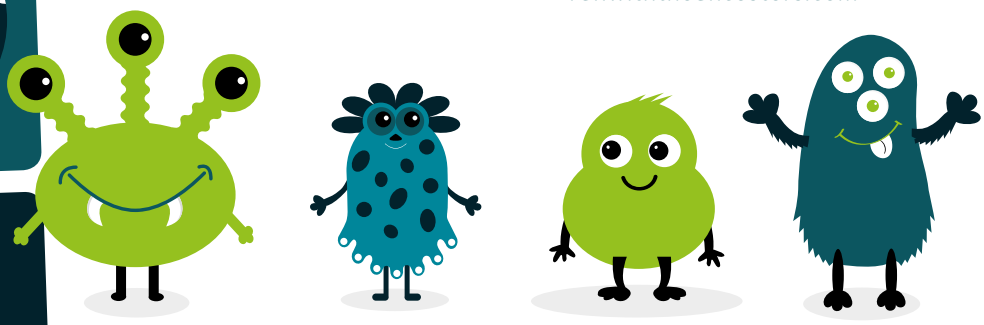
1. Invent your own person from the past and draw a picture of their face. Decide on the features they have; e.g. hair colour and eye colour. Use the decoder, on the next page, to create a DNA profile card for them. For example, if their eye colour is blue, write the DNA code 'GG' on the profile card.
2. Swap profile cards with a friend.
3. Use the decoder to find out what your partner's person looked like.
4. Make a mask using the craft materials to show what they looked like.
5. What things can't be worked out from DNA? Would you be able to tell if someone had been in a battle and had a scar on their face?
6. You could use the mask you have made to create a display to help you show others how DNA can help uncover the past.

Did you know?

- There is more genetic diversity in Africa than in the rest of the world put together.

Next steps:

- Discover more about DNA, genes and genomes and all aspects of their impact on society here: yourgenome.org
- You could use this activity to gain a CREST Award. If you spend at least 10 hours on this project you could get a Bronze Award. Find out more about how to enter and the Awards available at crestawards.org
- Why not learn more about your ancestry by trying our new virtual running app: Run with the Ancestors? Visit runwiththeancestors.com



WELLCOME GENOME CAMPUS
CONNECTING SCIENCE
PUBLIC ENGAGEMENT

BRITISH SCIENCE WEEK

ACTIVITY SHEET

Recreate a face

DNA decoder

Gene	DNA code	Face feature
Eye colour	AA	Brown eyes
	GA	Green eyes
	GG	Blue eyes
Hair colour	TT	Blonde hair
	CT	Brown hair
	CC	Black hair
Hair type	GG	Curly hair
	GA	Wavy hair
	AA	Straight hair
Skin colour	AA	Dark/black skin
	AT	Medium/brown skin
	TT	Fair/white skin

Profile card

Hair colour

Eye colour

Hair type

Skin colour

WELLCOME GENOME CAMPUS
CONNECTING SCIENCE
PUBLIC ENGAGEMENT

BRITISH SCIENCE WEEK

JOURNEYS OF THE BODY

Healthy brain

About this activity

Many people think that dementia is just part of ageing and don't realise that there are simple ways we can look after our brains and reduce the risk of developing dementia later in life. In this activity, you will try to separate dementia fact from fiction, and create a campaign to share the best advice on how to keep your brain healthy.

Time

1- 2 hours

Kit list

- Computer or tablet with the internet
- Video camera (such as on a mobile phone)
- Word processing software
- Paper and pen

Instructions:

Build your knowledge and understanding of dementia at alzheimersresearchuk.org/teens/what-is-dementia and learn about what affects your risk of developing dementia at alzheimersresearchuk.org/reducing-the-risk.

Discuss in groups what you have learnt. What causes dementia? Are there ways people can reduce their risk of dementia? Who needs to know about reducing their risk?

Create an attention-grabbing way to raise awareness of how people can reduce their risk of dementia.

Think about:

- **Target audience**
  Who needs to know this?
- **Message**
  What are the key things you want them to understand?
- **Style**
  Health campaigns can be serious, touching, shocking, funny or thought-provoking. What's the best way to make people take notice?
- **Method**
  How will you deliver this message? It could be a poster, video, story, song or something else.

Next steps:

- Extend this activity and see how effective your campaign is. Plan an investigation to test the effectiveness of your campaign with your chosen audience.
- Alzheimer's Research UK would love to see your campaigns, so please send them in to engage@alzheimersresearchuk.org
- This activity can be put towards a CREST Discovery Award and there are plenty more online activities you could try for free. For more information, follow this link: crestawards.org/crest-discovery

Alzheimer's Research UK
Make breakthroughs possible

BRITISH SCIENCE WEEK

JOURNEYS OF THE BODY

Journey to the afterlife - mummification

About this activity

Mummies are the preserved remains of dead people and animals. Mummies have been found all over the world, but it is the Ancient Egyptians who are most famous for their mummies, and their preparation of the dead for their journey to the afterlife. Ancient Egyptians believed that they needed to preserve their bodies in order for them to undertake this final journey.

Your challenge is to undertake your own mummification process using an orange.

Time

1+ hours

Kit list

- An orange
- Bicarbonate of soda
- Small roll of crepe bandage
- Knife & teaspoon
- Salt, cloves, ground cinnamon
- Two bowls
- Kitchen towel or toilet roll

Watch out!

- Do not eat the orange
- Do not do this experiment on anything other than an orange
- Be careful when using a knife

The mummification process involved removing all the internal organs, packing the body with natron (a type of salt) to soak up all the moisture, and coating the remains in resin to prevent decomposition. Finally, the body was completely wrapped in linen bandages.

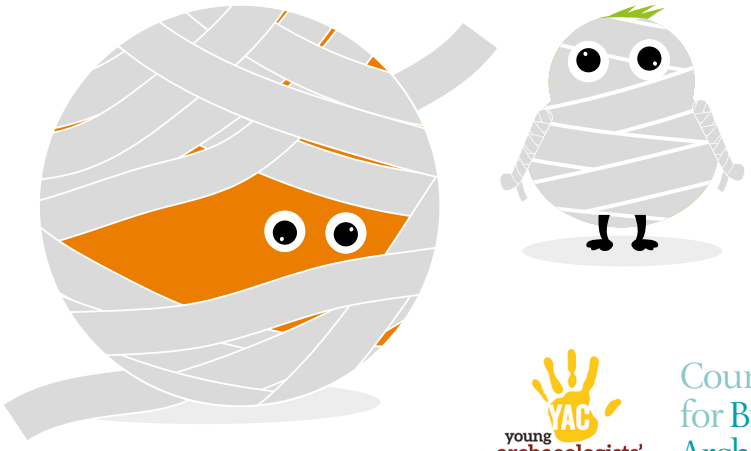
Instructions:

Let's start your own mummification process on an orange:

1. Make a slit in the skin of your orange from the top to the bottom (you may need an adult to help you).
2. Use your teaspoon to scoop out the inside of the orange. Make sure you do this over your bowl - it can get messy!
3. Once you have removed all the orange's insides, stuff it with kitchen roll to absorb any juices left over. Keep replacing with new kitchen roll until the inside of your orange is dry, then remove the kitchen roll.
4. Sprinkle a spoonful of cinnamon and a few cloves into your orange.
5. In another bowl, mix together enough salt and bicarbonate of soda to fill your orange, then spoon this mixture into the orange.
6. Now it's time to wrap up your mummy! Make sure the slit is pushed together fully, and then start to wrap the bandage around the orange.
7. Tie a knot or secure the bandages with a safety pin when your orange is completely covered.
8. Your mummy now needs to be kept in a warm, dry place like an airing cupboard.

Next steps:

- It can take a while for mummification to happen. Check your orange every few weeks to see what it looks like. You'll be able to see that it shrinks and gets darker over time - just like a real mummy!
- You can find more activities like this by visiting the Council for British Archaeology's Young Archaeologists' Club webpage: yac-uk.org/things-to-do
- This activity can be put towards a CREST Bronze Award and there are plenty more online activities you could try for free. For more information, follow this link: crestawards.org/crest-bronze



young archaeologists' club

Council for British Archaeology

BRITISH SCIENCE WEEK

LIFE CYCLES AND NATURE

Desert journey

About this activity

In this activity, you will step into the boots of conservationists operating and journeying in extreme desert conditions. You will learn about perseverance and teamwork, while creating engineering structures using your knowledge of shapes and pressure.

You have successfully conducted a surveillance exercise on wildlife and poachers to protect the endangered desert-adapted black rhino, having scared off the poachers. Unfortunately, you are now lost and need help, but there is not enough radio or phone signal where you are.

Your mission now is to get the radio antenna (the pencil) as high as possible on the unstable desert terrain, by building a tower.

Time

1 hour

Kit list

- Several packs of uncooked medium-length spaghetti
- Sellotape (several small rolls)
- Scissors
- Pencil (radio antenna)
- Measuring tape
- Sand
- Timer

Watch out!

- Always be careful when using scissors

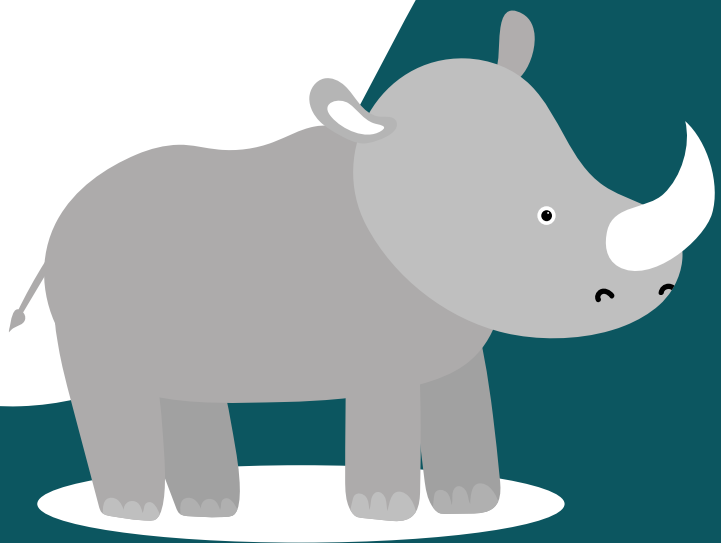
Instructions:

1. Using the materials available, you must build the tallest tower possible on a base of dry sand.
2. Begin by researching strong shapes and different pressures. What is the strongest shape, and why? How could you incorporate this into your tower?
3. Split into teams of four, and start thinking about how to build the highest tower possible out of the smallest amount of spaghetti.
4. Your teacher or group leader should set a time limit on the activity – remember that you are working under pressure in extreme desert conditions!
5. All towers should be able to stand without being held for at least one minute. The winner will be determined by the height of the antenna (pencil) from the floor.

Remember, the least materials used the better. Your teacher should have final say over which tower best meets the brief.

Next Steps:

- Learn more at army.mod.uk/careers.



ARMY BE THE BEST

STEM-ACCELERATORS

BRITISH SCIENCE WEEK

LIFE CYCLES AND NATURE

Game changer

About this activity

How will a changing climate impact your everyday life? Scientists predict there will be more extreme weather in the future, for example flooding, periods of drought, severe heat waves and water shortages. This could affect the food we eat, how we travel, the homes we live in and the way we live our lives. In this activity, you will design and make your own board game for friends and family, to communicate the climate challenges we may face in the future.

Time

Extended project/longer activity

Kit list

- Access to internet or other resources to research impact of climate change
- Large sheet of paper or card to make your game board
- Card to make game cards and player pieces
- A dice
- Scissors
- Colouring pens or pencils to decorate your game

Watch out!

- Come up with some fair play rules to avoid heated arguments
- Always be careful when using scissors

Instructions:

1. Start off by researching the topic. Scientists predict that in the future we might face more extreme weather, disruption to food supply, drought, flooding and heatwaves. What might the impact of this be on the food you eat, the transport you use, the home you live in and the water you use?

   You could start your research here: nerc.ukri.org/research/partnerships/ride/lwec/report-cards/water

   You don't need to include everything in your game, choose the information and issues you want to focus on. How will you check that it is accurate?

2. Next, select a target audience. Find out what they already know and decide how easy or difficult to make the game. Make sure people can play the game together as a group.

3. Now, design the game board. You could base it on an existing game like Snakes and Ladders or come up with something new. Some games are down to chance, using the roll of a dice or picking a chance card. In other games, players make choices and decisions that affect the outcome. How will your game work?

4. Come up with a catchy name for your game.

5. Make the board, player pieces and game cards needed for your game.

6. Test your game out to make sure it works. Why not host a board games night at your school and swap games with other groups?

Next Steps:

- You could use this activity to gain a CREST Award. If you spend at least 10 hours on this project you could get a Bronze Award. Find out more about how to enter and the Awards available at crestawards.org

ileaps

BRITISH SCIENCE WEEK

LIFE CYCLES AND NATURE

Rocks from Mars

About this activity

The rock cycle is a long, slow process that links the rocks and sediments of the Earth together. Digging into the Earth is a little bit like going back in time. We can apply an understanding of rock types and rock processes to different situations. Imagine that samples of rocks from Mars have been brought to Earth and that we want to use them to learn more about the red planet. You will create simulated samples and study them to identify the geological processes that formed them and how these compare to Earth.

Time

1 hour

Kit list

- Basin of Mars crustal material (see teacher instructions)
- Petri dishes for pupil samples
- Forceps
- Hand lens
- Toothpicks (for separating out sample)
- Labelled Earth rock samples of sedimentary, igneous and metamorphic rock for comparison. Alternatively, use pictures of different rock types if you can't access real samples

Advance activity for teachers:

Gather some 'samples from Mars'. This can be improvised from what is available but might typically include a mixture of coarse/fine sand, rounded pea gravel, rock salt, granite chips, pumice (or vermiculite), broken shells, or marble chips. These should be put in a petri dish and should be kept separate from the labelled rock samples of sedimentary, igneous and metamorphic rock.

Instructions:

1. Get into groups and do some research online about the Mars Rover and its mission. Try to find out more about the samples collected by the Mars Rover.
2. Still in your groups, study the labelled Earth samples and identify key observable features. Think about how each of these were formed.
3. You should then study the 'Mars' samples and suggest what these tell us about the conditions on the planet and what kind of rocks they are.
4. In your groups, take it in turns to present your ideas about one of the 'Mars' rocks and get other groups to critique these conclusions.
5. Were there any common themes between your analysis? Although these samples are not from Mars, the process of analysis is what scientists will do with any kind of evidence. What have you learned about analysing scientific samples?

Next steps:

- Visit collins.co.uk/SecondaryScience to view and download FREE material on the rock cycle and planets related to this activity.
- This activity can be put towards a CREST Discovery Award and there are plenty more online activities you could try for free. For more information, follow this link: crestawards.org/crest-discovery

Collins

BRITISH SCIENCE WEEK

LIFE CYCLES AND NATURE

Plastic – journey to the ocean

About this activity

There is a lot of plastic in landfill sites which often ends up journeying to the ocean. It is estimated that a plastic bottle may take up to 450 years to rot away. Plastic also causes problems for wildlife; some animals become tangled in it and some mistake it for food. This can be fatal to animals and, even when it isn't, scientists are worried that plastic is ending up in the food chain as it can break down into small particles called micro-fibres.

This investigation tests the prediction that micro-fibres of plastic get into the water when synthetic clothes are washed.

Time

45 minutes

Kit list

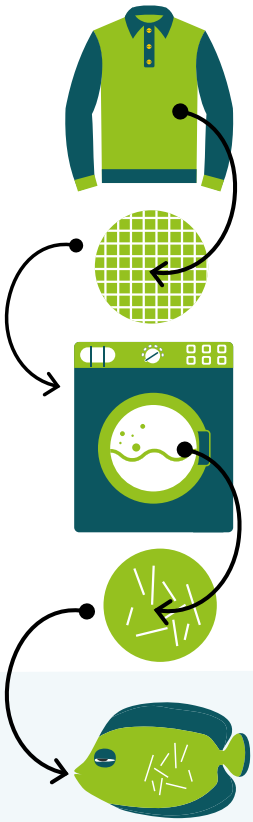
- A synthetic fleece
- A bowl
- Warm or cold water
- A funnel and a jug
- Two sheets of filter paper
- A magnifying glass and/or digital microscope

Watch out!

- Avoid using very hot water that could scald. Warm or cold water is fine

Instructions:

1. Line the funnel with a piece of filter paper.
2. Half fill a bowl with warm tap water.
3. Hold the funnel over a bowl to catch the water. Use the jug to help transfer the water from the bowl and through the filter paper in the funnel.
4. Remove the filter paper from the funnel. Use the magnifying glass and/or digital microscope to look closely at the filter paper.
5. This is a control. Why do you think you need to do this? Can you see anything on the filter paper?
6. Half fill the bowl again with warm water.
7. Dunk in the fleece so it is completely wet.
8. Take it in turns to give the fleece a good rub and squash under the water. Then lift the fleece out of the bowl and squeeze the water from it back into the bowl. Get as much water out of the fleece as you can.
9. Look at what is left behind in the water.
10. Line the funnel with a clean piece of filter paper. Hold the funnel over a bowl to catch the water and use the jug to help transfer the water from the bowl and through the filter paper in the funnel.
11. Remove the filter paper from the funnel. Use the magnifying glass and/or digital microscope to look closely at the filter paper.
12. Compare what you see on this filter paper to what is on the control paper.



Next steps:

- You've looked at the negatives of recycling plastics in fleece. Why not have a discussion around the benefits?
- Create a presentation about how we can reduce plastic waste and research how some people/companies are doing this.
- This activity can be put towards a CREST Discovery Award and there are plenty more online activities you could try for free. For more information, follow this link: crestawards.org/crest-discovery

BBC TERRIFIC SCIENTIFIC

BRITISH SCIENCE WEEK

LIFE CYCLES AND NATURE

Ditch the dirt

About this activity

Over 1/3 of the world's population do not have access to clean water. In countries such as Kenya and Sudan, children have to journey many miles a day to collect water that isn't very clean. If they are lucky they will have a way of filtering it. Your task is to design a filter.

Time

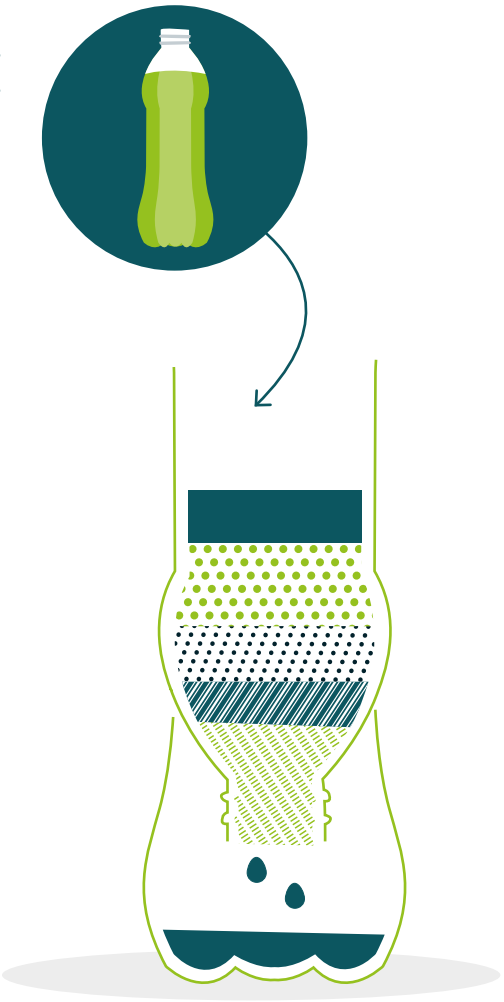
2+ hours

Kit list

- 2 litre plastic bottle
- Variety of plastic containers to store your water
- Dirty water (a mix of mud, stones, twigs, leaves etc.)
- Materials to make layers e.g. stones, course sand, fine sand, gravel, cotton wool
- Measuring jug
- Paper towels
- Cloth e.g. j-cloth
- Elastic band

Watch out!

- The water you have filtered may look clean but is not fit to drink. Do you know why?



Instructions:

1. Make a container for your water filter. You can make a simple one by cutting through a 2 litre water bottle approximately one third up from the bottom, then inverting the top into the bottom. Alternatively, you can design your own using the other plastic containers.

2. Look at the materials available to you and discuss/research what type of contaminants they would be able to remove. Contaminants can be divided into **biological** e.g. bacteria and viruses, **chemical**, e.g. cleaning liquids and **physical** e.g. dirt or broken glass.

3. Start to build your filter by experimenting with different materials and combining layers of material in different ways. Consider:
   - The order of the layers
   - The depth of the layers
   - Changing these variables could alter how clean the water is and the rate of filtration, both are important.

4. Pour 250ml of dirty water into the top of your filter and see how much (hopefully cleaner!) water you can collect in 5 minutes. Your aim is to collect at least 100ml.

5. Stand 100ml samples of both the original dirty water and your cleaner water next to each other on a sheet of white paper to compare. If you are carrying this out in your class, you can have a competition to see whose water filter has worked best and why.

Next steps:

- Your water may look clean, but it is still not safe to drink. Research what other things you might have to add to your filter to enable it to filter out other contaminants that can't be seen. Also find out about other ways you can make water clean enough to drink e.g. solar distillation.
- For other great Practical Action STEM challenges go to practicalaction.org/STEM
- Many countries including the UK are working towards achieving 17 Global Goals to eradicate poverty, including one on improving access to clean water. To find out more go to practicalaction.org/global-goals

PRACTICAL ACTION
Technology challenging poverty

BRITISH SCIENCE WEEK

Poster competition

About this activity

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

Time

1 hour

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, pom poms

N.B. try to avoid using straws or glitter – these plastics often end up journeying to the sea and harming ecosystems

Instructions: Research your poster

Investigate and imagine all the amazing journeys that take place around the world. Here are some topic ideas to get you started:

- What sort of journeys have you made? E.g. holidays
- Research famous journeys; e.g. Amy Johnson's flight alone from Britain to Australia or Charles Darwin's journey on the HMS Beagle.
- Think about journeys that might be made in the future or travels through time
- Other than travel, what other journeys can you think of? E.g. life cycles, or the life cycles of materials such as plastics.

Make your poster

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

- 2D (flat) – if you make a model, you need to just send us a photo of it On A4 or A3 paper
- You can use pop up pictures, pull out tabs or use materials such as paint, drawing pencils, crayons and paper.

Send us your poster

Posters will be judged on creativity, how well it fits 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**