



SUPERSTAR

Challenges

collection

Suitable for
7 to 11-year-olds



This collection of CREST SuperStar activities allows children to explore everyday problems using science. Once they complete eight of the challenges, they can receive a CREST SuperStar certificate and badge as well!

#Investigate #Experiment #Create #Discover

Start using CREST SuperStar

The activities in this pack have been selected from our library of CREST SuperStar challenges. Children need to complete eight challenges to achieve a CREST SuperStar Award. If you want, you can mix and match challenges from different packs, as long as children complete eight SuperStar challenges.

Preparation

1. Start by signing up for a CREST account: www.crestawards.org/sign-in
2. Select SuperStar Award and download a SuperStar Passport. Use the Organiser Cards in this pack to prepare for each challenge

Run the challenges in this pack

1. Each challenge will take 45 minutes to an hour and involves hands-on investigation, decision making and group discussion. Children can use the Passport to keep track of the challenges they have completed.
2. Once you've completed all eight activities, log back into your CREST account at: www.crestawards.org/sign-in
3. Tell us about the children and the challenges they completed.
4. Finally, complete the delivery and payment details to order your certificates and badges.
5. Congratulations on completing CREST SuperStar!
6. If you want to use your own activities, that's fine! Find out more about what a SuperStar activity should look like here: www.crestawards.org/run-crest-awards/assessing-projects/assessment

What next?

Why not challenge children further and try a full day project next? A CREST Discovery Day is a one day facilitated project, ideal for ages 10+. You can find out more and download all the resources you need here: www.crestawards.org/Crest-Discovery

Encourage others to take part in CREST projects. To get more ideas on how to get started visit: www.crestawards.org



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SUPERSTAR



A Hole in my Bucket

Organiser's Card



About the activity

This activity is designed to get children thinking about materials, liquids and testing methods.

Just like the song 'There's A Hole In My Bucket', the children are asked to find a way to plug the hole in a container to stop water pouring out.

Through this activity you will support your group to:

- Carry out their own tests to compare different sticky materials
- Observe, measure and record results carefully
- Respond creatively, writing new lyrics for a well-known song.

Kit list

- A selection of different materials for testing, eg: sticky tape, fabric, Blu-Tack, cotton wool, tissues, straws etc.
- Plastic containers with holes cut into the bottom
- Ruler
- Timers
- Washing up bowls or containers
- Measuring jugs
- Scissors
- Plastic aprons
- Paper towels



What to do

1. Introduce the activity using the song 'There's a Hole in my Bucket', ask them if they think they can help Liza and Henry by finding out the best way to fix the hole in their bucket.
2. Give out activity cards and equipment to the children.
3. Explain that they will be using the equipment provided to test the best way to stop a leak.
4. Encourage children to discuss their ideas and how to carry out their investigations. Prompt questions:
 - What materials will they test?
 - How will they cover the leaky hole?
 - How will they make sure their test is fair?
 - How will they record their results?
5. Support children to conduct their tests and make their own records of their results. They could also take photographs or make drawings.
6. Ask the children to present their findings to the rest of the group, they can be as creative in their presentation as they want - the activity card suggests they could re-write the words to the song, using their findings.



Discuss

Children may have difficulty keeping some tests fair, e.g. how to compare sticky tape with glue or Blu-Tack etc. The following prompts will help them to think about how to keep their tests fair.

Make sure they place a bowl under the bucket or cup to collect the leaking water.

If they use just one bucket for all of the tests, it must be dried thoroughly after each test. A new material might not stick properly to a wet surface and results will be inaccurate. If they succeed in stopping the leak, they will need a new bucket!

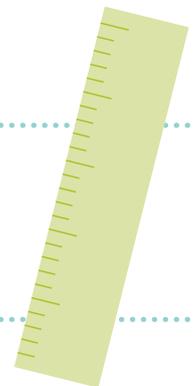
Keywords

- Observation
- Measurement
- Volume

Watch out!

Cut holes in buckets, cups or clean yoghurt pots before any tests begin and check that there are no rough edges around the hole.

When using water, make sure you have paper towels handy to mop up spills, especially on the floor.





SUPERSTAR

A Hole in my Bucket Activity Card

Do you know the tune to this well-known song?
If not, see if you can find out about it.

There's a hole in my bucket, dear Liza, dear Liza
There's a hole in my bucket, dear Liza,
a hole.
Then mend it dear Henry, dear Henry, dear Henry
Then mend it dear Henry, dear Henry mend it.
With what shall I mend it, dear Liza? . . .
With a straw, dear Henry . . .
The straw is too long . . .
Then cut it . . .
With what shall I cut it? . . .
With a knife . . .
The knife is too blunt . . .
Then sharpen it . . .

With what shall I sharpen it? . . .
With a stone . . .
The stone is too dry . . .
Then wet it . . .
With what shall I wet it? . . .
With some water . . .
With what shall I fetch it? . . .
With a bucket . . .
BUT THERE'S A
HOLE IN MY BUCKET!



Your challenge

Liza and Henry need your help. Can you find something that will stop Henry's bucket from leaking?

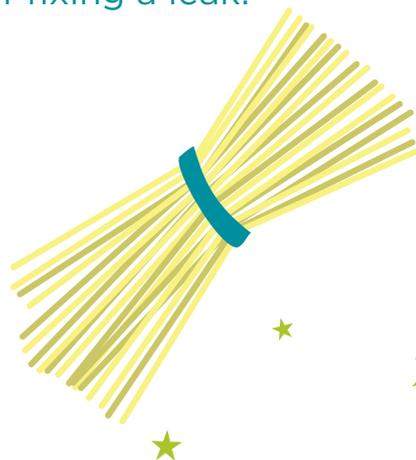
Liza suggests using straw to fix the hole. Do you think that would work well?

What about sticky materials? Would any of them be better for mending the hole in Henry's bucket?

Do some tests to find out the best method of fixing a leak!

Discuss

- Which materials will you test?
- How many different materials will you compare?
- Does it matter how you use your material to fill the hole?
- What will you need to observe or measure in your tests?



Getting started

We are going to use clean plastic drinking cups, with the same sized holes cut in the bottom of each, then try out our ideas.

Some of your fellow investigators have some ideas!

“I think we should try to fix the hole, then put water in and just watch what happens.”

“We could do some timing to find out how long it is before the water starts to leak out.”

“Let’s measure how much water leaks out in 2 minutes. We could put marks up the side of the ‘buckets’ to help us.”

What do you think? Do you have another idea?

Test your ideas

You could use a table like this to record your findings:

Material	How much water leaked through?
Blu-Tack	
Sticky tape	
Glue	
Chewing gum	
Straw	

Share your ideas

Were there any problems with your tests? How could you improve them?

How easy did you think it was to keep your tests fair? Why?

Which material should Liza and Henry use to fix a hole in their bucket?

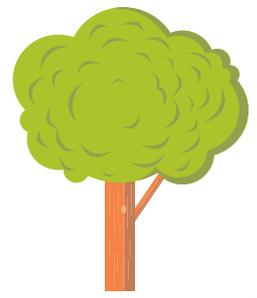
On which side of the hole should they stick it?

Why have you chosen this material?

Why not re-write the words to the song to include what you have found out?



SUPERSTAR



A Special New Tree

Organiser's Card



About the activity

This activity is designed to get children thinking about different types of trees and their different characteristics.

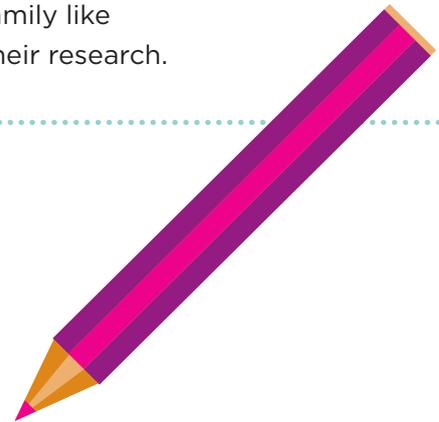
The local council in the town of Treedwell is planting a new tree in their special green space. However, they're not sure which tree to plant and need a little help deciding, lots of local residents have different ideas of what they would like from a tree.

Through this activity you will support your group to:

- Research different kinds of trees and their characteristics
- Do a survey to find out what tree characteristics their friends and family like
- Write a letter to Treedwell council to recommend a tree based on their research.

Kit list

- Access to the internet
- Plain paper to draw up the survey
- Tree guides to identify a range of trees and describe their characteristics
- Clipboards
- Pencils



What to do

1. Introduce the activity using the 'letter' from Treedwell council.
2. Give out activity cards and equipment to the children.
3. Explain that they will be conducting a survey to find out which characteristics different people like in trees. They will then need to do some research, using the tree guides or the website links on the activity card, to find out different characteristics of different trees, to decide which tree would be best suited.
4. Encourage children to discuss their ideas. Prompt questions:
 - What questions will they ask in their survey?
 - Who will they ask?
 - How will they record their results?
 - How will they make sure they get a range of opinions?
5. Support children to conduct their surveys and make their own records of their results. They could use the data they collect to make a table or a graph.
6. Ask the children to present their findings to the rest of the group, they can be as creative in their presentation as they want.

Things to talk about

Children may not know the names of trees. You can help them by providing access to simple identification guides.

You can obtain a simple tree identification guide from www.opalexplornature.org/crest

Take it further

Encourage the children to use a range of different ways to find out which tree might be best.

If they use the survey on the ACTIVITY CARD, encourage them to add, change or delete questions, and think about who to ask.

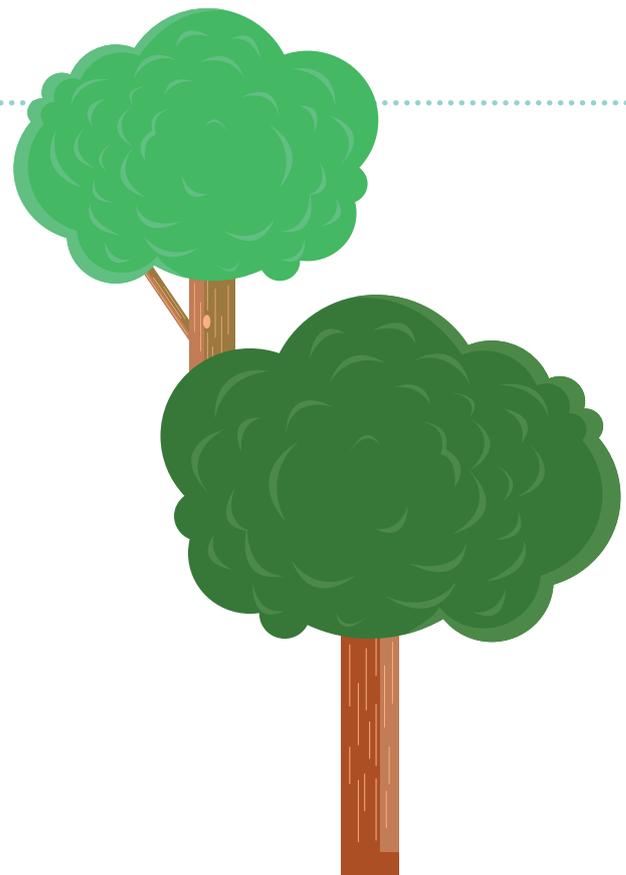
Encourage the children to make their own records, such as a table or a block graph.

Keywords

- Survey
- Ecology
- Evergreen
- Native
- Habitat

Watch out!

Remind children not to approach strangers to get them to complete the survey, unless they are accompanied by a responsible adult.





SUPERSTAR

A Special New Tree

Activity Card

Dear Investigators,

We are going to plant another tree for future generations to enjoy. There is a special green space for it in the town. But what tree should we plant? Can you help us to decide?

C. Ferr

Connie Ferr
Treedwell Council

Your challenge

The local council in the town of Treedwell is planning to plant a new tree. Can you help them to decide which tree?

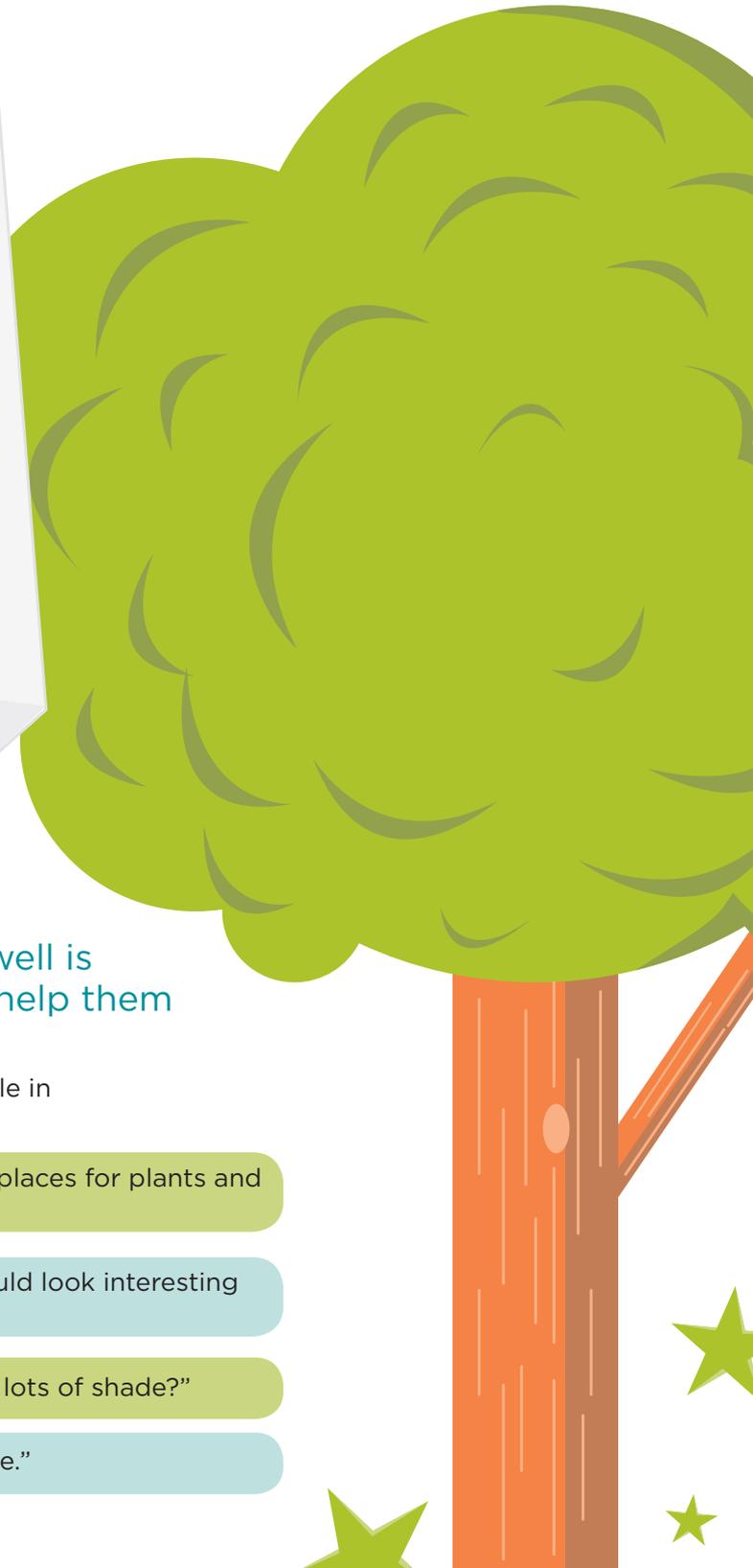
You will need to think about the different things people in Treedwell want from the tree:

Local resident one: "I think it should provide good places for plants and animals to live."

Local resident two: "It would be nice if the tree could look interesting all year round."

Local resident three: "Could we have one that gives lots of shade?"

Local resident four: "I think it should be a native tree."



Discuss



Think about trees that you like.

How will you decide which tree is the best suited to the town of Treedwell?

Getting started

You could do some research about different kinds of trees. There's a simple guide to trees on the internet at www.opalexplornature.org/crest and <http://trees.luidp.net/en/index.php>

Do you have an idea about how you can investigate which tree to plant? Maybe you could do a survey to find out what other people think about trees.

Test your ideas

Here is a survey you could use to find out which trees your family and friends think would be good to plant in a town centre. Can you think of any other questions to add to the survey?

Name: _____

1. If you could choose a new tree to plant in a town centre what would it be?

2. Why would you choose that tree?

Tick one or more boxes.

It provides a home for animals and plants

It gives lots of shade

It looks interesting all year round

It's a native tree

Another reason _____

Share your ideas

Which were the most popular trees in the survey?

What did you learn about trees?

Is there a tree that fits in best with what the people of Treedwell want?



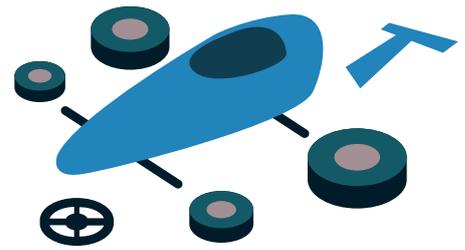


SUPERSTAR

A Sticky Problem Organiser's Card



About the activity



This activity is designed to get children thinking about the different properties of glue.

The children have been asked to read a letter printed in the Weekly Woodworker magazine from Ineda Bond. She's not sure which glue is the most suitable to build a cart and needs some help.

Through this activity you will support your group to:

- Make three different glue recipes
- Conduct different tests on all their glue mixtures to compare different properties
- Write a letter to tell Weekly Woodworker magazine about their results

Kit list

Glue ingredients:

- Flour
- Vinegar
- Skimmed milk (or non-fat milk powder with hot tap water)
- Baking soda (bicarbonate of soda, NOT baking powder)
- Cornflour

For testing:

- Glue spreaders
- Small blocks of wood, card or cork, wooden lolly sticks
- Force meters (optional)
- Funnel
- Beaker
- Paper towels
- Bowls or pots to make the glues in
- Samples of cloth, large bowl of warm soapy water, timer
- Labels, or pens to label the different glues



What to do

1. Introduce the activity using the letter from Ineda Bond. Ask them about the different properties of glue.
2. Give out activity cards and equipment to the children.
3. Explain that they will be using the equipment provided to make three different glue mixtures and test them.
4. Encourage children to discuss their ideas and how to carry out their investigations. Prompt questions:
 - What makes a 'good' glue?
 - What properties will they test and how will they test them?
 - How will they record their results?
 - How will they make sure their test is fair?
5. Support children to conduct their tests and make their own records of their results. They could also take photographs or make drawings.
6. Ask the children to present their findings to the rest of the group, they can be as creative in their presentation as they want, the activity card suggests they could write a reply to Weekly Woodworker magazine. Could also take photographs or make drawings.

Things to think about

You should be able to store the glue in plastic containers in the fridge for a short time. Keep the containers sealed. If the paste dries up, just put the sealed container in a bowl of warm water.

The only way to measure glue performance accurately is through laboratory testing. Because of this, the children's tests will not be perfect, but it is important that they are encouraged to try to make fair comparisons between glues.

Keywords

- Glue
- Adhesive
- Bonds
- Properties

Watch out!

These glues can be messy but are perfectly safe. Pay extra attention where hot water is used. Children need to wash their hands and rinse equipment when finished. They may need plastic aprons and gloves..





SUPERSTAR

A Sticky Problem Activity Card

Dear Weekly Woodworker magazine,

I am making a box cart and could do with some advice. I need to know:

- Which glue is the strongest (in case it's a bumpy race)?
- Which glue is the most waterproof after it dries (in case it's a rainy day)?

- Which glue will clean off my clothes most easily (in case of accidents)?

I hope you can help me to solve my sticky problem.

Yours faithfully,

Ineda

Ineda Bond
(age 9)



Your challenge

Can you help Ineda Bond to find out what kind of glue would work best for her box cart? **Make and compare some different recipes for glue.**

Some of your fellow investigators have had some ideas to get started with.

"Let's find out about glue strength. I think we can glue two blocks of wood together and see how easy it is to pull the blocks apart once the glue has dried. We could even use a force meter to measure the force needed."

"I think we should find out if the glues can be removed from cloth. I think we could stain some cloth with different glues and wait for them to dry. Then we can stir the cloth in soapy water for a minute, squeeze out the water and see what has happened to the glue."

"We could find out about how waterproof the glues are. I think we could stick two lolly sticks together with the glue. We will find out how strong the glue is when it is dry and then after we have wet it."

Discuss



Do you think that all glues are the same?

What do you think are the most important properties for glue?

How are you going to test the glue recipes to find out how well they work?

What will you try to stick together?

What will you need to observe or measure in your tests?



Getting started

Now make and test your glue recipes. Remember to label your containers of glue.

Recipe A

Ingredients

1/4 cup of water
1/2 cup of flour

Method

Add 1/4 cup of water to 1/2 cup of flour and mix until smooth.

Recipe C

Ingredients

3 tablespoons of cornflour
4 tablespoons of cold water
2 cups of boiling water

Method

Mix 3 tablespoons of cornflour and 4 tablespoons of cold water in a small bowl.
Pour in 2 cups of boiling water, stirring all the time.
When liquid is clear and thick, let it cool for your finished glue.

Recipe B

Ingredients

2 tablespoons of vinegar
1/2 cup of hot skimmed milk (or non-fat milk powder mixed with water from a hot tap)
1/2 teaspoon of bicarbonate of soda (NOT baking powder)
2 teaspoons of water

Method

Pour 2 tablespoons of vinegar into a cup and stir in 1/2 cup of hot skimmed milk (or non-fat milk powder mixed with water from a hot tap).
Let the mixture sit for about 3 minutes.
Line a funnel (or sieve) with a paper towel.
Carefully pour the mixture into the funnel and catch any liquid that drips through in an empty cup.
You should have a solid lump collected in the paper towel.
Scrape this into an empty cup and stir in 1/2 teaspoon of bicarbonate of soda (NOT baking powder) and 2 teaspoons of water.
Watch for bubbles of gas. When no more bubbles can be seen, you have made glue.



Test your ideas

You may want to record what you find in a table like this.

	How strong is the glue?	How waterproof is the glue?	How removable is the glue?
Glue A			
Glue B			
Glue C			

Share your ideas

Were there any problems with your tests? Why?

How could you improve your tests?

Which glue should Ineda use when making her box cart?

Why have you chosen this glue?

Do you think you could improve any of the glue recipes? How?

One way to share your ideas is to write a short reply to Ineda's letter to go in the Weekly Woodworker. Remember to say what tests you carried out and what you found.

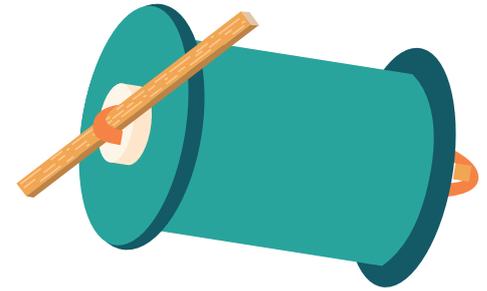
Why not add drawings or photographs? You could put samples of glue in small bottles or tubes and make labels for them.





SUPERSTAR

Band Rollers Organiser's Card



About the activity

This activity is designed to get children thinking about design, energy, forces and motion.

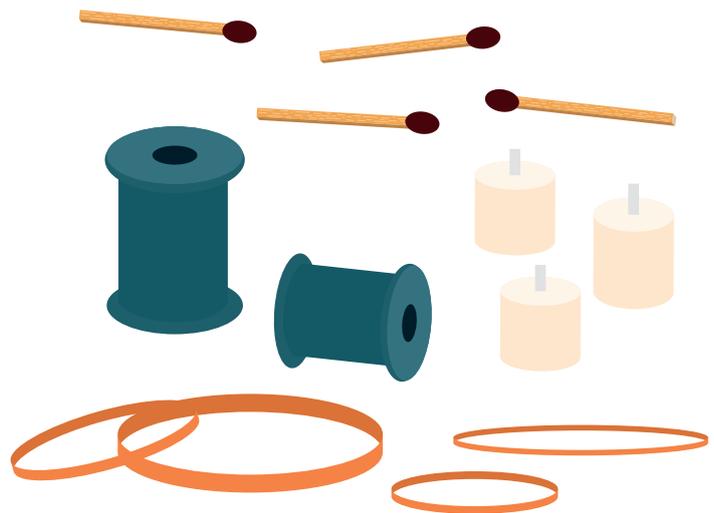
Children are shown a 'news story' from StarTown news 'Designers say clockwork technology could help to slow down climate change. Inventors of wind up radios, torches and children's toys that don't need batteries, or fuel, are invited to enter them in the CLIMATE CHANGE CHALLENGE at the Startown Technology Show.'

Through this activity you will support your group to:

- Create their own wind-up band roller.
- Compare the speed and duration of their different band rollers.
- Log and share their results, reflecting on how they could improve their design.

Kit list

- Selection of clockwork or wind up items e.g. clockwork radio, wind-up torch or watch etc.
- Cotton reels
- Candles (cut into 1 cm pieces)
- Matchsticks
- Elastic bands of different lengths and thicknesses
- Measuring tapes or sticks
- Timers
- Materials to stick on the roller (optional)



What to do

1. Introduce the activity using the 'news article'. Show the children some clockwork or wind up items. Ask them if they know how they work.
2. Give out activity cards and equipment to the children.
3. Explain that they will be using the equipment provided to build and compare wind-up band rollers.
4. Encourage children to discuss their ideas and how to carry out their investigations. Prompt questions:
 - How will they build their band roller?
 - What will they compare? Speed or distance? How will they test these?
 - How will they make sure their test is fair?
 - How will they record their results?
5. Support children to build their band roller following the instructions provided on the activity cards.
6. Help children to conduct experiments with their band rollers to investigate which factors make a difference to speed and duration. They need to change one factor at a time to try to find out what improves the toy e.g. size of the band, number of winds, size of the roller, the surface.
7. Encourage children to make their own records of their results. They could draw pictures of the best designs or make a bar chart of the results.
8. Let the children race the band rollers. Let them decide what makes it the winner - is it the one that travels fastest or furthest, or a bit of both? Ask the children to present their findings to the rest of the group, they can be as creative in their presentation as they want.

Things to think about

The band roller moves because energy is stored in the stretched elastic band. As the band unwinds the energy is released. This energy can move the roller. Clockwork toys work in a similar way by storing energy in a spring. Clockwork toys are designed to release the energy steadily. This can be more difficult to achieve with elastic bands.

Several things will affect the movement - different surfaces around the roller or on the ground (due to friction), slope, length and thickness of the elastic band and friction in parts of the roller. The number of twists on the elastic band is generally a key factor in how the band roller travels.

If the roller is not moving smoothly try rubbing the candle on the side of the cotton reel.

Very long elastic bands may be too long to hold the roller together.

Once the rollers are working, it is possible to count the number of winds and to look at the relationship between winds and distance.

It is possible to change the surface of the roller (add foam strips etc.) to look at the effects of friction.

Keywords

- Elastic
- Energy
- Motion
- Distance
- Friction

Watch out!



Take care when winding up the elastic bands do not over-tighten them so that they snap.



SUPERSTAR

Band Rollers

Activity Card



Your challenge

Can you make a wind up toy for the Technology Show? You might not be able to make a clockwork toy but you could use elastic bands instead.

Investigate what makes a 'good' wind-up toy? What can you do to make your wind-up toy go faster, or travel further?

Discuss

How do clockwork toys work?

What might make a difference to how long they keep going or how fast they go?

Why are elastic bands like clockwork?

How could wind up toys help to combat climate change?



Figure 1

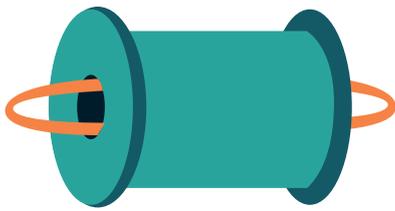


Figure 2

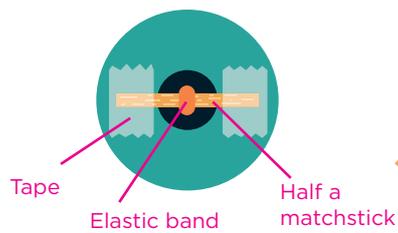


Figure 3



Getting started

How to make a band roller:

1. Use a piece of candle, about 1 cm thick. Remove the wick (string) to leave a hole.
2. Push an elastic band through the centre hole of a cotton reel (Figure 1).
3. Put half a matchstick through one end of the elastic band loop and tape it to the cotton reel (Figure 2).
4. Thread the other end of the elastic band through the hole in the candle (Figure 3).
5. Now put a whole matchstick through the elastic band loop by the candle (Figure 3).
6. Wind the long matchstick to twist the elastic band.
7. Put the band roller down and see if it moves!

Test your ideas

Race your band roller against other groups. Compare how well they work.

You will need to change one factor at a time to try to find out what improves the toy. You could try changing the size of the elastic band, the number of winds, the size of the roller, or the surface you are racing on

How will you record your results?

Share your ideas

Which band roller went the fastest or furthest?

What made a difference?

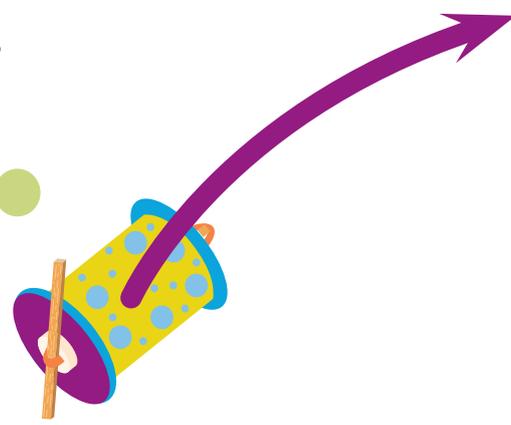
What could you change to make your band roller work better?

Extra things to do

Will your roller go uphill?

Can you make it look really interesting?

What else could you make using wind up power?





STAR



Bowled Over

Organiser's Card



About the activity

The children have been given a scenario where they are asked to build and test a ten-pin bowling game suitable for use outside.

Through this activity you will support your group to:

- Explore forces and stability while designing and testing their own outdoor bowling game
- Play and evaluate the game
- Create instructions.

Kit list

To make the bowling equipment they will need:

- Plastic bottles and containers (different sizes and shapes)
- Different fillings (e.g. gravel, sand, water)

To test their games they will need:

- Different outside surfaces
- A selection of balls

What to do

1. Introduce the activity using the story of Cosmic and Gem. Ask the children if they have played ten pin bowling before.
2. Give out activity cards and equipment to the children.
3. Explain that they will be using the equipment provided to test the best design of ten pin bowling.
4. Encourage children to discuss their ideas and how to carry out their investigations. Prompt questions:
 - What will they make the pins from?
 - What surface will they play on?
 - What ball will they use?
 - How will they make sure their test is fair?
 - How will they record their results?
5. Support children to conduct their tests and make their own records of their results. Encourage children to think about how the different variables (e.g. playing surface, shape/weight of pins, ball) might affect the game.
6. They could also take photographs or make drawings. Ask the children to present their findings to the rest of the group, they can be as creative in their presentation as they want.

Discuss

Children may need to be shown images of the pins used in indoor bowling alleys and how they are arranged. Get them to think about how the very specific shape of the pins and where they are placed might influence what happens to the pins when hit by a bowling ball.

Take it further

Pins made from containers that are wider at the bottom will be more difficult to knock over than pins that are wider at the top. It is important to let children discover this by trying out their own ideas.

Keywords

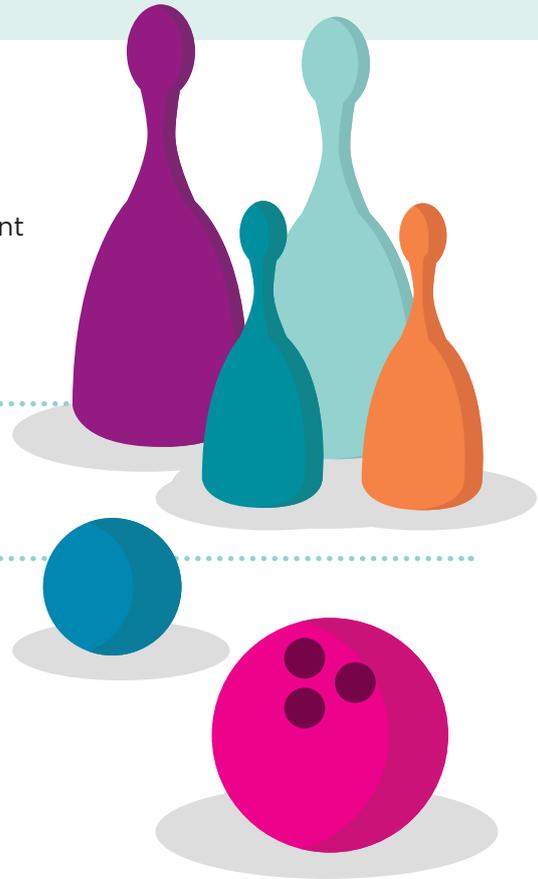
- Forces
- Stability

Watch out!

Follow the organisation's guidelines for outdoor work.

Ensure the outdoor environment is safe and clean.

Do not allow children to use equipment that is sharp or will break easily e.g. tin cans or glass bottles.





SUPERSTAR

Bowled Over Activity Card

Orion and Andromeda love playing outside but the play area isn't very exciting. They've played football, chase and hide and seek over and over again.

Now they want to play a new game. They both love going to the bowling alley. "Could we make a bowling alley outside?" they wonder.



Your challenge

Design and make a version of ten-pin bowling that you can play outside.

To help you out, a few of Cosmic and Gem classmates have had some ideas:

"I think we should compare short fat bottles and tall thin bottles."

"I think we should try using sand, water, gravel and bits of polystyrene to fill the bottles."

"I think we should compare big balls and small balls, and light balls and heavier balls."

"I think we should try playing our bowling game on gravel, short grass, long grass, sand, concrete and tarmac."

"I think we should see how many pins are knocked over in 10 throws to compare different arrangements."

Discuss

Talk about ten-pin bowling and how you play it. If you have never played ten-pin bowling, see what you can find out about how to play it.

How will you make pins that are like the ones at a bowling alley? Plastic drinks bottles could work, but you might have other ideas.

How will you arrange the pins? How will you make them stand up? Don't forget that it might be windy outside!

What will make the best bowling ball?

Bowling alleys are usually very smooth. Can you think why?

Which outside surface might be best for your new game?



Getting started

How will you test your ideas to see which works best?

How will you make sure you do your tests safely?

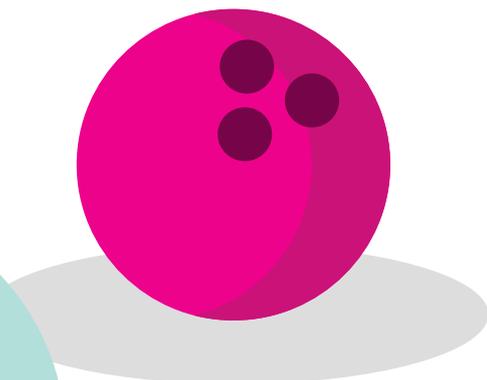


Test your ideas

How will you record your findings?

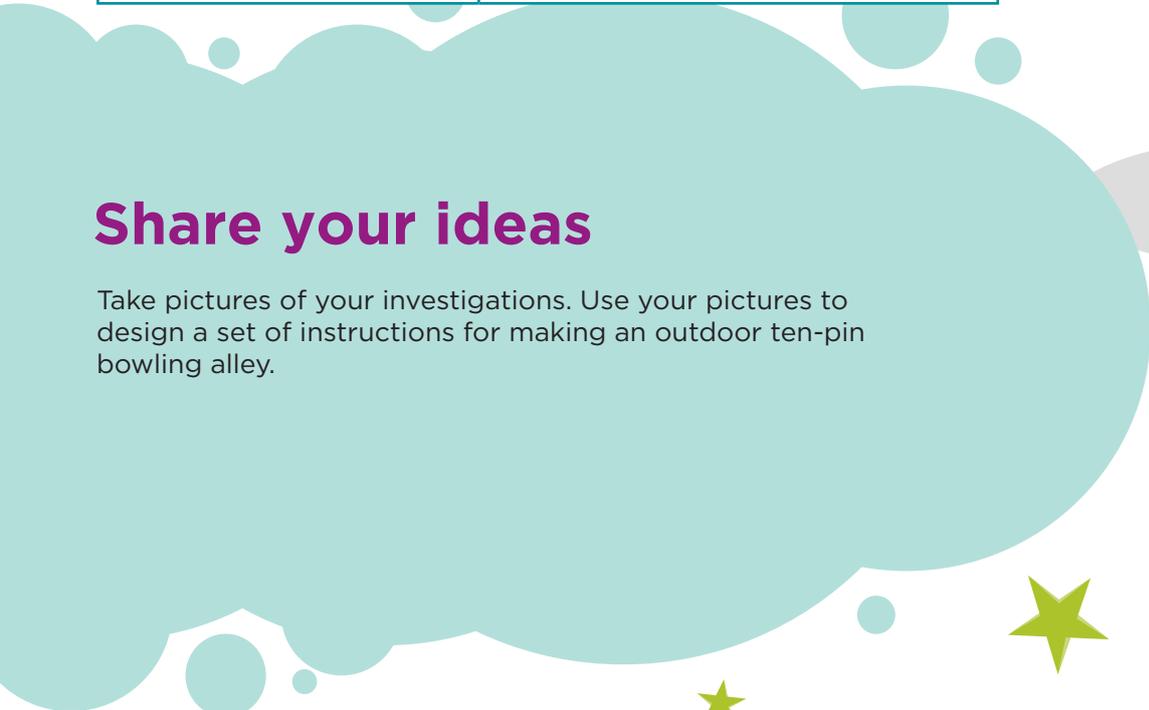
Could you make a table or a graph to show your results?

	Number of bottle knocked over in 10 throws
Big Bottles	
Small Bottles	
Big Ball	
Small Ball	



Share your ideas

Take pictures of your investigations. Use your pictures to design a set of instructions for making an outdoor ten-pin bowling alley.





SUPERSTAR

Bridge Blunder Organiser's Card



About the activity

This activity is designed to get children thinking about weights, forces and measures.

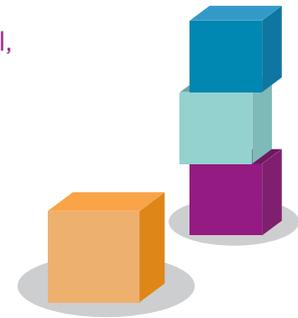
Children are set the challenge of helping Star Spans, a design company, fix their bridge and stop it swaying.

Through this activity you will support your group to:

- Build different models of bridges.
- Test their different models to see which can hold the most weight and why.
- Record and share their results.

Kit list

- A4 paper - 12 sheets per team (2 for initial exploration, 5 for their first trial, 5 for the final bridge). Have a few pieces in reserve. Scrap paper is fine.
- Sellotape - you should restrict this to a short strip per group. Sellotape is only for securing things, not for wrapping round the paper.
- 10 and 100 gram masses, coins, blocks or other equipment to act as 'weights' - bridges can support a surprisingly large mass.
- Play blocks or similar to create the 20 cm gap for the bridge - or gap between chair and tables.
- Pictures of bridges (optional)



What to do

1. Introduce the activity using the story of Star Spans. You may want to show the children some pictures of different shaped bridges.
2. Give out activity cards and equipment to the children.
3. Explain that they will be using the equipment provided to test the best design for a bridge. Give the children a little time to talk together and to try making strong shapes using single sheets of paper. They can fold or cut the paper if they wish.
4. Encourage children to discuss their ideas and how to carry out their investigations. Prompt questions:
 - How many different kinds of bridge do you know?
 - Are some shapes stronger than others?
 - How will they make sure their test is fair?
 - How will they record their results?

- Now give each group 5 sheets of paper and a small amount of tape. Tell them they have 10 minutes to try out ideas for how they might make their bridge. This will not be the final bridge. Let each group test their bridge with weights as they go along. You will need to decide together where to put the weights on the bridges to test them.
- Encourage children to evaluate the design. What do they need to change to make the bridge stronger? Now they will make their final bridge.

They will need more paper. Warn them that they are not allowed to use any of the old paper but can use their earlier ideas to help them.

- Support children to conduct their tests and make their own records of their results. They could also take photographs or make drawings. After children have tested their bridges, provide time for them to talk through what was successful and what didn't work.
- Ask the children to present their bridge to the rest of the group and test it.

Things to think about

Make sure the weights are placed, not dropped, on the bridges.

You can decide to spread weights evenly across the bridge (like the children in the story) or focus them in the centre. To make fair comparisons between the bridges the same test should be carried out on each one.

Do not fasten the ends of the bridge to the supports. This does strengthen the bridge but if well fastened it can require large weights to make even a single piece of paper collapse.

There are many solutions to this problem. The shape is all important.

The weakest bridge is often a flat sheet of paper. It can be made stronger by flat folding, creating a triangular prism shape or rolling the paper along its length. Walls can add strength as can pillars or arches. Suspending the bridge can also help.

We have used the term 'weights', rather than the more scientifically accurate 'masses', since this is the term that young children are more likely to know.

Keywords

- Construction
- Weights
- Masses
- Suspension
- Support



Take it further

Children could act out a design award to showcase the bridge or bridges that were the strongest. Children could sketch their bridge and make notes about how it worked.

Watch out!



Avoid weights falling from a height.

If bridges are high, you will need a bucket of sand or cardboard box filled with crumpled paper underneath to catch falling weights.



SUPERSTAR

Bridge Blunder Activity Card

A sparkling new footbridge has been built in Startown. Class 4 of Startown Primary School were invited to the grand opening. All the children stood on the bridge as their classmate Anil (aged 8) cut the official tape.

Even before the cheers had died down the bridge began to sway and bend. All the children were hastily rushed to one end and the bridge was closed.

Star Spans, the designers of the bridge, looked very red faced.

“We’re not sure what went wrong. The bridge was such a beautiful shape. What do we do now? Can anyone help us?”

Your challenge

Can you help Star Spans design a bridge that can be used safely?

When people design bridges they build models. This is what you will need to do.

Discuss

- How many different kinds of bridge do you know?
- Are some shapes stronger than others?

Getting started

Your bridge needs to span 20 cm. Think about which shapes are the strongest.

Try exploring bridge shapes with single pieces of paper. You can cut the paper if you wish.

Why not try rolling, curving and folding the paper.



Test your ideas

Test it with weights.

Does it matter where you put the weights?

Remember the children were standing across the whole length of the bridge when it started to wobble.

Now make one final model.

You might like to record your results in a table like this:

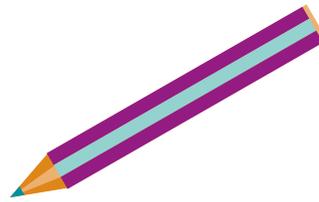


Bridge	Maximum weight bridge could hold
Bridge #1	
Bridge #2	
Bridge #3	

Share your ideas

Show your bridge to the rest of the class.

You could take pictures and add notes about what you think might make your bridge stronger and more stable.

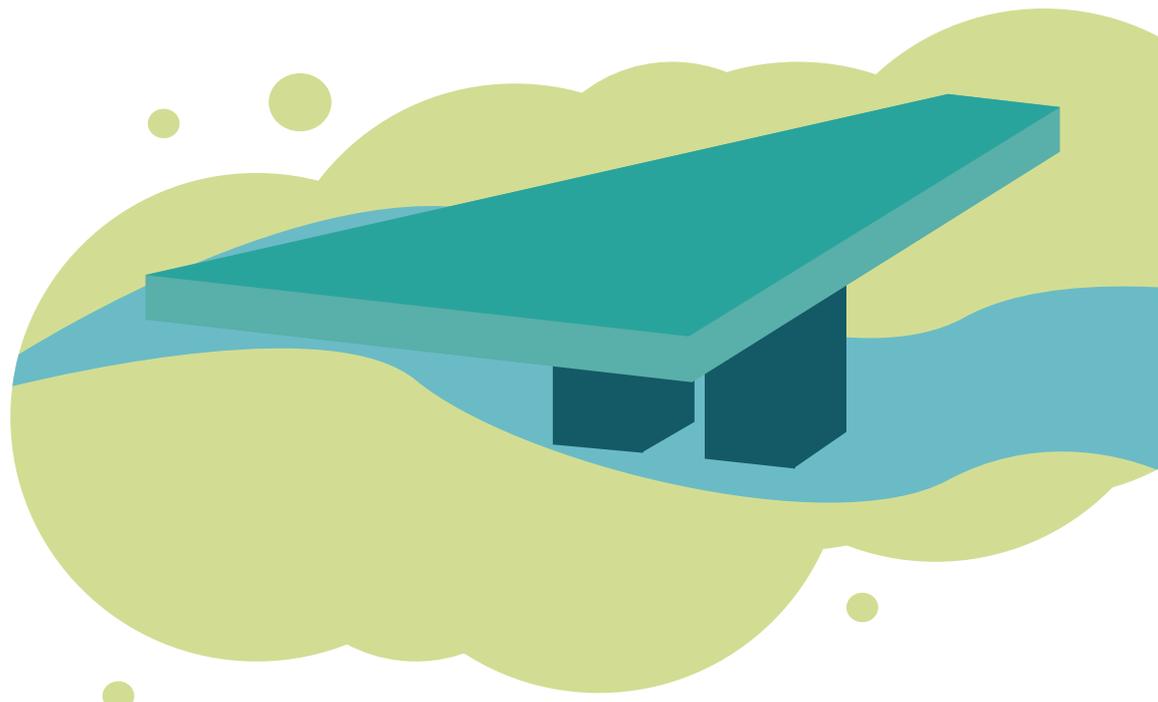


Extra things to do

Can you find out about the highest and longest bridges in the world?

What did people in ancient times use to build bridges? How does this compare to bridges built today?

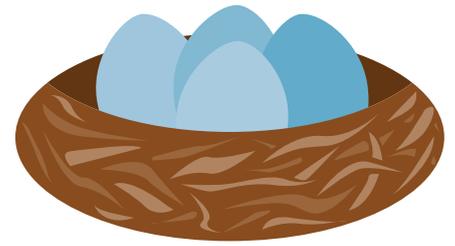
You could find out about different bridges and make models of them to show how they work.





SUPERSTAR

Brilliant Birds Organiser's Card



About the activity

This activity is designed to get children thinking about birds, habitats, designing and making.

The children have been given a story about Mrs Twitcher, a local bird expert. She thinks it is only birds who can build nests.

Through this activity you will support your group to:

- Design and build their own nest.
- Test the strength and stability of their nest under windy and wet conditions.
- Present their findings to the rest of the group.

Kit list

- An outside environment – playground, school field, shrubby area etc.
- Nest building materials e.g. wool, twigs, grass, leaves, feathers, shredded paper, pipe cleaners etc
- Pot of clay or modelling material per team to act as 'glue'
- 'Beaks' (chopsticks, pegs or folded card)
- A watering can
- Strong fan

What to do

1. Introduce the activity using story. Ask the children if they think Mrs Twitcher is right, or do they think they can build a good nest?
2. Give out activity cards and equipment to the children.
3. Explain that they will be using the equipment provided to build a nest and then test it in the 'rain' and 'wind'. You could show pictures or videos of birds building nests.
4. Encourage children to discuss their ideas and how to carry out their investigations. Prompt questions:
 - What materials will they use?
 - How will they fix their nest together?
 - How will they record their results?
5. Give each child a pretend beak to use. Remind them not to put the beaks in their mouths. Let them practice using their beaks.
6. In an outdoor area, ask the children to gather materials for their nest. If necessary set up extra materials in the outdoor environment beforehand.
7. Once all the nests are built, the children can test them. What happens if you pour water over them? Do they fall apart or get waterlogged? Support children to conduct their tests and make their own records of their results. They could also take photographs or make drawings.
8. Ask the children to present their findings to the rest of the group, they can be as creative in their presentation as they want - the activity card suggests they could re-write the words to the song, using their findings.

Things to think about

Birds often work with each other to build their nests. Children will find it is helpful to collaborate in this activity using their varied skills to construct the nest.

Some children will find this activity challenging. Give them time to try using a beak, but let them use their hands if they are not making progress.

Make sure children do not disturb natural birds' nests.



Keywords

- Habitat
- Nests
- Shelter
- Structure

Take it further

Birds use a range of materials to build their nests. The availability of materials and the need to protect their offspring influences the type of nest the birds build. As an extension activity, you can help children to think about this by providing a limited range of different materials to different groups and asking them to also think about what they would do to give the baby birds the best chance of survival.

Watch out!

Follow the organisation's policy for outdoor work. Check that the area is free of unsuitable materials e.g. animal faeces, broken glass or tin cans and hazardous plants such as stinging nettles.

Wash hands after working outdoors and handling nest building materials.

Find out more

Not all birds construct nests. The star no-nest builders are probably Emperor Penguins and Fairy Terns.





CREST
AWARDS

SUPERSTAR

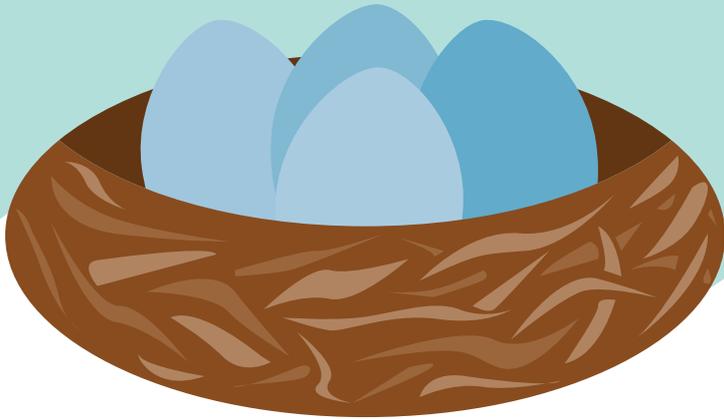
Brilliant Birds

Activity Card

The Best Of The Nests

Local birdwatcher Mrs Twitcher is an expert on birds' nests. "I think birds are brilliant," she told our reporter. "I don't think people can build nests like birds do."

Do you think Mrs Twitcher is right?



Your challenge

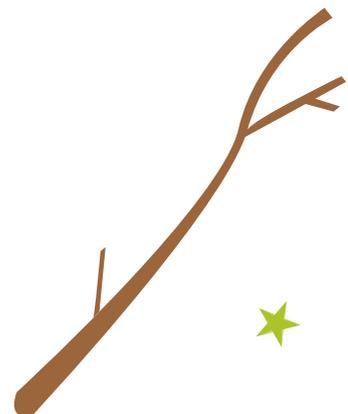


Can you build a birds' nest?
Make sure you only use your pretend beak!
How will your nest survive in the wind and the rain?

Discuss



- What do birds use to build nests?
- How do you think they decide which materials to collect?
- How difficult do you think building a nest will be?



Getting started

What materials can you find that you might be able to use to build your nest?

Which ones do you think will be best?

Do you need different materials inside and outside the nest?

How will you keep everything together?

You could start with a small bowl made out of modelling material.

What other ways can you think of to build a nest?

Test your ideas

What will happen to your nest on a windy day?

What will happen to your nest in rainy weather?

What works well and what could be improved?

Share your ideas

Take pictures of the best nests and make a display for Mrs Twitcher. Give a presentation on building birds' nests.

Extra things to do

Do birds with different shaped beaks make different nests?

Are there any unusual materials that birds use to make nests?

Find out if all birds build nests.



Remember to hold
you pretend beak
in your hands, not
your mouth



SUPERSTAR

Bumblebee Mystery

Organiser's Card



About the activity



This activity is designed to get children thinking about pollinators and their habitats.

The investigators have been sent a letter asking for help. The Buzzabout family don't see as many bumblebees as they used to and want to do a survey across the country to see where they are.

Through this activity you will support your group to:

- Learn about different kinds of pollinators and how to identify them
- Learn about different kinds of plants that attract pollinators
- Think about the importance of pollination

Kit list

- Pollinator identification key
- Pollinators card sort
- Bumblebee-friendly plants card sort

What to do

1. Introduce the activity using the letter.
2. Give out activity cards and equipment to the children.
3. Explain that they will be surveying the local area for bumblebees .
4. Encourage children to discuss their ideas and how to carry out their investigations.
5. Support children to conduct their investigation and make their own records of their results. They might like to make a tally chart.
6. Ask the children to present their findings to the rest of the group, they can be as creative in their presentation as they want. Children can make a chart of their observations. They can create a plan or guide to show how to make the area more bumblebee friendly

Things to think about

It is possible that you will not find bumblebees, but it is important to let the children find out for themselves if there are any. They can note other pollinators that they find.

Lack of bumblebees leads naturally into designing a more bumblebee-friendly environment. If you are able to make some changes, you can carry out more observations to see if they have had an impact.



Keywords

- Bees
- Pollen
- Pollinators
- Survey



Watch out!

Ensure children do not touch any plants or animals

Find out if any children have allergies to bee stings.

Follow your organisation's guidelines for outdoor work.

Find out more

There are about 250 species of bumblebee around the world and 25 in the UK. Six of these are commonly found. The decline of bumblebees seems likely to be due to changes in farming practices, the use of insecticides and the lack of natural habitats. This decline threatens biodiversity, food supplies and human health. A significant proportion of our food relies on pollinators such as bumblebees.

British bumblebees live in many different environments. Most areas should be able to attract them; sometimes they just need some encouragement by planting the right type of plants.





SUPERSTAR

Bumblebee Mystery

Activity Card

Dear Investigators

We think bumblebees are brilliant! They pollinate our flowers and help them to make seeds. We spend all our spare time looking for bumblebees. Our favourite is the great yellow bumblebee, but we haven't seen one yet.

We don't see as many bumblebees as we used to and we are worried because bumblebees are very

important. We'd like to do a survey across the country to see where the bumblebees are. Can you help us?

From,

Buzzabout

The Buzzabout family

P.S. We have sent some pictures of pollinators to help you.



Your challenge

Help the Buzzabout family by carrying out a bumblebee survey.

Discuss

Look at the pictures of pollinators.

Sort them into bumblebees and other insects.

Have you seen any of the bumblebees?

Where did you see them?

Getting started

Where will you look for bumblebees? How long will you spend looking?

Start a survey to see what you can find.



Test your ideas

Could you make a tally chart or pictogram to record what you see?

Pollinator	Tally
e.g. wasp	

Share your ideas

Make a plan or a guide to show how to make the area more bumblebee-friendly.

Extra things to do

Look at the bumblebee-friendly plants. Which do you have already and which could you add to your area?

Set up a camera to observe bumblebee activity.

Find out more about why bumblebees are so important.





Bumblebee Mystery Pollinator





SUPERSTAR

Bumblebee Mystery

Card Sort

Bee friendly plants card sort

- | | | |
|----------------|------------------|----------------|
| 1. Chives | 6. Sedum | 11. Fuchsia |
| 2. Rosemary | 7. Geranium | 12. Sage |
| 3. Daffodils | 8. Buddleia | 13. Cornflower |
| 4. Marigolds | 9. Clover | 14. Lavender |
| 5. Lambs' ears | 10. Runner beans | 15. Thyme |

Pollinators card sort

- | | | |
|-------------------------|----------------------------|-----------------------|
| 1. Peacock butterfly | 6. Red mason bee | 11. Bee fly |
| 2. Tachinid fly | 7. Beetle | 12. Common carder bee |
| 3. Red-tailed bumblebee | 8. Great yellow bumblebee | 13. Green lacewing |
| 4. Tree bumblebee | 9. Black soldier fly | 14. Black arches moth |
| 5. Blue bottle fly | 10. White-tailed bumblebee | 15. Wasp |



SUPERSTAR

Buy Them Try Them

Organiser's Card



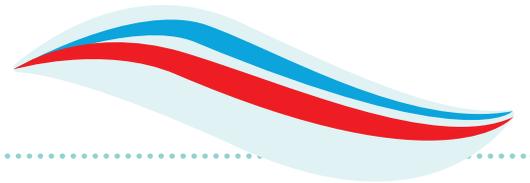
About the activity

This activity is designed to get children thinking about toothpaste, what it is made from and how different brands of toothpaste differ.

The children have been shown an advert for Bright Smile Toothpaste. Can they do some tests to check that the claims are correct before the ad goes to print? They'll have to check people agree with the advert first!

Through this activity you will support your group to:

- Carry out investigations on manufactured toothpaste
- Compare these with a homemade toothpaste (optional)
- Carry out toothpaste surveys.



Kit list

- At least 3 different brands of toothpaste for comparison
- Spare clean toothbrushes (not for teeth cleaning)
- White tiles or old plates
- Permanent markers or shoe polish
- Additional plastic containers and/or plates
- Covering for the tables
- Plastic aprons

What to do

1. Introduce the activity using the story.
2. Give out activity cards and equipment to the children.
3. Explain that they will be exploring different kinds of toothpaste and doing a survey on their friends and family to find out which toothpaste people like best and why.
4. Encourage children to discuss their ideas and how to carry out their investigations.
5. Support children to conduct their investigation and make their own records of their results. If children do have their own toothbrushes, they could test the toothpastes with dental disclosing tablets on their own teeth. Using plates and markers may make a better investigation.
6. Ask the children to present their findings to the rest of the group, they can be as creative in their presentation as they want.



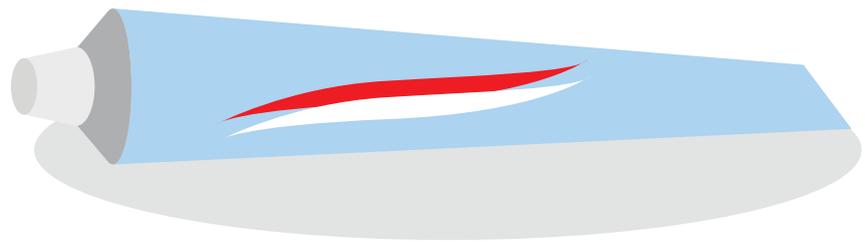
Keywords

- Toothpaste
 - Cleaning
 - Survey
-

Watch out!

If children use the toothpaste on their own teeth, they will each need their own brush and toothpaste sample.

Homemade toothpaste should only be tasted if you are certain it has been prepared hygienically.





SUPERSTAR

Buy Them Try Them

Activity Card

To: You

From: Bright Smile Toothpaste Company

Subject: Try them, Buy them!

Hi Investigators

We've just finished this advert for a new toothpaste. The boss says that we should make sure it is the best toothpaste before we put the ad on TV. Can you help us?

Thanks,

**Sales Team,
Bright Smile Toothpaste Company**

ADVERT

Bright Smile Toothpaste

Have you tried new Bright Smile Toothpaste? Developed by our team of CREST SuperStars, we think Bright Smile Toothpaste is the best.

Brush up - Bright Smile Toothpaste is a great choice to get rid of plaque really fast

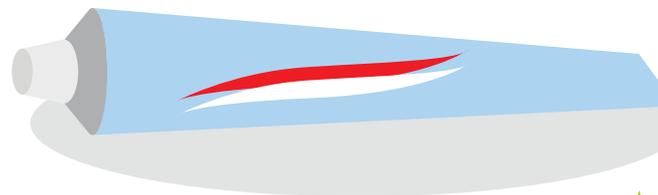
Bright and white - This new formula gets teeth brighter faster and keeps them whiter longer

Fresh flavour - Your mouth will feel cleaner and your breath will feel fresh for hours

Bright Smile Toothpaste comes in a range of attractive colours. Both our blue and red gels help you to have clean strong teeth, healthy gums and great smelling fresh breath throughout the day.

Your challenge

Your task is to help the sales team at Bright Smile Toothpaste Company to try other brands of toothpaste to see if they work better than their new toothpaste.



Discuss

Read the advert for Bright Smile Toothpaste.

What does the sales team say is so special about Bright Smile Toothpaste?

What tests can you do?

You might want to use some of the tests from Making Toothpaste.

How many brands will you use?

What will you observe or measure in each of your tests?

Don't forget to include the results from the Bright Smile Toothpaste that you made.

Getting started

Some other investigators have come up with a few ideas to get you started.

I think we should use some of the investigations that we carried out when we made our own toothpaste.

I think we could find out how much foam the toothpastes produce. Some people may not like too much foam.

We could find out if using different amounts of toothpaste makes a difference.

Now carry out a survey to find out which toothpastes your friends and family prefer.

How many people will you ask?

What do you want to find out?

Here are some questions some fellow investigators are going to ask people about toothpastes.

Do you like the smell of any of these toothpastes?

Do you like the colour of any of these toothpastes?

Do you use one of these toothpastes? If so, why do you use that one? Do you use a different toothpaste from these? Why do you use that one?

Can you think of any more questions to ask?

Test your ideas

Which toothpastes performed well in your tests?

How do they compare to the toothpaste that you made?

Do you think any of the toothpastes could be improved in any way? Why do you think this?

You might like to record your results using a tally like this:

No. of votes	Toothpaste 1	Toothpaste 2	Toothpaste 3
for favourite smell			
for favourite colour			
for favourite taste			

Share your ideas

When you have finished the survey you can:

- Make a block graph to show what people think
- Use the results from your tests to find out if people's favourite toothpastes are good at cleaning teeth
- Decide if one of the toothpastes is better than the others



SUPERSTAR

Camouflaged Creatures

Organiser's Card



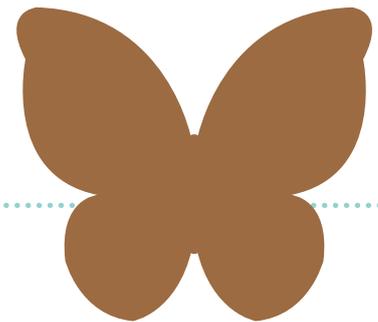
About the activity

This activity is designed to get children thinking about trees, and the life that trees support, and begin to be aware of the differences between trees.

The children have been asked to look at camouflage. Corina isn't sure how animals manage to do it.

Through this activity you will support your group to:

- Think about the different types of camouflage that animals use
- Test different camouflage patterns against different backgrounds
- Present their findings to the rest of the group



Kit list

For each group:

- Butterfly shapes cut out of brown or grey paper (sugar paper or wrapping paper is fine)
- 15 cm pieces of white string or pipe cleaners
- Crayons, pencils and/or felt tip pens, scissors, Blu-Tack

Objects to 'hide':

- A piece of brightly coloured wool or pipe cleaner
- Plastic animals in their natural colours
- Something cut out of a magazine page – their choice
- A square white sheet of paper (6 cm x 6 cm approx) and some patterned wrapping paper. You or the children can add other objects.

What to do

1. Introduce the activity using the email.
2. Give out activity cards to the children. You could show a couple of pictures of camouflaged creatures.
3. Explain that they will be exploring how animals use camouflage. Give the children the brown/grey butterfly shape and the piece of string. Give them time to discuss and explore camouflage by trying to work out how they might 'hide' the butterflies.
4. Encourage children to discuss their ideas and how to carry out their investigations.
5. Support children to conduct their investigation and make their own records of their results. Now the children can have the set of objects. You will need to tell the children that one of the camouflage challenges is to hide the white piece of paper on top of the wrapping paper. After they have played the game allow time to talk about which things were the hardest to see and why.
6. Ask the children to present their findings to the rest of the group, they can be as creative in their presentation as they want.

Things to think about

Remind the children that the challenge is NOT about hiding objects underneath things.

Let them choose how to 'hide' the objects even if you think that there are better ways of doing it.

Children may want to cut the white square of paper into an irregular shape as well as colouring it. The children may realise that not having a straight edge is helpful.

Keywords

- Animals
- Camouflage
- Patterns

Watch out!

There are few safety issues in this activity apart from stopping children climbing to 'hide' their objects.

Find out more

Animals, such as big cats, have spots or stripes to blend with their surroundings. Zebras' stripes make it difficult for a predator to know where one animal ends and the other begins.

Polar bears and other animals that spend a lot of time in snow often have fur to match. Some animals even have a brown coat for summer and a white coat for winter (e.g. stoat).

Some animals have special skin that can change colour. Chameleons are the most famous of these.

Other animals, such as stick insects, leaf insects and some moths, are shaped like twigs or leaves.

Female animals are sometimes better camouflaged than the males (e.g. pheasant). This is so that they are not seen when sitting on the nest or looking after young.

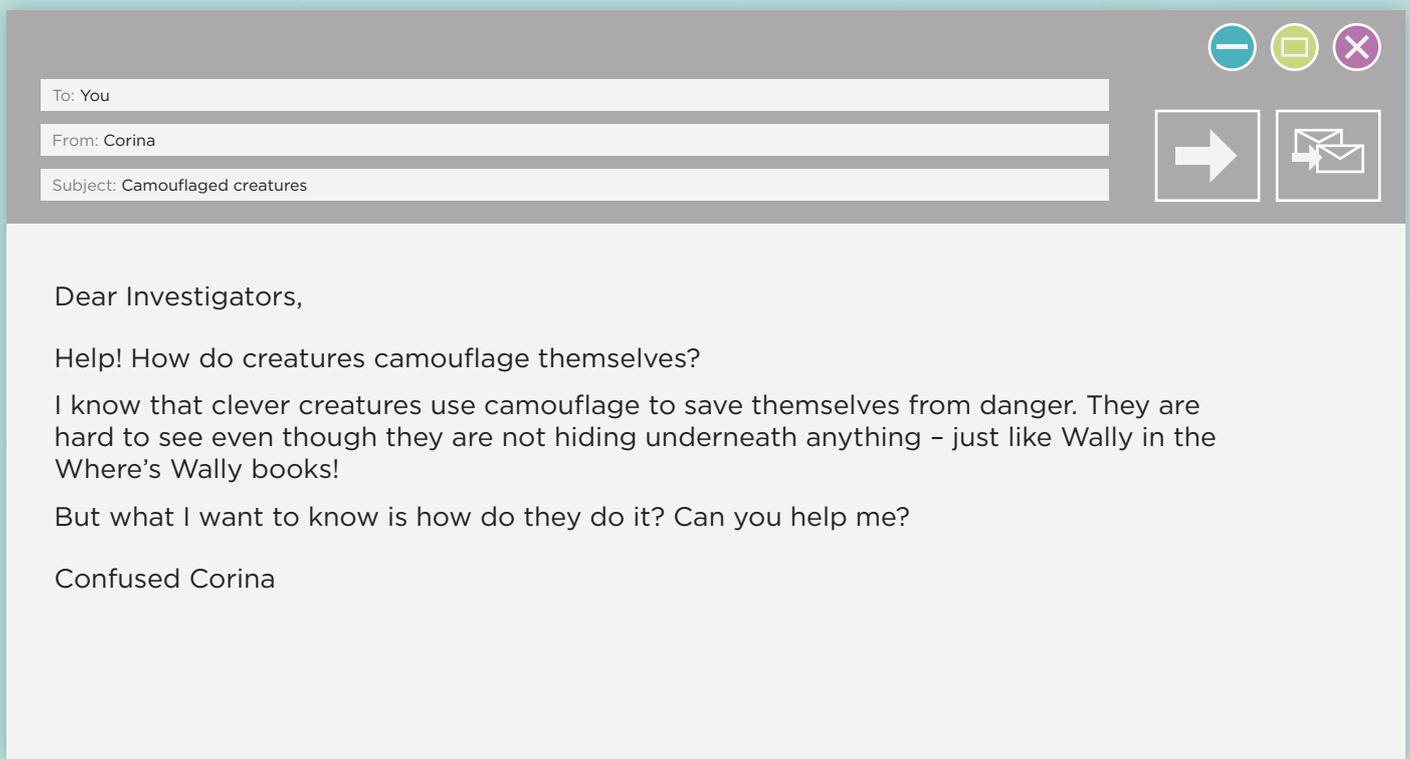




SUPERSTAR

Camouflaged Creatures

Activity Card



Your challenge

Help Corina to find out how different creatures are camouflaged by playing the Clever Camouflage Game.

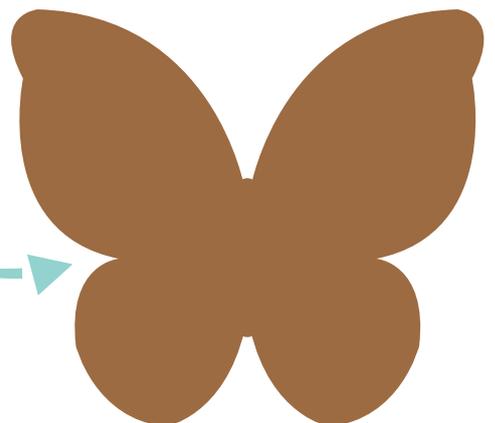
Discuss

You need a brown or grey butterfly shape and a piece of white string so that you can start exploring your ideas. Try putting each of them in different places.

Where are they difficult to see? Why do you think that is?

Where can they be seen very easily? Why do you think that is?

Can you do other things to help to camouflage them?



Getting started

Some animals, such as snakes, use patterns to hide. Others, like stick insects, use their shape to try to stay hidden. There are other ways of camouflaging as well. What if you change the colour of things? What about their shape? Can you see a pattern that might help? Are some places better than others?

Let's play the camouflage game:

You have things to hide but you are not allowed to cover them up. You don't have very much time. Where will it be best to hide them? Will anyone be able to find them?



Test your ideas

What were the best camouflage patterns? You could record your results in a table like this one:

	How well hidden was this pattern?
Stripes	
No pattern	
Spots	

Share your ideas

You could take photographs to send to Corina. You could make a poster showing creatures using different types of camouflage.

Extra things to do

Find out more about creatures that use camouflage and why. Find out why some female animals are better camouflaged than males.





SUPERSTAR

Cheesy Challenge

Organiser's Card



About the activity

This activity is designed to get children thinking about how milk is changed into cheese. Cosmic and Gem are confused about how milk turns into cheese. Can the children make their own cheese?

Through this activity you will support your group to:

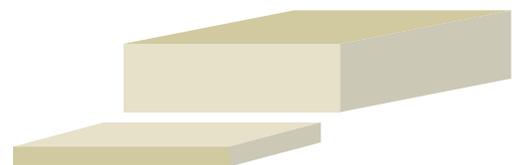
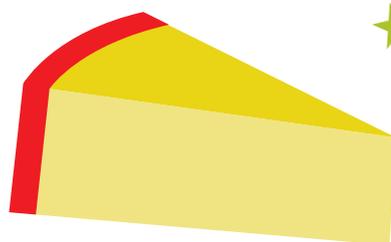
- Think about what they already know about cheese
- Make their own cheese
- Research other milk products

Kit list

- A cup of semi skimmed or skimmed milk each
- Lemon juice (or vinegar)
- A spoon, a bowl (for heating in the microwave) or a small pan (for heating on the cooker)
- A sieve, a bowl and a piece of very clean, thin cloth to strain the milk
- Salt
- Other flavourings (optional)

What to do

1. Introduce the activity using the story.
2. Give out activity cards and equipment to the children.
3. Explain that they will be making their own cheese today.
4. Encourage children to discuss their ideas and how cheese is made.
5. Support children to follow the cheese recipe on the activity card and make their own records of their results.
6. Ask the children to present their findings to the rest of the group, they can be as creative in their presentation as they want.



Things to think about

Skimmed milk works well for this activity. The fat, which is used to make other milk products such as cream, is not needed to make cheese.

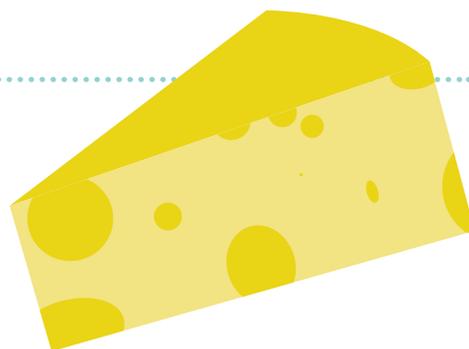
If you leave the cheese for a while to let more of the liquid drain out you will get a slightly firmer cheese.

The liquid (whey), which is left over after making the cheese, can be used in recipes to make food such as bread, soup and cakes.

Lots of children may be dairy or lactose intolerant. As with previous activities, you could encourage them to find out what happens if they use alternative.

Keywords

- Milk
- Curdling
- Cheese
- State
- Reversible changes
- Irreversible changes



Watch out!

The milk needs to be heated. This must be done with adult supervision. Cover tables with clean paper cloths. The cheese can be eaten if everything has been kept clean. Do not eat the cheese unless it is fresh.





SUPERSTAR

Cheesy Challenge

Activity Card

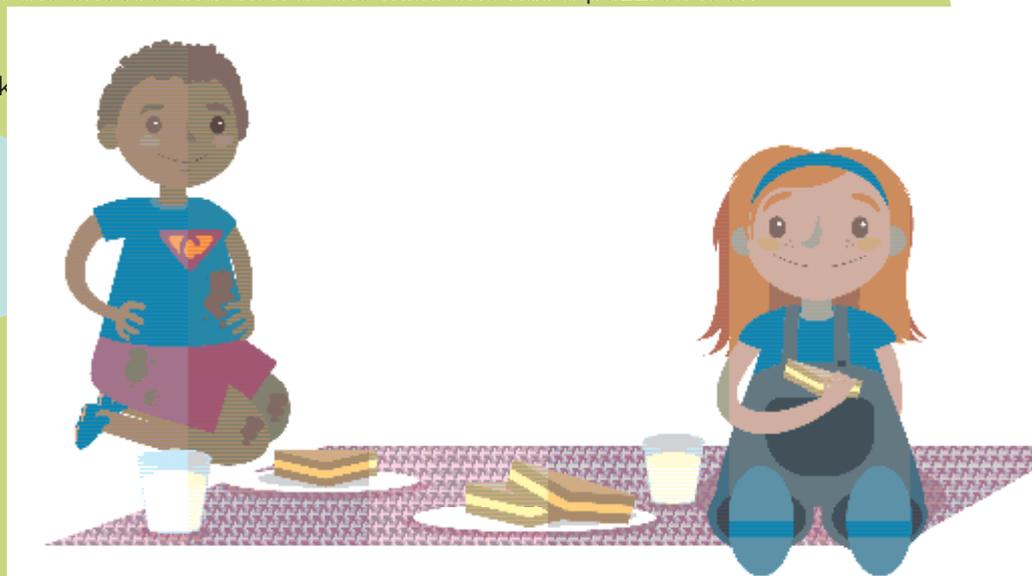
Cosmic and Gem are having a picnic. They are tucking into glasses of cool milk and tasty cheese sandwiches.

“Isn’t it amazing that they can turn a white runny liquid into cheese?” Cosmic wonders out loud.

Gem stops chewing and looks at the cheese and then at the milk. She has a puzzled look on her face.

“How do they do that?” Gem asks.

“It’s fascinating! We need to do some investigating. I think a little bit of chemistry might help.”



Your challenge

Can you help Cosmic and Gem find out how milk is turned into cheese?

Discuss

Take a look at some cheese and milk. Talk about what you already know about it.



Getting started

Cheese Recipe

Ingredients

A cup of semi skimmed or skimmed milk

Lemon juice

A spoon, a bowl (for heating in the microwave) or a small pan (for heating on the cooker)

A sieve, a bowl and a piece of very clean, thin cloth to strain the milk

Salt and other flavourings (optional)

Clean hands, equipment and table

Method

1. Pour 1 cup of milk into a bowl or small pan. Heat it in the microwave or on the cooker until the milk just begins to boil. If it is on the cooker, keep stirring to stop it burning.
2. Remove from the heat. Add lemon juice a few drops at a time and keep stirring gently.
3. Keeping adding lemon juice until the milk starts to go very lumpy (curdle). Let it cool.
4. Put a sieve on top of a bowl and put a cloth in the sieve.
5. Pour the milk into the sieve and let all the liquid (the whey) run through into the bowl. The lumps (called curds) will stay in the cloth.
6. Lift up the cloth and gently squeeze out more of the liquid.

You have now made some cheese!

Add a little salt and any other flavours that you like.

Test your ideas

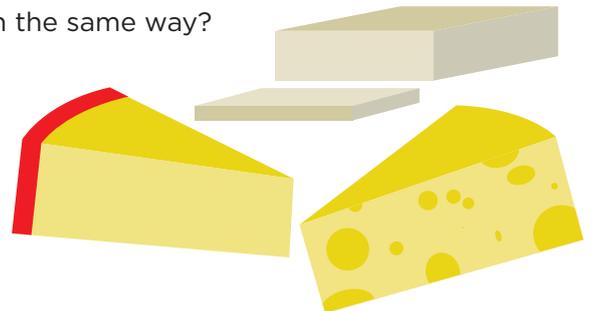
Is cheese only made from cow's milk?

What different types of cheese are there? Are they all made in the same way?

Do people eat cheese everywhere around the world?

When was cheese first made?

Can the whey be used for anything?



Share your ideas

What kind of cheese have you made?

Does it look like any of the cheese that you buy in the shops?

What does it taste like?

Make a poster showing how a little chemistry helps to turn milk into cheese. Put it on display.

Extra things to do

Here are some other milk products. Can you find out how they are made and what they are used for? Not all milk comes from animals. Can you spot which ones do not and find out more about them?

Yoghurt

Lassi

Cream

Butter

Condensed milk

Kaymak

Sour cream

Ghee

Smetana

Clotted cream

Creme fraiche

Buttermilk



SUPERSTAR

Colorado Brown Stain

Organiser's Card



About the activity

This activity is designed to get children discussing and debating the use of fluoride in drinking water. This is designed to be a challenging, research-based activity where children use real data in a realistic context.

The children have been given the story of the Colorado Brown Stain the dentist who discovered the benefits of fluoride for teeth. They must weigh up whether they would put fluoride in the water.

Through this activity you will support your group to:

- Look at a piece of genuine scientific research
- Think about an authentic scientific problem
- Recognise that there is often more than one view about the application of scientific research
- Sort ideas and draw conclusions.



Kit list

- Copies of the **ACTIVITY CARD** to cut up and sort peoples' opinions
- Scissors, glue sticks, sugar paper and pens
- Access to the internet
- Access to books about teeth

What to do

1. Introduce the activity using the diary of Dr. Frederick McKay.
2. Give out activity cards to the children.
3. Explain that they will be exploring the different arguments about putting fluoride in drinking water. Help the children to identify what the problem is.
4. Encourage children to talk together while they sort out the statements. Give extra support if you feel that children need it.
5. Support children to conduct extra research and to record this.
6. Ask the children to present their findings to the rest of the group, they can be as creative in their presentation as they want. If children want to write a script for a TV programme they may need some support to decide how to do this.

Things to think about

Some children may find it difficult to understand that people may have very different ideas about putting fluoride in water. You may need to explain to them that people sometimes exaggerate things to get their view across.

Children will probably need to be reminded that there can be more than one view about the application of scientific research. Support whatever conclusion they come to, provided that they can justify their ideas.



Keywords

- Fluoride
- Opinions
- Additives
- Water





SUPERSTAR

Colorado Brown Stain

Activity Card

The Diary of Dr Frederick McKay

May 1901 As a dentist in Colorado Springs, I am puzzled by the number of patients whose teeth are stained with brown spots – often as dark as chocolate. I call it 'Colorado Brown Stain'. Nobody knows what is causing the stain. It is worse in patients who have lived here all of their lives. I wonder what it might be?

September 1908 We have begun the first ever investigation of this strange stain. We are visiting every school in Colorado Springs and looking at the teeth of every child. We are making careful notes and asking every parent detailed questions.

December 1909 We have inspected 2,945 children. 90% have some brown stain; and all of these children were born in the Pikes Peak region of Colorado Springs. It's astounding! These children have less tooth decay. I wonder if there is a link between the brown stain and very strong teeth?

January 1931 I now have the results of tests on drinking water from several towns affected by brown stains. They all have high levels of the chemical called fluoride. This is unheard of! As the water from rain or snow trickles down the rocks in these areas, it must be picking up the fluoride naturally. Is this the solution to all my years of research? I wonder what would happen if we added fluoride to the drinking water for everyone? We would have to get the amount of fluoride just right so that we do not cause more of the brown stain!



Your challenge

Should your water company put fluoride in the drinking water?

Discuss

Have you heard of fluoride before?

What do you think about Dr Frederick McKay's idea?



Getting started

To help you to decide, we have found out what 16 people think. Why not sort these into ideas for and against putting fluoride in drinking water? You could cut them out and stick them in two columns.

Cut around the dashed lines on the speech bubbles.



Some people are allergic to fluoride and will have to buy expensive bottled water.

Different people drink different amounts of water. Some will get more fluoride than others.

It costs thousands of pounds to add fluoride to water.

Adding fluoride to water is one of the greatest ways to improve health.

We save thousands of pounds in dental care by adding fluoride to water.

More than 150 million Americans and 6 million people in Great Britain drink water with fluoride in it. We would have known about it if there was a problem. Adding fluoride to water is one of the greatest ways to improve health.

Some studies show that fluoride in water can cause health problems, including lower intelligence levels in children.

A study in America of almost 30,000 school children, born after fluoride was added to their water, showed that tooth decay had dropped more than 60%.

Fluoride is safe, if used correctly. Cough mixture and salt are poisonous in large amounts. No-one is worried about that!

There is fluoride in toothpaste so why put it in water?

Many people in poor areas cannot afford toothpaste but their teeth will still be strong if there is fluoride in their drinking water.

One study showed that elderly people living in areas with fluoride added to water had fewer bone problems.

There's no real proof that fluoride is harmful. Most studies are unreliable and have found no difference between cities with fluoride in the water and those without.

Test your ideas

Now you have looked at some evidence, do you think fluoride should be added to the water?

What would you recommend to your water company?

Share your ideas

You could make some notes about your ideas. It would be fun to use what you have found out to write a script for a TV programme where people argue from different points of view about adding fluoride to water. You could act it out for your friends.

It is impossible to control how much fluoride people get.

Fluoride is used to strengthen and protect teeth - that's why we must add it to drinking water.

Scientists and politicians say that adding fluoride to water is completely safe. It is impossible to add too much fluoride to the water.

Extra things to do

- Find out more about Dr McKay's research after 1931
- Look for information about adding fluoride to toothpaste and water
- Contact a local water board to find out what they do



SUPERSTAR

Crafty Rafts

Organiser's Card



About the activity

This activity is designed to get children designing and making a raft that floats.

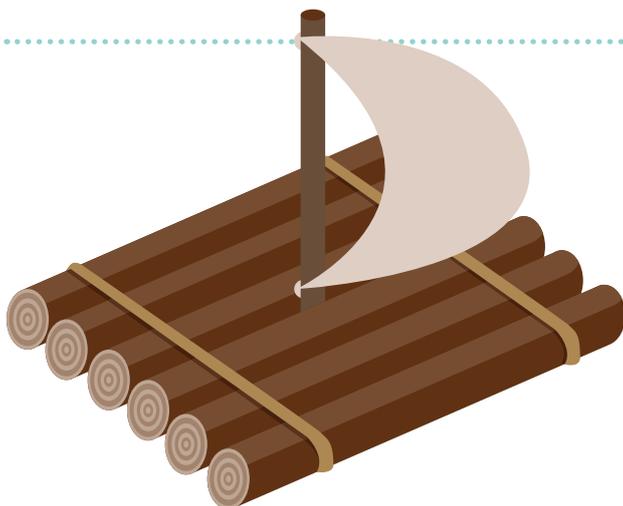
The children have been asked to design a raft. The Cub Scouts and Brownies of Startown are having a problem making a raft that floats.

Through this activity you will support your group to:

- Design and make a model raft using just a piece of paper
- Conduct a fair test to see which raft design can hold the most weight
- Record and present their results.

Kit list

- Plastic tanks or bowls of water – 1 per group
- A square sheet of paper (20 cm x 20 cm) or A4 – 6 per group plus spare sheets
- Foil (optional as an alternative to paper)
- A set of marbles all the same size – 30 per group plus lots of spares
- Sellotape, masking tape, staplers, or other fasteners – provide the same for each group
- Waterproof coverings if you are working on wooden desks



What to do

1. Introduce the activity using the story.
2. Give out activity cards and equipment to the children.
3. Explain that they will be designing and making rafts, and testing how much weight they can carry before sinking.
4. Encourage children to discuss their ideas and how to carry out their investigations. Give each group access to sheets of paper or foil. Remind them they can only use one piece at a time. Challenge groups to make several rafts of different shapes and sizes. They can do this by folding the paper or foil and securing the corners. Give children time to discuss which shapes might work and to practise ways of folding the paper to make different rafts.
5. Support children to conduct their investigation and make their own records of their results. Set them off on the challenge to build a raft able to hold the largest number of objects before it sinks. They can float their rafts in a container of water and add cubes or marbles until the rafts sink. The raft that carries the greatest number of objects will be the winner.
6. Ask the children to present their findings to the rest of the group, they can be as creative in their presentation as they want.

Things to think about

Make sure that the water is deep enough for the loaded rafts to float and not touch the bottom.

It's best if children use one sheet of paper at a time and are left to experiment with their own raft shapes.

Some children may add the objects to the raft too quickly or unevenly. Let them experiment on their own. They learn more when it goes wrong.

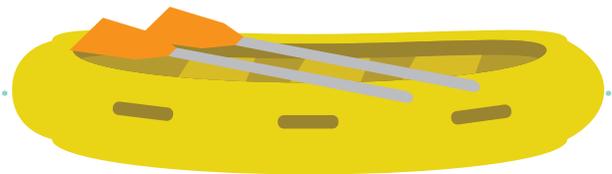
The children will need to agree on how they will know when a raft has officially sunk. This could be when it sinks below the water line or when it lands on the bottom of the container.

An object that is normally unable to float can be made to float by changing its shape. Different shapes will float in different ways. You will find a wide flat raft is very stable when it floats but can tip if it is loaded on one side. If the children are investigating carefully, the best raft is likely to be one with a large base and with sides approximately 1.5 cms deep.

A good raft will hold a surprisingly large number of objects.

Keywords

- Floating
- Buoyancy
- Paper
- Building
- Weights



Watch out!

Mop up water spills quickly and collect escaped marbles to avoid accidents.



SUPERSTAR

Crafty Rafts Activity Card



Your challenge

Can you help them to decide the best design for a raft?

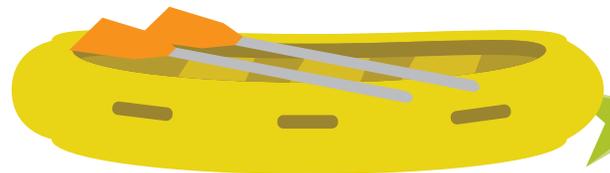
You can make models out of paper. What shape of raft will hold the largest number of objects before it sinks? **You can only use one sheet of paper at a time.**

Discuss

What do you know about rafts?

Have you ever made one?

What shapes do you think might make good rafts?



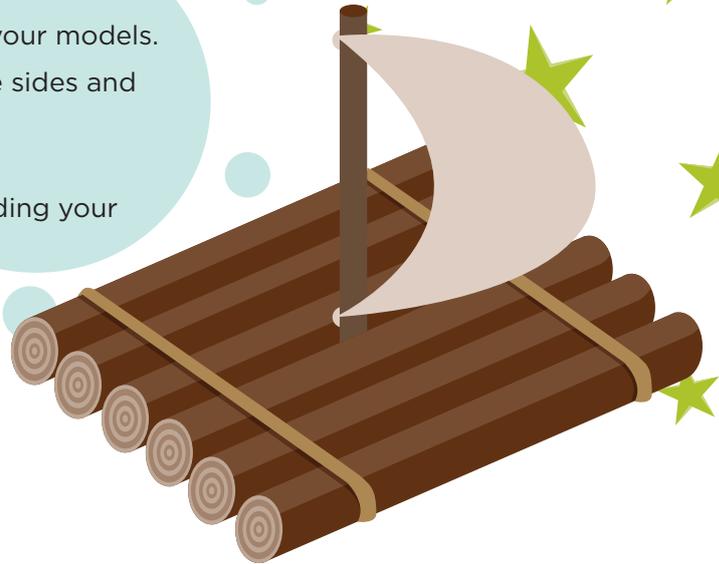
Getting started

You can use sheets of squared or A4 paper to make your models.

You can make the paper into a raft by bending up the sides and folding the corners.

Fasten the corners. Don't cut your paper.

What different shapes and sizes can you make by folding your pieces of paper in different ways?



Test your ideas

Put your raft to the test!

See which shape holds the most objects without sinking. What's the best way to add the objects? Which raft do you think will win and why?

You could record your results in a table like this:

	Picture/ description of raft	Maximum number of marbles before sinking
Raft 1		
Raft 2		
Raft 3		

Share your ideas

You could make a model of your best raft to send to Natty Nodrum.

Extra things to do

Would it matter if you use different types of paper?

Could you make the raft without fasteners?

What other materials can you use to make a raft?





SUPERSTAR

Disappearing Dinosaurs

Organiser's Card



About the activity

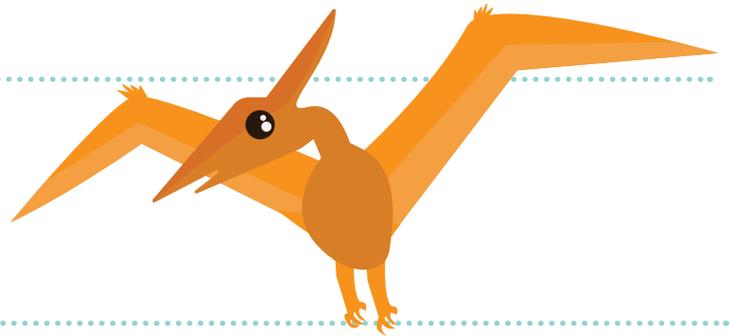
This activity is designed to get children researching and debating the extinction of the dinosaurs. The children have been given a poem about dinosaurs, can they find out why they are now extinct?

Through this activity you will support your group to:

- Carry out research into dinosaur extinction theories
- Evaluate different theories
- Plan a dino debate about dinosaur extinction.

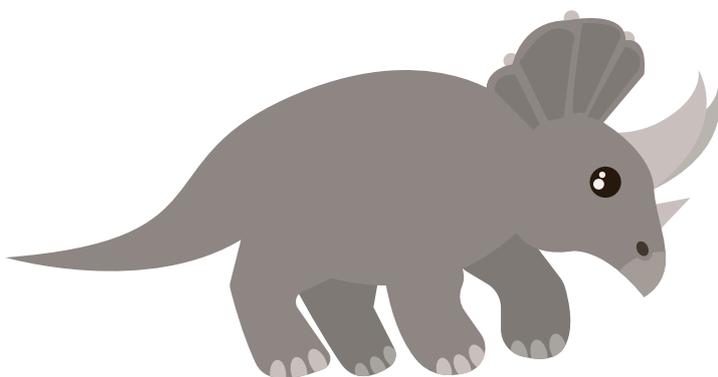
Kit list

- Access to the internet and/or books
- Pens and paper



What to do

1. Introduce the activity using the poem
2. Give out activity cards to the children.
3. Explain that they will be researching the extinction of the dinosaurs and planning a class debate.
4. Encourage children to discuss their ideas and how to carry out their investigations. Encourage speculation. Children may have their own ideas about dinosaur extinction.
5. Support children to conduct their investigation and make their own records of their results. Remind children that they need evidence to support a scientific theory.
6. Ask the children to present their findings to the rest of the group, they can be as creative in their presentation as they want.



Things to think about

Scientists are still arguing about this question. They still don't all agree. Children can consider whether it was a combination of factors that was bad luck for the dinosaurs.

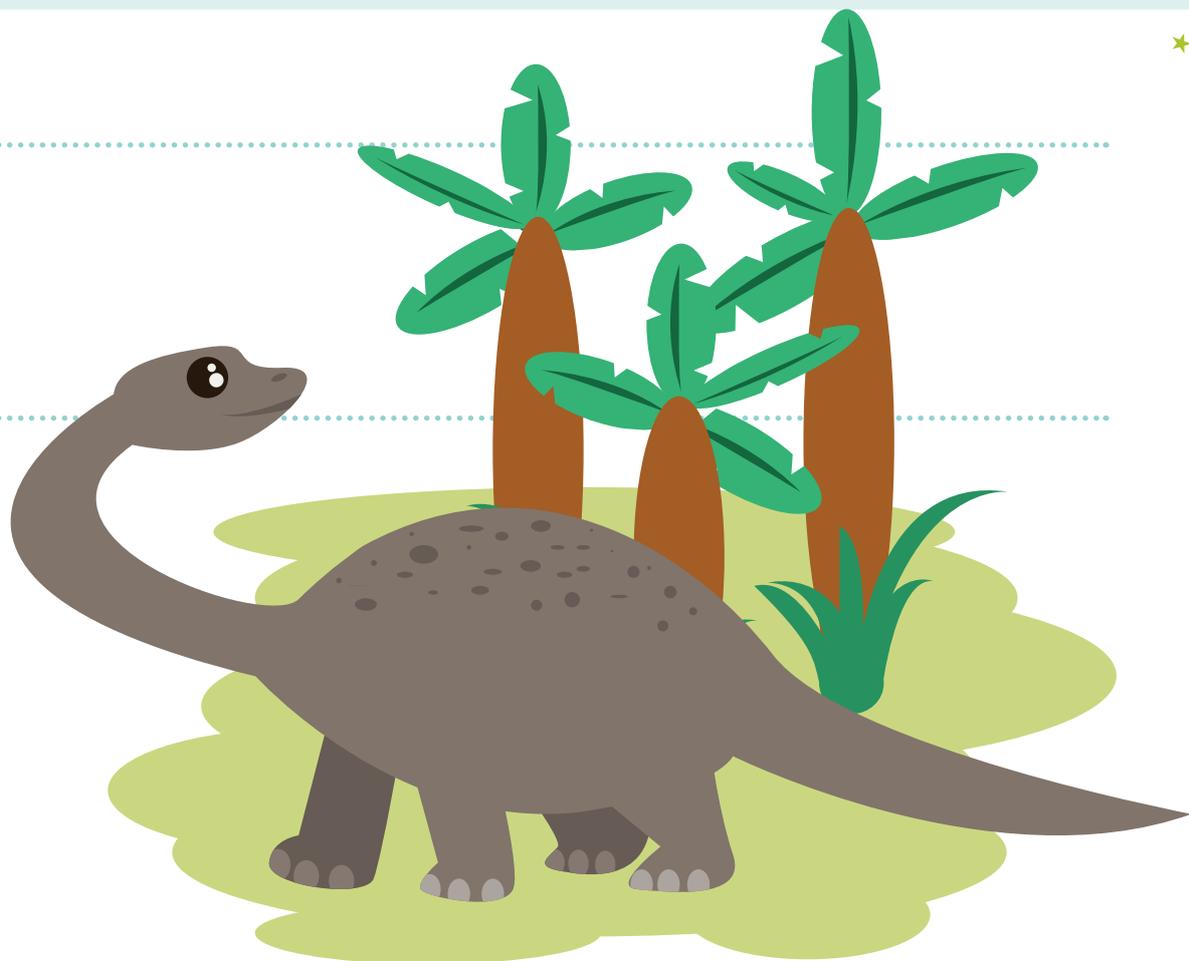
Prompt questions might include:

Not every prehistoric creature died. Why did some creatures survive, including frogs, crocodiles and some mammals?

Many scientists think birds are descended from dinosaurs. What evidence is there?

Keywords

- Dinosaurs
- Extinction
- Theories
- Asteroid
- Prehistoric





SUPERSTAR

Disappearing Dinosaurs Activity Card

This is Dina Digg's favourite dinosaur poem. She loves a mystery, and this is a big one!

Triceratops has one short horn,
and two as long as spears.

It dwelled near scores of carnosaur,
and yet it had no fears.

Triceratops was dangerous,
impervious and strong.

The predators that challenged it
did not last very long.

Triceratops fought valiantly, and vanquished every foe.
So why it ever disappeared nobody seems to know.

Poem from *Tyrannosaurus Was a Beast: Dinosaur* by Jack Prelutsky.



Your challenge

Dinosaurs roamed the earth for 165 million years, but 65 million years ago they all became extinct. What happened to them? Why did they die out?

Plan a dino debate to discuss the different extinction theories.

Discuss

People have been arguing for years about what happened to the dinosaurs. Dina Digg has been collecting their ideas. Here are some of them.

A massive asteroid hit the earth!

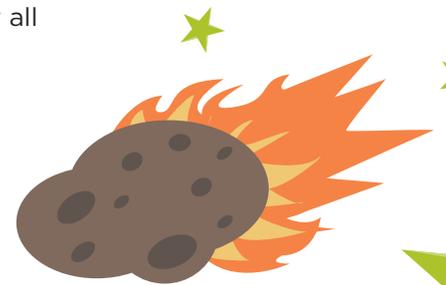
There was an ice age.

The climate changed. It got cooler and drier.

Huge volcanoes erupted.

Disease wiped them all out.

Aliens invaded from another planet and killed them all.



Getting started

Make a flyer advertising the discussion.

What will you call it?

'Who Dunnit to the Dinos?' 'Dinosaur Doomsday?' or something else?

Include some information about each extinction theory.

Make sure it sounds like a lively, interesting debate!

Are there any dinosaur books in the library? Can you find out any interesting information on the internet?

You could record your research in a grid like this one, with reasons for and against each theory.



	For	Against
Asteroid hit the earth		
Ice age		
Volcanoes erupted		
Climate changed		
Disease wiped them out		
Aliens invaded		

Test your ideas

What scientific evidence is there to back up each theory?

Why would each theory have led to the death of the dinos?

What more do you need to know?

Can you uncover any other theories?

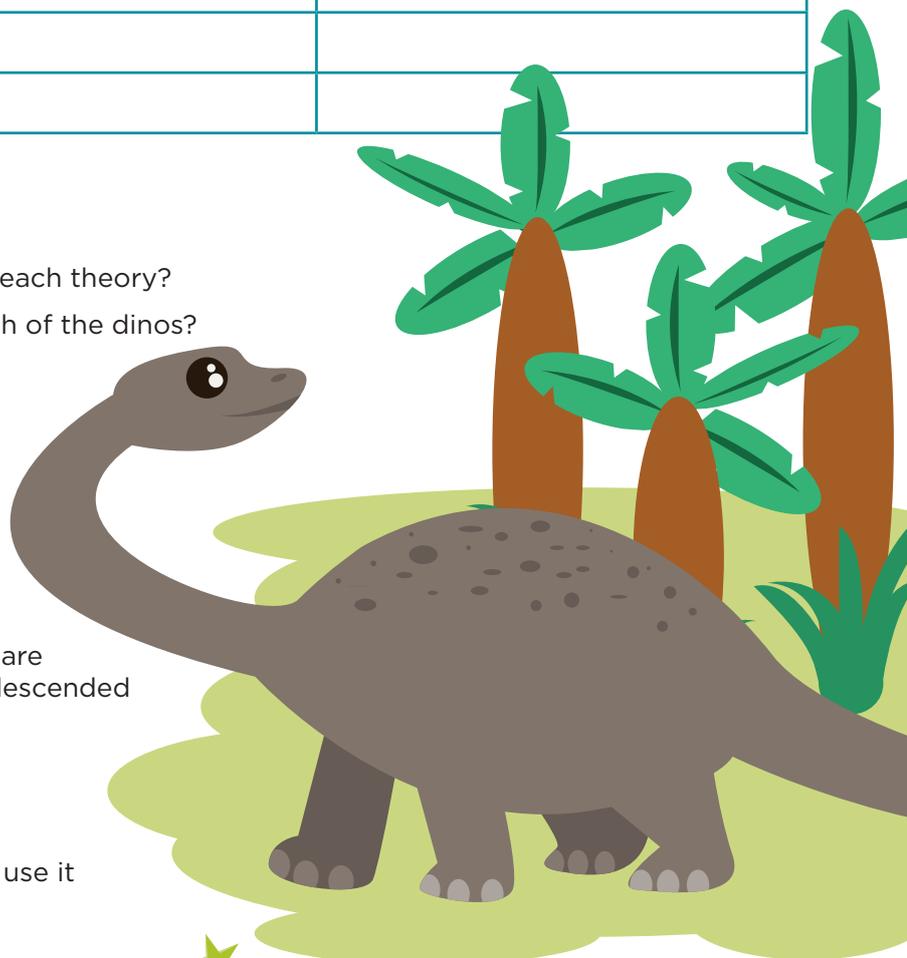
Maybe it was a combination of factors that meant bad luck for the dinosaurs.

Not every creature died. Why did some creatures including frogs, crocodiles and some mammals survive?

Did any dinosaurs evolve into creatures that are alive today? Many scientists think birds are descended from dinosaurs. What evidence is there?

Share your ideas

Why not present your poster to the class, or use it as a wall display?





SUPERSTAR

Discus Dilemma

Organiser's Card



About the activity

This activity is designed to get children designing and making a discus

Startown Primary School's caretaker thinks, he's seen a UFO. When Miss Terry comes to investigate she sees it's actually a discus.

Through this activity you will support your group to:

- Design and make a model discus
- Test and compare their discus models
- Record and present their results.



Kit list

- Single discus to investigate if available or photographs
- Modelling equipment including a selection of paper, plastic, polystyrene plates plus card and tape
- Stuffing materials to add weight such as bubble wrap, cotton wool, thick card, modelling material, tightly sealed bags of water
- Something to mark a throwing line, tape measure plus cones or similar to mark where each discus lands (optional)

What to do

1. Introduce the activity using the story. Ask them if they know what a discus is. You could show a real discus or photos or a video of one being thrown.
2. Give out activity cards and equipment to the children.
3. Explain that they will be designing and making their own discus, and testing them to see which model works best.
4. Support children to design and build their model. When making their discuses, encourage the children to think about size, shape, weight and if the material is safe to use.
5. Support the children to design and carry out a test and to make their own records of their results. Involve the children in deciding how to carry out safe tests. You are likely to need a starting line to throw from and a way to mark each throw. Encourage children to talk about how each discus performed. Why did some fly further than others? Give children the opportunity to think of safe ways to alter their designs and test again. Have they improved?
6. Ask the children to present their findings to the rest of the group, they can be as creative in their presentation as they want.

Things to think about

Talk to the children about how to make fair comparisons between their discs. How many throws is each person allowed with their discus? Could they work out the length of an average throw?

Paper plate discuses are light and will not throw very far. It is useful to let children find this out for themselves. Using the stuffing materials suggested will help to add weight.

Keywords

- Discus
- Weight
- Shapes
- Sport

Watch out

A discus can be heavy. Make sure everyone stands well behind the throwing line and care is taken when throwing.

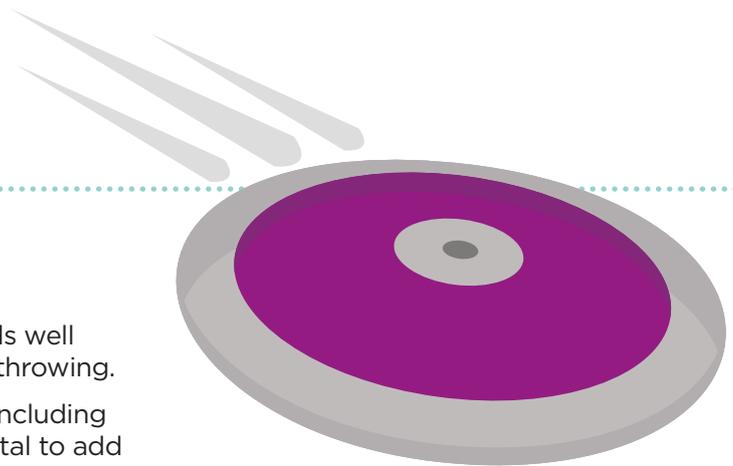
Encourage children to think about safe designs, including not using dangerous items such as stone and metal to add weight and avoiding sharp edges.

Futher info

The discus first emerged as a competitive sport in ancient Greece around 700 BC. Traditionally discuses were made from lead, bronze, iron or stone. Now discuses are made from metal or rubber. Men use discuses that weigh 2kg. Women use discuses that weigh 1kg.

A discus is shaped like an aeroplane wing. This means it travels further if you throw it into the wind, unlike a ball or javelin. The shape of a discus makes it spin as it is thrown. When a discus spins quickly it flies smoothly through the air and travels further.

The world record for the Men's Discus is over 74 metres. The female world record is over 76. Mark this out so that children can see how far this is and compare their throws.





SUPERSTAR

Discus Dilemma

Activity Card

Mr Cleanup, Startown Primary School's caretaker, is very excited.

He thinks that a tiny UFO has landed on the playground.

Local detective, Miss Terry, has come to investigate. "It's not a spaceship," she tells an embarrassed Mr Cleanup, "it's a discus!"

Now the children want a discus-throwing competition, but they've only one discus.

Can you help?



Your challenge

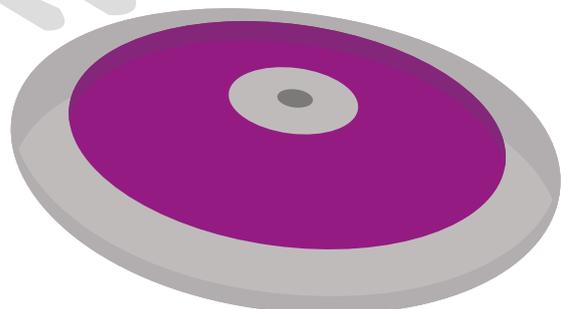
Design and make a discus to be used in the competition.

Discuss

Have you seen a discus before?

Why do you think it's shaped like that?

What might make a good discus?



Getting started

Think about the shape of a discus.

How can you use the materials to make a discus?

You can make more than one discus to try out different designs.

Test your ideas

How will you decide which is the best discus?

What is the best way to throw your discus?

What makes a difference to how the discus flies?

You could record your results in a table like this one:

	Distance travelled
Discus #1	
Discus #2	
Discus #3	

Share your ideas

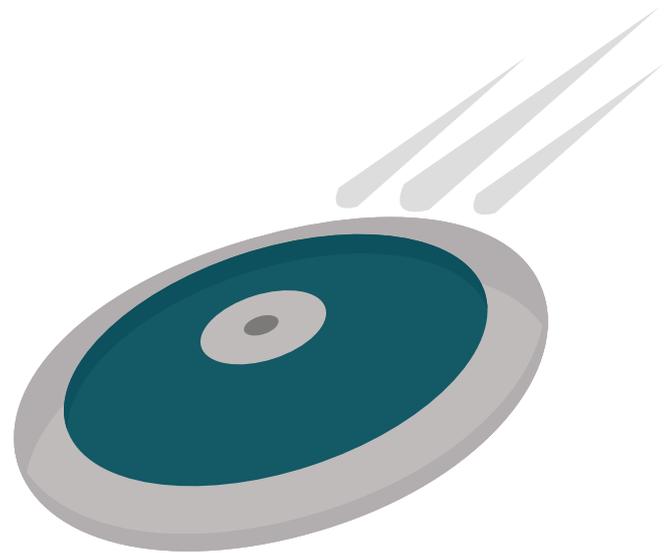
You can create a labelled design for your discus or write a report for the Star Town News about what happened during your discus-throwing competition.

Extra things to do

Find out what materials are used to make a real discus.

What is the furthest an athlete has thrown a discus?

How long ago was the first discus-throwing competition?





SUPERSTAR

Drifting Dandelions

Organiser's Card



About the activity

This activity is designed to get children thinking and discussing seed dispersion.

The school caretaker at Startown Fields Primary School has pulled up all the dandelions so now class 6 has no food for their pet rabbits, is Mrs Teachem right that they will always come back?

Through this activity you will support your group to:

- Find out about how dandelions spread their seeds
- Discuss the different factors that influence how seeds spread
- Record and present their findings

Kit list

- Dandelion seed heads
- Metre rule, string, tape measures
- Magnifying glasses
- Camera
- Wind meter (anemometer) or wind sock if available
- Art equipment (if making models)
- Scissors

What to do

1. Introduce the activity using the poster. Ask them if they have seen dandelion seeds, what do they look like?
2. Give out activity cards and equipment to the children.
3. Explain that they will be investigating how dandelions spread their seeds.
4. Give each group a dandelion seed head. Encourage the children to look closely at the seeds. Let the children decide how they might measure the spread of the seeds. They may have their own ideas. Let them try these out.
5. Check that the children have thought about how they are going to measure the distance the seed travels. They could use metre rules, tape measures or marks on paper around the plants. If you have the right equipment available, they could record wind direction and speed.
6. Go outside and start by making a record of where the dandelions are growing.
7. Ask the children to present their findings to the rest of the group, they can be as creative in their presentation as they want. Children could record the event through a display of their photographs, by making a model or by writing a letter to Class 6.

Things to think about

Dandelions generally produce seeds from late spring onwards. You may also find seeds in autumn.

On fairly still days you can see the spread of seeds by catching them on paper around the plant.

On breezy days the seeds can travel some distance. You can use a tape measure to find out how far.

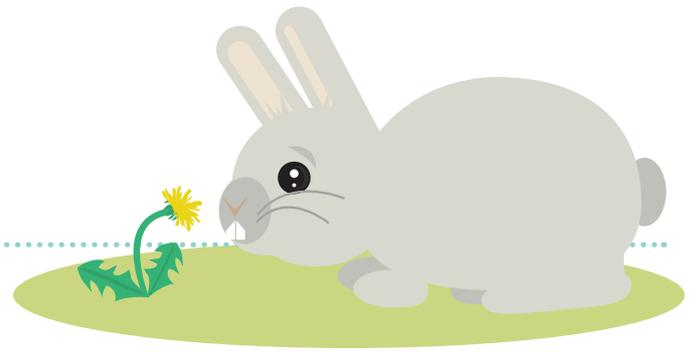
On very windy days the seeds might travel too far to measure.

It may be easier to release one seed at a time and record where it goes.



Keywords

- Seed
- Germination
- Pollination
- Plants
- Dispersion



Watch out!

The milk needs to be heated. This must be done with adult supervision. Cover tables with clean paper cloths. The cheese can be eaten if everything has been kept clean. Do not eat the cheese unless it is fresh.

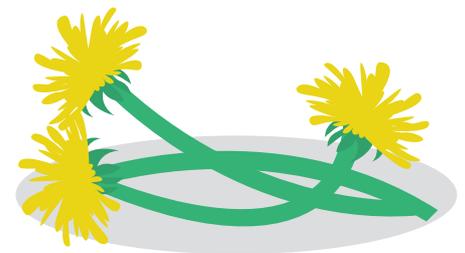
Find out more

Dandelion seeds are 'parachute' shaped and are spread (dispersed) by the wind. Seeds can travel up to 500 metres on very windy days. They produce many seeds that germinate (start to grow) easily. One flower can produce 400 seeds but the average is about 180. One plant can produce up to 12,000 seeds!

Dandelions can also grow from bits of the root if the roots are left in the ground. They are a very difficult plant to control.

Dandelion plants are used around the world for different things:

- Flowers are used to make wine.
- Leaves are eaten cooked or uncooked (they contain more vitamin A than carrots).
- Roots are roasted or brewed as a drink (e.g. dandelion and burdock).



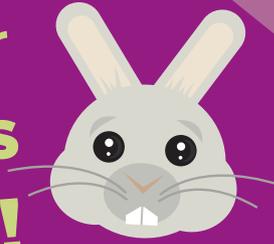


SUPERSTAR

Drifting Dandelions

Activity Card

Help our
**Ravenous
Rabbits!**



We had lots of dandelions around our school but Mr Cleanup, the caretaker has dug them all up!

Now we don't have any dandelions to give to our pet rabbits. Mrs Teachem, our headteacher, said that dandelions always come back.

Do you think she's right?

Class 6



Your challenge

Help Class 6 to find out how dandelions spread their seeds and how they might help dandelions to come back to their school.

Discuss

Look closely at dandelion seed heads using magnifying glasses.

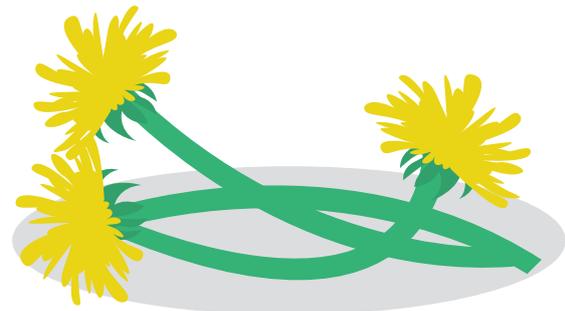
Where are the seeds?

What are they attached to?

People sometimes call them parachutes. Why do you think that is?

How far do you think the seeds from one flower can spread?

How will you find out?



Getting started

Find all the places where dandelions are growing nearby.

Do they grow everywhere?

How do seeds help them to spread?

How do the seeds travel from one place to another?

How far do they go?

How will you record where they travel?

You could try blowing at a dandelion head or holding it in the wind.

Test your ideas

Start investigating dandelions. Were your answers to the questions right?

Share your ideas

You could share photographs of dandelion investigations.

Can you make a big model of a dandelion seed?

Write a letter to Class 6 explaining how dandelions might come back.

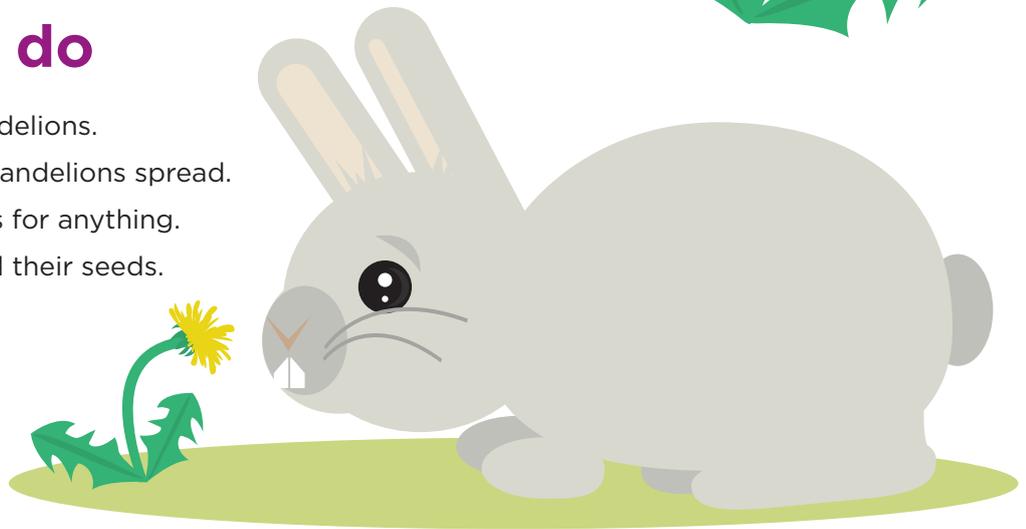
Extra things to do

Find out why they are called dandelions.

Find out about other ways that dandelions spread.

Find out if people use dandelions for anything.

Find out how other plants spread their seeds.





SUPERSTAR

Fantastic Fingerprints

Organiser's Card



About the activity

This activity is designed to get children thinking about fingerprints.

The investigators have been given a news article about fingerprints. Teachers at Startown Primary School are wondering if they can use fingerprints to identify the students. Are the students' fingerprints that different?

Through this activity you will support your group to:

- Collect their fingerprints
- Compare different fingerprints and identify patterns
- Record and present their results

Kit list

- Dust (flour, chalk, talc, cocoa powder)
- Soft pencils
- Blank paper (white paper for pencil and cocoa prints; black paper for white powder prints)
- Other things to investigate e.g. oil or cream (leaves a print on OHT film or plastic), non-permanent markers etc.
- Sellotape
- Scissors
- Hand lenses or magnifying glasses

What to do

1. Introduce the activity using the news article. Ask them if they have taken a fingerprint before.
2. Give out activity cards and equipment to the children.
3. Explain that they will be investigating fingerprints today. Give children time to talk about what they know about fingerprints. Let them look at their own fingerprints with hand lenses or microscopes.
4. Demonstrate how to take a fingerprint
5. Support the children to design and carry out a test and to make their own records of their results. Draw children's attention to the different patterns found in fingerprints (loops, arches and whorls)
6. Ask the children to present their findings to the rest of the group, they can be as creative in their presentation as they want. The prints could be projected for the entire group to see. The children could try to work out which print belongs to which person. They could draw large images of their fingerprints.



Things to think about

Let the children investigate how to get good prints. Only give advice if they are failing to make any progress.

To obtain a good quality fingerprint, children should wash their hands between prints. They also need to tap off the excess powder. A thin layer is best.

Marker pens and ink-pads can be used but they can be difficult to remove from the children's fingers.



Keywords

- Fingerprints
- Identification
- Forensics



Watch out!

Check if any children have wheat or nut allergies before using flour and cocoa.

Children should be reminded to keep fingers out of their mouths and eyes during this activity and to wash their hands thoroughly at the end of the session.

Do not use permanent markers.





SUPERSTAR

Fantastic Fingerprints

Activity Card



Your challenge

Find out if everyone's fingerprints really are different.

Discuss

- How do you think fingerprints are collected?
- Look at your fingerprints with a hand lens or microscope.
- What do your own fingerprints look like? Are they the same as your partner's prints?



Getting started

You either need to rub pencil onto a piece of paper or you can sprinkle a small amount of dust on a table.

Now put your thumb in the dust or on the pencil rubbing. Place your thumb firmly on the sticky side of a piece of sellotape. Now stick your sellotape onto a piece of paper.

You may need to experiment to get clear prints.

Test your ideas

Look at the prints, do you have any of these patterns?

ARCH



LOOP



WHORL



Compare your prints with other people. Are they all different?

Can you find other ways to collect fingerprints?

Share your ideas

Share all the fingerprints. Can you work out which are yours? You could let Mrs Teachem have copies or drawings of fingerprints.

Extra things to do

Look for fingerprints on surfaces such as glass. Can you identify who made them?

Some people think children's fingerprints should not be used as records in schools. What do you think?

Can you find out other ways of identifying individuals?



SUPERSTAR

Fossil Folly

Organiser's Card



About the activity

This activity is designed to get children thinking about dinosaurs.

Dina Digg isn't sure how to put together a dinosaur in the right way. Can the children help to work out the best orientation?

Through this activity you will support your group to:

- Investigate the strength and stability of dinosaur shapes
- Think about why dinosaurs come in different shapes and sizes
- Record and present their findings

Kit list

- Soft modelling clay
- Art straws
- Pipe cleaners
- Cocktail or kebab sticks

What to do

1. Introduce the activity using the story of Dina Digg. Ask the children what they know about dinosaurs, what do different dinosaurs look like?
2. Give out activity cards and equipment to the children.
3. Explain that they will be designing and making models of different dinosaur shapes.
4. Support children to design and build their models. Encourage the children to think about size, shape and weight.
5. Support the children to design and carry out tests on their models and to make their own records of their results.
6. Ask the children to present their findings to the rest of the group, they can be as creative in their presentation as they want.



Things to think about

Children will explore the effect of changing the shape and size of body parts i.e. head, neck, legs, body, tail. They may just want to build dinosaurs that they know about.

It is important that they are open-minded and try out different possible combinations of body shapes for strength and stability. This activity is not about classification, although it should help children to make connections between body shape, size, and lifestyles of dinosaurs.



Keywords

- Dinosaurs
- Bones
- Shapes

Watch out!

Remove the pointed ends of wooden sticks.





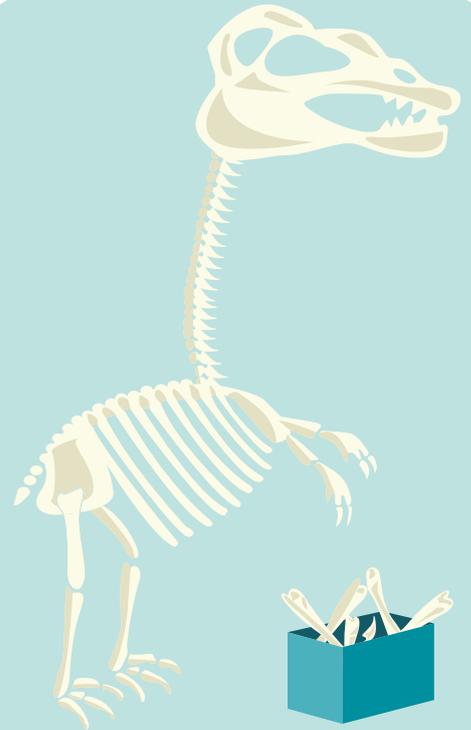
SUPERSTAR

Fossil Folly

Activity Card

A box of bones has been delivered to Dina Digg at the Dinosaur Museum and she has tried to put them together, but she's not sure she's got it right.

No one has ever seen a living, moving dinosaur, but lots of dinosaurs' bones have been found. Putting them together is not always an easy job. There have been plenty of dinosaur debates about the right way to assemble a skeleton.



Your challenge

Can you help Dina Digg to figure out how to put the dinosaur bones together? Is it a new dinosaur, unlike any ever found before? Has she got it wrong?

Discuss

**Do you have a favourite dinosaur? What did they look like?
A few other investigators have had some ideas:**

I like the ostrich dinosaurs like Gallimimus. Their long legs helped them to run very fast.

My favourite is the 26m long, plant-eating Diplodocus. It was built like a suspension bridge - with a very long neck and tail.

Stegosaurus rules! It was a medium sized dinosaur with a solid body and short legs. It had tail spikes and defensive plates on its back.

My vote goes to the agile Velociraptor. A small but deadly carnivore! It ran on two legs and had a long stiff tail that acted as a counterbalance.

Iguanodon's the one for me. It had a small head but a bulky body and a stiff tail. This meant it could stand on its back legs as well as walking on all four feet.

Getting started

Make model dinosaurs to find out which combinations of body shapes are:

- Most stable on two legs
- Most stable on four legs
- Best for reaching high leaves

Which combinations work and which ones do not?

Scientists compare fossil bones with the skeletons of living creatures to work out how to fit them together. Do the shapes that you made remind you of any living or extinct animals?



Test your ideas

Make a table to show which shapes work well together. Can you explain why?

Body shape	Stable on two legs	Stable on four legs	Good for reaching high leaves

Now decide whether the dinosaur put together at the Dinosaur Museum is definitely a dinosaur or a dinosaur disaster!

Share your ideas

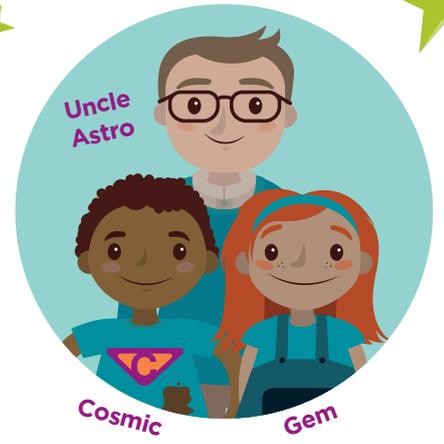
You could design a poster for Dina Digg at the Dinosaur Museum. You could include:

- Drawings or photos of your dinosaurs and your ideas about why they were successful or not
- Pictures of different dinosaurs that match the shapes that you have made
- Explanations of why some dinosaur shapes helped them to survive.





SUPERSTAR



Get Set Jellies

Organiser's Card



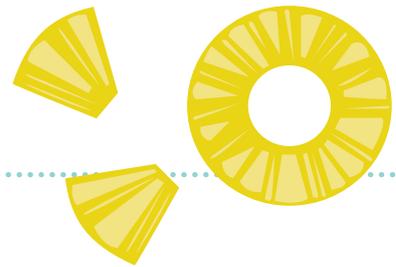
About the activity

This activity is designed to get children making and testing different jelly recipes.

It's Uncle Astro's birthday so Cosmic and Gem have made him a special jelly with fresh pineapple rather than tinned. But the jelly won't set! What could be causing it?

Through this activity you will support your group to:

- Make and test jellies with different types of fruit added.
- Record their results
- Produce a guide to making fruit jelly.



Kit list

- Jelly (any flavour will do)
- Kettle and water
- Spoons
- Measuring jugs
- Little dishes to put the jelly in
- Pineapple – fresh and tinned (frozen optional)
- Other types of fruit (optional)

What to do

1. Introduce the activity using the story. Ask them if they have made jelly before.
2. Give out activity cards and equipment to the children.
3. Explain that they will be making some different jellies and comparing them.
4. Support children to make their jelly recipe. Ensure that the jelly is made following the normal instructions on the packet. The children should focus on adding different fruit rather than changing the way the jelly is made. Encourage them to explore a range of fruit. They will find that there are others that will
5. Support the children to compare their jelly to the other jellies, and to design a way to record their results.
6. Ask the children to present their findings to the rest of the group, they can be as creative in their presentation as they want.



Things to think about

For many reasons, such as religion, some children cannot eat gelatine. Be sensitive to the group's needs, perhaps they could try using alternatives to see what happens.



Keywords

- Jelly
 - Gelatine
 - Setting
-

Watch out!

The main safety issue is attached to making the jelly. It does need to be made with hot water so will need to be done with adult supervision. Do not taste the food unless hygiene is scrupulous. Also ensure that the hot jelly is not carried around until it has cooled.





SUPERSTAR

Get Set Jellies

Activity Card

Uncle Astro loves jelly. His favourite fruit is pineapple. Cosmic and Gem have made a pineapple jelly for his birthday. Normally they use tinned pineapples but, because it is a special day, this time they have used big chunks of fresh juicy pineapple. Now it is time to enjoy some lovely, wobbly, wobbly jelly. Uncle Astro laughs with excitement as he tips the bowl over to let the jelly drop out. Oh no! The jelly hasn't set!

Uncle Astro laughed! **"How fascinating! I wonder if it has something to do with the pineapple? We need to do some investigating. I think a little chemistry might help."**



Your challenge

Find out if the fresh pineapple could have stopped Uncle Astro's jelly setting.

Discuss

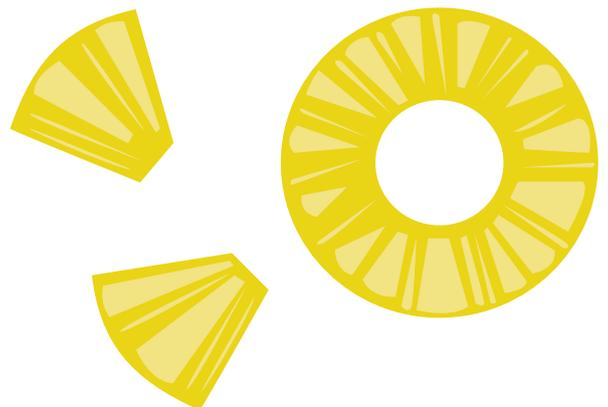
Talk about how to make jelly. Think about what might have stopped the jelly setting.

How will you decide if the fresh pineapple stopped the jelly setting?

What tests can you do to find out why the jelly didn't set?

How will you make sure that your test is fair and safe?

What will you observe or measure in each of your tests?



Getting started

Some other investigators have had a few ideas to get you started:

Why don't we try making the same jelly with and without pineapple?

I think we could use fresh, frozen and tinned pineapple.

I think we could try using different amounts of fresh pineapple.

What will you do?

Test your ideas

Which jellies set and which ones did not? Is there a problem when you use fresh pineapple? Does it make a difference if the pineapple comes from a tin or has been frozen?

You might want to make a table like the one below to compare the jellies.



	Jelly 1 - Fresh pineapple	Jelly 2 - Tinned pineapple	Jelly 3 - No pineapple
What happened?			

Share your ideas

Why not design a guide to show how knowing a little chemistry can help people to make very wibbly, wobbly fruit jelly.

Extra things to do

What happens if you use different fruit in your jellies? Try making small jellies to compare different fruit. Does it make a difference if you use tinned or frozen fruit?

You could try apples, strawberries, raspberries, lemons, tangerines, kiwi fruit, fresh figs, mango, grapes, peaches and/or any other fruit that you like.





SUPERSTAR

Goodbye Old Tree

Organiser's Card



About the activity

This activity is designed to get children thinking about trees, and the different materials we can get from trees.

The Treedwell local government want some ideas on what to do with in old tree once it dies. Can the children come up with any good ideas?

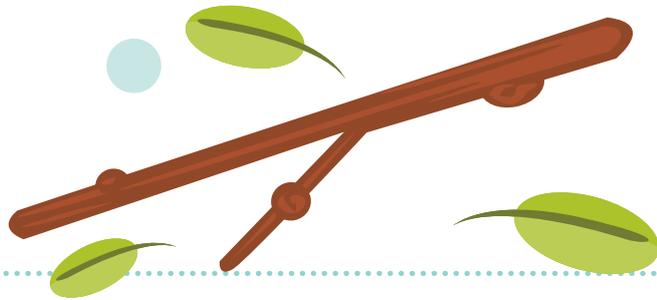
Through this activity you will support your group to:

- Research the possible uses of different parts of a tree and decide which they think are the most appropriate and interesting.
- Create a story about the life of the tree.
- Record and share their research and ideas.

Kit list

Access to the following will be helpful:

- Paper
- Pencils
- Access to the internet



What to do

1. Introduce the activity using the story.
2. Give out activity cards to the children. Encourage the children to think about all the things they know that are made from trees e.g. paper, wood, leaves, etc.
3. Support children to conduct their investigation and make their own records of their results. Encourage the children to do their own research using the internet or by reading books. Let them talk together about what they have found out. If

- children need help you could get them to look at how wood is used to help wild animals (e.g. bee, bird and bat boxes), or point them towards wooden items that could be used in the town (e.g. benches and sculptures made from wood)
4. Ask the children to present their findings to the rest of the group, they can be as creative in their presentation as they want. They could create a collage using the different tree parts or take bark or leaf rubbings.

Things to think about

There is no right or wrong answer for this challenge

Keywords

- Trees
- Nature
- Recycling
- Wood

Find out more

Show them art work made from leaves etc. Examples can be found at www.opalexplornature.org/crest

Help them find out more about how letting the wood rot supports biodiversity (e.g. the range of animals and plants that live in log piles).





SUPERSTAR

Goodbye Old Tree

Activity Card

NEWS

What should we do with the old tree? We need your ideas now!

Treedwell's local government are chopping down a tree. The Treedwell tree has been alive for almost 250 years. They want to plan ahead so that they know what to do with the tree when it dies. Councillor Hazel Nutt wants your help at the Startown Technology Show.



Do you have any ideas for what would be a suitable end for this lovely old tree?

"How can we use all of the tree, even the roots and the leaves?" asked Councillor Hazel Nutt. "We want to use the tree to support local plants and animals, as well as let the people of Treedwell remember the old tree."

Your challenge

Come up with some really good ideas for how to use the tree once it has been chopped down.

Discuss

What parts of the tree could you use?

How could the tree be used to help plants and animals?

How are you going to present your ideas? What will make your ideas stand out?

Getting started

To come up with some ideas you might need:

- Paper
- Pencils
- Access to a computer and the internet



Test your ideas

The people of Treedwell have had a few ideas, how similar are they to yours?

Perhaps we could put part of the tree somewhere where it could rot.

Perhaps it could be made into something for wild animals to use.

What about something that people could use in the town?

What about something that could be used to help plants to grow?

Share your ideas

Share your ideas with your partner school or another class. You can also send them to Hazel Nutt by visiting www.opalexplorenature.org/crest

Extra things to do

The tree has 'seen' some amazing things during its lifetime. Why not create a story about the life of the tree, or you could create a time line showing what was happening as the tree grew.

1760 Industrial Revolution begins in England

1833 Slavery abolished in British Empire

1859 Darwin's On the Origin of Species

1876 Bell patents the telephone

1903 Wright brothers fly first motorized airplane

1914 World War I begins

1939 World War II begins

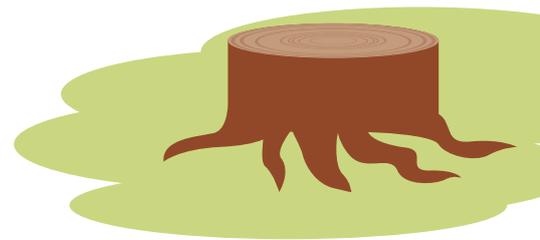
1947 Gandhi's civil disobedience movement leads to an independent India

1969 Armstrong and Aldrin walk on the Moon

1981 Scientists identify AIDS

1991 Apartheid ends in South Africa

Can you add some more historical events?





SUPERSTAR

Hoodie Hearing

Organiser's Card



About the activity

This activity is designed to get children investigating how sounds travels.

After nearly colliding with a student wearing a hoodie, Mrs Teachem thinks that wearing a hoodie may affect the wearer's hearing. Is she right? Can the investigators find out?

Through this activity you will support your group to:

- Investigate if wearing things over your ears affects sound
- Experiment with sound through a range of different materials
- Record and present their results

Kit list

Ear coverings:

- Hooded jackets
- selection of other ear coverings e.g. bobble hats, ear muffs, scarves, motorbike helmet etc.

Or pieces of different materials such as wool, cotton and bubble wrap. Hold these over the ears with a headband or fasten with a wrapped ribbon

- Selection of things to make noise with e.g. buzzer, timer, radio (radios can be useful as the volume can be controlled)
- Sound sensors (optional)

What to do

1. Introduce the activity using the story. Ask them to discuss sound and how it travels.
2. Give out activity cards and equipment to the children. Give children time to discuss their ideas. Do they wear hoodies or other coverings on their ears e.g. bobble hats, scarves, ear muffs? Do they think it stops them from hearing?
3. Explain that they will be designing experiments to find out which materials block sound. Let children try to decide how to test their ideas.
4. Children could simply explore the difference that ear coverings make, and try to put the materials in order. Alternatively they could try to carry out a fair test.
5. Encourage them to keep notes or draw pictures of objects to record what they are finding out.
6. Give the children time to present and share ideas about what they have found out. They could compare what each group has found. They may find that different people hear things differently. This would be interesting to talk about.

Things to think about

Some materials are better sound insulators than others. Soft material tends to prevent sound passing through it easily. Air also acts as a good sound insulator. Increasing the number of layers of material normally increases the sound insulation.

Direction also makes a difference. A person wearing a hoodie is more likely to hear a sound if it is coming from the front.

In this activity, good sound insulators are worse in terms of safety. However, there may be times when people need good sound insulation to protect their ears e.g. when using noisy equipment.



Keywords

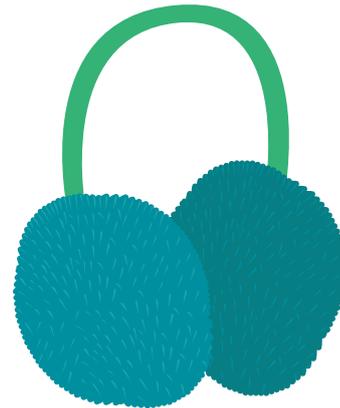
- Sound
 - Volume
 - Insulators
 - Materials
-

Watch out!

Do not let the children listen to loud noises close to their ears.

Do not let children plug their ears with material.

Do not let children share head coverings.





SUPERSTAR

Hoodie Hearing Activity Card

Headteacher of Startown Primary School, Mrs Teachem, narrowly avoided a collision with a pupil who stepped into the road in front of her car at the entrance to the school. **“He couldn’t hear a thing!”** exclaimed Mrs Teachem. **“He didn’t even hear the horn with that hoodie over his ears. Perhaps I should ban hoodies.”**



Your challenge

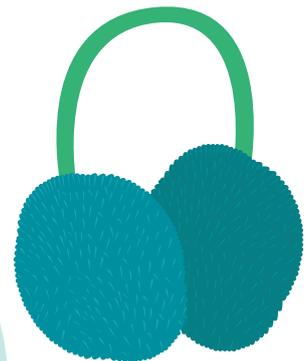
Is Mrs Teachem right? Find out if hoods and other ear coverings make it a lot more difficult to hear.

Discuss

Have you ever worn a hood? Did it make it difficult to hear?
What other things might stop you hearing very well?
How will you find out?

Getting started

You need hoods and/or a collection of things that might cover your ears.
You need to think of something to listen to.
You need to think of how to measure how well you can hear the sound.



Test your ideas

Will you need to make sure that your test is fair?

Will the direction and distance the sound travels from make a difference?

What about the number of layers?

Share your ideas

Discuss what happens if you wear something over your ears. Did everybody find the same result? You could do a 'thumbs up, thumbs down' chart to show your results. How could you use your results to improve road safety?

Extra things to do

What other senses do you use when you cross the road? Find out how wearing a hoodie might affect these.

Find out if wearing music earphones affects your safety.

How do people who are deaf keep safe on the roads?





SUPERSTAR

How Do You Drink Yours?

Organiser's Card



About the activity

This activity is designed to get children thinking about traditions and preferences around tea.

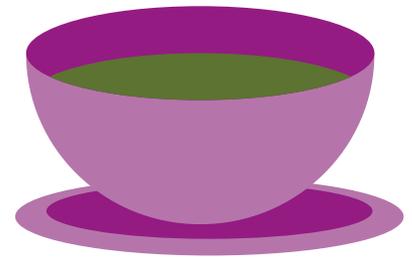
Tea is a large part of many cultures in the world, including Britain, Russia, China and Japan. Can the children investigate the tea drinking culture in the UK and see if there are any patterns?

Through this activity you will support your group to:

- Learn about different tea drinking traditions from around the world.
- Carry out a survey to find the most popular way of drinking tea.
- Make decisions about how to present the information they gather.

Kit list

- Copies of the questionnaire from the **ACTIVITY CARD** or their own version of it
- Clipboards
- Pens and paper



What to do

1. Introduce the activity using the stories about tea from around the world
2. Give out activity cards and equipment to the children.
3. Explain that they will be carrying out a survey to find out about how different people drink their tea.
4. Encourage them to add, delete or change questions from the questionnaire.
5. Help children list a wide range of people that they could ask.
6. Help them to think how they will gather the responses from the questionnaires into a tally chart and record their answers.
7. Support the children to carry out their survey
8. Ask the children to present their findings to the rest of the group, they can be as creative in their presentation as they want. Children will end up with a lot of data. They may need to produce tables, tick lists, tally charts or even spreadsheets to collect the results. They may be able to do some of this electronically. Alternatively, they can draw simple charts and tables of the data.

Things to think about

Try to help children to look for patterns in their data, such as the difference between the preferences of young and old people, males and females etc.

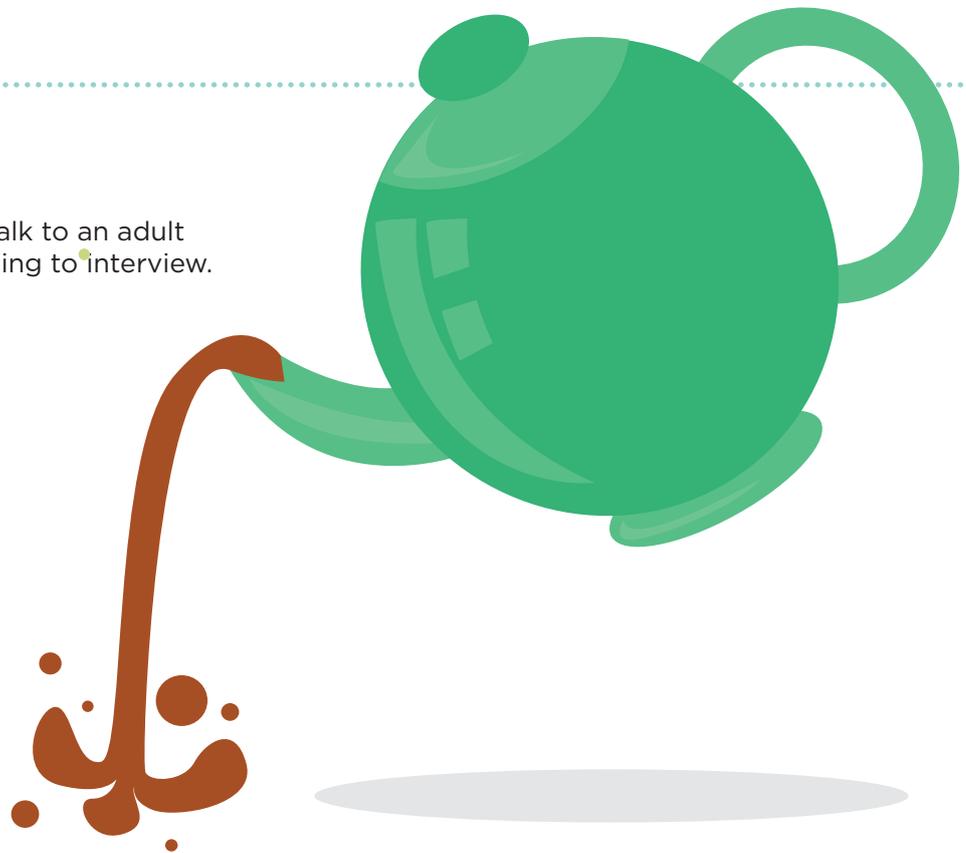


Keywords

- Tea
- Culture
- Patterns
- Trends
- Data
- Surveys.

Watch out!

It is important that children talk to an adult about the people they are going to interview.





SUPERSTAR

How Do You Drink Yours? Activity Card

Tea rituals

Over 70% of people **in the UK** drink tea everyday! 97% of them use tea bags, a relatively modern invention. Some use a teapot, others make it in their cup. Some people add milk, others don't. Some drink herbal teas, others regular tea.

In Japan, they have a special tea ceremony called the Chanoyu. The Tea Master makes the tea using powdered green tea and boiled water mixed together with a bamboo whisk.

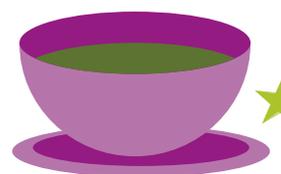
A special tea kettle called a samovar is used **in Russia** to make strong black tea. This tea is so strong that it has to be diluted with hot water before you can drink it.

In China, they have a tea ceremony, all about how it smells and tastes. To make sure that the tea is just right, the rules for making the tea must be followed carefully. The server pours the tea into each cup ensuring that it is just over half way, it is then polite to drink the tea by emptying the cup in three swallows.

Your challenge

As you can see making a cup of tea is far from simple. So what is the best way to drink tea? Hot or cold? Green or fruity? Black or milky? With sugar or without?

Can you find out which is the most popular way to drink tea?



Discuss

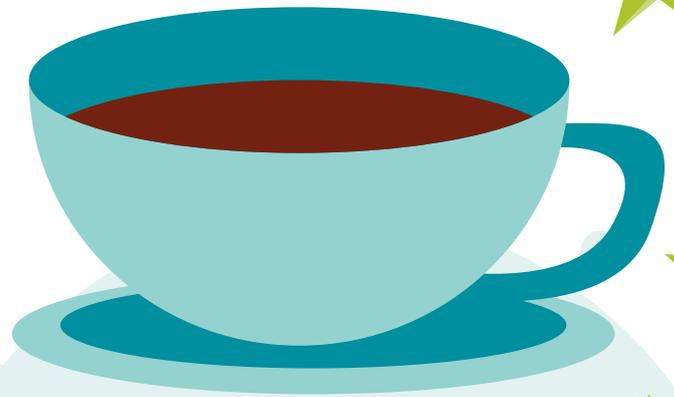


Who will you ask?

How many people will you include?

How will you record what you find?

Remember to ask as many different people as you can, but only interview people you know and trust.



Getting started

Look at the sample questionnaire below. Are there any questions you would like to change, delete or add?

Name:

Age:

Male / Female

1. Do you drink tea? Yes / No
2. How many cups of tea do you drink each day?
3. What type/brand of tea do you have in your cupboard at the moment?
4. Do you use teabags? Yes / No
5. Do you know anyone who drinks different types of tea? (who / what)

6. Do you make tea in a teapot?
7. How long do you leave the tea to brew?
8. Do you warm the pot or mug first?
9. How much sugar do you put in your tea?
10. What type of milk do you have in your tea?
11. Do you put the milk into the cup first or last?
12. Is there one thing which is more important than all the others when you make a nice cup of tea?

Test your ideas

You may want a tally chart like this to collect the results from the questionnaire. Then you can see any pattern in people's responses.



	1	2	3	4
How many cups of tea do you drink a day?				
	Tea bag	Tea pot	Herbal tea	
How do you make your tea?				
	30 seconds	1 minute	2 minutes	5 minutes
How long do you let your tea brew?				
	1	2	3	4
Do you have sugar? How many spoons?				
	Skimmed	Semi Skimmed	Full fat	No milk
Do you have milk? Which kind?				

What's the best way to present the information that you collected? Could you use a bar graph or even a pie chart? What other ways could you use?

Share your ideas

Do most people drink their tea in the same way?

Do older people drink more tea?

Do people still use teapots?

Do males drink more tea than females? Do females prefer sweeter tea?

Which tea comes out top?

Are there any results that surprised you? Were there any problems with your survey?





SUPERSTAR



Investigating Ink

Organiser's Card



About the activity

This activity is designed to get children thinking about how to identify different inks using chromatography.

Lady Felicity Feline's prize winning Cocker Spaniel has been dog napped and a note has been sent asking for a ransom. Can the investigators work out which one of the four suspects wrote the note based on the type of ink used?

Through this activity you will support your group to:

- Experiment with different ink pens using chromatography
- Design an experiment to help them identify the pen used to write a note
- Share their conclusion and present evidence to support it.



Kit list

- Absorbent paper e.g. blotting paper, white filter paper, white coffee filters
- Four pens (not biros) with black water-soluble ink inside, labelled with the suspects' names – it's better to have a set per group
- Additional pen or black ink for the initial exploration – you must check that the colour separates
- Ransom note (written using one of the pens prior to the activity). Don't worry if it spreads a bit.
- Beakers or pots
- Scissors
- Extra non-permanent marker pens in various colours
- Plain paper for wanted posters



What to do

1. In advance prepare the ransom note according to the instructions in the kit list.
 2. Introduce the activity by reading the news story together and examining the ransom note with the children. Show the children the suspects' pens.
 3. Give the children time to talk about ways of identifying which ink was used to write the ransom note. Give them a black pen or a blob of black ink and some white paper towel to explore the effect of water on ink.
 4. Let the children explore the pens and the note. You will need to cut the ransom note into strips so that groups can each try out their tests.
- Cut more strips than you need to have some spares. You will probably need plenty of them!
5. Some children may need help to examine the different patterns and colours produced by each pen.
 6. Give children time to talk about their evidence and decide who they think the culprit is.
 7. Children can now create a wanted poster to help detectives track down the criminal they have identified. Encourage them to include all the evidence they have collected.
 8. Encourage children to use the evidence from their experiment to justify their decision.

Things to think about

Test the pens/ink prior to the activity by putting marks on pieces of blotting paper and dropping water on them.

Some black inks will separate better than others. You need the criminal's pen to produce a different pattern from the others.

Your ransom note must be written on absorbent paper e.g. blotting paper. Write a large note so there is enough for everyone. Your note could read: Lady Feline. If you want Colin returned safely, put £100,000 in a brown paper bag and leave it under the big oak tree by the town hall at 5.15 pm prompt tomorrow.

Take it further

Ink is made up of a mixture of different colours. Different inks will be made up of different colours even if they look the same. With water-soluble inks you can separate the colours from one another using water (chromatography).

The colour from some other items such as food colouring, jelly beans and other sweets can be separated in the same way.

Chromatography is used to separate and identify all sorts of substances in police work. Drugs can be identified in urine and blood samples, often with the aid of chromatography.

Keywords

- Ink
- Chromatography
- Separation
- Mixture
- Absorbency
- Water-soluble

Watch out!

Use plastic beakers for this activity.

Any spills should be cleaned up quickly to avoid accidents.

Avoid using permanent marker pens



SUPERSTAR

Investigating Ink Activity Card

NEWS

Cocker Spaniel caught up in Canine Crime Spree

Earlier this week, Lady Felicity Feline received a ransom note demanding £100,000 for the safe return of Colin, her prize-winning cocker spaniel. Detectives have seized black pens from four prime suspects so that they can carry out ink investigations to find out who sent the note.

“Someone had splashed a drop of water on the note and we spotted something very interesting,” Inspector Khan told our reporter. “With a bit of help we should soon have Colin back.”



Your challenge

The four main suspects are:

- Ivor Swagbag
- Robyn Banks
- Kitty Catburglar
- Nick Goods

Help the detectives to match the ink from the ransom note to one of the suspects' pens to find out who has Colin the Cocker Spaniel.



Discuss

What ways could you use to tell the difference between the black pens?
Drop water on black ink and watch what happens.
How might this help to solve the crime?



Getting started

Pens write differently and the colour of the ink can vary. Perhaps you can see these differences if you look closely.

If you have explored what water does to some ink, can you use what you have found out to investigate the suspects' pens? This process is called chromatography.

Test your ideas

One way to test the ink is to drip water onto a sample of the ransom note. Watch what happens. Compare this with blobs of ink from the suspects' pens.

Try to gather as much different evidence as you can.

Can you find out who the dog napper is?

Share your ideas

Why not make a wanted poster which includes all the evidence to help detectives track down the criminal you have identified?

Extra things to do

Is it only black pens that you can test with chromatography?

Are there other things that are coloured that you can test such as jelly beans or food colouring?

Are there other ways of doing chromatography?





SUPERSTAR

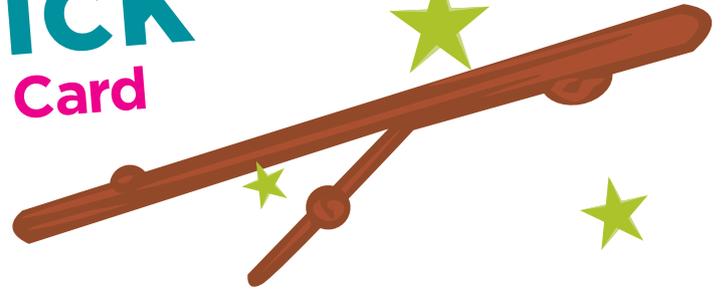


Journey Stick

Organiser's Card



About the activity

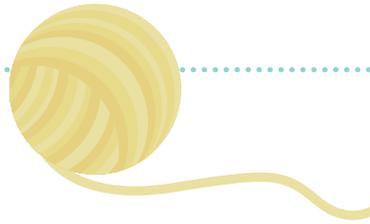


The children have been asked to follow in the footsteps of the Aboriginal Australians and create a journey stick. This has objects attached in chronological order to remind them of their journey and to help with storytelling.

When Australian Aboriginals went on long journeys they tied objects to a stick. They would start at one end of the stick and work along it as they travelled. The objects would help them to remember events and experiences on their journey and to tell others of their adventures.

In this activity, the children will collect objects to make their own journey stick.

Kit list



- Sticks (children might choose their own)
- Something to fasten the objects to the stick e.g. string, tape, cotton thread, elastic bands
- Coloured wool or strips of fabric in a large tray or little bags for each group. They can represent places and events on the journey e.g. blue wool for water or red fabric for the sun setting as the journey ended.

What to do

1. Read the ACTIVITY CARD to familiarise yourself with the activity.
2. Check the Kit list to ensure you have collected the necessary resources.
3. Set the scene by discussing the idea of the journey stick. It helps to think about Aboriginal people. There are many websites giving background information
4. Show the children a stick and discuss possible ways of recording things on the stick. Remember to think about recording events as well as objects.
5. Give children time to discuss what they might find and experience on their journey. They might also help to plan their route.
6. Remind children about safety and plants they must not pick.
7. Set the groups off on their challenge. If they go in different directions to increase the variety, you may need to ask additional adults to help you.
8. Remind the children to record things in order and not to have too many items.
9. Give the children about 20 minutes for their journey.
10. When the children return give them time to discuss what they are going to talk about.
11. Form a circle and share stories of their journeys using the journey sticks.

Things to think about

Encourage the children to attach their own items to the stick and to record events and experiences as well as objects.

Some plants are poisonous or irritate skin. Others are rare and should not be collected. If you are uncertain, check with someone or avoid the area.

Children should avoid pulling whole plants out of the ground.

Animals should not be attached to the stick!

This activity will be most successful outdoors, but could be carried out indoors, if appropriate.

Take it further

Sticks also have another significance for Aboriginal people. Sometimes they were called talk sticks. Whoever held the stick was allowed to talk while everyone listened. You could use your journey sticks in this way when the children are sharing their ideas.

Keywords

- Journeys
- Travel
- Mementos

Watch out!

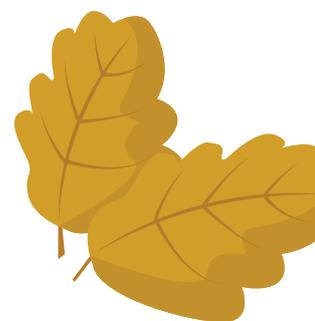
Children must wash their hands after the event. No fingers in mouths!

Avoid poisonous or prickly plants.

Avoid going too close to water.

Think about the number of adults needed if you are working outdoors.

If you go outside school grounds, make sure you follow school and local authority procedures



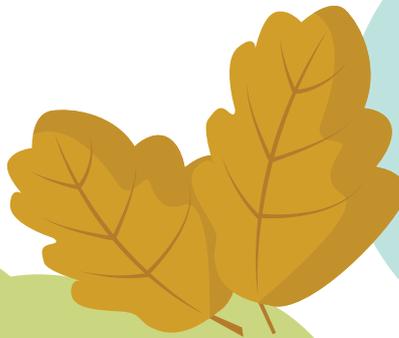


SUPERSTAR

Journey Stick

Activity Card

When Australian Aboriginals went on long journeys they tied objects to a stick. They would start at one end of the stick and work along it as they travelled. The objects would help them to remember events and experiences on their journey and to tell others of their adventures.

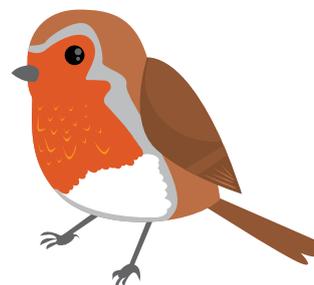


Your challenge

Go on your own journey and make a journey stick with a friend. Share your journey stick with other people.

Discuss

Talk to your buddy.
Where will you go?
What might you find or experience?
How will you attach the items to the stick?



Getting started

Think about how others can guess where you have been. For example, if you passed an old oak tree, you might want to collect a leaf or an acorn.

If you saw a robin, you might tie some red wool on your stick.
How could you show it was sunny when you started your journey?

Test your ideas

Look very carefully as you travel.

Remember to start at one end of the stick and work across to the other end.

Can others tell where you have been?

Does the stick help you to remember your journey?

Share your ideas

Talk about your journey to your friends.

You can display your journey sticks for others to see.
Can they tell where you have been?

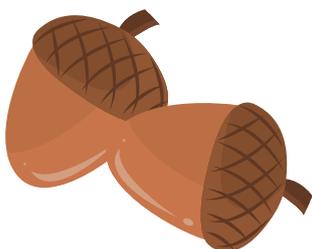
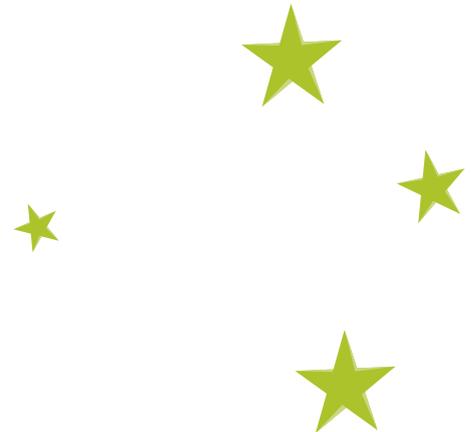
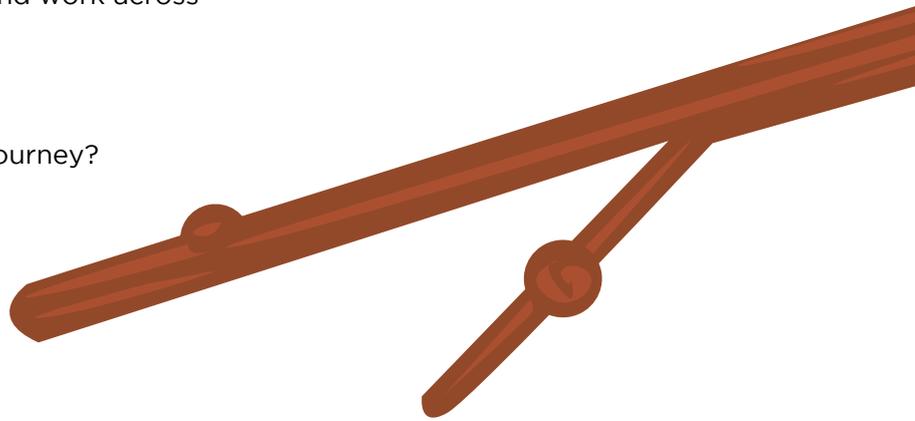
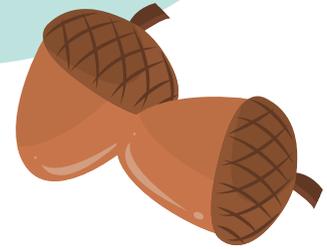
Extra things to do

What other journeys can you make?

How are your sticks different for each journey?

Can you make a simple map of your journey?

Can you find out more about how the Aboriginal people use their journey sticks?





SUPERSTAR

Just My Cup of Tea

Organiser's Card



About the activity

This activity is designed to get children thinking about design.

The QUALITEA tea company have a new advertising slogan 'Just my cup of tea', the children have been asked to carry out investigations on teacups and mugs to help decide which cup to use to match their advertising slogan.

Through this activity you will support your group to:

- Think about properties of teacups
- Match the different cups to different character profiles
- Design an advert for the QUALITEA tea company



Kit list

- Water
- Teaspoons
- Kettle
- Measuring jug
- Thermometers / temperature sensors
- Trays
- Different types of cups, including disposable cups – look for different shapes, materials and sizes

What to do

1. Introduce the activity, read through the different customer quotes, making sure that children understand all the vocabulary.
2. Give out activity cards and equipment to the children.
3. Explain that they will be using the equipment provided to test the best cup design for the needs of the different customers.
4. Encourage children to discuss their ideas and how to carry out their investigations. Prompt questions:
 - What makes a 'good' cup? What will they be testing for and how?
 - How will they make sure their test is fair?
 - How will they record their results?
5. Support children to conduct their tests and make their own records of their results. They could also take photographs or make drawings. Encourage children to do different investigations to help them decide which cup suits each of the characters. There may be other tests that they would like to add.
5. Ask the children to present their findings to the rest of the group, they can be as creative in their presentation as they want - the activity card suggests they could create an advert or design their own cup.

Things to think about

The cups and mugs do not all need to be the same size, shape and material – in fact they should be as different as possible. If a cup has a lid, keep it on as this is part of the design. The results of this activity will differ, depending on the cups used.

To decide which is the best cup for the commuter, children will need to think about insulation (stopping the outside getting too hot) and the 'grippiness' of the outside of the cup. Several disposable cups come with a sleeve that makes the cup 'grippy' and easier to hold when filled with very hot liquid. Even with warm water, children should be able to notice the difference in the outside temperature with and without the sleeve.

Keywords

- Insulation
- Cooling
- Materials
- Grip
- Surface



Take it further

An extension activity of designing their own cup based on their results is suggested on the activity card.

Watch out!



Make sure that children are not wandering around in the dark with sharp objects.

Make sure that the area is cleared of obstacles and dangerous substances



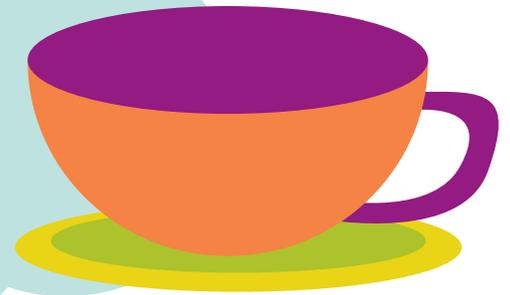
SUPERSTAR

Just My Cup of Tea Activity Card

It's official! Britain is a nation of tea lovers. 165,000,000 cups of tea are drunk every day in Britain.

Everyone likes the nation's favourite cuppa, but have you ever noticed how everyone has their own favourite cup too?

Some people insist on a bone china cup and saucer, others prefer a mug. Some cups have lids, some have handles. Some are tall and thin, some are short and fat. They are made from all sorts of different materials, with different colours and designs, and in different shapes.



Your challenge

The QUALITEA Cup Company is preparing a new advertising campaign with the slogan, 'Just my cup of tea' to launch a new range of cups.

Can you help to decide which type of cups will be best for their different customers?

Here are four of the QUALITEA Cup Company's customers:

Customer one: "I love a piping hot cuppa when I'm watching TV in the evening. I just want my tea to stay hot right to the last sip!"

Customer two: "At home, I pour my tea from the cup into the saucer. I like it to cool down quickly. I can't do this when I have visitors, it just wouldn't be polite."

Customer three: "I have to carry trays filled with cups of tea around my busy café. I just need cups that don't slide around and fall over!"

Customer four: "Before catching the train to work, I grab a cup of tea and a muffin. I need a cup to take away with me that is cool enough to hold and easy to carry."



Discuss

What does 'best cup' mean when we are drinking tea?

What tests can you do to compare different cups?

How will you compare different shapes, materials and sizes?

Getting started

Some of your fellow investigators have come up with a few ideas to get you started:

“We’re going to find out about keeping the drink hot. We need to investigate which cup is the best insulator by seeing how long it takes the drink to cool down.”

“We’re going to find out if different shaped cups affect how quickly tea cools down. We wonder if the size of the open top makes any difference too.”

“We’d like to find out if there are cups that won’t topple over and spill so easily. We are going to use a tray to test them.”

“We’re going to investigate cups to see what makes them easiest to hold and carry. Which material is easiest to grip? Do handles help? Does the shape make a difference?”

What will you do? Do you have a different idea about how to test the cups?

Test your ideas

You may want to record your findings in a table like this:

	CUP 1	CUP 2	CUP 3
Which cup insulates a hot drink best?			
Sticky tape Which cup shape cools the drink quicker?			
Which cup is easiest to hold?			
Which cup is best for preventing spills?			

Share your ideas

Which cups performed well in your tests?

Do you think any of the cups could be improved in any way? Why do you think this?

You could design a web or radio advert for the QUALITEA Cup Company ‘Just my cup of tea’ promotion. Make sure that you include the right cup for each person.

Extra things to do

Design a brand new teacup for the company to sell.





SUPERSTAR

Kite Calamity

Organiser's Card



About the activity

The activity is designed to get children to make a model kite that will fly.

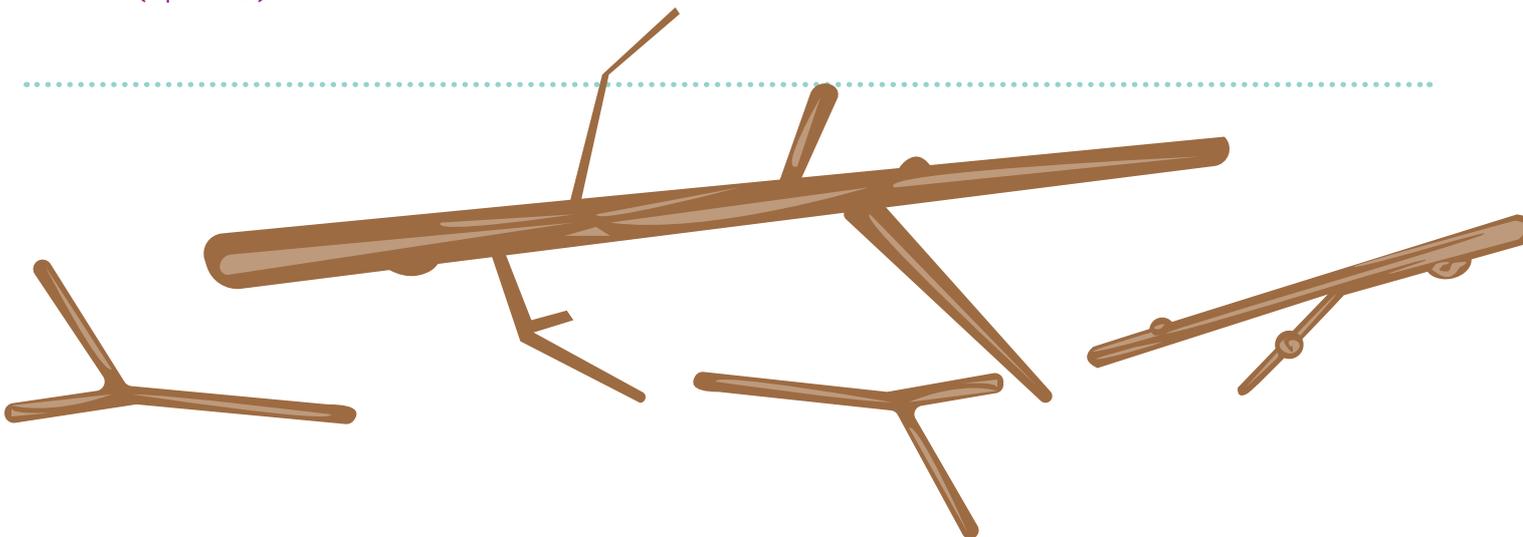
The children are presented with an article in the local newsletter about a kite festival. None of the kites at the festival would fly, and the organiser Sunny Day and Kite enthusiast Fly Further would like some help to make a kite that can fly.

Through this activity you will support your group to:

- design and test models to come up with the best kite
- make a model kite that will fly

Kit list

- Cover material e.g. sheets of paper, tissue, card and light plastic (such as a carrier bag)
- Tail – long strips of tissue, plastic or similar
- Foil – to make bows to add weight to the tail
- Struts – cocktail sticks
- Flying line – 2 metre lengths of strong cotton thread, string or fishing line
- Scissors
- Glue sticks and sellotape for each group
- Electric fan (optional) or hairdryer if operated by an adult (PAT tested)
- A longer length of strong cotton thread if you want to test how high the kites will fly outside (optional)



What to do

1. Read the ACTIVITY CARD to familiarise yourself with the activity.
2. Check the Kit list to ensure you have the necessary equipment. You could put the resources in a central place so that children can select what they want, or give each group a set.
3. Set the scene by reading the report about the Startown Amateur Kite Festival. You could show some kites or videos of kite flying.
4. Challenge children to come up with a definition for a kite, "If you had a friend that had never seen a kite before, how would you describe it?"
5. Give children time to think and talk about kites.
6. Now set them the challenge to build a kite. Show the materials that are available and remind them of the information and the picture on the front of the ACTIVITY CARD.
7. Get them all to start by trying to make the kite shown on the ACTIVITY CARD. Encourage children to experiment with their ideas. Only guide them if they are struggling. Let them make more than one design if they wish.
8. You can test kites together in the playground or use a hairdryer or fan indoors.
9. Let children talk together about any problems they may have encountered and discuss possible solutions and improvements together.
10. The kites will look good as a display. Children can also draw and annotate their designs.
11. There are extra challenges on the ACTIVITY CARD. These can be used if there is any spare time or if the children want to try out ideas at home and earn a bonus sticker.

Things to think about

Problems can result from choosing material that is too heavy or not getting the kite symmetrical. Children will learn this, given the chance to explore.

Take it further

Kites are helped to fly by the air. They tend to fly better when it is windy, just like wind helps sail boats to move. The shape of each kite and bows on the tail affect the way the wind flows around it and how it flies. The tail of a kite adds to its stability and balance.

In this activity children make small kites. These tend to be more successful as a first attempt. An internet search for 'kites' will give you plenty of information.

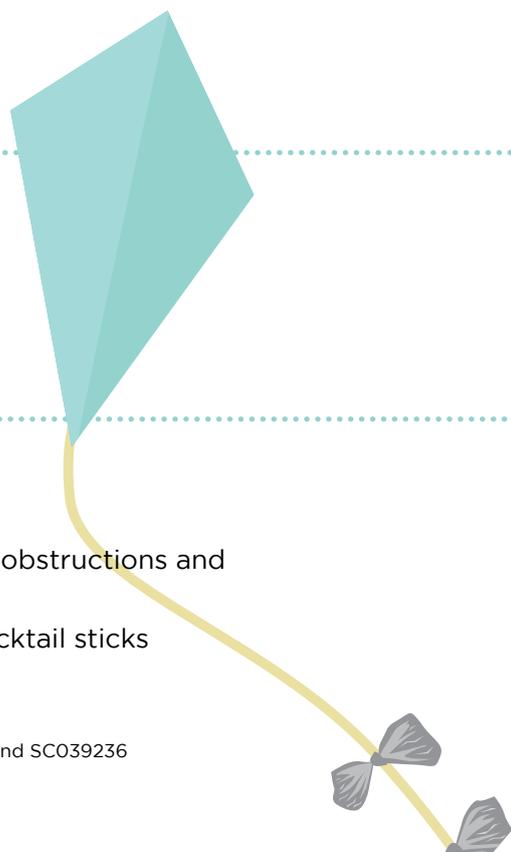
Keywords

- Aerodynamics
- Flight
- Kite
- Shapes
- Construction

Watch out!

Watch out for people, roads, power lines, obstructions and sunburn when flying the kite outdoors.

You may wish to cut the points off the cocktail sticks





SUPERSTAR

Kite Calamity

Activity Card

You've found an article
in the local newsletter:

NEWS LETTER

Despite perfect weather, the only thing that filled the air yesterday were moans and groans as the first Startown Amateur Kite Festival dramatically failed to get off the ground.

Organiser Sunny Day told us, "This is a festival for beginners. Everyone worked so hard to make the kites. They all looked fantastic. But not one of them flew. What a calamity!"

Kite enthusiast Fly Further said, "If there is anyone out there who can help us, we would love to hear from them."

Your challenge

Help Sunny Day and Fly Further to design a kite that will fly.
You can start by making a small model kite.

Discuss

- Talk to your buddy.
- What is a kite?
- How does a kite fly?
- What styles of kites are there?

Getting started

A kite is made up of different parts including support sticks, cover, tail and flying line.

You will need 5 cocktail sticks to make the struts.

Cut out the cover the same size as the one on the front of this sheet.

Glue the sticks onto the cover, 2 across and 3 down (overlapping)

Attach your flying line, with sellotape, where the sticks cross.

Fasten a tail at the bottom. Add aluminium foil bows.

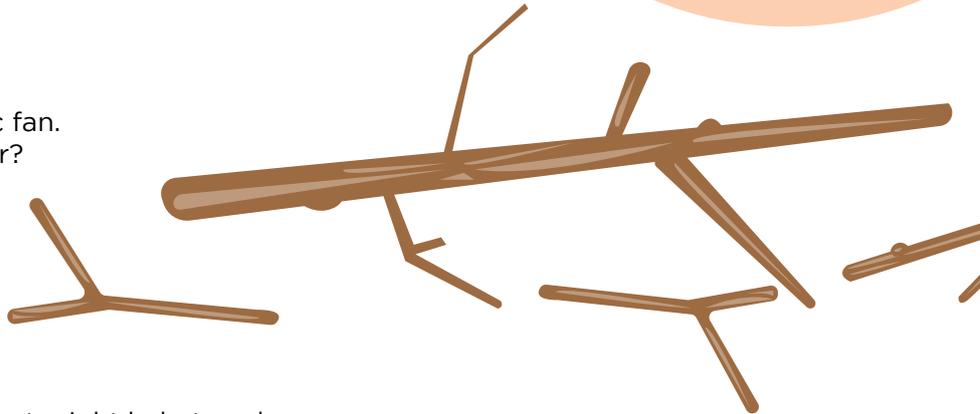
Test your ideas

What's the best way to test it?

You could try outside or use an electric fan.

What might make your kite work better?

Would other shapes fly?



Share your ideas

Talk about why some kites didn't fly. What might help to solve problems such as a kite spinning in circles or flying to one side? Draw the kite that you would like to take to the Startown Amateur Kite Festival. Make a fantastic display of your kites.

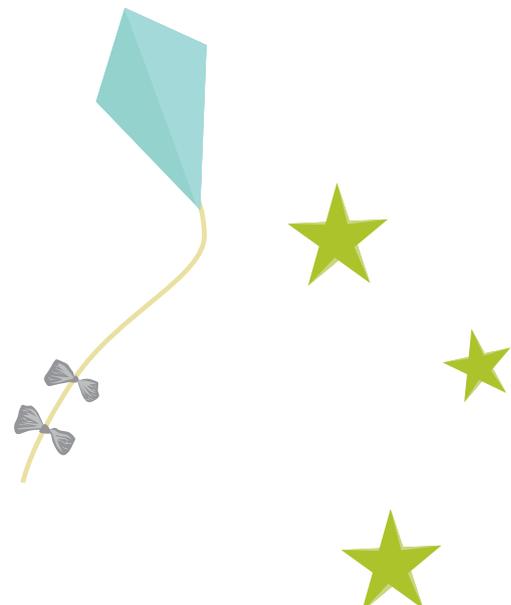
Extra things to do

Kites have been around for about 3000 years.

Can you find out more about who developed the first kites?

Try to make a large version of your kite.

What can you do to make it fly?





SUPERSTAR



Making Toothpaste/ Terrific Teeth Part 1

Organiser's Card



About the activity

This activity has been designed to get children thinking about the various properties of toothpaste.

The children have been sent a letter from the Bright Smile Toothpaste Company. They want the investigators to help test out their latest recipe.

The task asks them to:

- Talk about toothpaste ingredients.
- Make and test toothpaste.
- Write a letter (optional).

Through this activity you will support your group to:

- Think about what makes good toothpaste
- Make their own toothpaste and test it to see how well it works
- Record and present their results and share them with the group

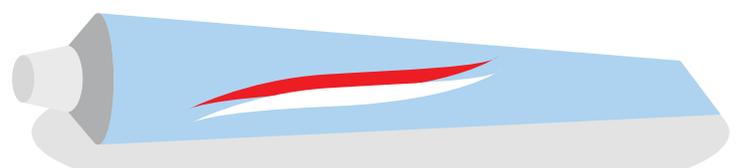
Kit list

To make the toothpaste they will need:

- Food grade baking soda (sodium bicarbonate NOT baking powder), cornflour, salt, glycerine, peppermint flavouring, food colouring, water, teaspoons, yoghurt pots or plastic beakers
- Additional flavourings, colourings and spare ingredients so they can change their recipes
- To avoid getting too messy they may need plastic aprons and gloves.

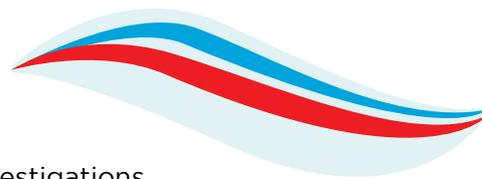
To do the tests they will need:

- Clean toothbrushes (not for teeth cleaning)
- White tiles or old plates
- Permanent markers or shoe polish
- Extra plastic pots and/or plates
- Covering for the tables



What to do

1. Read the ACTIVITY CARD to familiarise yourself with the activity.
2. Check the Kit list and ensure you have the correct resources.
3. Set the scene by discussing the letter with the children.
4. Help children gather the equipment.
5. Encourage children to talk together about their ideas and their investigations
6. Encourage the children to experiment with different recipes for the toothpaste.
7. Encourage the children to make their own records.



Things to think about

The more you give children the more they will use! Regulate the quantity of the ingredients available at any one time. They may need to make more than one batch.

Let the children make the toothpaste themselves. It doesn't matter if they do not follow the recipe precisely. The best way to test the toothpaste is by using it to clean marks off a white plate or tile. They can use a marker pen or shoe polish.

Keywords



- Toothpaste
- Cleaning
- Chemistry
- Taste
- Smell



Watch out!

All ingredients must be new and equipment clean. Despite warning the children not to taste the toothpaste, some might do so! It should only be tasted if you are certain it has been prepared hygienically.





SUPERSTAR

Making Toothpaste/ Terrific Teeth pt 1

Activity Card

The Bright Smile Toothpaste Company
have sent you a letter:

Dear Investigators,

Here at Bright Smile Toothpaste Company,
our scientists say that good toothpaste must:

- Remove plaque and stains quickly
- Have a pleasant smell for fresh breath
- Stay on the toothbrush
- Have an attractive colour

We need you to help make and test our latest recipe.
How will you test the four different properties?
Our scientists are always interested in new ways of testing
our toothpaste.

Here's our recipe:

- 3 teaspoons of baking soda (not baking powder)
- 1 teaspoon of cornflour
- 1/2 teaspoon of salt
- 3 teaspoons of glycerine
- 1-2 teaspoons of peppermint flavouring
- 1/2 teaspoon of food colouring (optional)
- 2-3 teaspoons of water

1. Mix together the baking soda, cornflour and salt in a container.
2. Add the glycerine and peppermint flavouring, and mix to form a thick paste.
3. Add a few drops of water at a time until the mixture is at the correct thickness.
4. You can add colouring as well.

We look forward to hearing from you.
Yours faithfully,

Sue Cavity

(General Manager, Bright Smile Toothpaste Company)



Your challenge

Bright Smile Toothpaste Company wants you to help with some very important, top secret research. Read the letter to find out more.

Discuss

Find out about toothpaste ingredients.

Why do you think the toothpaste company has chosen these ingredients for its toothpaste? What are they for?

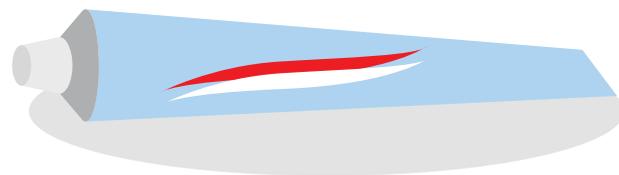
Why do you think the food colouring is an optional ingredient?

Do you think some colours would put you off using toothpaste? Why?
Why do you think that mint is the most common toothpaste flavour?

Plan what you are going to do, there are ideas on the back to help you.
In the letter there are four things that it says toothpaste must do. How are you going to test the toothpaste for each of these without using real teeth?

What will you observe and measure in each test?

Are there other things that might make the toothpaste better?
How will you test for these?



Getting started

To make the toothpaste you will need:

Baking soda (sodium bicarbonate NOT baking powder), cornflour, salt, glycerine, peppermint flavouring, food colouring, water, teaspoons, yoghurt pots or plastic beakers extra flavours and colours (optional)

To do the tests you will need:

Clean toothbrushes, white tiles or old plates, permanent markers or shoe polish, additional plastic containers and/or plates and a covering for the table.

You may want to use a grid like this to record your results, or you might think of a better way to keep notes.

How does the toothpaste remove plaque and stains?	
Does the toothpaste smell fresh?	
How well does the toothpaste stay on the brush?	
Does the toothpaste have an attractive colour?	
Other tests you think are important...	

To get you started, a few fellow investigators have come up with some ideas:

We are going to find out about plaque and stain removal.

We will put permanent marker pen or polish on a plate and find out how many rubs with a brush or how much toothpaste it takes to remove it.

Let's find out about the smell.

We could try to describe the smell and give it a score out of five. I wonder what other people will think?

We are going to find out if it stays on the brush.

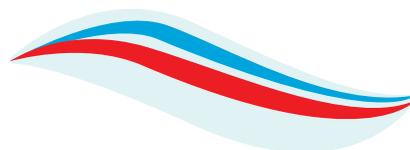
We could try shaking it off of a brush over a container. I wonder if the number of shakes and how hard you shake it make a difference?

What about colour?

We could try to describe the colour and give it a score out of five. I wonder if some people would give different scores to different colours?

What will you do?

Do you think your toothpaste will need improving? Why?



Test your ideas

What did you find out?

Has the toothpaste performed well in all the tests?

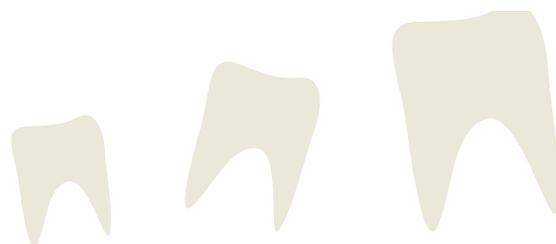
Were there any tests that you found particularly tricky? Why?

Do you think the toothpaste recipe needs to be improved in any way?

Why do you think this?

Share your ideas

You could write a letter to Bright Smile Toothpaste Company. Why not add drawings or photographs? You could put samples of your toothpaste in small bottles or tubes and make labels for them.





SUPERSTAR

Outdoor Gym Organiser's Card



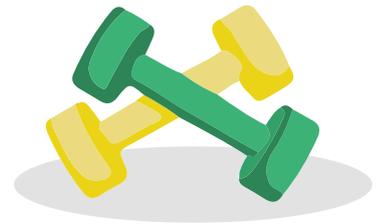
About the activity

This activity is designed to get children thinking about outdoor activity and exercise.

B Fitt has sent a letter to the investigators - he wants to help people in his town keep fit. Can the children help him design an outdoor gym?

Through this activity you will support your group to:

- Explore their outdoor environment to look for opportunities for exercise.
- Have their ideas evaluated through a survey.
- Design an outdoor gym.



Kit list

- An outdoor environment (including benches, steps, and other objects)
 - Camera and other recording equipment
-

What to do

1. Read the ACTIVITY CARD to familiarise yourself with the activity.
2. Check the Kit list and ensure you have the correct resources.
3. Set the scene by discussing the letter with the children.
4. Encourage children to think and talk together about how to exercise.
5. Allow children to use the internet or books to research different types of outdoor activity.
6. Ensure that they think about safety.
7. Help the children to record their survey results in a table, like the one in the ACTIVITY CARD.

Things to think about

There are lots of different ways people can exercise outdoors. When children are designing their outdoor gym they can include day to day activities that help people keep fit.

Most children will have seen people running. Encourage them to think of more unusual ways to keep fit outside.

Keywords

- Outdoors
- Exercise
- Gym
- Design.



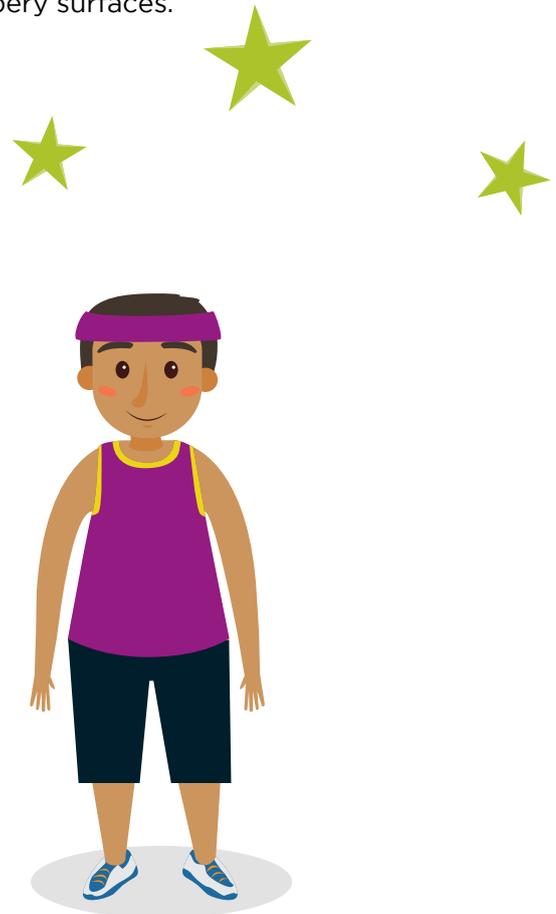
Watch out!

Ensure children wear appropriate clothing and sports shoes when exercising.

Give children the opportunity to explain ideas to you before they test them out.

Ensure that the area is safe and clean and avoid hard or slippery surfaces.

Follow your organisation's guidelines for outdoor work.





SUPERSTAR



Outdoor Gym

Activity Card

You've been sent a letter:

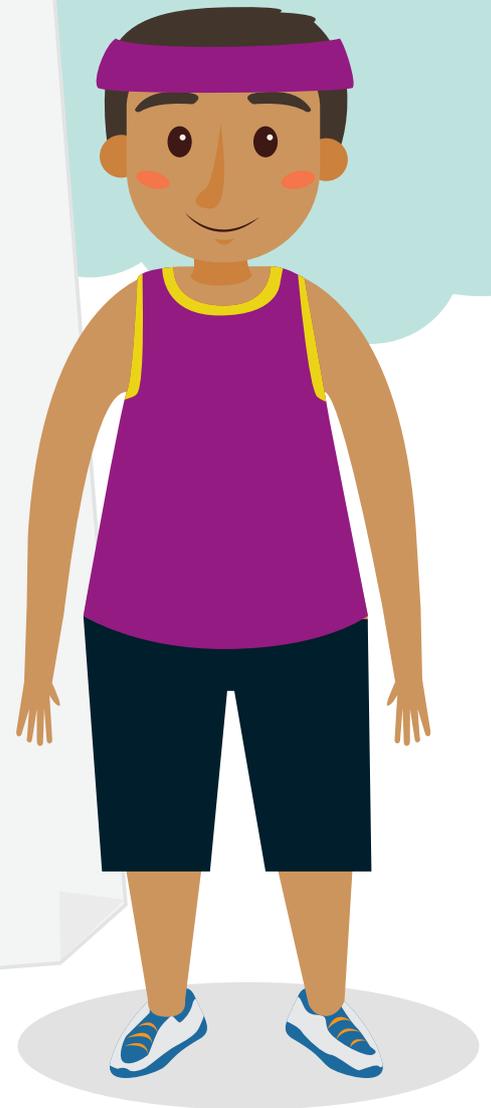
Dear Investigators,

Not enough people are keeping fit in our towns, so we would like your help to do something about it. We need you to think of great ways for people of all ages to exercise outdoors. For example, they could do leg lifts sitting on a park bench. We bet you have lots more ideas! You could make a guide called 'Outdoors and Active' to help them.

Looking forward to seeing your ideas.

B. Fitt

B Fitt



Your challenge

Come up with some great exercise ideas using parts of your local area to create an outdoor gym.

Discuss

You could find out:

- What kind of exercises do people like to do?
- Which muscles are used in different activities?
- What things can you do to improve your stamina?
- Go outside and explore your local area. What do you see?
- What could be used to do exercises? Don't forget that lots of the things we do every day are great exercise.
- Make a list of all the different activities you can do outside.
- How can you make sure they are done safely?
- Try out some of your ideas



Getting started

Some of your fellow investigators have come up with a few ideas to get you started:

You'll need:

- Camera to record ideas for your outdoor gym
- Pencils and paper to write down ideas
- Computer and books for researching ideas
- Why not record your thoughts and findings in a grid like this?



What we can use in our outdoor gym	Type of exercise we can do	How it helps to keep us fit

You could also start with a survey like this one:

- Ask people what they think about your ideas for an outdoor gym. Here are some questions to help you.
- Which ideas for an outdoor gym look most interesting?
- Which exercises do you think could be improved?
- Can you think of any more things we could use as part of our outdoor gym?

What other questions can you ask?

Some fellow investigators have had a few ideas to help you along

- We could sit on a bench to do leg lifts.
- We could use a step for doing step-ups.
- We could use the outside edge of the play area as a running track.
- We could use the lines on the paving stones for doing long strides.
- We could get someone to paint hop-scotch and other jumping and hopping games on the playground
- We could try digging in the garden.

What do you think?



Test your ideas

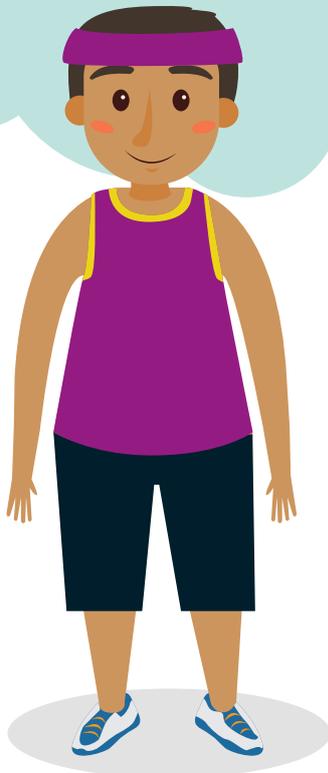
Which parts of the outdoor environment can you use to keep fit?
Are there things that adults can do to help to make an outdoor gym?

Share your ideas

Gather all your ideas together to make an 'Outdoors and Active' guide for your outdoor gym. Remember to explain how each exercise helps you to keep fit.

Extra things to do

Maybe you could start an outdoor gym club?
Design a poster to encourage people to join in.





SUPERSTAR

Over to You Organiser's Card



About the activity

This activity is designed to get children thinking about adhesives and using their creativity.

The children have been given two news articles about the scientific inspiration and the principles behind sticky tape and glue. Can they think of good uses for these sticky things? This is designed to be a creative, ideas generating activity that will stretch some children's imaginations and their ability to think scientifically and 'outside the box'.

Through this activity you will support your group to:

- Read stories of genuine scientific research.
- Recognise that new materials and products may be the result of chance experimentation.
- Understand how scientists may spend many years researching and developing their ideas into a final product.
- Help to find uses for innovative and unusual inventions.

Kit list

- Access to the internet and/or books



What to do

1. Read the ACTIVITY CARD to familiarise yourself with the activity.
2. Set the scene by discussing the news articles with the children.
3. Help the children to identify what the problem is.
4. Encourage children to talk together to develop their own ideas.
5. Encourage children who may want to do extra research via the internet etc.
6. Encourage children to make their own records. This might include creating a poster to advertise their ideas and to persuade people to buy them.



Things to think about

In this activity, there are no right or wrong answers. Children should be encouraged to think creatively and develop their own unusual or innovative ideas.

At the end of the activity, you may like to tell the children that the 'glue that would not set' was used to make the Post-it note. Ten years after Spencer Silver invented his unusual glue, Post-it notes were being sold all over the world.

The stories in the 'Extra things to do' section on ACTIVITY CARD may leave the children guessing but they probably worked out that:

George de Mestral's sticky fastener is the material we all know and love - Velcro.

Walter Diemer's sticky pink recipe is a children's favourite - bubble gum.

Keywords

- Glue
 - Adhesives
 - Invention
 - Imagination.
-





SUPERSTAR

Over To You

Activity Card

You've come across two news articles:

NEWS

Lizard Inspires New Super Strength Sticky Tape

After observing how the millions of tiny hairs on the bottom of a gecko's foot helps it to run up and down walls and even upside down on glass, scientists have invented a new super-strength sticky tape that will stick to any surface.

"Just one metre square of this new super-sticky material could hold a family car or even an elephant to the roof!" explains Dr Sajad Haq. The scientists think this material could be used in lots of situations. For example, a window cleaner might climb up the side of your house instead of using a ladder. They are interested in any other ideas people may have.

So go on, use your imagination.

PRESS

The glue that would not set

A chemist named Spencer Silver was in his lab trying out new ideas. He mixed up a new type of glue - but it didn't work. It did stick a bit but it wasn't very sticky. It could be easily lifted off any surface and it never set. No-one knew what to do with it. It was useless!

Then along came Arthur Fry, chemist and choir director. He took Silver's new glue and spread it over thin slips of paper to mark the different songs in his hymn book each week.

Nice idea, but not much use to anyone else - or is it? What do you think?

Your challenge

Use your scientific imagination to think of how you might put these sticky things to good use.



Discuss

Can you think of any interesting, creative or unusual uses for:

The super strength sticky tape?

The re-usable glue that sticks but never sets?

You'll need access to the internet and/or books to do some research



Getting started

Plan what you are going to do.

Take a big sheet of paper or some cards and write down all the ideas you can think of for using these two sticky things. Write down any idea, however odd it might seem.

Now sort your ideas into those that sound like they could be used and those that are creative but not as useful.

Choose one or two and see if you can develop your ideas. This is what many scientists do – they turn new scientific ideas into useful things.

Show your ideas to other people and see what they think about them.

Are there any changes that you could make to improve your ideas?

Think of all the sticky inventions that you have used at home and at school.

Think of imaginary situations where sticky stuff is used, for example, Spiderman climbing walls. Try to be as creative as possible.

A few fellow investigators have had some ideas to get you started:

I'd put a huge line of super-strong sticky stuff at the end of airport runways to stop planes overrunning.

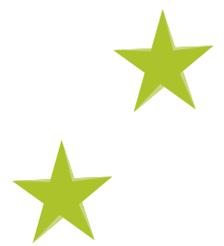
I'm going to put super-strong glue on my ceiling before going to sleep. During the night, all the lovely dreams that leave my head will decorate the ceiling.

I'm going to put re-usable glue on the top of my nose to keep my glasses in place.

Super-strong glue would be handy for police officers making an arrest. Instead of using handcuffs, they put glue on the person's feet and tell them to stay put while the officer does the paperwork.

I'm going to put re-usable glue on the classroom walls. Then all my ideas will stick to the walls. I can peel them off when I need to use them – no more writing!

Which of these are pure fantasy and which might really work?



Share your ideas

You could create a poster to advertise your ideas and persuade people to buy your inventions.

Extra things to do

Read these stories about other famous sticky inventions – both of them happened by pure chance. See if you can work out what each sticky product is...

STICKY INVENTION 1

One day in 1948, a Swiss engineer named George de Mestral found himself in a sticky situation. Returning from a walk in the woods, he found prickly seeds called burrs stuck to his dog and clothing!

Under a microscope, he saw that they were made of hundreds of tiny hooks, which meant they could latch onto anything loopy. He set to work developing his idea.

Many people laughed at his ideas but after eight years of experimenting, he was selling more than 80 million metres of the material every year. George's sticky product is now used in everything from shoes and clothes to watchstraps and space suits.

STICKY INVENTION 2

In 1928, Walter Diemer was working as an accountant for a famous food company in America. In his spare time he would play around with new recipes until, one day, he had made a mixture that was sticky and also very stretchy.

Walter carried a large sample of it to a local shop; it sold out that afternoon. His recipe was so successful that it sold over a million and a half dollars worth in the first year.

When asked about his invention, Walter said: "It was an accident; I was doing something else and ended up with something sticky with bubbles."

The only food colouring in the factory for Walter to use was pink. Even today, this is still the most popular colour for this sticky mixture.





SUPERSTAR

Playground Games

Organiser's Card



About the activity

This activity is designed to get children thinking about disabilities and creating games that are accessible and inclusive.

Cosmic and Gem's friend Lyra has limited vision, but would like to join in on their games. Can the investigators find some accessible games?

Through this activity you will support your group to:

- Learn about the effects of limited vision.
- Design games taking into account the needs of different players.
- Evaluate their games.



Kit list

- Games equipment such as bean bags, balls, cones, poles etc.
- Bells and other noise makers
- Torches and other lights
- Ear plugs
- Low-vision simulators etc.



What to do

1. Read the ACTIVITY CARD to familiarise yourself with the activity.
2. Check the Kit list and ensure you have the correct resources.
3. Set the scene by discussing Lyra's experience with the children.
4. Help children to decide what they can do to understand more about how certain games might limit access to children with disabilities.
5. Help children to collect resources.
6. Give children plenty of options when they research different inclusive sports e.g. using internet, books and leisure centre visit.
7. Ensure children think about how ideas can be tested safely.

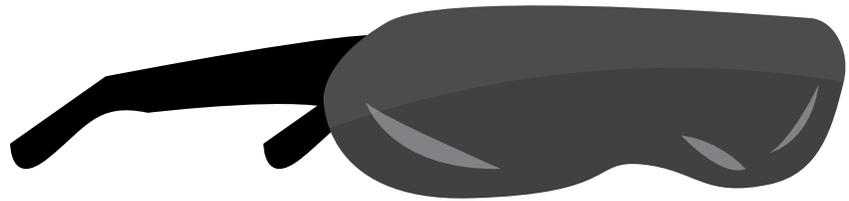
Things to think about

Visual disabilities can be experienced by using low-vision simulators. There are some suggestions for making these on the ACTIVITY CARD. Additionally you can paint different markings on goggles, block the central area of vision, block the whole lens apart from a small peep-hole or stick patches of translucent or opaque paper on the lenses.

Other disabilities could be experienced by playing a game while sitting in a chair, by using ear-muffs etc.

Keywords

- Disability
- Sports
- Adaptation
- Creativity
- Accessibility.



Watch out!

Before restricting sight, hearing or movement, ensure the children are in a safe space and have appropriate support. Watch out for any children showing signs of distress.

Follow your organisation's guidelines for outdoor work.

Make sure any alterations made to sports equipment are safe.



SUPERSTAR

Playground Games Activity Card

Cosmic and Gem have made a ten-pin bowling game. They love playing it! They want their friend Lyra to be able to join in. Lyra has low vision. Cosmic thinks that they can change the game so that they can all play together.



"Perhaps we could wear some special glasses so we see the game in the same way that Lyra does" says Gem.

What do you think they can do?

Your challenge

Create a set of playground games that can be played together by children, with and without disabilities.

Discuss

Try bowling while wearing low-vision simulators. What difference does it make? In what ways can you change the game to make it easier for everyone to play together?

Lyra was wondering if you can think of ideas for other games that children with and without disabilities can play?



Getting started

How well are outdoor games designed for children who have low vision or difficulty hearing, have limited movement or use a wheelchair?

Research games that people with disabilities play, for example Goalball.
Try out one of these games.

What games can you play outdoors? Are there any markings for games?

What could you do so that more children can join in?

What new games can you create?

What rules will your games have?

How will you make sure your games are safe?

Now test your games. How accessible are they? If you do not have a disability, you may need to try your games by using low-vision simulators, ear muffs, sitting in a chair, and so on.

To do your tests you will need:

Games equipment such as bean bags, balls, cones, poles, and so on.

Bells and other noise-makers

Torches and other lights

Limited-vision simulators – try very dark sunglasses; goggles covered with tissue with a small peep-hole cut in it; or your own glasses with one lens covered

Ear muffs

Some of your fellow investigators have had a few ideas to get you started:

I am going to use catching nets for rounders, to make it easier to catch the ball.

We could use a sound-maker on a game to help us find a target.

We could attach a bell to a beanbag or ball. I wonder if we can throw it to each other wearing a blindfold?

We could use a flashing light instead of a sound to start races.

We could try playing volleyball or tennis sitting on the ground instead of running around.

What will you do?

Share your ideas

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





SUPERSTAR

Polymer Problem

Organiser's Card



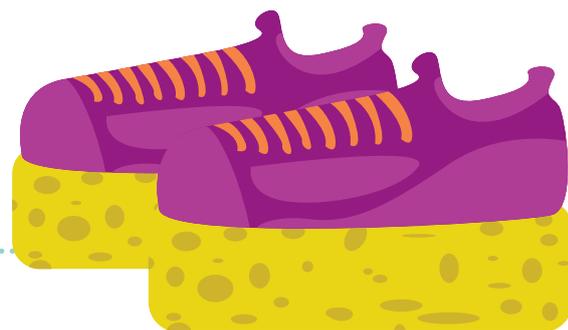
About the activity

This activity is designed to get children thinking about polymers and their different properties.

Dr Polly Murs from Horners has reached out for help to come up with a new polymer product for a competition.

Through this activity you will support your group to:

- Learn about how polymers are made
- Explore different types of polymers and their properties
- Record and present their findings to the group



Kit list

- A small selection of polymers. Choose from:
 - Pieces of polythene
 - Plastic from bottles or other containers
 - Nylon from tights
 - Magic snow
 - Water-absorbing crystals
 - Potty putty
 - Slime
 - Expanded polystyrene (trays, packaging)
 - Cling film
 - Lycra fabric
 - Polycarbonate (CDs)
 - Hair mousse
 - PVC (pipes, floor covering)
 - Silicone bakeware
 - Artificial sponge
 - Bouncy balls, etc
- Drawing materials
- Sticky post-it notes, enough for each group to have five

What to do

1. Introduce the activity using the email from Dr Polly Murs
2. Give out activity cards and equipment to the children.
3. Show the children examples of objects made from polymers. Focus on things obviously made from plastic. Tell them some simple information about polymers mentioned in the Things to think about section.
4. Encourage children to discuss their ideas and how to carry out their investigations. Give the children time to talk and identify other items they think are made out of polymers using post-

its. Share what they have chosen. Emphasise that this is an awareness-raising activity, not a test to see who is right.

5. Remind them about Polly's email. Then give a small selection of polymers to each group. Encourage the children to explore the properties of the materials using words from the activity card to help them. Choose ones that have different properties so they experience a wide range.
6. Encourage the children to think of new uses for the materials. You might want to suggest some creative possibilities to get them started,

such as nylon to make an expanding toy store, or expanded polystyrene to make a whacky warm hat. Once groups of children have decided on their favourite new use, allow them time to create their designs.

7. Give each group one minute to share their designs and explain their ideas. Then let the whole group discuss which to send to Dr Polly Murs.

Things to think about

Children may need some guidance to explore the properties of the polymers. If so, explore one material together using the word bank.

Encourage children to include as much detail as possible on their designs, such as what the new product is made from, what it does and who might use it.

Children only need to know that polymers are substances made up of groups of atoms (or

tiny particles) that are joined together in very long chains. The more these chains are tangled up, the stronger the polymer becomes.

Many polymers, such as those used in this activity, are manufactured. Polymers also occur naturally in materials like rubber, starch, silk, protein and DNA.

All plastics are polymers, but not all polymers are plastic. Polymers have a wider range of properties than those commonly associated with plastics.

Keywords

- Polymers
- Plastic
- Chains
- Molecules

Watch out!

Read all labels and avoid any potential hazards. Ensure that all samples are clean and free from sharp edges. Substances must not be put into mouths, noses or ears. In case of accident, flush with running water. Ensure children wash their hands after exploring the polymers.

Find out more

See www.fantasticplastic.org.uk for more information on polymers.

The Worshipful Company of Horners promotes the development, interests and image of polymers and the polymer industry. They foster links with industry and education bodies, and support a range of charitable activities - www.horners.org.uk

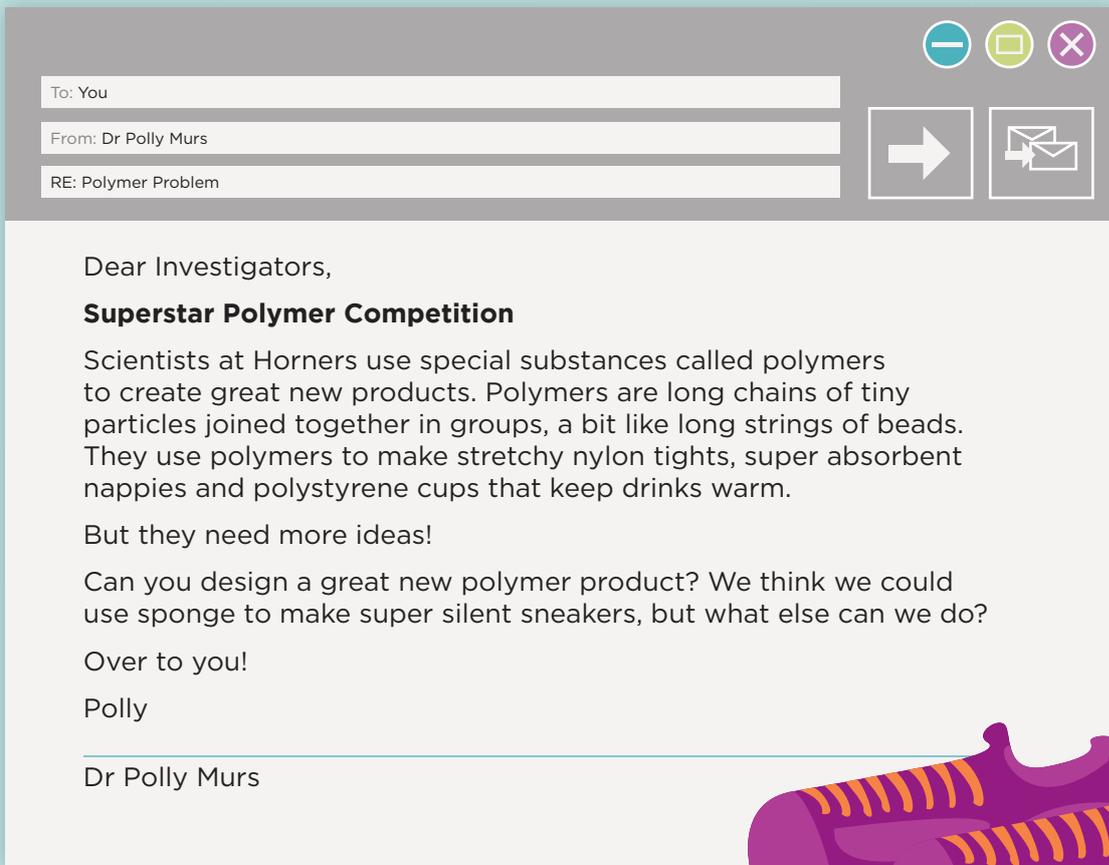




SUPERSTAR

Polymer Problem

Activity Card



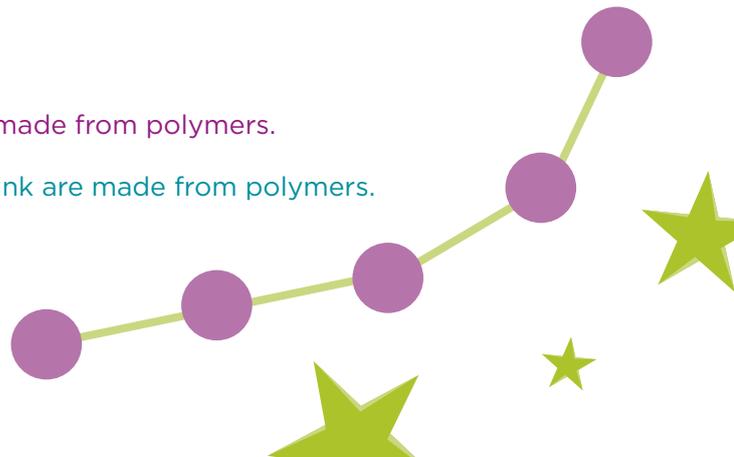
Your challenge

Help Dr Polly Murs and the other scientists at Horners to think of some new uses for materials made from polymers.

Discuss

Talk about some things you use every day that might be made from polymers.

Stick a post-it note on five things in the room that you think are made from polymers. Do you all agree?



Getting started

Explore the materials on your table. Each material is made from a polymer. What does it look like? What does it feel like?

Slippery Bouncy Flexible
Light Waterproof
Stretchy
Sticky Absorbent Squashy Transparent
Keeps things warm Shiny Hard
Bendy

Test your ideas

What can be made using your polymer materials? Be really creative.

Choose your favourite idea for using one of your polymers and create your design.

Make sure your design is big and clear so that you can convince your friends how brilliant it is.

Share your ideas

You have one minute to share your design. What will you say?

Which ideas will you send to Dr Polly Murs?

Extra things to do

Find out about recycling polymers.

Not all polymers are manufactured. Where can you find natural polymers?

What would be different if scientists hadn't discovered polymers?





SUPERSTAR

Protecting Polymers

Organiser's Card



About the activity

This activity is designed to get children thinking about polymers and their different properties.

Dr Polly Murs has asked for help to decide which cling film is best to cover her lunch. The foil she has been using keeps spilling her food! Can the children help by seeing which cling film is best?

Through this activity you will support your group to:

- Learn about polymers
- Test the strength and durability of different kinds of cling film
- Record and present their findings to the rest of the group

Kit list

- A selection of cling films (including PVC free cling film)
- Aluminium foil
- Lunch boxes or other containers
- 50 gram masses to act as 'weights'
- Rulers
- Video camera or other equipment (e.g. mobile phone) to video the investigation
- Freezer
- Microwave

What to do

1. Introduce the activity using the story.
2. Give out activity cards and equipment to the children.
3. Set the scene by discussing the email from Polly. Encourage the children to talk about cling film and foil. Do they use either at home? How do they bring packed lunches to school?
4. Give out samples of cling film and foil for the children to investigate. What similarities or differences can they notice? Encourage the children to make predictions. Do they think cling film will help solve Polly's lunchtime problem?
5. Support children to conduct their investigation and make their own records of their results. Give each group a selection of weights, a container to stretch the materials over and a ruler. If possible allow each group to put a sample of their best material into a freezer to see what happens. They could microwave the cling film too. It is not safe to put foil in the microwave. Make sure children wrap each material being tested around the whole container.
6. Ask the children to present their findings to the rest of the group, they can be as creative in their presentation as they want.

Things to think about

Testing foil and cling film against paper will help children understand the useful properties of polymers. For example water resistant, light weight and mouldable.

Aluminium foil is more practical than cling film for protecting food in the freezer. It will hold its seal and is more likely to prevent freezer burn.

The static electricity that helps cling film to stick can be demonstrated by hanging a piece of cling film off the edge of a table. Rub a plastic pen with fabric, then hold it close to the sheet of cling film. Can the children see the cling film move towards the pen?

Keywords

- Static
- Durability
- Polymers
- Weights
- Measures
- Strength



Watch out!

Very important: do not put foil in the microwave.

Find out more

Cling film first entered the domestic market in the 1950's. Cling film is made from thin plastic, so it is a good insulator. When you pull cling film off the roll, some of the electrons from one layer are pulled onto another layer, creating areas of positive and negative charge. The cling film holds this charge, causing it to be attracted to areas of opposite charge on other non-conductive materials such as ceramic plates.

Aluminium foil has been used as a food covering since the 1930's. Foil does not stick to other materials but can hold its shape when wrapped around food or other substances. Foil acts as a very good barrier to bacteria and odour.

Cling film and foil are both used for many things other than food protection. Cling film is especially useful in medical settings. Often cling film is used to help treat burns, but it has many other uses.

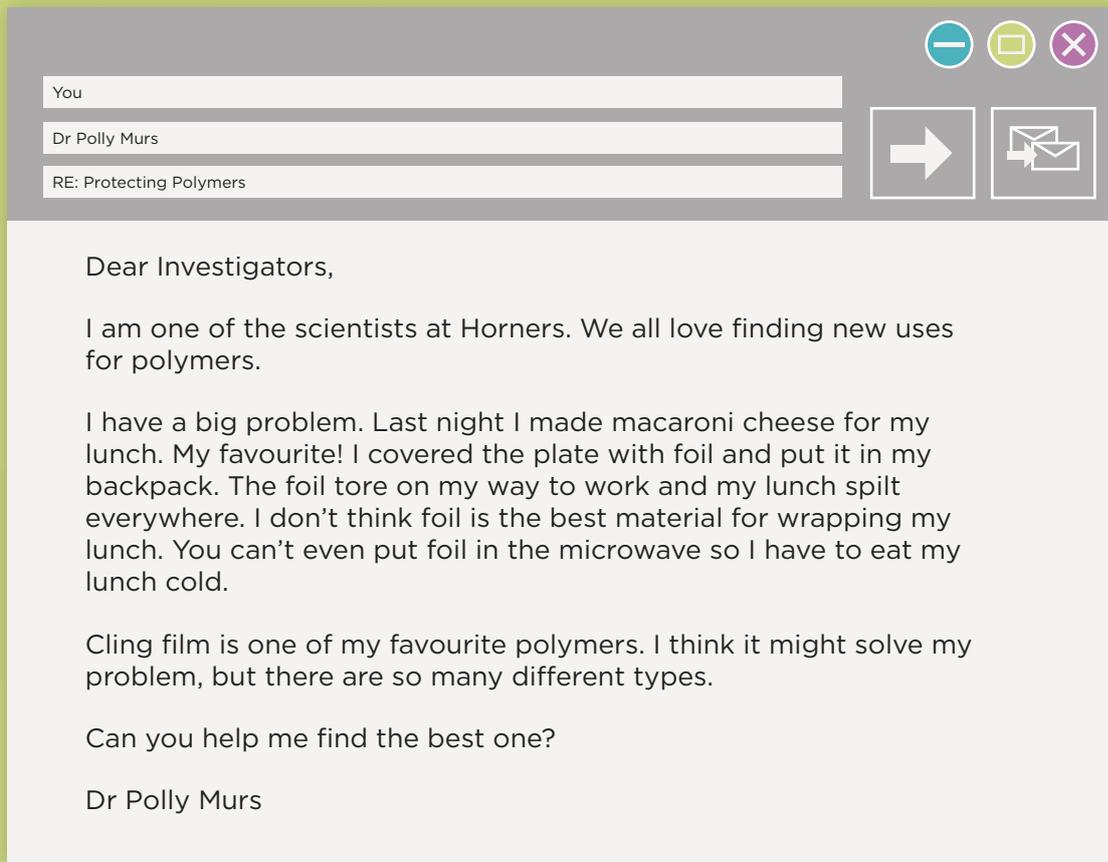




SUPERSTAR

Protecting Polymers

Activity Card



Your challenge

Can you help Dr Polly Murs to find the best cling film to protect her lunch?

Discuss

Do you bring lunch to school? What do you wrap it in?

What are the differences between aluminium foil and cling film?

Cling film doesn't feel sticky, so how does it stick?

Do you notice any differences between the different cling films?

How are they different from foil?

Getting started

You will need some different types of cling film and some foil.

First, wrap each material being tested around a container.

Next drop a weight onto the film from 10cm above.

- Do any of the films break?
- Do any come loose?
- What happens if you drop the weight from higher up?
- What happens if you put cling film in the freezer?
- Which cling film is strongest?
- Which cling film is stickiest?
- How do the cling films compare with foil?



Test your ideas

You might like to record your results in a table like this one. Can you think of any other ways you could test the different cling films and foil?

	Foil	Cling film 1	Cling film 2	Cling film 3
10g weight from 10cm height				
10g weight from 20cm height				
10g weight from 10cm height after cling film has been in the freezer				

Share your ideas

You could put your results in a table and display them in a bar chart, or make a video of your investigation to send to Dr Polly Murs.

Extra things to do

Find out how plastic films are used by doctors and nurses.

Make a list of other polymers Polly can use to protect her lunch.

Find out more about which polymers can be recycled.





SUPERSTAR

Racing Rockets

Organiser's Card



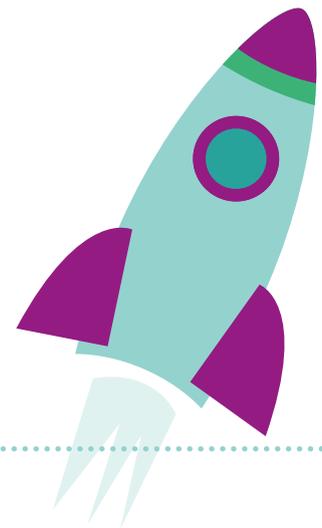
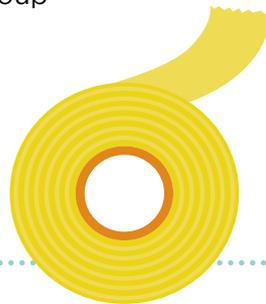
About the activity

This activity is designed to get the children to think about rocket designs and build a rocket that can go as high as possible.

The children have seen a poster about a new rocket competition inviting them to design and fly a rocket. The competitors need to set their sights high and produce creative ideas.

Through this activity you will support your group to:

- Think about different shapes of rockets
- Test different rocket shapes and sizes
- Share their findings with the rest of the group



Kit list

- Pencils or dowel to roll the rockets
- Strips of paper or card (cut to 1/4 of an A4 sheet)
- Sellotape
- Scissors
- Plastic straws - 1 per child
- Metre ruler or tape measure
- Plasticine, Blu-Tack or paperclips to add weight
- Extra card to make fins



What to do

1. Read the ACTIVITY CARD to familiarise yourself with the activity.
2. Check the Kit list to ensure you have the correct resources.
3. Set the scene using the poster and invite the children to enter the competition.
4. Give children a short time to talk about rockets and share their ideas.
5. Give each team the resources that they will need for the challenge.
6. Let children explore making and flying the basic tube shape. Give support to any groups that seem to be struggling.
7. Once they have the basic shape working, give children plenty of time to experiment to find out what makes a difference to how the rocket flies. They may need to make several versions to compare them.
8. When the time is up, all the children gather to present and test their rockets.
9. Measure the distance that each rocket travels. Test them three times each. It is up to you to decide if children can repair or adjust their rockets after each test.
10. Give points to each rocket according to the distance travelled. You can give extra points for design.
11. Announce the winners of the competition.
12. Encourage children to decide what made a difference to how each rocket flew. They could do a design report for Windy Astralbody.
13. The winning designs can be displayed on a podium.

Things to think about

The rockets will not work very well unless one end is flattened, folded and sealed. Let them explore this for themselves first.

Watch out for children launching rockets by hand rather than blowing.

The children will need to agree on where to launch their rockets from and how the flight will be measured.

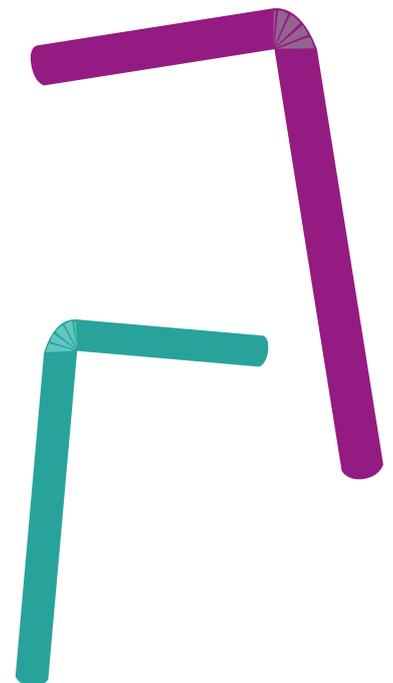
Take it further

Once children have the basic rocket shape there is plenty of scope for investigation such as size, materials and shape. Three important things affect the way rockets fly – aerodynamics, stability and balance.

Flattening and folding one end will help to make the rocket more aerodynamic and prevent air escaping. Children might experiment with trying to make the nose more cone-shaped.

Children can try attaching fins in different positions. This will affect the stability of the rocket. Fins at the tail end tend to be the most stable.

Weight will also affect the flight. A little additional weight at the tail end can help. If it is too heavy it may not fly at all.



Keywords

- Aerodynamics
 - Flight
 - Rocket
-

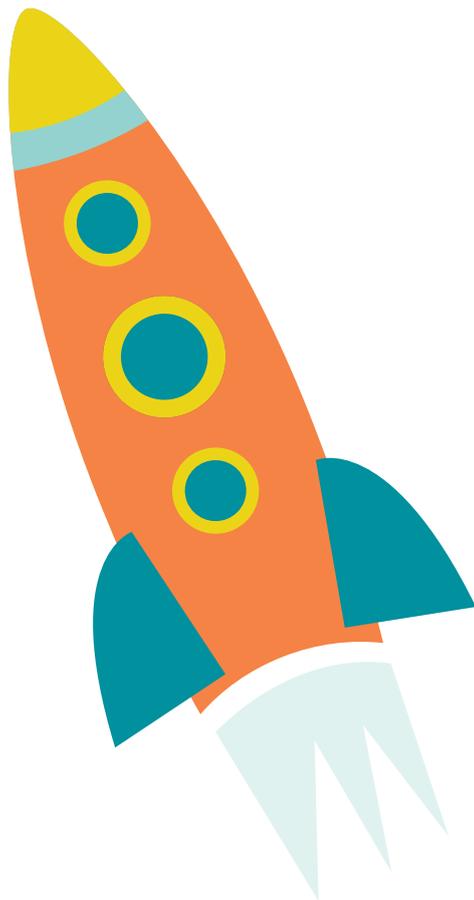
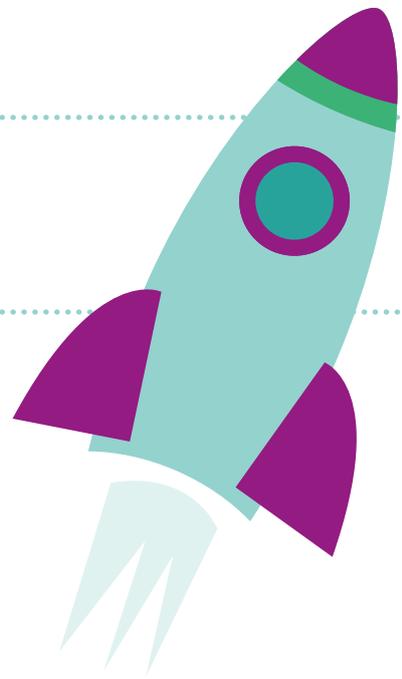
Watch out!

Remind children to stand behind the rockets as they are launched. Do not let children swap straws.

Remind children not to over-exert when blowing the rockets.

Find out more (links to further info)

Paper rockets could also be launched using plastic bottles.
See www.britishtscienceassociation.org/creststar





SUPERSTAR

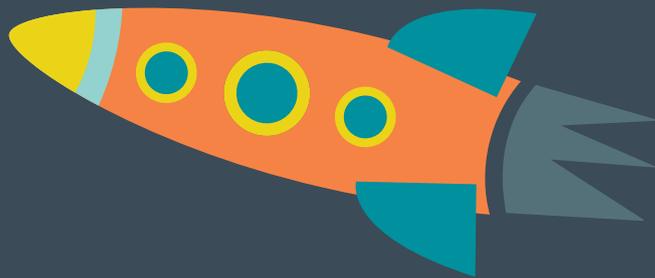
Racing Rockets

Activity Card

You've seen a poster on the noticeboard in town:

Director Windy Astralbody told us, "It's a tall order but we hope competitors will set their sights high and maybe even break some records. We are looking for really creative ideas. Who knows, one day the winners might get to fly into space in a real rocket."

A NEW ROCKET COMPETITION IS BEING LAUNCHED TODAY BY THE SPACE RESEARCH ASSOCIATION, 'RACING ROCKETS'.



The competition invites children to design and fly a rocket.

Your challenge

Can you design a rocket that will go the furthest? Building a proper rocket is difficult but you could investigate rocket shapes that might look something like this.



Discuss

Are all rockets the same shape?
What is important about the shape of rockets?
Does everyone agree?

Getting started

This is how you make your basic rocket shape.

Roll a strip of paper or card round a pencil (not too tightly) to make a tube.
Tape it in 3 places to keep it together, then take the pencil out.
Flatten one end of the tube, fold it over and secure it with tape.
Slide the tube onto a straw.
Blow your rocket across the room and see how far it goes. Don't blow too hard.

Test your ideas

How you can improve its flight?
Do you think fins will help?
Where is the best place to put them?
What shape should they be?
What about the size of the rocket?
Is card better than paper?
Does it help to put some weight in the rocket?
Try different rockets and choose the one that you think is best.



Share your ideas

Hold the 'Racing Rockets' competition. Each team needs to tell everyone else about their rocket design and then measure how far the rockets travel. Test each one three times. You could send your designs to Windy Astralbody and put the winning rockets on a podium.

Extra things to do

What other ways could you make a rocket? Find out what you can from books and the internet, then make and test some.

You could write a consumer report to compare and contrast rockets.

Several countries are trying to use rockets to travel into space.
Can you find out more about them?



SUPERSTAR

Recycle Reuse

Organiser's Card



About the activity

The children have been asked to think about recycling paper, and to try and make their own paper.

Recycling paper is a way we can help the environment. While researching why and how we recycle, can the children recycle old scraps to make their own paper?

Through this activity you will support your group to:

- Think about why we recycle paper
- Try different ways of making their own paper by recycling waste paper
- Share their ideas with the group

Kit list

- Used paper e.g. newspaper, coloured paper, sugar paper
- Magnifying glasses or microscope
- Washing up bowls and warm water
- Hand whisks (PAT tested electric whisks or blenders can also be used) or mashers
- Metal coat hangers shaped into a rough rectangle covered with old tights or nylon stockings to make a sieve
- Absorbent material – e.g. blotting paper, layers of newspaper or cloth
- Rolling pins, bottles and/or iron (PAT tested) to help to dry the paper
- Starch (optional)
- Colouring, glitter, bits of foil etc. to add to the paper. Leaves, buttons, string etc. to place on top of the paper, before it is dried, to make patterns.
- Crayons, pencils etc.



What to do

1. Read the ACTIVITY CARD to familiarise yourself with the activity.
2. Check the Kit list to ensure you have the required resources.
3. Set the scene by discussing the article. What do the children already know about paper-making? Does the story give them some ideas?.
4. Encourage the children in small groups to try to work out why there is a damaging effect on the environment by not recycling paper (see Background information).
5. Let children look closely at the fibres in different samples of paper (you could use a digital microscope to share images with the whole group).
6. Each group can make their own paper following the instructions provided.
7. Let children experiment on their own but give help to any children who seem to be struggling.
8. An iron can be used to speed up the drying process.
9. You or the children could take photographs of the process.
10. Give the children time to compare their paper samples and think about what has made a difference. Talk about which papers are good for recycling.
11. Children could display their paper once it is dry. They could write messages on it. Crayons and pencils are generally better than ink.
12. There are extra challenges on the ACTIVITY CARD. These can be used if there is spare time or the children want to carry on investigating at home and earn a bonus sticker.



Things to think about

Homemade paper can take many days to dry naturally.

Ensure pulp evenly covers the frame.

If the pulp is very thick the paper will be lumpy.

Homemade paper is sometimes difficult to write on. It can be too bumpy and too absorbent.

You can add a little starch to paper to improve its texture.



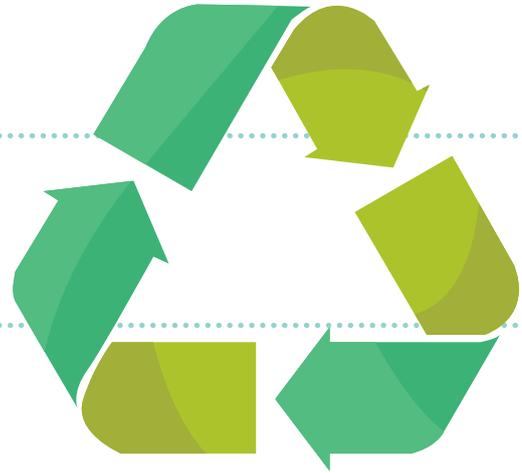
Take it further

Paper is made from cellulose fibre as well as wood pulp. It can also be made from straw, rags, grass, even elephant dung! In 2004, 74% of UK paper was recycled.

As paper is made from sustainable forests, recycling is carried out for environmental benefits, not to save trees. Paper in landfills produces methane, which is a potent greenhouse gas. Recycling 1 tonne of paper saves 30,000 litres of water, 3,000-4,000 kwh of electricity and 95% of air pollution, compared to the production of 1 tonne of new paper.

Keywords

- Paper
- Recycling
- Environment

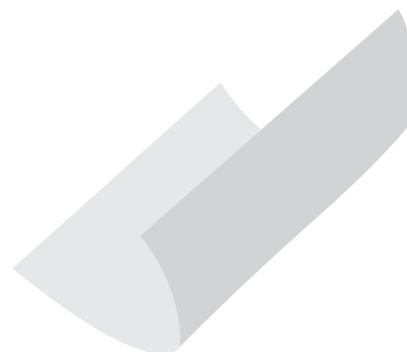


Watch out!

Irons, electric blenders or whisks are best used by an adult. Keep the iron at a low temperature.

Find out more (links to further info)

See website for more information about paper making resources www.britishsocietyassociation.org/creststar





SUPERSTAR



Recycle Reuse

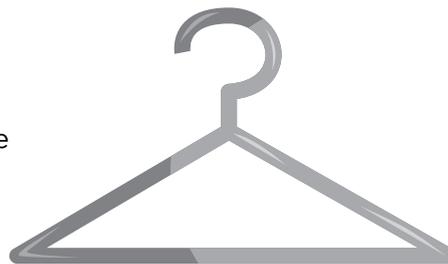
Activity Card



Paper was first created in China by Ts'ai Lun in A.D. 105. He mixed hemp, mulberry bark, and rags with water, mashed them, pressed out the liquid and hung it to dry. This humble idea has allowed people around the world to communicate ideas, share news and create works of art. But paper production has a major impact on the environment. It's time to take action! You can help by recycling.

Your challenge

Find out more about recycling paper and make your own paper by recycling waste paper.



Discuss

Why do you think it is better to recycle paper than to throw it in waste tips?

If you look at different types of paper with a magnifying glass or microscope, what can you see?

What kinds of paper do you think you could recycle?



Getting started

Tear old paper into small pieces, put in a bowl, cover with warm water.

Mash or whisk until it is like thick porridge.

Make a frame from a coat hanger and old tights.

Dip your frame into the liquid and make sure it is evenly covered with pulp. Let the water drip back into the bowl.

Put the coat hanger down on absorbent paper or cloth. Leave to dry.

To speed up drying, put another piece of paper or cloth on the top of the pulp and roll firmly with a bottle or rolling pin. Ironing it will help too. Ask an adult to help.

Your paper needs to be left to dry for at least a day before you try to write on it.

Test your ideas

Make a plain piece first, then try different ideas.

You could add colouring, seeds, glitter or other tiny items to your paper as you mix it.

You could put leaves, buttons, pieces of string or other interesting things on top of your paper to make patterns.

Share your ideas

Look at the different papers that have been made. How will you change what you do next time? You could make a display of the finished paper.

Extra things to do

How strong is your special paper?

Find out how much paper you use each day.

Find out more about how paper is recycled.





SUPERSTAR

Spinning Solutions

Organiser's Card



About the activity

This activity is designed to get children thinking about centrifugal force.

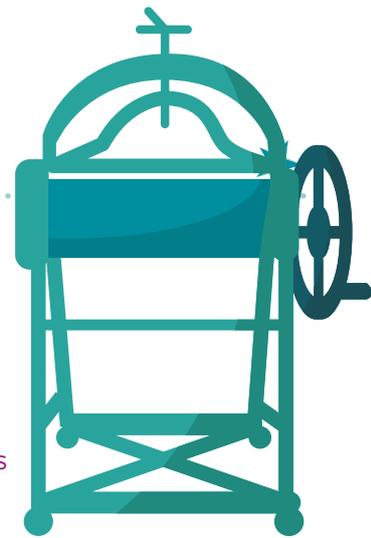
Richie from URENCO has been to the Startown History Museum and is fascinated by the mangle. Can the children help to find out how it works and what else spinning can be used for?

Through this activity you will support your group to:

- Design and make their own model washing machine drum and mangle
- Test different drum and mangle designs and record their results
- Present their findings to the group.

Kit list

- Different-size containers with lids, so the smaller fits inside the larger container (polystyrene or paper cups work well)
- Plastic or canvas bags
- Absorbent fabric - e.g. dishcloths or flannels
- Rolling pins
- Flat boards
- Plastic trays
- Measuring jugs or cylinders



What to do

1. Introduce the activity using the story of Richie. Ask the children if they have helped to wash clothes before. Have they ever tried washing clothes by hand? Children may not know what a mangle is. Show them a picture or video. Can they explain how it works?
2. Give out activity cards and equipment to the children.
3. Explain that they will be using the equipment provided to make a model mangle and a model washing machine.
4. Encourage children to discuss their ideas and how to carry out their investigations. Prompt questions:
 - How does a washing machine work? What does the drum do?
 - Does the spin speed make a difference to how dry the clothes are?
 - How will they make sure their test is fair?
 - How will they record their results?
5. Support children to conduct their tests and make their own records of their results, groups may decide to vary size, number, distribution or even type of hole. When testing the washing machine drums children should spin the bags at their side in a big circle up past their ears and down past their knees. Ask children to compare the water measurements by pouring the water from each model into a measuring jug.
6. Ask the children to present their findings to the rest of the group, they can be as creative in their presentation as they want.

Things to think about

This is a great activity to do outside. Otherwise a large room (e.g. a hall) allows plenty of space for spinning.

The simplest way to make a centrifuge is with two lidded polystyrene or paper cups. Use a sharp pencil or compass, supervised if necessary, to make holes in the side of the smaller cup and place it inside the bigger one. Put wet fabric inside the smaller cup and put both lids on. One needs to fit inside the other. When spun round in a bag the water will gather in the bigger cup. The washing machine drums do not need to be spun very quickly for the investigation to be effective. Spinning in a larger, slower circle also works well.

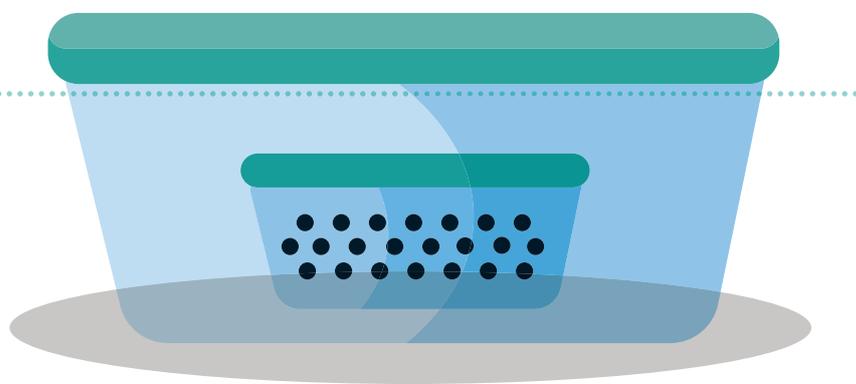
The simplest way to make a model mangle is to lean a flat board in a plastic tray so it is propped up on one end. Then use a rolling pin to roll the fabric. The water collects in the tray.

Mangles work by compressing fabric and squeezing the water out. Washing machines use centrifugal force as they spin to move the water to the outer container away from the fabric.

Centrifugal force causes the thing being spun to move away from the centre of the circle. A centrifuge spins rapidly so that heavier liquids or objects separate out from lighter ones. Lots of things can be separated in this way. They are used to analyse blood and to create nuclear fuel to make electricity.

Keywords

- Centrifuge
- Mangle
- Spinning
- Machines
- Liquids
- Volume



Watch out!

This activity should be done in an area where children have lots of space around them to spin their models safely.

Spilt water should be mopped up quickly to avoid accidents. Children should wear aprons or suitable clothing to avoid splashes.

Carefully consider group size due to physical nature of activity.

Find out more

Children can learn more about how centrifugal force can help to generate nuclear fuel for electricity by visiting www.learnwithrichie.com. Richie is a character who helps children learn about where electricity comes from.



SUPERSTAR

Spinning Solutions

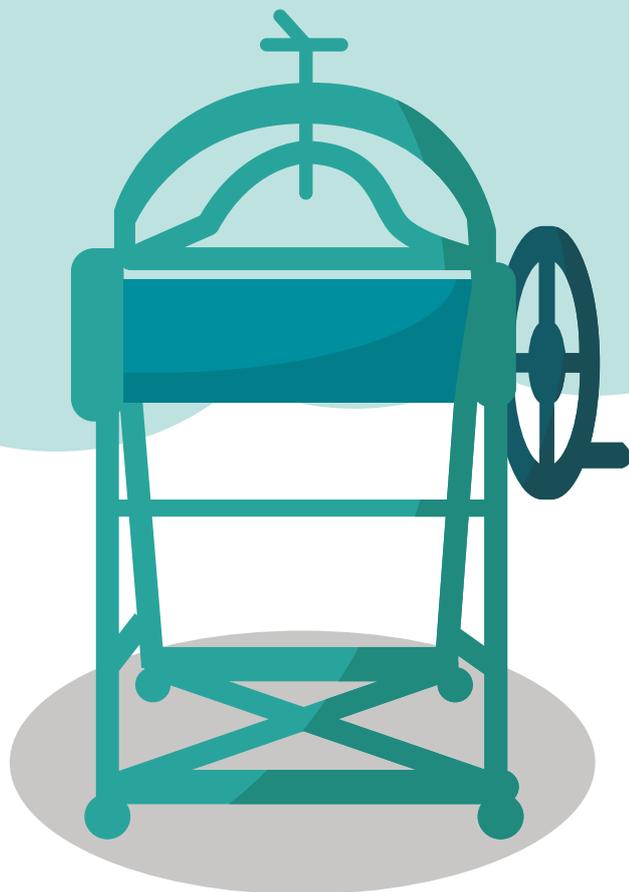
Activity Card

Richie has been to the Startown History Museum with his friends. They visited a display of inventions from the past.

Richie's favourite invention was a mangle.



People used mangles to dry out clothes after they had been washed. The museum guide said now washing machines dry out clothes by spinning around really fast. My clothes are still wet when they come out of the washing machine. I think a mangle would be better. Can you help me find out which is best?



Your challenge

Help Richie find out the best way to separate water from his clothes.

You can make models to help you decide!

Discuss

Have you ever washed clothes by hand?

How do you get the water out of them?

How does a mangle work?

Why does a washing machine drum spin around really fast?

Getting started

Plan what you are going to do:

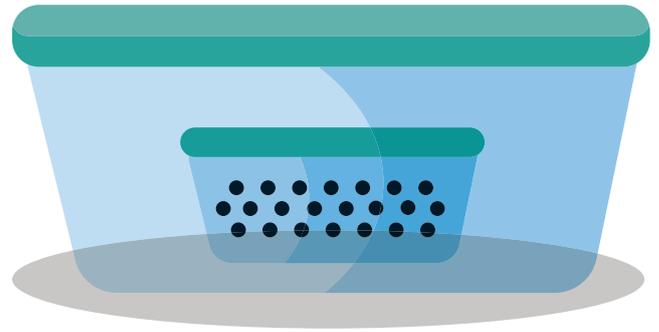
- Compare the amount of water you can separate from the fabric using a mangle and a washing machine drum. Think about how you can make this a fair test.
- Soak two pieces of the same fabric in water.
- Separate the water from one piece of fabric using your mangle and the other piece using your washing machine drum.

Make a model of a washing machine drum:

- First, make holes in a tub that has a lid.
- Next, put this inside a bigger tub with a lid to collect the water.
- Now you can spin this around at your side in a strong bag.
- Remember! Don't let go as you spin it.
- A washing machine can spin around more than 1000 times every minute to separate water from your clothes. How fast can you spin your drum?

Make a model mangle:

- A rolling pin is a good model of a mangle.
- Roll your fabric on a sloping surface.
- Remember to put something underneath to collect the water!



Test your ideas

You might like to record your results in a table like this one:

	How much water was removed from the fabric?
Mangle	
Washing machine drum spun slowly	
Washing machine drum spun fast	
Washing machine drum with lots of small holes	
Washing machine drum with a few small holes	
Washing machine drum with lots of big holes	
Washing machine drum with a few big holes	

Share your ideas

Were there any problems with your tests? Why?

How could you improve your tests?

Take photographs of your investigation and your models. Send your pictures to Richie to help him decide how to dry his clothes.

Extra things to do

Find out about other things that can be separated by spinning.

Find out how separating by spinning can help to generate electricity.

Find out how separating by spinning can help in medicine.



SUPERSTAR

Super Spinners

Organiser's Card



About the activity

This activity is designed to get the children thinking about helicopter blades, and how different blade sizes change the way a paper spinner falls.

Mr Sycamore arrived for work in a helicopter, amazing the students. He's testing which helicopter is best. Can the students help to find out if a longer blade design will make a difference?

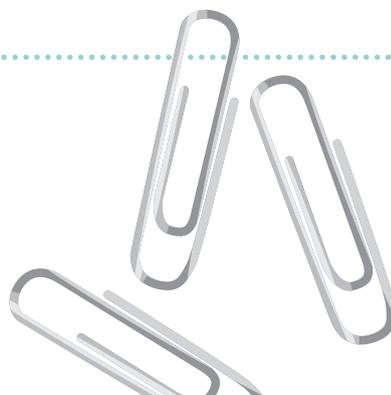
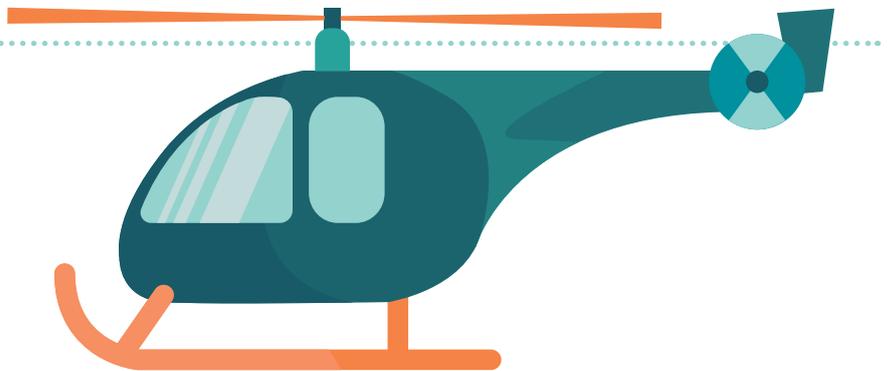
Through this activity you will support your group to:

- Think about what makes paper fall in different ways
- Test whether a paper spinner falls in different ways with different blade sizes
- Share their ideas with the group

Kit list

To make the spinners they will need:

- A4 Paper
- 30 cm ruler
- Metre ruler
- Paperclips or Blu-Tack
- Scissors
- 1 ready-made spinner to show the children how they work
- Large and small templates for spinners (if you think children will need them) - see following page
- Stopwatches
- Other types of paper and card



What to do

1. Read the ACTIVITY CARD to familiarise yourself with the activity.
2. Check the Kit list, including preparing a spinner and templates if you think that they might be needed.
3. Set the scene by discussing the news story and show the children a spinner falling.
4. Give children time to explore flat and screwed up paper and to think about what might be making a difference to the way that they fall.
5. Encourage the children to make their own large and small spinners. It is important to let them explore their ideas on their own. Have templates available if children need them. Some may need help to work out how to cut and fold the spinners.
6. Now let children try the spinners to see what happens.
7. Remind them about safety, particularly about not climbing to drop the spinners
8. Give children some time to talk about their observations and ideas. You could show children other spinners with different blade lengths and ask them to predict how they will fall.
9. Children can share their 'best' spinner or they can create a display by sticking their spinners onto paper with advice for Mr Sycamore. Avoid too much writing by composing text message replies.
10. There are extra challenges on the ACTIVITY CARD. These can be used if there is any spare time or if the children want to try out more ideas at home and earn a bonus sticker.

Things to think about



Encourage children to drop their spinners from the same height. This should be as high as possible so that the spinners can twirl before they hit the ground.

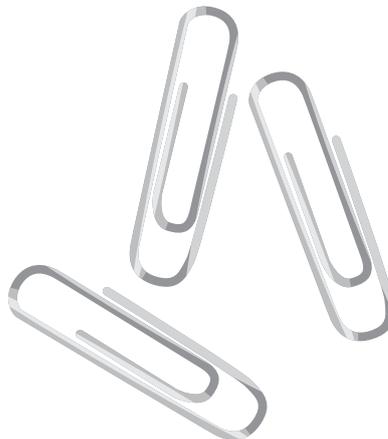
Very large spinners require a long drop to see any effect. You may need to drop them.

If they are too flimsy they will not spin.

Very tiny spinners can spin extremely quickly.

It is difficult timing the spinners if they fall quickly. However, if children want to try timing, you should let them have a go to see if works.

Adding paperclips or Blu-Tack can increase spin speed.



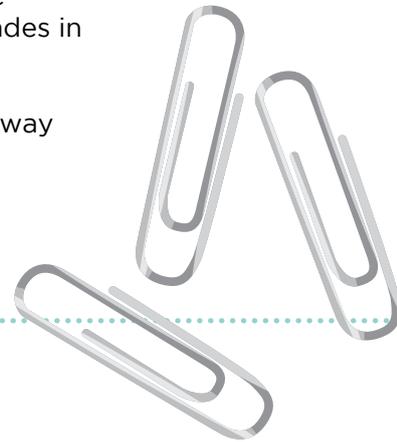
Take it further

In this situation, gravity pulls an object towards the Earth, but air pushes against it. Flat paper falls slower than screwed up paper because there is more air resistance.

Gravity pulls the spinners down. The air resists the movement and pushes on each blade causing the spinners to spin.

Spinners with longer blades will normally spin more slowly. This is because there is more surface area for the air to push against. The material on large spinners needs to be stiff enough to hold the blades in place to allow it to spin.

Sycamore seeds are sometimes called helicopters because of the way they spin as they fall.



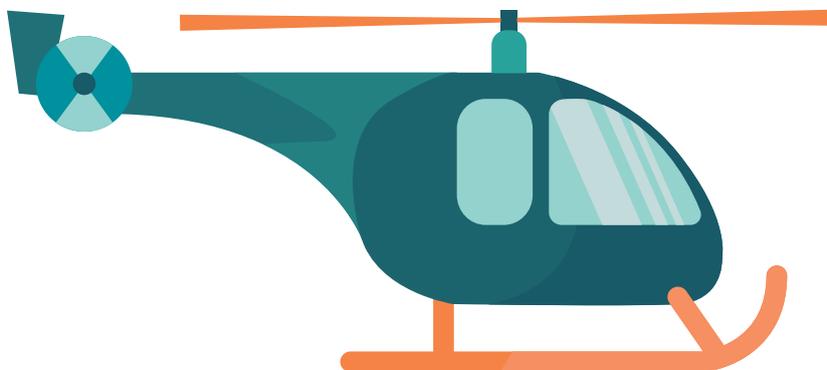
Keywords

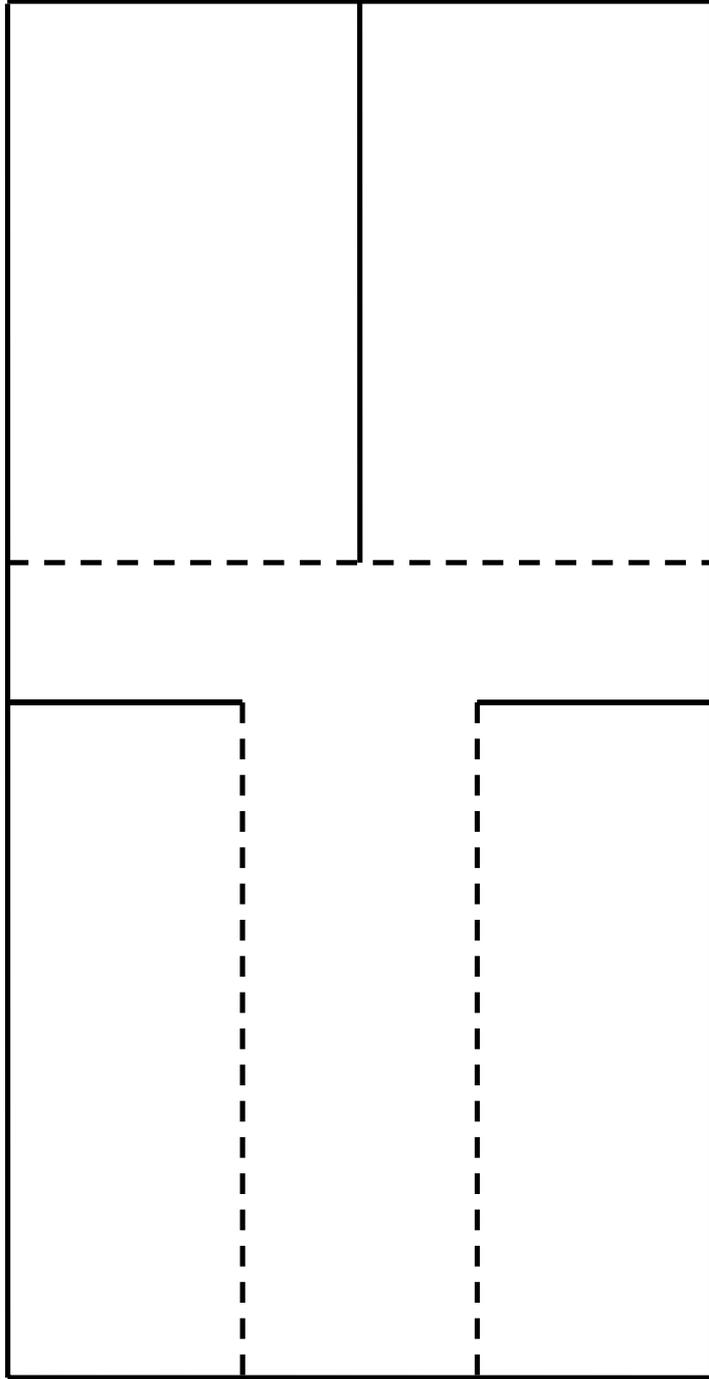
- Flight
- Shape
- Size
- Aerodynamics

Watch out!

It can be useful to drop the spinners from a height greater than a child's height. However, children should not stand on chairs or tables to launch their spinners unless very closely supervised. A library stool or kitchen steps are better.

Children need to handle and carry scissors in a safe manner.



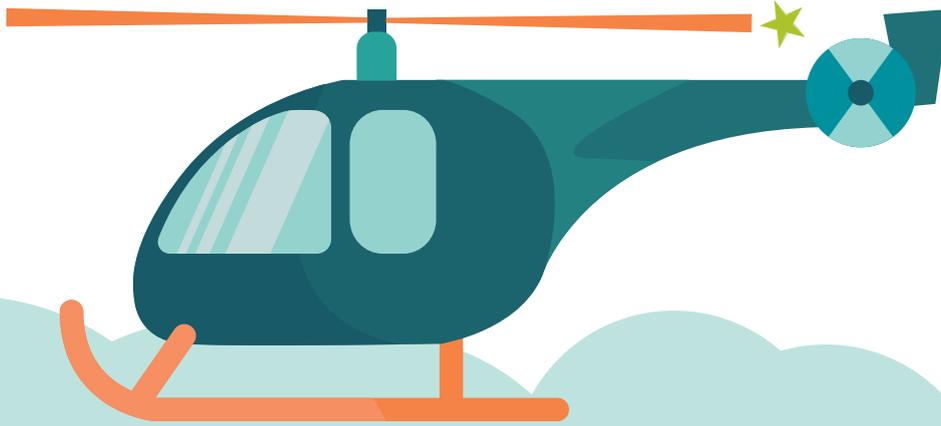




SUPERSTAR

Super Spinners

Activity Card



Mr Sycamore, class 5 teacher at Startown Primary School, amazed pupils and staff when he arrived for work in a helicopter!

“It’s a bit of a hobby really,” said Mr Sycamore, “I’m flying a different one every day and then I’ll buy the one I like the best. This helicopter has a short blade design, I wonder if the size of blade makes a difference? I’ll need some Super Spinner test pilots to help me decide!”

Your challenge

Can you help Mr Sycamore decide if the size of the blades makes a difference?

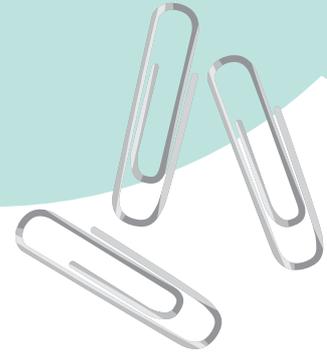
Building full size helicopters is difficult but you can have fun making paper helicopter blades and watching how they fall.

Discuss

- What happens if you drop flat and scrunched up paper?
- What do you notice about the way that they fall?
- What might be making a difference to the way that they fall?

Getting started

You can make paper spinners to use as a model. You will need to put a paper clip on the bottom to help them to fall properly. What sizes will you make them? How big will you make the blades? How many clips will you add?



Test your ideas

Watch the spinners carefully as they fall.
Can you make them go faster and slower?
You could try landing them on a target and score points for where they land.
Remember to change only one thing at a time.

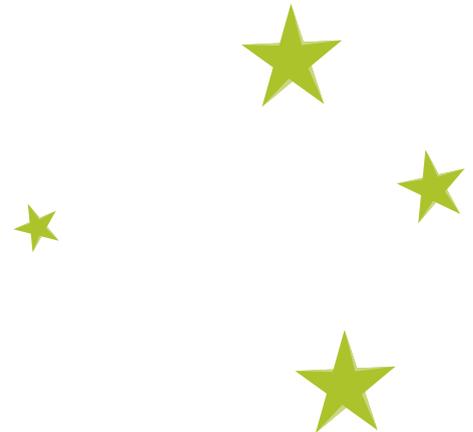
Share your ideas

You could make a display for Mr Sycamore using your spinners to show him what happened.



Extra things to do

Does the spinner act differently if you change its shape?
What if you make spinners from different kinds of paper?
What else could you change?
Can you make a bar chart to show your results?





SUPERSTAR



Surprising Stains

Organiser's Card



About the activity



This activity is designed to get children thinking about chemistry.

Cosmic and Gem have been picking and eating blackberries and managed to get juice on their white tee shirts. Cosmic puts soap on his, Gem puts lemon juice on hers. Both of the stains changed colour - can the children work out why?

Through this activity you will support your group to:

- Investigate what caused the colour changes.
- Explore different plant materials (food) that change colour.
- Group chemicals by colour change and make a chart.

Kit list

- Blackberries - you do not need a lot of juice (you could use ripe blackcurrants instead)
- Saucers or small containers
- Spoons
- Lemon juice (bottled is fine)
- Liquid soap
- A selection from lime juice, vinegar, fizzy drinks, apple juice, white grape juice, orange juice, crushed rhubarb, cream of tartar, yoghurt etc. (optional)
- A selection from baking soda, mild washing powder, indigestion tablets, milk of magnesia, toothpaste, window cleaner (with ammonia) etc. (optional)
- Other dark coloured plants - see the **ACTIVITY CARD**.



What to do

1. Read the **ACTIVITY CARD** to familiarise yourself with the activity.
2. Check the Kit list and ensure you have the correct resources.
3. Set the scene by discussing the story with the children.
4. Help the children to identify what the problem is.
5. Encourage children to talk together to develop their own ideas.
6. Encourage children to follow Frank's ideas and then to explore their own ideas.
7. Encourage the children to make their own records. This might include creating a poster or chart.

Things to think about

Many of the plants listed in the ACTIVITY CARD will change colour. Many red or purple plants will work, but red cabbage is particularly effective. The slightly smelly, but strongly coloured, liquid gives a broad range of colours when various substances are added. Extracting the colour is best done by boiling the cabbage. Encourage children to compare several plants.

Keywords

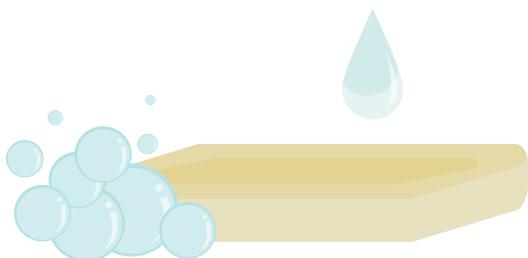
- Stains
- Colour
- Plants
- Berries
- Acid
- Alkali
- Chemistry.



Watch out!

More colour can be extracted from plant material if it is heated. Only allow children to use hot water under supervision. Using warm water helps reduce the safety risks. Do not let children use any substances in the kitchen that may be hazardous such as bleach, washing soda, dishwasher detergent and powerful cleaners.

Do not taste anything in this activity.





SUPERSTAR



Surprising Stains Activity Card

Frank, Cosmic and Gem love blackberries. There are blackberries in the hedges near where they live. They have collected large bowls full of the dark, juicy fruit. Then, they look at their white tee shirts. Oh no! They are covered in blackberry stains. Cosmic rushes to the sink and gets some soap to wash them out. Gem sprinkles her stains with lemon juice.



"Look what's happened to the stains! They have change colour" commented Cosmic.

"So have mine! Why did that happen?" asked Gem.

"How fascinating! We need to do some investigating. I think a little chemistry might help" answered Frank.

Your challenge

Find out what has happened to the stains on Cosmic and Gem's tee shirts.

Discuss

Talk to your buddy about what you think might have happened.



Getting started

Here is what Frank thinks you need to do first.

Squash some blackberries in a little water to get the juice out of them.

Put a bit of blackberry juice on two saucers or in small containers.

Add a little soap to the juice in one container and see what happens.

Now add lemon juice to the blackberry juice in the other container.

Compare the colours.

Now try adding other things to blackberry juice

To carry out the tests you will need:

Blackberries - you do not need a lot of juice (you could use ripe blackcurrants instead)

Saucers or small containers

Spoons

Lemon juice (bottled is fine)

Liquid soap

A selection from lime juice, vinegar, fizzy drinks, apple juice, white grape juice, orange juice, crushed rhubarb, cream of tartar, yoghurt etc. (optional)

Other dark coloured plants

You may want to use a table like this to record your findings:

What we added	Soap	Lemon juice		
What happened				

You may also want to try:

Raspberries
Blackberries
Beetroot
Red cabbage
Purple sprouting broccoli
Cherries
Red onion skins
Blueberries
Red grape juice

What else would you like to try?



Test your ideas

What colours did you get?

Lemon juice is an example of something that is an acid. Soap is alkaline. Can you use the colours to work out which other liquids and powders are acids and which are alkalis? Are there any that do not seem to be either?

Are there any other plants that change colour? Look in the garden, hedgerows and in shops for ideas. What colour will they turn if they make a stain and you try to get it out with either soap or lemon juice?

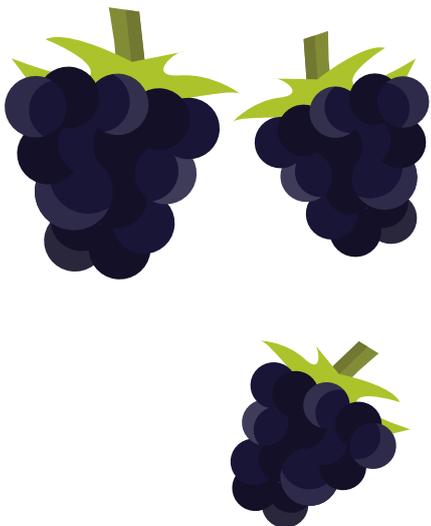


Share your ideas

Why not make a plant colour chart showing all the different colours that you have made and how you made them. Use this to explain to someone what has happened to the stains on Cosmic and Gem's tee shirts.

Extra things to do

To find out more about using the colours from plants, visit www.britishsocietyassociation.org/CRESTstar





SUPERSTAR

Testing and Comparing Tea

Organiser's Card



About the activity

This activity is designed to get children thinking about diffusion.

The children have been given a story about three brothers who gather tea from India, China and Japan, and cannot decide which tea is the best.

Through this activity you will support your group to:

- Explore different varieties and origins of tea.
- Devise and carry out their own tea-making tests.
- Host a tea party and find out which tea is the favourite.

Kit list

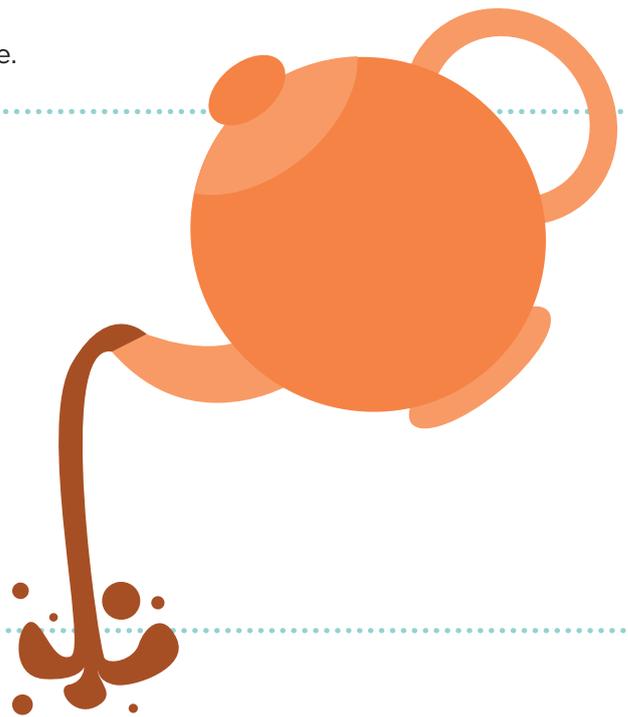
- A range of tea
- Kettle
- Water
- Spoons
- Measuring jugs
- Beakers
- Mugs or cups
- Filter paper
- Magnifying glasses or digital microscope

What to do

1. Introduce the activity using the story from the activity card. Ask the children if they think they can help the brothers to decide which tea is best.
2. Give out activity cards and equipment to the children.
3. Explain that they will be using the equipment provided to test the different kinds of tea and methods for making tea.
4. Encourage children to discuss their ideas and how to carry out their investigations.

Prompt questions:

- How will they make sure their test is fair?
 - What is the difference between looking (observing closely) and liking (personal taste)?
 - How will they record their results?
5. Support children to conduct their tests and make their own records of their results. They could also take photographs or make drawings.
 6. Ask the children to present their findings to the rest of the group, they can be as creative in their presentation as they want.



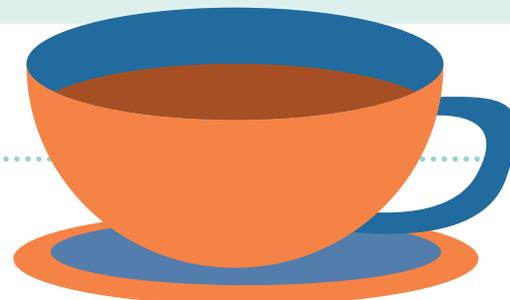
Things to think about

To decide which is best, encourage children to look closely at the teas as well as do tests for taste etc. If children want to add milk and sugar to the tea, remember that for a fair test they must add the same amount to each cup. Professional tea tasters always taste the tea black!

Cheaper tea bags often contain a lot of tea dust. You often find this in the box! Does this affect the taste and flavour?

Keywords

- Diffusion
- Temperature
- Filter



Watch out!



Children need adult supervision with kettles and boiling water. They could use hot tap water for some of their tests but temperature is one of the factors that affects the taste of tea.

Drinking and tasting activities should NOT take place in laboratories.



SUPERSTAR

Testing and Comparing Tea

Activity Card

An old tea tale

An old man made each of his three sons promise to go on journeys to explore the wonders of different countries. After the old man died they set off on their travels. One went to India, one to China and one to Japan. When the brothers met again, each of them was carrying a large sack.

The oldest brother spoke first. "India is full of wonders. The mountains are covered in bushes with bright, green leaves. These are gathered by women carrying large baskets. The leaves are taken to a factory, dried in an enormous machine and made into an amber coloured drink. I have brought some leaves home to show you."

The middle brother told his story. "In the secret gardens of China, they use the upper leaves and buds of special plants to make a sacred drink for the emperor and his family. A young princess gave me some leaves to bring home."

The youngest brother then said, "In Japan I saw a miracle. Velvety-green waves cover the country's hills. Each spring, women remove the top layer of buds and leaves and use them to make a marvellous drink. It is these valuable leaves which I have with me today."

When they looked in the sacks they were amazed to find that they had each collected tea leaves! The eldest brother had collected black tea, the middle brother had red oolong tea and the youngest brother had fresh, green tea. The brothers made drinks using the leaves but they couldn't agree which was the best tea of all.

(Story adapted from the series 'The Healing Properties of Food' written by Alexandra Lopatina and Maria Srebtsova available through Kings Hart Books.)

Your challenge

Can you help the brothers in the story to decide which type of tea makes the best drink?

Discuss

Look closely at different tea leaves (you can get them out of tea bags). Are they all the same?

How will you know which tea is best? Could people have different views?

How many different types of tea will you use?

How will you make sure that you are testing the type of tea, not the way that it is made?

Getting started

Why not carry out a survey to find out which type of tea your friends and family like. You could hold a tea party for them.

How many people will you ask?

What will you ask them?

Some fellow investigators have had a few ideas to get you started:

I think we should look at the size and shape of the tea leaves. Are some leaves big and others just bits of dust?

I think we can dip filter paper in each of the teas after they have brewed for 5 minutes, then compare the colours.

We could add the same amount of hot water to the same amount of tea leaves, then compare the colour and smell.

I think we can make different types of tea in the same way and taste them. Remember everyone will need their own cup.



Test your ideas

You may want to use a table like the one below to record your results:

Type of tea	Loose tea or teabags	Strength	Colour	Smell	Taste
<i>e.g. green tea</i>					

When you have finished the survey you can:

- Make a block graph or pictogram to show what people think
- Decide if one tea is better than the others.

Share your ideas

Why not design a menu for a special café that serves lots of different kinds of teas. You could include:

- Photographs and descriptions of the different types of tea
- Ratings for each tea based on your investigations and survey
- Advise on which tea to drink.





SUPERSTAR

Tomato Sauce

Organiser's Card



About the activity

This activity is designed to get children thinking about thickness of liquids (viscosity).

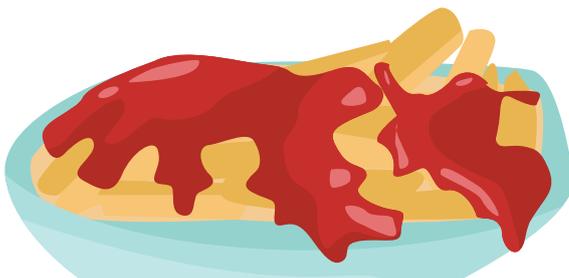
Startown Sensational Sauces have had a few complaints about their new tomato sauce. Some find it too thick, some too thin. Can the investigators help to find the perfect level of thickness?

Through this activity you will support your group to:

- Think about what thickness sauce should be
- Test and experiment with different thicknesses to help decide which is best
- Record their results and create a story or interview about the results

Kit list

- Real tomato sauces
- Fake tomato sauce (alternative to real sauce for testing) - very thick wallpaper paste without fungicide with red food dye added - follow mixing instructions carefully
- Disposable cups for sauce samples
- Rulers, timers
- Plastic teaspoons and/or pipettes
- Funnels with different sized spouts or plastic bottles cut in half
- Plastic aprons and disposable gloves



What to do

1. Read the ACTIVITY CARD to familiarise yourself with the activity.
2. Check the Kit list including making the basic 'tomato sauce' recipe and ensure you have the necessary resources.
3. Set the scene by discussing the story and show the children some tomato sauce bottles.
4. Give out a small amount of tomato sauce and let the children talk about the questions on the card.
5. Get some quick feedback or go straight on to planning the investigation.
6. Give children some time to talk about how they might test different samples. There are ideas on the card that they can choose from.
7. Check that they have thought about keeping notes but don't spend a lot of time recording results. You could prepare blank grids for them if it would help.
8. Remind them about safety.
9. Give out the real and/or fake sauce. Remind them that they need to test different thickness of sauce. Let the children make the different thicknesses themselves (they could add water to the sauces to try this).
10. Encourage them to try whichever tests they think are appropriate.
11. Give them time to talk about what they have found out and to demonstrate what they think is the best thickness for the sauce.
12. They could write a story about being a scientist testing tomato sauce in the Startown Sensational Sauces laboratory. Alternatively they could interview each other as if they were scientists at the factory.
14. There are extra challenges on the ACTIVITY CARD. These can be used if there is spare time or if children want to try out more ideas at home and earn a bonus sticker.

Things to think about

You can use real tomato sauce, but 'fake sauce' is a useful alternative (or use both). Encourage children to add a little water at a time to their 'sauce' to make a range of thicknesses. It needs to be mixed in well to get an even mixture.

Restrict the amount of sauce that is used. If you give out a lot they will use a lot!

Take it further

How well tomato sauce flows (viscosity) can be tested in a machine called a Bostwick Consistometer. One regulation states that to get a high grade, the sauce must flow no more than 10 cm in 30 seconds along the flat surface of the Consistometer. This is tested at 20°C.

Tomato sauce contains many different ingredients: cooked and strained tomatoes, vinegar, sugar or another sweetener, salt, onion or garlic flavours, spices such as cinnamon, cloves, mace, allspice, nutmeg, ginger and pepper.

Scientists work hard to make sure that the mix of ingredients and colour is right, to make high quality tomato sauce.

Tomato sauce is also known as tomato ketchup, red sauce and catsup.



Keywords

- Sauce
 - Viscosity
 - Liquids
 - Thickness
-

Watch out!

If using fake sauce, children should be warned that it is NOT edible. They must be warned not to taste or eat it.

Clean up any mess on the table or floor quickly with a damp cloth to avoid any accidents.





SUPERSTAR



Tomato Sauce

Activity Card

Startown Sensational Sauces has opened in the town. Their extra tasty recipes are already very popular and are selling out fast. Unfortunately, last week they were overwhelmed with complaints about their tomato sauce.

One disappointed customer wrote,

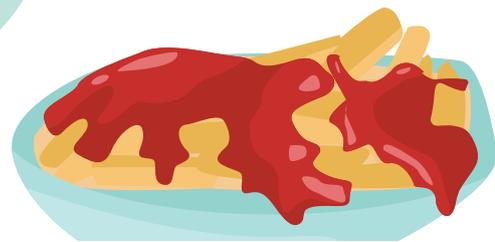
"It was hopeless. I shook the bottle really hard but nothing came out. The tomato sauce was far too thick. Chips are just not the same without tomato sauce."

Another customer said,

"I tipped up the bottle and out flopped all the sauce! What a shock! Everything was red. What use is tomato sauce if it all pours out at the same time?"



Startown Sensational Sauces is asking for help to put the problem right. How thick should tomato sauce be?



Your challenge

Find the perfect thickness for tomato sauce – not too thick and not too thin, but just right.

Discuss

How thick do you think tomato sauce should be?
How quickly should it pour?
How well should it keep its shape on the plate?
Should it pour easily through a small hole?
How well should it cling to a chip?

Getting started

You could do a drip test to see how well the sauce drops off a spoon or pipette.
How about letting it run down a slope?
You could watch how it splats on a plate.
You could see how easily it drips through different sized holes.
Why not put it on a chip and see how easily it slides off?



Test your ideas

What will you measure?
What will you observe?
How many tests will you do?
Don't forget to try different thicknesses
(you could add water to the sauce to make it a different thickness)

Share your ideas

You could write a story about scientists working in the Startown Sensational Sauces' testing laboratory. How would they test the tomato sauce and what might they find out?

Extra things to do

Find out the ingredients of tomato sauce. You could try to make some.
Test different makes of tomato sauce. Are they all the same runniness?
Look at tomato sauce bottles. How are they designed to help you to get the tomato sauce out?



SUPERSTAR

Tree Trouble

Organiser's Card



About the activity

This activity is designed to get children thinking about trees as habitats for other living things.

There's a debate going on in Treedwell about the fate of an old tree. Should it be demolished to make way for new housing, or will the biodiversity and the shade it provides be too precious?

Through this activity you will support children to:

- Discuss whether or not cutting down an old tree is a good idea and why.
- Find out about the biodiversity that a tree supports, either by research or by looking for living things on and around a tree.
- Write a report or produce an information poster.

Kit list

- Large sheet or piece of fabric
- Magnifying glass
- Binoculars
- Clipboard, pens or pencils
- Identification charts
- Big net
- Computer for research
- Bug box

What to do

1. Introduce the activity using the story.
2. Give out activity cards to the children. Encourage the children to think about all the things they know that live in or near trees.
3. Support children to conduct their investigation and make their own records of their results.

- Encourage them to think of more than one way of observing the tree's biodiversity. They could record their results in a table or using drawings.
4. Ask the children to present their findings to the rest of the group, they can be as creative in their presentation as they want.

Things to think about

Some trees will have more 'life' around them than others. However, there will be living things on any reasonable size tree.

The time of day may make a difference to what children observe. Later in the afternoon, or first thing in the morning, are ideal. Encourage children to find information for themselves. However, they may need help to find simple, accessible identification guides and books.

Keywords

- Biodiversity
- Nature
- Trees
- Protectors

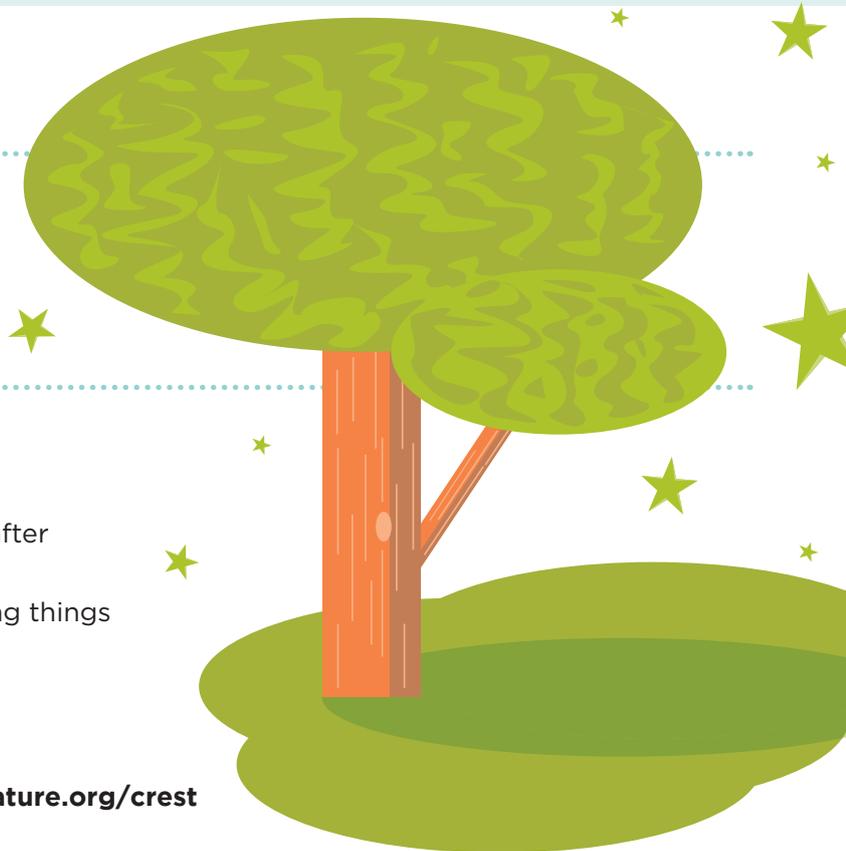
Watch out!

The children should wash their hands with soap after handling the trees and any other living things.

Remind the children of the rules for handling living things and for safe working outdoors.

Find out more

There is more information at www.opalexplornature.org/crest





SUPERSTAR

Tree Trouble Activity Card

There's a dilemma in Treedwell about an old tree:

The local government think we need new houses in the town, but the old tree is on the site. The builder says he wants to cut it down.



Protestor 1 thinks if they cut the tree down, there will be nowhere for animals to live and it will affect the local biodiversity.



Protestor 2 thinks we need the shade from the tree to sit in when it gets hot.

Do you think the old tree should be chopped down?

Your challenge

Find out whether it makes a difference to animals and plants if a tree is chopped down.

Discuss

What do you think biodiversity means?

What sorts of wildlife would you expect to find on and around a tree?

Are plants wildlife too?

Do you need to look at lots of trees or is one tree enough?



Getting started

Some fellow investigators have had some ideas to get you started:

If we lay a large sheet under the tree, we could gently shake some of the branches and catch what falls out. Then we could find out about what we have caught.

We could see how much shade a tree makes and find out whether there are more plants and animals in its shade than in the open.

We could use the internet to look up what types of plants and animals might live around a tree. By sitting quietly and watching the tree, we could see what types of animals come near it.

Test your ideas

Does a tree have any life on and around it? If so what kinds?

Do you think it is the same for all trees?

How would it affect plants, animals and people if an old tree was being cut down?

You might like to record your results like this:

Living thing	Would it be effected by cutting down the tree?
<i>E.g. Squirrel</i>	<i>It would have nowhere to climb and hide</i>

Share your ideas

Write a report to Treedwell's local government and explain what you found out. You could include some bar charts or drawings to help explain.

The town needs new houses, so do you think it is a good idea to cut down the tree? Why? Produce a poster to convince other people.



SUPERSTAR

Tumbling Toast

Organiser's Card



About the activity

This activity is designed to get children thinking about probability.

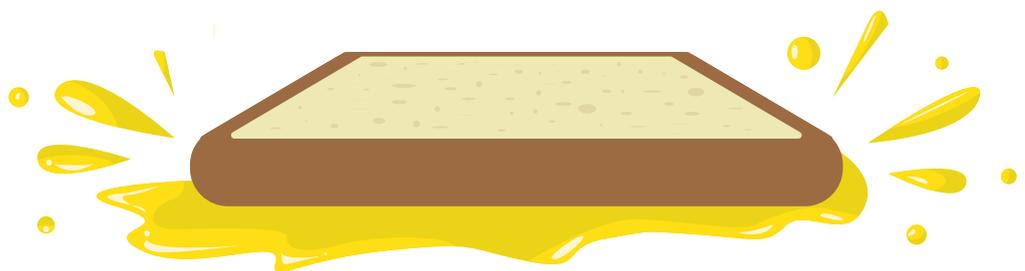
Mayor Quandary seems to drop her toast butter-side down every morning, and she can't work out why. Her secretary Dayley Diary thinks it's Murphy's Law but she's not so sure. Can the investigators help?

Through this activity you will support your group to:

- Think about the world around them from a different perspective
- Investigate and explore what living things they can find outdoors
- Record their thoughts and ideas and present them to share with the group

Kit list

- Bread – supermarkets often sell off sliced bread at the end of the day. Try to get thick and thin slices.
- Toasters (PAT tested), or toast
- Knives
- Butter (cheap margarine is fine)
- Cardboard or plastic plates
- Newspaper as a landing pad
- Jam or other spread (optional)
- Marker pens
- Recording grid with three columns – type of toast, landed butter-side down, landed butter-side up (optional)



What to do



1. Read the ACTIVITY CARD to familiarise yourself with the activity.
2. Check the Kit list to ensure you have the correct resources.
3. Set the scene by discussing Mayor Quandary's problem. Talk a little about Murphy's Law to make sure that the children understand it.
4. Give children time to discuss what they know about Murphy's Law and their experience of dropping toast.
5. Give children time to work out their plan. Tell them that they have limited resources so they need to plan carefully.
6. Remind children about being careful if they make the toast themselves.
7. Get them investigating. Start them off with comparing toast with and without butter. Then let them test other factors such as the height, the size of the bread, other spreads, how they drop it, etc.
8. They may find it helpful to mark the unbuttered toast each side with a marker pen so that they know which side is which.
9. Some children may need a bit of support but let them try things out first.
10. Remind them to keep notes of what is happening.
11. Give children about 20 minutes for their testing.
12. Give them a few minutes when they have cleared up to check their ideas before sharing their findings with the rest of the group.
13. They could make a display of all their toast samples and the outcomes.
14. They could write to Mayor Quandary suggesting what she might do. Encourage them to finish the letter with creative ideas.
15. There are extra challenges on the ACTIVITY CARD. These can be used if there is any spare time or if the children want to try out more ideas at home and earn a bonus sticker.



Things to think about

In this activity fair testing is important. If children are looking at the size of toast slices, they need to keep the way they drop it the same. If they are looking at the height of the drop, they need to keep the toast slices the same.

To get reliable results each test needs to be repeated several times (20 is often recommended) to avoid the outcome being just chance.

Watch out for fire detectors if you are making toast.



Take it further

The way toast lands has long been of interest. An internet search reveals many investigations looking into this question. It seems that there is a scientific explanation for why it does land on the buttered-side.

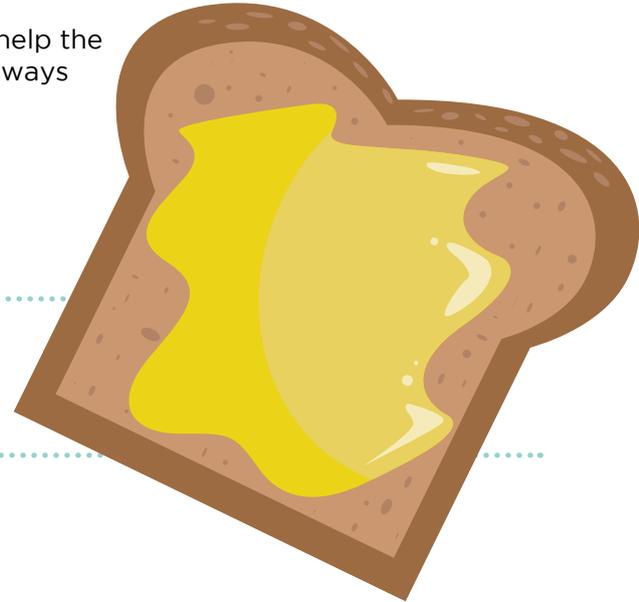
It is all to do with how much a piece of bread can rotate as it falls. If the distance is increased, then it can do a complete rotation and land buttered-side up!

It has been suggested that if the slice of toast is very small (less than 3 cm) it is able to complete the rotation before landing.

Encourage the children to come up with some creative ideas to help the Mayor, such as attaching the toast to the back of a cat as they always land right side up!

Keywords

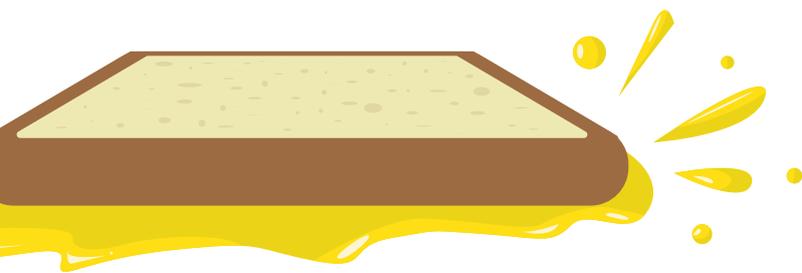
- Murphy's Law
- Probability.



Watch out!

Remind children not to eat the toast.

Only use toasters under very close supervision otherwise provide pre-made toast.





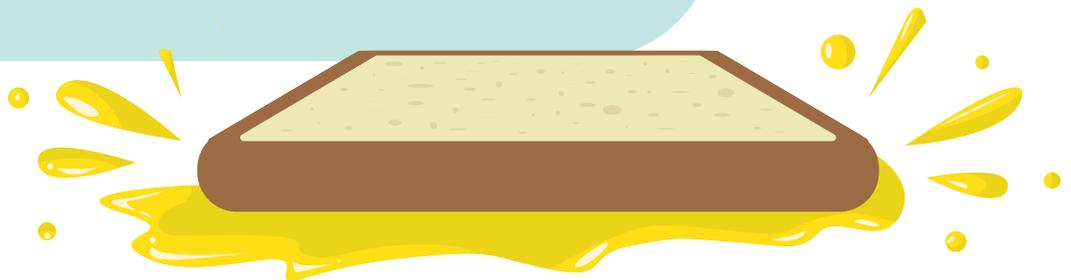
SUPERSTAR



Tumbling Toast Activity Card

Startown's Mayor, Councillor Imin A Quandary, is calling on all children to settle a dispute she is having with her secretary, Dayley Diary.

"You see, I'm always in a hurry so only have time for a couple of pieces of toast for breakfast. But every day I manage to drop a piece off my plate and onto the floor. The toast always seems to land butter-side down! It is such a nuisance. Dayley tells me it's just Murphy's Law - if something can go wrong, it will go wrong - but I think there's a reason. What do you think? Does toast always land butter-side down? Can you help me?"



Your challenge

Help Mayor Quandary to find out if toast really does always land butter-side down. Is there anything you can do that makes a difference to which way it falls?

Discuss

- Have you ever dropped toast?
- Which way did it fall?
- Have you heard of Murphy's Law about toast?
- Do you think that you could find a way to test it?

Getting started

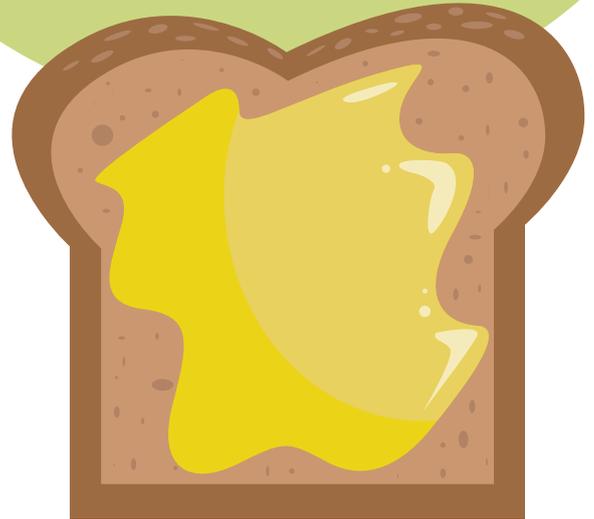
Start by finding out what happens when you drop buttered and non-buttered toast.

Then try other ideas.

Don't forget to try to keep your test fair.

You may need to do each test lots of times.

Will you need to record anything?



Test your ideas

People normally drop toast off a plate.

Does the height make a difference?

What if it is a very small piece?

What if you put anything else on the toast?

What will happen without butter?

Think about your investigation and then get toasting.

Share your ideas

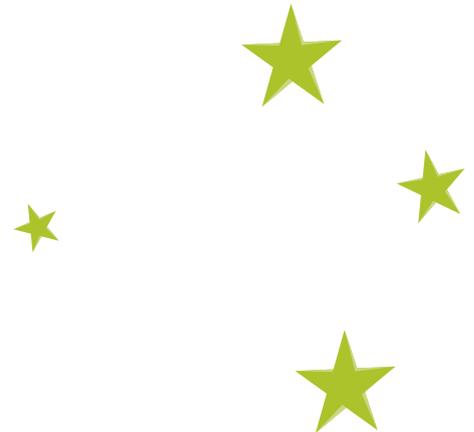
Compare your ideas with other groups. Did you all get the same answer? What advice would you give to Mayor Quandary? You could write her a letter.

Extra things to do

Find out about other people who have tested toast. Did they get the same answer as you?

Find out about other sayings such as 'Red sky at night, shepherd's delight', 'Soaking conkers in vinegar makes them stronger', and 'Putting the milk in first is better when you make a cup of tea' etc.

Try testing some of them.





SUPERSTAR

Under Your Feet Organiser's Card



About the activity

This activity is designed to get children thinking creatively about nature.

Stella Storyteller is struggling for inspiration for her latest story book.

It's the story of two special children who wake up one morning and find themselves the size of ants. Can the children help to find a challenge for the intrepid duo?

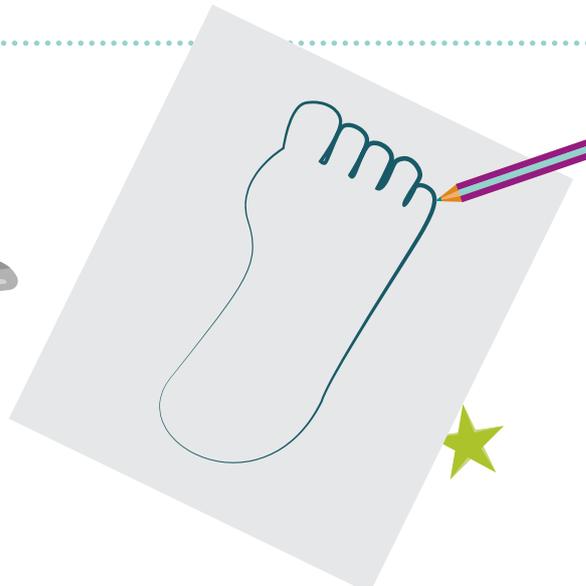
Through this activity you will support your group to:

- Think about the world around them from a different perspective
- Investigate and explore what living things they can find outdoors
- Record their thoughts and ideas and present them to share with the group



Kit list

- Cut out 'feet' for children to record their results on - you might want to provide a template as children's feet are usually too small
- Cut out 'holes' for children to place on the ground and look through
- Hand held magnifiers
- Identification charts or books
- Drawing materials - thin coloured markers or pencils etc.
- Digital camera (optional)



What to do

1. Read the ACTIVITY CARD to familiarise yourself with the activity.
2. Check the Kit list to ensure you have the necessary resources.
3. Set the scene by discussing the news story
4. Give children time to talk about what it might be like to be so tiny. Encourage them to think about what they might encounter.
5. Help them to create their cut out 'feet' if they are struggling.
6. Remind them of safety issues before you go outside.
7. Try to look in different places outdoors to find a range of interesting living things – remember to get children to include plants as well as animals and anything else that is interesting.
8. You might want to look at one place together to encourage children to look very closely.
9. If there is time, record a couple of places before returning indoors.
10. When they return indoors, encourage children to find out more about what they have seen and to think about the story.
11. Give children time to share their ideas. You could put all the 'feet' on display. Can people tell where each 'foot' was drawn?
12. They could write the story for Stella or draw pictures of what it might be like to be so small living in these places.
13. There are extra challenges on the ACTIVITY CARD. These can be used if there is spare time or if children want to try out more ideas at home and earn a bonus sticker.



Things to think about

Children may need to be encouraged to look closely. You may wish to create an example of what their filled in 'feet' might look like when they are finished. You should draw everything you can see including pebbles, sticks, the texture of tree bark or soil, spiders' webs etc.

Try to encourage children to include details of the animals, plants etc. in their stories rather than just writing about battles with giants!



Take it further

There is a wide range of things to be found under your feet, even in areas that look fairly barren. The focus of this activity is to get children to be aware of this range of living things. It also helps them to get some sense of where living things are found by studying and comparing the small environments enclosed within the foot shape. You could use PE or maths sorting hoops to focus on a small area. However, children find using the cut out feet more engaging.

Do not worry if you cannot identify everything that is found. Looking closely and describing and drawing what has been seen are far more important than naming things.

Keywords

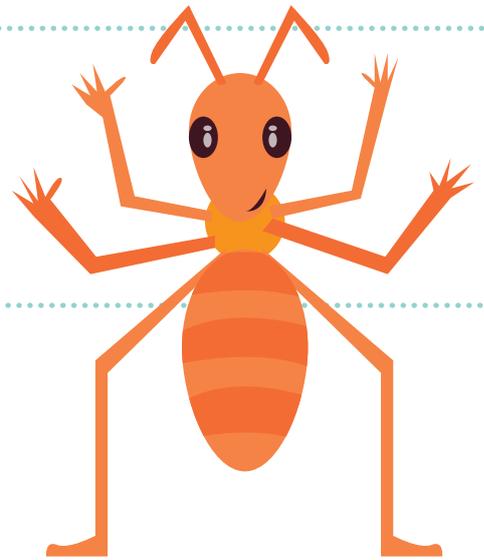
- Outdoors
- Nature
- Insects
- Challenge
- Storytelling

Watch out!

Follow the organisation's safety code for working outdoors. Check the area first to look for dangerous plants or other items such as broken glass, sharp stones, etc. Avoid areas regularly used by dogs.

Ensure that animals are treated with care.

Wash hands carefully after the activity outside.





SUPERSTAR



Under Your Feet

Activity Card

You've come across a news article in the Startown News:

NEWS



Storyteller's tiny dilemma
Good news! Children's writer, Stella Storyteller, is writing her latest book. It's the story of two special children who wake up one morning and find themselves the size of ants. They go on a journey and encounter all sorts of difficulties because of their size. But Stella is stuck for ideas! What would create a challenge for our intrepid duo? Can you help?



Your challenge

Find out what's under your feet and create one of the adventures to go in Stella Storyteller's new book.

Discuss

What animals, plants and other tiny things might you find if you look closely under your feet?

What would it be like if you were very small?

What would you find if you climbed a tree?



Getting started

Cut a big foot shape out of a piece of card. Keep the cut out foot and the hole that's left.

Place the cut out hole on a patch of ground and look carefully at what you find there.

Then record what you see by drawing on the cut out foot. Include all the plants and animals and anything else you see such as rocks, twigs and spiders' webs.

You can place the cut out hole in another place such as a field, a tree trunk or bare soil and record the results on the back of the cut out foot

Test your ideas

You are not going to bring any living things indoors, so you need to make sure you record very carefully what you see. Use a magnifier to help you. You could take digital photographs or look things up using identification keys or books.

Share your ideas

Talk about what you have found. Then share your ideas for one of the adventures to go in Stella Storyteller's book.

Extra things to do

Think about other places where you could look under your feet. What do you find?

Will you find different things under your feet each day?

How can you encourage more living things into your garden or school grounds?





SUPERSTAR

Warm or Cold Organiser's Card



About the activity

This activity is designed to get children thinking about warm and cold-blooded creatures.

Dina Digg needs some help working out whether dinosaurs were cold-blooded or not. Can the children work it out by doing some tests?

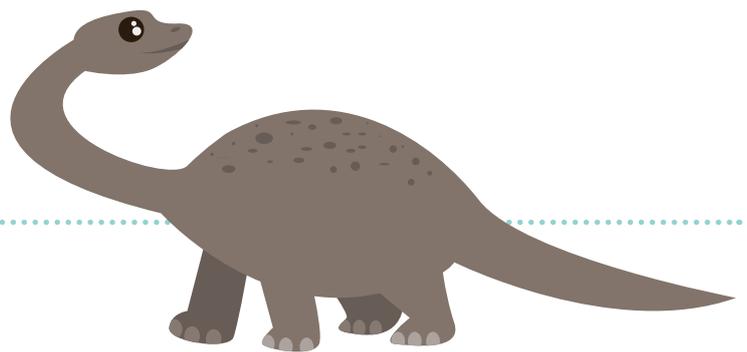
Through this activity you will support your group to:

- Explore whether dinosaurs were warm or cold-blooded.
- Investigate the difference size makes to how quickly things cool down.
- Complete a grid to compare warm and cold-blooded theories.
- Design a dinosaur fact sheet.

Kit list

To test temperature change of water in different sized bottles they will need:

- Different sized plastic bottles with lids
- Measuring jugs
- Warm water
- Thermometer and stop watch or data logger



What to do

1. Read the ACTIVITY CARD to familiarise yourself with the activity
2. Check the Kit list and ensure you have the correct resources.
3. Set the scene by discussing the story with the children.
4. Help children gather the resources.
5. Encourage children to talk together about their ideas and carry out their own investigations.
6. Discuss the differences between warm-blooded and cold-blooded animals.
7. Encourage children to read scientists' arguments for and against dinosaurs being cold-blooded.
8. Help children to recognise that more tests may be needed to reach a firm conclusion.

Things to think about

Scientists argue about whether dinosaurs were warm or cold-blooded. Cold-blooded animals lie in the sun to warm up. They need to stay warm for as long as possible. One theory says that dinosaurs could have been cold-blooded because very large animals are able to stay warmer for longer than small ones. Evidence from this investigation appears to support this theory.

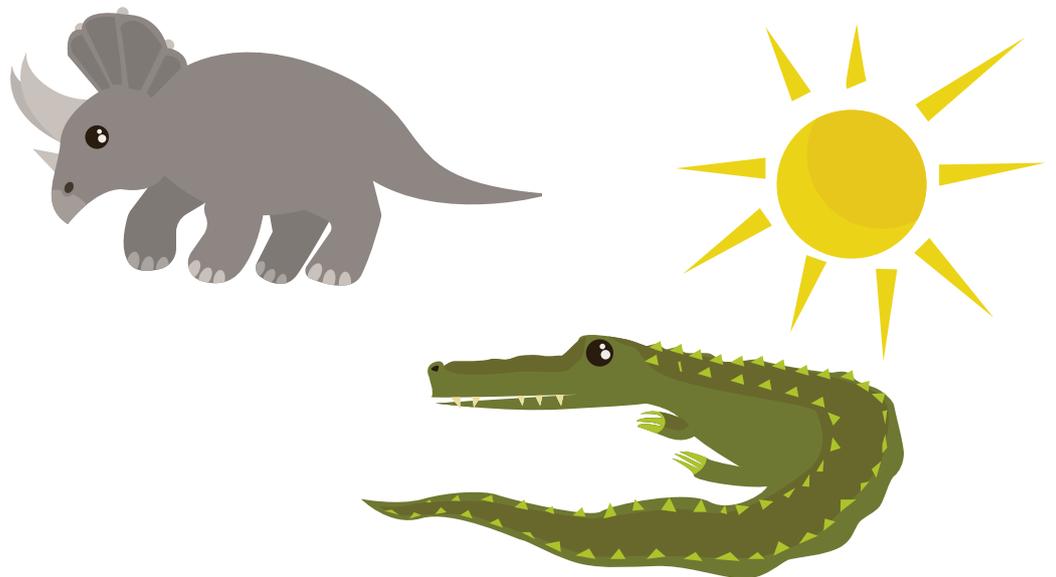
However, there are other theories (see the ACTIVITY CARD). Encourage children to research these theories. The current view seems to be that some dinosaurs were cold-blooded and some warm-blooded.

Keywords

- Dinosaurs
- Water
- Temperature
- Warm-blooded
- Cold-blooded

Watch out!

If children do not use very hot water there are no safety issues with this investigation.





SUPERSTAR

Warm or Cold Activity Card

No one has ever seen a live dinosaur but scientists know a lot about them.

Some ate meat, some only plants. They laid eggs. Dinosaurs lived between 230 and 65 million years ago. They lived on dry land.

Scientists have worked out all these dinosaur facts from looking at fossils.

But one dinosaur fact is still puzzling Dina Digg.

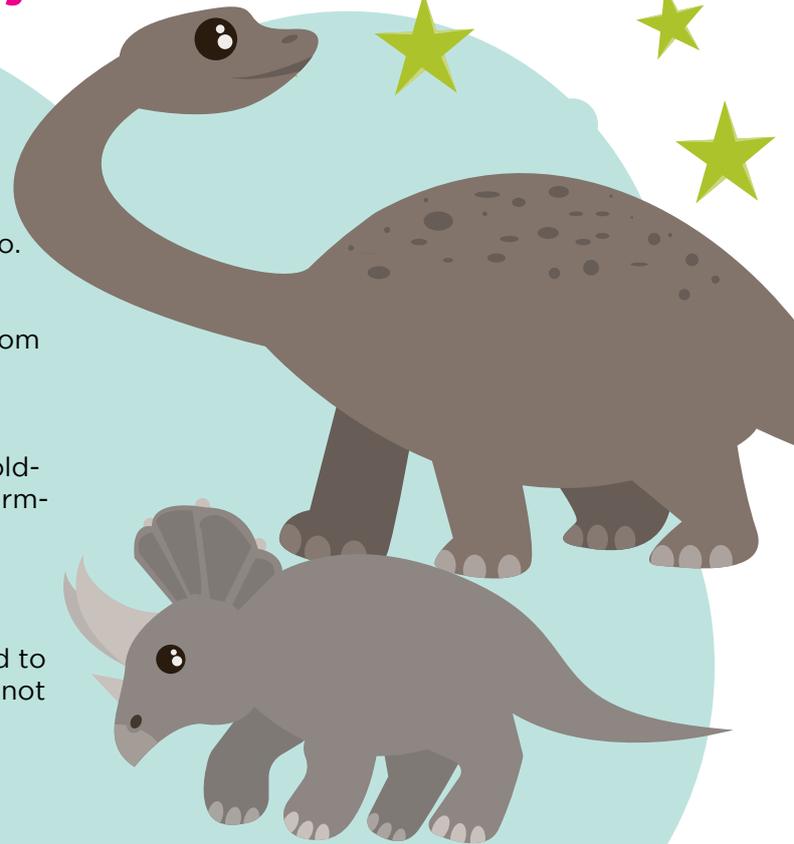
For many years scientists believed dinosaurs were cold-blooded animals, like modern reptiles, rather than warm-blooded like birds and mammals.

Now they are not so sure.

Cold-blooded reptiles like crocodiles and lizards need to lie in the sun to warm up. Warm-blooded animals do not have to do this.

Time to become a dino detective ...

Cold-blooded animals get warm by lying in the sun. The size of an animal's body makes a difference to how quickly it cools down again. Many dinosaurs were very big. If dinosaurs were cold-blooded, would being big be a problem? Or would being big be helpful? Do big things cool down faster or slower than smaller ones?



Your challenge

Help Dina Digg to explore if size matters.

Discuss

You can't get a real dinosaur but you can use large and small plastic bottles to make model dinosaurs.

If you fill the bottles with warm water you can see how long they take to cool down.

What will you measure in your test?

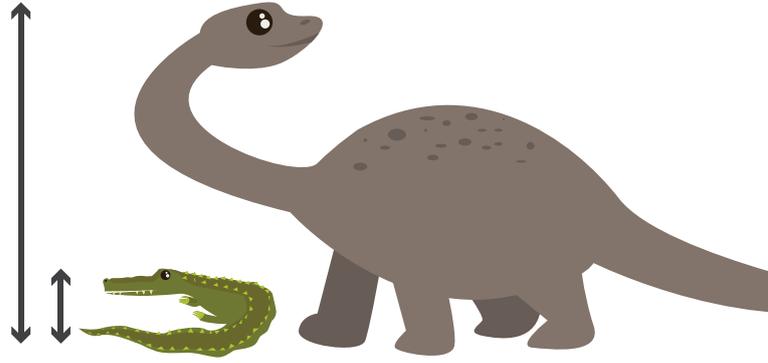
How will you record your results?

Getting started

You could start by looking at how quickly water cools in different size bottles:

To do the tests you will need:

- Different sized plastic bottles with lids
- Measuring jugs
- Warm water
- Thermometer and stop watch or data logger



You might want to use a table like this one:

Volume of bottle	Temperature at the start	Temperature after ? minutes	Temperature after ? minutes	Temperature after ? minutes

You may want to record your findings in a table like this:

	Evidence	Evidence	Evidence	Need to know more about
1	Birds could have descended from dinosaurs.	Birds are warm-blooded. This could mean that dinosaurs were warm-blooded not cold-blooded.	Dinosaurs were descended from reptiles. Reptiles are cold-blooded.	Could there have been both warm-blooded and cold-blooded dinosaurs?
2	The climate was warmer.	Plenty of sunlight would help cold-blooded animals warm up. So dinosaurs could have been cold-blooded.	It wasn't warm everywhere on Earth.	
3	Dinosaurs were very big.	Big things cool down.	Not all dinosaurs were big.	
4	Dinosaurs had scales.	Animals with scales, such as lizards, are... This could mean that dinosaurs are...	Some dinosaurs had feathers. Animals with feathers are...	If an animal has a layer on the outside like feathers or fur, can it get warm by lying in the sun? Try to investigate this.
5	Anything else you can think of?			

Can you find other scientific evidence to help you decide if dinosaurs were cold-blooded or not?



Test your ideas

Do big things cool down more quickly than smaller ones?

Does the shape of the container seem to make a difference?

Were there problems with your tests? How could they be improved?

Does your evidence support the argument that dinosaurs were cold-blooded?

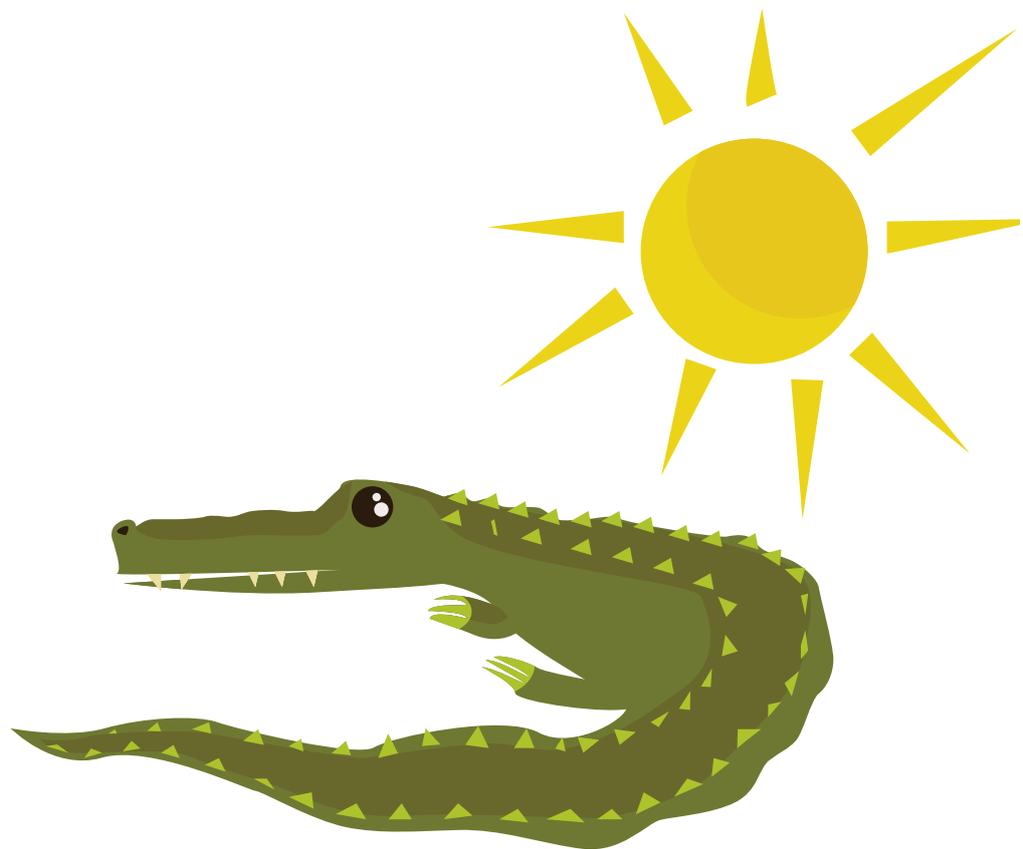
Share your ideas

Why not help complete a dinosaur fact sheet for Dina Digg?

Use the internet or reference books to find out more.

You could design some different physics investigations to test your ideas.

There is more information on www.britishsociety.org/creststar





SUPERSTAR

Windy Ways

Organiser's Card



About the activity

This activity is designed to get children thinking about wind patterns and directions. Bubbles provide an interesting and engaging way for children to investigate wind speed and direction. They can make simple measurements of the time it takes for bubbles to travel a set distance to get wind speed, and can plot the movement of bubbles to get the wind direction.

The children are asked to read a news article: Startown Primary School has been invited by an organisation called OPAL to take part in an exciting new weather survey. It has asked the school to see if they can find out about the wind using bubbles! Can they help?

Through this activity you will support your group to:

- Think about how the wind behaves
- Investigate wind speed and direction using bubbles
- Record and present their results to the group

Kit list

- Bubble blowers and solution
- Pens or pencils
- Paper
- Compasses
- Timers
- Measuring tapes or sticks

What to do

1. Introduce the activity using the story. Set the scene by discussing the weather and how it is measured and get the children to think about their own experiences of things blowing in the wind (balloons, dandelion seeds etc).
2. Give out activity cards and equipment to the children. Let them practice blowing bubbles.
3. Explain that they will be trying to measure wind direction and the speed that the bubbles travel.
4. Encourage children to discuss their ideas and how they will use the resources to carry out their investigations.
5. Support children to conduct their investigation and make their own records of their results. Go outside to carry out the investigation. Make sure groups are not too close together.
6. Ask the children to present their findings to the rest of the group, they can be as creative in their presentation as they want. They could record their findings by making a chart or presentation.

Things to think about

Make sure that the bubble solution is a good strength so that bubbles are easy to blow. Try it before the children use it.

The children are likely to be excited at first and chase bubbles. This is normal. Once they have done this they should be ready to focus on solving the problem. They can do this without running around frantically.

Encourage children not to use too many bubbles at once. A few at a time are generally easier to investigate.

Avoid very windy days. The bubbles will move too quickly and erratically. A gentle breeze is best.

Keywords

- Weather
- Wind
- Surveys
- Bubbles

Take it further

Children can draw a labelled picture depicting the movement of their bubbles.

They can create a chart showing their findings.

They can make a guide for someone who wants to find out more about the wind.

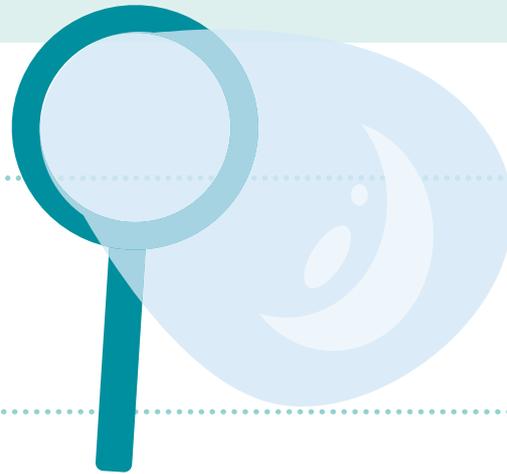
Watch out!

Ensure children do not swallow the bubble solution or get it in their eyes.

Children can become excited when blowing bubbles. It should be safe for them to chase the bubbles in an open area if they are well spread out, but remind them about behaving sensibly to avoid bumps and falls.

Find out more

For more information see www.opalexplornature.org/crest

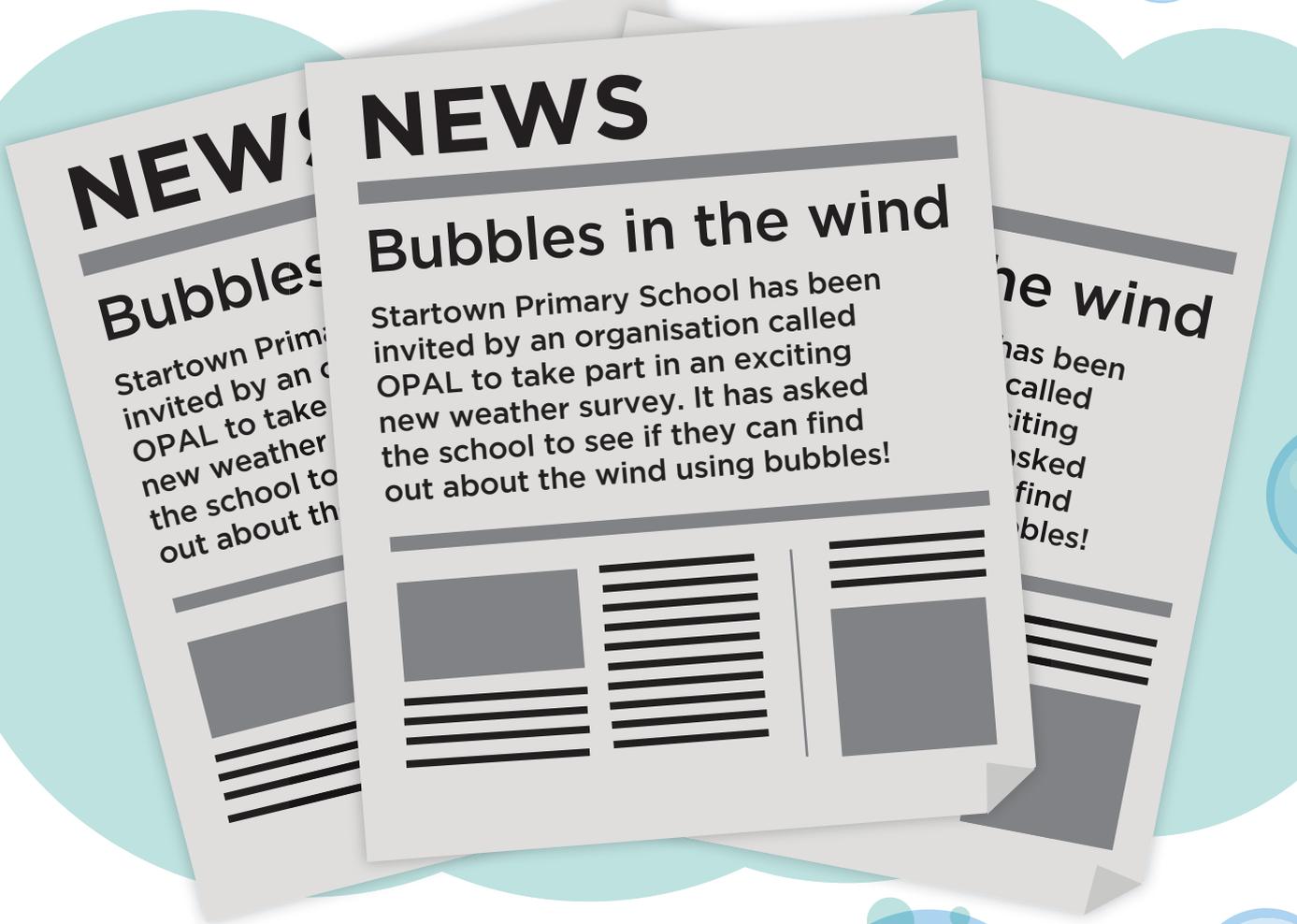




SUPERSTAR

Windy ways

Activity Card



Your challenge

Can you help the children of Startown Primary find out how to use bubbles to show how the wind moves?

Discuss

What happens to the bubbles when the wind blows?
How could you use bubbles to help you learn about the wind?

Getting started

Practice blowing bubbles and look at how they move.

You will need a bubble blower and solution. You can also use a timer, compass, measuring tape, sticks or anything else you choose.

Try to use the bubbles to find out which direction the wind is blowing.

Try to use the bubbles to find out how fast the wind is blowing.

Can you use your bubbles to find out anything else about the wind?

It is easier to investigate the wind if you use a few bubbles at a time.

Test your ideas

You might like to record your results in a table like this.

	Bubble Movement
No wind	
Wind	
Fast wind	

Share your ideas

Make a chart to show your findings.

Draw a picture of bubbles to show how they move in the wind.

Create a 'wind guide' for someone else who wants to find out more about the wind.

Extra things to do

Make a wind sock.

Make a daily record of the wind.

Find out if the wind blows differently in different places.





SUPERSTAR



Worm Charming

Organiser's Card



About the activity

This activity is designed to get children thinking about worms and vibrations.

The town of Willaston, Cheshire is having a worm charming championship. Can the children investigate how to get the worms out of the ground?

Through this activity you will support your group to:

- Think about how to create vibrations to charm worms
- Experiment with different ways of charming worms out of the ground
- Record their results and present them to share with the group



Kit list

- Buckets of water for wetting the ground.
- String, metre rulers, pegs to secure string in squares on the field. You could use large PE hoops or similar instead.
- Containers of damp soil, moss or compost to put the charmed worms in.
- Timers
- Selection of objects for the children to choose from – e.g. garden forks or old kitchen forks to twang, drums or other musical instruments which can be banged. Musical instruments that can be blown, rounders bats or similar to hit the ground, trays or something metallic or wooden to jump or tap dance on etc. – feel free to use your imagination.



What to do

1. Read the ACTIVITY CARD to familiarise yourself with the activity. You may find worm charming websites helpful too.
2. Check the Kit list and ensure you have the correct resources. You might need to wet the ground in advance if it has been very dry..
3. Set the scene by discussing the news story with the children.
4. Encourage small teams of children (pairs or threes are best) to decide where and how will they do the worm charming. Some may need extra hints to get started. They could use a worm charming website for ideas.
5. Check that they have thought about making fair comparisons e.g. same area of soil and same amount of time. You could run it as a competition.
6. Remind them about handling the worms gently and keeping the worms and themselves safe.
7. Give out pots of damp soil, a bucket of water and let the worm charming begin!
8. You or the children could take photographs.
9. Encourage the children to look at the worms carefully to find out more about them.
10. Give the children time to share ideas about what happened.
11. Children could record the event through a display of photos or drawings. Alternatively they could create a headline or news story.
12. Ensure that they return the worms safely.
13. There are extra challenges on the ACTIVITY CARD which can be used if there is spare time or if children want to carry on investigating at home and earn a bonus sticker.

Things to think about

Children may be tempted to tug at the worms before they are out of the soil. It could harm the worms and will not help to remove them.

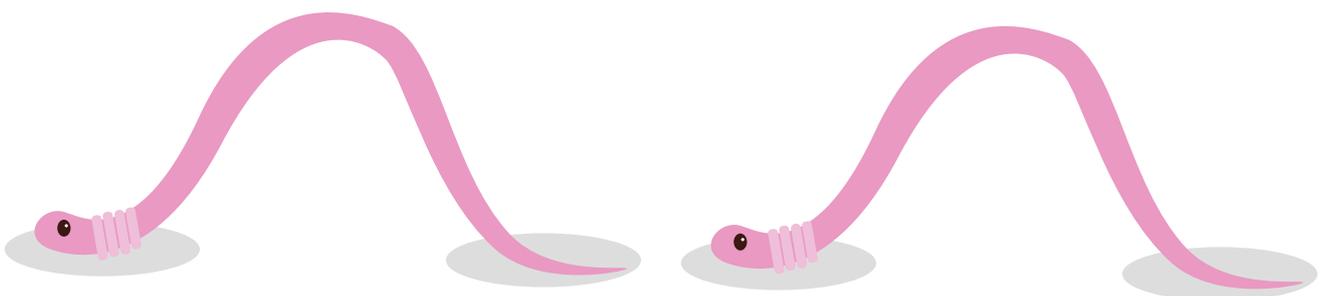
Take it further

A worm's skin is sensitive to vibration.

Worms move using muscular contractions and bristles on their skin. You can hear the bristles when worms move on paper.

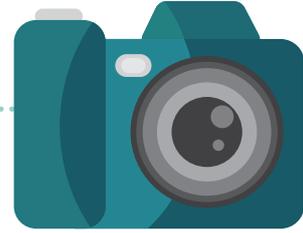
An internet search using the words 'worm charming' will provide lots of background including the rules of the worm charming competition. There is also a video on the Guinness World Records website.

Only use water on the ground. Washing up liquid brings up the worms but this is because it irritates their skin and could kill them.



Keywords

- Nature
 - Vibration
 - Habitat
 - Worms.
-



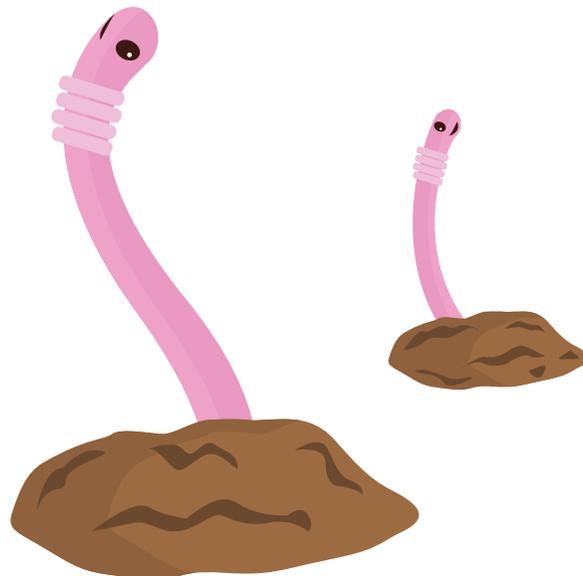
Watch out!

Children must wash their hands with soap and water after handling soil and/or worms. No fingers in mouths or eating or drinking! You may decide to provide disposable gloves. Ensure safe use of equipment e.g. garden forks.

Keep the patches that they are using well-spaced to avoid accidents.

Avoid areas known to be contaminated with dog faeces or broken glass.

Handle the worms carefully as they are living creatures. The children must put the worms back in a safe place on top of loose soil so that they can burrow quickly (watch out for birds). Do not leave worms in sunlight or water.





SUPERSTAR

Worm Charming

Activity Card

You've come across a news article:

NEWS

Willaston World Worm Charming Championship

The world worm charming championship has been held on a primary school playing field in Willaston, Cheshire.

One competitor told our reporter, "It's easy. You just vibrate the ground in some way and up pop the worms! I didn't know worms were so fascinating." According to the worm charming website, the world record for the number of charmed worms is a staggering 511!

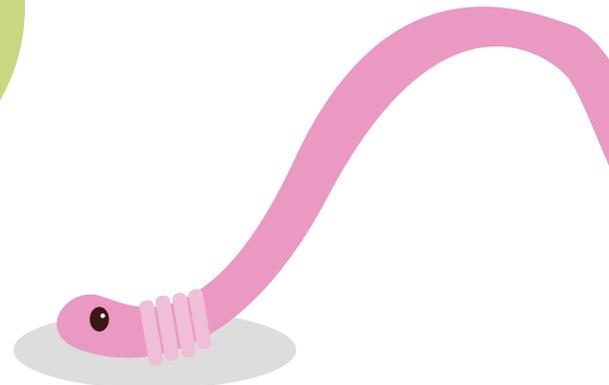
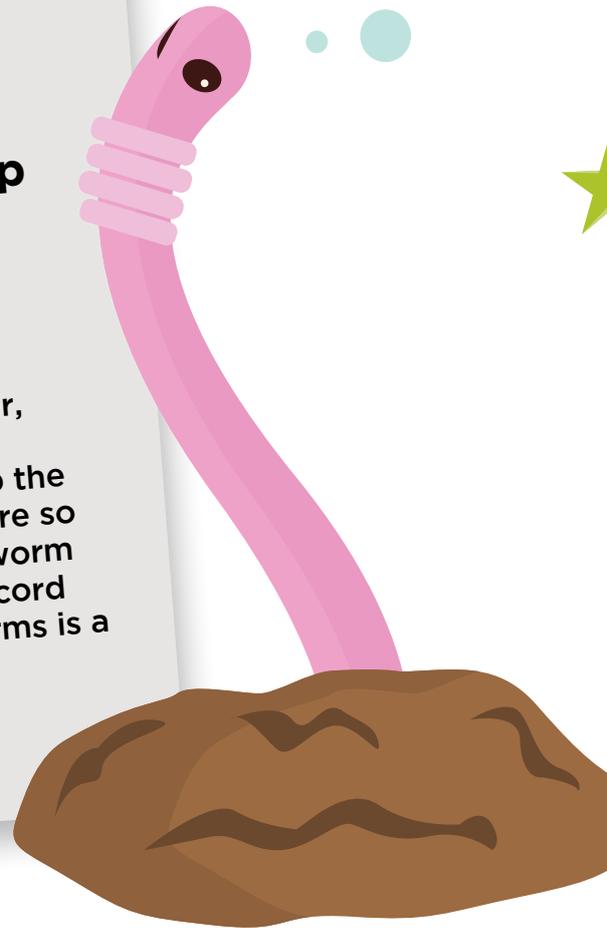
Your challenge

Investigate how to charm worms out of the ground.
Which way is the best?

Remember that you will need to keep your worms safe in damp soil.

Discuss

How will you vibrate the ground?
Do you need any rules to make your tests fair?
How will you keep yourselves and the worms safe?



Getting started

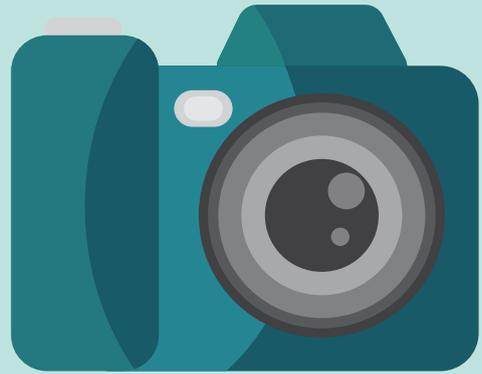
Make sure that the ground is very wet before you start.

Some ways you could vibrate the ground:

Push something in the ground and wiggle it.

Dance or jump or move in some other way.

Play a musical instrument.



Test your ideas

You are not going to bring any living things indoors, so you need to make sure you record very carefully what you see. Use a magnifier to help you. You could take digital photographs or look things up using identification keys or books.

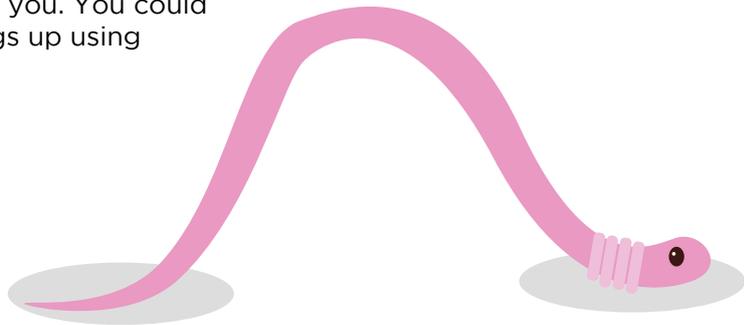
Share your ideas

Did you charm any worms?

Do you have photographs to share?

What did you use?

You could write your own newspaper heading about worm charming or make a display of photographs/drawings.



Extra things to do

Explore more about why vibration makes worms come out of the ground.

Look closely at worms to find out how they move.

Find out more about the life of a worm.

Find out why worms are important.





SUPERSTAR

Yummy Yoghurt Makers

Organiser's Card



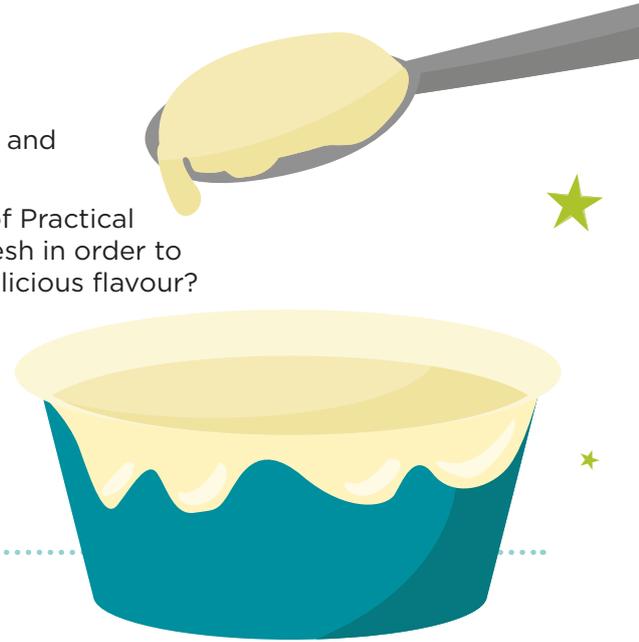
About the activity

This activity is designed to get children thinking about reversible and irreversible reactions.

The children have been sent an email by Mita Gabbar on behalf of Practical Action, who help farmers turn milk into yoghurt in rural Bangladesh in order to make the most money. Can the students help to find the most delicious flavour?

Through this activity you will support your group to:

- Make different varieties of yoghurt
- Conduct a taste test scientifically
- Record and present their results to the group
- Think about the lives of those living in a developing country`



Kit list

- Different types of milk (full fat cow's milk, skimmed and/or semi-skimmed cow's milk, goat's milk, sheep's milk, soya milk, almond milk, etc).
- Flasks
- Saucepans
- Cooker, hot plate or some other source of heat
- Large spoons for stirring
- Small spoons for tasting
- Yoghurt (make sure it is 'live' yoghurt)
- Dried milk powder (if using)
- Ready-made yoghurt samples, prepared the day before
- Blindfolds made from pieces of fabric
- Thermometer
- Selection of finely chopped or pureed fruit

What to do

1. Prepare a selection of yoghurt samples the day before this activity so that children can test them. Remember to use a variety of milks.
2. Introduce the activity using the email from Mita. Children may be surprised that in other countries children don't always go to school. Tell them how people around the world are trying to change this as one of the Global Goals. For information go to globalgoals.org/global-goals/quality-education/
3. Give out activity cards and equipment to the children.
4. Encourage children to discuss their ideas and how they will use the resources to carry out their investigations.
5. Encourage the children to predict the type of yoghurt the different milks will make. Will the yoghurt be thick, runny, sweet or sour?

6. Help the children to make their own batches of yoghurt using different ingredients. Make sure you have a ready-made yoghurt sample for each of the types of milk the children will be using to make their own yoghurt.
7. Support children to conduct their investigation and make their own records of their results. Allow the children to do blind taste tests of the ready-made yoghurt samples. Can they guess which milk was used to make each yoghurt sample? Were their predictions right? Children

can vote for their favourite yoghurt. Can they make it even tastier by adding chopped or pureed fruit?

8. Ask the children to present their findings to the rest of the group, they can be as creative in their presentation as they want e.g. they could make a pictogram of each person's vote to show which yoghurt was the most popular. They could write to Mita to tell her what they found out about making yoghurt and to share their recipes.

Things to think about

To make 500ml of yoghurt you will need 500ml of any milk and 3 tablespoons of fresh, live, plain yoghurt. Using 25g of dried milk powder for every 500ml of milk will help your yoghurt set. Some types of milk take longer to set.

Heat the milk in a saucepan. When the milk reaches 46°C take it off the heat and stir in the yoghurt. The temperature of the milk is important. Help the children measure the temperature of the milk carefully.

Pour the mixture into a flask and leave overnight. In the morning it should have thickened and turned into yoghurt.

Making yoghurt is an irreversible reaction. Once the bacteria have fermented the milk you cannot turn it back into milk. This activity is a good opportunity to think about which reactions they know that are reversible, for example turning water into ice.

Keywords

- Yoghurt
- Cultures
- Fermentation
- Reactions

Watch out!

Emphasise washing hands and keeping work spaces and equipment clean when preparing food.

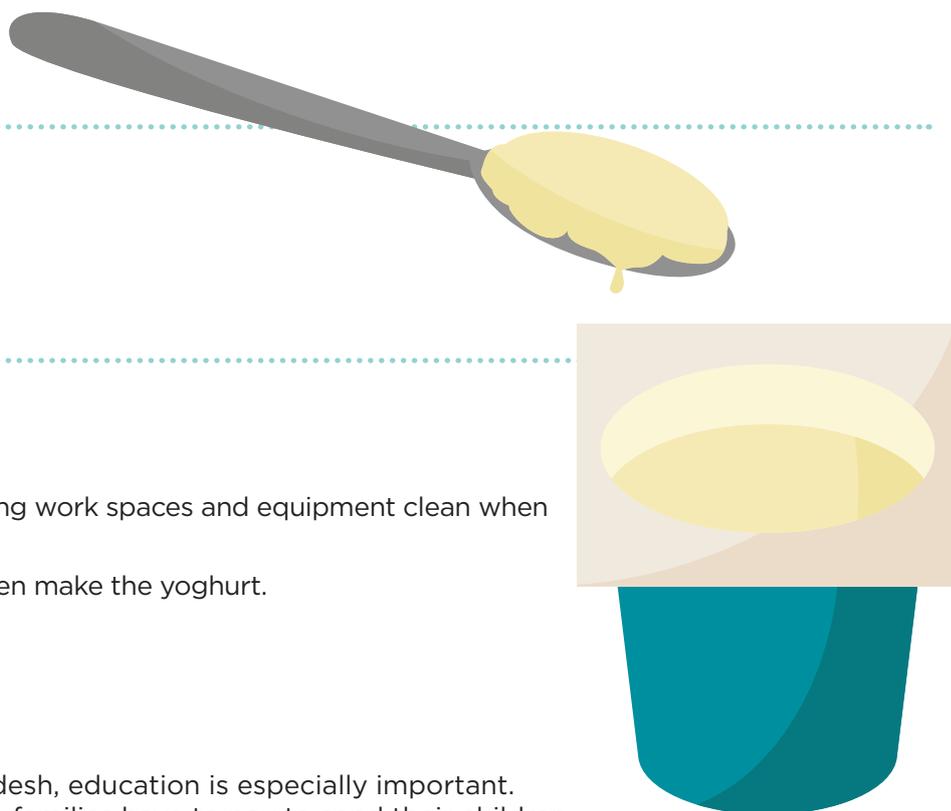
Ensure adult supervision when children make the yoghurt.

Check for any food allergies.

Find out more

In developing countries like Bangladesh, education is especially important. However, with no national provision, families have to pay to send their children to school. Making and selling yoghurt is one way that families can generate an income for school fees.

To help pupils find out more about the lives of children in Bangladesh take a look at some of Practical Action's other activities for Primary including the Floating Garden Challenge, an investigation into growing food in areas of Bangladesh prone to flooding. practicalaction.org/primary

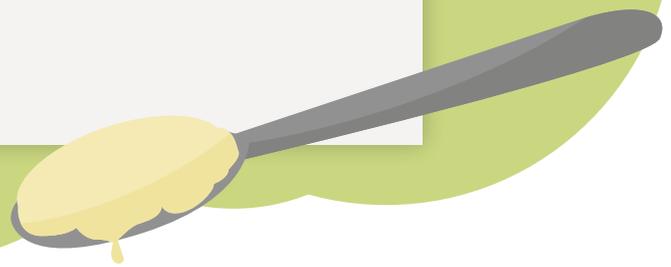
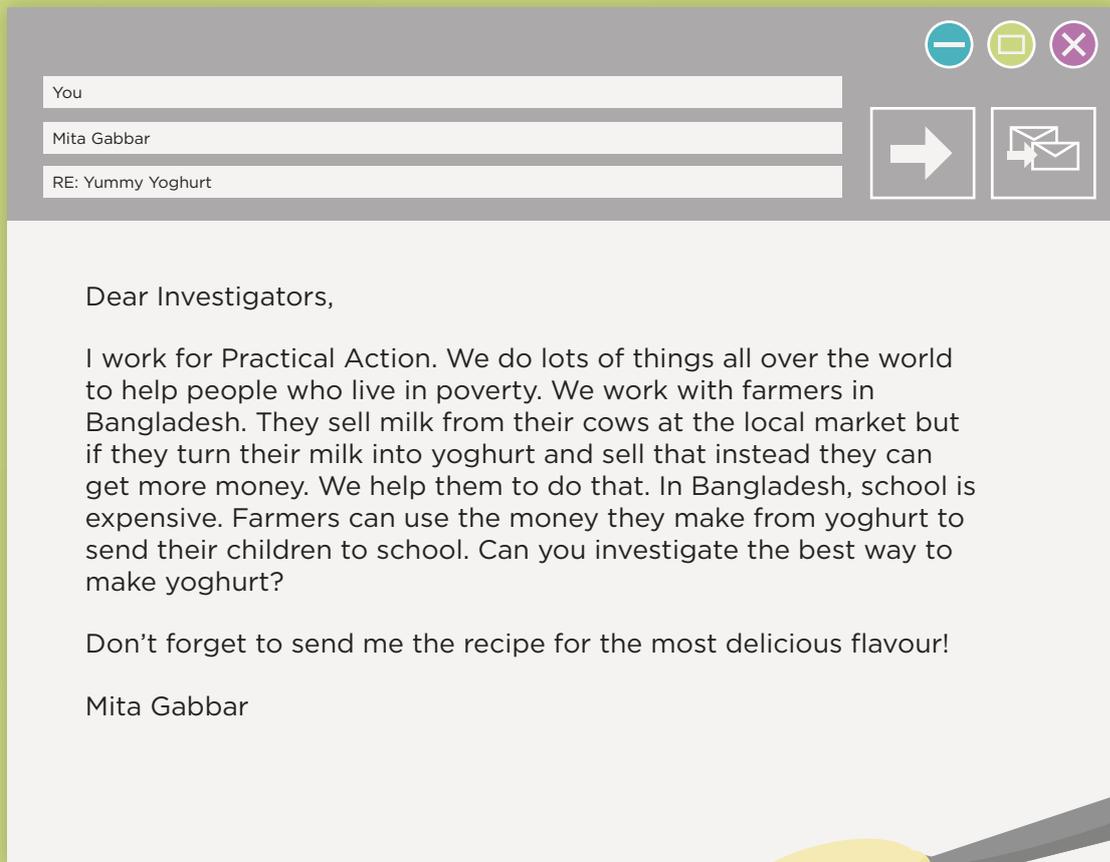




SUPERSTAR

Yummy Yoghurt Makers

Activity Card



Your challenge

Investigate how to make the tastiest yoghurt from milk. Did the different types of milk make different types of yoghurt?

Which flavours work best?

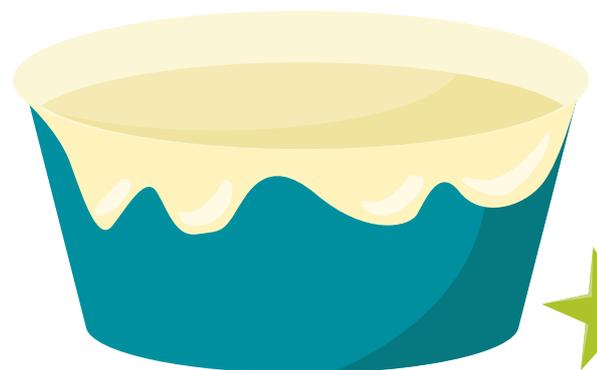
Discuss

Have you eaten yoghurt before? Which kind is your favourite?

What type of milk do you think will work best?

Why do you need to start with fresh yoghurt to make more?

How will you test the yoghurts? You could do a blind taste test.



Getting started

Before you start wash your hands with soap and water

Pour your milk into a saucepan and gently heat it up.
When it is 46 C take it off the heat. Use a thermometer to help you.
The yoghurt culture has live bacteria in it. Stir this into the warm milk.
Pour the new mixture into a flask.
In the morning the milk will have turned into yoghurt!

Test your ideas

You might like to record your results in a table like this one. You could use a tally to keep track.

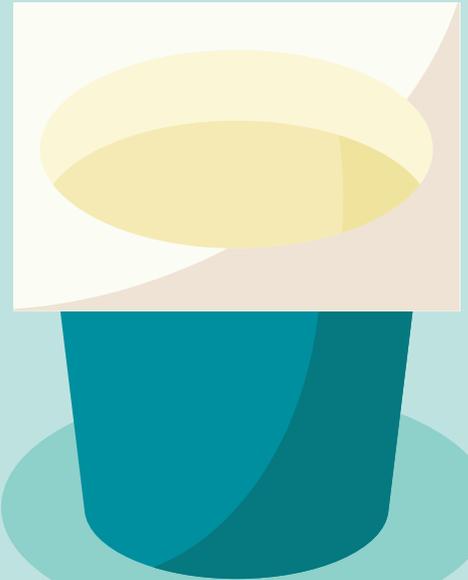
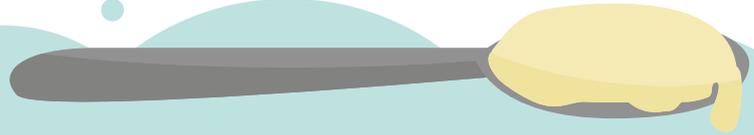
	Yoghurt 1	Yoghurt 2	Yoghurt 3
Number of votes for favourite yoghurt			

Share your ideas

Make a pictogram of each person's vote – which yoghurt is most popular? Write to Mita to tell her what you have found out about making yoghurt.

Extra things to do

- Design a poster to sell your yoghurt at market.
- Find out what else you can make from milk.
- Find out more about the food people eat in Bangladesh. Draw a picture of a meal a child your age might eat in Bangladesh...and include yoghurt!





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