

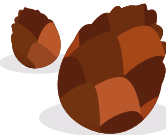


CREST  
AWARDS

| STAR

# Home learning collection

Suitable for  
**5 to 7-year-olds**



This collection of CREST Star challenges allows children to explore everyday problems using science.

#Scienceathome #CRESTathome



## Risk assessment

These hands-on challenges are designed to be interactive and fun for everyone taking part. As with all practical activities, the adult(s) running the investigation should carry out a full risk-assessment beforehand, to ensure that any accidents are avoided. Refer to CLEAPSS for expert advice and guidance, helping to keep you, your children and colleagues safe and ensuring that everyone can enjoy the benefits of hands-on STEM learning (<https://primary.cleapss.org.uk/>).



# Start using CREST Star

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

1. Download the CREST Star Passport: [primarylibrary.crestawards.org/crest-star-passport/62595279](http://primarylibrary.crestawards.org/crest-star-passport/62595279)

## 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.
2. Read the story on the Activity Card with your group and introduce the challenge.
3. Give each group of children a copy of the Activity Card to guide them through the investigation.
4. Children can use their Passport to keep track of the challenges they have completed.
6. Congratulations on completing CREST Star!
7. If you want to use your own activities, that's fine! Find out more about what a Star activity should look like here: [help.crestawards.org/portal/en/kb/articles/can-i-use-my-own-activities-for-the-star-and-superstar-awards](http://help.crestawards.org/portal/en/kb/articles/can-i-use-my-own-activities-for-the-star-and-superstar-awards)

## What next?

Why not challenge children further and try CREST SuperStar next? You can find out more and download all the resources you need here: [www.crestawards.org/crest-superstar](http://www.crestawards.org/crest-superstar)

Encourage others to take part in CREST projects. To get more ideas on how to get started visit: [www.crestawards.org](http://www.crestawards.org)



# Contents

## Activity

Brilliant Bubbles

Confusing Cans

Music Maker

Slippery Slidey Shoes

Tea Bag Trouble

## Page

5

9

13

17

21

## Activities also suitable for early years and non-readers

Be Seen, Be Safe

Peggy Problem

Sneaky Shadow

Sniffly Sneezes

## Page

25

29

33

37



# STAR



# Brilliant Bubbles

## Organiser's Card



## About the activity

This activity is designed to get children thinking about liquids, gases and bubbles.

Cosmic has a new bubble machine. All the bubbles are the same. He would like different bubbles.

Through this activity you will support children to:

- Carry out their own tests to try and make different shaped bubbles
- Carry out their own tests to try and make different sized bubbles
- Carry out their own tests to try and make different colour bubbles

## Kit list

- Plastic trays or bowls
- Clean drinking straws – 1 per child
- Bubble wands
- Soft wire (e.g. florist's wire or pipe cleaners)
- to bend into different shape frames such as a triangle or square
- Bubble mixture
- Food colouring

## What to do

1. Introduce the activity using the story. Ask the children if they have blown bubbles before, were they all the same?
2. Give out activity cards and equipment to the children.
3. Explain that they will be using the equipment provided to test if they can make different shape, size and colour bubbles.
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?
  - 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 a bubble competition.

# Things to think about

Children will get better bubbles if they blow slowly and gently through a straw.

They will usually get bigger bubbles from a wand or a wire frame.

A bubble is a pocket of air, surrounded by a very thin film of liquid.

Water acts as though it has a stretchy skin. It is this that helps to make a round bubble shape. Scientists call this surface tension.

The colour of bubbles is due to the light reflecting off the bubble surface and creating what scientists call interference patterns. The pattern and colour changes according to the direction of the light and the thickness of the bubble's 'skin'.

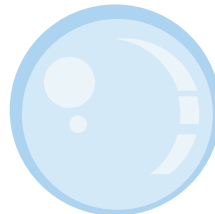
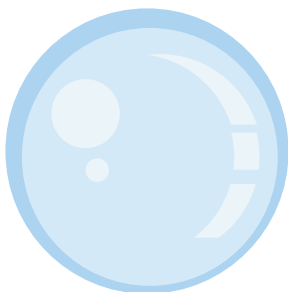
## Keywords

- Bubbles
- Surfaces
- Gases

## Watch out!

Children will create a lot of mess with their bubbles, so be prepared for this.

You can colour the mixture with food colouring, but when the bubbles burst the children get sprayed with drops of food colouring, so this is VERY messy.





# STAR

## Brilliant Bubbles

### Activity Card

Cosmic is very excited. Today is his birthday!

His present is a big, bright purple bubble machine. When he turns the handle, dozens and dozens of bubbles float out into the air.

Gem arrives to wish him happy birthday. Cosmic shows her how his new bubble machine works.

"What lovely bubbles!" Gem shouts, as she jumps about trying to catch them.

"They are OK," says Cosmic. "But they are all the same shape... And they are all the same size... And they are all the same colour. I wanted lots of different bubbles, but these are all the same."

"You must be able to make different bubbles," says Gem, peering into the end of the machine. "Perhaps there's something wrong with it."

"I'm not sure," says Cosmic.

**What do you think?**

### Your challenge

**Can you find a way to blow different bubbles for Cosmic?**

Cosmic thinks you can make bubbles with different shapes.

Gem thinks you can make different size bubbles.

Aunt Stella thinks you can make different colour bubbles.



# Discuss

Have you ever blown bubbles?  
Do you think that they were all the same?

## Getting started

Put some bubble liquid in a bowl or tray.  
Use a straw to blow some bubbles. **Don't share your straw with anyone else.**  
Dip the end of the straw in the liquid. Lift it out.  
Now blow down your straw to make a bubble.  
Try blowing gently and then blowing harder.  
How do the bubbles change?

## Test your ideas

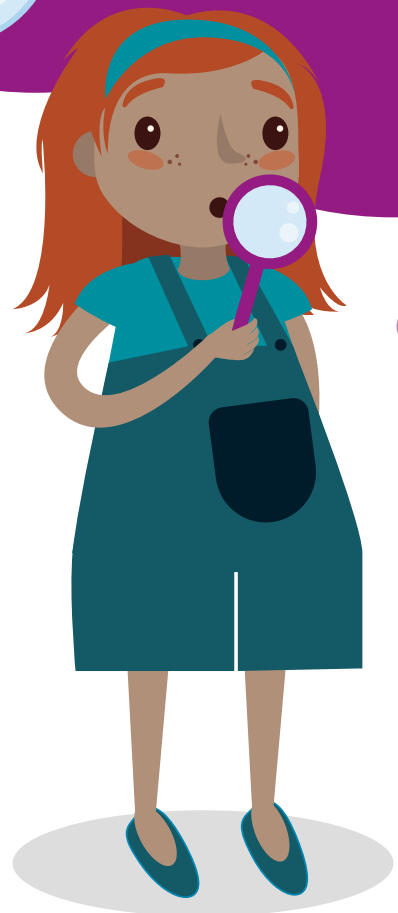
Can you think of other ways to find out about bubbles?

## Share your ideas

You could have a bubble competition to see how many different types of bubbles you can blow.

## Extra things to do

Find out how long you can keep a bubble before it bursts.  
Find out whether bubbles float or fall to the ground.  
Find out how long you can keep a bubble in the air.







# STAR



# Confusing Cans

## Organiser's Card



## About the activity

This activity is designed to get children thinking about weights, ramps and investigation.

Gem and Cosmic want baked beans for lunch but Uncle Astro's cans don't have any labels! Gem thinks that they can roll the cans to find out what is inside them.

Through this activity you will support children to:

- Think about how to find out what is inside a can without opening it
- Conduct an experiment to find out what is inside various cans
- Record and present their results



## Kit list

- A can of tinned tomatoes, soup, baked beans, cat food for each group, labels removed and marked with different numbers or colours
- A set of cans with labels for comparison
- Boards/trays to make the slopes plus blocks/books to support it
- Metre rulers, tape measures and other distance markers
- Can opener

## 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 how to find out what is inside the tins without opening them.
4. Encourage children to discuss their ideas and how to carry out their investigations. Discuss how they might make the cans roll. Can they make it a fair test e.g. using the same slope or letting go of the cans rather than pushing them from the top etc?
5. Support children to conduct their investigation and make their own records of their results. Let them explore the unlabelled cans first. Then roll the labelled cans to make a comparison. Ask them to use their observations to predict which of their cans contains the beans. Talk about the distance each can rolled and what is inside it. Can they see a pattern? Let the children try rolling other things to see if they fit the pattern. You could open the chosen cans.
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

Let children decide how to measure the distance each can has rolled. They might make accurate measurements or put down markers to compare distances.

What is inside the can will affect how far it will roll. Normally, the more solid the food, the further the can rolls.

Children might shake the cans to 'listen' to what is inside. The ones that they can 'hear' tend not to roll as far as the ones they cannot hear.

It is useful to have other labelled cans of food available for children to roll to see if they fit the pattern.

They can compare their ideas. You might open some cans. If they have chosen beans they may wish to heat and eat them. If they have chosen cat food, they won't!

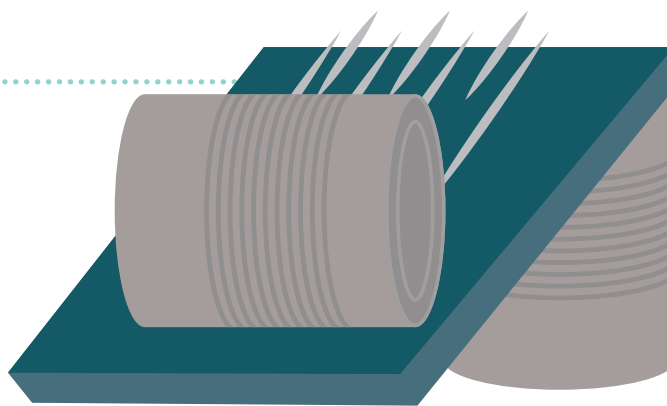
## Take it further

You can fill plastic bottles with water, freeze them (without the top) then see if there is a difference in how they roll as the water thaws (don't forget to put the top back on!).

Children can fill containers (large coffee tins or jars with lids are ideal) with different things e.g. sand (different amounts), syrup or cotton wool and see what happens.

## Keywords

- Measuring
- Testing
- Distance
- Acceleration
- Weight
- Density
- Volume



## Watch out!

Remind children not to leave cans lying on the floor for people to trip over.

Use a safety can opener. Push the can lid well inside open cans and dispose of safely after use. Opening cans and heating food should be done by adults.



# STAR

# Confusing Cans

## Activity Card

It is lunchtime at Uncle Astro's house. They are going to have beans on toast. It is Cosmic's favourite.

Uncle Astro opens the cupboard doors and suddenly, CRASH, all the cans roll out. Cat food, soup, baked beans, tinned tomatoes all over the floor, and the labels have fallen off. What a disaster!

"How do we know which is the baked bean can?" asks Cosmic. "I don't want cat food or soup on toast!"

Gem picks up one of the cans. It has rolled much further than the others. Cosmic picks up another can. It is still close to the cupboard. "I wonder if the way they roll might help us to work out what is in each can?" says Gem. "Let's see if we can find out."



## Your challenge

See if rolling the cans will help Gem and Cosmic to find out what is inside.

**Gem**



I think a can of beans will roll the furthest.

I think a can of soup will roll the furthest.

I think that what is in side of the can does not make a difference to how it rolls.

**Cosmic**



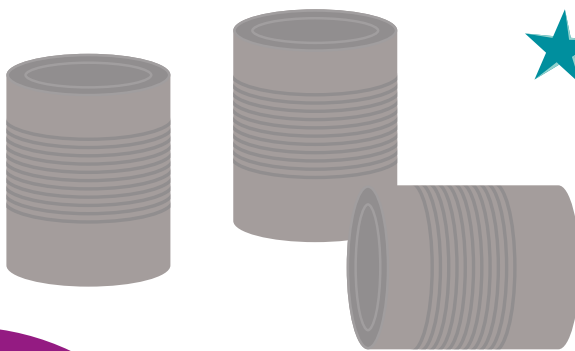
**Uncle Astro**



## Discuss

Have you ever dropped a can and seen it roll?

What happened?



## Getting started

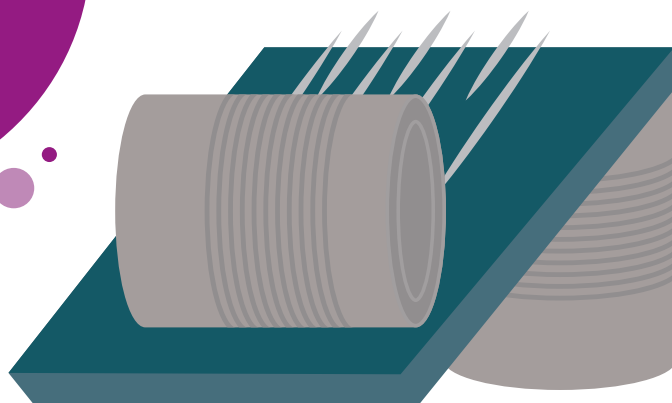
Roll each can down a slope and watch how they roll.

How high will you make the slope?

How will you make sure that you are rolling all the cans in the same way?

How will you know how far they have rolled?

Can you think of other ways to find out?



## Test your ideas

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

	Can 1	Can 2	Can 3
Distance rolled from a 30 cm high slope			
Distance rolled from a 50 cm high slope			
Distance rolled from a 1m high slope			

## Share your ideas

Talk about which can might have beans inside it and why. Compare your cans with ones with labels to help you to decide. Open the can and see what's inside!

## Extra things to do

Find out what happens if you roll cans or plastic bottles with different things inside. There are lots of things you could use e.g. dry sand, cotton wool, water, plastic beads.



# STAR

# Music Maker

## Organiser's Card



## About the activity

This activity is designed to get children thinking about how different sounds are made.

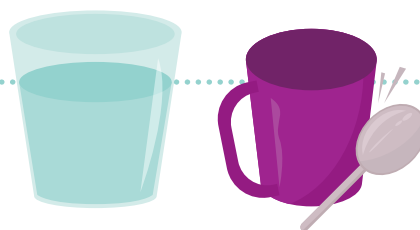
Cosmic and Gem are having breakfast with Uncle Astro. Gem is tapping things with her spoon to make sounds. Cosmic notices that the tune sounds different after he has poured fruit juice out of the bottle and the mugs are filled with tea.

Through this activity you will support your group to:

- Think about why the bottle makes different sounds
- Test different amounts of water in bottles and observe how they change the sound
- Record their results and present them to the group

## Kit list

- Several identical glass bottles
- Additional glass or pot containers of different sizes e.g. flower pots, mugs, cups, glasses or jars
- Spoons, pencils or other tappers
- Tubes with one end sealed and/or bottles with narrow necks to blow across e.g. milk or water bottles. Wine bottles work best, if you wish to use them (optional).
- Food colouring (optional)



## What to do

1. Follow the instructions on the activity card. Make sure you give the children time to talk about their ideas.
2. Read the story. Get the children to talk to a buddy about the ideas in the questions and the opinions of Gem, Cosmic and Uncle Astro.
3. They can start by exploring what happens when you change the amount of liquid in a bottle. The children will need several bottles all of the same size and should tap them gently with a spoon.
4. You could also give them other things to explore e.g. different sized glass bottles, jars, glasses, teapots, mugs or clay plant pots.
5. Encourage the children to work together with their buddy to put the sounds in order from low to high notes.
6. Can the children create a simple tune and share it with everyone else?
7. There are follow up activities for children who want to do more finding out.



# Things to think about

Whenever a sound is made, something vibrates. Sound can travel through air, solid or liquid. When you tap a bottle of water, the water vibrates. The more water in the bottle, the lower the note becomes. So we can create different notes (i.e. change the pitch), by changing the amount of water in a bottle.

Another way of making a sound is to blow across the top of a narrow necked bottle or tube sealed at the bottom. The sound is made by air vibrating in the bottle. The more air in the bottle, the lower the note. So a nearly full bottle makes a low note when tapped and a high note when blown across.

Cracked containers or objects touching each other do not produce clear notes. It is good for children to discover this themselves. If it is affecting their exploration then it is worth pointing it out to them.

## Take it further

Other things will produce sound when tapped, blown or plucked. Different sized tubes, clay flowerpots, cups, mugs or glass containers can all produce different notes. String, elastic bands or rulers of different lengths make different sounds when plucked.

## Keywords

- Sound
- Vibration
- Music
- Pitch

## Watch out!

Care needs to be taken when using glass. Check your organisation's policy for using glass. Clear up water spills and breakages quickly. Encourage children to tap gently.





# STAR

## Music Maker Activity Card



Cosmic and Gem are having breakfast with Uncle Astro. Cosmic lifts the fruit juice out of the fridge. Clunk goes the bottle as he puts it down.



"What a marvellous music maker you are this morning, young Gem," says Uncle Astro, as he tips tea into the mugs.

Gem has an idea. She begins to tap things gently with her spoon. Clink, clink, clink goes her mug. Plunk, plunk, plunk goes the teapot. Clung, clung, clung goes the fruit juice bottle. Tink, tink, tink goes Cosmic's glass.

"Hey, that was a different tune! How did you do that?" asks Cosmic. "I don't know," says Gem. "I'm not sure either," Uncle Astro adds. "Let's find out and then we can play a tune."

Cosmic fills his glass almost to the brim with orange juice. "Play it again, Gem," he says. So Gem plays again. Chunk, chunk, chunk goes her mug. Plink, plink, plink goes the teapot. Cling, cling, cling goes the fruit juice bottle. Tunk, tunk, tunk goes Cosmic's glass.

Gem thinks the note will be higher when the fruit juice bottle is nearly empty. Cosmic thinks the note will be higher when the fruit juice bottle is nearly full. Uncle Astro thinks the size of the bottle makes a difference.

**Have you ever made music by tapping things?**

**Did you find ways to change the sound?**



### Your challenge



Find out why Gem's tune changed and how to make music.

## Discuss



Talk about the best way to find out why the tune changed.

**What do you think?**

## Getting started

Collect glass bottles that are all the same size.

Put different amounts of water in each.

Tap on the bottles to see what sound they make.

Can you put them in order from the lowest note to the highest?

You will have made a musical instrument.

## Test your ideas

Can you think of any other things that you could use to make music?

What about different sized bottles?

## Share your ideas

See if you can tap out a tune. If the sound is not quite right, try adding a little more water or taking some out to make the sound that you need.

You could put your instruments on display. Try to make them look interesting by adding coloured water or by decorating them.

## Extra things to do

Try blowing across the top of the bottles.

Try tapping other things like mugs, jars, cups, glasses and flower pots. See what else you can do to make a musical sound.







# STAR



# Slippery Slidey Shoes

## Organiser's Card



### About the activity

This activity is designed to get children thinking about friction.

Oops! Gem and Cosmic have slipped on the floor.  
Help them figure out how to stop it happening again.

Through this activity you will support your group to:

- Think about why the shoes slipped on the floor
- Test different shoes and observe which ones are the most and the least slippery
- Record their results and share them with the group

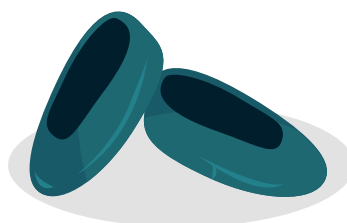


## Kit list

- A collection of shoes to sort and test
- Wide ramp e.g. a shelf, a wipe board, a tray
- Different materials to cover the ramp (optional)

## What to do

1. Follow the structure on the activity card. Make sure that you give children time to talk about their ideas.
2. Read the story. Then get the children to talk about the questions and the opinions of Cosmic, Gem and the Caretaker.
3. Talk through how they might test the shoes but encourage children to use their own ideas too.
4. When they have finished talk about why the best shoes were best. Children could also take
5. There are follow up activities for children who want to do more.



# Things to think about

The children may want to explore sliding the shoes on the ramp first before they test each shoe systematically.

It is good if children decide to use their ramp in different ways from the one suggested on the activity card.

They might try lifting the ramp to see when the shoes slide.

They might try two shoes at a time.

They might try changing the surface of the ramp to see why Cosmic and Gem slipped on the hall floor but not on the carpet in the corridor.

## Take it further

Friction between surfaces stops things slipping.

If shoes and surfaces are very smooth, there is unlikely to be much friction. If either surface is roughened a little, the shoes will generally grip better.

High-heeled shoes are slippery as they do not have very much surface in touch with the ground. Some wellingtons can also slide easily because they are designed to be used in muddy conditions, not on smooth surfaces.

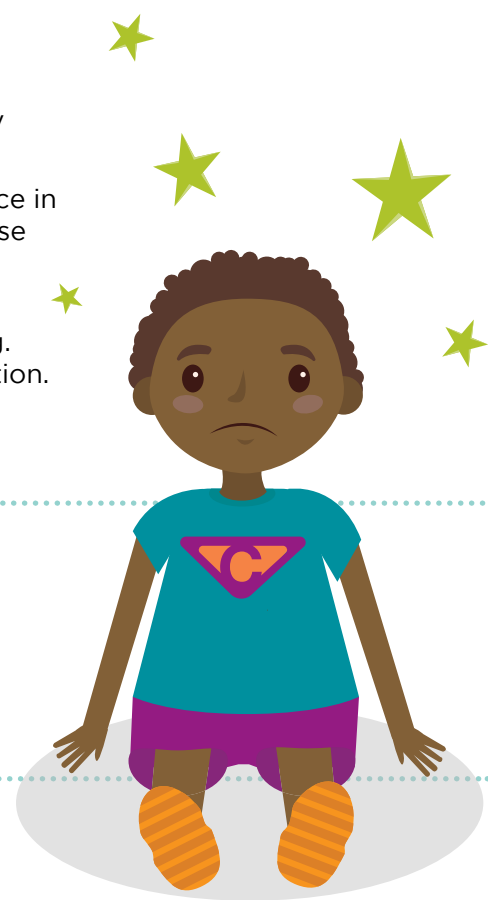
Changing the floor surface will make an obvious difference to sliding. Polish reduces friction. Carpet is much rougher, which increases friction.

## Keywords

- Friction
- Slip
- Surfaces

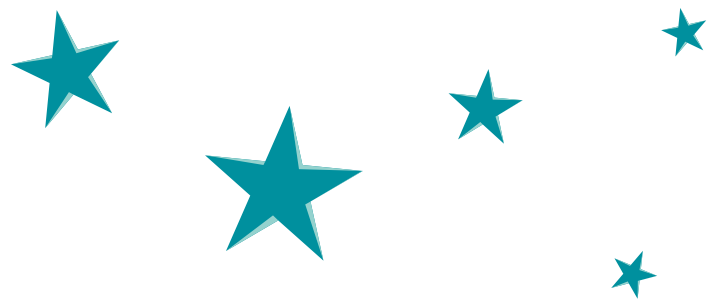
## Watch out!

Be cautious about children trying out the activity for real on a slippery floor.





# STAR



# Slippery Slidey Shoes

## Activity Card



Gem is very late. It is a wet day and Gem wears her wellingtons to go to school. She waves 'bye' to dad, turns round and runs down the corridor into the hall. SPLAT!! Gem's feet fly from under her and she falls heavily onto the hall floor. Cosmic is late too. He runs into the hall. "Watch out!" shouts Gem. Too late, SPLAT!! Cosmic slips on the floor too.

"What happened?" says Cosmic to Gem.

"I think the caretaker has done something to the floor," Gem replies.

"I think you've got slippery slidey shoes!" says the caretaker.

Cosmic and Gem look at their shoes. Then they rub their bruises and wonder how they can stop it happening again. Do you think you can help them?

Have you ever slipped over?  
Why was this?  
Why do you think Gem and Cosmic slipped?

Gem thinks it's because the floor is made of wood.  
Cosmic thinks that the caretaker has put polish on the floor.  
The caretaker thinks it's the kind of shoes they're wearing.



## Your challenge



**Gem has a great idea - have a competition to find the best non-slip shoe.**

# Discuss



Talk about the shoe that you think will be the best.

## Getting started

Set up a ramp.

Put two shoes on the ramp and try to find which one isn't very slippery.

Keep trying until you find the best non-slip shoe.

How can you make sure that everything is fair?



## Test your ideas

Can you think of other ways to find out?

## Share your ideas

Make a poster about why you think your winning shoe was the best.

## Extra things to do

Find out more about shoes for different purposes.

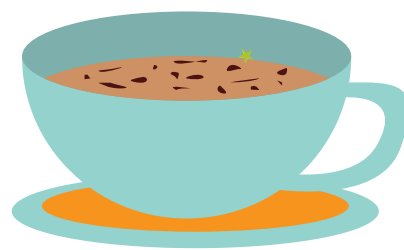
Do some shoes need to be slippery?

Can you find out different ways to stop surfaces being slippery?





# STAR



# Tea Bag Trouble

## Organiser's Card



### About the activity

This activity is designed to get children thinking about materials.

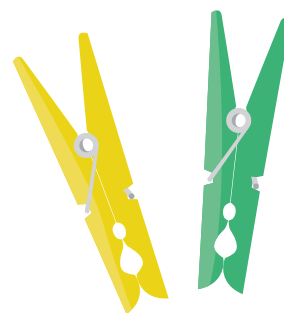
Uncle Astro wants to make a nice cup of tea but he's run out of tea bags. The shop is only selling packets of loose tea leaves. Uncle Astro doesn't like tea leaves floating around in his drink, so Cosmic and Gem wonder if they can make him some tea bags.

Through this activity you will support your group to:

- Think about what makes a good tea bag
- Test different materials and observe how they behave when used as a tea bag
- Record their results and share them

## Kit list

- Loose tea leaves and tea bags
- Water from the hot tap
- Clothes pegs
- Selection of different materials e.g. tissues, newspaper, kitchen roll, silk, cotton, tissue paper, crepe paper
- Teaspoons, clear containers, measuring jug, minute timer
- Scissors and thermometers
- Coloured pencils, including brown



## What to do

1. Give out the activity cards and introduce the activity by reading the story together.
2. Get the children to talk about the questions and the opinions of Aunt Stella, Gem and Cosmic.
3. Look at some tea bags together. Talk about making tea.
4. If possible let them choose their own materials.
5. Check that they understand how to make tea bags using the pegs. Let them talk about what makes a good tea bag (lets colour and flavour out and keeps tea in).
6. Discuss safety issues when using hot water.
7. Ask the children to draw cups of tea to show what happened. Encourage the children to use lighter or darker browns to show the tea colour and to draw in tea leaves.

# Things to think about

They need to fix the peg so that the tea leaves cannot escape through the top. Children may need to practice. Thin or soft materials are easier to use.

Some materials will absorb a lot of water and some will tear easily. Encourage children to notice this.

Children should be encouraged to use the same amount of tea in each bag, the same sized piece of material, the same volume and temperature of water, and to dunk for the same amount of time.

Encourage children to observe differences in tea colour and the number of escaping tea leaves.

To show off their research, children can draw pictures of cups of tea. They can stick a piece of the appropriate tea bag material next to each picture.

## Take it further

The first tea bags were made from silk muslin in 1903 in the USA. Tea bags weren't popular in the UK until the 1950's. Now 96% of all tea sold in the UK is contained in tea bags.

Modern tea bags are usually made of paper fibre and heat sealed. They come in square, rectangular, circular and pyramidal shapes. The quality of the tea in the bags varies. Some can have a high quantity of tea dust in them. Bags with whole leaves tend to take longer to brew.



## Keywords

- Hot Water
- Tea
- Absorption
- Filtration
- Materials



## Watch out!

Water from the hot tap will work. Check its temperature before use to make sure it is not too hot for children to use.

Try to prevent over vigorous dunking and splashing.

Children should not drink the tea.





STAR



# Tea Bag Trouble

## Activity Card

Uncle Astro loves drinking tea. He drinks tea with his breakfast and with a biscuit mid-morning. He has tea after his lunch and with a piece of cake at 4 o'clock. He has tea with his evening meal and a cup just before he goes to bed.

"No wonder the tea bag tin is empty," sighs Aunt Stella.

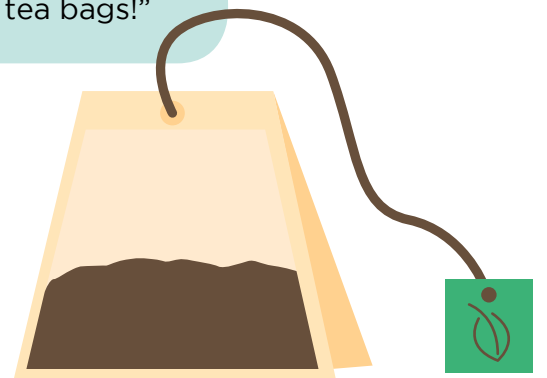
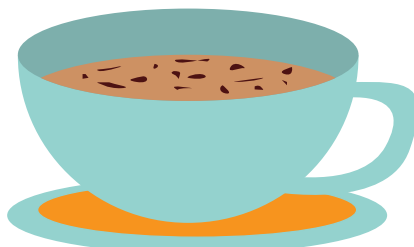
"We'll go to the shops to get some more," offer Cosmic and Gem. But when they come back there are no tea bags in their shopping basket. "The shop has run out of tea bags. We had to buy a packet of loose tea instead."

"Oh no!" says Uncle Astro. "That won't do. I'll end up with a cup full of tea leaves. How am I going to make a nice cup of tea this afternoon?"

"We can try to make some tea bags for you Uncle Astro," they answer eagerly.

"That's very kind of you, but remember - I don't like tea leaves in my tea. I just like a nice cup of lovely brown tea."

"Come on," says Aunt Stella. "Let's start testing tea bags!"



# Your challenge



Uncle Astro doesn't like tea leaves floating around in his drink, so Cosmic and Gem wonder if they can make him some tea bags.

Have you ever helped to make a cup of tea?

Do you know how tea bags work?

Aunt Stella thinks they should make Uncle Astro some tea bags out of kitchen roll

Cosmic wonders if newspaper would work.

Gem thinks thin fabric would be better.

What do you think?

**Find the best material to make a tea bag for Uncle Astro.**

## Discuss



Plan how you can test different tea bags. How will you know which is the best tea bag?

## Getting started

Cut out a square of kitchen roll.

Put a teaspoonful of tea leaves in the middle.

Gather up the corners with a clothes peg to make a bag.

Half fill a clear beaker with water from the hot tap.

Holding the peg, dunk the teabag up and down in the water for one minute.

Try other papers and fabrics to see which type makes the best tea bag (lets the flavour and colour out, and keeps the tea leaves in).

Take care with the hot water and don't drink the tea!

## Test your ideas

Can you think of other ways to test tea bags?

## Share your ideas

Draw a picture of each cup of tea.

What colour is the water?

Are there any tea leaves in it?

## Extra things to do

Are all tea bags the same shape?

Are some shapes better than others?

Why do some have string attached?

Find out when tea bags were invented.



## Organiser's card:

# Be Seen, Be Safe

## About the activity

This activity is designed to get children thinking about reflection and light. The activity works best when run with small groups.

Tara wants to join Zeke and take Luna the dog out for a walk, but it's starting to get dark. The children are asked to help Tara and Zeke decide on the best thing to wear that will help them be seen in the dark.

Through this activity you will support your group to:

- Test different materials to see how reflective they are.
- Record and share their results.

## What to do

1. Introduce the activity using the story on the accompanying slides or activity card. Ask the children what they think will help them to be seen in the dark. Show the equipment to the children.
2. Explain that they will be using the equipment provided to test the best way to be seen in the dark.
3. Encourage children to discuss their ideas about how to carry out their investigations. Prompt questions could include:
  - Which materials do you think will be seen?
  - How will you test to see if the materials are reflective?
  - How will you record your results?
4. Support children to conduct their tests and make their own records of their results. They could sort the materials or order them from least to most effective reflector.
5. Ask the children to share their findings with the rest of the group – they can be as creative in their presentation as they want.

## Kit list

You could ask children in advance to bring things in that they think will help them to be seen in the dark.

- A selection of different materials, e.g. different coloured t-shirts or fabrics, reflector armbands, mirrored card, dark/light coloured paper etc.
- Torches
- A place that can be partially blacked out, e.g. use a dark coloured tablecloth over a table to create a dark den.

## Things to think about

Some things produce light, e.g. a lamp, the Sun. We call these light sources. Other things can reflect light, but they don't produce light of their own, e.g. a mirror, aluminium foil, a white t-shirt. We call these reflectors. Some colours reflect more light than others. White is easier to see than red; red is easier to see than black.

Reflectors will be seen if there is a source of light. Even on a 'dark' night, there is usually light around, especially in towns. A good reflector may be visible on a dark night because of this. Cat's eyes and reflective strips will also reflect the lights of cars. So Tara and Zeke will need to wear something light coloured or shiny to be safe in the dark.

## Key words

- Light
- Dark
- Shiny
- Safety
- Reflection
- Source

## 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.

Explain that children should not stare directly at bright light sources.

## Activity card:

# Be Seen, Be Safe

Tara is really excited as she's going to meet Zeke's new dog, Luna, and help take her out for a late afternoon walk. Joyti, Tara's grandmother, is coming too, but when she sees Tara putting on her black coat, she shakes her head.

"Hold on," says Joyti, "it's going to start getting dark soon, you can't go out in those clothes, it's not safe!"

"What do you mean?" asks Tara.

"That black coat you're wearing won't be seen once it's dark," explains Joyti. "Let's find you something that will keep you seen and safe!"

## Your challenge

Find out if Tara and Zeke can wear something that will help them to be better seen in the dark.

Tara thinks they need to wear something shiny.

Zeke doesn't think what they wear makes a difference.

Joyti thinks they need to wear something white.

What do you think?



## Discuss

Why do you think Tara's black coat might not be seen at night?

Have you noticed what you can see in the dark?

How will you find out if different materials can be seen in the dark?

## Getting started

You need to compare how well each material can be seen. Make a dark space. You could draw the curtains, work in a tent or cupboard, or use black fabric to make a den. This will help you see the difference between good and bad light reflectors.

Which materials can you see the best?

What difference does having more light make? What can you see in complete darkness?

Do some colours work better than others?

## Test your ideas

You could test the different materials and then put them in order from the most difficult to see in the dark, to the easiest to see in the dark. Take a photo and compare your order to other people's. Are they different or the same?

Which material would keep Tara and Zeke the safest as it starts to get dark outside?

## Share your ideas

How did your investigation go?  
Was there anything you could have improved about your test?  
Why not design something for Tara, Zeke or Luna to wear?

## Extra things to do

Find out if you can see reflectors in total darkness.  
Design a warning poster to help children be safe at night.

Organiser's card:

# Peggy Problem

## About the activity

**This activity is designed to get children thinking about grip and strength. The activity works best when run with small groups.**

It's washing day at Aunt Stella's house. She cleans her clothes and then hangs them on the line to dry. The wet clothes keep falling off the line. Cosmic and Gem decide to try to find out which are the best clothes pegs for her to use. Will some clothes pegs be grippier than others?

Through this activity you will support your group to:

- Think about what makes a peg work well.
- Test different types of peg and observe how strong they are.
- Record their results and share them with the group.

## What to do

1. Introduce the activity using the story on the accompanying slides or activity card. Ask the children to talk about the questions and the opinions of Gem, Cosmic and Aunt Stella.
2. Talk through the idea of testing the pegs by adding sand, large marbles or pebbles to a sock on a washing line.
3. You could let them think of other ways of testing the clothes pegs too.
4. Discuss safety issues (see 'Watch out!' overleaf for more details). Then support children to carry out their investigation.
5. Talk together about what they have found out. Were some pegs better than others? Which one worked best?

## Kit list

- A length of washing line, fixed at a suitable height for the children to reach
- Different types of clothes pegs (you could ask children to bring in pegs from home)
- Socks
- Something to gradually weigh down the socks – you could use sand, large marbles or pebbles (pebbles can be numbered and used in the same order each time if they are different sizes)
- If you are using sand, you will also need small cups for filling the socks, a dustpan and brush and bowls or a floor covering to catch the sand

## Key words

- Grip
- Weight
- Spring
- Pegs
- Heavy
- Light

6. Let the children show their findings by drawing a picture or poster, encouraging them to add as much detail as possible.
7. There are extra things to do on the activity card for children who have finished or who want to do more at home.

## Things to think about

If you are using sand to weigh down the socks, make sure that the children empty the sock as much as they can each time so that each peg is tested the same way. Otherwise get a collection of socks and use a new one each time. Test the socks to check that the sand does not leak out!

If you are using pebbles, you could number them and use them in the same order each time, testing the pegs one by one. As pebbles are not completely uniform in shape and size, this will ensure that each peg is tested in the same way. Is there another way to check that the pebbles used are the same each time? Can children think of a different way of testing the pegs?

The first pegs were probably sticks with a slit in one end used by fishermen hanging their washing on the rigging while out at sea. It wasn't until the 'spring-clamp' was invented in 1853 that pegs started to resemble those we use today.

It is important that the children are able to feel like 'real scientists' during this activity and know that their own ideas are important too. If children do come up with their own tests, try to let them have a go, provided you have the equipment, and the test is safe.

## Take it further

Children could try weighing the pebbles each time as part of the testing.

Pegs can also be tested in many other ways. For example, measuring the clamping pressure of sprung pegs. You can do this by attaching the pegs to plasticine and measuring the depth of the indentation.

Can you think of any other jobs that a peg might be used for?

## Watch out!

- If you're using sand, put a bowl or mat underneath the washing line for the sand-filled socks to fall onto.
- If you're using marbles or pebbles, ensure that they are large enough not to be a choking hazard. Children should be reminded to take care with the sand, marbles or pebbles and not to drop or throw them, or put them in their mouths.
- Be careful where you hang the line so that children cannot run into it. Keep the line low so that the socks do not have too far to fall, and the children can reach it easily.
- Children should be careful when handling pegs, particularly those with spring hinges, to avoid getting fingers and skin trapped.
- Children should be reminded not to rub their eyes if they are handling sand and to wash their hands afterwards.



STAR

Cosmic

Gem

Activity card:

# Peggy Problem

Aunt Stella looks out of her kitchen window. "Warm and windy... looks like the perfect washing day." she declares, as she rolls up her sleeves to wash her clothes.

When they are all clean, she carries the heavy, wet pile outside to hang on the washing line to dry. Cosmic and Gem's friendly faces appear.

"Just in time to help." Aunt Stella smiles, and soon the washing line is filled with brightly coloured T-shirts, socks, skirts and jumpers.

The three of them head into the house for a well-deserved glass of apple juice.

"Oh no!" Cosmic shouts with surprise. "Some of the clothes have fallen off the line onto the grass! I don't think your clothes pegs are grippy enough for the heavy, wet clothes."

"We've got different clothes pegs at home, perhaps they would be better." suggests Gem, looking thoughtful.

"We could test them for you, Aunt Stella." they offer eagerly.

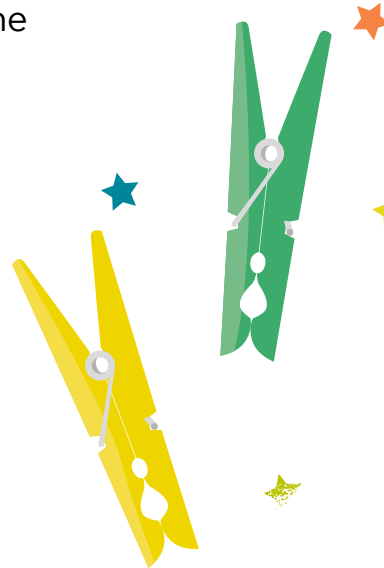
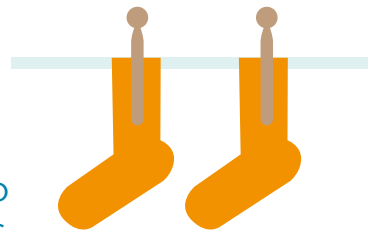
Aunt Stella thinks a peg with a spring will have the most grip.

Cosmic thinks all the plastic pegs will have a tight grip.

Gem thinks wooden pegs might be better as she thinks wood is stronger.

Have you ever helped to hang clothes out to dry at home?

What type of clothes pegs did you use?



## Your challenge

Test different types of clothes pegs and find out which ones are good for keeping washing on the line.



## Discuss

Plan how you can test different clothes pegs. How are you going to find out which pegs are strong and grip things well?

## Getting started

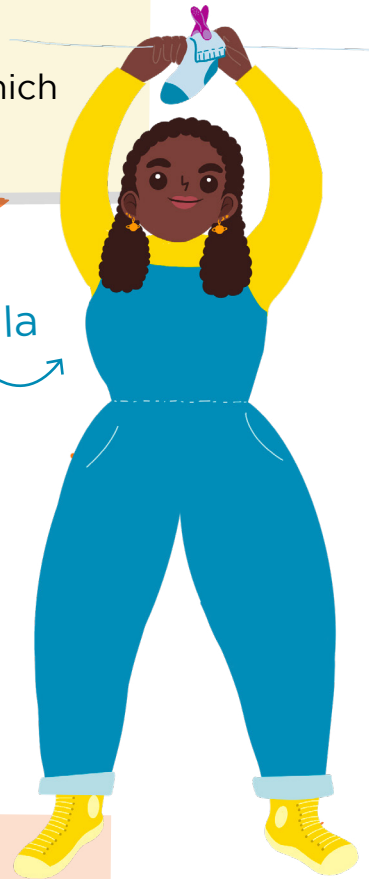
Collect different types of clothes pegs.

Make your own washing line with a thin skipping rope or string. Don't fix it too high - ask an adult to help you!

Choose one peg to hang a sock on the washing line.

Keep filling the sock with cups of sand, large marbles or pebbles until it falls off the line. Make sure you keep track of how many you use!

Aunt Stella



## Test your ideas

Try other pegs and see which type has the strongest grip (which can hold the most sand, marbles or pebbles in the sock).

Stand well back from the falling socks and don't rub your eyes with sandy fingers.

Can you think of other ways to test clothes pegs?

## Share your ideas

Take a photo or draw a picture of each peg and write down the number of pebbles, marbles or cups of sand it took to pull it off the line!

You could order the pegs from the one with the least grip, to the one with the most grip.

Which peg should Aunt Stella use?

Draw or paint a picture of your tests. You can use the best peg to hang your picture on the washing line.

## Extra things to do

Find out if clothes dry better on a windy or a still day.

Find out if some clothes dry faster than others.

Try to work out how to dry clothes on a rainy day.



## Organiser's card:

# Sneaky Shadow

## About the activity

This activity is designed to get children thinking about shadows. You could run the activity with small groups, or with a whole class.

Seren has lost her shadow. She knows that it was with her all day but now it is missing. Gem and Aunt Stella try to help her to find it. Gem finds it under an outside light and Aunt Stella finds it on the wall. Where has the sneaky shadow been hiding?

Through this activity you will support your group to:

- Experiment with making shadows indoors and outside.
- Create a shadow play to share.

## What to do

1. Introduce the activity using the story on the accompanying slides or activity card. Ask the children to talk about the questions and the opinions of Seren, Gem and Aunt Stella.
2. If it is sunny, you could go outside first to look at shadows.
3. Children can explore shadows using torches or other light sources.
4. Set up a shadow theatre for the children to explore.
5. Children can cut out a variety of shapes e.g. people, animals or cars. They can then attach their shapes to sticks to make simple puppets and use them to create a shadow play. Some children may need help to think of a story for their play.
6. They can experiment with coloured transparent material. Is it possible to make a coloured shadow?
7. Let them share their plays with each other. They could add sound effects using musical instruments!
8. There are extra things to do on the activity card for children who have finished or who want to do more finding out at home.

## Kit list

- Torches or other light sources
- Card or thick paper
- Scissors
- Sticks to attach to the shadow puppets
- Sticky tack or sellotape
- Coloured transparent material (this can be interesting to experiment with)
- A shadow theatre – this could be a small table-top theatre, or a large screen made from a sheet.  
You will need: a light source (e.g. torch, projector or bright lamp) and a screen (e.g. tracing paper stuck to a cardboard frame, or a white sheet)
- Musical instruments (optional)

## Things to think about

Children may think that shadows are there all the time, even when it is dark. They may think that shadows have faces or coloured clothes. It is important that they are allowed to talk about and explore their own ideas, without being told that they are wrong.

A shadow theatre is ideal to disseminate the information. Put a bright light source behind a screen. Children hold their cut-out characters on sticks in front of the light and behind the screen so that the shadows are cast on the screen. The plays can be shared with each other.

## Take it further

As children explore, they will find that the closer the object is to the light source, the bigger the shadow. The shadow is always on the opposite side of the object from the light source.

You do not need complete darkness to explore shadows with torches or other light sources. Light coming through a window can form shadows. However, it can be helpful to minimise light coming through windows to make the shadows formed by torches clearer.

## Key words

- **Shadows**
- **Light**
- **Dark**
- **Colour**
- **Block**

## Watch out!

- Make sure children do not touch a hot light source.
- Observe your organisation's policy for working outdoors.
- Do not look directly at the Sun.
- Do not look directly at a bright light source.
- Beware of trip hazards if working in dark conditions.
- You can access further guidance on exploring shadows on the CLEAPSS website, in [Guide P138](#).



# STAR

Activity card:

## Sneaky Shadow

Seren is very worried. Her shadow is missing. It was there when she was outside playing. It was still with her when she walked home from school. But now it is nowhere to be seen.

Seren goes to play at Gem's house, perhaps her shadow is in Gem's garden. Aunt Stella is looking after them and says they can go outside to look for it. It is late afternoon and getting dark.

"Come here quickly," shouts Gem. "I've found a shadow!" Gem is under an outside light, looking down at her feet.

Seren runs over and looks down at her feet too. "You've found it! Great!" But when the outside light goes off, her shadow is missing again. Oh no!

Just then Aunt Stella comes out of the house. She is carrying a big torch. "I'll help you find your sneaky shadow," she says, waving the light around the garden, "and there it is!"

There on the wall is Seren's shadow. "Wow! Where did that come from?" asks Seren.

Can you guess?

Aunt Stella thinks you will see your shadow if there is bright light. Gem thinks you can only see your shadow when the sun is shining. Seren thinks shadows hide when it goes dark.

Have you ever looked at your shadow?

Does your shadow ever disappear?

Seren



Aunt Stella

Gem



## Your challenge

Find out what makes a shadow and what makes it disappear.

## Discuss

Talk to your group about how you are going to find out.

## Getting started

You could go outside to look for shadows. What do you see? Can you find places where you can see your shadow and where your shadow disappears?

If you are indoors, try using a bright torch.

Make shapes in front of the light with your hands. What do you see?

Make some little people or other shapes from card. What happens when you put them in front of the light?

## Test your ideas

Can you think of other things that you can do to make shadows and see whether Gem, Seren or Aunt Stella is right?

You could use your little people to make a shadow play. Ask an adult to help you to set up a shadow theatre.

## Share your ideas

Talk about why Seren's shadow was missing. Share your shadow play. Can you explain how to make a shadow?

## Extra things to do

Can you make different coloured shadows?  
Can you make your shadows change size?  
Make up more shadow plays.



## Organiser's card:

# Sniffly Sneezes

## About the activity

This activity is designed to get children thinking about the strength and absorbency of materials. You could run the activity with small groups, or with a whole class.

Achoo!! Zeke has a cold and his hankie isn't working very well. Can you help him find a better one?

Through this activity you will support your group to:

- Think about what makes a good hankie
- Test different materials and observe how they behave when used to absorb water
- Record their results and share them with the group

## What to do

1. Introduce the activity using the story on the accompanying slides or activity card. Get the children to talk about the questions and the opinions of Zeke, Tara and Joyti.
2. Then give the children a set of materials to test as hankies. Let them talk about which they think might be best and how they will find out, before they start investigating.
3. You could list the different tests they might want to do e.g. absorbency, strength, smoothness. Make sure that they test all the different materials. Encourage them to use their own ideas too.
4. When they have finished, agree on the winners and talk about why these were the best hankies. You might ask the children to think about why we have disposable tissues.

## Kit list

- A selection of different materials that could be used as hankies e.g. cotton fabric, newspaper, crepe paper, cotton wool, tissue paper, greaseproof paper, tissues.
- Plastic trays
- Beakers
- Coloured water (dissolve a drop of food colouring or paint in a beaker of water, this will make the liquid easier for the children to see)
- Pipettes
- Paper towels to clean up any spills

**5.** To present their work the children could:

Sort the materials into those that worked well and those that didn't.

Put the materials in order, from the one that soaked up the most water, to the one that soaked up the least. Take a photo and compare it to other children's results!

Make a collage, using bits from the different hankies.

Produce a poster, using smiley faces and sad faces to indicate how good the hankies are.

## Things to think about

Encourage children to think of all aspects of what makes a good hankie.

Get them to think carefully about the amount of water used in the absorbency test.

There is no easy way to measure for roughness. The children can estimate how the hankies feel, perhaps using a simple 3-point scale e.g. smooth, rough and in-between.

## Take it further

The hankie's absorbency depends on a number of factors, including the thickness of the fibres and size of the spaces between them.

The hankie's strength is important. Cheap tissues can be absorbent, but they may fall apart easily when wet.

How rough the hankie feels is essential, especially when you have a cold. Some tissues have added lubricants, such as Aloe Vera, so that they feel softer. Greaseproof paper feels smooth but is not very absorbent.

Disposable tissues are more hygienic and should be thrown away after they have been used. Germs can multiply quite rapidly in a tissue or hankie that is kept in a warm pocket. If you use it over the course of a day, then it can get pretty unpleasant and unhygienic. This is a good opportunity to remind children to wash their hands regularly if they have a cold.

## Key words

- Wet
- Dry
- Strong
- Weak
- Soft
- Rough
- Germs
- Absorbent
- Durable

## Watch out!

- Mop up spills to avoid a slippery floor.
- Warn children not to squirt coloured water at each other.
- Test hankies on hands, not noses.
- Remind children not to share hankies.
- Ensure children do not taste or put the liquid or materials used in this activity near their mouths. If you are using food colouring for this activity, it can stain children's hands.

Zeke

Joyti

Tara

## Activity card:

# Sniffly Sneezes

Zeke grabs his hankie. Achoo! Achoo! Achoo!

He holds his hankie to his nose and sneezes three more times. "Oh dear, what a horrible sniffly sneeze!" he sighs, tucking his hankie into his pocket.

Now his nose is running! He needs to wipe it quickly. Zeke pulls out his hankie again and rubs his nose. This isn't any fun.

There's a knock at the door. It's Tara. She's brought Zeke a lolly to cheer him up.

Tara looks at Zeke, "Your nose is all red," she says. "It must be sore."

Zeke sighs again. "It's my hankie. It doesn't work very well. I wish I had a better one."

"OK," says Tara cheerfully. "I'm sure we can find something. I'll go and ask my grandma, Joyti, to help us. She will have lots of things we could try. But how will we know which is best?"

Joyti says she thinks a hankie needs to be strong when it's wet. Tara thinks a hankie needs to be soft on your nose, and Zeke thinks it needs to soak up water to keep your nose dry.

Have you ever had a cold? What kind of hankie did you use?

## Your challenge

Zeke needs to know which hankie to use. He has lots of things to try. Can you help him?

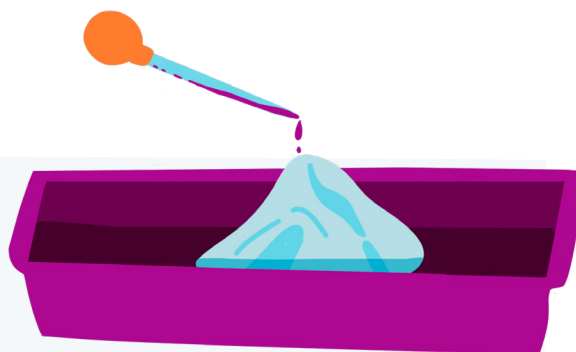


## Discuss

Talk to your buddy about how you will find out which is the best material for a hankie.

## Getting started

Get some different materials and a tray.  
Collect a beaker of coloured water.  
How will you decide which material is best at soaking up the drips of water?  
How much water will you put on each material?



## Test your ideas

One at a time, put each material in the tray.  
Drip coloured water onto the material.  
Does it soak up the water?  
Will it make a good hankie?

## Share your ideas

Sort the materials into ones that worked well and ones that didn't.  
Can you put the materials in order from the one that soaks up the least water to the one that soaks up the most?  
Take a photo of your order and compare it to other people's.  
Which material would make the best hankie?

## Extra things to do

Can you do any other tests to decide which hankie is the best?  
Find out why it might be better to have a hankie that you can throw away after you have used it.





British Science Association  
Wellcome Wolfson Building  
165 Queen's Gate  
London  
SW7 5HD

**crestawards.org**

British Science Association Registered Charity No. 212479 and SC039236

Managed by

