CREST AWARDS | STAR

Developed in partnership with:

ROYAL COMMISSION EXHIBITION OF 1851

Early years and primary challenges

Suitable for **ages 3-7, or those working at this level**

Risk assessment

These hands-on challenges are designed to be interactive and fun for everyone taking part. We recommend reading both the Organiser and Activity Cards before running the activities. Each Organiser Card gives some health and safety pointers but, as with all practical activities, you should carry out a full risk assessment beforehand.

As these activities are aimed at a range of ages and abilities, please use your professional judgement and feel free to adapt the resources for your children, giving them the opportunity to explore each challenge in a way that is accessible and appropriate for them.

You can also 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/)

CREST Star Collection for early years and primary

Suitable for 3-7 year olds, or those working at this level

This collection includes eight practical activities that have been selected from our CREST Star challenges collection. They have been chosen and adapted to make them suitable for children aged 3-7, or those working at this level. Each project is accompanied by a set of supporting slides that can be used to introduce and explain the activity.

Preparation

1. Visit **primarylibrary.crestawards.org** and download the CREST Star Passport. Print a Passport for each child you are running CREST with.
2. Read through the activities in this pack, and the accompanying supporting slides, to prepare to run the challenges. Instructions can be adapted to suit the needs of the children at any point.

Run the challenges in this pack

1. Each challenge takes 45-60 minutes and involves hands-on investigation, decision making and group discussion. There is a short demo video available for each project, giving you tips and guidance on running the activity. The supporting slides can be used on your whiteboard or a laptop to support the children's understanding.
2. Once children have taken part in an activity, they can use their CREST Passport to keep track of the challenges they have completed. You can use stickers, stamps or signatures to track their progress.
3. When children have carried out at least six activities, they will have earned a CREST Star Award and can receive a certificate to celebrate their achievement.
4. Go to crestawards.org/sign-in and create an account to login. Tell us about the challenges the children completed and fill in your delivery and payment details to order your certificates.
5. Congratulations on completing CREST Star!

What next?

Why not try other CREST Star projects, such as those in the space themed *Earth and Beyond pack*, with a physics focus for younger children. Or you could explore more challenges from the full CREST Star challenges collection.

Meet our **CREST Star** characters

Uncle Astro
Uncle to Cosmic and Gem

Aunt Stella
Aunt to Cosmic and Gem

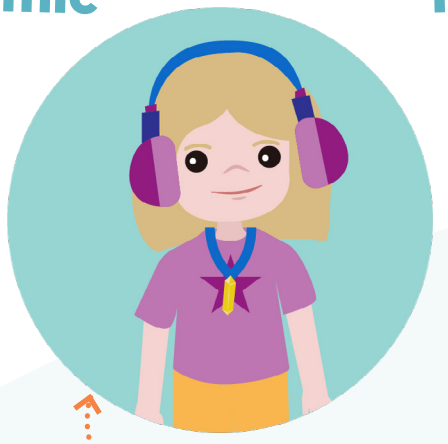
Joyti
Grandmother to Tara and Cosmic's neighour

Gem

Cosmic

Tara

Zeke



Seren

Gem, Cosmic, Tara, Zeke, and Seren all go to the same school.

Contents

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Organiser's card:

Animal Adventure

About the activity

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

Cosmic and Seren are bored. Cosmic wants to go on an animal adventure. Uncle Astro said that they will find minibeasts if they look carefully. Cosmic looks high and low but he can't find any little animals. Seren thinks that they should ask Uncle Astro for help.

Through this activity you will support children to:

- Go on a minibeast hunt.
- Find out about the minibeasts they see and their habitats.
- Share their findings with the rest of their group.

What to do

1. Introduce the activity using the story on the accompanying slides or activity card. Ask the children where they think they will find minibeasts.
2. Explain that they will be going on a minibeast hunt.
3. Encourage children to share their ideas about how they will hunt for minibeasts. Prompt questions:
   - Where will we look for minibeasts?
   - Will we collect them?
   - How will we make sure we don't harm them?
4. Give out the equipment to the children.
5. Support children to conduct their investigation and make their own records of their results. They could take photographs or make drawings. Support them to identify what they find – if you have a tablet or mobile phone, you could use Google Lens or a similar app to help with this.

Kit list

- Suitable minibeast collection kit, e.g. pooter, collection jar, collection scissors (special devices for catching minibeasts)
- Appropriate magnifiers, e.g. magnifying glasses
- Identification book or app (optional)
- Outdoor environment, preferably with rocks, logs, large stones, pieces of old carpet (you could place some on the ground a few weeks earlier)

Key words

- **Habitat**
- **Damp**
- **Moist**
- **Minibeast**
- **Skeleton**
- **Invertebrate**

6. Ask the children to share their findings with the rest of the group.
7. Return any collected minibeasts to their habitat.

Things to think about

Teach children to handle all animals with care. It is best to observe minibeasts in their natural environment. However, they can be taken inside for short periods, as long as they are treated with respect and returned to where they were found.

Take it further

Many children believe the word 'animal' refers only to large furry animals and not humans, birds, fish, insects, etc. This hunt focuses on minibeasts but could also include spotting other animals such as birds.

The scientific name for minibeasts is invertebrates, this means an animal without a backbone. Some invertebrates have no skeleton, like worms. Others, like insects and spiders, have a skeleton on the outside (exoskeleton).

You can generally find plenty of minibeasts living in moist, damp, dark environments which help to keep them safe and stop them 'drying out'.

The children could design and make minibeast homes or bug hotels as a follow-up activity. They might like to make up a song or poem about the minibeasts, or create models of them.

Watch out!

- Children should be supervised at all times during this activity – levels of supervision will vary depending on the location and the age of the children.
- All children should be made aware of the boundaries of the minibeast hunting area.
- Children should be reminded not to put their fingers in their mouth, nose or eyes and to wash their hands afterwards.
- Make sure that any stones are not too heavy and are lifted carefully.
- Common outdoor allergens include plants, animals, pollen and stings. Check school records beforehand to see whether any of the children have severe allergies to these.
- Do not bring wild birds or mammals into school as they may carry diseases.
- Follow your organisation's guidelines for outdoor work.
- You can find more guidance on minibeast collection on the CLEAPSS website, in Guide P144

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Activity card:

Animal Adventure

Cosmic and Seren are sitting on the climbing frame in Cosmic's garden. They are trying to think of something to do.

"Let's go on an animal safari!" shouts Cosmic, jumping down.

"Ok," Seren replies, "Do you mean with toy animals?"

"No, not a pretend safari," says Cosmic, "I mean a real animal adventure."

Seren looks puzzled. She follows Cosmic round the garden. He looks high, he looks low but doesn't seem to be able to find what he is looking for.

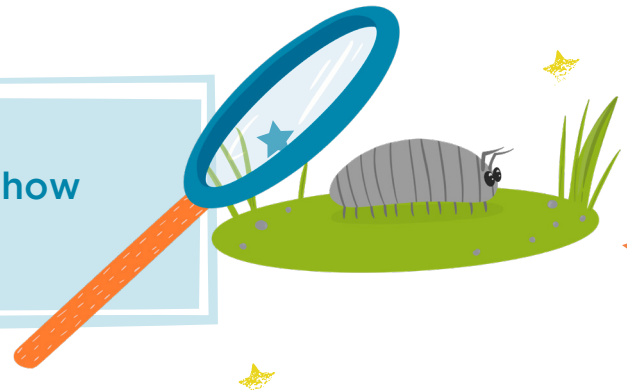
"Uncle Astro said that there are little animals, called minibeasts, all around us," says Cosmic. "But I can't see any."

"Wow! You mean tiny lions and tigers and things?" asks Seren. "Come on, let's see if Uncle Astro can help us."

Where do you think Uncle Astro will tell them to look?

Your challenge

Go on an animal adventure and see how many minibeasts you can find.



Discuss

Cosmic thinks that they might live under logs and stones. Seren thinks we might need to look in trees and on the top of walls.

What do you think?

Getting started

Find a place with a large stone or log. Look carefully all around it to see how many minibeasts you can spot.

Now lift the log or rock very carefully (ask an adult for help) - how many minibeasts can you see? You might collect some of them to look at indoors (check with an adult first).

Test your ideas

Can you find out the names of the minibeasts?

Can you find out more about some of them?

Where is the best place for them to live?

Where do you find the most minibeasts?

Share your ideas

You could take a photo, draw a picture, make up a song or poem, or make a model of the minibeasts you find. Share them with your group.

Extra things to do

Can you think of other places to look for minibeasts?

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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.

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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!"

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?

Your challenge

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

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.

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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.

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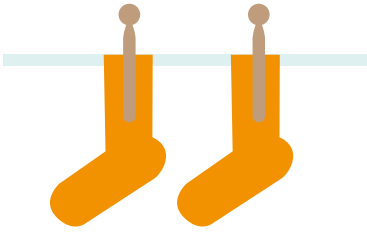
Activity card:

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.

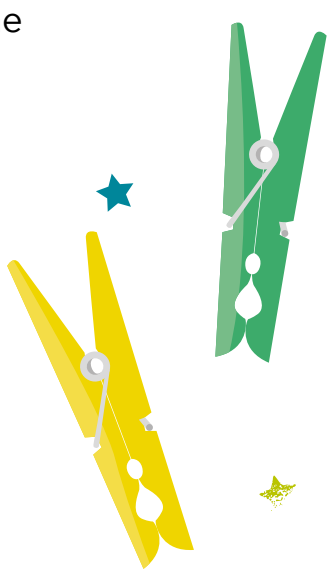


When they are all clean, she carries the heavy, wet pile outside to hang on the washing line to dry. Cosmic and Gem’s friendly faces appear.

“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!

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.

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Organiser's card:

Plant Detectives

About the activity

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

Zeke has found a plant growing out of the pavement. He can't work out how it got there. Plants grow in gardens, not pavements – don't they? Zeke and Tara need to be plant detectives and look for clues! But where should they look to solve the mystery?

Through this activity you will support your group to:

- Think about where plants grow.
- Investigate and discover plants in their surroundings.
- Record their results using photos, drawings or a map.

What to do

1. Introduce the activity using the story on the accompanying slides or activity card. Get the children to talk to each other about the questions and the opinions of Zeke and Tara.
2. Talk with the children about where they can search for plants. Encourage them to think of unusual places to look.
3. Discuss with the children how they will record their findings and make sure everyone stays safe.
4. Children can collect samples, take photographs or create drawings. If you provide a map or plan of the area, they can add stickers or images to record where plants were found. Confident children may be able to make their own maps or plans.
5. Warn children not to eat any part of the plants that they find.
6. When the children finish hunting, let them share what they have discovered.
7. 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

- Access to a safe outdoor environment, ideally with a variety of surfaces such as brick walls, paving, concrete, grass
- Appropriate magnifiers, e.g. magnifying glasses
- Cameras/tablets, drawing equipment, or stickers and a simple map of your outdoor environment

Key words

- **Grow**
- **Leaves**
- **Flowers**
- **Soil**
- **Plants**
- **Seeds**
- **Samples**
- **Map**

Things to think about

The plants that are found during the hunt will vary depending on the time of year. You can repeat this activity in different seasons and find out how the plants change.

Most children will think that plants need to be planted in soil to grow. They may not be aware that plants (including tree seedlings) can grow in many places where there is little or no soil – for example, between bricks and paving stones, on walls, in gutters, in cracks in the bark of trees and in water. Some plants are adapted to survive in difficult conditions. For example, rosebay willowherb and poppy are plants that grow readily in very sparse conditions.

Take it further

If you have a tablet or a mobile phone, you could try using Google Lens or a similar app to identify the plants that the children find.

During the plant hunt the children may also find lichen and fungi. These are not actually plants, but they are living.

Watch out!

- Follow your organisation's guidelines for outdoor work. Children should be supervised at all times – levels of supervision will vary depending on the location and the age of the children.
- All children should be made aware of the boundaries of the investigation area.
- Common outdoor allergens include plants, animals, pollen and stings. Check school records beforehand to see whether any of the children have severe allergies to these.
- Children should be reminded not to put their fingers in their mouth, nose or eyes.
- Children must not put any plants in their mouths.
- Ensure they wash their hands when they have finished.
- The CLEAPSS website offers more guidance on working safely outdoors, refer to Guide P094 for more information

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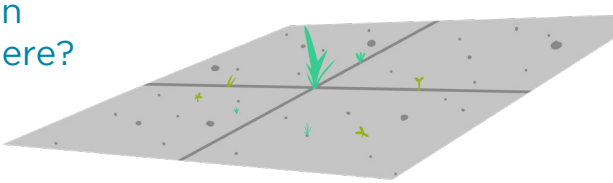
Activity card:

Plant Detectives

Zeke is going to play at Tara's house. He's about to open her gate when he notices a plant sticking out of a crack in the pavement. How exciting! Plants usually grow in gardens, not in pavements. How did the plant get there? He thinks that perhaps someone dropped it as they walked along, but who?



Zeke rushes inside to ask Tara to help him solve the mystery. She's bound to know the answer. Zeke explains what he has found, but Tara isn't sure how the plant got there either. She wonders if the plant might have grown from a seed under the pavement, but who could have planted the seed?

Zeke and Tara know they have to look for clues to solve a mystery. They can't wait to start searching. Tara's grandmother, Joyti, loves plants, so she comes outside to help them. But where will they begin? Can you be plant detectives and help to find clues about plants that grow in unusual places?

Where have you seen plants growing?

Have you ever seen any plants growing in a pavement?

Your challenge

Become a plant detective and help Zeke and Tara solve the mystery of where plants grow.

Discuss

Talk to your buddy and plan where you will go on your plant hunt.

Getting started

Have a good look around outside.

Look up and down, in corners, on buildings and patches of land.

Remember, clues about plants might be hidden anywhere!

How can you make sure that everyone stays safe?

Test your ideas

Can you find any plants with flowers?

Can you find any plants growing in strange places?

Do you notice anything about where you find plants growing?

Share your ideas

Take photographs or draw pictures of the plants you find to make a plant detective album. You could mark on a map where you found the plants. What is the strangest place you found a plant growing?

Extra things to do

Try to discover the names of the plants you found.

Try to find out if plants always need soil to grow.

Would you find different plants at different times of year?

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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**

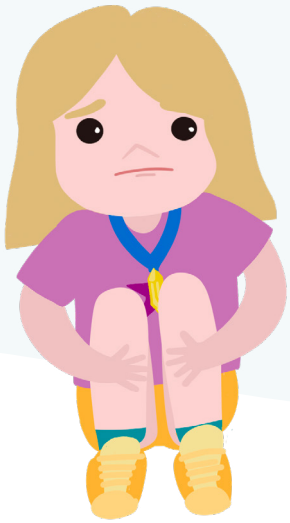
Watch out!

- 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.

CREST AWARDS | 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!"

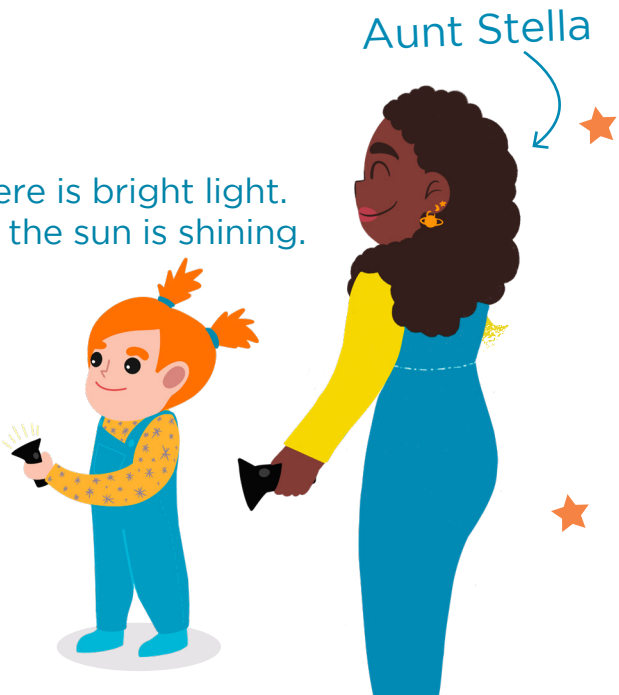
There on the wall is Seren's shadow. "Wow! Where did that come from?" asks Seren.

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.

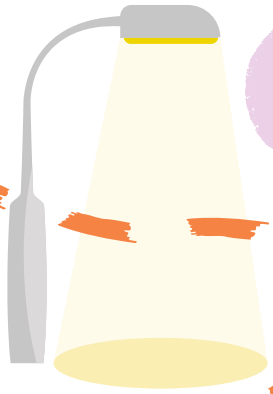
Have you ever looked at your shadow?

Does your shadow ever disappear?



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.

CREST AWARDS | STAR

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.

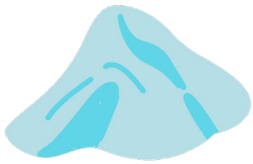
CREST AWARDS | STAR

Activity card:

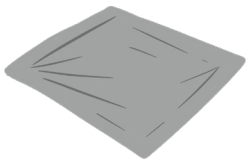
Sniffly Sneezes

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?

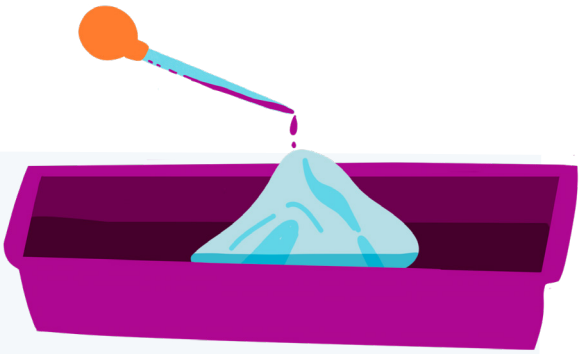
Your challenge

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.

CREST AWARDS | STAR

Organiser's card:

Testing Timers

About the activity

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

Cosmic, Gem and Seren are practising for sports day. They need a timer to work out how many beanbags they can get into the hoop in one minute, but they are not allowed to throw things in the kitchen near the clock. They want to make a timer to take into the garden. Uncle Astro thinks that they can use sand to make a timer.

Through this activity you will support your group to:

- Compare real sand timers and observe which variables affect the time they measure.
- Experiment with different hole size and quantities of sand in their own sand timer.
- Test their sand timer and reflect on how it could be improved.

Kit list

- Real sand timers
- Dry paper cups
- Dry sand
- Sharp pointed pencil to make holes (use some sticky tack or plasticine underneath the cup to help)
- Stopwatch or clock with second hand (you could use a countdown timer on a tablet or on your whiteboard)
- You might like to use trays or a covering on the tables where the children are working
- Water, sugar, salt etc (optional alternatives to sand)

What to do

1. Introduce the activity by reading the story on the accompanying slides or activity card together. Get the children to talk about the questions and the opinions of Cosmic, Gem and Seren.
2. Discuss how to make sure they carry out the task safely.
3. Let the children look at real sand timers first. Then encourage them to explore different cups and sizes of hole before they try to make their one-minute timer.
4. Talk together about what they have found out. Can they explain why they have different answers to how much sand you need? What would they change to improve their timer?

5. Children can create pictures or take photographs of their timer. Encourage them to add as much detail as possible including design features and the amount of sand.
6. They can try out each other's timers by playing the 'beanbag and hoop' game.
7. 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.

Things to think about

Some children may not have seen sand timers, so they may need to play with manufactured ones first.

Children can change the type and amount of sand and/or the size of the hole. Let them explore this, with support if they need it.

Making the timers will be easier if children work in pairs or small groups.

Children can use clocks or stopwatches to test their timer. If they find this difficult, let them compare their timer with a manufactured timer.

Take it further

The earliest records of sand timers date from the 14th century and they were often used as timers in factories and on sailing vessels. Sand timers are also known as sandglasses or hourglasses. Today, sand timers are frequently found in kitchens and board games.

It required great skill to create very accurate sand timers with the beautiful hourglass shape and a tiny hole to control the flow of the sand.

Key words

- **Time**
- **Timer**
- **Measuring**
- **Minutes**
- **Seconds**

Watch out!

- Sand on the floor can be very slippery.
- Remind children not to rub their eyes when they are handling the sand and to wash their hands afterwards.
- Adult supervision may be required to make the holes in the cups. Make the hole from the inside of the cup. Use a soft surface underneath the cup, you could use a blob of sticky tack or plasticine.
- If you are using sugar or salt as an alternative to sand, ensure that the children do not taste it or put it in their mouths.

CREST AWARDS | STAR

Activity card:

Testing Timers

It will soon be sports day and Cosmic, Gem and Seren are very excited. They have all been chosen to take part in their favourite game. They will have just one minute to throw as many beanbags as they can into a hoop.

"Let's get practising," says Cosmic.

"Good idea, we can start straight away," replies Gem. "I think there's a hoop and some beanbags in the garden, and we can use the clock on the kitchen wall to time ourselves."

They are having a wonderful time until Uncle Astro comes into the kitchen to check how his cakes are getting on in the oven. "What are you three getting up to now?" he says with a smile, "Off you go into the garden before something gets broken."

"But we won't be able to see the clock from there," cries Cosmic.

"And then we can't time one minute to see how many beanbags we get in the hoop," adds Seren.

"Why don't you make a timer that you can take outside?" suggests Uncle Astro. "There's some sand in the shed that might be useful."

Have you ever seen a sand timer? How do you think a sand timer works?

Cosmic thinks you'll need a lot of sand to measure one minute.

Gem thinks you only need a little bit of sand.

Seren thinks it might depend on the size of the hole in the timer.

What do you think?

Your challenge

Can you make a timer using sand? Can you make your timer run for exactly one minute?

Discuss

Talk to your buddy about how you can make your timer and how much sand you will need.

Getting started

Make different size holes in the bottom of paper cups with the point of a pencil. Ask an adult to help you with this.

Explore what happens when you put sand in the cups. You can catch the sand in another cup!

How do you think you can stop the sand getting out too soon?

Uncle Astro

Test your ideas

Try each of the cups. What changes how long it takes the sand to come out?

Can you make the sand run for exactly one minute?

Share your ideas

Try out your timer by playing the beanbag and hoop game with your friends.

Draw some pictures or take photographs to show how to make a sand timer.

You could make a short video explaining how a sand timer works.

Extra things to do

Try putting more holes in your timer and see what happens.

What else can you use to make a timer?

Where do you find sand timers? What are they used for?

CREST AWARDS | STAR

Organiser's card:

Useless Umbrella

About the activity

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

Aunt Stella is going to a friend's wedding. She is going to take a beautiful, big, rainbow umbrella with her in case it rains. Cosmic has rushed into the garden with the umbrella to try it out. It's raining. Oh no! The umbrella is leaking. Cosmic is getting very wet. How can they fix the umbrella for Aunt Stella?

Through this activity you will support your group to:

- Design an experiment to test how waterproof different materials are.
- Carry out their experiment and observe what happens.
- Decide on the best material for an umbrella and share their ideas.

What to do

1. Introduce the activity by reading the story on the accompanying slides or activity card. Get the children to talk about the questions and the opinions of Cosmic, Seren and Aunt Stella.
2. Provide the children with a selection of different pieces of fabric and other materials to test, some examples are in the kit list.
3. Talk through how they might find out if the fabrics are waterproof. Encourage them to explore their own ideas.

Kit list

- Selection of fabrics and other materials e.g. plastic, sponge, foil, card and wood. Try to make sure some of the fabrics are waterproof. (Pieces from a broken umbrella or raincoat would be good.)
- Pipettes
- Water coloured with food dye or a drop of paint
- Beakers
- Plastic trays
- Paper towels (including a few extra to wipe up any spills)
- Paper, pencils and pens for creating pictures (optional)

4. When they have finished they can sort the materials and talk about which ones were waterproof. The children could design an umbrella and evaluate which designs will work and why. They might like to draw a picture of Aunt Stella's umbrella and stick on a piece of the material they would choose to fix it.

5. 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.

Key words

- **Wet**
- **Dry**
- **Materials**
- **Waterproof**
- **Liquids**

Things to think about

There may be more than one property to consider when designing and making objects such as umbrellas, e.g. what it looks like, if the material is flexible, as well as if it is waterproof.

An umbrella needs to be waterproof but a waterproof material that does not fold will not be any use at all. If no-one likes how the umbrella looks, or the material is too heavy, then it will not be used. It is helpful to provide materials such as plastic, foil and wood so that children can explore and discuss their suitability.

Water will sometimes sit on top of some fabrics but when they are touched the water goes through. Thick, soft materials, such as wool and sponge, can get waterlogged even if very little water drips through.

In science, the word material is used to describe the substance from which anything is made. Fabric is one type of material. Metal, plastic and glass are also materials.

Watch out!

- Mop up spills to avoid a slippery floor.
- Warn children not to squirt coloured water at each other.
- Ensure children do not taste or put the liquid or materials used in this activity near their mouths. If using food colouring, this can stain children's fingers.

Take it further

Dripping coloured water onto the material, placed on top of a paper towel, can make it easier to judge how much water has come through. Children can measure the width of the watermark.

You could put the fabric over a container and see how much drips through in a certain amount of time and/or when touched.

CREST AWARDS | STAR

Activity card:

Useless Umbrella

Aunt Stella is very excited, she has been invited to a friend's wedding.

"Have you got a new dress," Seren asks, "and a new hat?" Aunt Stella goes to her wardrobe and pulls out a rainbow coloured dress and a bright purple hat.

"You are going to look fantastic," says Cosmic. "Do you have an umbrella too, in case it rains?" Aunt Stella nods and goes to the cupboard and pulls out a huge, rainbow coloured umbrella to match her dress. "Here it is," she says.

"It's enormous! Can we try it Aunt Stella?" shouts Cosmic, as he rushes outside to open the umbrella.

But it's raining outside and no sooner has Cosmic opened the umbrella than drip, drip, drip, rain is tumbling onto his head through the umbrella. The umbrella is full of holes! The umbrella is useless. "What am I going to do?" says Aunt Stella. "I don't have another one."

"Don't worry Aunt Stella, I am sure we can fix it for you," says Cosmic.

"We just need to find something waterproof," suggests Seren.

Cosmic and Seren need to find something to fix Aunt Stella's umbrella.

Cosmic thinks they need a sponge to make it waterproof

Seren thinks they need thick fabric to fix the umbrella

Aunt Stella thinks they need brightly coloured, thin fabric to fix the umbrella.

What do you think?

Your challenge

Think about what umbrellas are made from and how they stop you getting wet.

Can you find the best material to fix Aunt Stella's umbrella?

Discuss

Talk to your buddy about which material you think will be the best for an umbrella. How do you think you can find out?

Getting started

Collect some different materials and a beaker of coloured water.

You will also need a plastic tray and some dry paper towels.

Which materials do you think will let the water through?

Test your ideas

One at a time, put each material on a paper towel, on the plastic tray.

Put one drop of coloured water on each material. Does any water come through onto the paper towel?

Can you think of any other ways to find out which materials are waterproof?

Share your ideas

You could use a hoop to sort the materials into ones that are waterproof and ones that are not. Would all the waterproof materials be good for fixing the umbrella? Why?

Draw Aunt Stella's umbrella and stick pieces of the best materials on the picture. Do you think Aunt Stella will like the umbrella?

Extra things to do

Make a list of things that you might want to protect from the rain.

What about a rabbit in the garden, your books on the way to the library or shopping on the way home? Can you think of ways to keep them dry?

CREST AWARDS | STAR

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