



STAR

Developed in partnership with:



# Early years challenges

## Earth and beyond

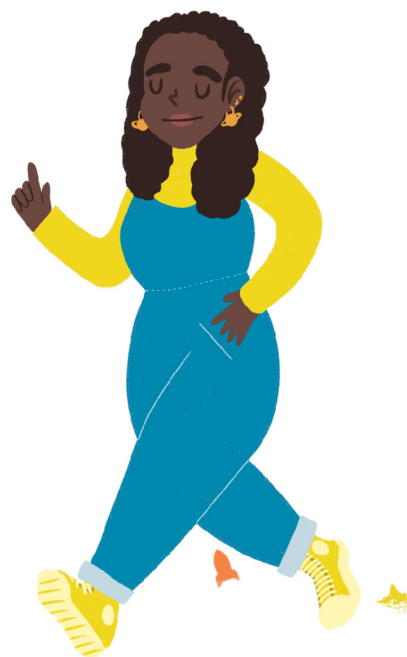


Suitable for **3-5-year-olds**



## 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 CLEAPPS 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 for early years

The activities in this pack have been developed in partnership with the Ogden Trust to create a range of CREST Star activities that are suitable for running with children in the early years foundation stage (EYFS) or equivalent. Children need to complete at least six challenges to achieve a Star CREST Award. You can mix and match challenges from other packs, as long as children complete at least six Star challenges.



## Preparation

1. Visit [primarylibrary.crestawards.org](http://primarylibrary.crestawards.org) and download the CREST Star Passport. Print a passport for each child taking part.
2. Read through the activities in this pack, and the accompanying '[Earth and beyond](#)' PowerPoint presentation for students 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. Children can use their passport to keep track of the challenges they have completed.
2. Once children have completed at least six activities, log in or create a CREST account at: [crestawards.org/sign-in](http://crestawards.org/sign-in).
3. Tell us about the children and the challenges they completed.
4. Finally, complete the delivery and payment details to order your certificates.
5. Congratulations on completing CREST Star!
6. If you want to use any of your own activities, that's fine! Find out more about what a Star activity should look like here: [bsa.sc/crest-guiding-principles](http://bsa.sc/crest-guiding-principles)

## What next?

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



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# Skills matrix

Learning Area	Aspect	Area of knowledge development (linked to Early Learning Goals)	Sessions where there is an opportunity to develop pupil knowledge
<b>Communication and Language</b>	Listening, Attention and Understanding	Make comments about what they have heard and ask questions to clarify their understanding.	Rocket Reach Lunar Landers Galactic Gardeners Mask Makers
	Speaking	Offer explanations for why things might happen, making use of recently introduced vocabulary from non-fiction.	Lunar Landers Galactic Gardeners
	Speaking	Participate in small group, class and one-to-one discussions, offering their own ideas, using recently introduced vocabulary.	School Spotters Mask Makers
<b>Expressive Arts and Design</b>	Being Imaginative and Expressive	Perform songs with peers.	Galactic Gardeners Constellation Counters
	Creating with Materials	Safely use and explore a variety of materials, tools and techniques, experimenting with colour, design, texture, form and function.	Rocket Reach Lunar Landers Crater Creators Constellation Counters Mask Makers
<b>Literacy</b>	Word Reading	Read words consistent with their phonic knowledge by sound-blending.	Constellation Counters
	Writing	Write recognisable letters, most of which are correctly formed.	Galactic Gardeners
<b>Maths</b>	Numerical Patterns	Compare quantities up to 10 in different contexts, recognising when one quantity is greater than, less than or the same as the other quantity.	Crater Creators
		Explore and represent patterns within numbers.	Crater Creators Constellation Counters

Learning Area	Aspect	Area of knowledge development (linked to Early Learning Goals)	Sessions where there is an opportunity to develop pupil knowledge
<b>Personal, Social and Emotional Development</b>	Building Relationships	Work and play cooperatively and take turns with others.	Lunar Landers
	Managing Self	Be confident to try new activities and show independence, resilience and perseverance in the face of challenge.	School Spotters Rocket Reach Lunar Landers
		Manage their own basic hygiene and personal needs.	Galactic Gardeners
	Self-Regulation	Set and work towards simple goals, being able to wait for what they want and control their immediate impulses when appropriate.	Lunar Landers
		Show an ability to follow instructions involving several ideas or actions.	School Spotters Galactic Gardeners
<b>Physical Development</b>	Fine Motor Skills	Begin to show accuracy and care when drawing.	Rocket Reach
		Hold a pencil effectively.	School Spotters Rocket Reach Lunar Landers
		Use a range of small tools, including scissors and cutlery.	School Spotters Rocket Reach Lunar Landers Galactic Gardeners
	Gros Motor Skills	Negotiate space and obstacles safely, with consideration for themselves and others.	Astronaut Antics
		Demonstrate strength, balance and coordination when playing.  Move energetically, such as running, jumping, dancing, hopping, skipping and climbing.	
<b>Understanding the World</b>	The Natural World	Explore the natural world around them, making observations and drawing pictures.	School Spotters Galactic Gardeners Constellation Counters
		Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class.	Lunar Landers Galactic Gardeners
		Understand some important processes and changes in the natural world around them.	Mask Makers





Established by Sir Peter Ogden in 1999, The Ogden Trust is a charitable trust that exists to promote the teaching and learning of physics. They do this by enabling innovative physics teaching to take place in, and collaboratively between, schools, often forging links to universities and other organisations. They address the shortage of physics teachers in the UK by funding programmes that encourage young graduates to go into teaching and by supporting teacher professional development in an effort to enhance retention.

Physics is a fascinating subject, asking questions about how the world works; it is at the heart of many decisions made by everyone every day. Young children are naturally curious about the world around them and can be encouraged and supported to develop their scientific enquiry, problem solving and understanding of the world. Physics can lead to a huge range of careers, as well as being interesting and relevant to day to day lives.

This CREST Star pack, co-developed with The Ogden Trust, has been designed to develop curiosity and develop young scientists who ask questions and learn to solve problems. The pack brings together

eight different activities relating to Earth and space that allow children to be creative, develop their communication skills and collaborate with others.

The Ogden Trust is a family charity that supports physics education and engagement for young people (4-18) across England. It works with teachers of physics and their schools, and provides physics professional development for teachers in all stages of their career. The Trust works with groups of schools to support the improvement of their physics provision and promotes equitable opportunities for young people to enjoy physics and see it as a subject that could be for them.



## Activity 1

# School Spotters

This activity gets children thinking about where their school is located on Earth.

Cosmic and Gem want to show Uncle Astro where their school is.

Through this activity you will support children to:

- produce a display to show where their school (or nursery) is
- discuss their learning with the rest of the group

## What to do

1. The children should be sitting together on a mat in front of a screen.
2. Start the challenge by asking the children the following questions:
  - What is the name of your school?
  - Which village/town/city is your school in?
  - Which country do we live in?
  - What is the name of our planet?
  - Why are we able to live on our planet?
3. Show the children your school on Google Earth. Perhaps use Street View so that the children can see their school building.
4. Slowly start to zoom out to show your nearest town or city. You could then go to Street View again and show them some examples of buildings in their closest town. Or, it might be easier to source some pictures of local landmarks e.g.

## Kit list

### Each child will need access to:

- Card templates (on page 10-12)
- Pipe cleaner
- Scissors
- Colouring crayons
- Hole punch

### You will need access to:

- [Google Earth](#)

### Pre-activity prep:

- Check that you can access Google Earth
- Check you have access to images of your school and your town including local landmarks – insert these into PowerPoint presentation on slides 3 and 4
- Print out the circle templates
- Print out UK and Earth templates on page 12



cathedral, park, supermarket, etc, and have these saved in the template PowerPoint presentation ready for you to show (Slide 3 and 4).

5. Using Google Earth, you can then zoom out further to show the UK. You will be able to point to your country and explain that the children live in one of the countries in the UK.
6. Ask the children what they notice when you zoom out (they should start to see the sea). You could ask about the size of the UK in comparison to other countries. What are the differences between the land and the sea?
7. Children can then return to their tables.
8. Children should be given the templates of the four circles. They should cut out each circle. On each circle, children should write the title (if they can) and either draw an image or stick an image onto the card (as per the table below). Templates of the earth and UK have been provided for ease.

Size of circle	Title
Smallest	School
	Town/City
	UK
Largest	Earth

9. The children should order the cards from the largest to smallest and place the circles on top of each in size order with the largest on the bottom and the smallest on top. If able, they should then hole punch their cards on the blue dot. Children should thread the pipe cleaner through the pre-cut holes and twist the ends of the pipe cleaner together so that the cards stay together.

## Things to think about

Encourage the children to work with others to tidy their desks. Once their desks are clear and only their displays remain, inform the children that they are going to talk to their partners about their work. Tell them that you are looking for them to stand up tall and look at their partners whilst they are talking to them. Encourage big, loud voices and smiley faces.

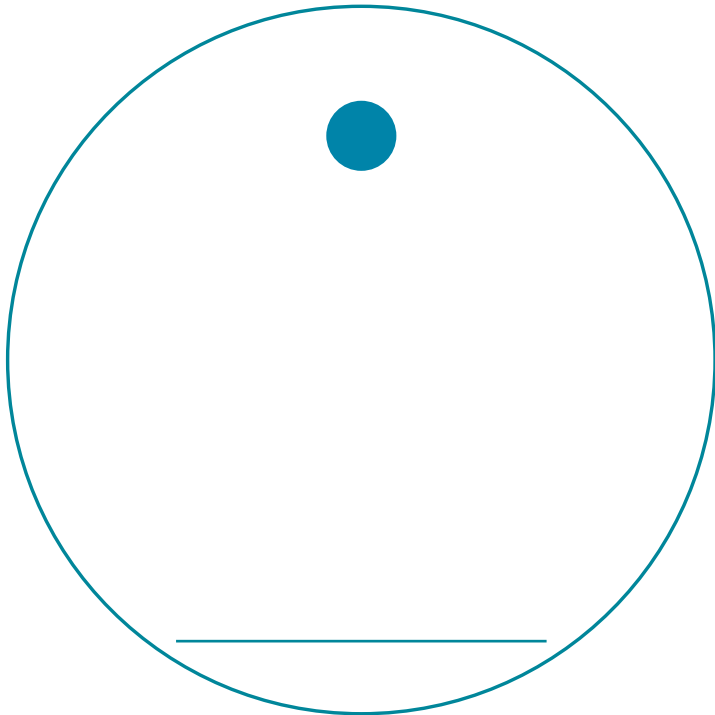
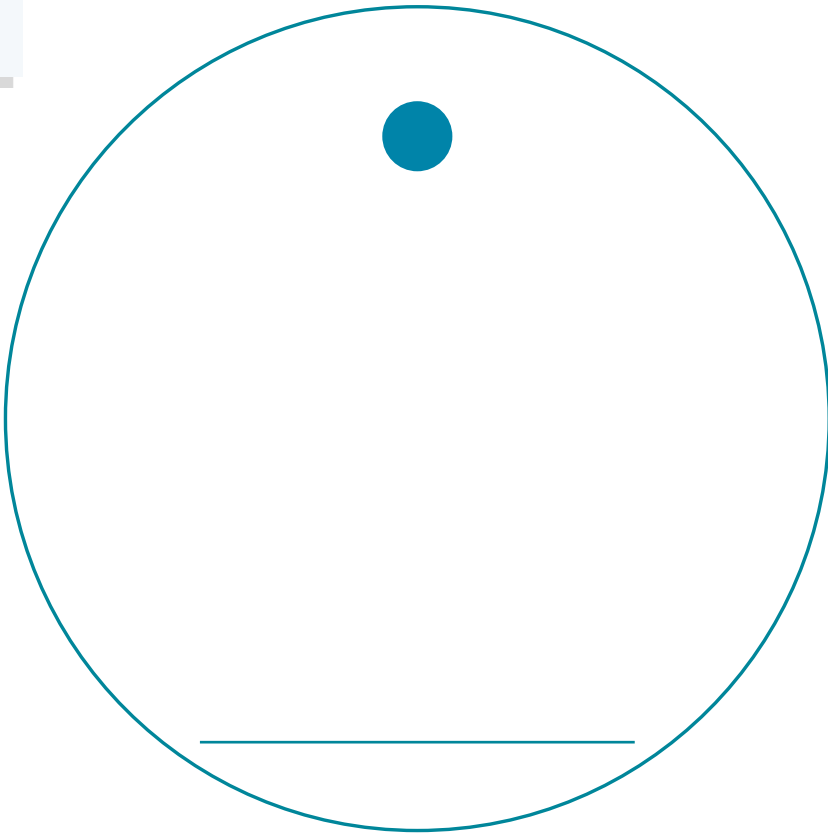


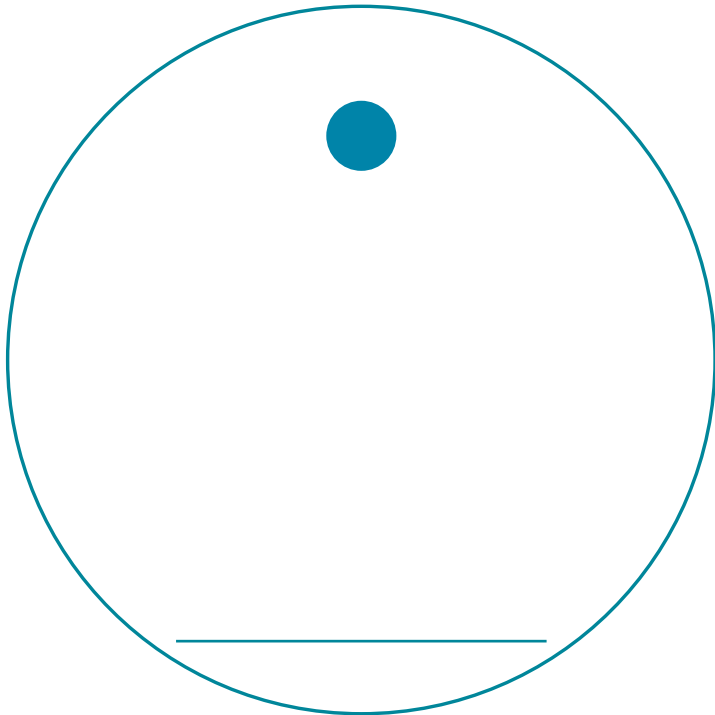
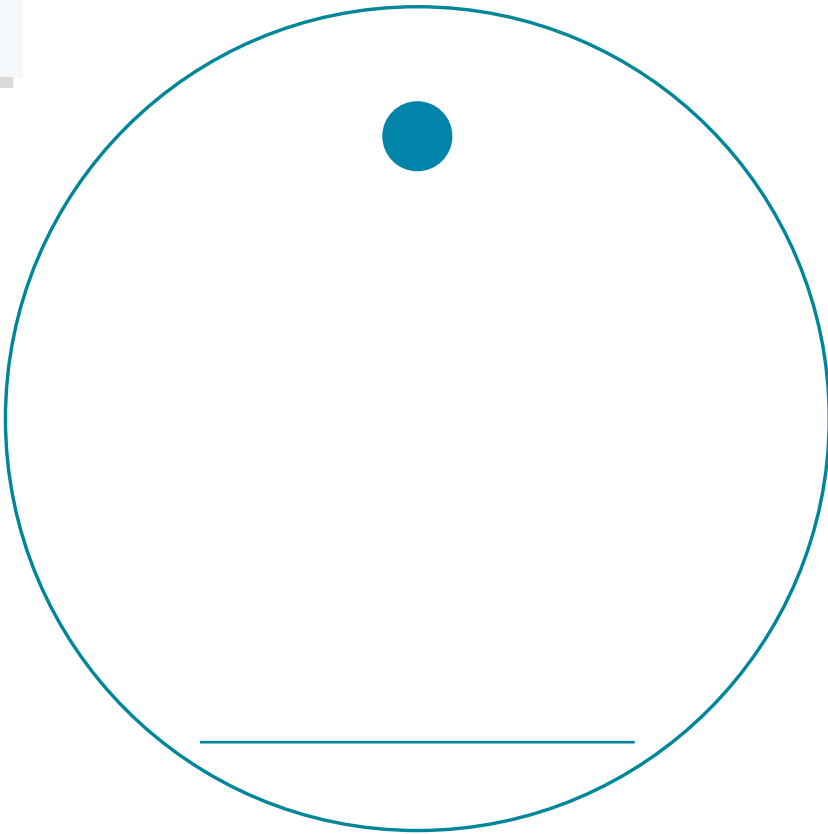
## Watch out!

- **Scissors** – always use child safe scissors.
- **Hole punch** – make sure the hole punch has a safety guard and children using this are supervised by an adult.

## Key words

- School/pre-school/nursery
- Village/town/city
- United Kingdom
- Earth
- Smaller
- Bigger/larger





## Templates







# STAR

 [Watch the demonstration video](#)

## Activity 2

# Rocket Reach

### Kit list

This activity is designed to get children thinking about the differences between Earth and the Moon, and how far apart they are. After looking at a scale model of Earth and the Moon, the children should design and make a rocket and see whether they can fly their rocket to the Moon.

Uncle Astro and Aunt Stella are on holiday on the Moon. Cosmic and Gem want to go and see them. Can they make a rocket to get them there?

Through this activity you will support children to:

- think about the distance between Earth and the Moon
- construct a rocket
- carry out their own tests to see if their rocket can fly to the Moon

### What to do

1. Organise the children on the carpet in front of the whiteboard. Turn the lights off and turn the volume up to create excitement and anticipation.
2. Show PowerPoint presentation slide 7. Start playing the video at 1 minute and 12 seconds. Stop playing after a minute or so.
3. Ask the children the following questions:
  - Where is the rocket going?
  - Will it be different to Earth?

### Each child will need access to:

- Flexible straws
- Variety of materials
  - paper, card
- Colouring pencils
- Felt tip pens
- Scissors
- Glue
- Sellotape

### You will need access to:

- Inflatable globe (size of an average beach ball)
- Tennis ball – covered in aluminium foil/painted to resemble the Moon
- String

### Before the activity you need to:

- Inflate the globe
- Make a tennis ball look like the Moon – wrap aluminium foil around it
- Print out rocket templates on page 16
- Arrange scrap materials – different thicknesses of paper and card
- Organise crayons, Sellotape, pencils, glue and scissors onto each table

- How long will it take to get there?
  - What will they need for the journey?
4. Show slide 8.
  5. Ask the children 'What does this image show?'. Then show the models of Earth and the Moon. Ask for volunteers to hold them.
  6. Ask 'How far away is the Moon from Earth?'. Encourage the children holding the models to follow other childrens' suggestions to move closer or further away, until all the children are happy with the positions.
  7. Then, wrap some string around Earth ten times. This represents the distance that the Moon is away from Earth. Release the string and walk to the end of the length of string that has been wrapped around Earth. Explain that Earth and the Moon are much bigger in real life and so the actual distance between Earth and the Moon is much bigger. We are using a model to represent the distance.
  8. Now challenge the children – do you think that you can make a rocket which would be able to travel from Earth to the Moon?
  9. Encourage the children to think about the materials they are choosing. They can choose from the templates or can decide to make their own versions. The rocket needs to be light enough that the children blowing through a straw will be enough to 'launch' it. Provide a selection of materials so the children have to think about which would be best.

## Whilst making the rocket

1. Allow children to work independently to make their rocket if they are able. Help with sticking and constructing but the design should be the child's decision. Encourage the children to decorate their rockets if there is enough time.
2. If the children are using the template, cut out the rectangle on the template page. Have them roll the rectangle around a pencil; they may need help with this. Once the rectangle is fully rolled, secure it with a small piece of sellotape, then remove the pencil. This is the body of the rocket. There is a template for the fins also included and the other template image can be used for decoration.
3. Have the children made a nose cone for their rocket? If they haven't, encourage them to put their rocket onto the straw and try blowing. The rocket will not 'launch' without one. Encourage the children to think independently to come up with a solution. If the children need assistance, show them how to twist the end of the paper to make a cone.

## Questions to ask

- Why have you chosen that material?
- Would your rocket be better if you chose a different material? Why?
- How far do you think your rocket will travel?

## Next steps

1. Once the rocket has been constructed children should see how far their rocket will fly when they blow through the straw. A suitable space needs to be determined – outside would be preferable so that the children can stand in a long line.
2. Use your model of Earth and the Moon and repeat the activity question: Can we make a rocket that will fly to the Moon? Place the model of Earth and the Moon on the ground at the correct distance apart. Making the start line next to Earth, so the children can see how close to the Moon their rockets reach.
3. Ask: What can you do to make the rocket travel further (blow harder, change the design such as the shape of the nose cone?) Can you make it pointier? Change the launch angle by moving the straw up and down.
4. The children should be encouraged to take their rockets and straws home so that they can discuss their learning with their grown-up.

## Whole group discussion

Can our rockets reach the Moon based upon the model?  
Why not? How could we change our designs?

## Things to think about

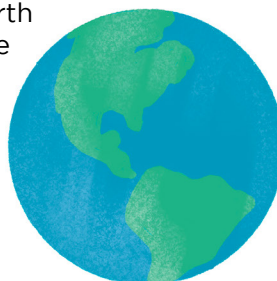
Earth's circumference: 25,000 miles

Earth to the Moon distance: 250,000 miles (10 x greater than the circumference of Earth)

If Earth was the size of the globe and the Moon was the size of the tennis ball, the length of the string is how far Earth and the Moon would be from each other.

The International Space Station (ISS) orbits Earth 250 miles away – referring to model used in the lesson the ISS would be about a penny's width from Earth.

The Apollo 11 mission took 51 hours and 49 minutes to arrive on the lunar surface on 19 July 1969.



## Watch out!

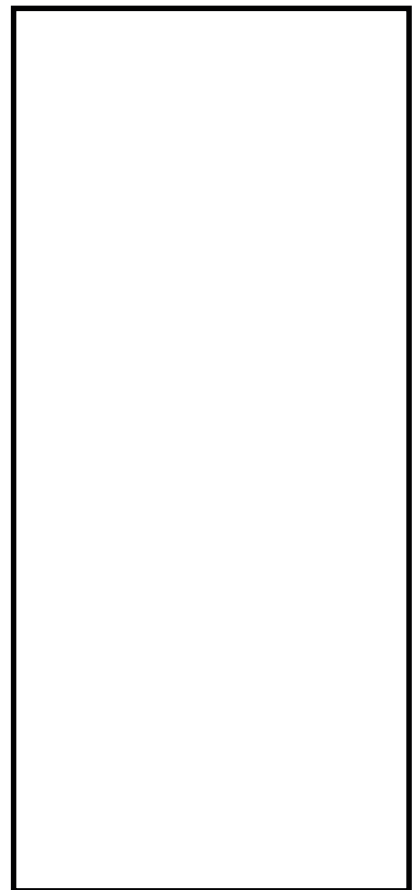
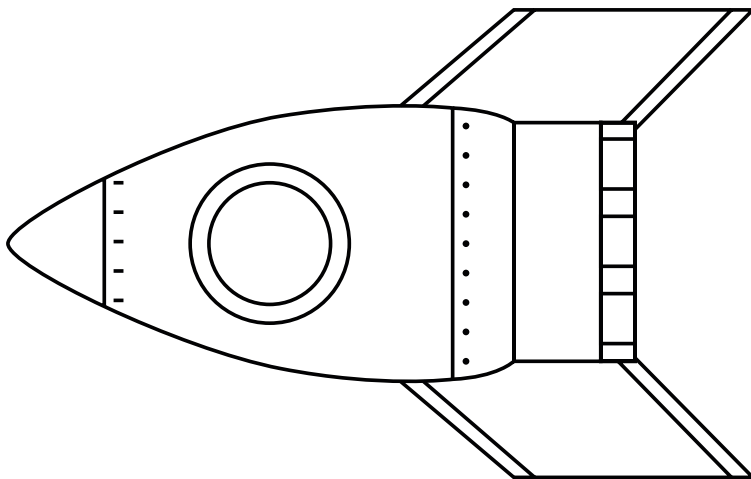
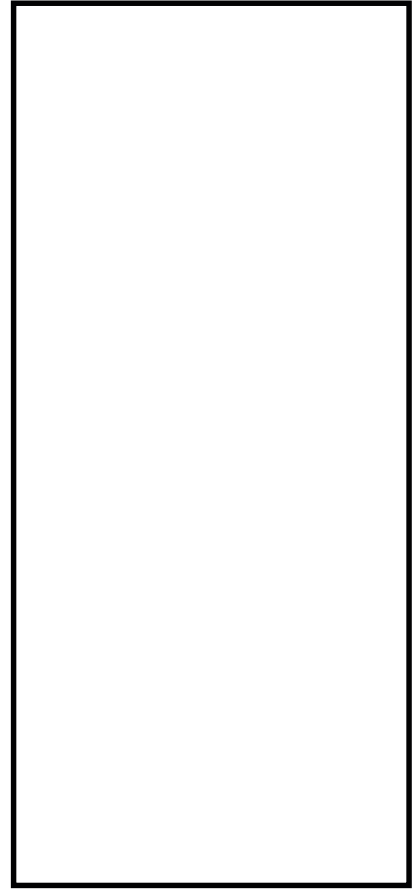
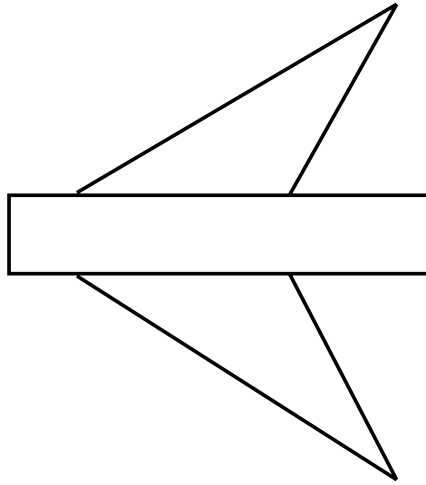
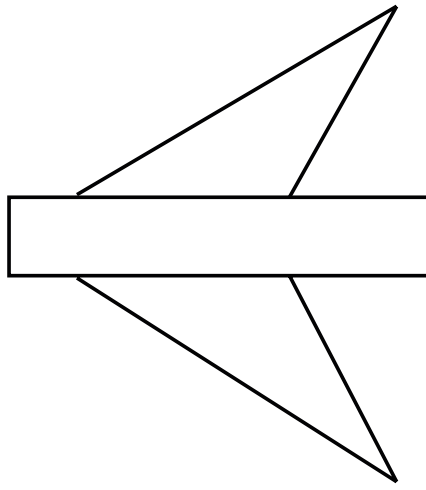
- **Scissors** - always use child safe scissors.
- **Pointy nose cones** - launch rockets from a line and then get all the children to collect their rockets at the same time.

## Key words

- Earth
- Moon
- Rocket
- Near
- Far/further
- Rectangle
- Triangle
- Cone



## Templates





## Activity 3

# Lunar Landers

### Kit list

This activity is designed to get children thinking about how to land safely on the Moon.

Cosmic and Gem managed to make a rocket that could help them reach the Moon. Now they can visit Uncle Astro and Aunt Stella and find out some information about the Moon. The only problem is they must land safely. Can you help them?

Through this activity you will support the children to:

- think about the surface of the Moon and how it is different to the surface of Earth
- construct a landing device
- carry out their own tests to see if they can land safely

### What to do

1. Whilst sat on the mat, show slide 11. Show the children a rocket that was made in Activity 2. Tell them that Gem and Cosmic are nearly at the Moon. Show slide 12. Ask the children to think about how the surface of the Moon looks different to the surface of Earth.
2. Engage the children in a whole-group discussion by asking, 'How could we help Gem and Cosmic land safely on the Moon?'. Think about protection and speed. Bring in the idea of using parachutes to slow the landing device down.
3. Show an egg holder with a cut out image of Cosmic and Gem inside. Explain that they are going to leave the rocket and travel to the Moon in the landing device (an egg holder). Hold the landing device high and ask, 'What would happen to Gem and Cosmic if they fell to the Moon like this?'.

### Each child will need access to:

- An egg
- One egg holder
- Pipe cleaners
- String
- Different materials – paper, plastic bags, fabric
- Scissors
- Sellotape
- Glue

### You will need access to:

- Egg boxes
- Hole punch
- Cut out image of Cosmic and Gem on page 19

### Before the activity you need to:

- **Create a lunar landscape:**  
You could have lots of rocks and soil. It would be great to have a raised platform that the children could access safely. Place a big sheet of plastic or black bin bags under the landscape. This makes clearing away a lot easier!
- **Make an egg holder:**  
Cut out an egg carton from the egg box. You will then need to pierce four holes around the outside.

4. Then show the children how they could make a parachute to make the flight safer for Cosmic and Gem. To do this, the children will thread a pipe cleaner through each of the four holes that you previously created in the corners of each egg holder, and tie a knot, so the pipe cleaners are secured. Provide lots of different materials to make the parachute with, such as tissue paper, kitchen roll and blue roll. Once they have chosen, a square of kitchen roll for example, they can either pierce the corners with the pipe cleaners then twist the tips down to secure, or wrap the corner of the material around the top of the pipe cleaner, and twist.
5. The children should work in pairs and explore the materials. Encourage them to make one parachute and test it without the egg inside. They should compare the fall of their parachute to others. Ask them to think about why the fall is different – try and link the size of the parachute with the time taken to fall. The bigger the parachute, the slower the fall.
6. Challenge the children to change the design of their parachute to make the journey of the landing device safer.
7. Final designs should be tested with eggs. This would ideally be done on a 'lunar landscape' outside, to make clearing up easier. It is helpful to put down a bin bag or similar below the testing area.
8. Each child should let go of their landing device at the top of the platform. All the other children should be observing. Encourage cheering if Gem and Cosmic (the egg!) survive the landing. It's always a good idea to ensure that some of the eggs survive! Return inside the workspace and wash hands.

## Watch out!

- Ensure that **egg boxes** are visually checked for cleanliness before using.
- Ensure there are **no children with egg allergies**, if so a tomato (provided there are no tomato allergies) can be used instead.
- You should clear up **raw eggs**.
- **Wash hands** after touching eggs.

## Key words

- Moon
- Landing device
- Parachute
- Slow
- Fast
- Hard
- Soft

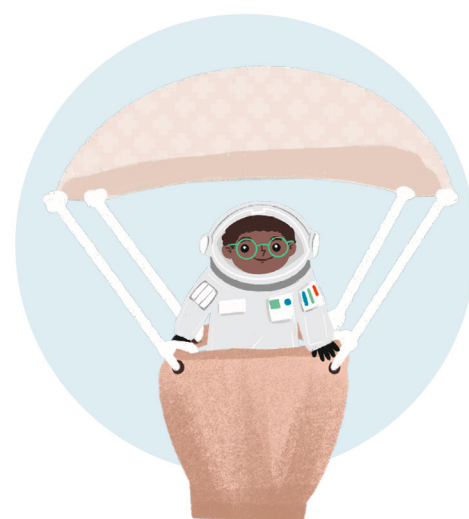
## Whole group discussion

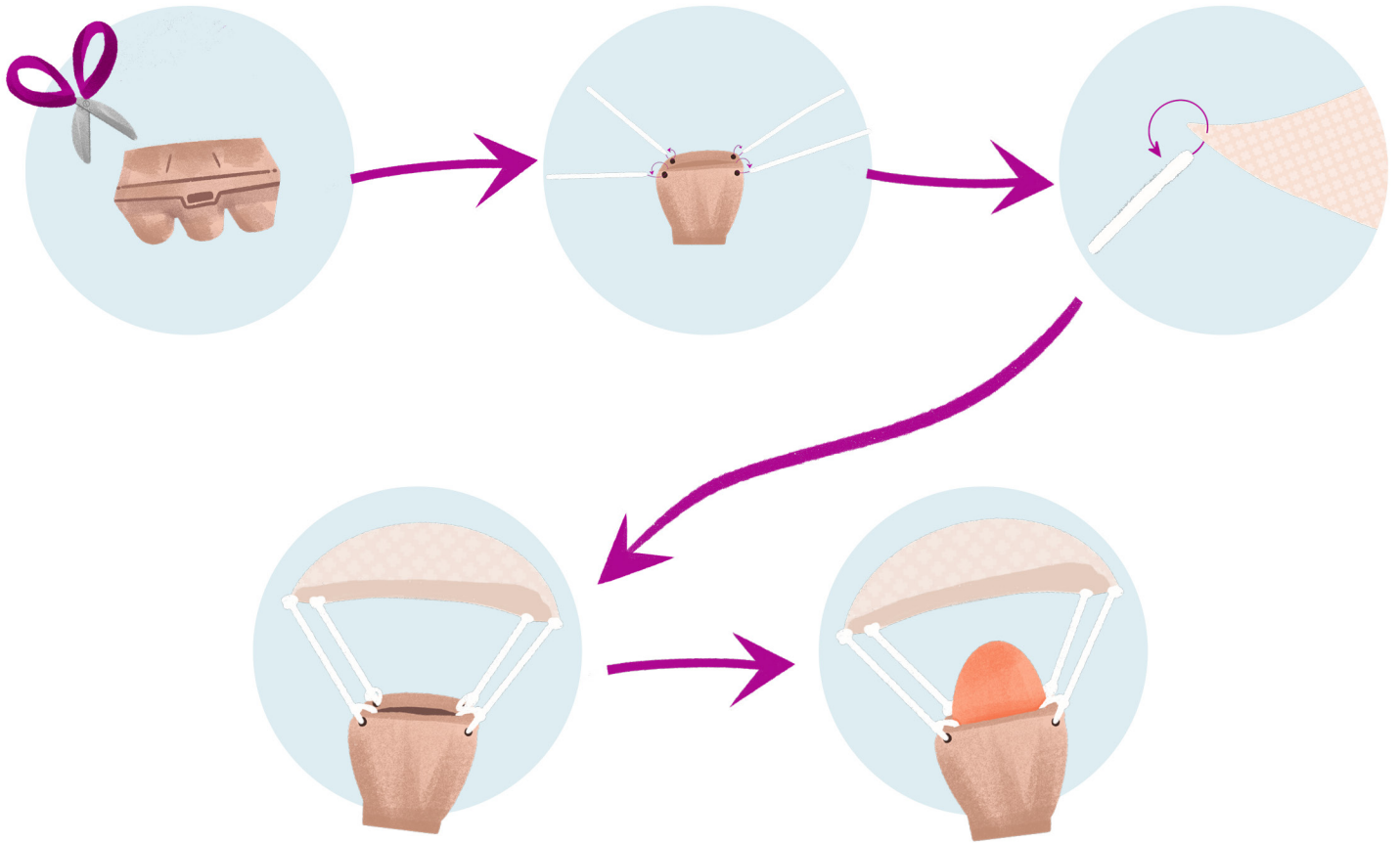
Gather the children back on the mat. Ask them the following questions to get them to reflect on the activity.

- What worked well?
- How could your parachute have worked better?
- What could Gem and Cosmic look for on the Moon?
- What information might we want to know about the Moon. Why? How would the information be sent to Earth?
- Did you work well with your partner?

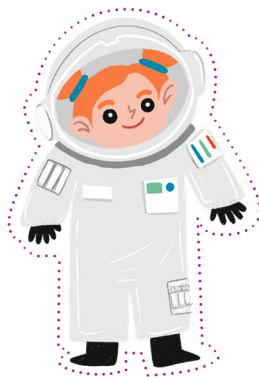
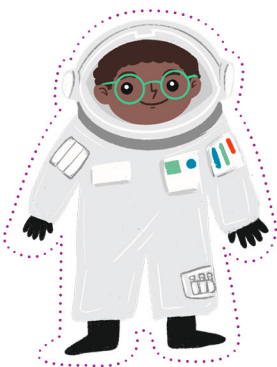
## Things to think about

This is a fictional activity and has been used as it fits the story about landing on the moon to be able to see Uncle Astro. Please note that a parachute would not be useful on the moon due to the difference in the moon's atmosphere.





## Templates





# STAR

[Watch the demonstration video](#)

## Activity 4

# Crater Creators

This activity gets children thinking about what the surface of the Moon looks like.

Cosmic and Gem want to find out how they can make the biggest crater.

Through this activity you will support the children to:

- produce craters
- measure craters
- present their findings to others

## What to do

1. The children should be sitting together on a mat in front of a screen.
2. Start by showing video of Moon clips on slide 15.
3. You could ask the children the following questions:
  - What can you see?
  - What does the Moon look like?
  - Can we compare Earth to the Moon? What are the similarities/differences?
  - How do you think that the craters were formed?
4. Explain that we are going to try to recreate the craters found on the Moon using marbles/rocks/balls of playdough, flour or sand and cocoa powder. The children are going to help Cosmic and Gem to find out how to make the biggest crater.
5. Demonstrate that a crater can be made by dropping the marble/rock/ball of playdough into the tray.

## Kit list

### Each child will need access to:

- Lunar surface tray
- Balls of play dough (or small rocks/marbles suitable size for young children)
- Pre-cooked spaghetti
- Results table

### You will need access to:

- Trays/tubs
- Flour or fine sand
- Sieves
- Cocoa powder

### Before the activity you need to:

- Cook spaghetti and then coat in vegetable/olive oil. Store in sealed tubs.
- Lunar surface trays should be prepared in advance by covering the bottom of your tray with about 2cm of flour/fine sand. Then use a sieve to put a very thin layer of cocoa powder on top.
- Print out results tables.



6. Ask the children how you could measure the crater.
7. After getting a few ideas, show the children that they can use the cooked spaghetti. Lay the spaghetti across the middle of the crater then pinch to the correct size (to measure the diameter). Children can then stick the spaghetti onto their results table. Children could drop the marble/rock/ball of playdough from different heights e.g., knee, waist, shoulder, head or as high as they can reach, or they could use bigger marbles to create a larger crater.
8. The children should return to their areas and investigate using the materials provided.

## Questions to ask whilst investigating

- What is a crater?
- How can you measure the size of the crater?
- How did you make the biggest/smallest crater?
- What would happen to the size of the crater if your rock was bigger/smaller?
- What would happen to the size of the crater if the marble/rock was higher up/lower down?

## Things to think about

### Essential prior knowledge:

Size – big, small, which is the biggest/smallest?  
Comparing different lengths.

### Educator knowledge:

Craters on the Moon were formed when comets (small icy objects) and asteroids (small rocks) hit the Moon's surface. These impacts produced craters that are much larger than the original comet or asteroid. The force of the impact is often enough to completely destroy the asteroid or comet and can even melt rocks!

After large impacts, the centre of the crater can rebound, creating a bump in the middle.

Material from the edges of the crater can also slump back towards the middle, creating interesting effects. Once a crater has formed on the Moon, there aren't any processes to destroy it, so we can still see them.

## Watch out!

- The balls of playdough (or rocks/marbles) should not be small enough to **present a choking hazard**, but not big enough to **cause harm if dropped on toes**
- Check for any **flour allergies** - replace flour with fine sand and spaghetti with thin strips of paper
- For students, wear **suitable eye protection**

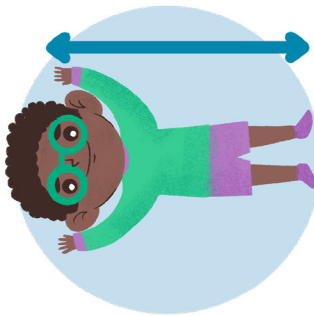
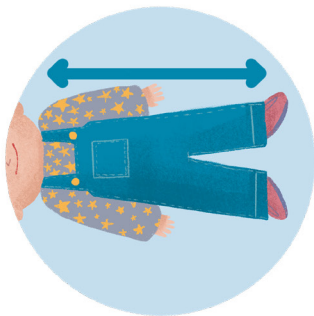
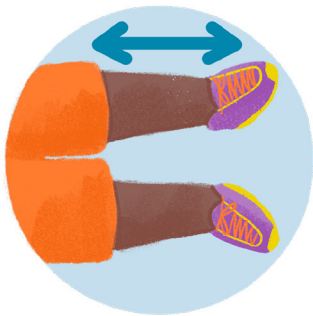
## Key words

- Moon
- Crater
- Size
- Measure
- Circle
- High
- Low



Results table

Height to be dropped from	Result
Knee height	
Shoulder height	
As high as I can reach	
My grown-ups shoulder height	
As high as a grown up can reach	





# STAR

 [Watch the demonstration video](#)

## Activity 5

# Galactic Gardeners

This activity gets children thinking about growing food.

Cosmic and Gem wave goodbye to Uncle Astro. They leave the Moon and return to Earth. They want to find out how to grow food and whether it is possible for Uncle Astro to grow food on the Moon.

Through this activity you will support the children to:

- make observations about their surroundings
- use a hand lens and draw what they can see
- predict whether food can be grown on the Moon

## What to do

1. Gather the children on the mat. Play the song on slide 18. Play the song a couple of times and encourage the children to sing along. Then play the song on slide 19.
2. Ask the children to think about what we need to stay alive. Hopefully one of their ideas will include food. Explain that if Uncle Astro is to stay on the Moon, then he will need to be able to grow his own food for him to be able to survive. Explain to the children that they need to think about the next question carefully and they will vote 'yes' or 'no'.
3. Ask the children, 'Can we grow plants on the Moon?' and then ask them to vote (you could do stand up for 'yes' and sit down for 'no' or, hands up, etc). Let them know that this is what they are going to be thinking about for the rest of the activity.

## Kit list

### Each child will need access to:

#### Activity B:

- Hand lens
- [Pre-made vegetable petri dishes \(or clear takeaway containers\)](#)
- Vegetables and their corresponding seeds
- [Vegetable worksheets](#)
- Pencils
- Colouring crayons

#### Activity C:

- Cress seeds
- Tubs
- Soil
- Spoons
- Pipettes (optional)
- Beakers (or cups)

### You will need access to:

- [Biodiversity and tree identification guide](#)
- Petri dishes (or clear plastic containers)



## Kit list

continued...

### Activity A: 20 minutes

1. If you can, prepare the children to go outside. Take them to the playground and around your school grounds if you have a green space. This should last about 20 minutes.
2. Whilst walking discuss the following:
  - Can we find some plants?
  - What are the sizes of the plants?
  - Are there different types of plants? How can we tell? Can we name any?
  - What do plants need to grow?
  - Where does the water come from?
  - Where does the light come from?
  - Do plants grow at night?
3. You could use the biodiversity and tree identification guides to enable you to name what you can see.
4. If you do not have a green space in your school, you could watch BBC Wild Isles, series 1 episode 3: [Grassland](#) (7 to 9 minutes and 13 minutes 50 seconds to 15 minutes), available on BBC iPlayer. Alternatively, you could watch BBC [The Green Planet](#) from 9 minutes for a few minutes and then ask the children the same questions.

### Activity B: 20 minutes

1. Have a selection of the petri dishes and vegetable name cards/post-it notes or the vegetables themselves in the middle of each table. Encourage the children to look at the seeds but they should not turn then petri dish over. The children should guess which vegetable the seed will turn into by deciding which post-it note should be stuck onto which petri dish. When they have decided what everything is then they can turn the petri dishes over and the vegetable will be revealed by viewing the image.
2. The children should look carefully at the seeds using the hand lens. Encourage them to carefully draw what they see (vegetable worksheets can be used).
3. Can they write the name of the vegetable chosen?

### Activity C:

1. Ask the children to consider how the conditions on the Moon are different to the conditions on Earth.
2. Use iced water and warm water to help the children 'feel' what the differences are. Explain that the temperature on the Moon gets much hotter and much colder than it does on Earth. Ask the children to predict whether plants will grow if we placed them in these different conditions.

- Selection of seeds such as courgette, peas, tomatoes, lettuce, carrots and cress
- Sellotape
- A freezer
- A windowsill

### Before the activity you need to:

#### Activity A:

- Print out a copy of a biodiversity and tree identification guide. We recommend this one from [OPAL](#).

#### Activity B:

- Purchase vegetable seeds. In a petri dish, stick an image of the vegetable (petri dish vegetable images) so that this can be viewed when looking at the bottom face. If viewing the petri dish from the top, you should not be able to see the image of the vegetable (you may need to add some white paper). Sprinkle a few of the vegetable seeds into the petri dish and put the lid on. Seal the lid down with Sellotape (ensure that the seeds and the bottom image are both visible).

If you are able to have examples of the corresponding vegetables for the children to see and feel, this would be ideal. Print out the vegetable name cards.

#### Activity C:

Purchase cress seeds

3. Each child should be given a tub which they fill almost to the top with soil. They will then scatter a few seeds onto the soil, and cover them with a light layer of soil. The children will then water the tubs with the pipettes if you have them, or another small watering device. Half of the pots produced should then be stored in the freezer and the other half should be stored on a windowsill preferably in the workspace where the children can see them. Remember to water your seeds every few days. Make sure that the tubs that go into the freezer are labelled so that the children do not know which is which.
4. Ask the children questions such as:
  - What do plants need to grow?
  - Do you think that the plants on Earth and on the Moon will look the same?
  - Do you think that the plants on the Moon will grow? Why?
5. Record childrens' answers and revisit them when the seeds have developed into seedlings.

## Watch out!

- **Soil** – wash hands after use
- Be aware of any **vegetable allergies**

## Key words

- Light
- Water
- Plant
- Seed
- Vegetable
- Temperature
- Grow
- Hot
- Cold

## Things to think about

The temperature on the Moon can reach a blistering 120° Celsius during lunar daytime at the Moon's equator, and plummet to -130° C at night.

You may want the children to access pipettes prior to this activity so that they can get used to using them. A good activity is to see how many droplets of water a one penny can hold!



## Activity 6

# Constellation Counters

This activity gets the children thinking about the night sky and what we see.

Cosmic and Gem are looking out of the window and want to know more about what they can see. Aunt Stella explains that they are looking at far away stars, and asks if they know about the way they are grouped into constellations.

Through this activity you will support the children to:

- make observations
- verbally count the number of stars
- produce a constellation poster

## What to do

1. Gather the children on the mat. Ask them about what they can see in the sky during the day. Talk about the shapes of the clouds and whether they can make up stories about the clouds that they see in the sky.
2. Ask if they see the clouds at night? What do we see instead?
3. Explain that the Ancient Greeks used to imagine that the stars looked like objects in the sky, and they used to make up stories about what they saw.
4. Show video on slide 23. Then show slide 24 and ask what the image on the left-hand side is. It's the Sun, our closest star. At night we see lots of stars in the sky. Then play song on slide 25. Repeat and encourage the children to join in and sing along.



## Kit list

### Each child will need access to:

- Black paper
- Aluminium foil
- White chalk (or other pale colours)
- Glue

### You will need access to:

- [Constellation posters](#)
- [Constellation templates](#)
- [CBeebies PDF stargazing maps](#)

### Before the activity you need to:

- Display the constellation posters around the workspace.



## Activity A:

1. The children should walk around the constellations displayed.
2. Encourage them to **blend** the sounds together to be able to say the name of the constellation. Encourage the children to say the names out loud.
3. They should also count the number of stars in the constellations.

## Activity B:

1. The children should then choose a constellation which they want to recreate.
2. Provide templates, black card, aluminium foil, glue and chalk (or white/ yellow pencil crayons). The children can either make a star or 'scrunch' up aluminium foil to represent a star and this can be stuck down onto the black paper in the correct positions of the stars in the constellation selected.
3. Encourage the children to write the name of the constellation on their poster, if they can.

## Watch out!

- Supervise children using **glue**

## Key words

- Star
- Constellation
- Day
- Night

## Things to think about

The children then make their constellation poster and take it home to share with their parents/carers . Challenge them to do some star gazing with their parents/carers to spot their constellation in the night sky.

You could provide constellation information to parents (CBeebies stargazing) and ask them to comment on the home learning.





## Activity 7

# Mask Makers

This activity gets the children thinking about how to block out light.

It's the summertime and Cosmic wants to stay up late so that he can view the constellations in the night sky. He needs to have an afternoon nap but the Sun is so bright that he can't sleep. Aunt Stella suggests he wears a mask to block out the light. Can you help him to make a mask so that he is able to sleep?

Through this activity you will support the children to:

- explore different fabrics
- sort objects into groups
- justify their decision

## What to do

1. The children should be sitting on the mat. Ask the children to look in their envelopes/bags in pairs/threes. How many samples of fabric can they find?
2. The children should explore the fabrics – how do they feel/smell?
3. Can the children sort the fabrics? Ask them why they sorted them in that way.
4. Explain the context to the children: 'It's the summertime and Cosmic wants to stay up late so that he can view the constellations in the night sky. He needs to have an afternoon nap but the Sun is so bright that he can't sleep'.
5. Show the sleeping mask. Ask the children what they think it is used for.

## Kit list

### Each child will need access to:

- Fabric pouches
- Torches
- Sorting hoops/sorting frames/other object to help with sorting materials.

### You will need access to:

- A sleeping mask

### Before the activity you need to:

- Select ten different fabrics. They should be different colours and different textures. Preferably some will be opaque and others transparent. Cut the fabrics into large squares (10 cm by 10 cm) and organise a sample of ten different fabrics in a pouch/envelope. These are your fabric pouches.

6. Ask the children which fabric they would choose to help Cosmic to sleep better. Ask them how they think that they could find out.
7. The children should then go back to their tables, where you will have laid out a selection of materials. They should explore the fabrics using torches. Does light pass through the fabric? Encourage the children to sort the materials into those that let light through, and those that don't. They could place two hoops on the ground and use them to place the two categories of materials into.
8. Ask questions such as:
  - Are some materials easier to group than others?
  - Which material would feel the nicest?
  - Which material allows light to pass through?
  - Which material doesn't allow light to pass through?
  - Which material would you choose to make the mask out of and why?
9. Have the children choose from the materials they sorted into the those that don't let light through, the materials that would be comfortable to use to make a sleeping mask. They could hold the materials to their cheeks, or touch them with their hands to decide if they have a soft texture.
10. Ask the children to hold up the material that they would make the sleeping mask out of. Ask them to explain why they would make the mask out of this material.

## Watch out!

- We should never look directly at the Sun because it can damage our eyes.

## Key words

- Fabric
- Touch
- Group
- Light

## Things to think about

The Sun is our closest star. Sleeping masks block light from the Sun to help people to sleep better.

This activity is short and so provides an opportunity to look at the seeds planted in Activity 5.

Place a selection of seedlings on each table (some from the freezer and some from the windowsill).

The children should look at them and decide which came from the Moon (freezer) and which from Earth. Ask them why they have sorted in this way and how they know.

Involve the children in watering the seedlings. They could also use the hand lenses to observe the stem and leaves. If there is enough time, encourage the children to draw what they can see.





# STAR

 [Watch the demonstration video](#)

## Activity 8

# Astronaut Antics

This activity gets the children thinking about being an astronaut.

Cosmic and Gem have decided that after going to the Moon and learning more about the night sky, they now want to become astronauts. To do this, they need to do some training.

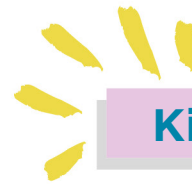
Through this activity you will support the children to:

- complete some physical activity
- discuss how exercise makes them feel
- learn how to speak Russian

## What to do

1. Gather the the children on the mat and welcome them to the 'NASA astronaut training camp'.
2. If you have one, your astronaut trainer/s should be introduced. Here's a possible introduction:

"Hello, my name is **X** and I train astronauts. **INSERT YOUR NAME** got in touch to let me know how fantastic you have all been and that they thought we may have some future astronauts that go to **INSERT SCHOOL/NURSERY NAME**. This is **X**, they work with me and are a specialist astronaut coach. We're really pleased that **INSERT YOUR NAME** is going to help with the training as well today. Together, we're going to complete some challenges that we make all astronauts do. (Big, enthusiastic voice) Right, who is ready to train to be an astronaut? **INSERT YOUR NAME** will now organise you in rows ready to go outside."



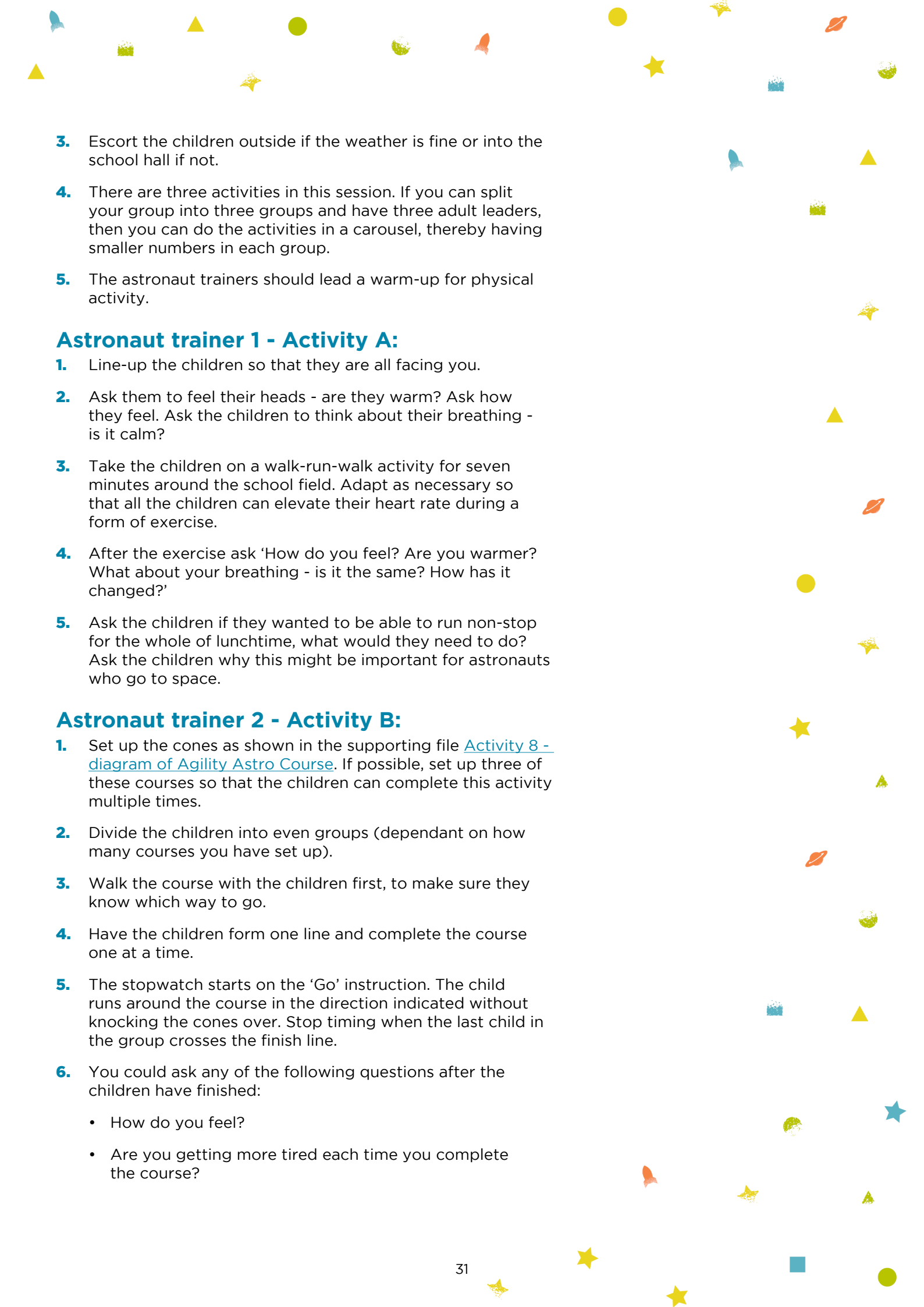
## Kit list

### You will need access to:

- Eight cones minimum (16 or 24 would be helpful)
- Stopwatches
- A NASA t-shirt/cap would be great for the trainers to wear but not essential!
- Computer and screen
- The video on slide 30 of the presentation

### Before the activity you need to:

- Try to find two new adults to act as NASA astronaut trainers. You could ask a teaching assistant from another group or approach your local university for pupil ambassadors. If you don't have any willing volunteers, then you can pretend that in your spare time you also train astronauts!

- 
3. Escort the children outside if the weather is fine or into the school hall if not.
  4. There are three activities in this session. If you can split your group into three groups and have three adult leaders, then you can do the activities in a carousel, thereby having smaller numbers in each group.
  5. The astronaut trainers should lead a warm-up for physical activity.

### **Astronaut trainer 1 - Activity A:**

1. Line-up the children so that they are all facing you.
2. Ask them to feel their heads - are they warm? Ask how they feel. Ask the children to think about their breathing - is it calm?
3. Take the children on a walk-run-walk activity for seven minutes around the school field. Adapt as necessary so that all the children can elevate their heart rate during a form of exercise.
4. After the exercise ask 'How do you feel? Are you warmer? What about your breathing - is it the same? How has it changed?'
5. Ask the children if they wanted to be able to run non-stop for the whole of lunchtime, what would they need to do? Ask the children why this might be important for astronauts who go to space.

### **Astronaut trainer 2 - Activity B:**

1. Set up the cones as shown in the supporting file [Activity 8 - diagram of Agility Astro Course](#). If possible, set up three of these courses so that the children can complete this activity multiple times.
2. Divide the children into even groups (dependant on how many courses you have set up).
3. Walk the course with the children first, to make sure they know which way to go.
4. Have the children form one line and complete the course one at a time.
5. The stopwatch starts on the 'Go' instruction. The child runs around the course in the direction indicated without knocking the cones over. Stop timing when the last child in the group crosses the finish line.
6. You could ask any of the following questions after the children have finished:
  - How do you feel?
  - Are you getting more tired each time you complete the course?



- Are you getting better each time you practice the course?
- How do you know you are getting better?
- What do you think would be more difficult for an astronaut: completing this course after a 14-day mission or a six-month mission? Why?

## Watch out!

- **Ensure that the exercise is tailored to suit individual needs.**

## Activity C

You will need access to a computer and screen for this.

1. After completing Activity A or B start the video at 43 seconds. This video teaches the children the numbers 1 – 10 in Russian. Stop at 1 minute and 53 seconds. Repeat this as many times as you wish.
2. After a break, can the children remember any of the numbers? Was it easy or hard to remember?

## Key words

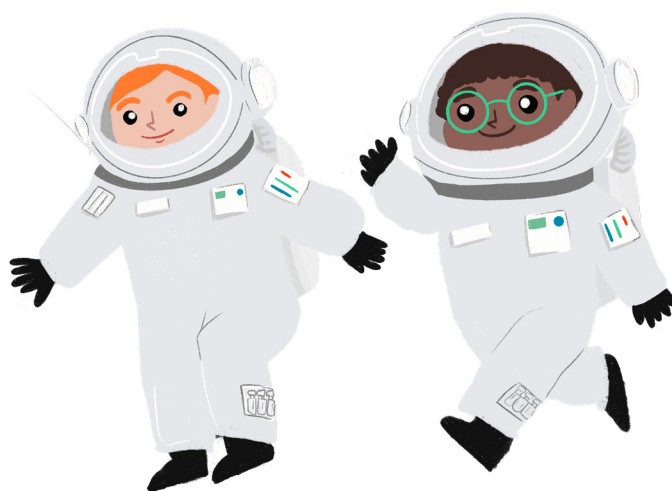
- Numbers
- Exercise
- Astronaut

## Things to think about

The activities in this session have been adapted from the Mission X: Train Like an Astronaut programme. Further activities and information can be found in the [supporting documents folder](#).

An astronaut working in space for a six-month mission will have a more difficult time completing the agility course in Activity B when they return to Earth. During longer missions, an astronaut's body has been exposed to the microgravity environment for a longer period of time. Because of this, the body will take longer to adapt to the environment on Earth. Astronauts must get as much exercise as they can to help their bodies prepare to come back to Earth.

Russian is the international language used in space. So, for astronauts to be able to communicate effectively with other astronauts, they need to learn to speak Russian.





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