STARGAZING LIVE

ACTIVITY PACK

BBC TWO

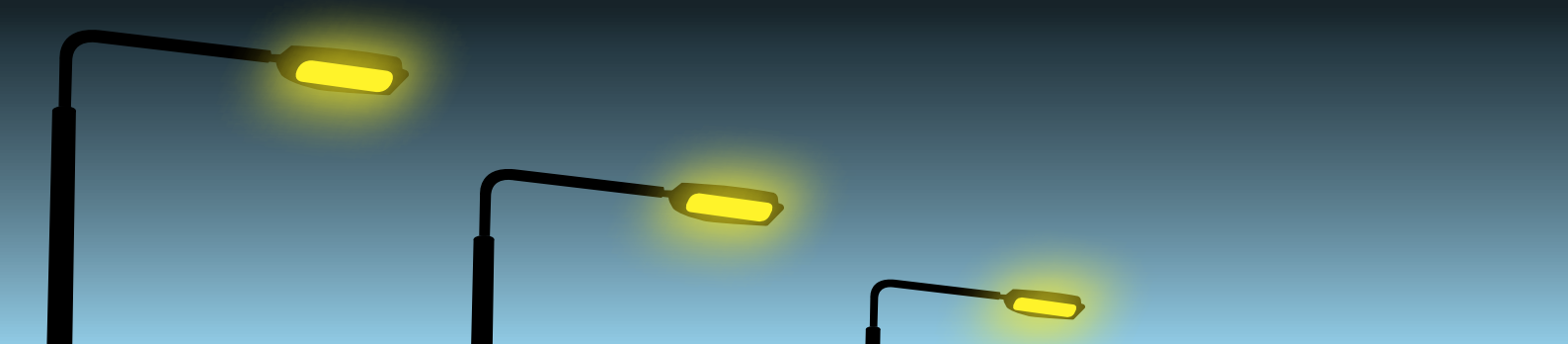
WELCOME TO YOUR STARGAZING LIVE ACTIVITY PACK!

We have put together this activity pack to accompany the BBC Two programme *Stargazing LIVE*. You can use it to help you run a *Stargazing LIVE* event, or to explore astronomy further with your friends and family.

The activities in this pack are suitable for a range of ages and abilities. Please do feel free to photocopy the activities, so you can use them with groups. You can also download further copies of the pack, accompanying curriculum links, and other free resources at **bbc.co.uk/stargazing**

Please ensure that you think about safety and the supervision of children when carrying out these activities and – most of all – have fun!

The *Stargazing LIVE* Team



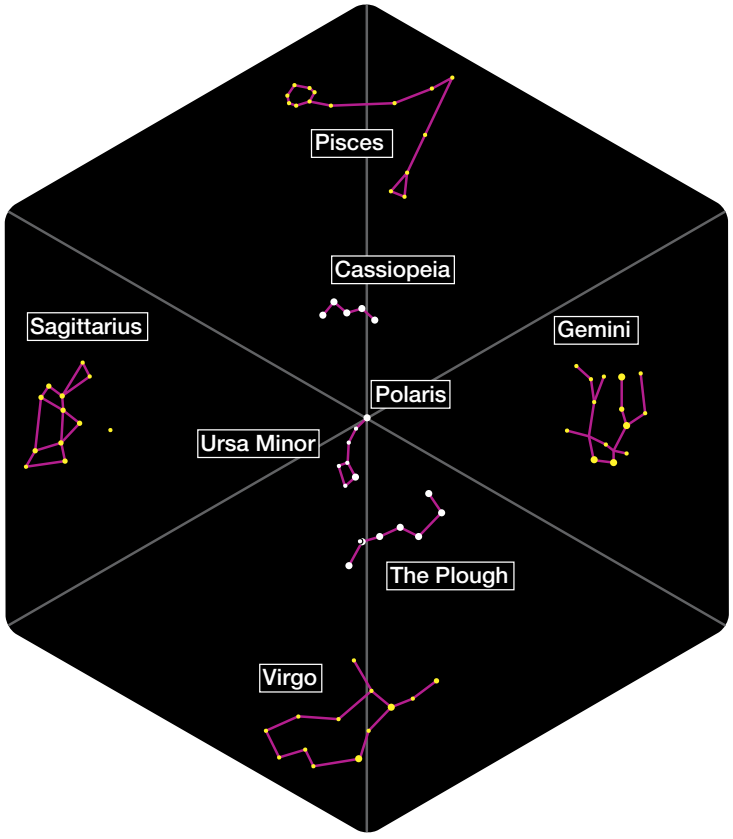
MINI-PLANETARIUM

STARGAZING LIVE

MINI-PLANETARIUM

Make your very own mini-planetarium and use it to understand why the stars that we can see at a certain time of night change throughout the year.

UMBRELLA MINI-PLANETARIUM



WHAT YOU NEED

- A black umbrella
- Small, white sticky dots
- Small, yellow sticky dots
- Long, thin stickers (any colour)
- Eight large, white stickers for labelling

WHAT TO DO:

1. Open your umbrella and use the centre of the inside to represent Polaris (the North Star).
2. Using the diagram as a guide, work through each section of the umbrella and mark out the constellations shown using the sticky dots to represent the stars. Start with the white sticky dots to create the stars in Ursa Minor, The Plough and Cassiopeia.
3. Next, use the yellow sticky dots to make the other constellations.
4. Use the long, thin stickers to mark connecting lines between the stars in each constellation.
5. Write the name of each constellation onto a large sticker. Stick each name next to its matching constellation.
6. Once you have completed your mini-planetarium, you can use it to spot these constellations in the night sky. Note that not all the constallations in the sky are shown on your umbrella and not all will be visible in a single night, so make sure you look carefully.
7. You can also watch the relevant ‘How to’ video at **bbc.co.uk/stargazing** to find out why the stars we see at a certain time of night change throughout the year.

Mini-planetarium activity produced with thanks to Dan Hillier of Dark Sky Scotland.

SOLAR ECLIPSE VIEWER

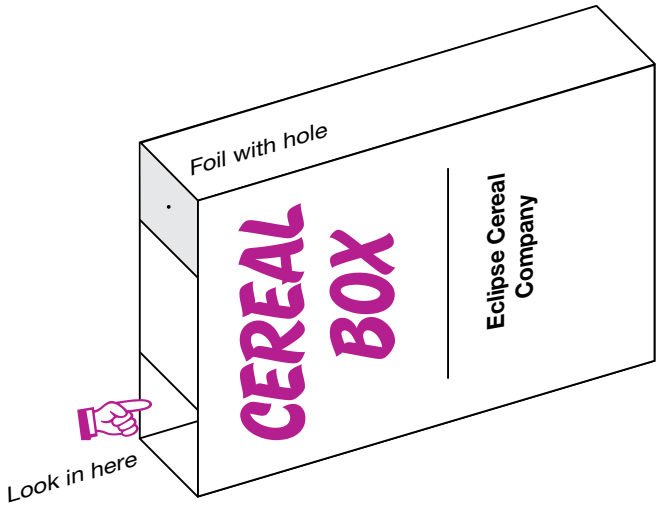
STARGAZING LIVE

WHAT IS A SOLAR ECLIPSE?

A solar eclipse occurs when the Earth, the Moon and the Sun are all aligned with one another in such a way that from Earth, the Moon appears to block the light coming from the Sun.

One of the safest and easiest ways to view a solar eclipse is with a pinhole viewer. Here's how to make one.

SOLAR ECLIPSE VIEWER



SAFETY

Children will need adult supervision.

Remember! Looking directly at the Sun can permanently damage your eyes. You must never look at the sun directly or use any devices such as binoculars or telescopes to view it.

WHAT YOU NEED

- An empty cereal box
- Scissors
- Glue
- Aluminium foil (approx. 10cm by 10cm)
- Sticky tape
- A strip of white paper – the same size as the bottom of your cereal box
- A pin
- A ruler

WHAT TO DO:

1. Open your cereal box at the top and stick the white paper onto the inside of the bottom of the box using glue. This is going to be the 'viewing area'.
2. Cut off the two small tabs at the top of the box and cut off 4cm from each end of the two larger flaps.
3. Fold the remaining flaps together and secure with sticky tape so that you have a box with two rectangular holes in the top.
4. Place the foil over the hole on the right-hand side of the box and secure with sticky tape.
5. Carefully pierce the middle of this foil with the pin – making sure that you only make a very small hole.

Your pinhole viewer is now ready to use! Look into the box through the uncovered hole, whilst making sure the foil-covered hole is pointing towards the Sun. Move the box until an image of the Sun appears on the 'viewing area' at the bottom of the box.

PHOTOGRAPH THE NIGHT SKY

STARGAZING LIVE

IS IT DIFFICULT?

Photographing the night sky isn't as hard as you might think. Most cameras are capable of capturing basic shots of the stars, but what you can achieve depends on how much control your camera gives you over its settings.

WHAT YOU NEED

- A digital camera
- A tripod (optional)
- Shutter release cable (optional)

WHAT TO DO:

1. **Position the Camera**
   Tripods are a great way of holding the camera steady whilst you point it at the sky. If you don't have one, rest your camera on a solid and sturdy base instead.

2. **Set the Focus**
   Make sure you turn the auto-focus function off because it doesn't work well with the low light conditions of the night sky. Then set your camera's focus to infinity.

3. **Refine the Focus**
   To get the best results, point your camera at a bright star and adjust the focus until the object is as sharp as you can get it.

4. **Adjust the Aperture**
   Set the camera's f-number to the smallest number possible. This means the lens aperture (hole) will be at its largest and will therefore let more light into your camera.

5. **Adjust the Zoom**
   If your camera has a zoom capability, use the lowest zoom setting to give you the widest angle shot.

6. **Adjust the Sensitivity**
   Camera sensitivity is adjusted via the ISO setting. The higher the ISO, the easier it is to see faint objects, but it also increases the digital 'noise' in your pictures. If you think some of the stars in your image may be due to noise, turn down the ISO setting. If you're not sure, cover the lens with card and take a picture – any 'stars' that appear in this image are due to digital noise.

Now all you need to do is to point your camera at some bright stars and get clicking!

TOP TIP!

You can use a shutter release cable or a shutter delay timer to help prevent camera shake caused when you press the shutter button.

WHY NOT TRY...

Experimenting with exposure times as the longer the exposure you use, the more stars you're likely to record. If you leave the shutter open for at least a minute, you might start to get images of star trails as the stars appear to move across the night sky. Basic cameras may not be able to take such long exposures, however DSLRs can if you set them onto their 'bulb' exposure setting and use a shutter release cable to hold the shutter open.

MAKE AN ORRERY

STARGAZING LIVE

WHAT IS AN ORRERY?

An Orrery is a mechanical model of the Solar System. Here you can make a simple Orrery, showing the Sun, Earth and Moon, and how they move.

SAFETY

Children will need adult supervision.

WHAT YOU NEED

- Scissors
- 2 paper fasteners

WHAT TO DO:

1. Carefully cut out the four templates shown on the next page.
2. Place Piece 1 where shown on top of Piece 2.
3. Place the Earth over Piece 1, and secure all three pieces together with a paper fastener.
4. Now place Piece 2 on top of the Sun where shown and secure with another paper fastener.
5. Your Orrery is now ready to use. You can orbit the Moon around the Earth and see how it seems to change over a month. You could also try orbiting the Earth around the Sun to see how it moves throughout a year.

DID YOU KNOW?

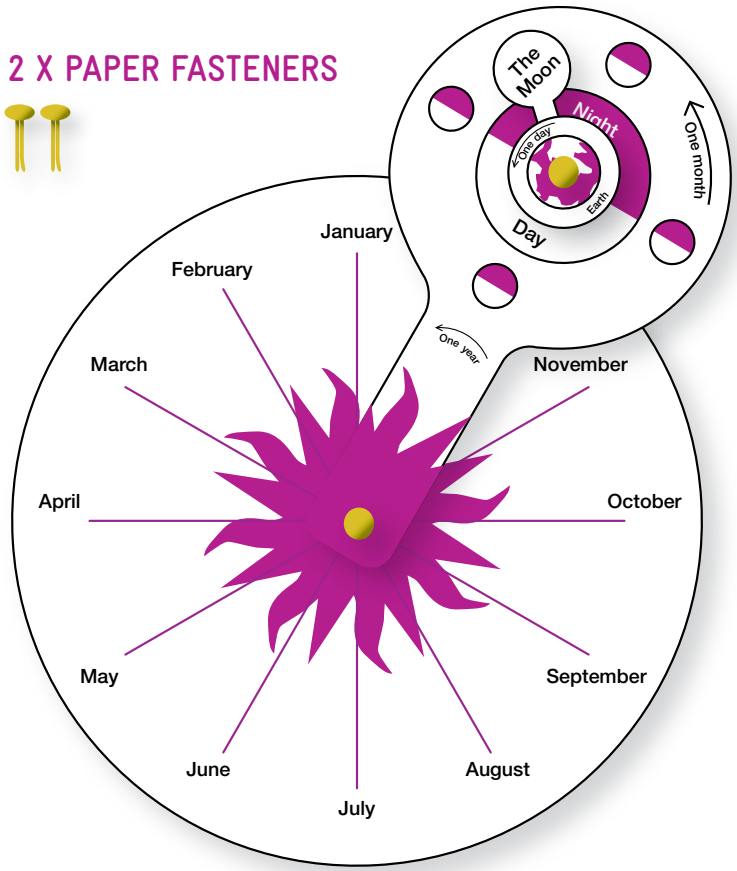
A day is the length of time it takes for the Earth to completely spin on its axis, which is approximately 24 hours.

A lunar month is the time it takes for the Moon to complete one set of phases (full Moon back to full Moon) and is approximately 29.5 days.

A year is the time it takes for the Earth to complete one orbit of the Sun, which is approximately 365¼ days.

COMPLETED ORRERY

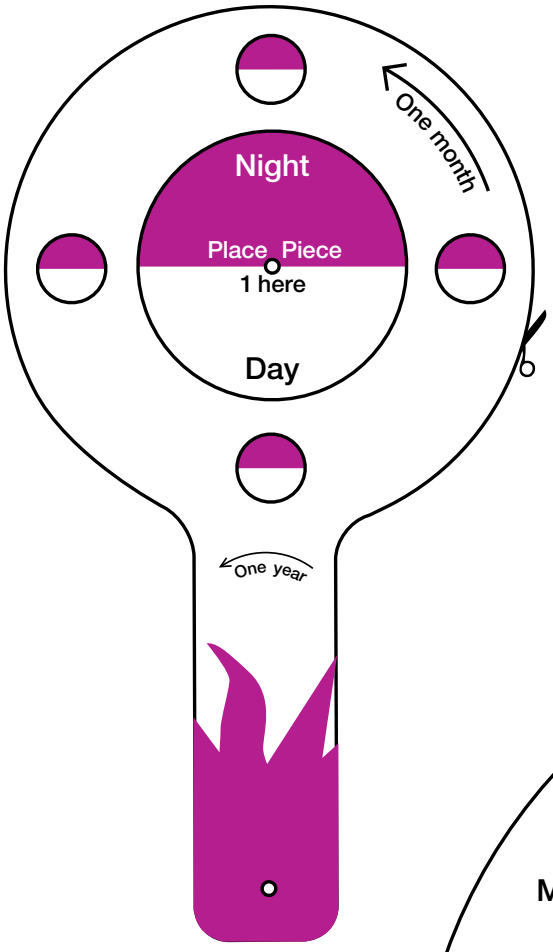
2 X PAPER FASTENERS



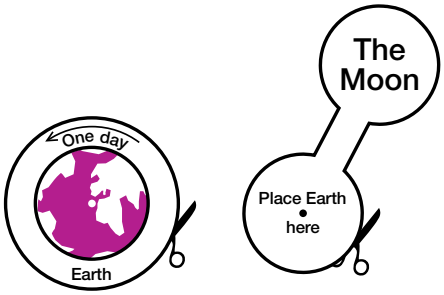
Orrery activity produced with thanks to the Wynyard Woodland Park Planetarium and Observatory.

THE ORRERY

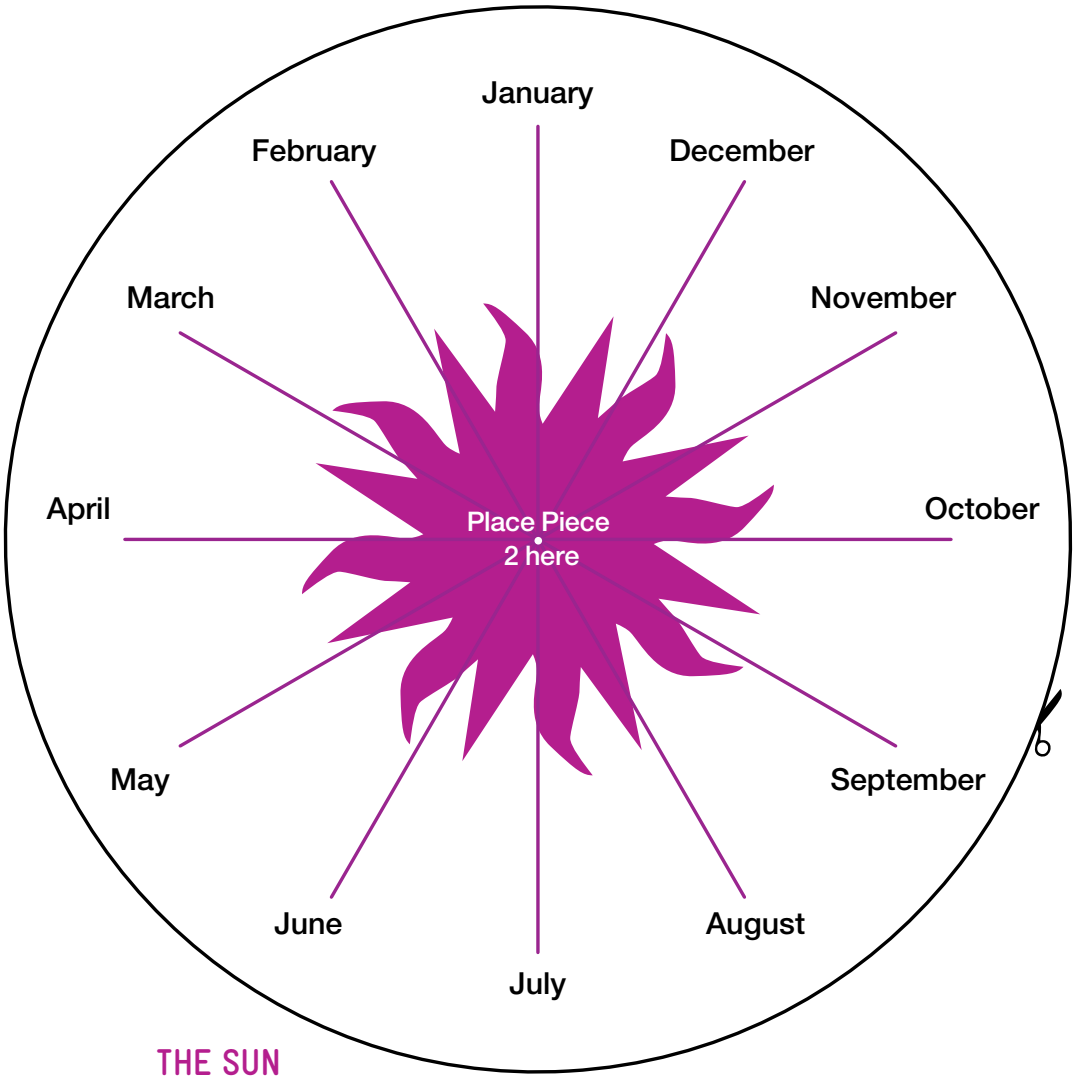
STARGAZING LIVE



PIECE 2



PIECE 1



THE SUN

ROCKET JUICE

STARGAZING LIVE

Space rockets use either solid or liquid fuel to propel them from Earth. Here you can build your own rocket that's powered by air!

SAFETY

Children will need adult supervision.

WHAT YOU NEED

- A small empty drinks carton with bendy straw
- Sticky tack
- Sticky tape
- Scissors
- Glue

WHAT TO DO:

1. Carefully cut out the four templates on the next page. The rectangle will make the body of your rocket, and the other three templates will make the fins.
2. Lay the rectangle flat on the table, picture side down, and put the long part of the straw over the top of it. Roll the paper around the straw, making sure that it's a snug fit (but not too tight!).
3. Secure the rolled paper with sticky tape and then remove it from the straw.
4. Fold over one end of the rolled paper at the dotted line and secure in place with sticky tape.
5. Now take the fins and fold along the dotted lines.
6. Apply glue to all of the printed sides of each fin. Stick the middle rectangles to the yellow zone of the rocket and stick the triangles of the fins together as shown.

YOUR ROCKET IS NOW READY, SO IT'S TIME TO MAKE THE LAUNCHER!

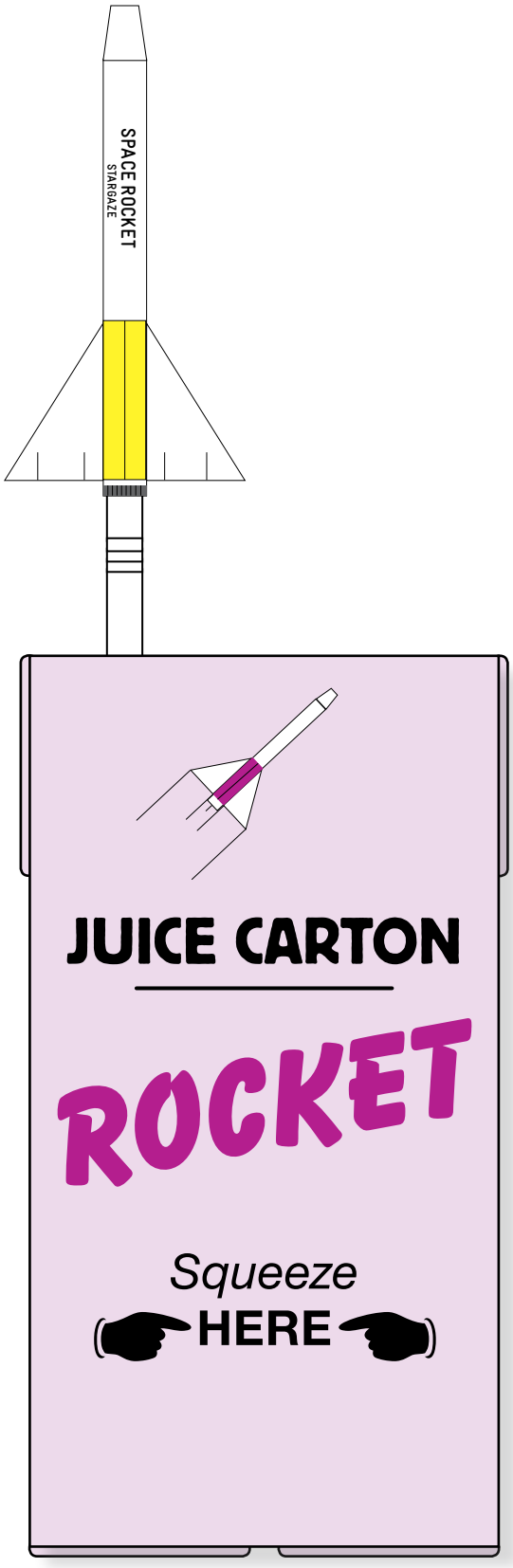
1. To do this, insert the short end of the straw into the carton and seal any gaps between the straw and carton with sticky tack (it's important that your launcher is airtight).
2. Place your rocket onto the straw and you're ready. To launch the rocket simply squeeze the carton and watch your rocket fly!
3. Now, why not decorate your carton?

DID YOU KNOW?

By squeezing the carton you push the air from inside it into the body of the rocket. This air is then pushed out the bottom of the rocket, launching it forwards and into the sky!

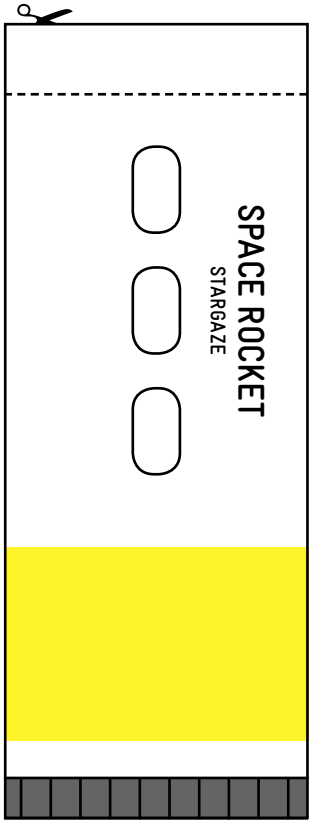
ROCKET JUICE

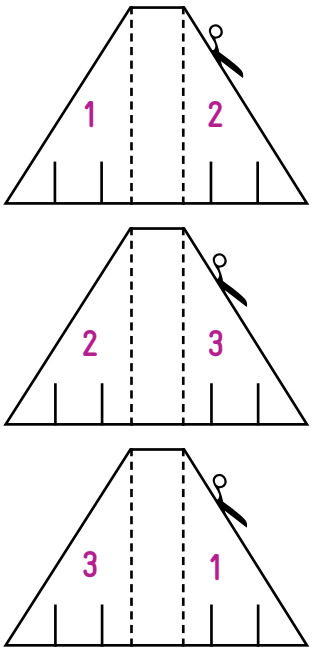
STARGAZING LIVE



FINAL ROCKET ON CARTON READY TO LAUNCH!

SECTIONS TO CUT OUT





NOTE: GLUE THE FINS WITH THE SAME NUMBERS TOGETHER.

'CAN'STELLATIONS

STARGAZING LIVE

Constellations are arrangements of stars that are shown to represent objects, animals or mythological creatures. There are 88 official constellations, and different ones can be seen in the night sky throughout the year. But if you can't get outside, or it's too cloudy to see the real constellations, why not make a constellation of your own – in a can! These can be seen anywhere at anytime. Just follow these instructions.

SAFETY

Children will need adult supervision.

WHAT YOU NEED

- Empty crisp can (the ones that are 8cm in diameter work best)
- Scissors
- Sticky tack
- Drawing pin
- Nail
- Hammer
- Torch (optional)

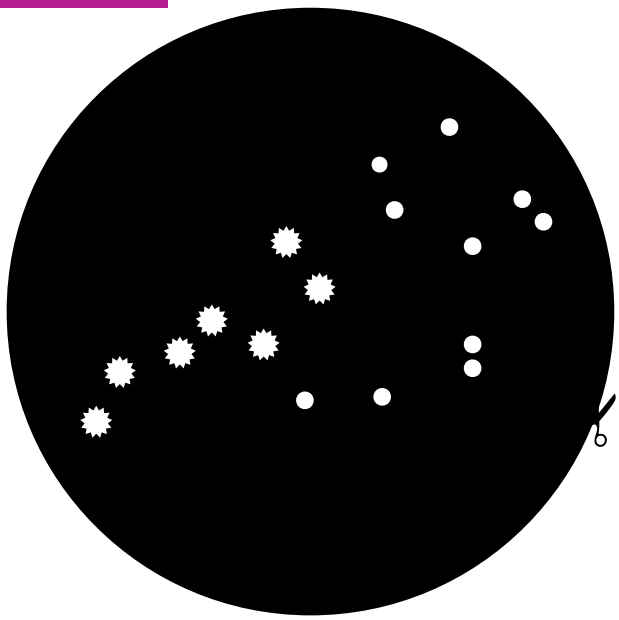
WHAT TO DO:

1. Use the nail and hammer to carefully make a small hole in the centre of the metal end of the can. This will be your viewing hole.
2. Carefully cut out one of the constellation templates on the next page.
3. Place your chosen template on top of a ball of sticky tack and use the drawing pin to carefully make a small hole at the centre of each of the stars. (The sticky tack will stop the pin from pricking your fingers or the table!)
4. Remove the template from the sticky tack and place it inside the plastic lid of the crisp can. If it helps, you can use a bit of sticky tack to ensure it's held in place.
5. Put the lid on the can and point it towards the light. Look through the viewing hole at the bottom and you should see your very own constellation.
6. Now, why not try putting a torch inside the crisp can and pointing it upwards? If you turn out the lights, you should be able to see the stars on your ceiling!

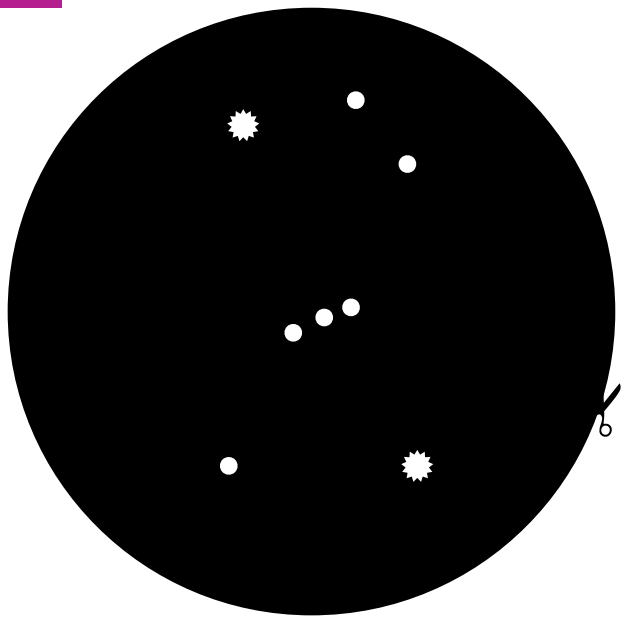
'CAN'STELLATIONS

STARGAZING LIVE

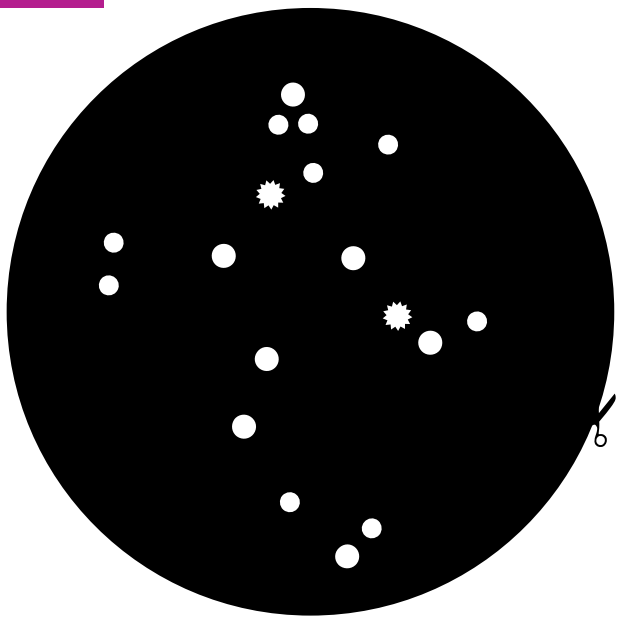
URSA MAJOR



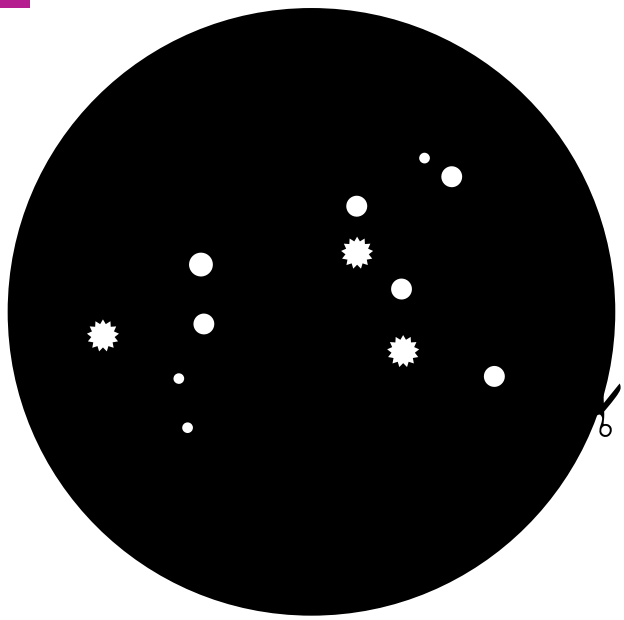
ORION



PERSEUS



LEO



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MC4 A4 Media Centre
201 Wood Lane
London W12 7TQ