

# A STARGAZER'S GUIDE TO SCOTLAND'S SKIES



PART OF  
SCOTLAND  
AT NIGHT

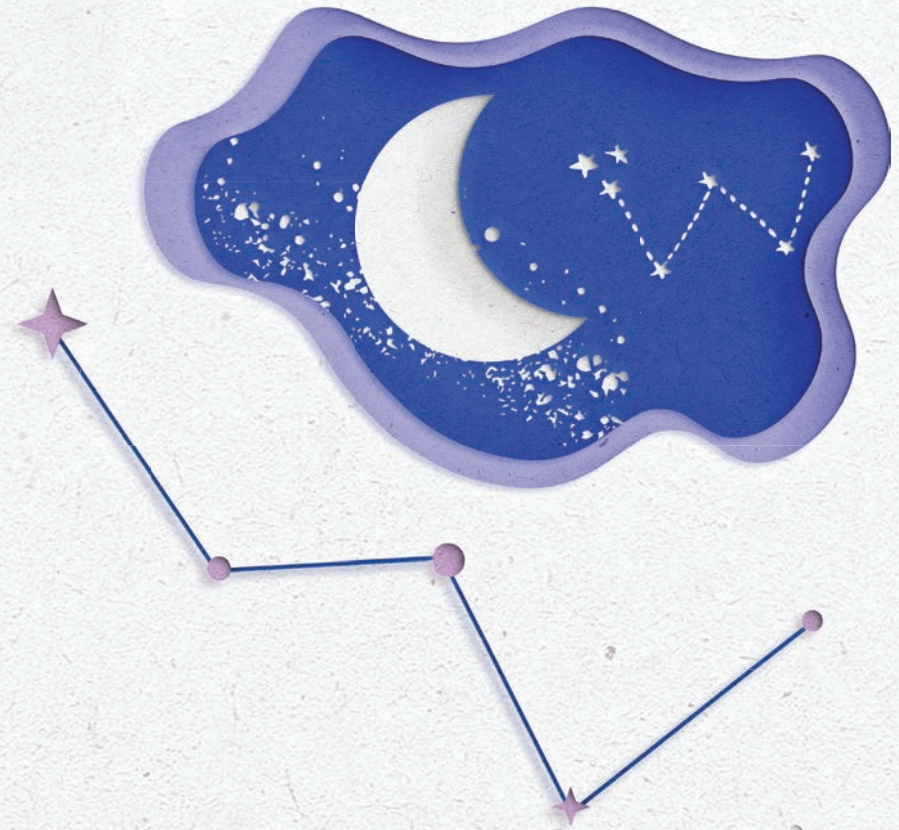


# AN INTRODUCTION TO STARGAZING IN SCOTLAND

There are few things as amazing or as exciting as gazing up at the night sky and looking at the distant stars, far off planets and even our neighbouring galaxy. In fact, Scotland has some of the darkest skies in Europe to enjoy the cosmic heavens.

Only in Scotland could a country look so beautiful by day and put on a celestial light show so full of wonder and amazing things by night.

And, you don't need lots of expensive or fancy kit. This pack will give you lots of fun activities and information to get you out and looking up.





# WAYS TO GAZE

## Stargazing

### 1 Galloway Forest Park

The UK's first Dark Sky Park is a perfect location to not only explore during the day, but observe over 7,000 visible stars by night.

### 2 The Scottish Dark Sky Observatory

Located on a hilltop within the Galloway Forest Dark Sky Park, this public observatory runs stargazing tours and includes a spectacular planetarium.

### 3 Moffat, Dumfries and Galloway

Europe's very first Dark Sky Town, adopted special street lighting to keep light pollution to a minimum.

### 4 The Mills Observatory, Dundee

Gifted to the people of Dundee in 1935, Mills Observatory is Britain's first purpose-built public observatory. You can see breathtaking views of the stars and planets through the impressive Victorian refracting telescope.

### 5 Isle of Lewis, Outer Hebrides

There's very low light pollution on this beautiful rugged island. What's more, it is home to one of Scotland's earliest astronomical observatories, the Calanais Standing Stones.

### 6 Isle of Coll, Inner Hebrides

This stunning 'Dark Sky Island' is a popular draw for budding astronomers. The Cosmos Planetarium also offers a fascinating haven for star enthusiasts, young and old alike.

### 7 Melrose, Scottish Borders

It may be true that the further north you head in Scotland the darker the skies, but Melrose also offers a wonderful view of the cosmos.

### 8 Caithness, North Highlands

Whilst both Shetland & Orkney are renowned for viewing the Northern Lights (aurora borealis), this area has some spots with zero light pollution, making it popular with astrophotographers.

### 9 Tomintoul and Glenlivet, The Cairngorms

For the best views of the night sky in the most northerly Dark Sky Park in the world!

## Northern Lights

### 1 Shetland, Orkney and Caithness

The further north you go, the better view of the northern lights you will get. Low light pollution and beautiful scenery will make for a stunning stargazing themed trip away.

### 2 Aberdeenshire, Moray

This region is synonymous with the aurora borealis. The tune 'The Northern Lights Of Old Aberdeen' is a well-loved favourite for locals.

### 3 Lewis and Harris

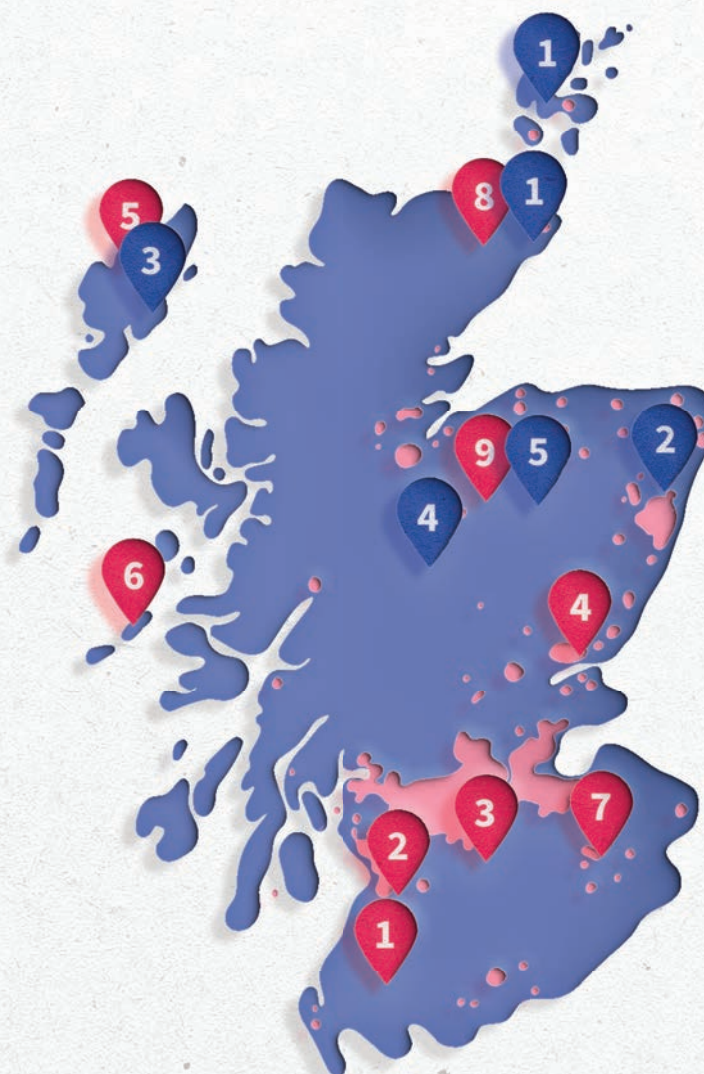
With incredible vistas and very low light pollution, the archipelago of islands that form the Hebrides are a ideal for gazing at stars and the aurora.

### 4 Rannoch Moor

One of the last remaining wildernesses in Europe, the Great Moor of Rannoch is a beautiful outdoor space stretching far north and west from Rannoch Station.

### 5 The Cairngorms

The high vantage points and dark skies will increase your chances of seeing the Northern Lights.





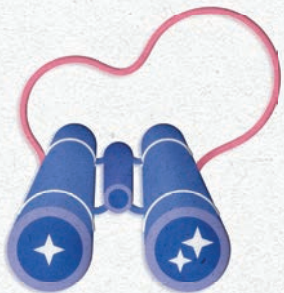
# DARK SKIES CHECKLIST

## ☐ Get some advice

We've made a terrific series of short, easy to follow films with Steve Owens of Glasgow Science Centre who gives some great advice and information on how to best enjoy the night skies in Scotland. Check out the Stargazing in Scotland videos at [www.youtube.com/visitscotland](http://www.youtube.com/visitscotland).

## ☐ Avoid bright light

Once your eyes have adjusted, you want to keep them that way. Avoid looking at your phone. If you're using a night sky app, it should have a night-time setting. Use a red-light torch if possible. Red light won't stimulate your eyes so much in the dark.



## ☐ Binoculars at the ready

You don't actually need a telescope to get started. However, a good pair of binoculars is essential for when you want to take your stargazing to the next level. Generally, the bigger they are the better, as they gather more light and make the images clearer and more detailed.

## ☐ Give it time

Your eyes need to adjust to the dark. After about 10 to 15 minutes, you'll find your eyesight will become a lot more sensitive to light, allowing you to see more stars and detail.

## ☐ Star charts

Star charts can be essential for knowing what's in the sky at which times of the year. You can download monthly charts from a variety of places online. But you could also use our planisphere on page 12.



## ☐ Check the forecast

Have a look at what the weather's going to be like before you head out. If your area is set for cloudy skies and heavy rain, it may be best to leave it for another night. There's plenty of activities in this pack to keep you busy on such occasions.



## ☐ Wrap up

Let's face it, Scotland can be a little chilly at times. So if you're going outdoors at night, and it's in the dead of winter, then you need to layer up with warm clothing and sensible footwear.



## ☐ Head outside

If you're using binoculars or a telescope indoors, you might get reflections or distortions in the viewfinder. Try head outdoors, away from light sources.



## ☐ Find the Pole Star

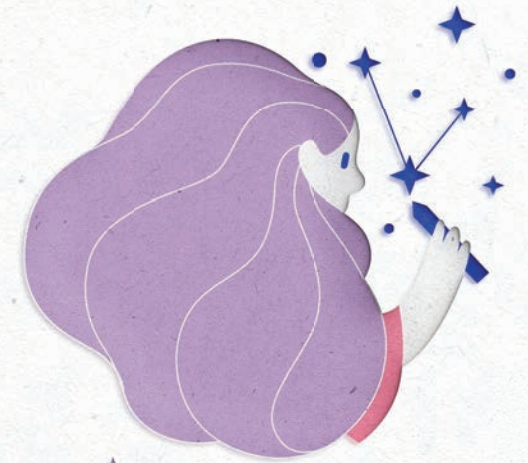
By learning how to find this star using the easy to find star patterns known as The Plough (or Big Dipper) you may find it easier to navigate the sky to find other constellations and planets.



# COLLECT SOME CONSTELLATIONS

Constellations are patterns of stars that are connected by imaginary lines, a little like a giant dot to dot. They are often named after mythological characters or objects. There are 88 official constellations. Some are seasonal constellations, whilst several are visible all year round from Scotland.

Here are six constellations for you to try to find and collect when you're out stargazing.



## □ Ursa Major

### The Big Dipper

is visible all year round in Scotland. It contains a famous pattern of bright stars known as the Plough, or Big Dipper, which looks like a saucepan with a long curved handle.

## □ Cygnus

### The Swan

High in the summer sky in Scotland, Cygnus the Swan looks exactly as its name suggests. The long neck of the swan follows the line of the Milky Way, making it a great way to find that often elusive band of light.

## □ Pegasus

As we move into autumn you can pick out Pegasus, the winged horse. One of the corners of the Great Square of Pegasus joins on to the constellation Andromeda, home to the most distant object visible to the naked eye, the Andromeda Galaxy.

## □ Orion

### The Hunter

A favourite for winter stargazers, Orion the Hunter stands tall and proud, his legs apart, his belt hanging from one hip, one arm outstretched in front of him and the other raised above his head, holding a club. Orion's left shoulder is a star called Betelgeuse. Betelgeuse is red in colour as it is running out of fuel and dying.

## □ Leo

### The Lion

Leo is a fainter spring constellation, but the head of the lion makes out quite a distinct backwards question mark shape. The dot of the question mark is a star called Regulus.

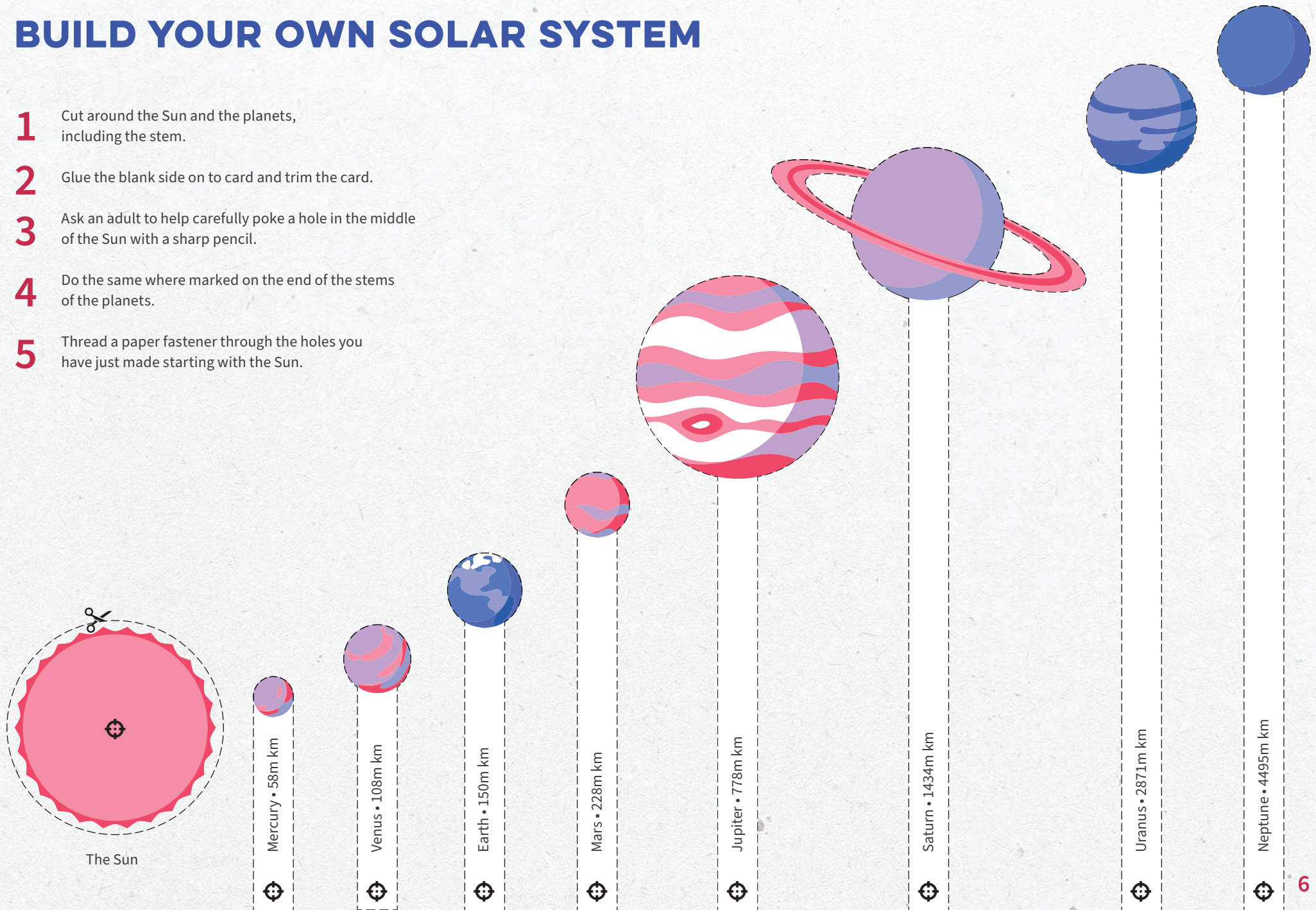
## □ Cassiopeia

Named after the vain and boastful queen in Greek mythology, Cassiopeia is visible all year round in Scotland, but it's easier to spot in the autumn.



# BUILD YOUR OWN SOLAR SYSTEM

- 1 Cut around the Sun and the planets, including the stem.
- 2 Glue the blank side on to card and trim the card.
- 3 Ask an adult to help carefully poke a hole in the middle of the Sun with a sharp pencil.
- 4 Do the same where marked on the end of the stems of the planets.
- 5 Thread a paper fastener through the holes you have just made starting with the Sun.

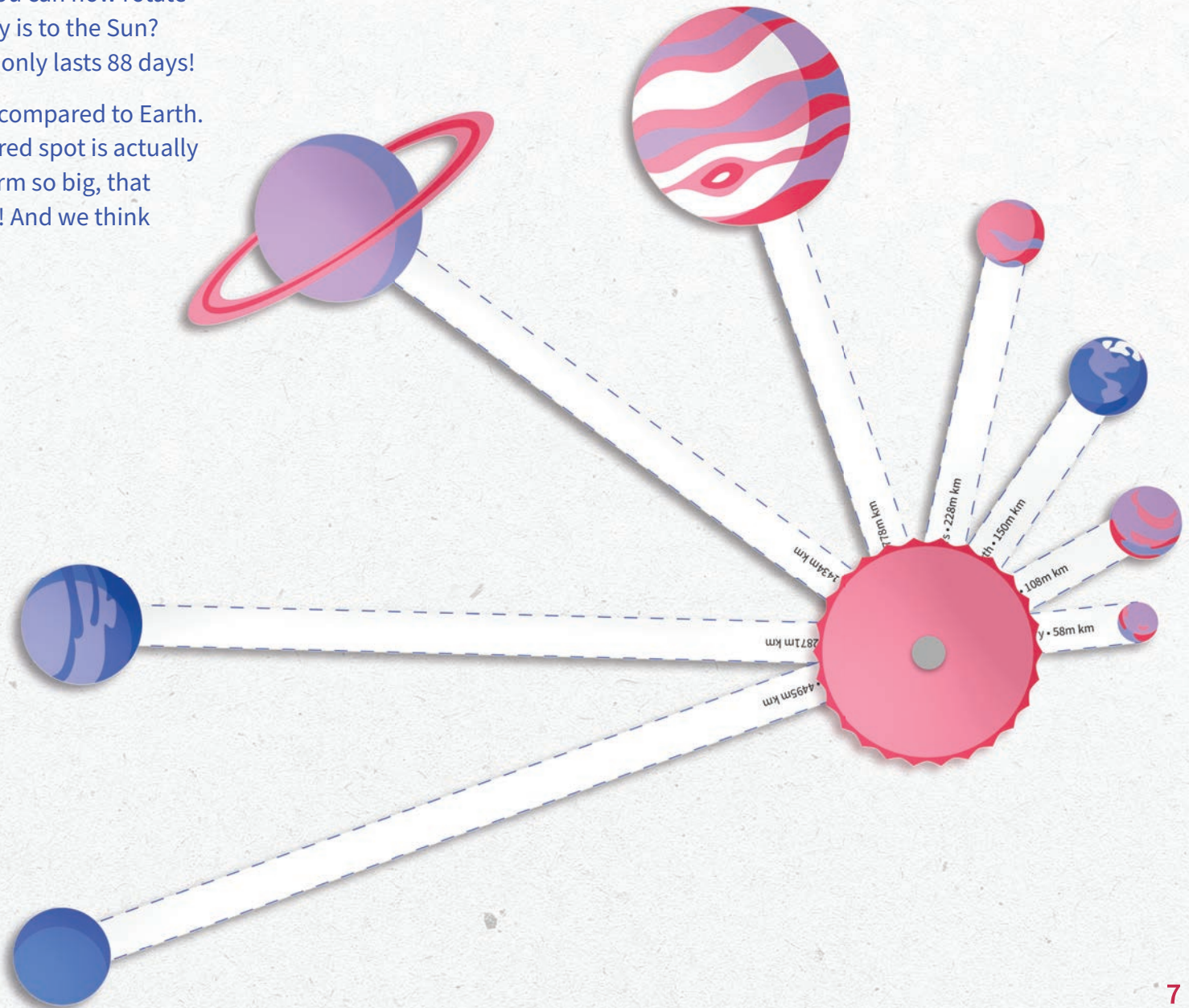




# BUILD YOUR OWN SOLAR SYSTEM

Now that your solar system is complete you can now rotate the planets. Do you see how close Mercury is to the Sun? That's why Mercury is very hot and a year only lasts 88 days!

You can also see the size of other planets compared to Earth. Jupiter is mindbogglingly big. Its famous red spot is actually a storm that's been raging for years. A storm so big, that three Earth size planets could sit within it! And we think Scotland can be stormy!



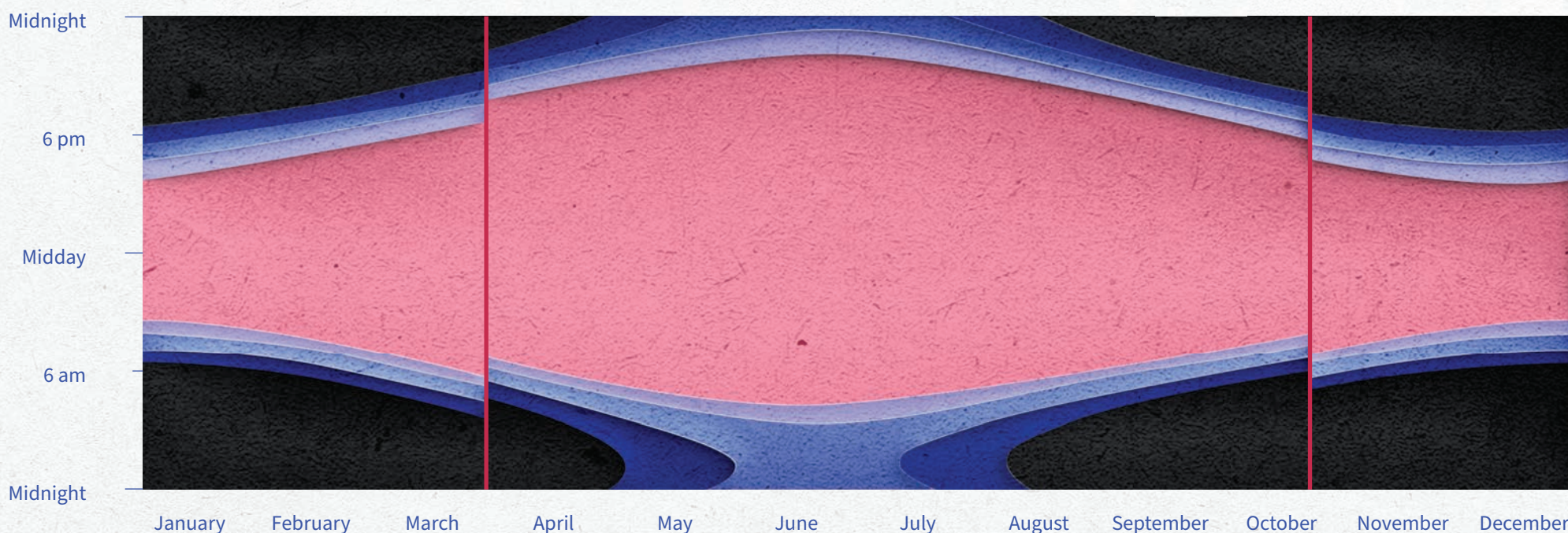


# DARK SKY GRAPH

To make sure you see everything when stargazing, it is best to look when the night sky is in full darkness. This graph tells you roughly when the sky above Scotland is at its darkest. Just look for the month at the bottom and you will see the times up the left side of the graph.



## Scotland



- Daylight**  
 The first appearance of light in the morning.
- Civil Twilight**  
 During civil twilight, the sky is still quite bright and only the very brightest stars and satellites can be seen.
- Nautical Twilight**  
 Both the horizon and the brighter stars are usually visible at this time, making it possible to navigate at sea.
- Astronomical Twilight**  
 It is the darkest of the 3 twilight phases. It is the earliest stage of dawn in the morning and the last stage of dusk in the evening.
- Full Darkness**  
 This is when you will see the most stars and planets.
- Daylight Saving Time**



# STARGAZING BINGO

There are a lot more things to look out for when you're out stargazing at night in Scotland. See if you can spot some of the objects below. Some may be harder than others. But if you do manage to get them all, then congratulations, you are a very lucky stargazer!

**Northern Lights**



**Moon**



**Astronaut**



**Wisp**



**UFO**



**Constellation**



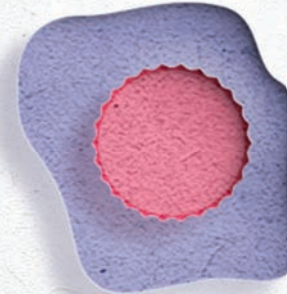
**Meteor**



**Rocket**



**Sun**



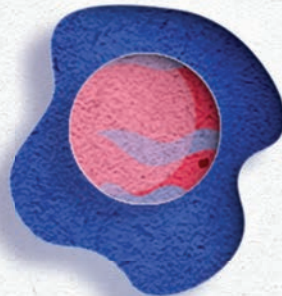
**Owl**



**Alien**



**Mars**



**Galaxy**



**Fox**



**Jupiter**



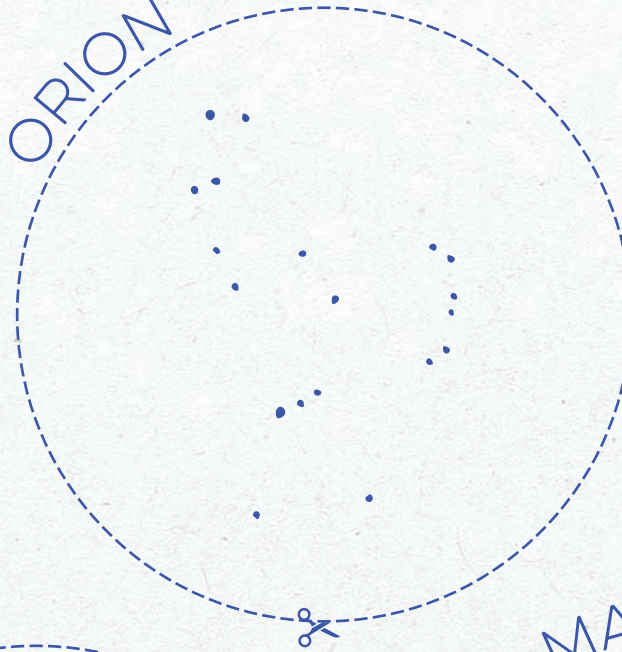


# MAKE YOUR OWN DARK SKY

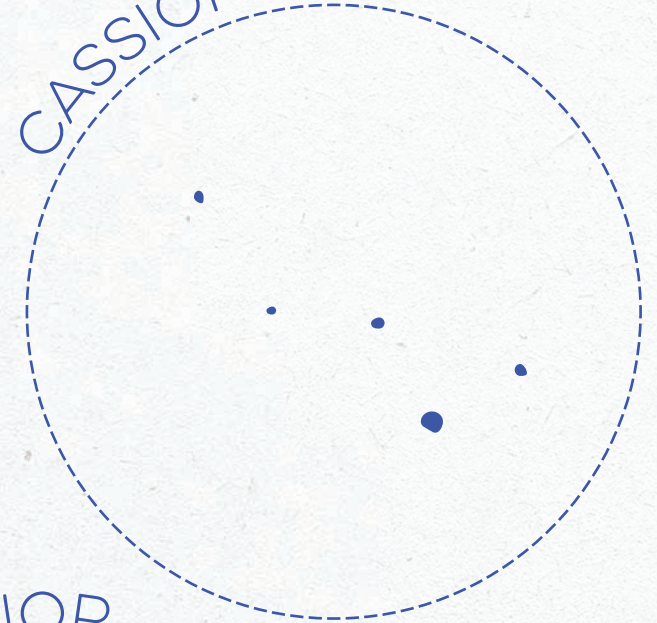
Here's an ideal way to go stargazing for some constellations without stepping out of your home!

- 1** Cut out the circles.
- 2** Glue the blank side of the circle to tin foil and trim.
- 3** Get an adult to help use a drawing pin or a sharp pencil to poke a hole where the dots are.
- 4** Now find a blank wall or a ceiling and point your torch at the paper side to see the projection of the constellations.

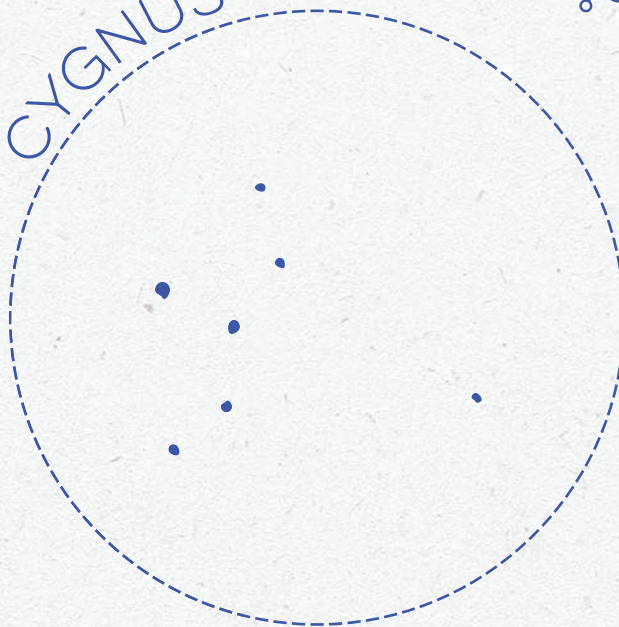
ORION



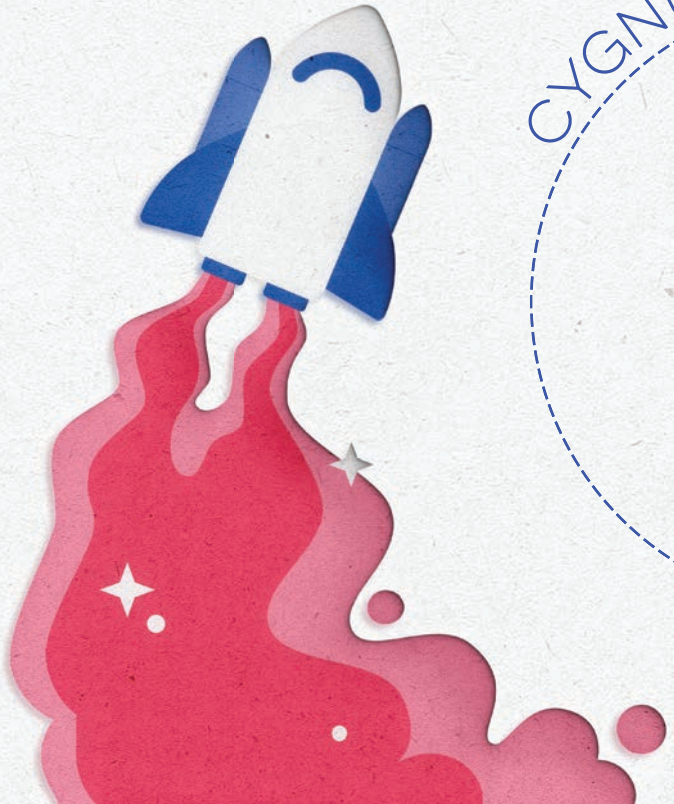
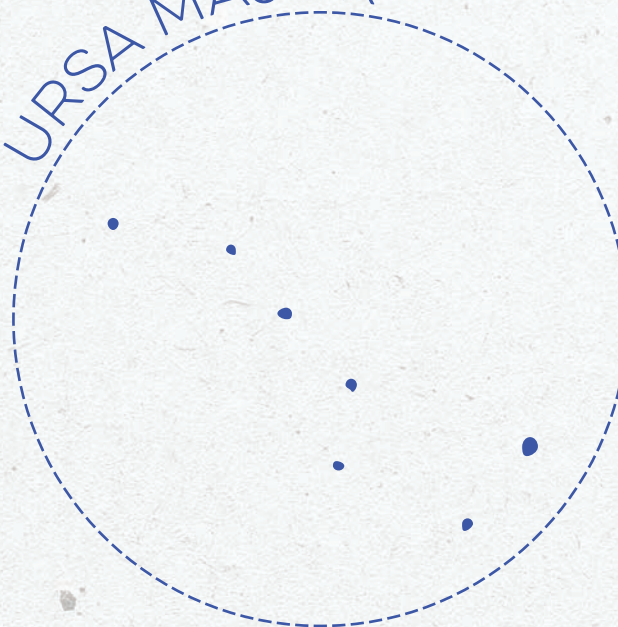
CASSIOPEIA



CYGNUS

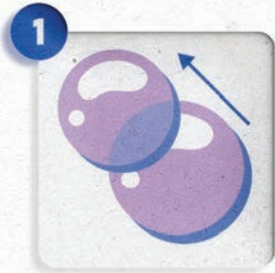


URSA MAJOR

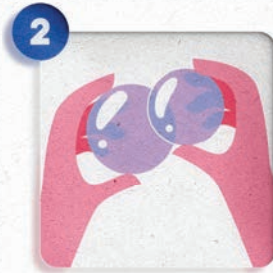




# MAKE YOUR OWN TELESCOPE



1 Gather all your materials. Make sure your magnifying glasses are different sizes. If they are the same size, the telescope won't work.



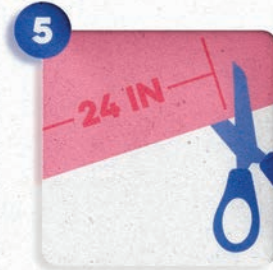
2 Hold one magnifying glass (the bigger one) between you and the paper. Place the second magnifying glass between your eye and the first magnifying glass. Move the second glass forward or backward until the print comes into sharp focus.



3 Wrap the paper around one of the magnifying glasses. Mark the diameter on the paper with the pencil. Make sure that it is pulled tight.



4 Measure along the edge of the paper from the first mark. You will need to measure about 1.5 inches from the mark. This will create the extra length to glue around the magnifying glass.



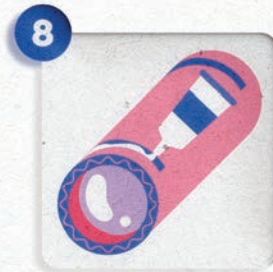
5 Cut down the marked line on the paper to the other side. You should be cutting across the width of it. The paper should be about 24 inches in length on one side.



6 Cut a slot in the cardboard tube near the front opening an inch away. Do not cut all the way through the tube. The slot should be able to hold the large magnifying glass. Cut a second slot in the tube the same distance from the first slot as was written down between the two glasses.



7 Place the two magnifying glasses in their slots (big one at front, little one at back) and tape them in with the duct tape. Leave about 0.5 - 1 inch of tube behind the small magnifying glass and cut off any excess tube remaining.



8 Glue first length of paper around one of the magnifying glasses. You'll need to glue the edges of the paper together as well.



9 Make the second magnifying glass tube. This one will need to be slightly bigger than the first one. Not too much bigger, only so that the first will fit into the second one.



10 Slot the 1st tube into the 2nd. Try observing the moon with your new telescope.

**You will need**  
**Corrugated paper**  
**Two magnifying glasses**  
**Strong glue**  
**Scissors**  
**Pencil**





# MAKE YOUR OWN PLANISPHERE

## Part A

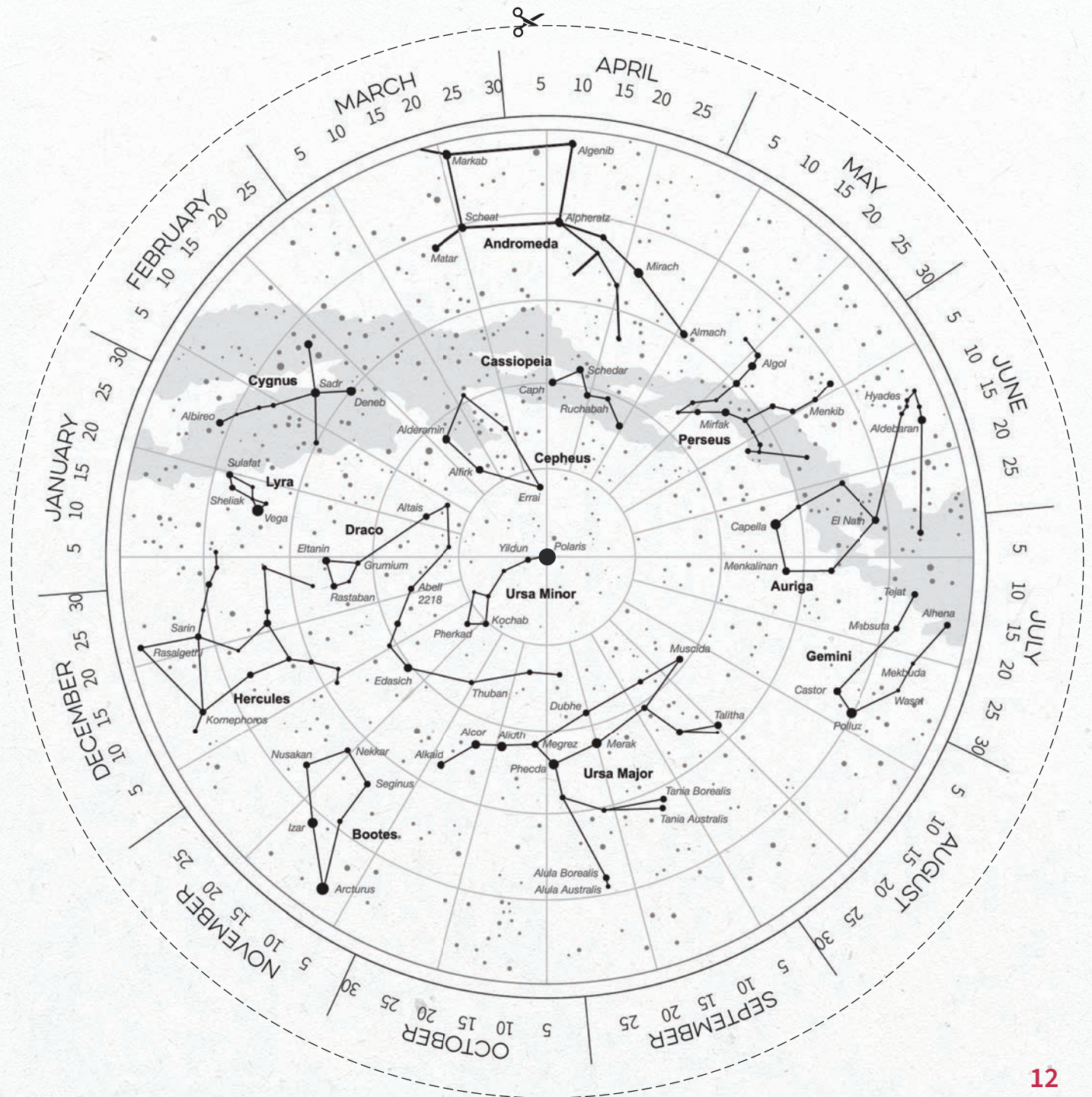
A planisphere is a really simple piece of equipment that can really help you when out stargazing in Scotland.

You can use it to find the stars and constellations in the sky at particular times of the year.

Before we learn how to use it, we first have to make it.

1

Cut out the circle and stick it onto some card.

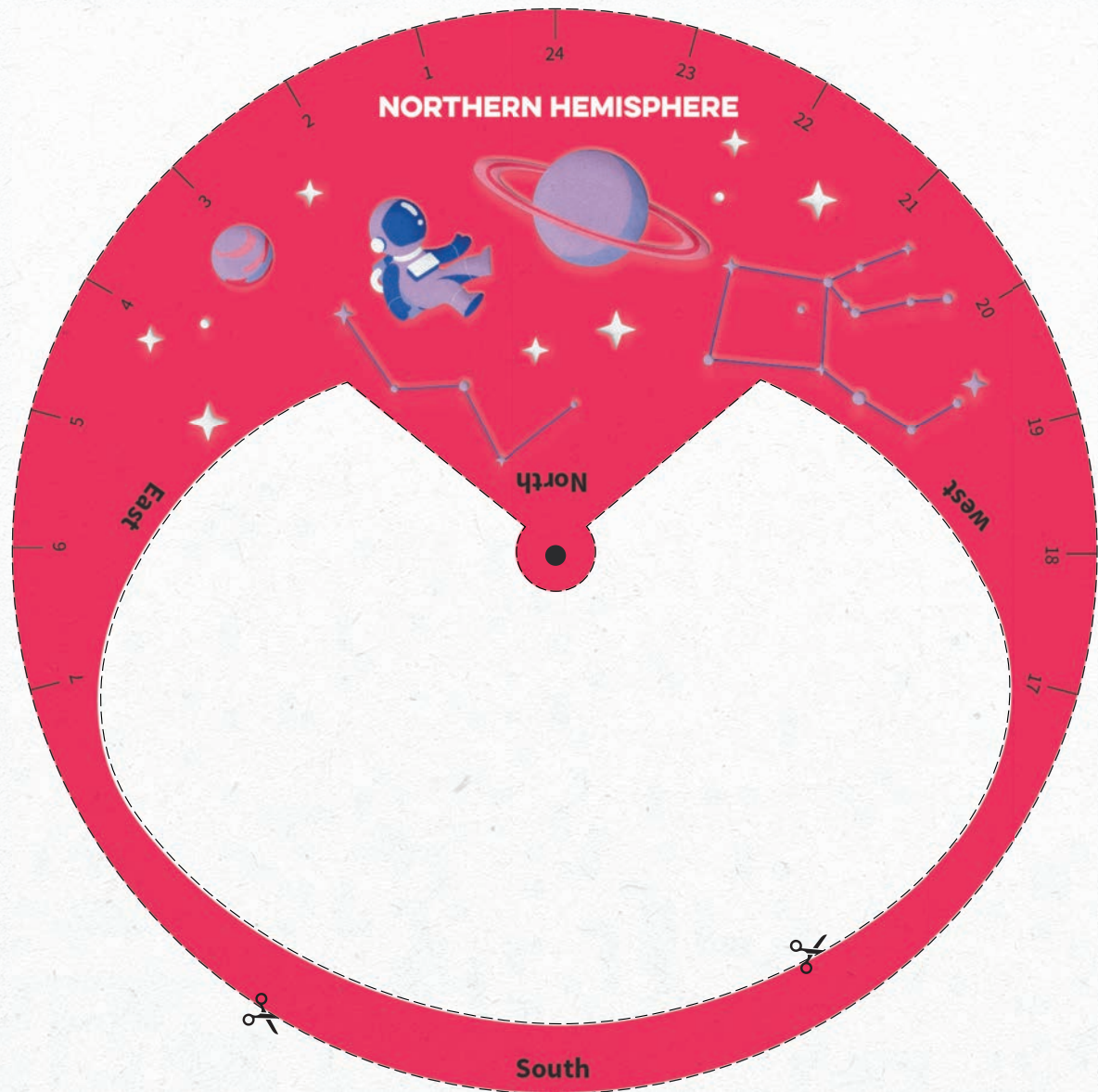
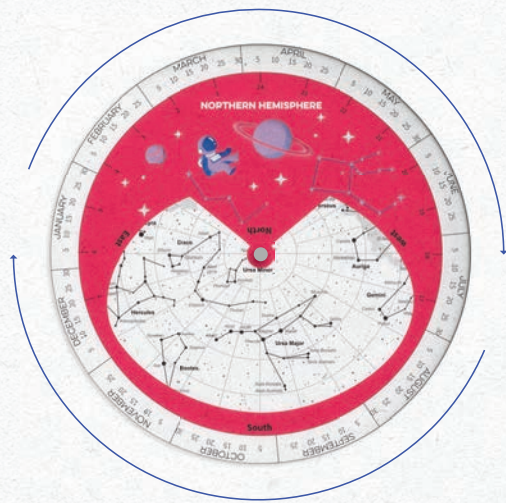




# MAKE YOUR OWN PLANISPHERE

## Part B

- 2 Now do the same for this shape as well, making sure to cut out the white shape inside.
- 3 Once you have both pieces onto card, carefully (with the help of an adult) make a hole in the center of both pieces where there is a dot.
- 4 Put part B on top of A, then carefully insert a spilt pin to fasten them together.
- 5 You should still be able to freely rotate both pieces 360 degrees.





# FAMILY STARGAZING QUIZ

You've learned a lot about stars, but let's see how bright you are. See if you can answer as many of the following questions correctly. If you get stuck, you'll find the answers somewhere in this pack or in the Stargazing in Scotland videos at [www.youtube.com/visitscotland](http://www.youtube.com/visitscotland).



## Questions

1. **In which constellation can you find the Plough?**
  - A. The Great Bear
  - B. The Grated Pear
  - C. The Great Grannie
2. **The best light to use while stargazing is the colour:**
  - A. Green
  - B. Blue
  - C. Red
3. **If you're going out stargazing in Scotland, be sure to:**
  - A. Check the weather
  - B. Check for tigers
  - C. Check your pockets
4. **The constellation of Orion The Hunter is said to wear what?**
  - A. A kilt
  - B. A belt
  - C. A beret
5. **Our Sun isn't a planet, it's a:**
  - A. Moon
  - B. Star
  - C. Constellation
6. **One of the best places to see the Northern Lights is:**
  - A. Glasgow
  - B. Orkney
  - C. The Moon
7. **Light pollution is caused by:**
  - A. Birds
  - B. Streetlights
  - C. Clouds
8. **Your eyes will begin to adjust to the darkness in:**
  - A. 30 seconds
  - B. About an hour
  - C. Several hours
9. **The patterns of stars called constellations are usually named after:**
  - A. Pets
  - B. Movie stars
  - C. Mythological characters
10. **The author Douglas Adams once famously said, "Space is big..."**
  - A. "but not THAT big."
  - B. "REALLY big."
  - C. "as big as Loch Ness."
11. **Which is wrong? A planisphere helps you...**
  - A. Know which stars can be seen and when
  - B. Pick out constellations
  - C. Communicate with extra terrestrials
12. **If you don't have a telescope, you can also use...**
  - A. A toilet roll tube
  - B. A rolled up newspaper
  - C. A pair of binoculars
13. **A building with a large telescope inside it is known as:**
  - A. A telescope palace
  - B. An observatory
  - C. A lookhouse
14. **When it comes to stargazing, Scotland is one of the best places in...**
  - A. The world
  - B. Europe
  - C. The galaxy
15. **The nearest neighbouring galaxy Andromeda is:**
  - A. Made of chocolate
  - B. Exactly like Scotland
  - C. 2.5 million light years away





# FAMILY STARGAZING QUIZ ANSWER SHEET



**15** CORRECT ANSWERS  
You are a future star!



**10** CORRECT ANSWERS  
That's pretty cosmic!



**5** CORRECT ANSWERS  
Not bad, Earthling.

**0** CORRECT ANSWERS  
Houston, we may have a problem.



1. In which constellation can you find the Plough?

*Answer* A. The Great Bear

2. The best light to use while stargazing is the colour:

*Answer* C. Red

3. If you're going out stargazing in Scotland, be sure to:

*Answer* A. Check the weather

4. The constellation of Orion The Hunter is said to wear what?

*Answer* B. A belt

5. Our Sun isn't a planet, it's a:

*Answer* B. Star

6. One of the best places to see the Northern Lights is:

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7. Light pollution is caused by:

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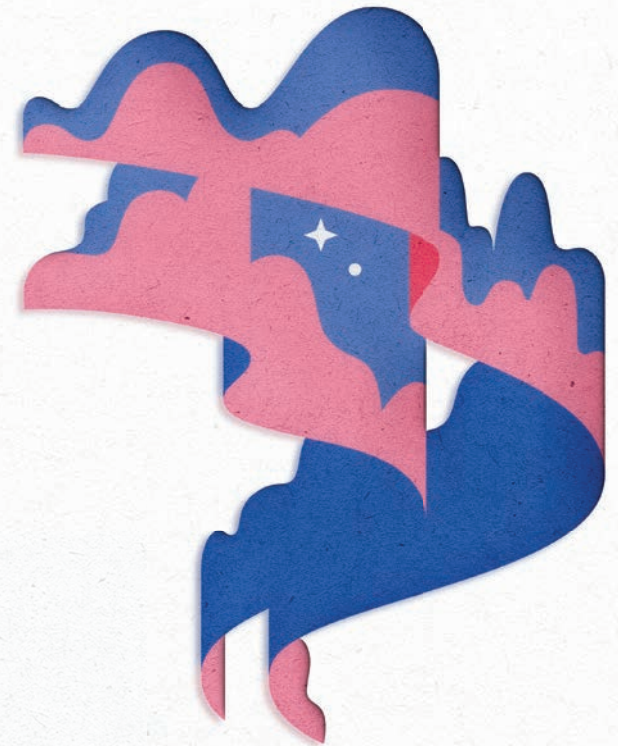
*Answer* C. Several hours

9. The patterns of stars called constellations are usually named after:

*Answer* C. Mythological characters

10. The author Douglas Adams once famously said, *Space is big...*

*Answer* B. "REALLY big."



11. Which is wrong? A planisphere helps you

*Answer* C. Communicate with extra terrestrials

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13. A building with a large telescope inside it is known as

*Answer* B. An observatory

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*Answer* C. 2.5 million light years away





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