AN EDUCATION RESOURCE FOR 5 TO 7 YEAR OLDS

HANDS ON UNIVERSE

Science and Technology Facilities Council

THIS PACK BELONGS TO:

HANDS ON UNIVERSE

Science and Technology Facilities Council

HELLO AND WELCOME TO HANDS ON UNIVERSE, A RESOURCE THAT HAS BEEN DESIGNED FOR USE WITH PUPILS AGED 5-7 YEARS BUT YOU MAY ALSO FIND IT HELPFUL FOR EARLY YEARS AND FOUNDATION STAGE STUDENTS TOO. IF YOU WOULD LIKE TO KNOW HOW YOU CAN USE THIS RESOURCE IN YOUR CLASSROOM THEN TAKE A LOOK AT OUR HINTS AND TIPS BELOW.

WHAT IS THIS RESOURCE MADE UP OF?

Five separate sections have been created with each section then further split into two parts; a 'Discover' section and an 'Explore' section. The 'Discover' sections consist of background knowledge and the 'Explore' sections contain activities for students to try out in the classroom.

The six sections are:

1. **The Night Sky**
2. **Dark and Light**
3. **The Moon**
4. **The Solar System**
5. **Galaxies**
6. **Exploring further**

I AM NOT AN EXPERT IN ASTRONOMY, IS THIS PACK FOR ME?

Absolutely! We are not expecting you to be an expert at all. This pack just provides the framework for you and your students to find out more about the science curriculum in a real world setting using astronomy as a context and to learn about astronomy and space science together.

WILL I NEED LOTS OF EQUIPMENT FOR THIS RESOURCE?

No. We know how difficult it is to source equipment for a class full of students so everything that we have suggested uses things you should already have in your classrooms or can access digitally for free.

DOES THIS DIRECTLY LINK TO THE NATIONAL CURRICULUM?

Yes, each section has links to the curriculum. The focus of the resource is on science within a real world astronomy context so therefore links to aspects of the EYFS and KS1 science curriculum. However, the resource also covers cross-curriculum topics such as English, Maths and computing.

HOW IS IT BEST TO USE THE PACK?

That is completely up to you. If you want to brush up on your knowledge then you can use the 'Discover' sections just for you and use the 'Activity' sections to set tasks for the students. Alternatively you can give your students a whole section to work through independently, so that they may develop their scientific skills.

WHERE CAN I GET INFORMATION TO FURTHER MY KNOWLEDGE ON ASTRONOMY?

The Royal Observatory Greenwich astronomers release a monthly podcast called 'Look Up' where you can find out about the latest news in astronomy and space exploration and also if there is anything special coming up in the next month. There is also a 'Spacebook' blog where particular things of interest will be covered in more detail. If you are looking for more direct support then why not join the teacher forum at the Royal Observatory Greenwich. Here the astronomy team can help you develop your knowledge and support you to translate that back into your classroom teaching.

WHAT CAN I USE AS A FOLLOW ON FROM THIS ACTIVITY?

If you are looking for even more resources including classroom activities, videos, podcasts and vodcasts then check out the the Royal Observatory and National Space Centre schools websites. You can also find information here about how to come and visit – an excellent follow up to this resource.

IS THERE A WAY TO SHOW STFC THE WORK THAT IS PRODUCED AS PART OF THIS RESOURCE?

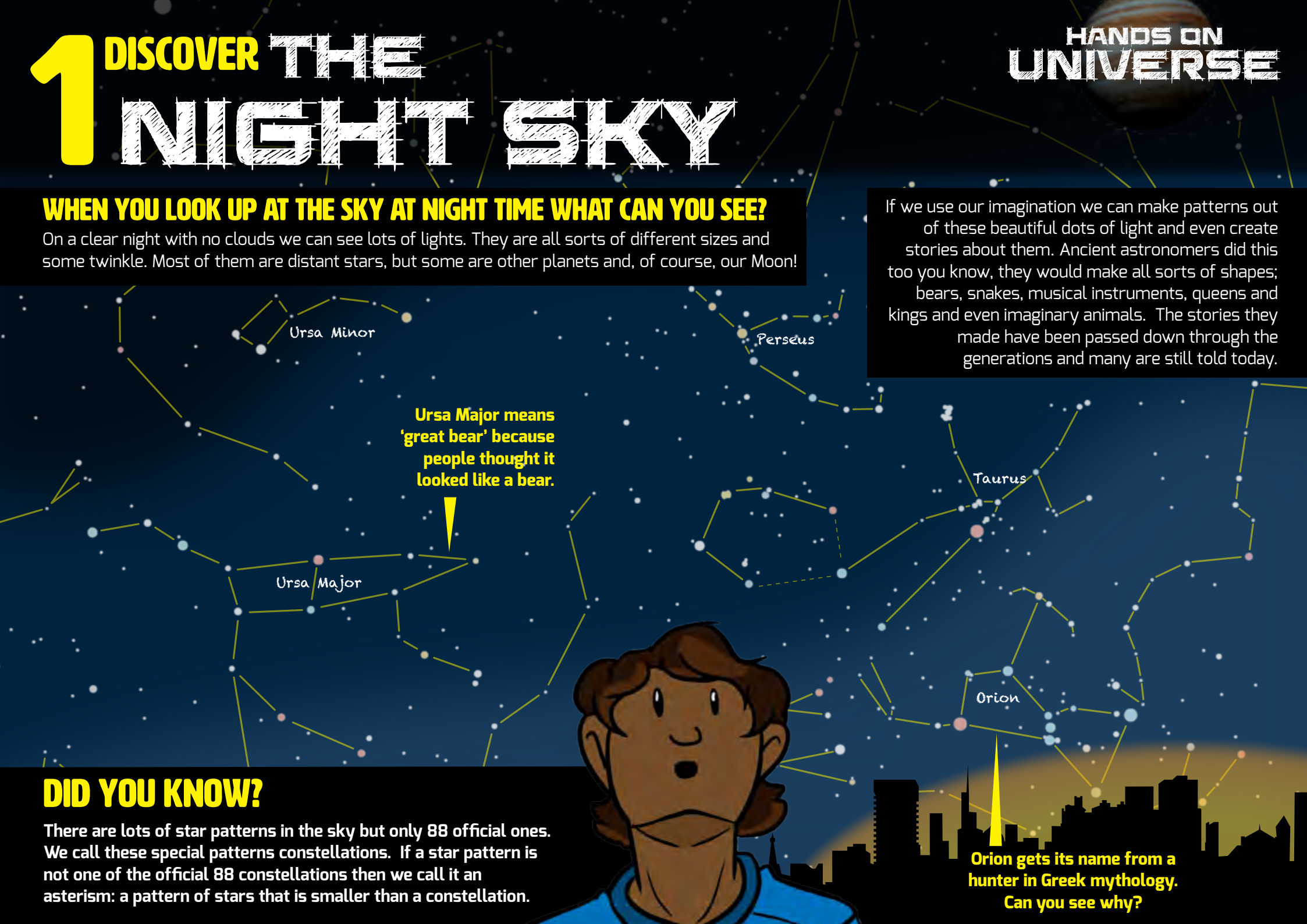
Yes please do, we would love to see it. You can do this by using the social media tag #STFC_HOU or emailing us on STFCPublicEngagementTeam@stfc.ac.uk

1 DISCOVER THE NIGHT SKY

WHEN YOU LOOK UP AT THE SKY AT NIGHT TIME WHAT CAN YOU SEE?

On a clear night with no clouds we can see lots of lights. They are all sorts of different sizes and some twinkle. Most of them are distant stars, but some are other planets and, of course, our Moon!

If we use our imagination we can make patterns out of these beautiful dots of light and even create stories about them. Ancient astronomers did this too you know, they would make all sorts of shapes; bears, snakes, musical instruments, queens and kings and even imaginary animals. The stories they made have been passed down through the generations and many are still told today.



DID YOU KNOW?

There are lots of star patterns in the sky but only 88 official ones. We call these special patterns constellations. If a star pattern is not one of the official 88 constellations then we call it an asterism: a pattern of stars that is smaller than a constellation.

1.1 DISCOVER THE NIGHT SKY

FINDING OUR WAY

It might sound strange but the stars can also help us find out where on Earth we are, we can use them a little like a tour-guide. Some of the constellations in the night sky above us will change throughout the year when we move from Summer to Autumn to Winter then to Spring.

There are also some constellations that we will always see no matter what time of year it is. For us in the UK, there is one star in particular that is super helpful if we want to work out where we are – the North Star. If you know where that is then all you have to do is follow it down to the nearest horizon and that will always tell you where north is – pretty nifty eh?

We cannot always see the stars as clearly as we would like to in the night sky. Clouds or light from towns and cities that can cause light pollution can make it tricky for us stargazers.

DID YOU KNOW?

The name of the North Star is actually Polaris.

LOOK UP!

When the weather is good you can stargaze from absolutely anywhere: on holiday, at school, from your garden, with your science club and even on the way home from school. If you live in the countryside the sky will be nice and dark so it is easy to see things in the sky. If you are in the city like the astronomers here at the Royal Observatory Greenwich don't panic; they stargaze from the middle of London all the time and still see lots of amazing sights. All you have to do is look up.

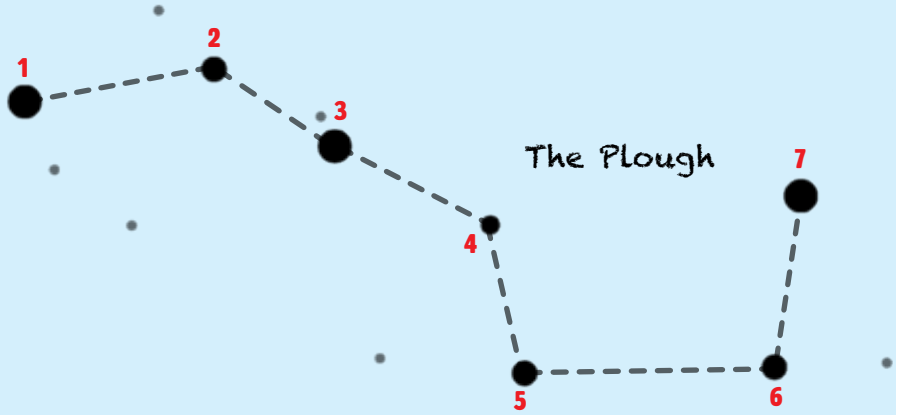
ACTIVITY 1A TEACHER SHEET STARGAZING

WHAT IS IT ALL ABOUT?

This activity comes with separate teacher and student worksheets and will get your children started on their stargazing journey. In the first section students will be joining the dots from 1 to 7 to reveal the star pattern of The Plough. They will then go on to find out how this star pattern is a small part of a larger constellation, Ursa Major.

1. FINDING THE PLOUGH

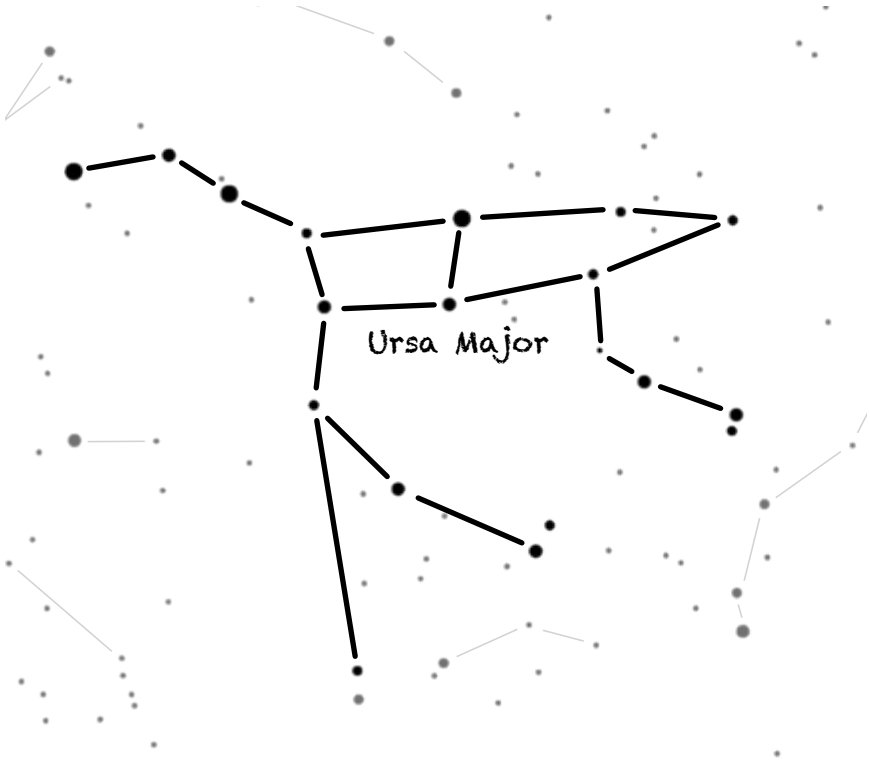
Before you get cracking explain to the children that they are going to go on a mission to discover The Plough. The Plough is a star pattern and actually has many different names depending on where in the world you live. In the UK we call it The Plough but elsewhere around the world it is referred to as The Kite, The Chariot or The Big Dipper depending on what people have thought it has looked like.



2. FINDING URSA MAJOR

Next up, explain that The Plough is a small part of one of the most famous constellations Ursa Major which we will find out more about very soon. Ask the students to look at the picture below and using their imaginations tell you what they think it looks like.

You may want to give them hints to start their imagination whirling. Does it look like a person or any animals they may have seen? How about something they may have in their homes or at school?



THE GREAT BEAR

At the end of the activity when they have all guessed what it is tell them that this is the constellation of Ursa Major which actually means Great Bear.

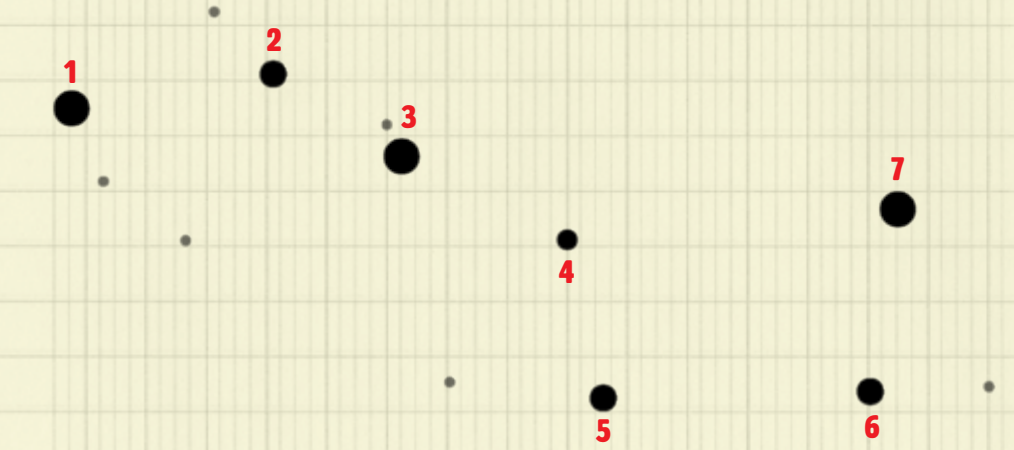
It doesn't look much like the bear we might have seen though because it has a very long tail for a start! One of the stories from Greek mythology says that this is because the Great Bear was thrown into the sky by the God Zeus and it stretched her tail – ouch, poor bear.

ACTIVITY 1A YOUNG ASTRONOMER STARGAZING

Now it is time for you to work like an astronomer – off we go!

1 FINDING THE PLOUGH

You are going to go on a mission to discover a star pattern called **The Plough**! Join the dots from 1 to 7 to reveal the pattern!



Why do you think it's called The Plough?
What else does it look like?

2 FINDING URSA MAJOR

The Plough is a small part of one of a famous constellation called **Ursa Major**. Ursa Major has another name though. Can you guess what it is? Look at the picture below. What do you think it looks like?

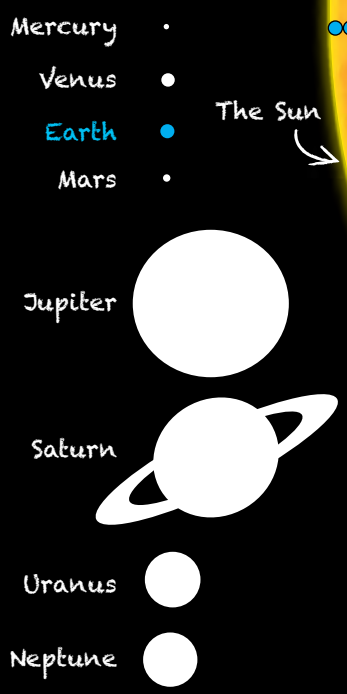
I think this looks like _____

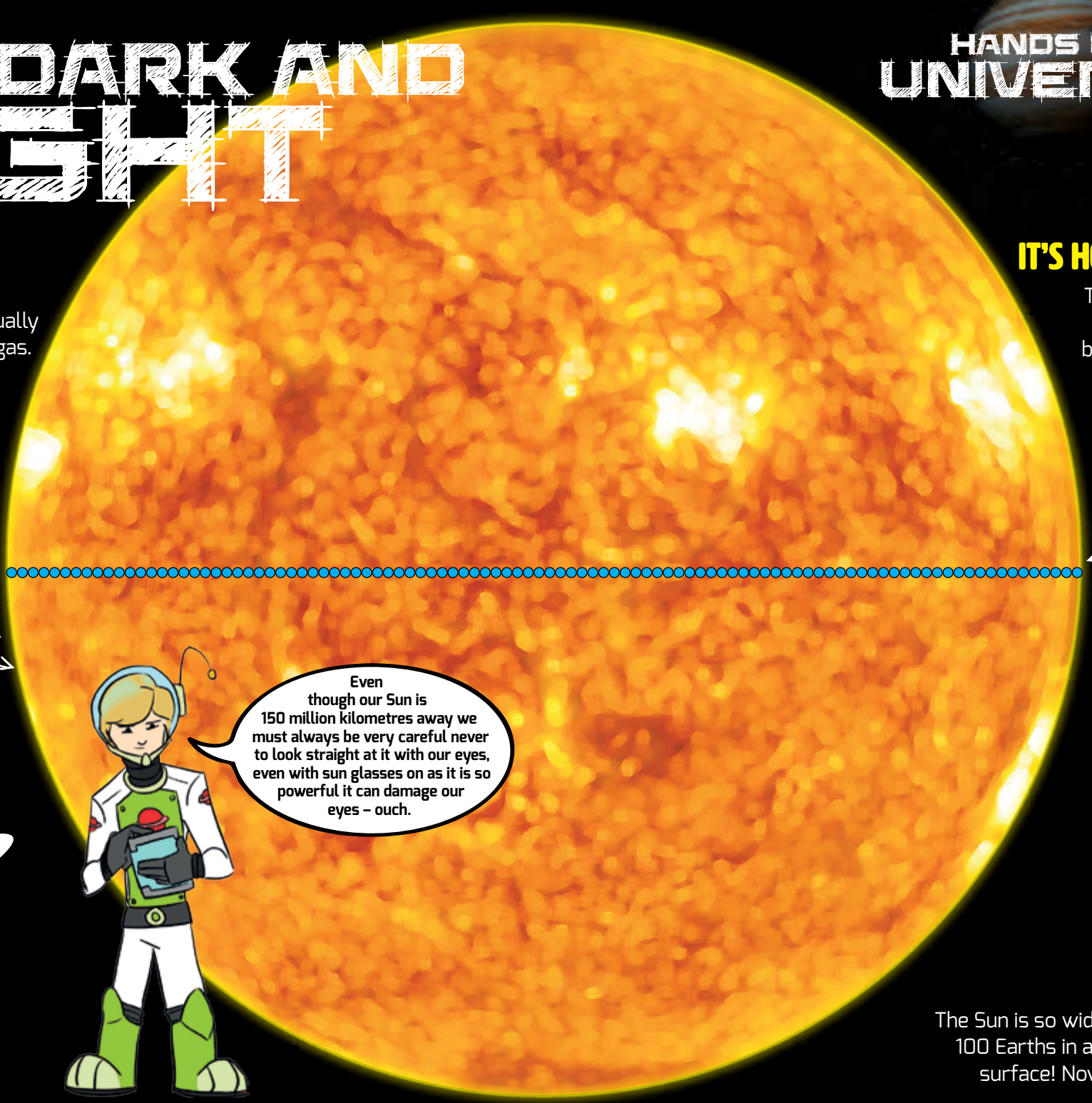
2 DISCOVER DARK AND LIGHT

WHAT IS THE SUN?

It looks like a huge fireball burning bright in the sky doesn't it but actually it is a star, a ball of scorching hot gas.

The Sun really is huge! This shows just how much bigger the Sun is compared to the planets. Look how small the Earth appears!





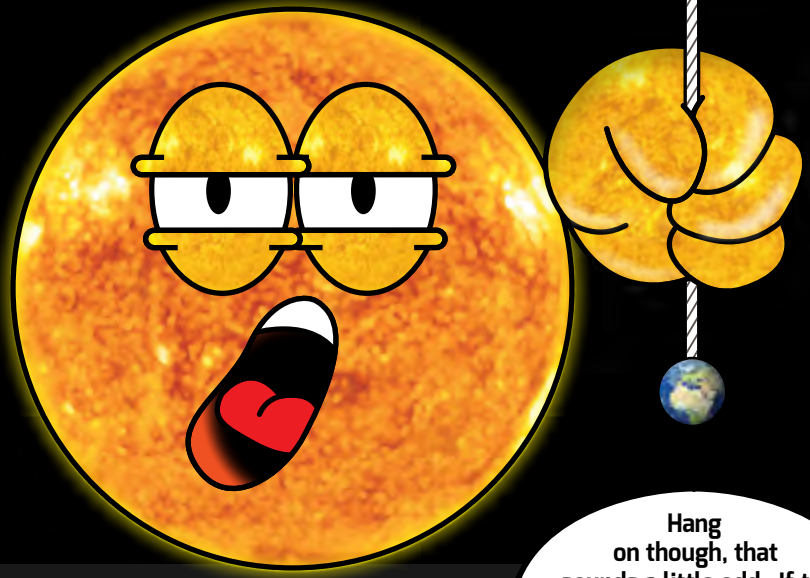
IT'S HOW WIDE?

The Sun is very wide indeed, but how wide is it? Can you count how many Earths would fit across the Sun's width?

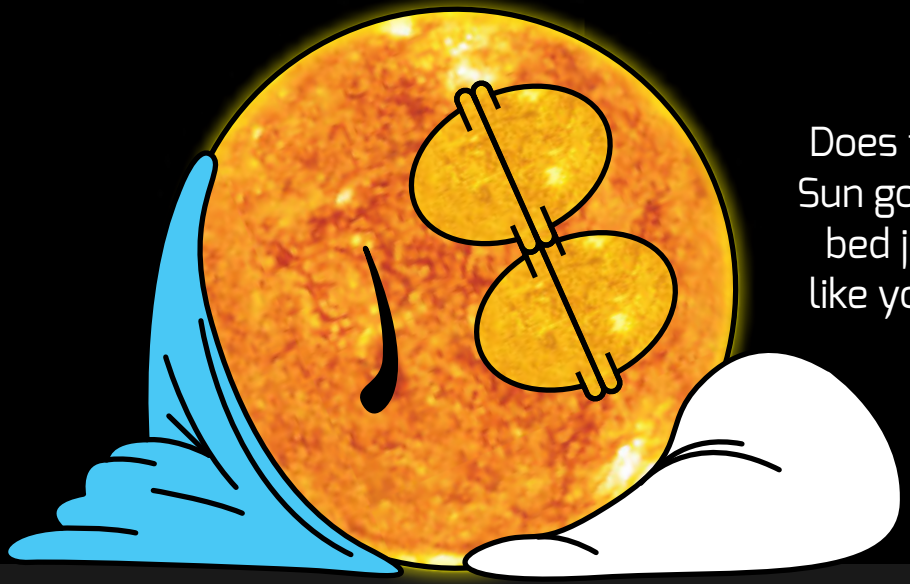
The Sun is so wide you could fit 100 Earths in a line across its surface! Now that's HUGE!

2.1 DISCOVER DARK AND LIGHT

WHY DOES IT GET DARK AT NIGHT?



Does the Sun switch itself off at night like a lightbulb?

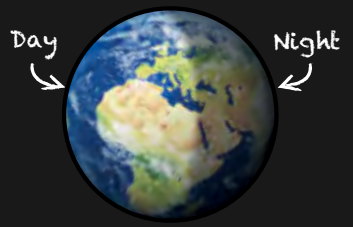


Does the Sun go to bed just like you?

The reason we get night and day is all to do with where we are facing. Our Sun never stops shining because it has plenty of energy to shine bright no matter what time of day it is. Imagine having so much energy you never needed to go to sleep – wow, imagine all the extra things you could get done!

First things first, we need to understand that our planet Earth is spinning around, it never stops in fact. It makes one full spin every 24 hours, one day. Our day is made up of day time and night time.

During the day the side of Earth we live on will be facing the Sun and we are bathed in lovely sunshine.



During the night the side of the Earth we live on will have spun around and be facing away from the Sun. As we are facing away no light shines on our part of the world which means it stays dark and is night time. Easy peasy!

ACTIVITY 2A

WHAT HAPPENS TO THE STARS DURING THE DAY?

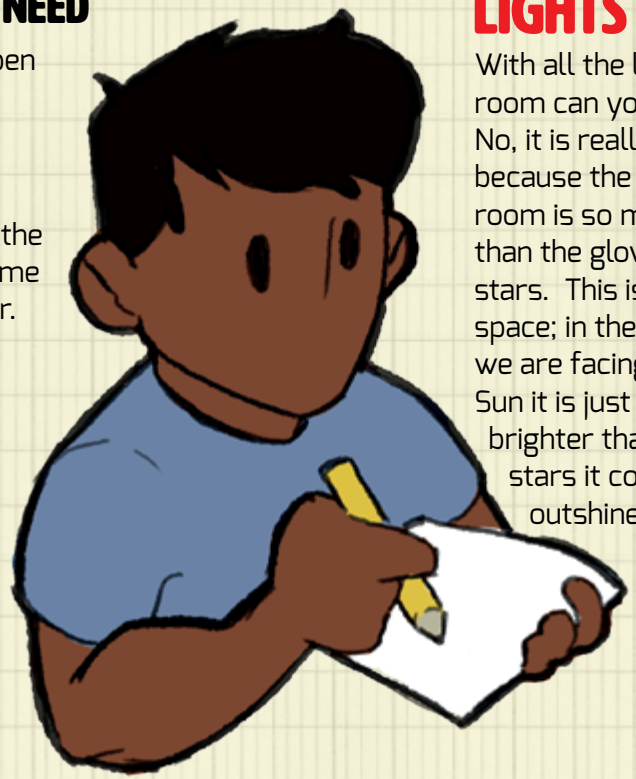
Just like the Sun doesn't go anywhere at night, the stars don't go anywhere in the daytime, we just can't see them. Let's do an experiment to understand why.

WHAT YOU'LL NEED

Glow in the dark pen
Paper

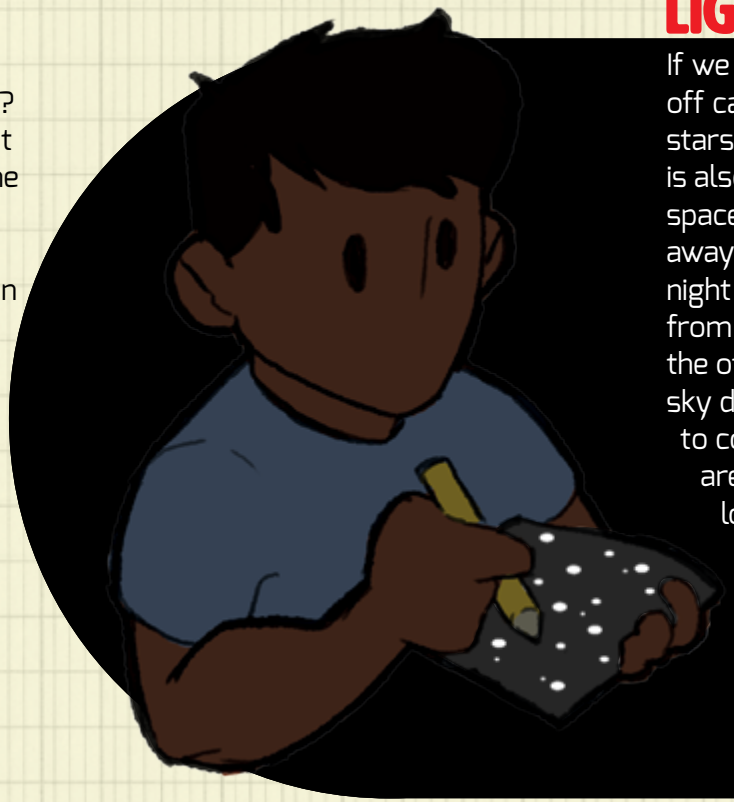
WHAT TO DO

Using the glow in the dark pen draw some stars on the paper.



LIGHTS ON

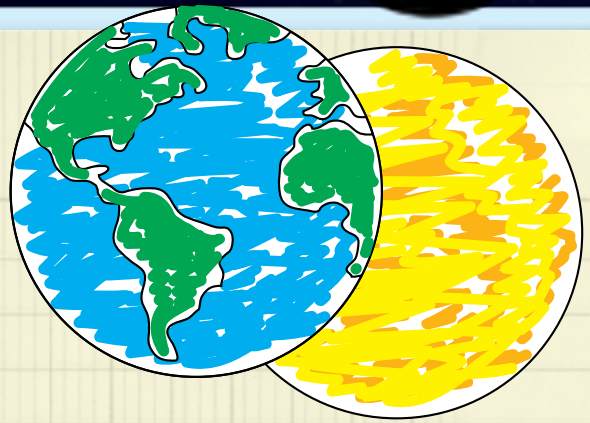
With all the lights on in the room can you see the stars? No, it is really difficult isn't it because the other light in the room is so much brighter than the glow in the dark stars. This is what it is like in space; in the daytime when we are facing towards our Sun it is just so much brighter than any other stars it completely outshines them.



LIGHTS OFF

If we switch the lights off can you see the stars? Yes! Great, this is also the same in space. When we turn away from the Sun at night we are facing away from all the sunshine so the other stars in the sky don't have as much to compete with so we are able to get a good look at them.

ACTIVITY 2B OUR SUPER SUN AND EARTH



Let's try to understand night and day a little better shall we? To do this we will need two volunteers – one will play the role of the Sun and the other will play the role of the Earth... and, just for fun, let's make them SUPER!

WHAT YOU'LL NEED

A powerful torch.

A printout, or photocopy of the Super Earth and Super Sun masks.

Scissors to cut out the masks (ask your teacher for help).

Colouring pencils.

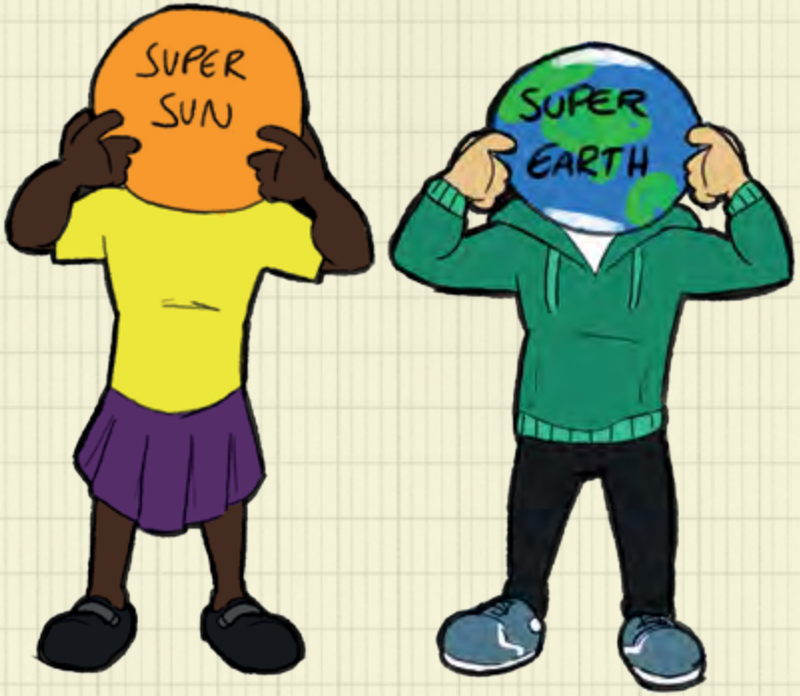
WHAT TO DO

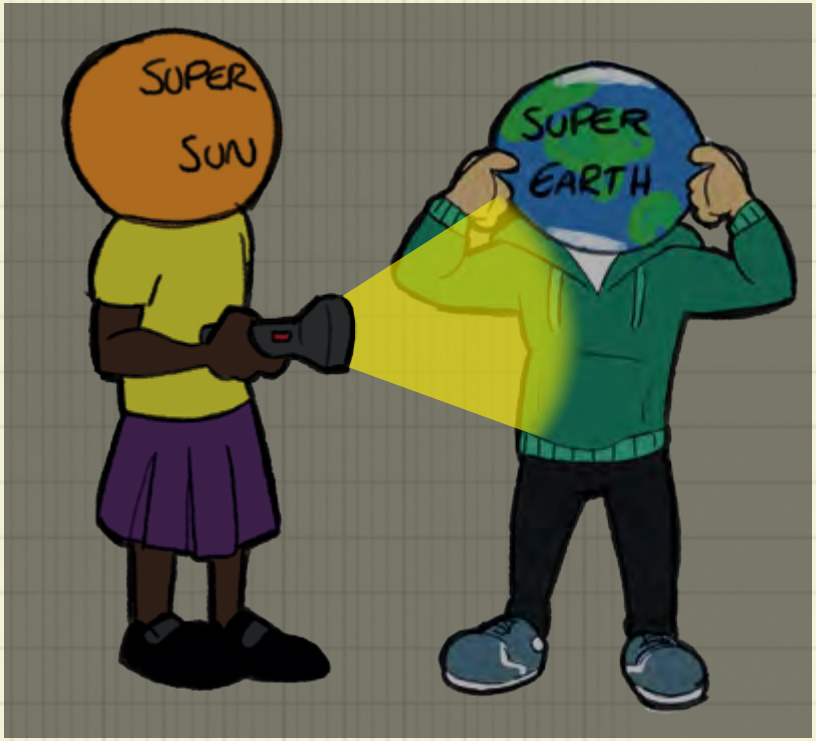
Use the colouring pencils to colour in the Super Earth and Super Sun masks and then carefully cut them out.

One of you will play the Super Earth and one of you will play the Super Sun.

Listen to your teacher and follow the instructions.

HAVE FUN!





DID YOU KNOW?

The term Super-Earth is actually real and refers to a planet with a higher mass than our Earth. We don't get Super Suns as such but rather supergiant stars which are stars much more massive than our Sun. Of course for the purposes of this activity when we say 'super' we mean more along the hero and heroine lines instead.

ACTIVITY 2B TEACHER SHEET OUR SUPER SUN AND EARTH

Things get altogether a little dramatic with this activity. Here you will find a short guide script to use so you can lead your students on their very own journey of discovery. This really is just a guide script though, you can use it as it is, split it up or completely add your own - whatever works for you!

WHAT IS IT ALL ABOUT?

The aim of this immersive activity is to allow the students to work scientifically by asking questions, making observations, performing tests and then using the results of their tests to suggest answers to their questions.

WHAT YOU WILL NEED

Two volunteers; one to be the Super Sun and one to be the Super Earth.

A powerful torch.

Printed versions of the two masks with Super Earth and Super Sun on. These have been designed so you can print them in black and white and the students can colour them in however they like.

SUPER SCRIPT!

Below you will find the suggested script in bold with some hints and tips italicised.

Let's get started!

Our Sun and Earth are pretty amazing you know, super some might say. Let's take a look at our Super Sun and Super Earth shall we. I need someone to be my Super Sun and someone else to be my Super Earth.

The person who is the Sun needs to be just like our special star so needs to be energetic and very bright. The person who is the Earth need to be just like our special planet and needs to be very good at spinning and able to do lots of things at once. *Ask each student to come to the front of class with their coloured in Super Sun and Earth masks on.*

Ok then Super Sun and Super Earth, are you ready to get cracking? I want to understand night and day a little better so I am hoping our super Sun and Earth here can help us out! Can you stand facing each other please and Super Sun could you shine the torch towards Super Earth but be careful not to shine it in their eyes please.

We are going to see what happens when we get day and night. First of all we need to get to know our Super Sun and Earth a little better. The Super Sun is going to stay pretty much where they are, they might jiggle around a little because they have so much super powered energy but they won't wander through space. So Sun what I need you to do is have a little jiggle to get rid of some super powered energy around but keep your feet just where they are.

Now for the Super Earth, let's have a look at what you will be up to. Our Super Earth is a very busy planet and moves around in space, let's look at how it moves in one day. If we looked down on you from above we would see that you turn around anticlockwise. So in one day you will spin around a whole turn once heading in an anticlockwise direction. Can you show us how please Super Earth? *You will need to help them to do this as they may not know what direction.*

Great. You also move around the Sun but as we are only looking at one day we won't worry about that today. So we know how you move in a day but how does that give us night and day? Super Earth, Super Sun is shining light on you at the moment when you are facing each other. If we can see lots of light and sunshine would it be day time or night time? Day time yes!

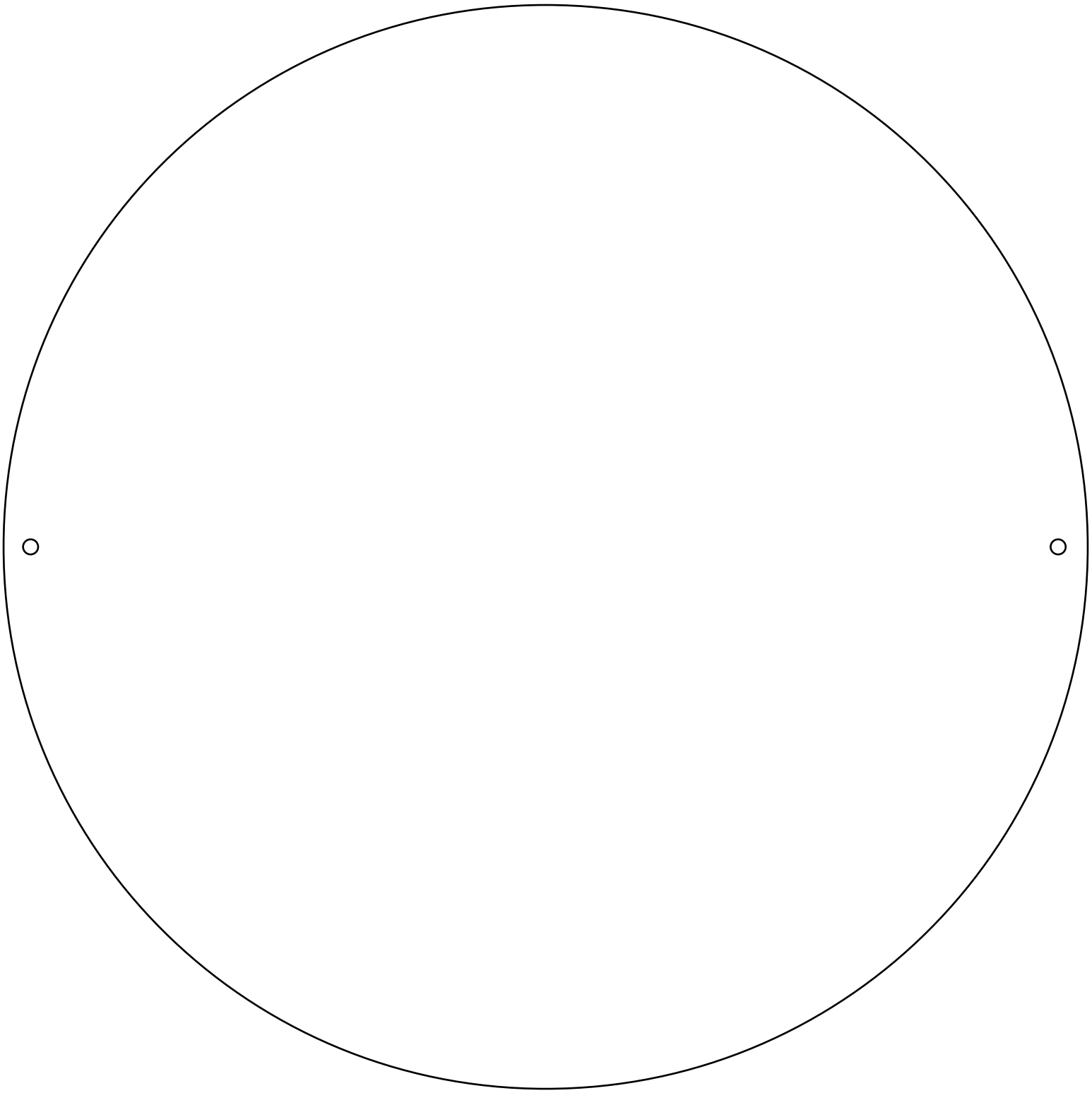
Can you now spin for us, just half the way around though please. *They need to have their back to the Sun now.* **Super Earth can you see lots of sunshine and light from the Sun? No? Ok, so if there is no sunshine it must be dark, if it is dark do you think it is day time or night time? Night time yes! I think we might have cracked it then - so when we face the Super Sun it is daytime and when we face away it is night time! Easy-peasey right?**

SUPER!

SUPER EARTH MASK

Use the worksheet supplied (or you can photocopy this one if you run out).
Colour it in and cut it out (carefully)!

SUPER SUN MASK



Use the worksheet supplied (or you can photocopy this one if you run out).
Colour it in and cut it out (carefully)!

3 DISCOVER THE MOON

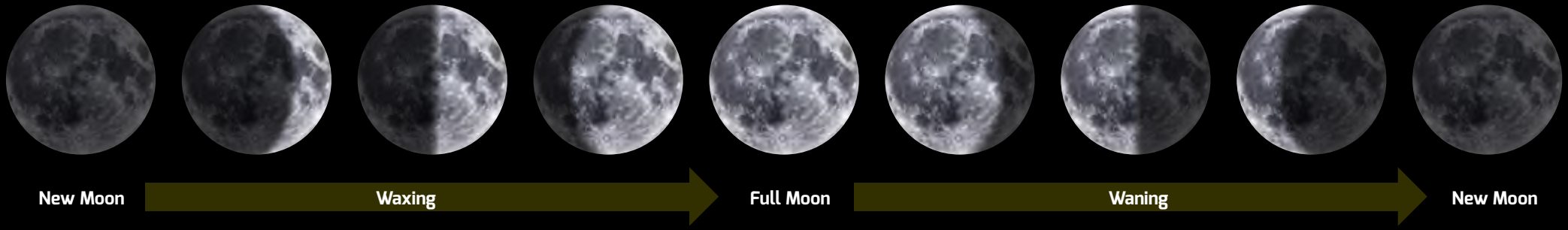
Our closest neighbour is the Moon and what a neighbour it is to have.

It looks as though it is a great big light bulb in the night sky sometimes when it shines so brightly. The Moon is actually a rocky ball and does not shine by itself – it reflects light from the Sun towards the Earth.

DID YOU KNOW?

The boundary between the bright and dark parts of the Moon is called the terminator. If you were on the surface of the Moon in the bright section it would be daytime for you, in the dark section you would experience nighttime.

As the Moon moves around the Earth we see different amounts of its sunlit side. Sometimes we see a full, bright circle, we call this a full moon. Other times we can't see any of the sunlit side and we call this a new moon. As it moves from new to full moon we say it is waxing and after a full moon is starts to wane until it becomes a new moon again.

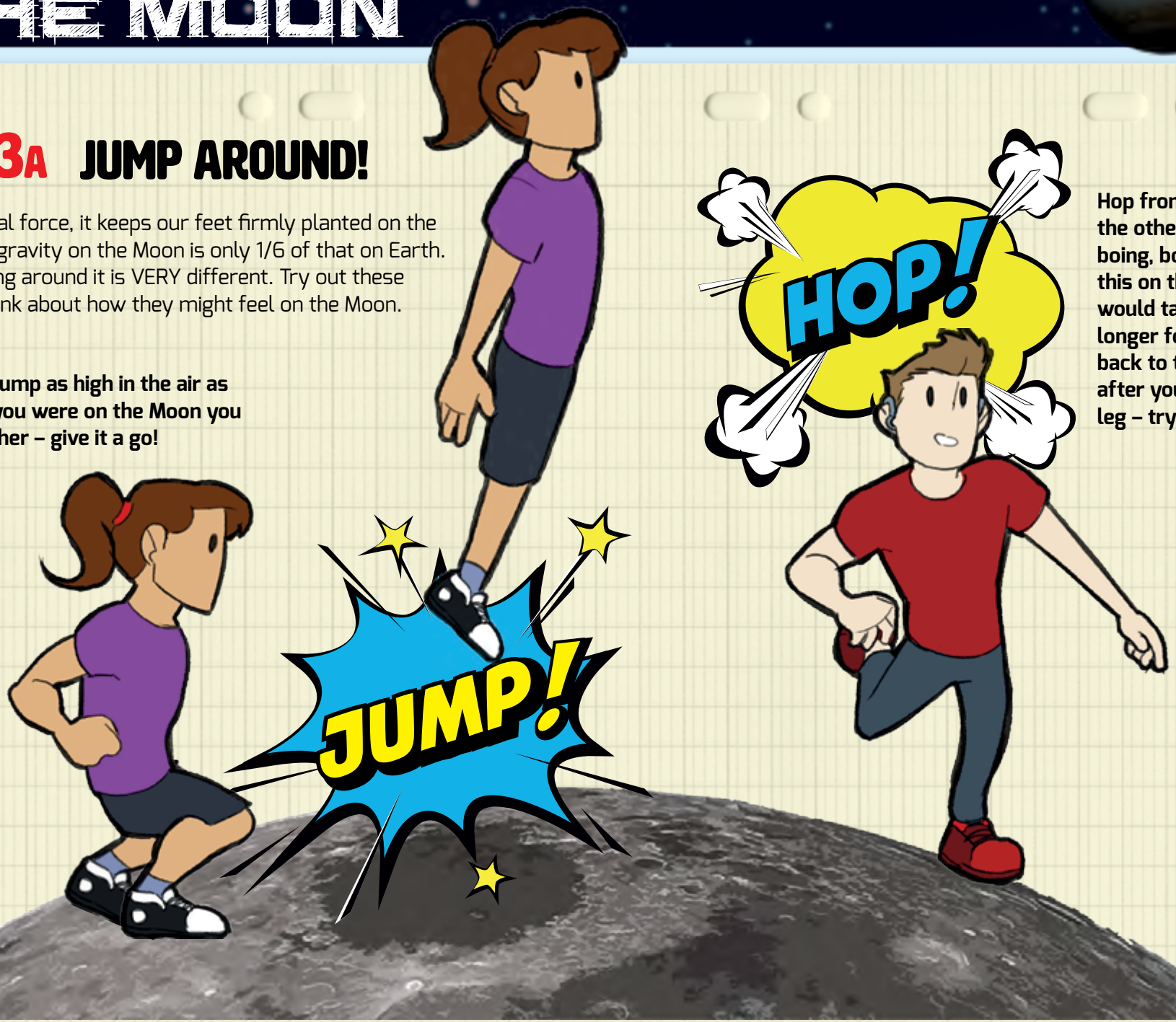


ACTIVITY 3A JUMP AROUND!

Gravity is a very special force, it keeps our feet firmly planted on the surface of Earth. The gravity on the Moon is only 1/6 of that on Earth. This means that moving around it is VERY different. Try out these snazzy moves then think about how they might feel on the Moon.

Bend both knees and jump as high in the air as you can – whoosh! If you were on the Moon you would go so much higher – give it a go!

Jump up and down as fast as you can – bounce, bounce, bounce. If you did this on the Moon you would bounce so much more slowly because it would take longer to come back down after each jump – have a go.



Hop from one leg to the other – boing, boing, boing! If you did this on the Moon it would take much longer for you to come back to the surface after you hop on each leg – try it out.

ACTIVITY 3B GUESS THAT SHADOW

Many years ago the Moon was smashed into by lots and lots of space rocks. This meant that big chunks were taken out of the Moon's surface – leaving it rough and bumpy rather than smooth. This is why we see beautiful shadows when we look at the moon; because the sunlight shining on the surface is bouncing on craters, valleys and seas where there used to be lava flowing.

WHAT YOU'LL NEED

Trays filled with sand.

Different objects to drop into the sand.

Torches.

WHAT'S IT ALL ABOUT?

You will need to collect objects you think are interesting shapes that can be dropped into the sand.
They could be heavy, light, spikey, smooth, jagged – whatever you like.

Before you drop your object, think about some of these questions!

Q DO YOU THINK THIS SHAPE WILL LEAVE AN IMPACT IN THE SAND?

Q WHAT SHAPE DO YOU THINK THE IMPACT WILL BE? WHY?

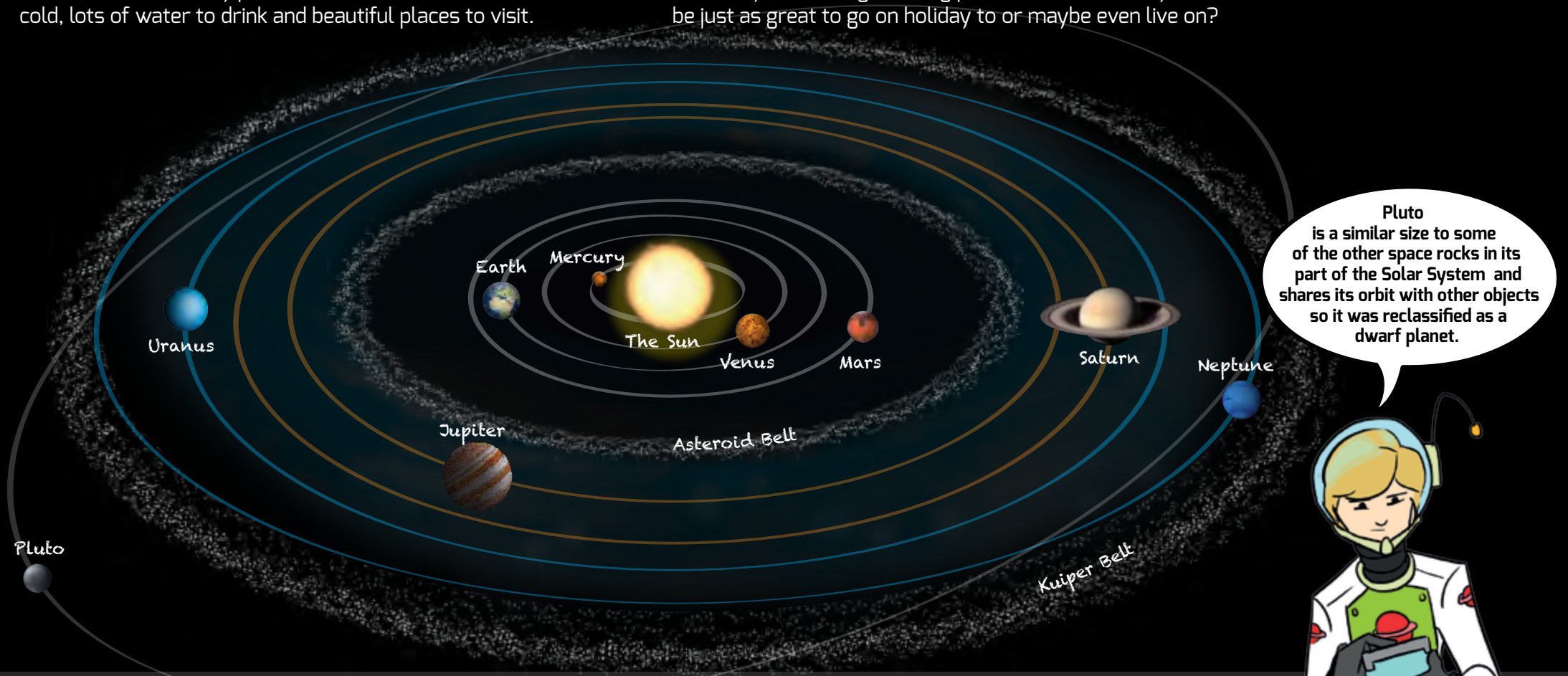
Q DO YOU THINK WE WOULD MAKE INTERESTING SHADOWS IF WE SHINE A LIGHT OVER THE IMPACT? WHAT SORTS OF SHAPES DO YOU THINK WE MIGHT SEE?

Try dropping different objects from different heights and see what happens! After you have experimented go back to the questions so that you can see if you were right!

4 DISCOVER THE SOLAR SYSTEM

Planet Earth is a lovely place to live isn't it; not too hot, not too cold, lots of water to drink and beautiful places to visit.

Could any of our neighbouring planets in our Solar System be just as great to go on holiday to or maybe even live on?



DID YOU KNOW?

Pluto was considered to be a planet for a very long time, however, in 2006 the definition of a planet changed. To be a planet Pluto had to follow these three rules:

1. **Be spherical** – *Pluto is indeed roughly spherical.*
2. **Orbit the Sun** – *Pluto does orbit the Sun.*
3. **Clear its own orbit** (either join up with other similarly sized space rocks in its path or bump them out of the way) – *Pluto has not done this.*

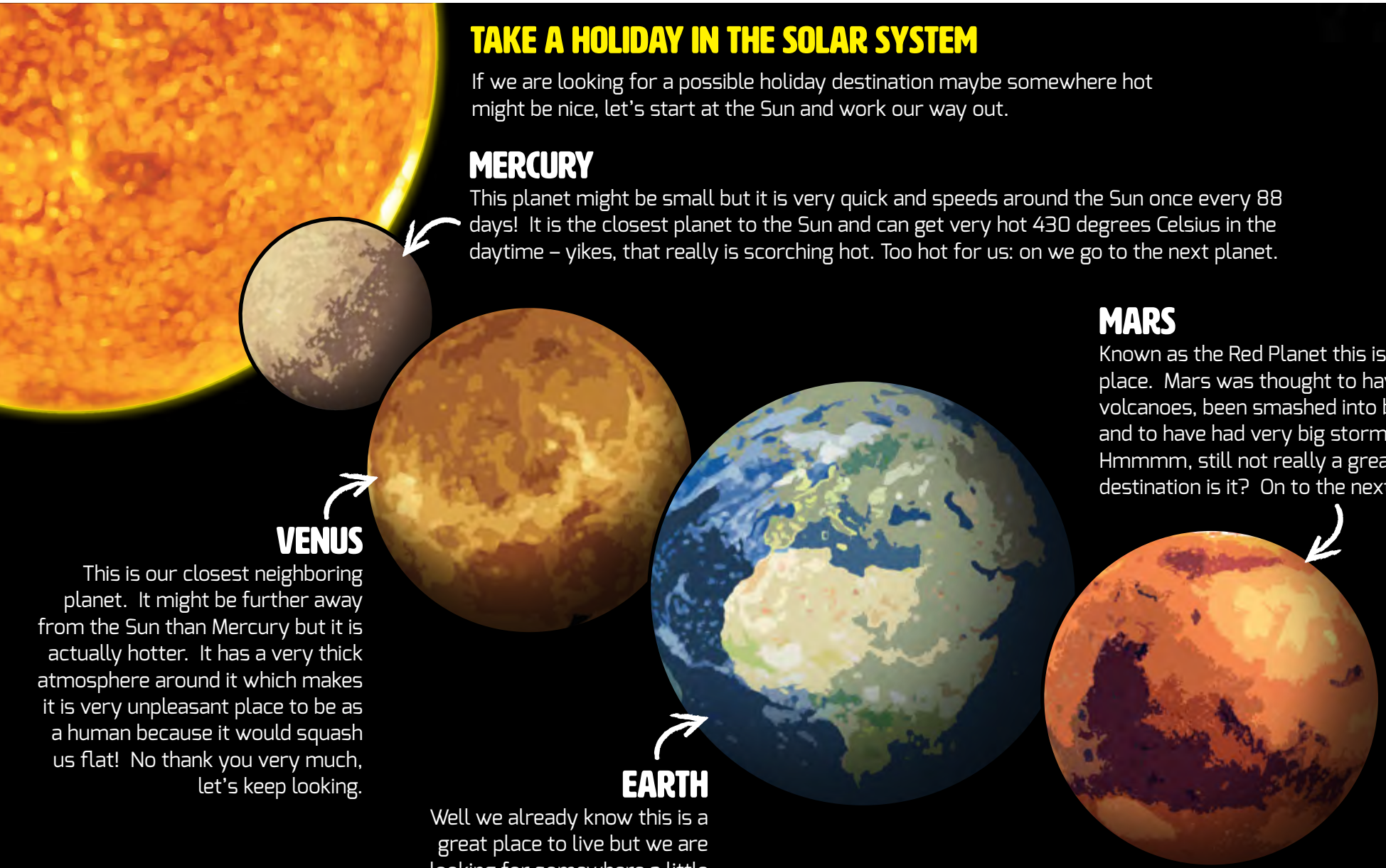
4.1 DISCOVER THE SOLAR SYSTEM

TAKE A HOLIDAY IN THE SOLAR SYSTEM

If we are looking for a possible holiday destination maybe somewhere hot might be nice, let's start at the Sun and work our way out.

MERCURY

This planet might be small but it is very quick and speeds around the Sun once every 88 days! It is the closest planet to the Sun and can get very hot 430 degrees Celsius in the daytime – yikes, that really is scorching hot. Too hot for us: on we go to the next planet.



VENUS

This is our closest neighboring planet. It might be further away from the Sun than Mercury but it is actually hotter. It has a very thick atmosphere around it which makes it is very unpleasant place to be as a human because it would squash us flat! No thank you very much, let's keep looking.

EARTH

Well we already know this is a great place to live but we are looking for somewhere a little further away as a change.

MARS

Known as the Red Planet this is one interesting place. Mars was thought to have had volcanoes, been smashed into by space rocks and to have had very big storms too. Hmmmm, still not really a great holiday destination is it? On to the next planet we go!

So that's it for the rocky planets. Let's explore the gas giants and ice giants!

4.1 DISCOVER THE SOLAR SYSTEM

JUPITER

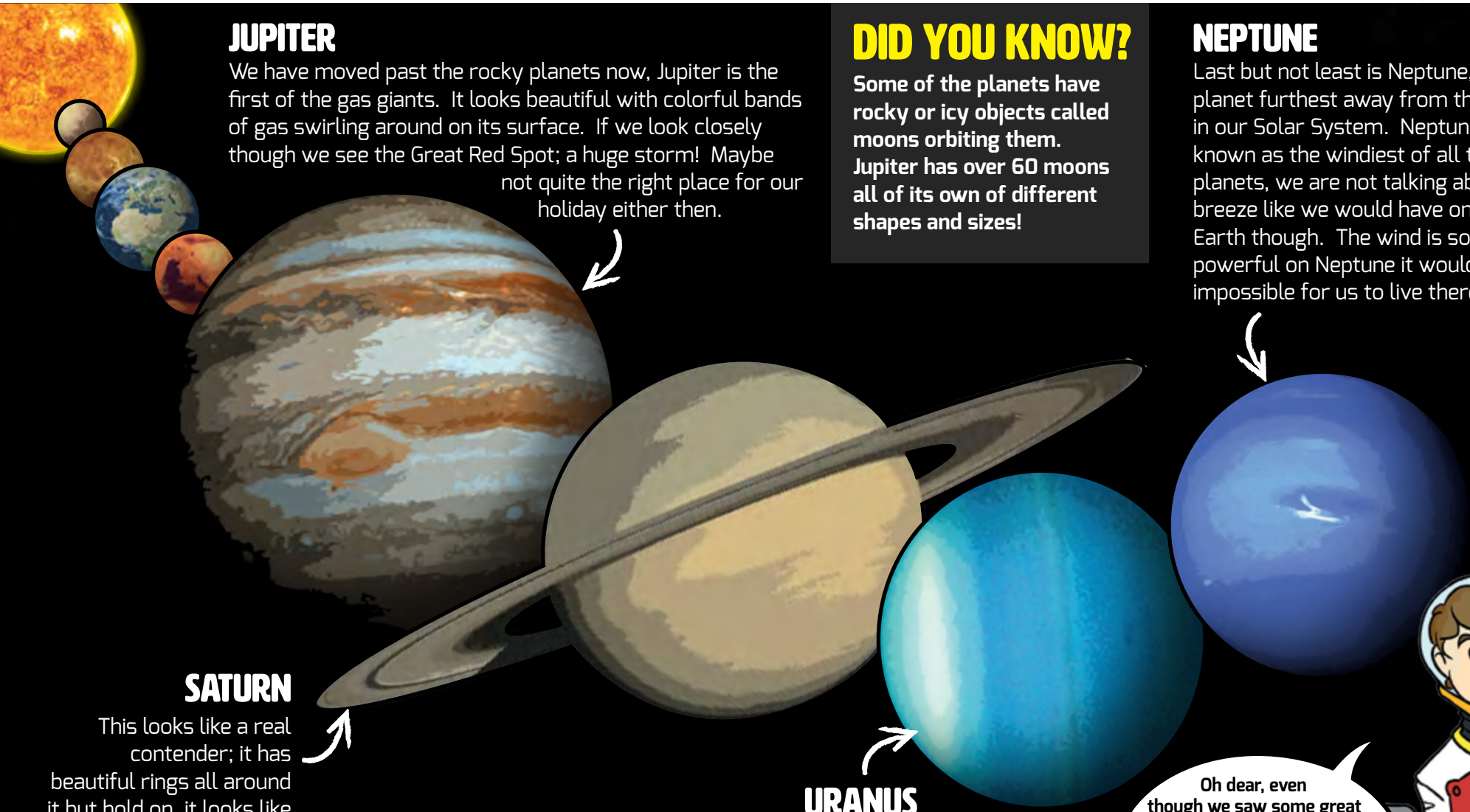
We have moved past the rocky planets now, Jupiter is the first of the gas giants. It looks beautiful with colorful bands of gas swirling around on its surface. If we look closely though we see the Great Red Spot; a huge storm! Maybe not quite the right place for our holiday either then.

DID YOU KNOW?

Some of the planets have rocky or icy objects called moons orbiting them. Jupiter has over 60 moons all of its own of different shapes and sizes!

NEPTUNE

Last but not least is Neptune, the planet furthest away from the Sun in our Solar System. Neptune is known as the windiest of all the planets, we are not talking about a breeze like we would have on Earth though. The wind is so powerful on Neptune it would be impossible for us to live there.



SATURN

This looks like a real contender; it has beautiful rings all around it but hold on, it looks like these are made of rocks and ice. That could make getting to the planet itself pretty dangerous – next please!

URANUS

Well look what we have here, this planet is spinning like the other planets do but it does so on its side instead – how strange. It might look pretty but it is not called an ice giant for nothing – this planet is far too cold for us humans to have much fun living there!

ACTIVITY 4A LEAPING THROUGH THE SOLAR SYSTEM!

That was a quick but interesting trip through the Solar System wasn't it! It seemed as though the planets were very close to us indeed but don't be fooled; space is huge so things that seem to be close can actually be much further away than you might think.

WHAT'S IT ALL ABOUT?

This activity is called **Leaping Through the Solar System** because you do just that. You will take the biggest jump you can from the Sun to see how far through the Solar System you can go!

WHAT YOU'LL NEED

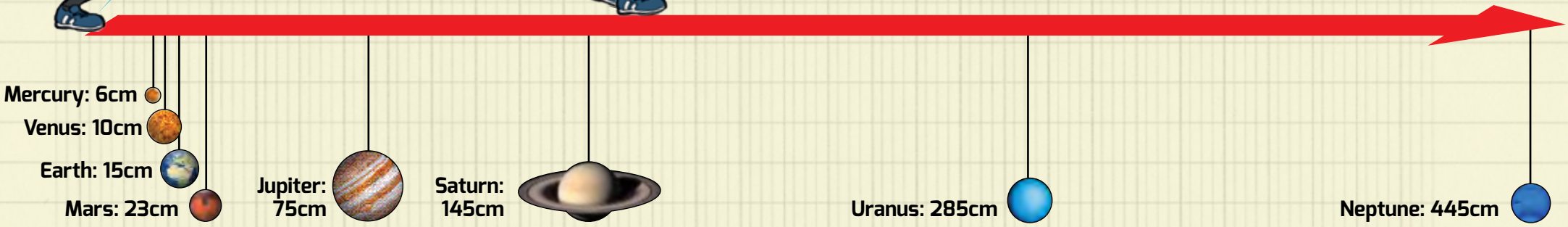
4.5 metres of space in one straight line.

Sticky labels for the planet names and more for each of the children.

WHAT TO DO

You will need to do a tiny bit of measuring before you get started to make sure you know how far away the planets are. The distances on the diagram below have been calculated using a much smaller scale than in real life. The planets are the right distance apart from each other but the scale has been shrunken down to be able to fit everything into your classroom.

HAPPY LEAPING!



ACTIVITY 4B

A MODEL OF THE SOLAR SYSTEM

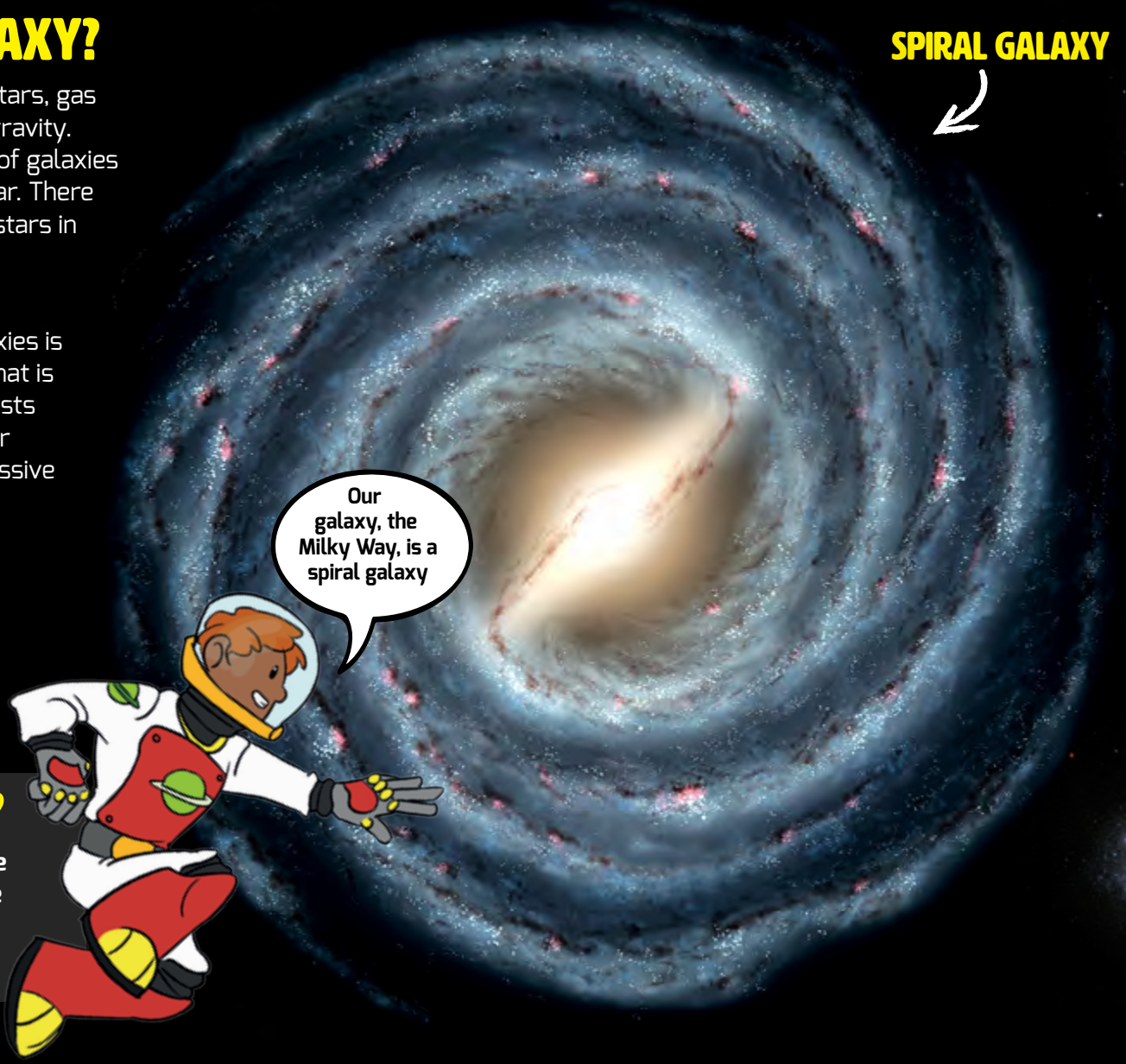
You can make your very own model on the Solar System in your classroom with the Royal Observatory Greenwich's Fruit Solar system: *www.rmg.co.uk/discover/teacher-resources/fruit-solar-system*

5 DISCOVER GALAXIES

WHAT IS A GALAXY?

A galaxy is a collection of stars, gas and dust kept together by gravity. There are different shapes of galaxies – spiral, elliptical or irregular. There are hundreds of billions of stars in each galaxy in space.

Each star within these galaxies is made of the gas and dust that is found in that galaxy. Scientists believe that galaxies like our Milky Way have a super massive black hole at their centre.



SPIRAL GALAXY

ELLIPTICAL GALAXY

IRREGULAR GALAXY

DID YOU KNOW?

Did you know there are more stars in space then there are grains of sand across all the beaches in the world?

5.1 DISCOVER GALAXIES

SPACE TELESCOPES

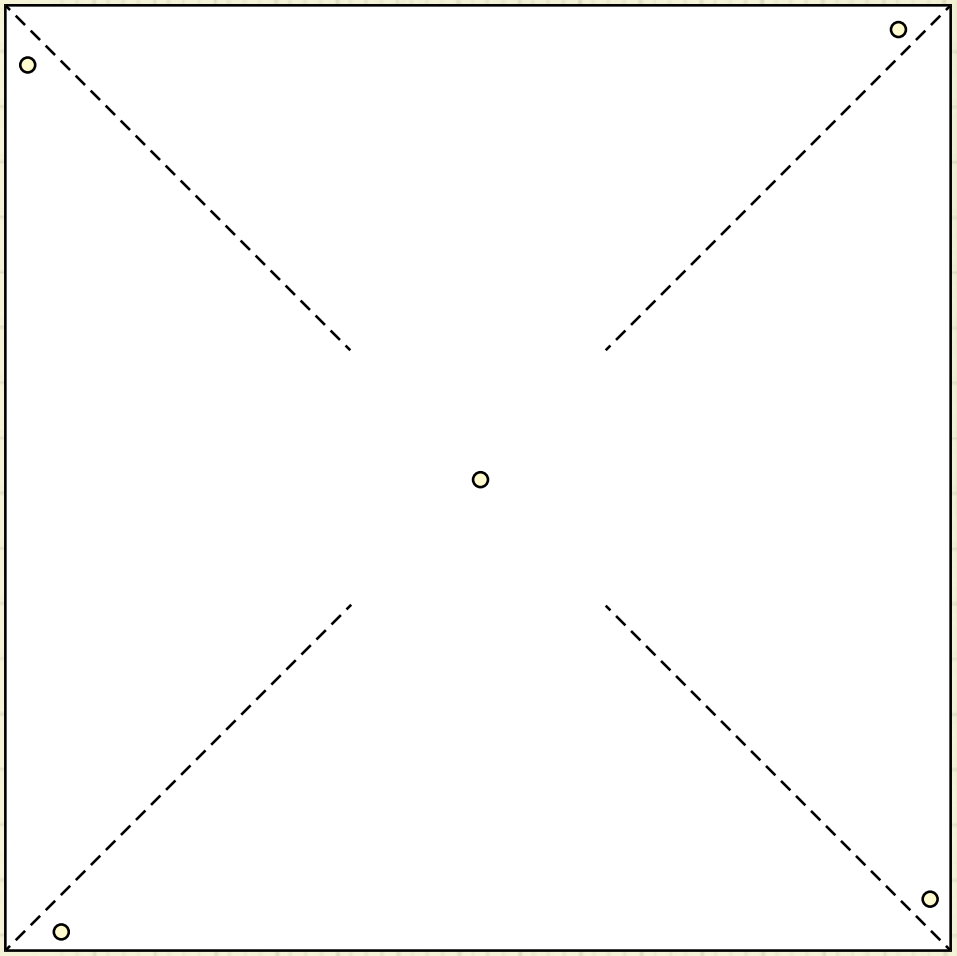
The Hubble space telescope has been taking images of deep space objects since 1990. It is a man-made satellite roughly the size of a bus, that takes pictures from outside our atmosphere looking at different areas of space. By taking pictures outside the Earth's atmosphere it can take clearer images than ground-based telescopes.

This image 'Hubble Ultra Deep Field' shows a very tiny area of the observable universe but we can see on this picture many dots of light. Each of these is a galaxy full of billions of stars. By looking further into space we can find out more about the Universe and our own Solar system.

All those galaxies fit into a patch of sky this much smaller than the Moon appears in the sky! Imagine how many are in the whole Universe!

ACTIVITY 5A MAKE YOUR OWN GALAXY

Spiral galaxies, like our Milky Way, spin in space. In this activity, you will make your own pinwheel galaxy, which you can make spin just by blowing!



WHAT YOU'LL NEED?

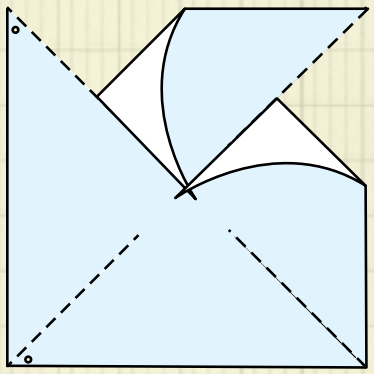
- Scissors
- Drawing pin
- Pencil
- Paint/pens
- Glitter
- Glue

WARNING!
Pins and scissors are sharp!
Get an adult to help

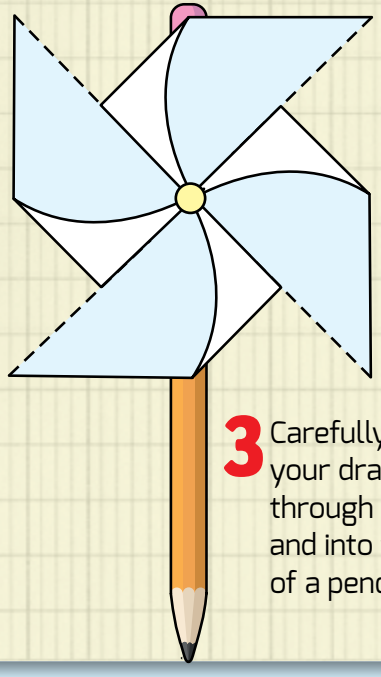
WHAT TO DO

1 Print out, or photocopy the square on the left. Carefully cut it out and snip along the dotted lines.

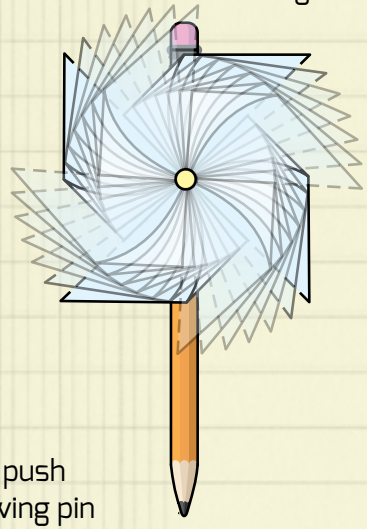
Decorate your pinwheel galaxy! Galaxies are beautiful and be made of lots of colours. You could even use glitter for your stars. Don't forget to decorate both sides before folding!



2 Fold each corner into the centre so that all the dots line up.



3 Carefully push your drawing pin through the dots and into the top of a pencil.



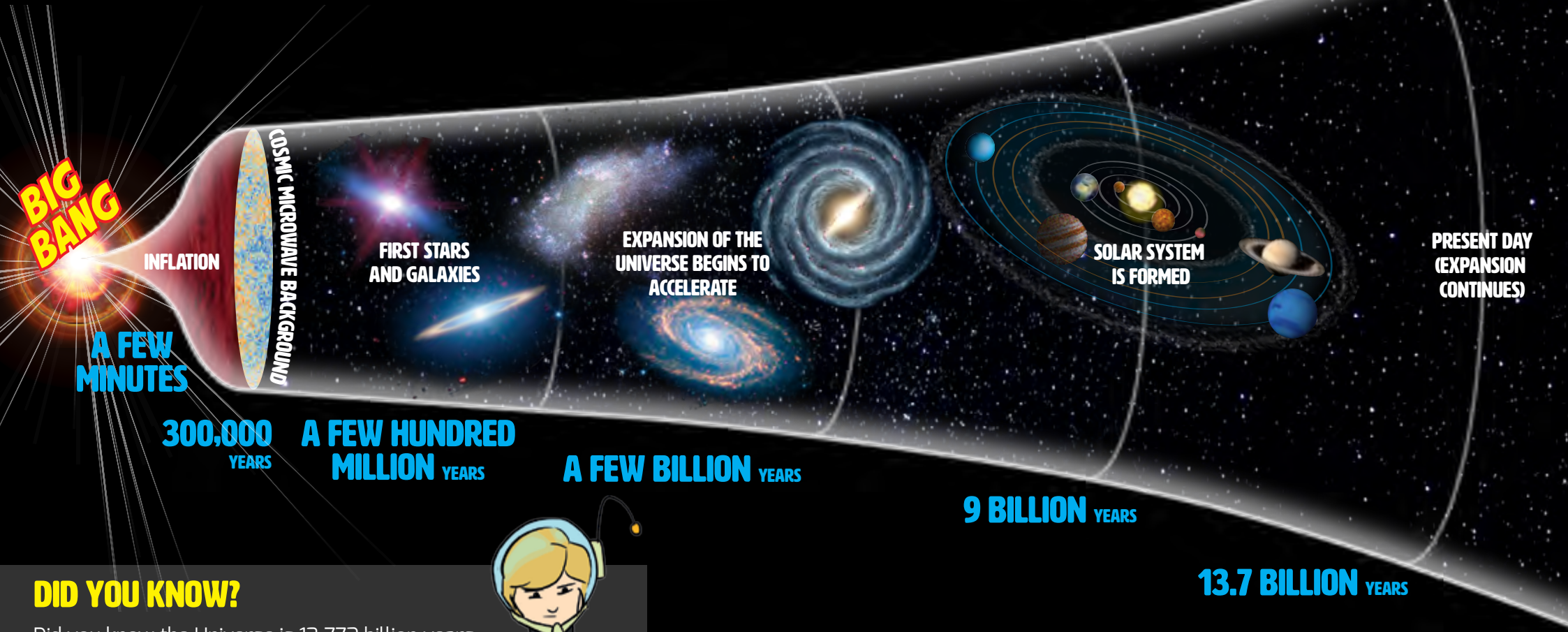
4 Spin the galaxy by blowing!

6 DISCOVER EXPLORING FURTHER

WHERE DID THE UNIVERSE COME FROM?

Most scientists believe that the Universe started from an incredibly hot dense point which exploded in the Big Bang and then started to expand and cool. It grew from smaller than the tiniest atom to the size of an enormous galaxy in less than a second!

As, it started to cool it went through different periods in which things formed such as atoms and gravity. Eventually from here stars, galaxies and planets formed that we know today, and it is still expanding.



DID YOU KNOW?

Did you know the Universe is 13.772 billion years old and our solar system is 4.6 billion years old?

ACTIVITY 6A MAKE A BALLOON UNIVERSE

The Universe is a really, really big place – and it is getting bigger all the time because it is expanding. In this actvity, you will make your own expanding Universe in a balloon!

WHAT YOU'LL NEED?

A balloon

A marker pen

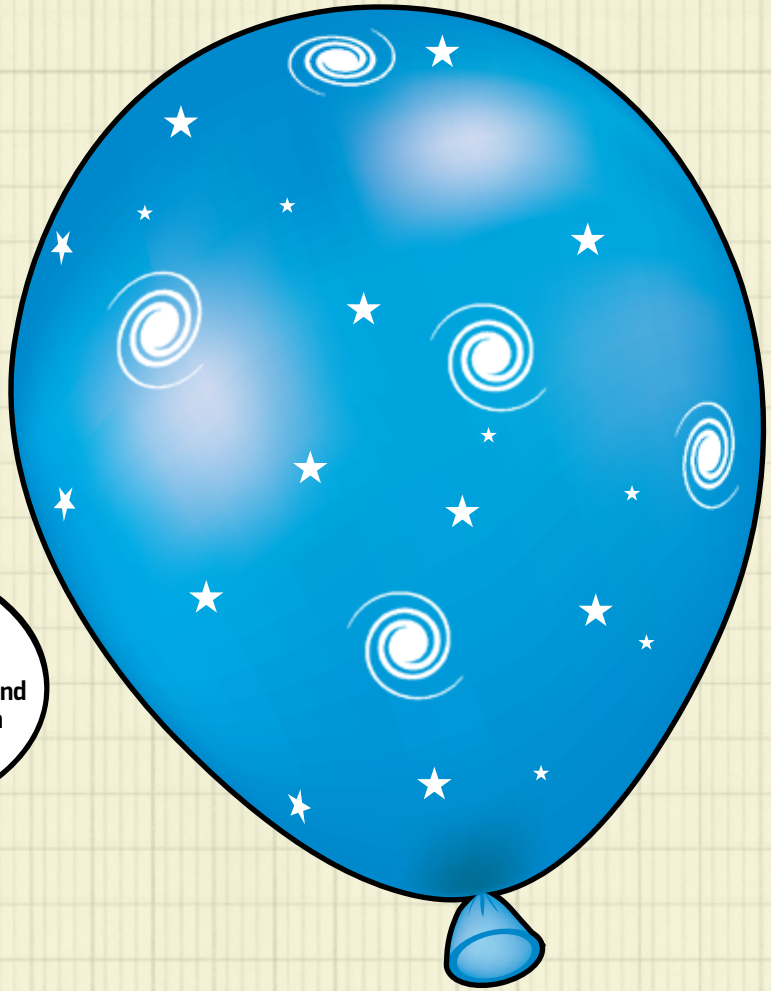
Strong lungs to blow it up!

WHAT TO DO

1. Draw dots and small spiral galaxies on the balloon – these are your stars and galaxies.
2. Before you blow up the balloon, see if you can predict what will happen to the dots and spirals when you start to blow up the balloon.

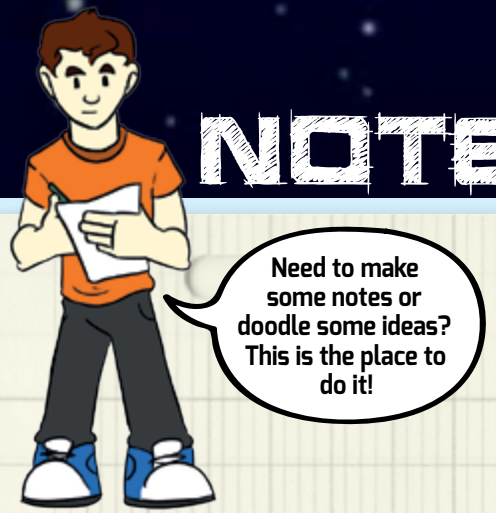
I think that the dots and spirals will...

3. Blow up the balloon! Don't let go though – no one wants to see a Universe flying around the class room!



Did you notice how the stars and galaxies move away from each other as the balloon expands? This is what is happening in the Universe – as it expands, the stars and galaxies move away from each other!

NOTES


Need to make some notes or doodle some ideas? This is the place to do it!

The Science and Technology Facilities Council operates world-class, large-scale research facilities; supports scientists and engineers world-wide; funds researchers in universities and provides strategic scientific advice to government.

The Council's Public Engagement Team offers a wide range of support for teachers, scientists and communicators to facilitate greater engagement with STFC science which includes astronomy, space science, particle physics and nuclear physics.

FOR SCHOOLS

- **Free Publications and resource guides** suitable for teaching ages 10-18.

- **Funding** schemes for projects and school visits.

- **A Moon rock and meteorite loan scheme**.

- **Visits** to STFC's UK laboratories in Cheshire, Oxfordshire and Edinburgh plus CERN in Geneva.

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HANDS ON UNIVERSE

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