

## Curriculum-linked resources for KS2 teachers and librarians

### Introduction

Explore themes of:

Space

Earth

STEM

Inspiring individuals

The history of planet Earth

The future of planet Earth

The Solar System

The Universe

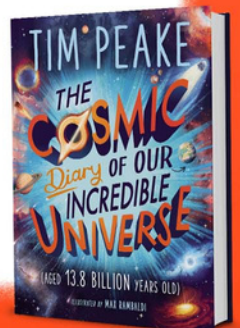
Subject checklist:

Literacy

STEM Subjects

Art and Design

Illustrations by Max Rambaldi



## Contents

### Theme One: An introduction with Experts and Astronauts

Activities: Complete the postcard task.

Objectives: complete the postcard about prior knowledge of the planets; discuss the role of an astronaut; prepare and complete interview questions for the experts.

### Theme Two: Bang! I'm Here.

Activities: Picture Description Task

Objectives: Brainstorm task; write a description of the picture; complete the vocabulary task.

### Theme Three: Create galactic shapes

Activities: Design your own galactic shapes.

Objectives: Create your own galactic shapes; unscramble the planets task; discuss the discussion questions.

### Theme Four: Other worlds

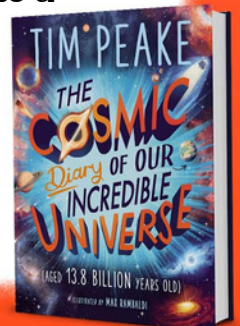
Activities: Postcard from Mars as an Earthling.

Objectives: Complete the sentence stem task; create your very own creature; write a postcard as an Earthling on Mars.

### Theme Five: Post – reading tasks

Activities: Creativity tasks

Objectives: create a new title, blurb and cover the book based on your own interpretation; explore predictions for the future; complete a definition match up task.

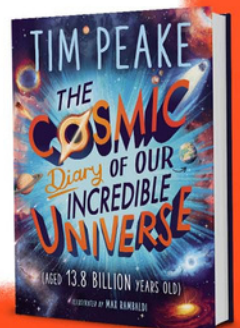


## Theme One

### An introduction with Experts and Astronauts

#### Activity 1: Pre-reading Task

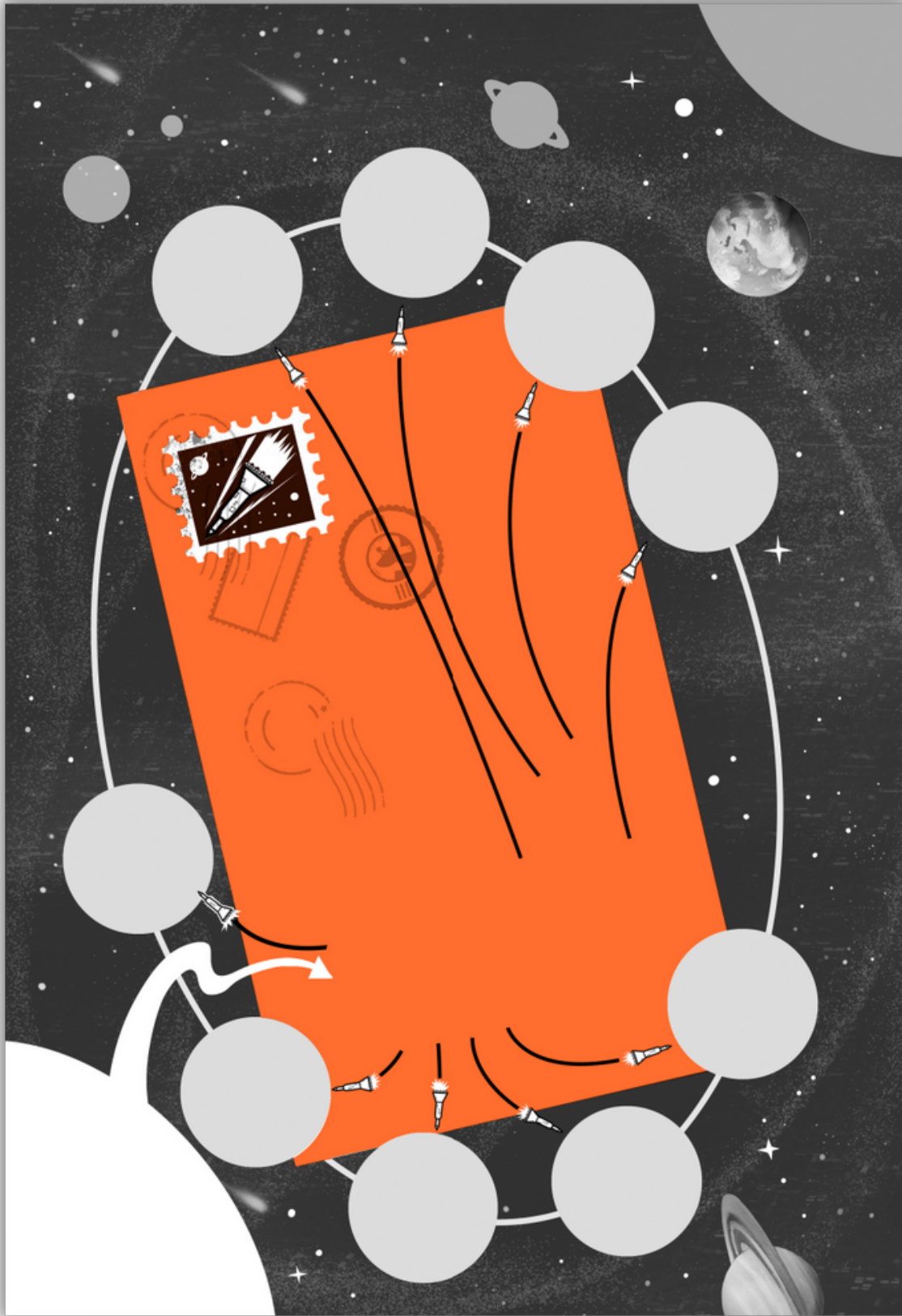
Use Activity Sheet 1 and look at all the items on the postcard, work in groups and think about what you already know about each of them. Write your ideas in the appropriate circles, but if you don't know the answer can you guess what it might be? Share your ideas with your classmates.



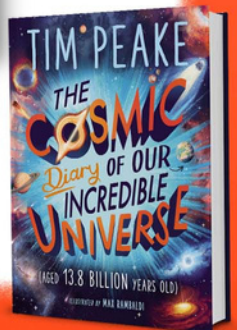


# TIM PEAKE THE COSMIC *Diary of our INCREDIBLE* UNIVERSE

## Activity Sheet 1: Pre-Reading Task



Extract taken from *The Cosmic Diary of our Incredible Universe* by Tim Peake

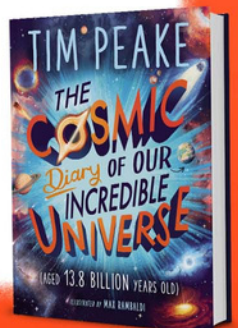
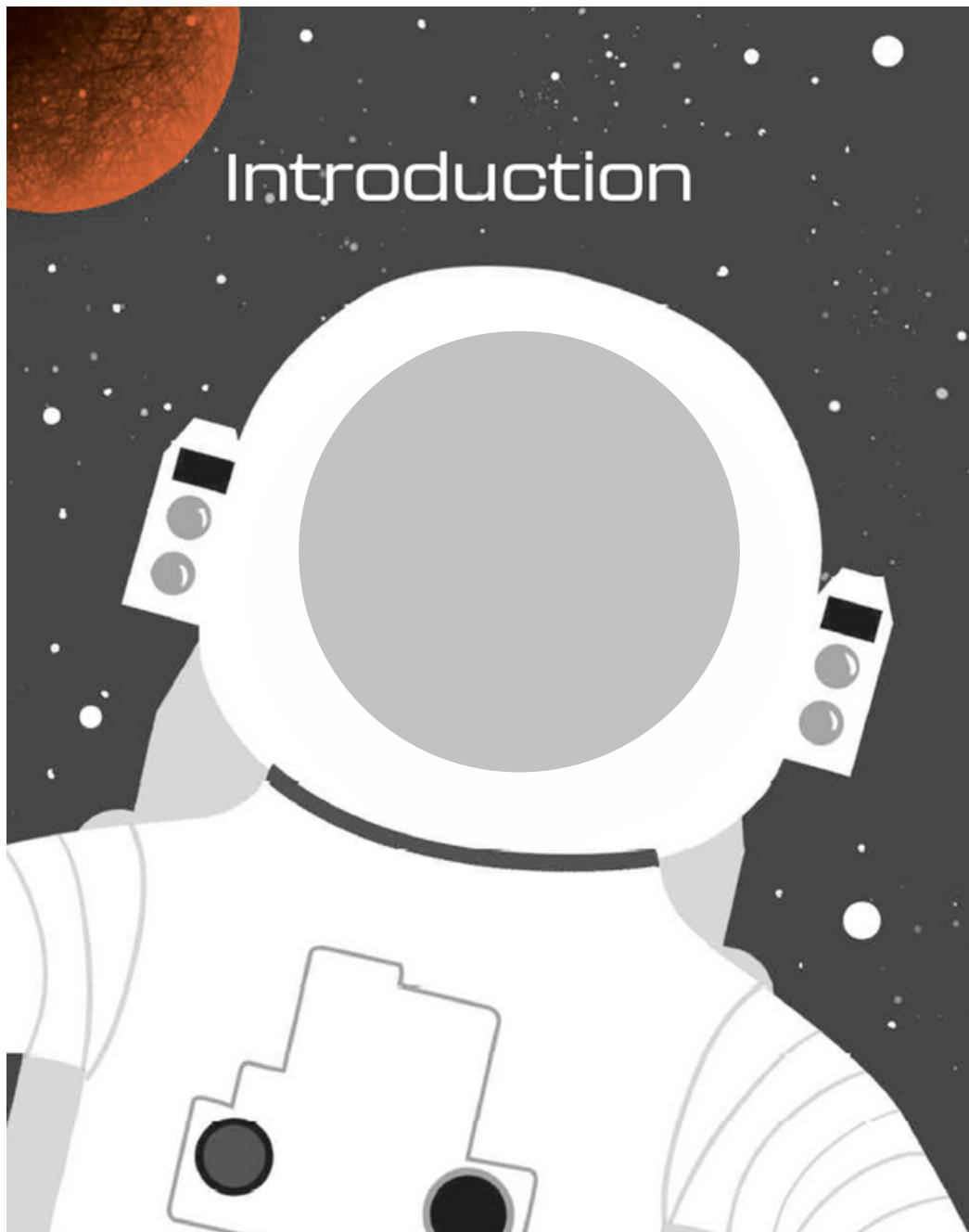


## Theme One

### An introduction with Experts and Astronauts

#### Activity 2: Meet an Astronaut

What do you think an astronaut does? How do you think it feels to be an astronaut in space? Work with a partner or in a small group and write your answers to the two questions above in the astronaut picture below.





## Theme One

### An introduction with Experts and Astronauts

#### Activity 3: Meet The Experts

You are going to have the opportunity to interview the experts. Using Extract 1 on the next page, read through the information about each expert and work in groups. You need to think of three questions to ask each expert. Write them in the spaces below

#### Particle Physicist: Malika

1

2

3

#### Cosmologists: Ben and Clara

1

2

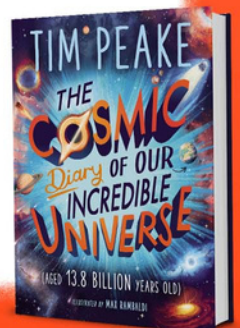
3

#### Astronaut: Tim

1

2

3



## Extract 1 - Meet the Experts

### Meet the Experts

Far-out facts about the cosmos are brought to you by:

#### Particle Physicist: Malika

Hi, I'm Malika, and I'm a particle physicist! You may not have heard of 'particles' before, but they are tiny pieces of something. I study the tiniest building blocks of matter (the stuff that everything in the Universe is made of), and I help to develop and test theories about how the particles behave and interact. Particle physicists are really important to understanding how our Universe came to be!

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#### Cosmologists: Ben and Ciara

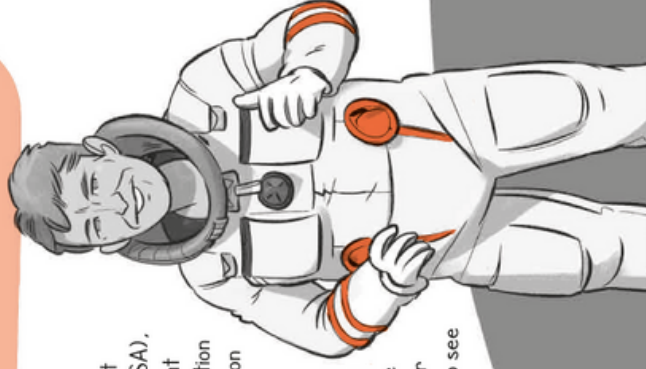
Hello, I'm Ciara. And I'm Ben. We are both cosmologists! Our job is to explore and investigate the nature of the Universe. We study the creation and evolution of our cosmos and try to predict and understand what the future of the Universe will be. Cosmologists use and interpret data a lot. We look forward to explaining facts about the cosmos to you!



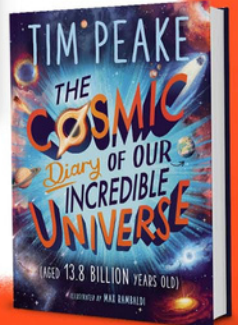
#### Astronaut Tim

Hi there, Tim here! I'm an astronaut for the European Space Agency (ESA), and I was the first British astronaut to visit the International Space Station (ISS). During my six-month mission on the ISS, I conducted a spacewalk, ran the London marathon from the space station's treadmill, took part in over 250 scientific experiments and engaged with more than 1.6 million schoolchildren in over 30 scientific projects. It's great to see you here, and I look forward to explaining more about space as you read on!

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Extract taken from *The Cosmic Diary of our Incredible Universe* by Tim Peake





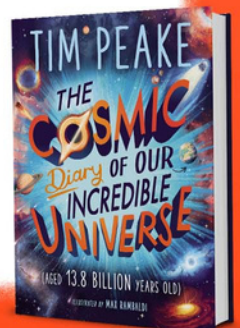
## Theme One

### An introduction with Experts and Astronauts

#### Activity 3: Meet The Experts Continued

Discussion Questions:

- 1) Would you rather be an astronaut, a cosmologist or a particle physicist?
- 2) Would you like to go into space?
- 3) Space is very silent with only the sound of your oxygen pump; how does that compare to normal life and planet Earth?
- 4) What definition can you give to planet Earth?





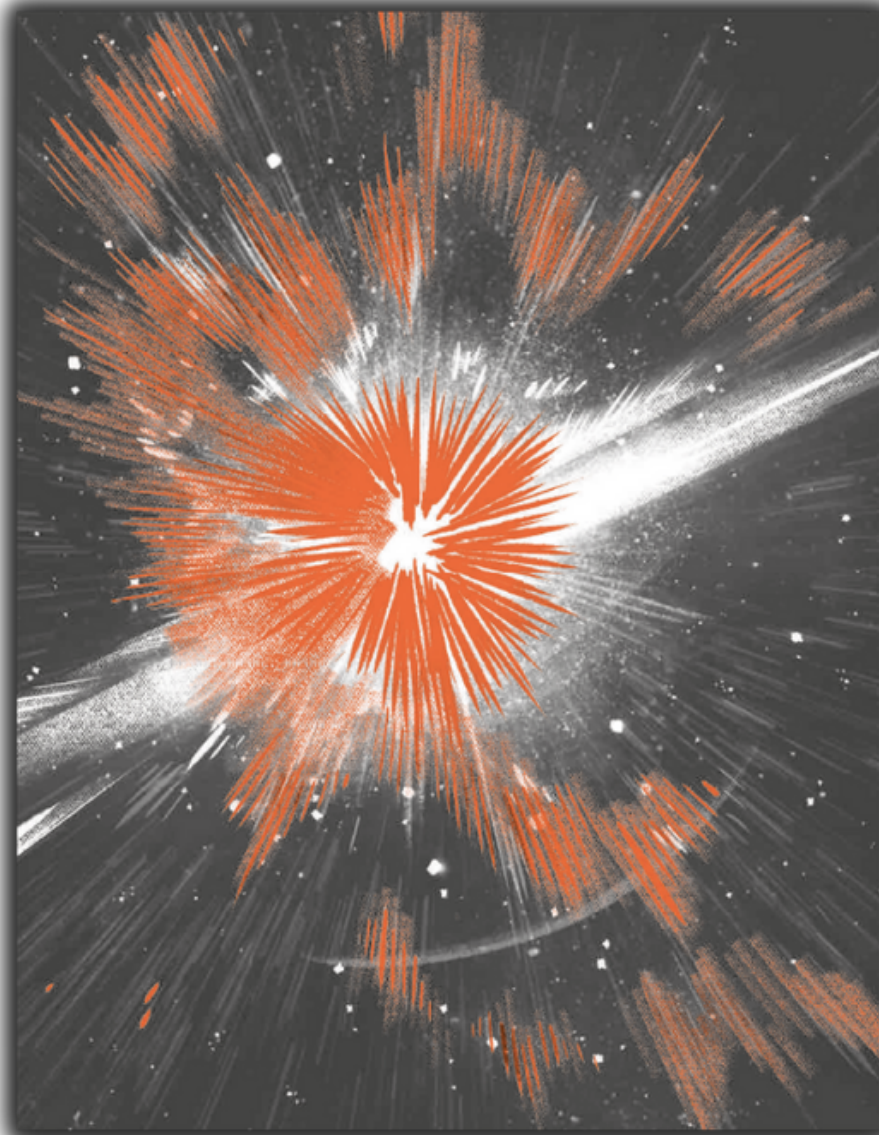
## Theme Two Bang! I'm here

### Activity 1: Brainstorm the Bang

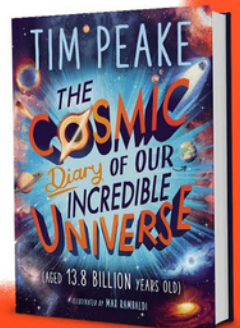
Work in pairs or small groups and brainstorm as many words as you can related to this picture.

When you have finished brainstorming, see if you can put as many of these words as possible into a paragraph describing the picture:

### Extract 2 - Bang! I'm here



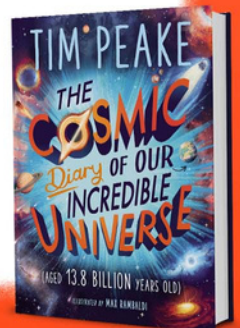
Extract taken from *The Cosmic Diary of our Incredible Universe*  
by Tim Peake



## Theme Two Bang! I'm here

### Activity 1: Brainstorm the Bang Continued

You can write your description in the box below.





## Theme Two Bang! I'm here

### Activity 2: The Arrival of Earth

Let's look at some of the words used in Extract 3 to describe the arrival of Earth.

#### Extract 3 - Dear Diary

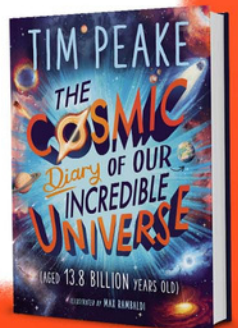
**Dear Diary,**

Today began a bit weirdly when, all of a sudden, I just **POPPED** into existence! Call it what you want – magic, or a miracle, or some mysterious law of nature – but one minute there was nothing and then there was something ...



And boy, did I create **HAVOC** on my arrival.

I burst in on the scene as just a mega-ultra-super-teeny-weeny speck and then grew at least a gazillion times larger in just a tiny fraction of a second.



## Theme Two

### Bang! I'm here

#### Activity 2: The Arrival of Earth Continued

Work with a partner to think of a definition for each word below – and a synonym – if you can:

Weirdly

Popped

Magic

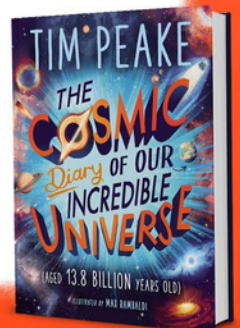
Miracle

Havoc

Burst

Tiny

Mysterious





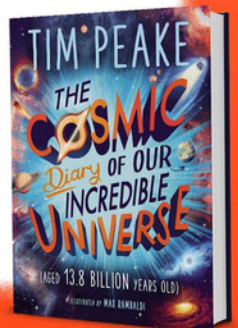
## Theme Two

### Bang! I'm here

#### Activity 3: Earth's Creation

Can you imagine how Earth was created? Work together to come up with a short paragraph, and write it in the box below.

(This is based on your ideas and imagination and does not have to be fact!):

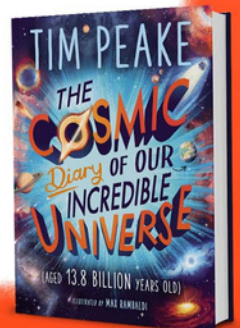


## Theme Three

# Galactic Shapes and The Solar System

### Activity 1: Creating Galactic Shapes

Look at the amazing galactic shapes on the next page. Can you work in pairs or small groups to create three new galactic shapes and then write a description for each one?



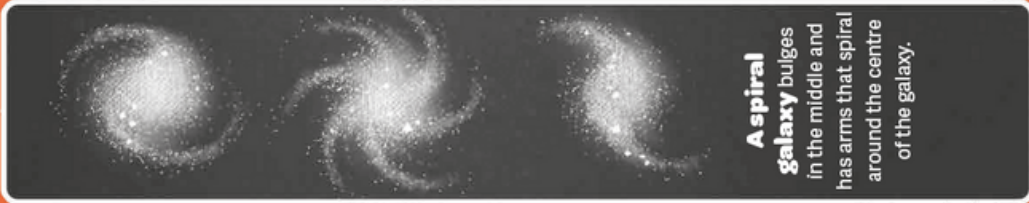


## Extract 4 - Galactic Shapes

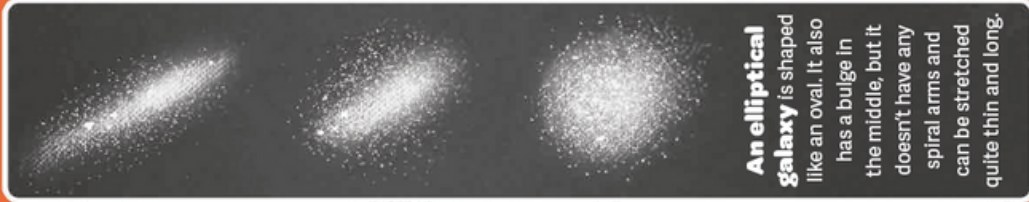
### GALACTIC SHAPES

Not all galaxies are the same. We sort them into different types, depending on their shape.

The Milky Way is a spiral galaxy! The Earth orbits the Sun in the middle of one of its spiral arms.



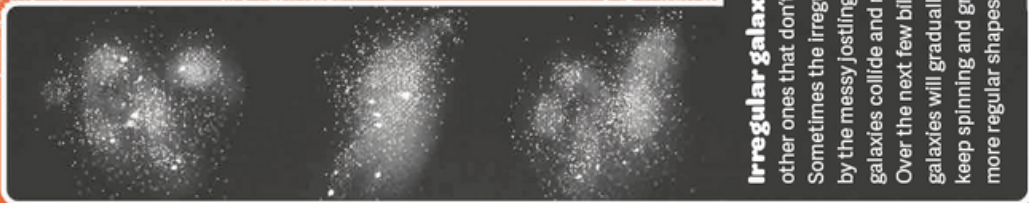
**A spiral galaxy** bulges in the middle and has arms that spiral around the centre of the galaxy.



**An elliptical galaxy** is shaped like an oval. It also has a bulge in the middle, but it doesn't have any spiral arms and can be stretched quite thin and long.

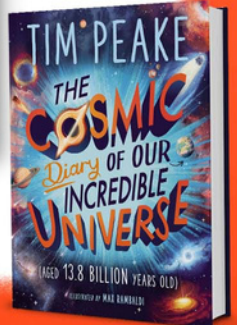


**A barred spiral galaxy** is a spiral galaxy with a bar-shaped cluster of stars going through its middle.



**Irregular galaxies** are all the other ones that don't have a clear shape. Sometimes the irregular shape is caused by the messy jostling of stars when two galaxies collide and merge together. Over the next few billion years these galaxies will gradually change as they keep spinning and gravity pulls them into more regular shapes.

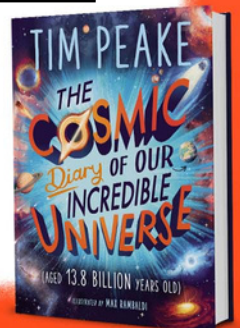
Extract taken from *The Cosmic Diary of our Incredible Universe* by Tim Peake



## Theme Three Galactic Shapes and The Solar System

### Activity 1: Creating Galactic Shapes Continued

My galactic shape 1	My galactic shape 2	My galactic shape 3





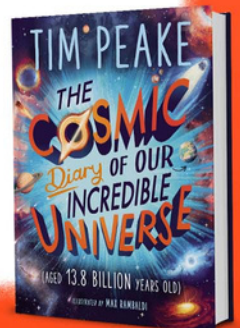
## Theme Three

### Galactic Shapes and The Solar System

#### Activity 2: Solar System Scramble

Can you unscramble the names of the early planets in the solar system in this word puzzle?

- |            |         |
|------------|---------|
| 1) usnev   | 1)..... |
| 2) rsma    | 2)..... |
| 3) rnasut  | 3)..... |
| 4) ymreruc | 4)..... |
| 5) eepnnut | 5)..... |
| 6) haetr   | 6)..... |
| 7) piretuj | 7)..... |
| 8) nusaru  | 8)..... |
| 9) tuolp   | 9)..... |



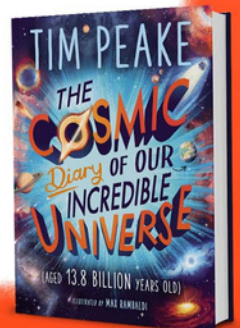
## Theme Three

### Galactic Shapes and The Solar System

#### Activity 3: Planets Form Slowly


Take a look at Extract 5 on the next page and then consider the following discussion questions:

- 1) How are the forming of planets like snowballs?
- 2) What are planetesimals?
- 3) What do leftover planetesimals become?
- 4) How long ago was the Earth formed?
- 5) How much longer did it take to form Earth in comparison to the Sun?





## Extract 5 - Planetesimals



We mentioned the solar wind – but it's really more of a solar hurricane! The intense heat and energy of the Sun hurls tiny particles out into space at incredible speeds, blowing atoms of different elements with them, clear across the solar system.


Throughout the solar system, gravity turned ice and dust and dirt into solid lumps which very slowly joined with others to become **planetesimals** – small, rocky objects. And we mean ve-r-r-y slowly. It took about ten thousand years for clumps of ice and dust in our solar system to become just the size of sugar cubes! It would take at least another 10 MILLION years before these planetesimals clumped together like toy building bricks to eventually build rocky planets. In fact, it took about a thousand times longer to assemble the Earth than it did to form the Sun.

The Earth formed about **4.5 billion years ago**.

## PLANETS FORM S-L-O-W-L-Y

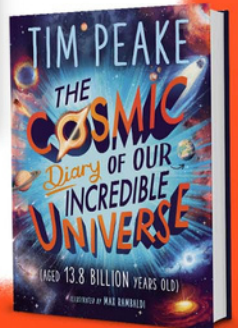
Have you ever rolled a snowball down a hill to make a huge snowman? Well, making a planet begins in a similar way – by starting out very small and gradually accumulating stuff to grow bigger and bigger.

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Leftover planetesimals remain in the solar system today as lumpy asteroids or comets!

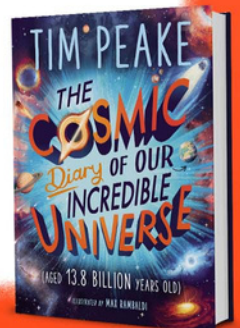
Extract taken from *The Cosmic Diary of our Incredible Universe* by Tim Peake



## Theme 4 Other Worlds

Take a look at Extract 6 on the next page and consider these discussion questions:

- 1) What does the word harsh mean? Can you use it in a different context?
- 2) What can we learn from Tardigrades?
- 3) Can you think of a synonym for the word tough?
- 4) What are the special features of a Tardigrade?



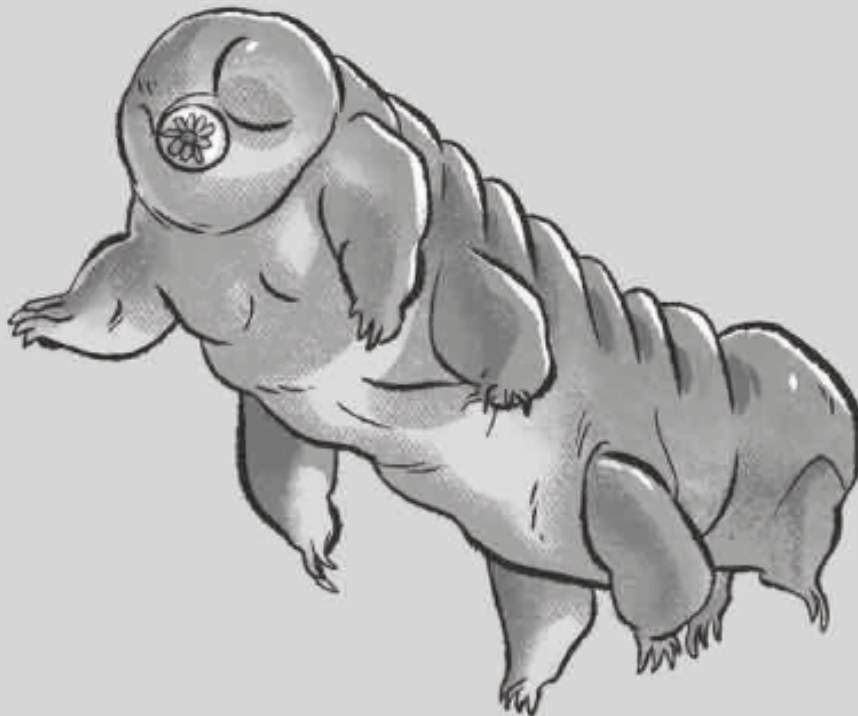


## Extract 6 - Tardigrades



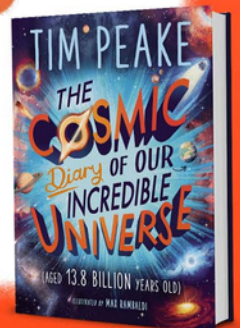
### What kind of life can exist in really harsh conditions?

Tardigrades – also known as water bears – are tiny eight-legged creatures that are about half a millimetre long. They evolved about 600 million years ago and are still around today.



They are amazingly tough. They can survive in extreme heat and cold, high or low pressures, and even without air or water. When conditions are particularly harsh they go into a sort of hibernation and can survive without food or water for an amazing 30 years. Tardigrades have even survived spending 10 days in the vacuum of space! We can learn more about how life survives in different environments by studying tardigrades.

Extract taken from  
*The Cosmic Diary of our Incredible Universe*  
by Tim Peake



## Theme 4 Other Worlds

### Activity 1: Understanding Tardigrades

Have another look at Extract 6 and then finish the sentence below in your own words based on your understanding from the text.

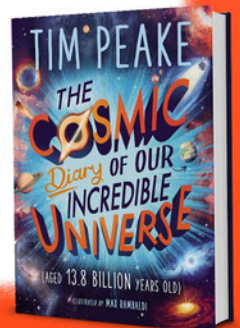
Hi, I'm a Tardigrade, I can survive in harsh conditions because.....

.....

.....

.....

.....

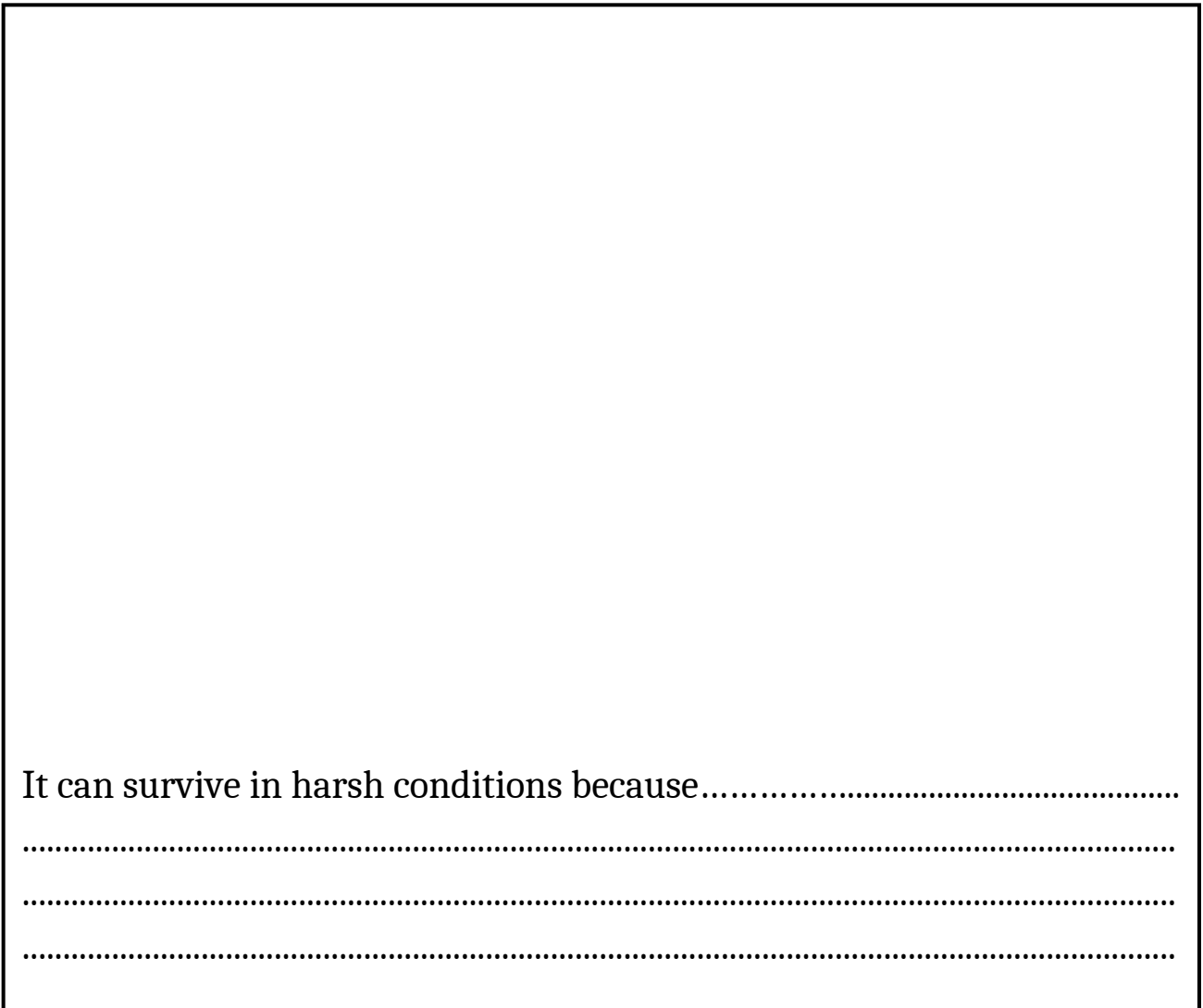




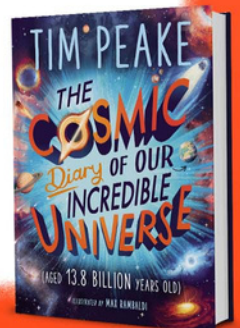
## Theme 4 Other Worlds

### Activity 2: Is there life on other worlds?

Can you create your very own creature that can survive in harsh conditions?  
Draw your creature below and write a description of them.



It can survive in harsh conditions because.....  
.....  
.....  
.....



## Theme 4 Other Worlds

### Activity 2: Is there life on other worlds? Continued

Read through the Extract 7 on the next page and think about the significance of each world. Then, work in groups and discuss each of the following words and what they represents.

Cells

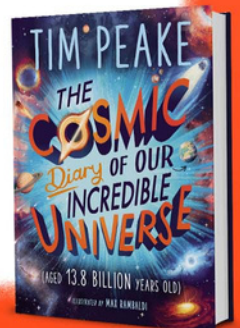
Oxygen

Carbon

Silicon

Methane

Gravity





## Extract 7 - Is there Life on Other Worlds?

### IS THERE LIFE ON OTHER WORLDS?

Each planet has a unique environment. They might be hotter or colder than the Earth. They might not have oxygen in their atmospheres. They might not even have water. Could life still exist on worlds like these?

The answer is: perhaps! **Let's explore...**

The cells of all living things on Earth contain carbon. Carbon atoms can bond with other atoms in many different ways, so they are really good at making the useful chemical reactions that life depends on. **Silicon** makes bonds in a similar way to carbon. Silicon-based life is not possible on Earth because it would react with oxygen in our atmosphere, but it might be possible on another world that lacks oxygen.

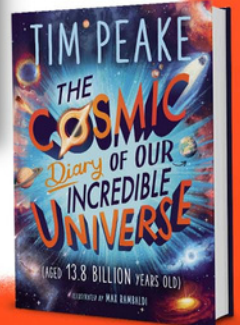
Also, liquid methane could be an alternative to liquid water on colder worlds! **Titan** – one of Saturn's moons – has a thick methane atmosphere, so it's possible that Titan might have liquid methane. If there are super-hot vents deep down in Titan's ocean floor, perhaps some life forms might have grown there?

Closer to Earth, the surface of Mars is too cold for liquid water, and the only water we know of on the planet is in the form of ice at the planet's north pole. However, Mars shows signs of old, dried-up riverbeds, and scientists believe that there may have

been liquid water on Mars about 4 billion years ago. Does this mean that there might once have been **life on Mars**?

Of course, gravity plays a part too. On higher-gravity worlds such as Jupiter, creatures would likely be shorter and stockier because the higher gravity would make them heavier and they would need to be stronger. An ocean world might give rise to enormous beasts like whales on Earth. A lower-gravity world might have more flying creatures, taking advantage of less pull to the ground.

Now we are planning to send people to live on Mars. Who knows what they might find... and who knows how those first emigrants to Mars might evolve... from **Earthlings into Martians!**



Extract taken from *The Cosmic Diary of our Incredible Universe* by Tim Peake

## Theme 4 Other Worlds

### Activity 3: Earthlings into Martians!

You are one of the first Earthlings to experience life on Mars. What's it like?!  
Write a postcard home all about your life on Mars:

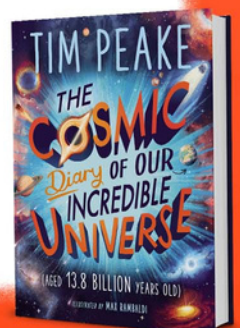
Dear .....



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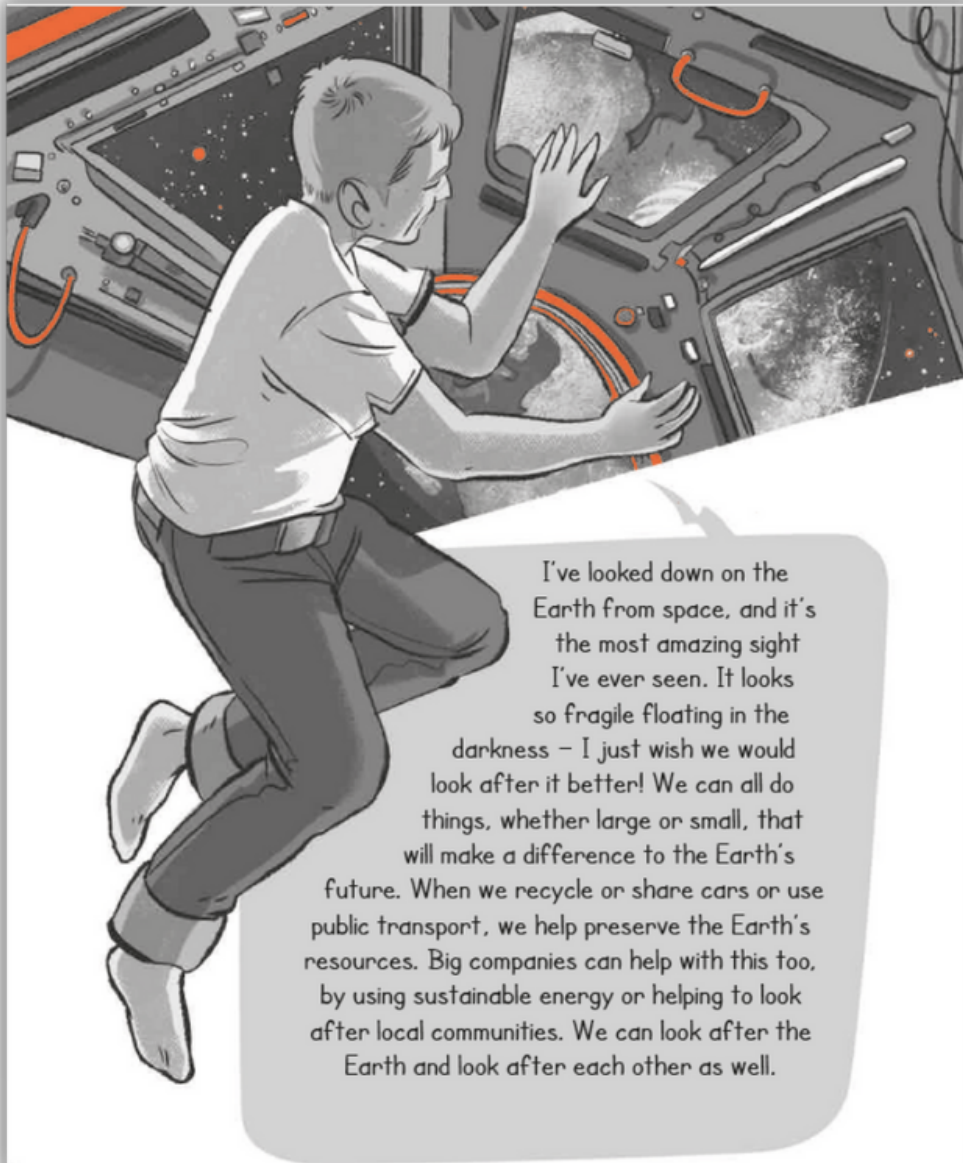
## Theme Five

### Protecting the Planet Earth Critical thinking task

#### Activity 1: Protect the Planet

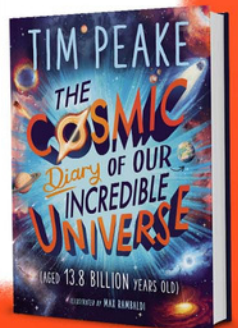
Take a look at Extract 8. What advice is Tim giving us about protecting planet Earth? Can you write his key points in the box on the next page?

#### Extract 8



I've looked down on the Earth from space, and it's the most amazing sight I've ever seen. It looks so fragile floating in the darkness – I just wish we would look after it better! We can all do things, whether large or small, that will make a difference to the Earth's future. When we recycle or share cars or use public transport, we help preserve the Earth's resources. Big companies can help with this too, by using sustainable energy or helping to look after local communities. We can look after the Earth and look after each other as well.

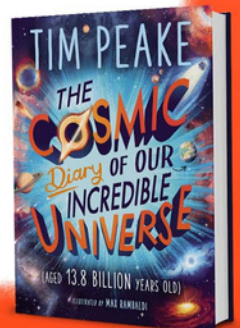

Extract taken from *The Cosmic Diary of our Incredible Universe* by Tim Peake



## Theme Five

### Protecting the Planet Earth Critical thinking task

#### Activity 1: Protect the Planet Continued





## Theme Five

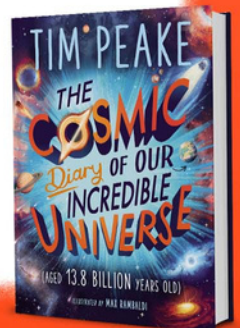
### Protecting the Planet Earth Critical thinking task

#### Activity 2: Project Task – Poster presentation task

Working in pairs or small groups, create a poster that focuses on the other things we can do to protect planet Earth. What can we do....

- At school
- In our class
- At home
- Together

When you've finished, present your poster to the rest of your class



## Theme Six

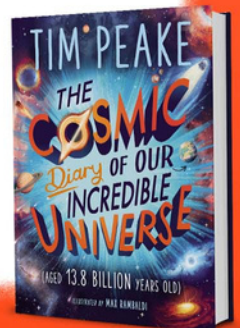
### Post Reading Tasks

#### Activity 1: Create your own Book

Can you show how much you have understood from this amazing book?

- 1) Give the book a new title based on your personal understanding.
- 2) Design a new front cover for the book based on what you liked the most.
- 3) Write a blurb for the book – this is a short summary of everything you really liked from it.

My new title for the book:

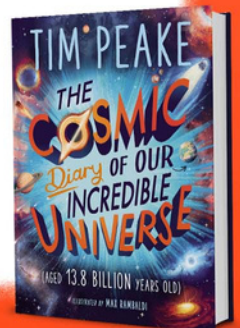
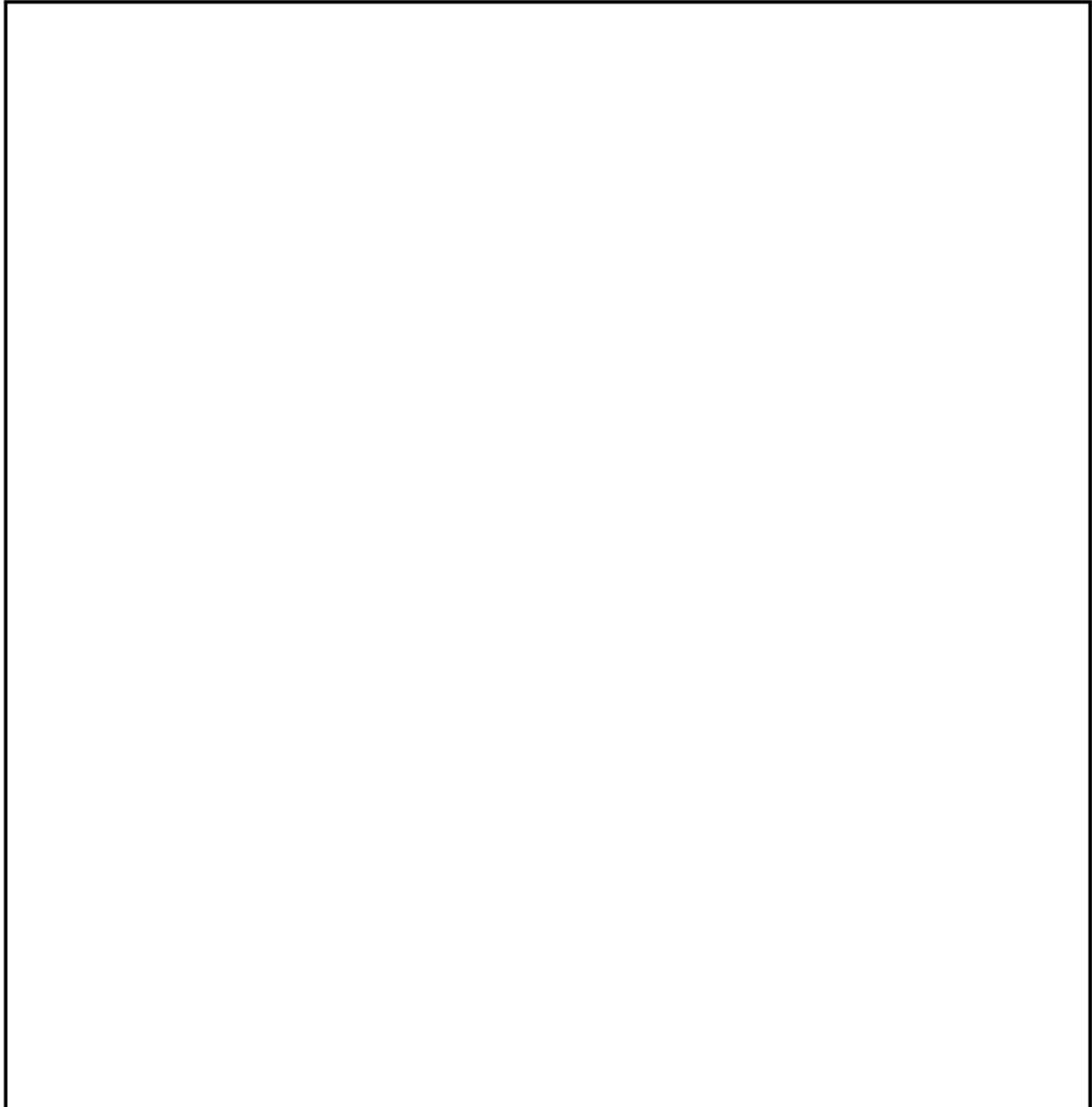




**Theme Six**  
**Post Reading Tasks**

Activity 1: Create your own Book Continued

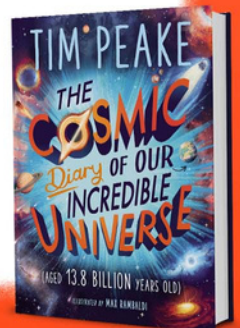
My new book cover:



**Theme Six**  
**Post Reading Tasks**

Activity 1: Create your own Book Continued

My new blurb for the book:



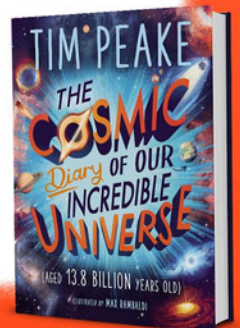


## Theme Six

### Post Reading Tasks

#### Activity 2: Predicting Earth's Future

Imagine you can peer into the future . . . What predictions can you make about planet Earth in the future?



## Theme Six

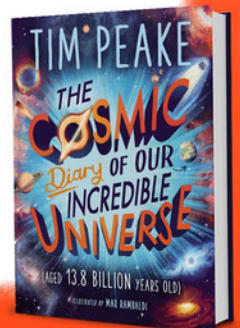
### Post Reading Tasks

#### Activity 3: Let's mingle Definition Match Up Task

Using Extract 9, which is the glossary taken from the back of the book, choose ten words and their definitions. Working in pairs create separate word and definition cards so that you have 20 cards in total.

Now mix them up.

Your mission is to work together to match the word to their definitions as quickly as you can!





## Extract 9 - Glossary

### GLOSSARY

**antimatter:** Tiny particles that cannot come into contact with regular matter without going BOOM!

**asteroid belt:** In our solar system, the region of space between Mars and Jupiter in which most asteroids are found.

**asteroids:** Small, rocky objects orbiting the Sun.

**atmosphere:** The layer of gases surrounding a planet or star.

**atoms:** Tiny particles that make up the basic building blocks of all matter in the Universe.

**Big Bang:** The idea that the Universe began as a single point, then expanded rapidly.

**Big Crunch:** The Big Bang in reverse, with everything in the Universe squashing down into fiery destruction.

**black hole:** A place in space where the gravity is so strong that it pulls all matter into a tiny space.

**planet:** A planet that orbits a full-size black hole.

**brown dwarf:** An object that is smaller than a star and bigger than a planet.

**cell:** The basic building block of animals and plants.

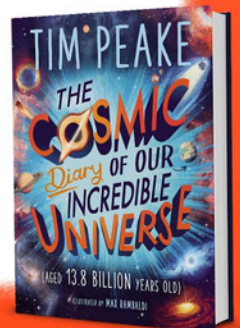
**comet:** A ball-shaped mass, orbiting the Sun, that is made up of frozen gases, rocks, dust and ice.

**constellation:** A group of visible stars that, when viewed from Earth, form a pattern in the sky.

**cosmic inflation:** The fast expansion of the early Universe after the Big Bang.

**Cosmic Microwave Background (CMB):** Leftover radiation from the Big Bang.

Extract taken from *The Cosmic Diary of our Incredible Universe*  
by Tim Peake



## Extract 9 Continued - Glossary

**cosmic rays:** High-energy particles that move through space close to the speed of light.

**cosmic year:** One complete orbit of the Sun around the centre of the Milky Way galaxy (which is equal to 250 million Earth years).

**cosmologist:** Someone who studies cosmology – the origin and development of the Universe.

**cosmos:** The entire physical Universe.

**dark energy:** A form of energy that produces a force which acts in the opposite direction to gravity.

**dark matter:** Matter made of particles that don't reflect, emit or absorb light.

**dwarf planet:** A planet-like object, orbiting the Sun, that is smaller than the planet Mercury.

**electromagnetic spectrum:** The entire range of all types of electromagnetic radiation that exist – gamma rays, X-rays, ultraviolet radiation, visible light, infrared radiation, microwaves and radio waves.

**electromagnetism:** Interaction between electricity and magnetism.

**event horizon:** The part of a black hole where light cannot escape.

**evolution:** The way something develops, adapts and changes over time.

**exoplanets:** Any planet beyond our solar system orbiting a star that is not our Sun.

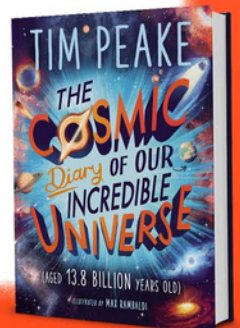
**galaxy:** A collection of stars, gas, dust and dark matter, all held loosely together by gravity.

**gravity:** The force of attraction that pulls things together.

**infinity:** The concept of something that is unlimited or endless.

**interstellar space:** The space between stars in a galaxy.

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## Extract 9 Continued - Glossary

**Kulper Belt:** A ring of ice, icy rocks and comets at the edge of the solar system, beyond the orbit of Neptune.

**Laniakea Supercluster:** A supercluster of galaxies that includes the Milky Way and approximately 100,000 other nearby galaxies.

**light:** A type of energy that travels as electromagnetic waves.

**light year:** The distance light travels in one year.

**Local Group:** The group of more than 20 galaxies that includes the Milky Way and the Andromeda galaxy.

**mass:** The amount of matter in an object.

**matter:** Anything that has mass and takes up physical space.

**meteors:** Meteoroids that enter Earth's atmosphere and burn brightly due to friction with air. Also called shooting stars.

**meteorites:** Meteors that don't burn up completely and manage to land on Earth.

**meteoroids:** Very small asteroids, less than a metre across.

**Milky Way:** Our galaxy.

**moonmoons:** Moons that orbit a planet's moon.

**nebula:** A giant cloud of dust and gas in space.

**neutron star:** The collapsed core of a giant star.

**nuclear force:** The force that holds particles together in an atomic nucleus.

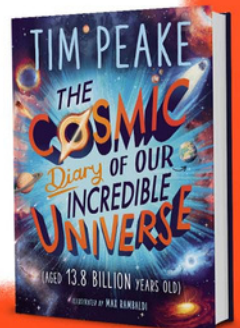
**nuclear fusion:** The fusing together of protons and neutrons to make nuclei.

**observable Universe:** How much of the Universe we can see through our most powerful telescopes.

**Oort Cloud:** A region at the furthest reaches of our solar system.

**orbit:** The continuous movement of one object revolving around another.

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## Extract 9 Continued - Glossary

**particles:** Small bits of matter that make up everything in the Universe.

**periodic table:** A table of all the elements arranged in order of atomic number.

**photons:** Particles of light energy made of electrical and magnetic waves.

**photosynthesis:** The process by which plants make food from water and carbon dioxide, using light energy from the Sun.

**planetesimals:** Small, rocky objects formed when ice, dust and dirt clump together.

**plasma:** A hot, dense gassy mixture of atomic nuclei and electrons.

**plutoid:** A dwarf planet that orbits the Sun beyond the orbit of Neptune.

**pulsar:** A neutron star that spins very fast.

**quark:** One of a group of tiny particles which, when they combine, form other particles such as hadrons, protons and neutrons.

**solar system:** A sun and the planets that move around it.

**star:** A large ball of hot burning matter in space.

**supernova:** The explosion of a star at the end of its life.

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