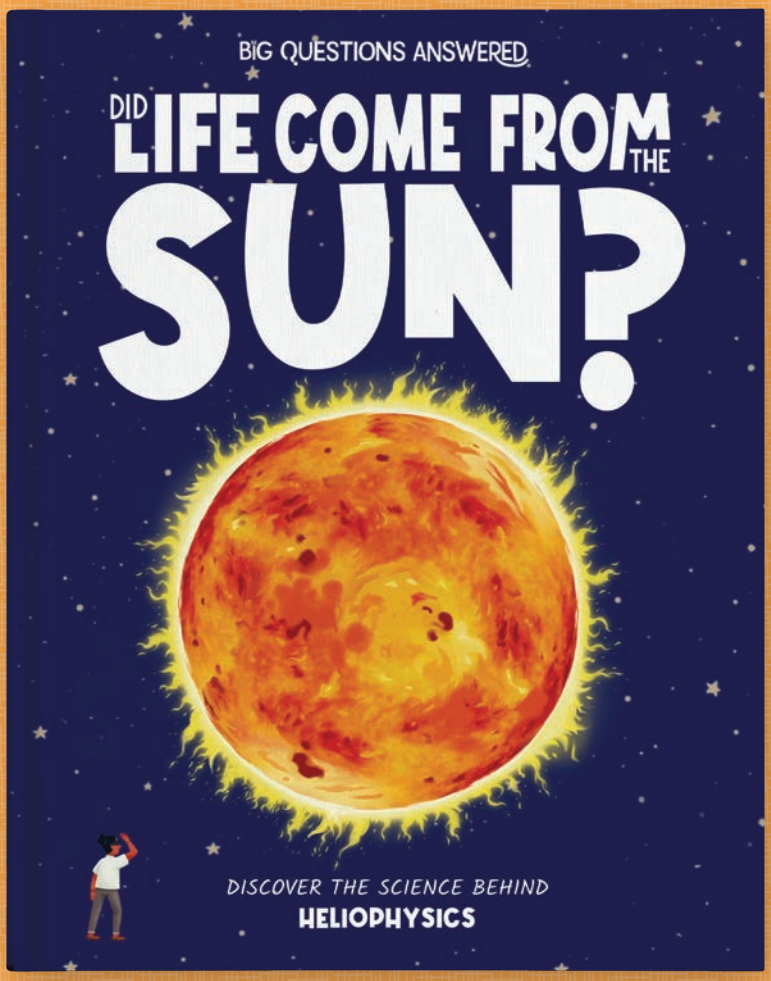
BIG QUESTIONS ANSWERED

TEACHERS' & PARENTS' RESOURCES



Full of thought-provoking questions and fascinating extra information to accompany this book!

CONTENTS:

INTRODUCTION

NOTES FOR TEACHERS, HOME EDUCATORS AND PARENTS

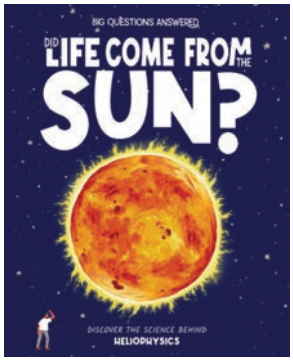
Inspire children's natural curiosity, improve literacy, and have fun learning about different sciences with The Big Questions Answered. Each book in the series is accompanied by a selection of fantastic, **FREE** downloadable resources.

Our **Teachers' and Parents' Resources** booklets are full of ideas for discussions, extra facts, and links to hands-on activities – all great ways to help children explore each field of science and the key topics surrounding them.

Our **Young Scientists' Activity Packs** are a real bonus. They're full of soft-learning, fun activities, all subtly linked to the field of science, that will encourage independent learning. Visit the 'Kids' Zone' to find out more.

Don't forget, on the website you can also download our **'Meet the Scientist' pages** – there's one to accompany each book – and sign up to our newsletter to follow what's coming up next for The Big Questions Answered. Download all these and more at: **www.thebigquestionsanswered.com**

Did Life Come From the Sun? book



Young Solar Physicists' Activity Pack

KEY CURRICULUM TOPICS

The resources related to *Did Life Come From the Sun?* tie in with key curriculum topics including:

- Animals, including humans
- Earth and space
- History
- Plants
- States of matter
- Working scientifically

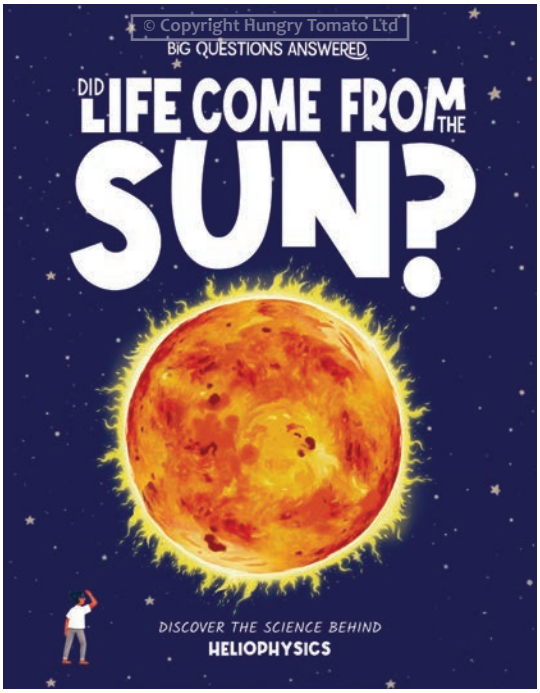
The most relevant topics are indicated throughout this guide.

DID LIFE COME FROM THE SUN?

This book explores the extraordinary world of heliophysics. As well as covering key facts about the Sun, the book also explores the wider field and the way in which the Sun impacts everything around it, including Earth. It looks at the Sun's impact on Earth over time, from ancient Earth to the development of the first signs of life and how the Sun's power sustains and supports life today.

PRE-READING QUESTIONS

Engage in discussion about the general topic of heliophysics and the Sun with the suggested questions below.



- **What do you know about the Sun already?**
- **What would you like to learn about the Sun?**
- **Do you think life as we know it came from the Sun?**
- **If you had the chance, would you travel to outer space? Why or why not?**

THE SUN AND ANCIENT COMMUNITIES: SCENE 1

The material for this scene can be linked to curriculum topics, including:
Animals, including humans; Earth and space; history.

Introduce children to the incredible world of heliophysics and encourage them to share what they know about the Sun. Explore how the Sun has influenced human life for centuries, even in ancient communities.

DISCUSSION PROMPTS

- **What do you know about the Sun already? What are you curious about?**
  Encourage children to discuss what they know about the Sun, and what they may be curious to learn about it.

- **What actually is the Sun?**
  Information overleaf

- **What did ancient communities believe the Sun could do?**
  Information overleaf

ACTIVITY

Corresponding activity on page 3 of the activity pack: 'Fun Sun Words' is an engaging word search that introduces children to Sun- and Earth- related words.

The Sun and Ancient Communities: Scene 1

Relevant Information

Keywords that you may want to pull out and explain have been put into bold.

What is the Sun?

The Sun is a **star** – a huge, glowing ball of **gas** in the middle of our **solar system**.

It is made mostly of two gases in particular, called **hydrogen** and **helium**. It uses these to produce **energy** that provides light and heat to the **planets**.

It is the largest object in the solar system. It is so large that it could fit over one million Earths inside it!

The Sun is a type of star called a **'main sequence star'**. These are the most stable type of star, and are in the middle of their **life cycles**.

Ancient Beliefs about the Sun

For as long as humans have been on Earth, the Sun has shone down on them. Before modern science, people believed lots of different things about it.

Going as far back as ancient Greece, it was thought that Earth was the middle of the solar system and that everything else – including the Sun – **orbited** around it. We now know that it is the other way around. It is the Sun that in the middle!

The summer **solstice** is the longest day of the year. On that day, certain communities would light bonfires to celebrate the Sun and ensure that it shone on their **crops** and led to a large, healthy **harvest**.

Some communities also believed that the Sun had healing powers. In some ways, they were correct.

The human body can use sunlight to create **vitamin D**, which helps to keep bones, teeth, and **muscles** healthy.

But at the same time, spending too much time in the Sun can burn the skin and damage it.

EARLY EARTH: SCENE 2

The material for this scene can be linked to curriculum topics, including:
Animals, including humans; Earth and space; plants.

Introduce children to what Earth was like before life existed. Discuss similarities and differences between early Earth and Earth as we know it today, and when animals and plants first appeared.

DISCUSSION PROMPTS

- **What was Earth like before life existed?**
Information overleaf

- **What were the first animals and plants to develop?**
Information overleaf

- **How does early Earth differ from Earth today?**
Encourage children to discuss similarities and differences between how Earth was before life developed and how it is today.

ACTIVITY

Corresponding activity on page 4 of the activity pack: 'Discovering the Sun's Secrets' is a true or false quiz. Children what they have learnt from reading the main book, as well as their intuition, to fill in the answers.

EARLY EARTH: SCENE 2

RELEVANT INFORMATION

Keywords that you may want to pull out and explain have been put into bold.

EARTH BEFORE LIFE

Early in its history, Earth had no **oxygen** – something that all living things need to breathe. Instead of oxygen, its **atmosphere** was filled with gases like **carbon dioxide** and **methane**. These gases trapped in a lot of heat and stopped it from escaping out into space. Because of this, Earth was very hot. It's possible that temperatures on Earth's surface were as hot as 200 °C (400 °F)!

The carbon dioxide and methane in the atmosphere were likely the results of **volcanic eruptions**. There were a lot more volcanic eruptions in Earth's first few billion years than there are now.

Earth would also be regularly hit by large space rocks floating around the solar system. One of these collisions created the Moon!

THE FIRST PLANTS AND ANIMALS

Earth was formed 4.5 billion years ago. But it wasn't until 500 million years ago that the first animals started to develop.

Sea sponges were among the very first. These sponges were simple creatures that didn't move very much. **Oxygen** levels in the oceans were still low at this stage in Earth's history, but that didn't matter to the sponges. Because they were mostly **immobile**, they didn't need as much oxygen as animals that did move!

The first plants on land emerged over 450 million years ago. Scientists think these plants helped to **absorb** a lot of the carbon dioxide that was in the atmosphere at the time.

Having less carbon dioxide in the atmosphere would have helped to cool Earth down and made it much easier for the earliest animals – both in the water and on land – to develop and survive!

THE POWER OF THE SUN: SCENE 3

The material for this scene can be linked to curriculum topics, including:
Animals, including humans; Earth and space.

Introduce children to the different kinds of energy that the Sun produces and how the Sun is studied. Explore why Earth is the perfect distance from the Sun to support life.

DISCUSSION PROMPTS

- **What kinds of energy come from the Sun?**
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- **What do solar physicists do?**
  Information overleaf

- **What technology do solar physicists use to study the Sun?**
  Information overleaf

ACTIVITY

Corresponding activity on page 5 of the activity pack: 'Solar Scramble' is an activity where children have to unscramble the letters to spell out Sun-related words. In a linked activity, they have to see how many words they can create out of set letters.

THE POWER OF THE SUN: SCENE 3

RELEVANT INFORMATION

Keywords that you may want to pull out and explain have been put into bold.

THE SUN'S ENERGY

The Sun produces lots of energy, called 'solar energy'. Solar energy takes eight minutes to cover the 150 million km (93 million miles) between the Sun and Earth. It travels at **light speed**!

While some of this energy is **visible** to humans as sunlight, most of it is invisible. We feel this invisible energy – also called **infrared** energy or infrared **radiation** – as heat.

Solar energy helps to create the weather on Earth. It warms the **atmosphere** and moves the air around in it. This then creates clouds, the wind, rain, and ocean **currents**.

Earth is at just the right distance from the Sun to be **habitable**. Any closer to the Sun and it would be too hot. Any further away and it would be too cold!

SOLAR PHYSICISTS

Solar physicists are scientists who study the Sun and the effects that it has on Earth.

They use **satellites** and ground-based **telescopes** to observe the Sun's structure, its activity, and how this activity changes from day to day. These satellites and telescopes can see the infrared energy that is invisible to humans!

There are telescopes in **orbit** around Earth – like the Hubble Space Telescope – that can take amazing photographs of other planets.

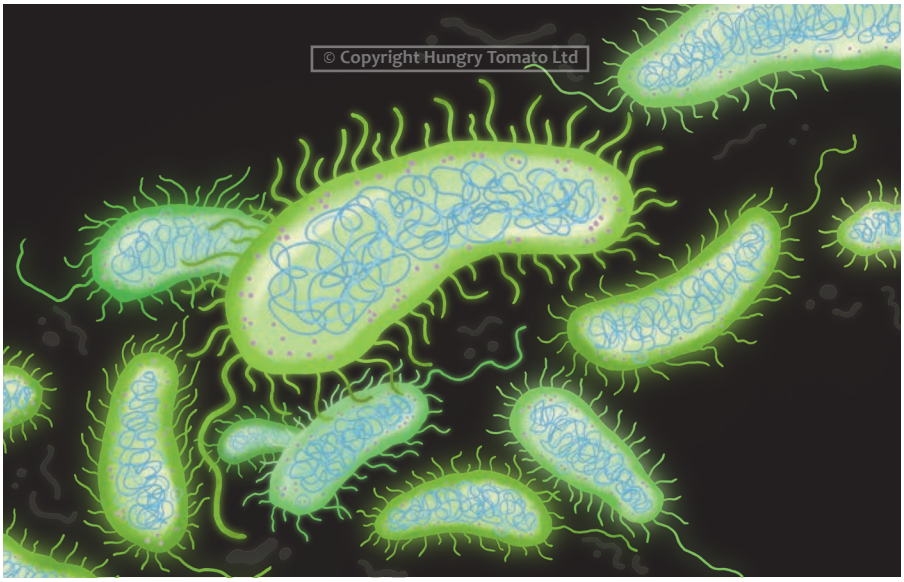
However, solar physicists can't use Hubble to photograph the Sun. If it looked directly at the Sun, its instruments would be damaged by the intense sunlight! The same applies to our own eyes – it is very dangerous to look directly at the Sun.

The Sun is the only star near enough to Earth for solar physicists to study in detail. They can use it to learn more about other **main sequence stars** even further out in space!

FIRST CELLS OF LIFE: SCENE 4

The material for this scene can be linked to curriculum topics, including:
Animals, including humans; living things and their habitats.

Introduce children to cells and their role in the human body. Discuss their importance to all living things and whether all living organisms have the same number of cells.



DISCUSSION PROMPTS

- **What do you think cells are, and what do you think they do?**
Information overleaf

- **Do all living things have the same number of cells?**
Information overleaf

- **What is the largest living land animal?**
Information overleaf

ACTIVITY

Corresponding activity on page 6 of the activity pack: 'Odd Cell Out' is an odd one out activity where children must spot the cell that stands out from the rest.

FIRST CELLS OF LIFE: SCENE 4

RELEVANT INFORMATION

Keywords that you may want to pull out and explain have been put into bold.

CELLS AND THEIR PURPOSE

Cells are the basic building blocks of life. Every single living **organism** has them, and wouldn't exist without them.

Most cells are **microscopic**, meaning that you need a **microscope** in order to see them.

Some organisms, like bacteria, have only one cell. But at the other end of the scale, humans have over 30 trillion. That's more than 100 times the number of stars in the **Milky Way galaxy**!

In the human body, each cell has a specific purpose. They can convert food into energy, help to structure your **skeleton**, ensure that your heart beats – and so much more.

AFRICAN ELEPHANTS

The bigger the living organism is, the more cells it has.

African elephants are the largest land animals alive today. Not only are they very tall, standing up to 4 m (13 feet) high, they are also very heavy. They can weigh as much as 5,500 kg (12,000 lbs).

Scientists think that one African elephant has about the same number of cells as 100 humans!

They have more than 63,000 **nerve cells** in their faces alone. These help the elephant to move its trunk.

An elephant's trunk is used for everything from breathing and smelling, to drinking and grabbing things. It can even be used as a snorkel if an elephant is wading through deep water!

PHOTOSYNTHESIS: SCENE 5

The material for this scene can be linked to curriculum topics, including:
Earth and space; plants.

Introduce children to photosynthesis. Explore how plants use cells to turn sunlight into energy, and what the biggest plants in the world are.

DISCUSSION PROMPTS

- **What do you think photosynthesis is?**
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- **Why do you think it is so important?**
  Information overleaf

- **What do you think the biggest plant in the world is?**
  Information overleaf

ACTIVITY

Corresponding activity on page 7 of the activity pack: 'Lost in the Field' is a line maze activity where children must help the gardener reach their flowers.

PHOTOSYNTHESIS: SCENE 5

RELEVANT INFORMATION

Keywords that you may want to pull out and explain have been put into bold.

PHOTOSYNTHESIS

Photosynthesis is a very important part of the natural world, carried out mostly by plants.

Plants **absorb** light from the Sun and **carbon dioxide** from the air through their leaves, as water from the soil through their roots.

The cells inside the plants turn the absorbed light, carbon dioxide, and water into **energy** and **oxygen**.

Photosynthesis ensures that plants have enough energy to grow healthily. If they didn't, it would affect the whole **food chain** – including humans! It also produces a lot of the **oxygen** in the air that we need to breathe.

SELF-CLONING SEAGRASS

The record for the largest living plant in the world belongs to a type of **seagrass** called *Posidonia australis*.

It can be found in shallow water off the coast of Australia and stretches for over 180 km (112 miles). Scientists think it is over 4,500 years old!

The reason this seagrass is so big is because it is **self-cloning** and is making identical copies of itself! This is why it's considered to be just one plant rather than lots of individual ones.

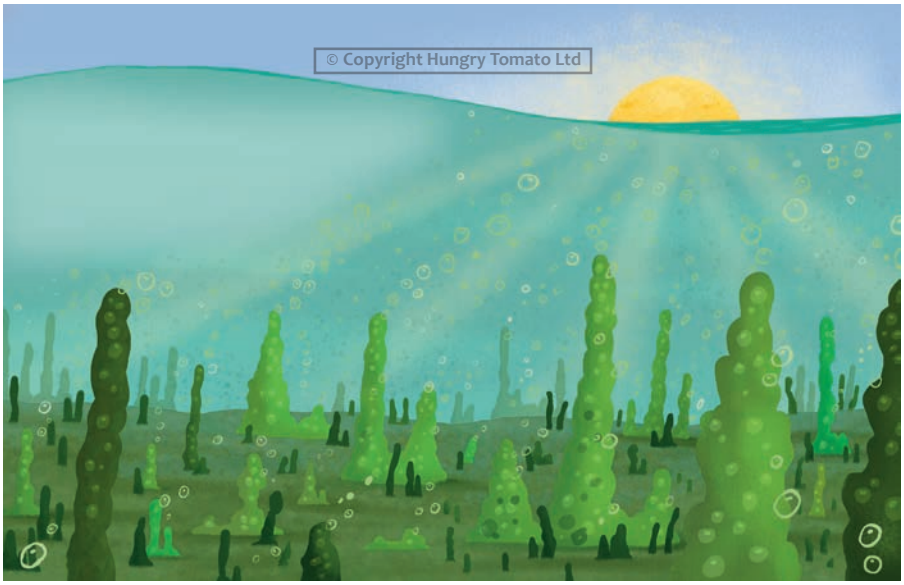
The seagrass used to be even bigger than it is now, but a **heatwave** damaged a significant portion of it. It is growing back, but only very slowly.

It is an important habitat for lots of **species** of animals, including seahorses, turtles, and even penguins!

THE GREAT OXIDATION EVENT: SCENE 6

The material for this scene can be linked to curriculum topics, including:
Animals, including humans; living things and their habitats.

Introduce children to what oxygen is and why it is so important. Explore what the Great Oxidation Event was and how it helped to transform Earth into a place where life can thrive.



DISCUSSION PROMPTS

- **What is oxygen?**
Information overleaf

- **What do you think the Great Oxidation Event was?**
Information overleaf

- **Do all living things need oxygen to breathe?**
Information overleaf

ACTIVITY

Corresponding activity on page 8 of the activity pack: 'Solar-Powered Exploration' is a reflective writing activity where children must think about what they have learnt so far and answer the questions provided.

THE GREAT OXIDATION EVENT: SCENE 6

RELEVANT INFORMATION

Keywords that you may want to pull out and explain have been put into bold.

THE IMPORTANCE OF OXYGEN

Oxygen is an invisible **gas** that has no smell.

Despite only making up 20% of Earth's **atmosphere** – which is made mostly of another invisible gas called **nitrogen** – oxygen is incredibly important to all living things.

It helps **cells** inside our bodies to turn food into the **energy** that we need to survive. Of course, we also need it to breathe!

THE GREAT OXIDATION EVENT

Early in Earth's 4.6 billion-year-long history, the atmosphere didn't have much oxygen in it. Instead, it was likely made of other gases like **carbon dioxide** and **methane**.

Nearly 3 billion years ago, a type of **bacteria** called cyanobacteria developed in the ocean. Helpfully, cyanobacteria could perform **photosynthesis**! It absorbed light from the Sun and turned it into energy, producing oxygen in the process.

As more and more oxygen was produced, it started to escape from the water into the atmosphere.

This Great Oxidation Event made it possible for life on Earth to flourish!

HENNEGUYA SALMINICOLA

Most living things need oxygen to breathe – but not all!

Henneguya salminicola is a tiny kind of **parasite** that is related to jellyfish and latches onto salmon. It has less than ten **cells** and doesn't need oxygen.

It did breathe oxygen at one point in its history, but has lost this ability over time.

Scientists don't fully understand how it gets its energy if it doesn't breathe oxygen. But it's possible it gets its energy from its **host** instead.

GIANT INSECTS: SCENE 7

The material for this scene can be linked to curriculum topics, including:
Animals, including humans; living things and their habitats.

Introduce children to the amazing giant insects that lived on Earth millions of years ago. Explore why they grew to such huge sizes and why they don't exist anymore.

DISCUSSION PROMPTS

- **How would you feel if you saw a scorpion that was the size of a cat, or a dragonfly the size of a hawk?**
Encourage children to visualise what these giant insects might have looked like and make comparisons with insects that they can see now.

- **Why do you think these insects grew so big?**
Information overleaf

- **Why do you think they don't exist anymore?**
Information overleaf

ACTIVITY

Corresponding activity on page 9 of the activity pack: 'Curious Creatures' is a symmetry drawing activity where children must complete the drawing of the prehistoric scorpion.

GIANT INSECTS: SCENE 7

RELEVANT INFORMATION

Keywords that you may want to pull out and explain have been put into bold.

GIANT INSECTS

Millions and millions of years ago, huge **insects** used to called Earth home.

Among these insects was a huge **invertebrate** that was similar to a millipede – except it was over 2.5 m (8 feet) long!

The largest scorpion alive today is 23 cm (9 inches) long. But one used to wander Earth that was over twice as long and was the same size as a cat.

There was also a huge dragonfly with a wingspan of 70 cm (27 inches)!

HUNGRY FOR OYXGEN

There was more **oxygen** in the **atmosphere** at the time that these giant insects existed – it made up 30% of the atmosphere then, compared to 20% today.

A lot of insects absorb oxygen through small holes in their bodies rather than through lungs.

Having more oxygen in the atmosphere meant that the insects could absorb more, and therefore grow bigger.

However, taking in too much oxygen is actually **poisonous**! Having a larger body meant that the giant insects could deal with this problem better.

THE RISE OF BIRDS

When these giant insects first appeared, they were at the top of the **food chain**.

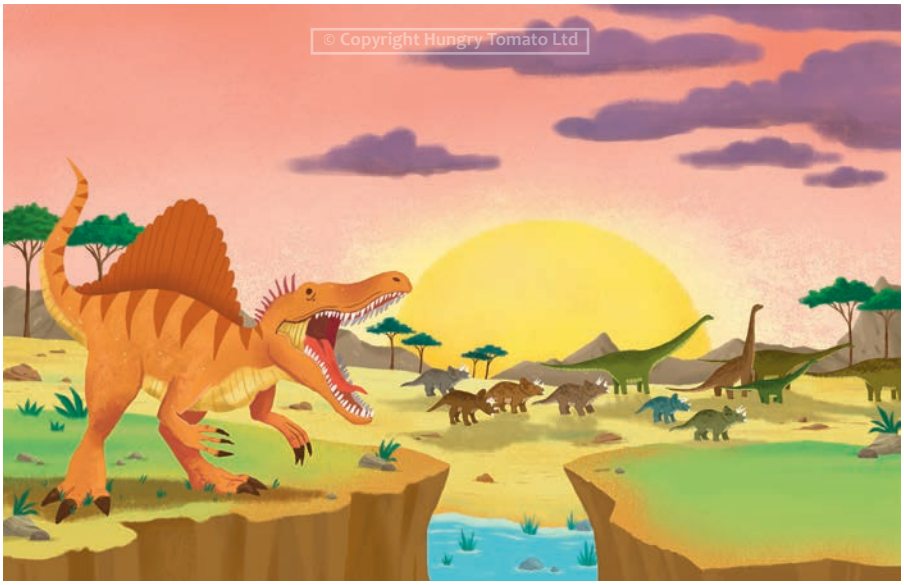
However, this changed when birds started to develop. The size of the insects became a weakness because birds were smaller, lighter, and more **agile**.

The giant insects found it hard to compete for food and ended up having to shrink over time, until they reached the sizes that we are familiar with today.

EXPLOSION OF LIFE: SCENE 8

The material for this scene can be linked to curriculum topics, including:
Animals, including humans; living things and their habitats; plants.

Introduce children to the incredible dinosaurs that roamed the Earth and how long they lived for. Explore what caused them to become extinct and how scientists are able to study them.



DISCUSSION PROMPTS

- **What were the dinosaurs?**
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- **Why do you think the dinosaurs do not exist anymore?**
  Information overleaf

- **How do we know that dinosaurs existed?**
  Information overleaf

ACTIVITY

Corresponding activity on page 10 of the activity pack: 'Dinosaur Mix-Up' is a task where children match the name and description of a dinosaur with its photograph.

EXPLOSION OF LIFE: SCENE 8

RELEVANT INFORMATION

Keywords that you may want to pull out and explain have been put into bold.

WHAT WERE THE DINOSAURS?

Dinosaurs were a group of **reptiles** that lived on land a long time ago. They came in all shapes and sizes, and lived all around the world.

Not all dinosaurs lived at the same time. Some appeared a long time before others.

The earliest dinosaurs – like the long-legged Herrerasaurus – date back to between 251 and 201 million years ago during a time period called the **Late Triassic**.

Stegosaurus was among the dinosaurs that lived in the **Jurassic Period**, between 201 and 145 million years ago.

Tyrannosaurus rex, the most famous dinosaur of all, walked the Earth between 145 and 66 million years ago during the **Cretaceous Period**.

THE END OF THE DINOSAURS

66 million years ago, a huge **asteroid** hit Earth.

The impact threw lots of **debris** and **ash** into the **atmosphere**, which blocked light from the Sun.

As a result, plants struggled to **photosynthesize** and couldn't grow properly. This led to the dinosaurs not being able to find enough food.

The **food chain** collapsed, and the dinosaurs became **extinct**!

FOSSIL HUNTING

Despite the last dinosaurs going extinct 66 million years ago, scientists in the present day can still study them.

This is thanks to **fossils**, which are the remains of **prehistoric** animals or plants **preserved** in rock. It is very rare for the complete skeleton of a dinosaur to be found – they often have to be put together piece by piece like a giant jigsaw puzzle!

THE SUN'S INFLUENCE: SCENE 9

The material for this scene can be linked to curriculum topics, including:
Everyday materials; light; plants.

Introduce children to different kinds of plants that thrive in different levels of sunlight. Explore how greenhouses use sunlight to help the plants growing inside them.

DISCUSSION PROMPTS

- **Have you ever tried to grow your own fruit or vegetables? What kinds**
- **were they?**

Encourage children to discuss their experiences with trying to grow their own food.

- **Do you think all plants need the same amount of sunlight?**

Information overleaf

- **What do you think a greenhouse is?**

Information overleaf

ACTIVITY

Corresponding activity on page 11 of the activity pack: 'Sneaky Sun' is a spot the difference activity where children must spot the eight differences in the two scenes provided.

THE SUN'S INFLUENCE: SCENE 9

RELEVANT INFORMATION

Keywords that you may want to pull out and explain have been put into bold.

LIGHT AND SHADE

Some plants need more sunlight than others.

As their name suggests, 'full-Sun plants' like cactuses do best when they grow in direct sunlight. This makes cactuses perfectly suited to the hot, dry **deserts** where they are usually found.

Because cactuses don't have leaves, which are what plants usually use to **photosynthesize**, they had to **adapt**. Instead of leaves, they use large **stems** to absorb sunlight instead.

Other plants – like different kinds of ferns – prefer to grow partly in the **shade**. They do still need light from the Sun, but also need protection from when the Sun is at its strongest in the middle of the day.

WHAT IS A GREENHOUSE?

Greenhouses are structures with walls and a roof made from **transparent** materials like glass or plastic. This lets in as much sunlight as possible.

The things inside the greenhouse – like plants, soil, and water – absorb the sunlight and turn it into heat. This heat is then released.

Heat energy can't pass through glass or plastic as well as light can, so it gets trapped inside the greenhouse.

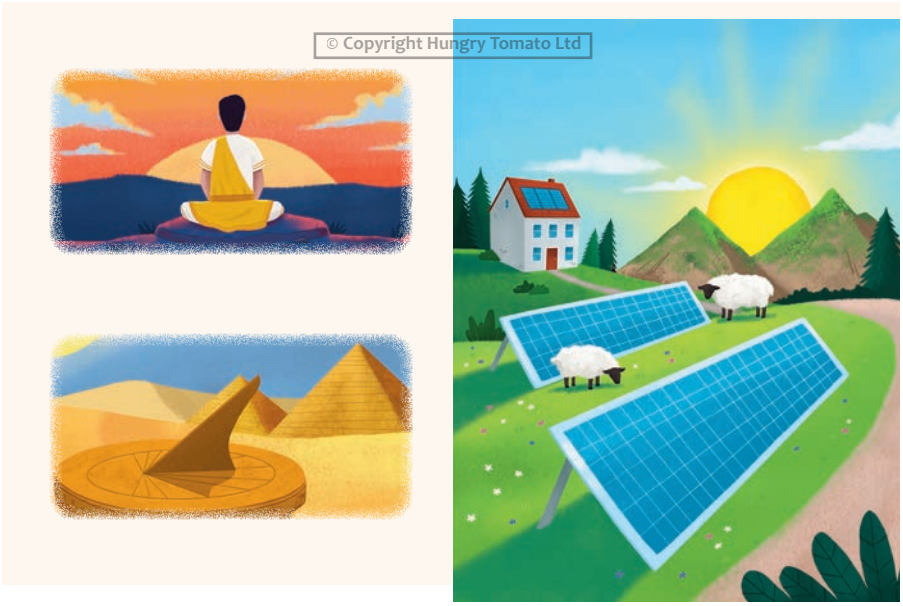
This keeps the greenhouse a consistently warm **temperature** and means that gardeners can grow fruits, vegetables, flowers, and other plants in it all year round – even if it's cold and windy outside!

While this is the main purpose of greenhouses, they can also be used to help protect plants from **pests** like insects and other animals that would normally try to eat them.

THE HUMAN CONNECTION: SCENE 10

The material for this scene can be linked to curriculum topics, including:
Electricity; history; light; seasonal changes

Introduce children to what renewable energy is and why it is so important. Explore what solar panels are and how they convert light from the Sun into energy.



DISCUSSION PROMPTS

- **What do you think a sundial is?**
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- **What do you think renewable energy is?**
  Information overleaf

- **What do you think solar panels are used for, and why?**
  Information overleaf

ACTIVITY

Corresponding activity on page 12 of the activity pack: 'Super Sun Facts' is a classic activity where children fill in the blanks in a series of sentences and facts about the Sun.

THE HUMAN CONNECTION: SPREAD 10

RELEVANT INFORMATION

Keywords that you may want to pull out and explain have been put into bold.

WHAT ARE SUNDIALS?

Sundials are devices used to tell the time, based on the position of the Sun in the sky. They were the first proper way for humans to measure time, with the earliest known sundial coming from **ancient Egypt** over 3,500 years ago!

They consist of two parts: a flat plate split into twelve sections, each representing an hour, and a stick. As the Sun moves across the sky, the stick casts a **shadow** on a different section and indicates what time of day it is.

RENEWABLE ENERGY

For a long time, humans relied on **fossil fuels** like coal, gas, and oil to generate power and energy.

However, there are only limited amounts of fossil fuels on Earth – one day they're going to run out! They also contribute to **climate change**, which is heating our planet up more and more.

Renewable energy, on the other hand, is energy made from natural resources like wind, water – and even sunlight. Because they will never run out, they are very **sustainable** and much better for our planet.

WHAT ARE SOLAR PANELS?

Solar panels convert light from the Sun into **electricity** and heat.

However, the amount of energy that solar panels produce can vary depending on the weather. While they can still work on cloudy days, they are not as **efficient** as they would be on a bright, clear, sunny day.

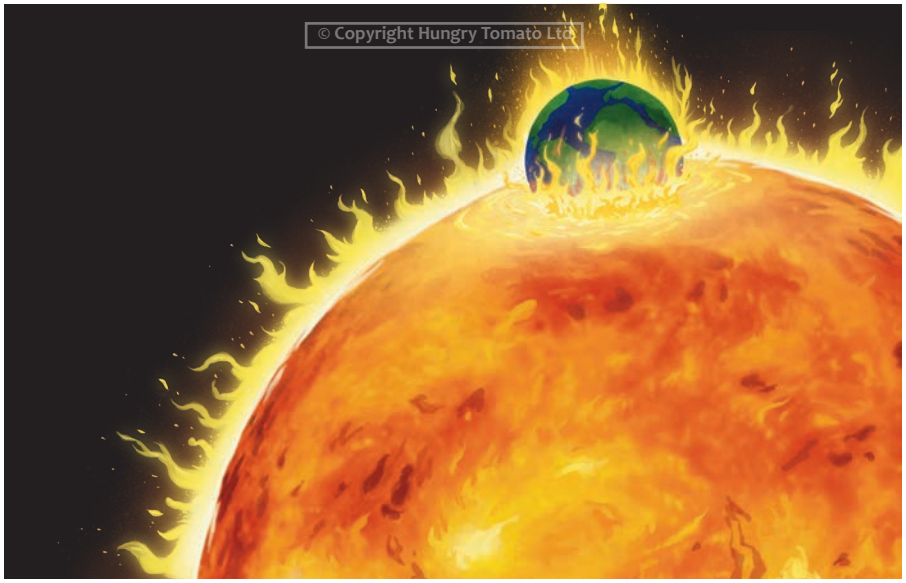
However, rain can actually help solar panels! It keeps them clean by washing away bits of dirt and dust.

It's not just on Earth that solar panels are used. Many spacecraft in **orbit** around our planet rely on solar panels to create the power that they need to work.

THE FUTURE OF THE SUN: SCENE 11

The material for this scene can be linked to curriculum topics, including:
Earth and space.

Introduce children to the different types of stars that exist in space. Explore which type the Sun will turn into, and what this could mean for Earth.



DISCUSSION PROMPTS

- **What do you think our planet would look like without the Sun?**

Encourage children to discuss what they think Earth would be like to live on if the Sun didn't exist – if it is possible to live at all.

- **What is a red giant star?**

Information overleaf

- **What do you think the life cycle of a star is like?**

Information overleaf

ACTIVITY

Corresponding activity on page 13 of the activity pack: 'Cosmic Journey' is a creative writing activity which encourages children to imagine they are on a mission to explore the solar system, and describe it in a diary entry.

THE FUTURE OF THE SUN: SCENE 11

RELEVANT INFORMATION

Keywords that you may want to pull out and explain have been put into bold.

THE SUN'S FUTURE

Scientists think that in five billion years, the Sun will run out of the **hydrogen** and **helium** that it uses as **fuel** to produce **energy**.

When this happens, the Sun will turn from a **main sequence star** into a red giant star.

It will start to expand until it is up to 1,000 times wider than it is today. This will spread the energy that it still has left over a much larger **area** and cool the Sun down.

Because it will be so wide, scientists think that it will swallow up the planets nearest to it – which might include Earth!

DIFFERENT TYPES OF STARS

As well as **main sequence stars** and **red giants**, there are several other kinds of stars, including:

- White dwarf stars: After a red giant star has expanded, it loses its outer layers and turns into a white dwarf. Only its **core** is left behind, which is about the same size as Earth.

- Neutron stars: Neutron stars are what remains after a massive star explodes. They are very small, usually measuring 20 km (12 miles) across, but they are very **dense**. A spoonful of a neutron star weighs as much as Mount Everest!

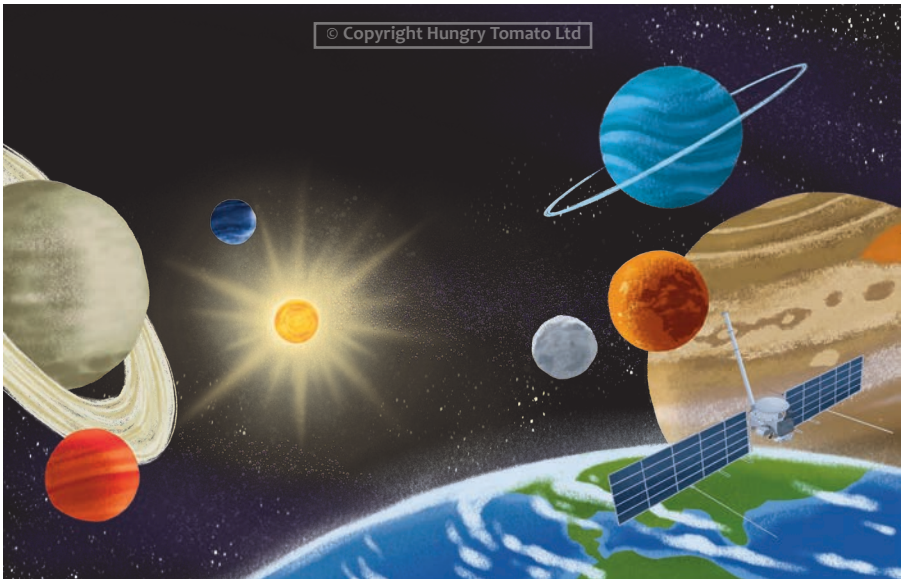
- Red dwarf stars: These are a small type of main sequence star. They are the most common type of star in the **solar system** and have a lifespan that is a lot longer than our Sun's.

- Blue giant stars: Blue giants are the hottest of all stars. They burn through a lot of **energy** and use up all of their **fuel** very quickly. Their lifespan is the shortest of any star.

LIFE BEYOND EARTH: SCENE 12

The material for this scene can be linked to curriculum topics, including:
Earth and space.

Introduce children to the different planets that make up our solar system. Explore which one has the most moons and which one has the largest volcano.



DISCUSSION PROMPTS

- **What planets are there in our solar system?**

Encourage children to name the planets in our solar system. There is also information overleaf.

- **Do you think there may be life on other planets in our solar system?**

Encourage children to discuss what they think life needs in order to exist, and whether they think there could be life elsewhere in the solar system.

ACTIVITY

Corresponding activity on page 14 of the activity pack: 'Pick a Favourite Planet' is a fact file activity where children must research a planet and find out as many fun facts as they can.

LIFE BEYOND EARTH: SCENE 12

RELEVANT INFORMATION

Keywords that you may want to pull out and explain have been put into bold.

PLANETS IN OUR SOLAR SYSTEM

There are eight **planets** in our **solar system**, including Earth. There used to be nine! Pluto was considered a planet until scientists decided that it wasn't big enough. They now call it a **dwarf planet** instead.

Starting closest to the Sun, the planets in our solar system include:

- **MERCURY:** The smallest planet in the solar system. It has no **atmosphere** and is very hot during the day and freezing cold at night.

- **VENUS:** Similar in size to Earth but covered in thick clouds of **gas**. It is the hottest planet due to its thick atmosphere trapping in heat.

- **EARTH:** Our home planet, the only one known to support life! It has water, land,
- and air.

- **MARS:** Known as the 'Red Planet' because of its rusty surface. It has the largest **volcano** and **canyon** in the solar system.

- **JUPITER:** The largest planet, made mostly of gas. It has a famous storm called the Great Red Spot and over 95 **moons**!

- **SATURN:** Famous for its stunning rings made of ice and rock. It has the most moons of any planet in the solar system, with over 270!

- **URANUS:** A **gas giant** that spins on its side and looks blue due to the large amounts of **methane** in its atmosphere.

- **NEPTUNE:** The farthest planet from the Sun, known for being deep blue and having strong winds.

OUR SUN: SCENE 13

The material for this scene can be linked to curriculum topics, including:
Earth and space.

Introduce children to Proxima Centauri, which is the next nearest star to Earth after the Sun. Explore the spacecraft that was sent to learn more about the Sun, the incredible speeds it reached, and the temperatures it had to withstand.

DISCUSSION PROMPTS

- **How far away do you think the next nearest star to Earth is, after the Sun?**
Information overleaf

- **Do you think a spacecraft would be able to explore the Sun?**
Information overleaf

ACTIVITY

Corresponding activity on page 15 of the activity pack: 'A Message From the Stars!' is a code-breaking activity where children have to align symbols and letters to decipher a message from a solar physicist.

OUR SUN: SCENE 13

RELEVANT INFORMATION

Keywords that you may want to pull out and explain have been put into bold.

PROXIMA CENTAURI

After the Sun, the next nearest **star** to Earth is called Proxima Centauri.

It is located 4.2 **light-years** away from Earth. One light-year is the distance that light travels in one year.

It is a **red dwarf** star, the most common type, and is seven times smaller than the Sun. It also isn't bright enough to be seen from Earth.

Despite being smaller, scientists think that Proxima Centauri will have a **lifespan** longer than the Sun's – possibly up to four trillion years!

PARKER SOLAR PROBE

The Parker Solar Probe is an amazing spacecraft that was launched in 2018 on a mission to explore the Sun.

In 2024 it flew closer to the Sun than any other spacecraft before it. The probe flew into the Sun's outer **atmosphere**, just 6.1 million km (3.8 million miles) above the surface.

In the process of making its closest approach to the Sun, the Parker Solar Probe became the fastest human-made object in history. It flew at an incredible 430,000 mph (692,000 kph)!

Because of the intense heat and **radiation** from the Sun, the Parker Solar Probe had to be very tough. It used a **heatshield** to successfully withstand temperatures of up to 1000 °C (1800 °F)!

It collected lots of important data about the Sun's atmosphere, which could help scientists further study its effects on Earth.

POST-READING QUESTIONS

Engage in discussion about the journey taken throughout the book and the facts that were uncovered, with the suggested questions below.

- **Were you surprised to learn that life does come from the Sun?**
- **Did anything else in the book surprise you?**
- **What's the coolest thing you've learnt from this book?**

ACTIVITY

Corresponding activity on page 16 of the activity pack: 'Write Your Own Heliophysics Story' is a creative writing activity which encourages children to write a story about Heliophysics using three key prompt words.

DISCLAIMER:

Every effort has been made to ensure the information in this booklet is correct as of the time of publication, Autumn 2025.

THE BIG QUESTIONS ANSWERED

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