BIG QUESTIONS ANSWERED

TEACHERS' & PARENTS' RESOURCES

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

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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**

Are Meteors the Fastest Things in Outer Space? book

Young Meteoriticists' Activity Pack

KEY CURRICULUM TOPICS

The resources related to *Are Meteors the Fastest Things in Outer Space?* tie in with key curriculum topics including:

- Animals including humans
- Earth and space
- Forces
- Geography
- History
- Rocks
- States of matter
- Working scientifically

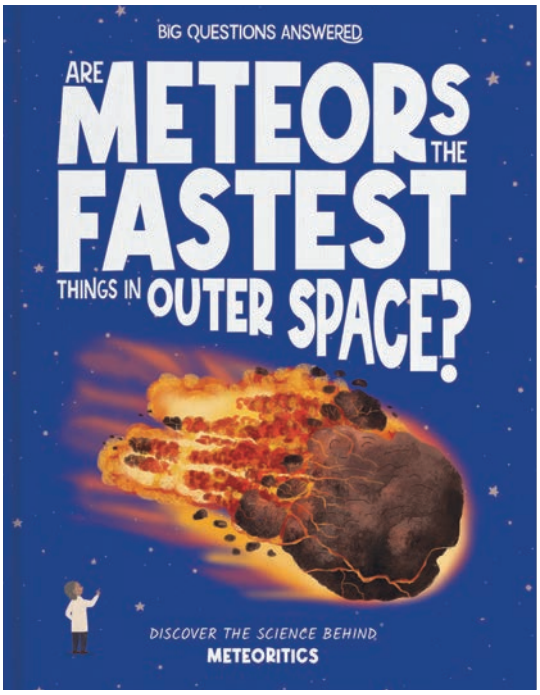
The most relevant topics are indicated throughout this guide.

ARE METEORS THE FASTEST THINGS IN OUTER SPACE?

This book launches into the extraordinary world of meteoritics by exploring whether these speedy space rocks are really the fastest things in our solar system. As well as covering the incredible speeds that meteors reach, the book also dives into their journey through space and the secrets that they could reveal.

PRE-READING QUESTIONS

Engage in discussion about the general topic of meteoritics and meteors with the suggested questions below.



- **What do you know about meteors already?**
- **What do you want to find out about meteors?**
- **Do you think meteors are the fastest things in outer space?**
- **What is the fastest thing that you can think of?**

THE 1833 METEOR SHOWER: SCENE 1

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

Introduce children to the incredible world of meteoritics and encourage them to share what they know about meteors. Explore the amazing meteor shower of 1833 and how people thought about meteors at the time.

DISCUSSION PROMPTS

- **What do you know about meteors already?**
Encourage children to discuss what they know about meteors, and what they may be curious to learn about them.

- **What actually are meteors?**
Information overleaf

- **What did people think meteors were at time of the 1833 meteor shower?**
Information overleaf

ACTIVITY

Corresponding activity on page 3 of the activity pack: 'Diary Entry' is a creative writing activity which encourages children to imagine they witnessed the 1833 meteor shower, and describe it in a diary entry.

THE 1833 METEOR SHOWER: SCENE 1

RELEVANT INFORMATION

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

METEORS, METEORITES, AND METEOROIDS

The small pieces of rock that occasionally shoot across the night sky as a bright streak of light have different names, depending on where in their journey from outer space they are.

In space, small chunks that have broken off **comets** or **asteroids** are called **meteoroids**. They float around freely until pulled towards a **planet** like Earth by its **gravity**.

As soon as a meteoroid starts to fall through Earth's **atmosphere**, scientists called it a **meteor**.

If a meteor survives the intense heat of its descent through the atmosphere and manages to land on the surface of Earth, then it is called a **meteorite**!

BELIEFS ABOUT METEORS

Although we know now that meteors are rocks from outer space, that wasn't always the case.

Hundreds of years ago, there were people who didn't realise that meteors were rocks in the first place, let alone that they came from space. They instead thought that they were signs of bad things to come.

Others correctly thought that they were rocks. However, rather than being from space, they believed that they were rocks from Earth that had been thrown high into the air by a **volcanic eruption** or a **hurricane**.

It was thanks to scientists like Denison Olmsted that the true origin of meteors was discovered.

Denison Olmsted watched the Great Meteor Storm of 1833 and noticed that all of the meteors seemed to come from a point in one specific **constellation** of stars. As the stars moved across the night sky, so did that point.

Olmsted created the science of meteoritics, which helped us learn so much about these fascinating space rocks.

METEOR SHOWERS: SCENE 2

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

Introduce children to meteor showers and why they happen. Discuss how often meteor showers happen, and how often meteors fall to Earth.

DISCUSSION PROMPTS

- **What are meteor showers?**
Information overleaf

- **How many meteorites fall to Earth each year?**
Information overleaf

- **Have you ever spotted a meteor?**
Encourage children to discuss whether they have ever seen a meteor and how they felt when they saw it.

ACTIVITY

Corresponding activity on page 4 of the activity pack: 'Cosmic Words' is a fun word search activity that introduces children to meteoritics-related words.

METEOR SHOWERS: SCENE 2

RELEVANT INFORMATION

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

METEOR SHOWERS AND STORMS

Meteor showers are when lots of meteors fall through Earth's **atmosphere** over a relatively short period of time.

This higher intensity of meteors is caused when Earth travels through the **debris** left behind by a **comet** as it circles the Sun. This debris includes many tiny pieces of dust and rock – **meteoroids**!

Very intense meteor showers can be called 'meteor storms'.

While people on Earth would be lucky to spot only two or three meteors each hour on a normal night, during a meteor shower or meteor storm this can increase to 100 meteors an hour!

HOW OFTEN DO METEORITES LAND ON EARTH?

Scientists think that hundreds of thousands of meteors and other pieces of space debris enter Earth's atmosphere every year.

However, most of these meteors are not big enough to survive the journey. Because they are so small, they can't withstand the incredible heat and burn up high in the atmosphere. These are what we call 'shooting stars'.

Only a few thousand meteors manage to make it through, every year.

But because over 70% of Earth is covered in water, the chances are that most of these survivors will land in the ocean rather than on solid ground.

Finding the meteorites that have landed on solid ground is very tricky because of their tiny size, so it is hard to say precisely how many do so each year. But scientists are always looking!

THE ASTEROID BELT: SCENE 3

The material for this scene can be linked to curriculum topics, including:
Earth and space; forces; light; rocks; states of matter.

Introduce children to the asteroid belt, where bumps and collisions create countless meteoroids. Explore where in the solar system the asteroid belt is, and the other places that meteoroids can come from.

DISCUSSION PROMPTS

- **Do you know where the asteroid belt is?**
  Information overleaf

- **Where else can meteoroids come from, apart from asteroids?**
  Information overleaf

ACTIVITY

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

THE ASTEROID BELT: SCENE 3

RELEVANT INFORMATION

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

WHERE IS THE ASTEROID BELT?

The asteroid belt is an area between Mars and Jupiter that contains millions of scattered space rocks.

Scientists think that the rocks in the asteroid belt are left over from when the **solar system** was formed billions of years ago.

While most of these rocks are quite small, some are huge – like Ceres, which used to be labelled as an asteroid but is now called a **dwarf planet**!

Collisions between asteroids in the belt create meteoroids, some of which drift away into space and fall through Earth's atmosphere.

The asteroid belt is not the only region of space filled with rocks! The **Kuiper belt**, found beyond Neptune, is also packed with millions of rocky objects, including dwarf planets like Pluto.

WHERE ELSE CAN METEOROIDS COME FROM?

Meteors don't just come from asteroids. They can also come from **comets**!

Comets are icy 'cosmic snowballs' made of frozen ice and dust. They are as old as the solar system itself!

If they fly near the Sun, they start heating up. The ice melts and turns into gas, creating a huge, bright 'tail' that can sometimes be seen from Earth.

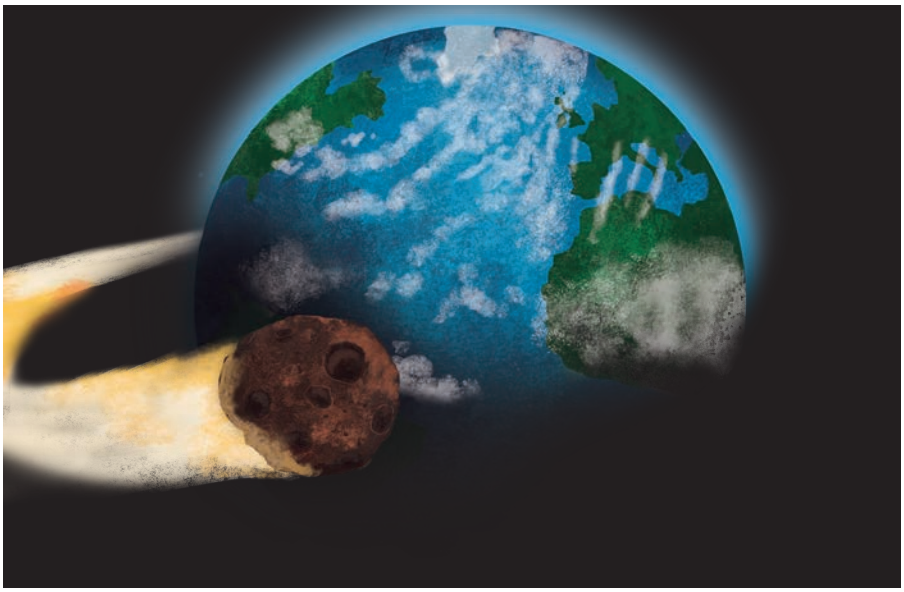
These tails also contain pieces of rock and dust that cause meteor showers if they fall to Earth!

However, most meteorites that land on Earth come from asteroids, not comets. The debris from comets is a lot more delicate and fragile, and is much more likely to burn up in the atmosphere.

THE PULL OF GRAVITY: SCENE 4

The material for this scene can be linked to curriculum topics, including:
Forces; history; working scientifically.

Explore the discovery of gravity with this scene which focuses on how meteoroids are pulled towards Earth. Discuss what the fastest crewed plane in history is and why some of its pilots were called 'astronauts'.



DISCUSSION PROMPTS

- **What is gravity?**
Information overleaf

- **Do you know the scientist who discovered gravity?**
Information overleaf

- **What is the fastest crewed plane in history?**
Information overleaf

ACTIVITY

Corresponding activity on page 6 of the activity pack: 'Draw Your Own Plane' is a creative drawing activity where children imagine they are an engineer designing the fastest plane in the world, and draw a scene to show off their invention.

THE PULL OF GRAVITY: SCENE 4

RELEVANT INFORMATION

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

WHAT IS GRAVITY?

Gravity is an invisible force that pulls objects towards each other. It keeps our feet on the ground and, by pulling together **gas** and dust in space, it creates **stars**, planets, and even **galaxies**!

Gravity is not the same on all planets or moons. An astronaut could jump a lot higher on Earth's Moon than they could on Neptune, because gravity on the Moon is a lot weaker!

WHO WAS ISAAC NEWTON?

Isaac Newton was a famous mathematician and scientist from the 17th century.

After watching an apple fall from a tree, Newton wondered why the apple fell straight down rather than falling sideways or upwards.

This observation led him to discover the laws of motion, including gravity, which are the foundations of many fields of science!

THE X-15

The fastest **crewed** plane in history was called the X-15. It reached an amazing top speed of 4,534 mph (7,296 kph)!

Rather than taking off from a runway, the X-15 was attached underneath the wing of a larger plane. Once the larger plane was at the right **altitude**, the X-15 was released – and away it zoomed!

To go so fast, the X-15 needed to be as light as possible. Launching it this way meant it didn't have to carry as much fuel as it would if it took off like a normal plane.

As well as flying very fast, it also flew very high. It flew so high, in fact, that it passed the **Kármán Line** and technically flew into space – the pilots became astronauts!

SHOOTING STARS: SCENE 5

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

Discuss the concept of where space begins with this scene about meteors making their fiery descent through the atmosphere. Explore which other planets in the solar system also have atmospheres.

DISCUSSION PROMPTS

- **Where does the atmosphere end and space begin?**
  Information overleaf

- **Do you know which other planets have atmospheres?**
  Information overleaf

- **How many different planets can you name?**

ACTIVITY

Corresponding activity on page 7 of the activity pack: 'Solar System Secrets' is a classic activity where children fill in the blanks in a series of sentences and facts about space, planets, and amazing scientific discoveries.

SHOOTING STARS: SCENE 5

RELEVANT INFORMATION

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

THE KÁRMÁN LINE

The Kármán Line is the name that some scientists give to an imaginary point 100 kilometres (60 miles) above sea level where Earth's **atmosphere** officially ends and outer space begins.

Above this point, normal planes can't fly because there is no air for their wings to create **lift**. Instead, spacecraft and special planes like the X-15, which is the fastest crewed aircraft in history, have to use **rocket thrusters** to move around.

However, not everyone agrees with the Kármán Line as the boundary between the atmosphere and space. Some companies, like **NASA**, define the edge of space as being at an altitude of 80 kilometres (50 miles) instead.

OTHER ATMOSPHERES

Every planet in the solar system has an atmosphere of some kind. But the thickness varies from one planet to another.

Venus, for example, has a very thick atmosphere made of **carbon dioxide**. It is very **dense** and makes Venus the hottest planet in the **solar system**!

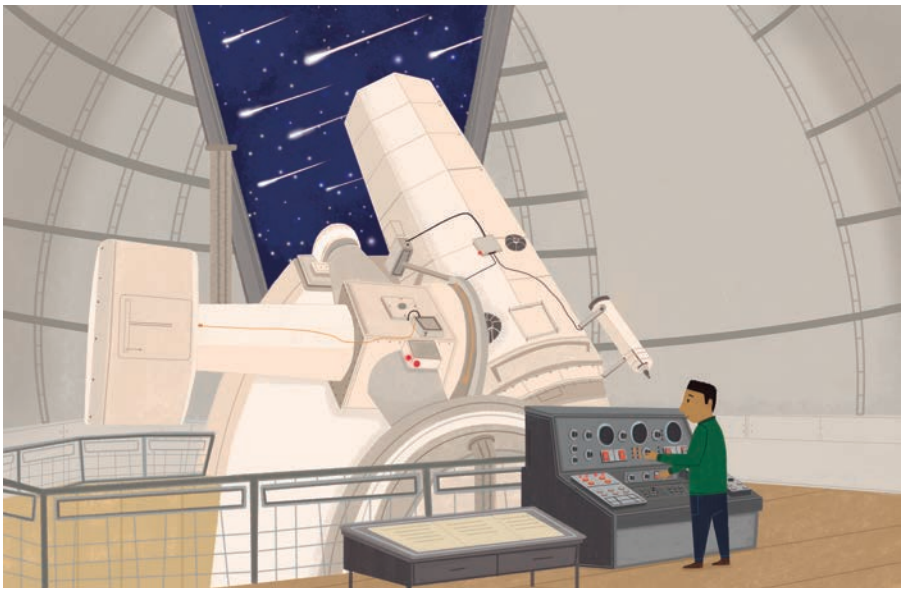
Mercury, on the other hand, has an extremely thin atmosphere that scientists call an 'exosphere'. This exosphere is the reason why Mercury is covered in **craters** – it doesn't have anything to protect it from **asteroid** and **meteoroid** impacts!

Even some **moons** have atmospheres, like Saturn's largest moon, Titan. Titan has a dense atmosphere that is thicker than Earth's. Like Earth, it also has a kind of water cycle – it's the only other place in the solar system to have one, that scientists know of!

TRACKING METEORS: SCENE 6

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

Explore where meteoriticists often work with this scene set in an observatory. Discuss how big some of the telescopes in observatories can be, and why some telescopes have even been launched into space.



DISCUSSION PROMPTS

- **Where is the meteoriticist working?**

Encourage children to observe the scene and discuss where they think it is set.

- **What is the largest telescope in the world?**

Information overleaf

- **Do you know the names of any telescopes in space?**

Information overleaf

ACTIVITY

Corresponding activity on page 8 of the activity pack: 'Computer Code' is a decoding challenge where children must figure out the hidden message using the code provided.

TRACKING METEORS: SCENE 6

RELEVANT INFORMATION

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

THE LARGEST TELESCOPE

The largest single-dish telescope in the world is located in China. The dish is an amazing 500 metres (1,600 feet) wide!

The dish itself is made of over 4,400 individual panels, and can be adjusted to search for **radio waves** created by different objects in space, like planets, **stars**, and **galaxies**.

Because it is so big, it can pick up signals from the farthest reaches of the **solar system**.

It is also so sensitive that people nearby have to be careful when using phones and computers, in case the signals from those devices interfere with the telescope!

TELESCOPES IN SPACE

Several telescopes have been launched on top of a rocket into space, with the most famous being the **Hubble Space Telescope** and the **James Webb Space Telescope**.

Telescopes in space have a few advantages over those on Earth.

Earth-based telescopes have to deal with the **atmosphere** slightly blurring their view. By putting telescopes in space above the atmosphere, this problem is removed. They also don't have to worry about **light pollution**.

However, they also have to be careful.

The Hubble Space Telescope, for example, isn't allowed to photograph the planet Mercury. Mercury is the closest planet to the Sun, and the light from our star would damage the sensitive instruments on the telescope.

Space-based telescopes are also a lot harder to repair if something goes wrong!

STUDYING METEORITES: SCENE 7

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

Explore one of the largest meteorites to ever land on Earth in this spread about why scientists study these fascinating space rocks. Discuss some of the equipment that they might use.

DISCUSSION PROMPTS

- **What is the Willamette meteorite?**
  Information overleaf

- **Why are the scientists wearing gloves?**
  Information overleaf

- **How old is the solar system?**
  Information overleaf

ACTIVITY

Corresponding activity on page 9 of the activity pack: 'Searching for Meteorites' is a crossword activity where children use clues to name some of the places that scientists could look to find meteorites. They can then fill in the crossword with the answers.

STUDYING METEORITES: SCENE 7

RELEVANT INFORMATION

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

THE WILLAMETTE METEORITE

The Willamette meteorite is one of the largest meteorites to have been found on Earth. It's over 3 metres (10 feet) long!

Scientists think that it started out as part of the **iron** core of a planet that was shattered in a collision billions of years ago.

Over 10,000 years ago, it finally crossed paths with Earth and crashed down to the surface.

Earth was in the middle of an **ice age** at the time. Scientists believe that the meteorite was carried over vast distances by **glaciers** until it reached the place where it would eventually be discovered in Oregon in the United States.

WHY DO SCIENTISTS WEAR GLOVES?

Scientists studying meteorites don't handle them with their bare hands.

If they have to pick them up, they will wear gloves. This helps to protect the meteorite.

Our hands have lots of different oils, **microbes**, and tiny pieces of dust on them which would **contaminate** the meteorite.

THE ANCIENT SOLAR SYSTEM

Our solar system was formed 4.6 billion years ago!

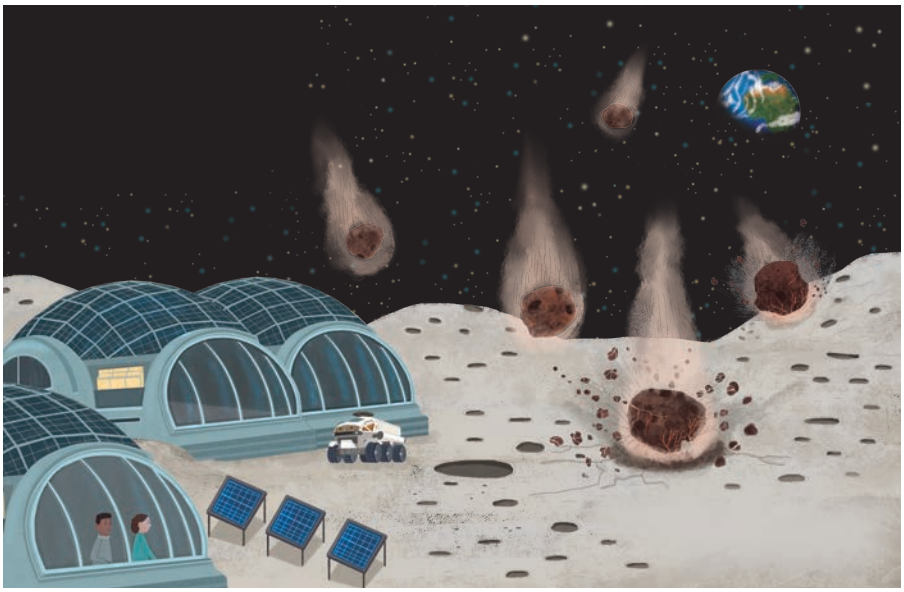
It started as a giant, swirling cloud of **gas** and dust. Eventually it collapsed under its own weight, with **gravity** pulling most of the gas and dust to the middle. This created the Sun!

The debris that remained formed planets, **comets**, and **asteroids**.

LIVING ON THE MOON: SCENE 8

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

Discuss how old the Moon is and how it was formed with this futuristic scene showing a high-tech Moon base. Uncover the first crewed mission to the Moon and what they brought home with them.



DISCUSSION PROMPTS

- **How was the Moon created?**
  Information overleaf

- **Who were the first astronauts to land on the Moon?**
  Information overleaf

- **Would you want to live on the Moon?**
  Encourage children to discuss what it would be like to live on the Moon, and whether they would like to do so or not.

ACTIVITY

Corresponding activity on page 10 of the activity pack: 'Rogue Rover' is a line maze activity where children have to complete the maze to help the astronaut find their way back to their lunar rover.

LIVING ON THE MOON: SCENE 8

RELEVANT INFORMATION

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

THE MOON'S FORMATION

There are a few **theories** about how the Moon was created.

The most supported theory is that not long after the **solar system** formed, an object that was a similar size to Mars crashed into Earth.

The impact flung lots of **debris** into space. Captured by Earth's **gravity**, over time this debris was drawn together to form the Moon.

Because of Earth's gravity, the Moon has continued to orbit our planet ever since.

APOLLO 11

In July 1969, the **Apollo 11** lunar module landed on the surface of the Moon.

Inside were two astronauts: Neil Armstrong and Buzz Aldrin.

Neil Armstrong was born in 1930 in the United States. He learnt how to fly a plane before he learnt to drive a car!

Before becoming an astronaut, he worked for **NASA** as a test pilot and flew all kinds of experimental planes.

Buzz Aldrin was also born in 1930 in the United States. Like Armstrong, he too worked as a pilot before he became an astronaut.

Armstrong and Aldrin spent 21 hours on the Moon. Two hours of this was spent outside their spacecraft, collecting samples of rocks to bring back to Earth for scientists to study.

There was also a third astronaut involved in Apollo 11 – Michael Collins. Collins flew with Armstrong and Aldrin, but stayed in another spacecraft orbiting the Moon rather than landing on the surface.

FALLING TO EARTH: SCENE 9

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

Discuss the different layers of Earth's atmosphere and how thick they are. Explore the story of the only person in recorded history to have been hit by a meteorite.

DISCUSSION PROMPTS

- **Do you know what the different layers of Earth's atmosphere are called?**
  Information overleaf

- **Who is the only person to have been hit by a meteorite?**
  Information overleaf

ACTIVITY

Corresponding activity on page 11 of the activity pack: 'Mischievous Meteors' is a spot the difference activity where children must spot the seven differences between the two scenes provided.

FALLING TO EARTH: SCENE 9

RELEVANT INFORMATION

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

LAYERS OF THE ATMOSPHERE

Earth's atmosphere has five main layers:

- The **troposphere** is where humans live. The lowest layer in the atmosphere, it extends up to about 6.2 miles (10 km) above **sea level**. It is where most planes fly and where most of the weather happens.

- Above the troposphere is the **stratosphere**. The stratosphere is very important to life on Earth because it is the home of the **ozone layer**, which protects us from harmful **rays** from the Sun.

- The **mesosphere** is where most meteors burn up. It has the coldest temperatures of any layer!

- Because of **radiation** from the Sun, the **thermosphere** is very warm! However, because there aren't many **molecules** in this layer, it would still feel very cold to our skin – if we could go up that high, that is!

- The **exosphere** is the outer layer of the atmosphere. Most **satellites orbit** around Earth in this layer.

ANN HODGES

In 1954, Ann Hodges became the first documented case of a person being hit by a meteorite!

Hodges was sleeping on her sofa when a meteorite crashed through the roof of her house, bounced off a radio, and hit her hip.

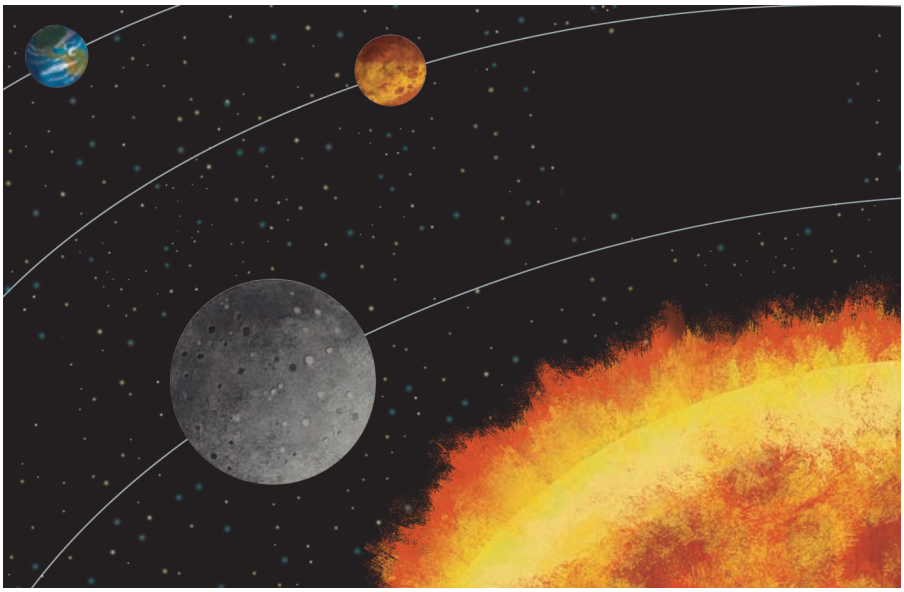
Thankfully she wasn't badly injured!

People in the area nearby had seen the meteor and its accompanying bright light flying across the sky. As it flew through the air it created a **sonic boom** that was mistaken for a plane crash!

SPEEDY MERCURY: SCENE 10

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

Explore the two rocky planets closest to the Sun in our solar system. Discuss how similar or different they are to Earth.



DISCUSSION PROMPTS

- **Apart from Earth, can you name the other two planets in this scene?**
Information overleaf

- **If you could visit any planet in the solar system, which one would you choose?**
Encourage children to use their knowledge of the planets to discuss which one they would like to visit the most, and why.

ACTIVITY

Corresponding activity on page 12 of the activity pack: 'Planet Mix-Up' is a task where children match the photograph and name of a planet with its description.

SPEEDY MERCURY: SCENE 10

RELEVANT INFORMATION

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

MERCURY

Not only is Mercury the fastest planet in the **solar system**, it's also the smallest. It's only slightly bigger than Earth's Moon!

The temperature on the surface can swing between very hot and very cold. Because of its closeness to the Sun, during the day it can get as hot as 430 °C (800 °F)!

But with only a very thin **atmosphere**, there's nothing to **retain** that heat at night and temperatures can drop all the way down to -180 °C (-290 °F).

Because of these extreme changes in temperature, scientists think that it is impossible for life as we know it to live there.

In 2011, the Messenger spacecraft became the first spacecraft to reach Mercury. It collected data and took lots of images of the planet, which it sent back to scientists on Earth.

VENUS

After the Sun and the Moon, Venus is the brightest object in the night sky. This is thanks to the thick clouds in its atmosphere, which reflect light very well.

Nicknamed 'Earth's twin', Venus is similar in structure and size to our home planet. However, unlike Earth, Venus is not **habitable**. Its atmosphere traps in heat, with temperatures on the surface hot enough to melt metal!

Venus is incredibly slow spinning. On Earth, a day lasts 24 hours and a year lasts 365 days On Venus, however, a day is the equivalent of 243 Earth days and a year is 225 Earth days. Its days are longer than its years!

Venus also spins the opposite way to Earth! Scientists think that early in the solar system's history, Venus was hit by an object nearly the same size as it. This impact caused it to start spinning backwards.

PARKER SOLAR PROBE: SCENE 11

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

Explore the amazing engineering of the Parker Solar Probe, the spacecraft sent to explore the Sun. Discuss the different types of stars that scientists know of, and which type the Sun is.

DISCUSSION PROMPTS

- **Do you know how long it took the Parker Solar Probe to reach the Sun?**
  Information overleaf

- **Do you know what kind of star the Sun is?**
  Information overleaf

ACTIVITY

Corresponding activity on page 13 of the activity pack: 'Speedy Spacecraft' is a symmetry drawing activity where children must complete the drawing of the Parker Solar Probe.

PARKER SOLAR PROBE: SCENE 11

RELEVANT INFORMATION

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

THE PARKER SOLAR PROBE

The Parker Solar Probe is a spacecraft built by **NASA** that is on a mission to explore the Sun.

After its launch in 2018, the Parker Solar Probe used the **gravity** of Venus to slowly shrink its **orbit** around the Sun over a period of six years.

At its closest approach, the Parker Solar Probe came within 3.9 million miles (6.2 million km) of the Sun. That might not sound very close, but it's seven times closer than any other spacecraft had ever been!

It passed through the Sun's outer **atmosphere**, called the corona, collecting important data to send back to scientists on Earth.

THE SUN

The Sun is a **main sequence star**, meaning that it is in the longest and most stable phase of its life cycle.

It produces the light and heat that all life on Earth needs to survive.

It is the brightest and largest object in our **solar system** – so big, in fact, that Earth could fit inside it more than one million times!

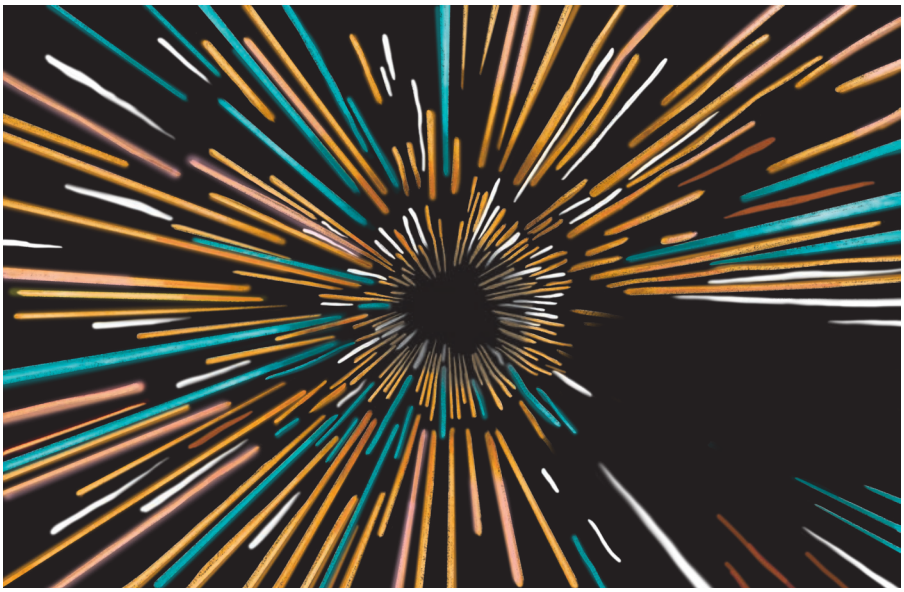
It is not, however, the largest star that scientists know of. One star, called AH Scorpii, is 1,411 times larger than the Sun!

In about 5 billion years, scientists believe the Sun will run out of the **hydrogen** that it needs for fuel. When this happens, it will transform into a white dwarf, slowly cooling down and shrinking until it is roughly the same size as Earth.

THE SPEED OF LIGHT: SCENE 12

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

Discuss how humans see light with this scene about the fastest thing in the solar system. Explore what a light-year is and how long it would take a spacecraft to travel one light-year away from Earth.



DISCUSSION PROMPTS

- **How do humans see light?**
  Information overleaf

- **Do you know what a light-year is?**
  Information overleaf

- **What's the farthest a spacecraft has travelled from Earth?**
  Information overleaf

ACTIVITY

Corresponding activity on page 14 of the activity pack: 'Spotlight on Space' is a true or false quiz. Children must use what they have learnt from reading the main book, as well as their intuition, to fill in the answers.

THE SPEED OF LIGHT: SCENE 12

RELEVANT INFORMATION

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

HOW DO WE SEE?

Light is a type of **energy**. It can be emitted from light sources that are **natural**, like the Sun, or **artificial**, like light bulbs.

Light reflects off objects and enters our eyes first through the **cornea**, which is a clear layer at the very front of our eye that protects it from injury.

Next, it passes through the **pupil**. The iris, which is the **coloured** part of our eye, controls how much light the pupil lets through.

The lens then focuses the light onto the **retina** in the back of our eye. Special **cells** turn this focused light into electrical signals that are sent to the brain to create the image that we see.

The light that is initially projected onto the retina produces an image that is actually upside down at first! Luckily, our clever brains know how to turn this image the right way up.

LIGHT-YEARS AWAY

Space is so vast that beyond a certain point, units of measurements like metres, kilometres, and miles are not useful anymore.

For example, if a scientist is trying to calculate the distance between stars, then using light-years is much more appropriate.

Despite its name, a light-year is still a way of measuring distance rather than time. It is the distance that light travels in one year.

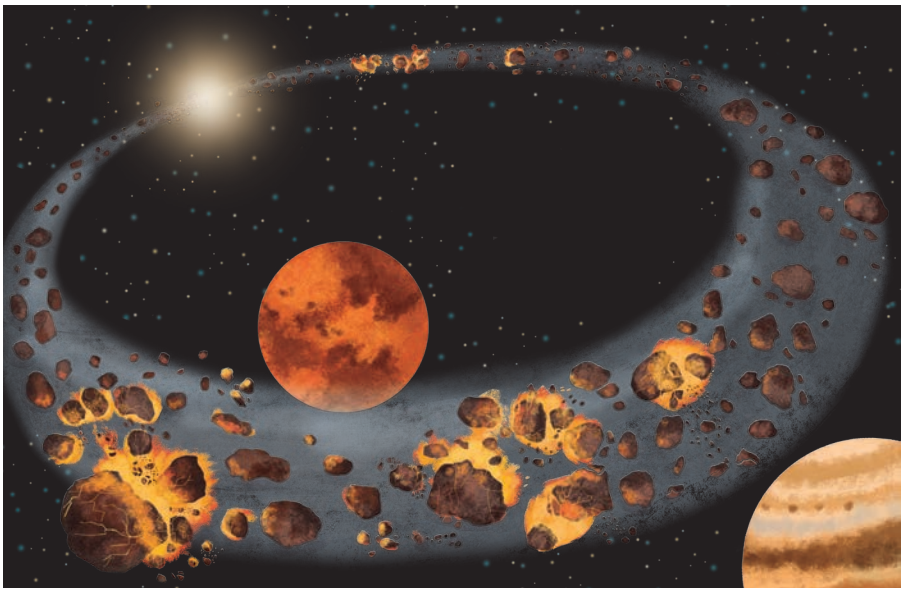
The Voyager 1 spacecraft holds the record for the spacecraft that has travelled farthest from Earth. Since its launch in 1977 it has covered over 15 bilion miles (25 billion kilometres).

Despite that, it will still take another 15,0000 years for it to reach one light-year away!

ARE METEORS THE FASTEST?: SCENE 13

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

Explore Mars and Jupiter with this scene depicting collisions between asteroids in the asteroid belt. Discuss some of these planets' most famous features and some of the exciting spacecraft sent to explore them.



DISCUSSION PROMPTS

- **Do you know what the two planets in this scene are?**
Information overleaf

- **Do you know why Mars is called the 'Red Planet'?**
Information overleaf

- **What is the big spot on Jupiter?**
Information overleaf

ACTIVITY

Corresponding activity on page 15 of the activity pack: 'Zooming Through Space' is a reflective writing activity where children must think about what they have learnt so far, form their own opinions, and answer the questions provided.

ARE METEORS THE FASTEST?: SCENE 13

RELEVANT INFORMATION

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

MARS

Mars is the fourth planet from the Sun and, along with Mercury, Venus, and Earth, is a rocky planet.

It is nicknamed the 'Red Planet' because of its distinctive appearance. **Minerals** in the soil on the planet's surface **oxidise** and rust, turning it a shade of red.

Mars has another famous physical feature. Despite being the second smallest planet in our solar system, it is home to Olympus Mons, the largest and tallest volcano in the solar system. It is three times as tall as Mount Everest and is as wide as a country!

Multiple spacecraft have been sent to explore Mars over the years. This includes several rovers, like **NASA**'s Perseverance Rover. Perseverance landed in an area of Mars that scientists thought was once filled with water and was tasked with searching for signs of possible ancient **microbial** life!

Space agencies like NASA are looking to further explore Mars and maybe even build a base there in the future!

JUPITER

Jupiter is the fifth planet from the Sun and is the largest planet in the solar system. If you put all of the other planets together, Jupiter would still be twice as big!

Rather than a rocky planet, Jupiter is a gas giant. It is made of mostly **hydrogen** and **helium**, with **ammonia** and water creating swirling clouds.

Jupiter is famous for its Great Red Spot, a huge storm wider than Earth that has been raging for at least 150 years!

The Great Red Spot was studied by NASA's Juno spacecraft. Juno also discovered other storms around Jupiter's **poles**, as well as several active volcanoes on Io, one of the planet's moons.

Scientists are curious about one of Jupiter's other moons, called Europa. They think that there might be an ocean of salty, liquid water under its frozen surface!

POST-READING QUESTIONS

Engage in discussion about the journey taken throughout the book and the facts that were uncovered.

- **Were you surprised to learn that meteors aren't the fastest things in outer space?**
- **If you were given the chance, would you visit outer space?**
- **Did anything 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 Meteoritics Strory' is a creative writing activity where children must write a piece of descriptive writing including the three words or phrases provided.

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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