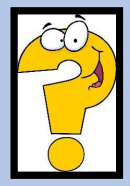
SPACE

Space terms

Exploring space

Life elsewhere in the Universe



The Earth

09/01/2025

Starter:

What do you know about space? Write down 5 words or sentences

The Earth

09/01/2025

Learning Intentions:

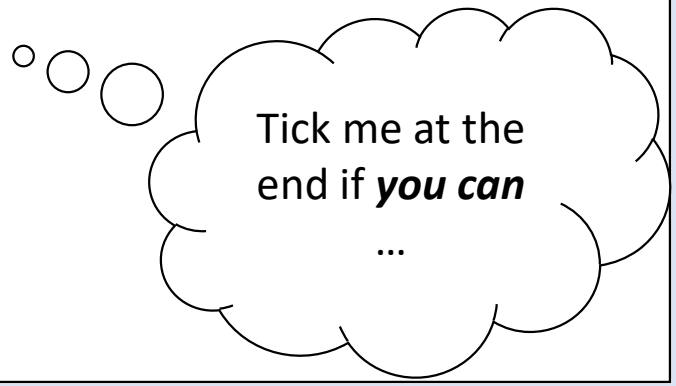
- To learn that day and night are caused by the Earth rotating on its axis.
- To learn that the Earth orbits the Sun once in one year.
- To learn how the seasons are caused by the tilt of the Earth.

The Earth

09/01/2025

Success Criteria

- ❑ I can state that day and night are caused by the Earth rotating on its axis.
- ❑ I can state that the Earth orbits the Sun once in one year.
- ❑ I can explain how the seasons are caused by the tilt of the Earth.



The Earth

We have all heard these words before, do you know what they mean?

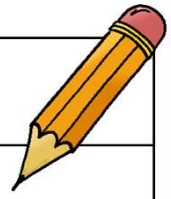
Discuss these words with your partner and describe what they mean.

Daytime
Night-time
Day
Month
Year
Seasons

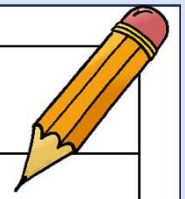
The Earth

Daytime Month Night-time Year Seasons Day

Terms	Definitions
	The time of the day between sunrise and sunset.
	The time of the day between sunset and sunrise.
	A 24 hour period corresponding to one rotation of the earth on its axis.
	Each of the twelve named periods into which a year is divided.
	The time taken by the earth to make one revolution around the sun.
	Each of the four divisions of the year resulting from the earth's changing position around the sun.



The Earth



Terms	Definitions
Daytime	The time of the day between sunrise and sunset.
Night-time	The time of the day between sunset and sunrise.
Day	A 24 hour period corresponding to one rotation of the earth on its axis.
Month	Each of the twelve named periods into which a year is divided.
Year	The time taken by the earth to make one revolution around the sun.
Seasons	Each of the four divisions of the year resulting from the earth's changing position around the sun.

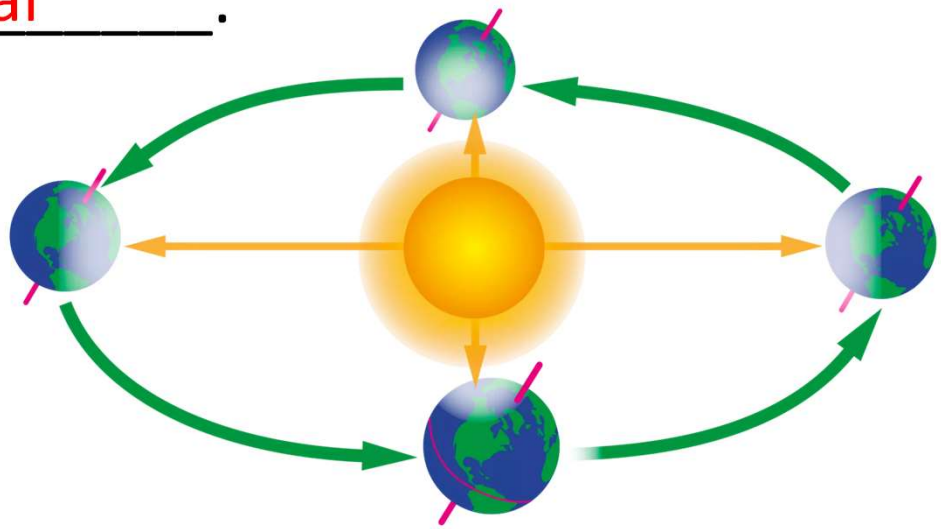
A Day

A day is the period of time during which the Earth completes one rotation around its axis.

The Earth has a day of 24 hours.

A Year

The Earth orbits the Sun once every 365.25 days. This is known as a year.



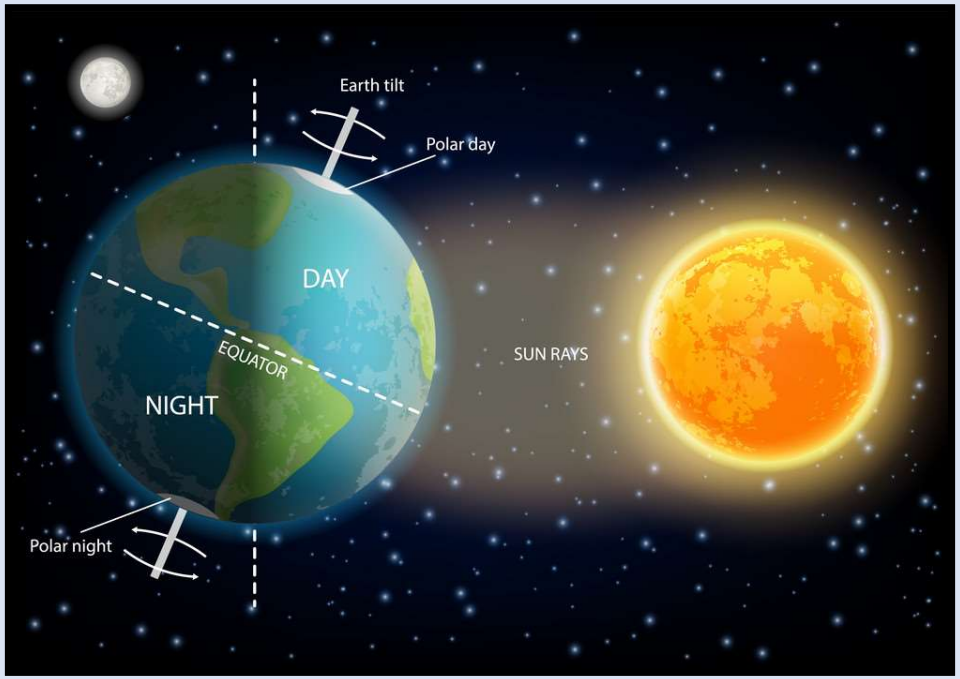
Our calendar year is 365 days. Every 4 years we have a leap year and add another day to the calendar. This makes up for the 4 missing quarters.

DID YOU KNOW?

Daytime and Night-time

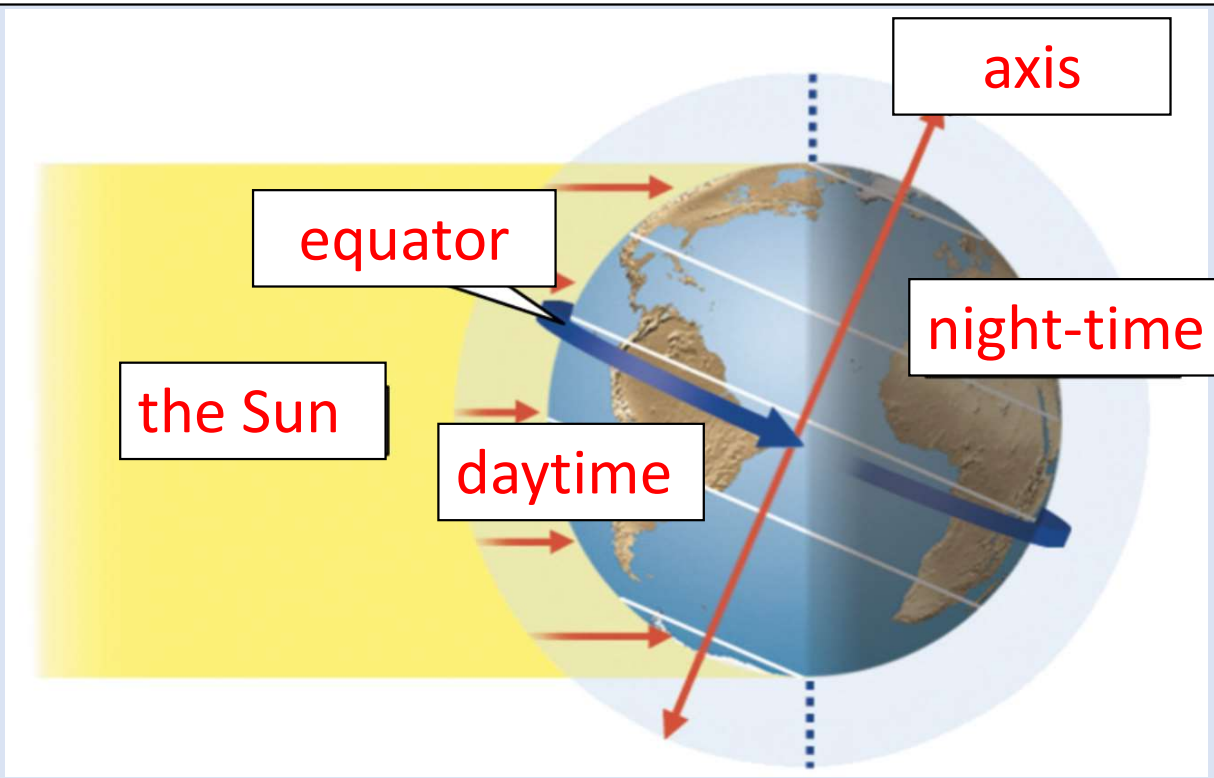
The side of the Earth facing the Sun is bathed in light and heat (daytime).

The side of the Earth facing away from the Sun is darker and colder (night-time).



Day and Night

It is daytime on the slide of the Earth that is _____facing_____the Sun and night-time on the opposite side of the Earth.



Day and Night

Aim: To explain how the position of the Sun varies throughout the day.

Equipment:

- globe
- lamp
- small stick figure
- blue tack

Label your diagram

Day and Night

Method:

1. Attach the stick figure to globe with blue-tak so that it is standing in Scotland.
2. Rotate the globe anti-clockwise so the figure just moves into daylight. This is morning.
3. Note down what direction on Earth the figure needs to look to see the Sun (north, south, east west).
4. Continue rotating the globe so that the figure is directly in the Sun (midday) then almost in darkness (evening).

Day and Night

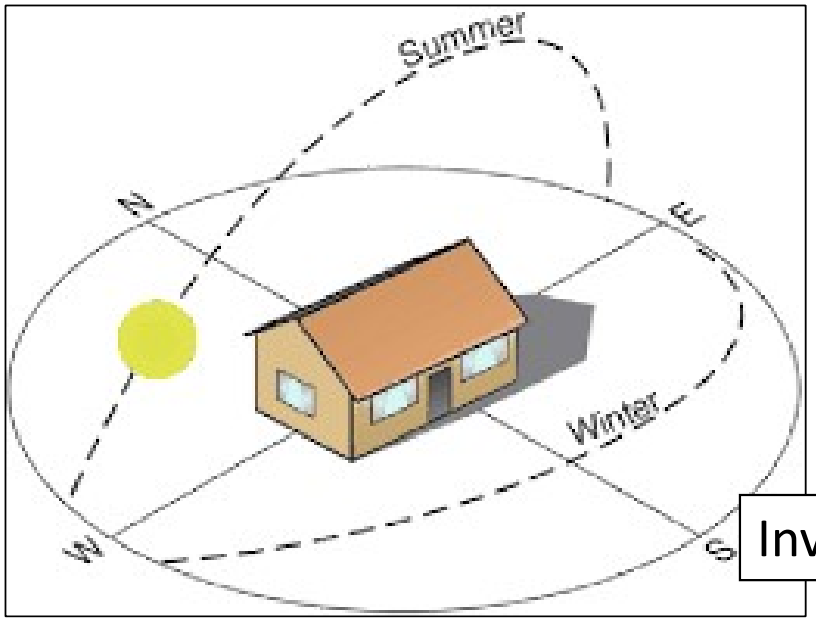
Results

Time of day	Direction to look to see the Sun
Morning	East
Midday	South
Evening	West

Day and Night

Conclusion:

In the Northern Hemisphere, the Sun rises in the east and sets in the west.



Investigate further using the Sun Calculator

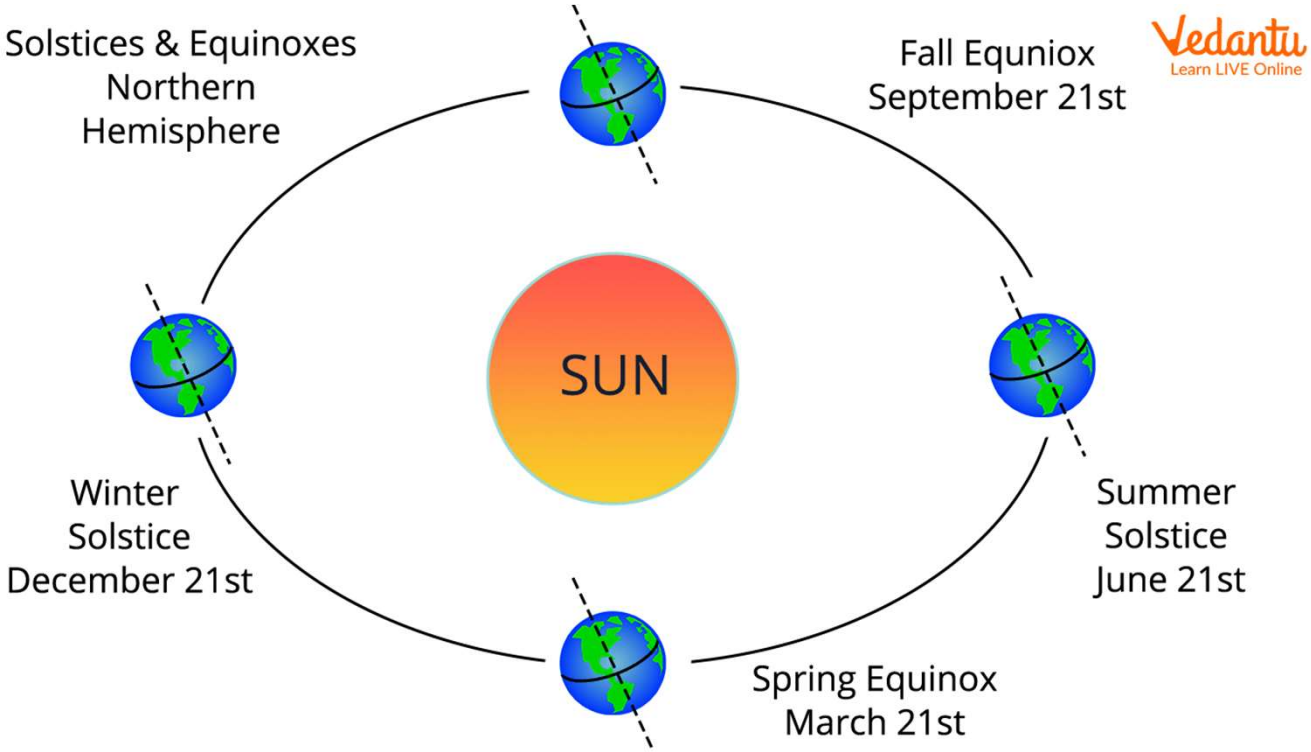
The Seasons

DID YOU KNOW?

The Earth's axis is slightly tilted in relation to its orbit around the Sun. This is why we have seasons.

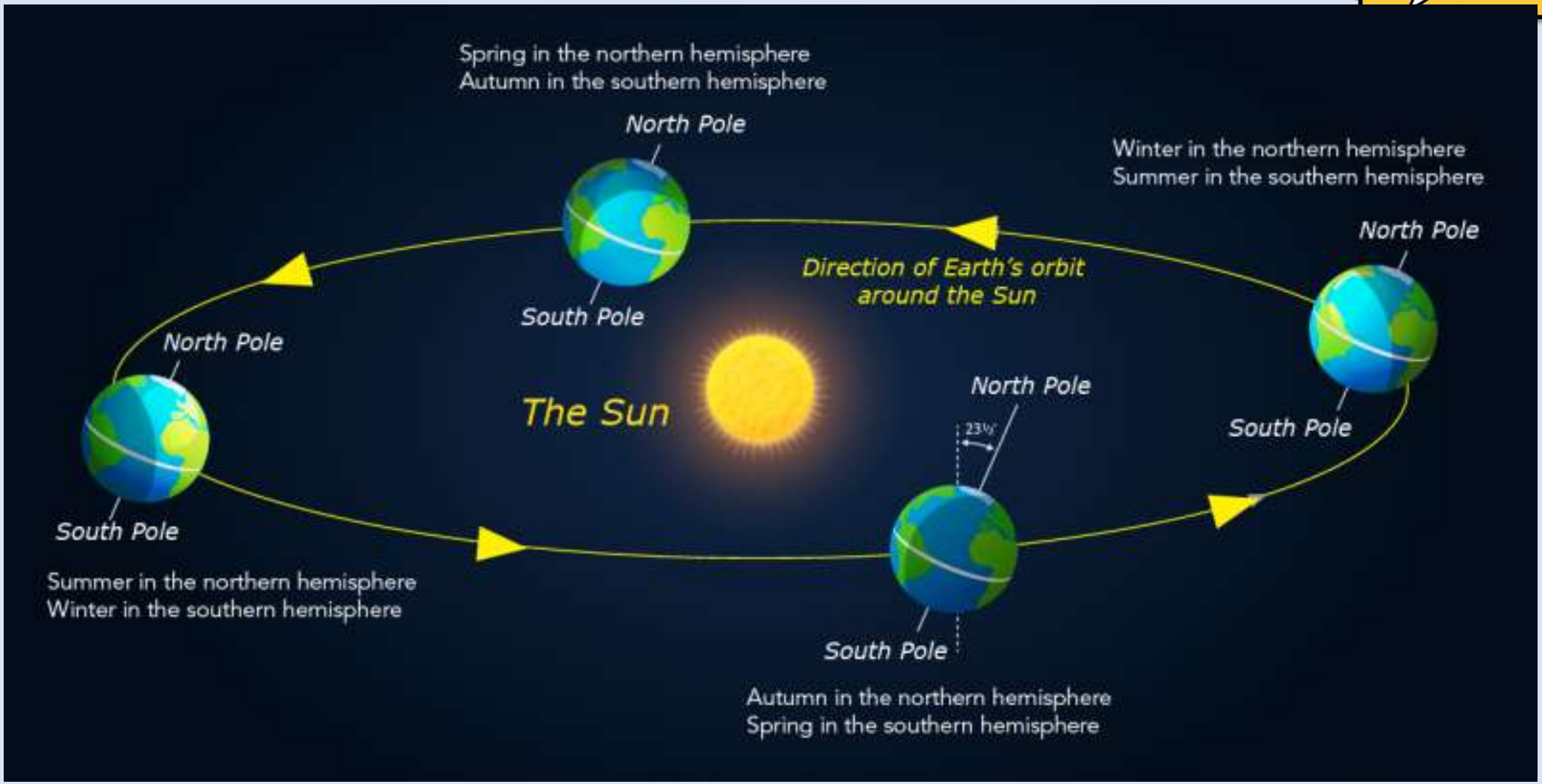
The year is commonly divided into four seasons:

- Spring
- Summer
- Autumn
- Winter



The Seasons

DID YOU KNOW?



The Earth

09/01/2025

Plenary:

Summarise today's lesson……..

Success Criteria

- ❑ I can state that day and night are caused by the Earth rotating on its axis.
- ❑ I can state that the Earth orbits the Sun once in one year.
- ❑ I can explain how the seasons are caused by the tilt of the Earth.

Tick me at the end if ***you can*** …

The Earth and the Moon

09/01/2025

Starter:

1. Describe why we have day and night.

2. How long does it take the Earth to rotate on its axis?

3. How long does it take the Earth to rotate around the Sun?

The Earth and the Moon

09/01/2025

Learning Intentions:

- To learn how the rotation of the Moon around the Earth creates the phases of the Moon.
- To identify the phases of the Moon.
- To learn the effect the Moon has on tides
- To explain how a solar and lunar eclipse are formed

The Earth and the Moon

09/01/2025

Success Criteria

- ❑ I can state that the rotation of the Moon around the Earth creates the phases of the Moon.
- ❑ I can identify the phases of the Moon.
- ❑ I can explain the effect the Moon has on tides
- ❑ I can explain how a solar and lunar eclipse are formed

Tick me at the end if ***you can*** …

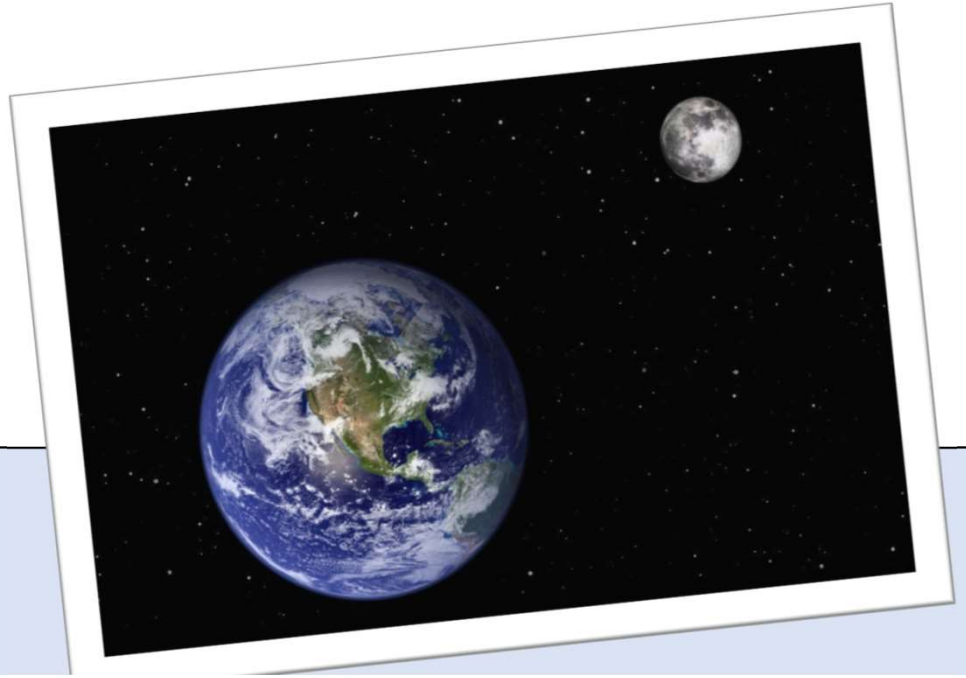
The Earth and the Moon

What do you know about the Moon?

The Moon

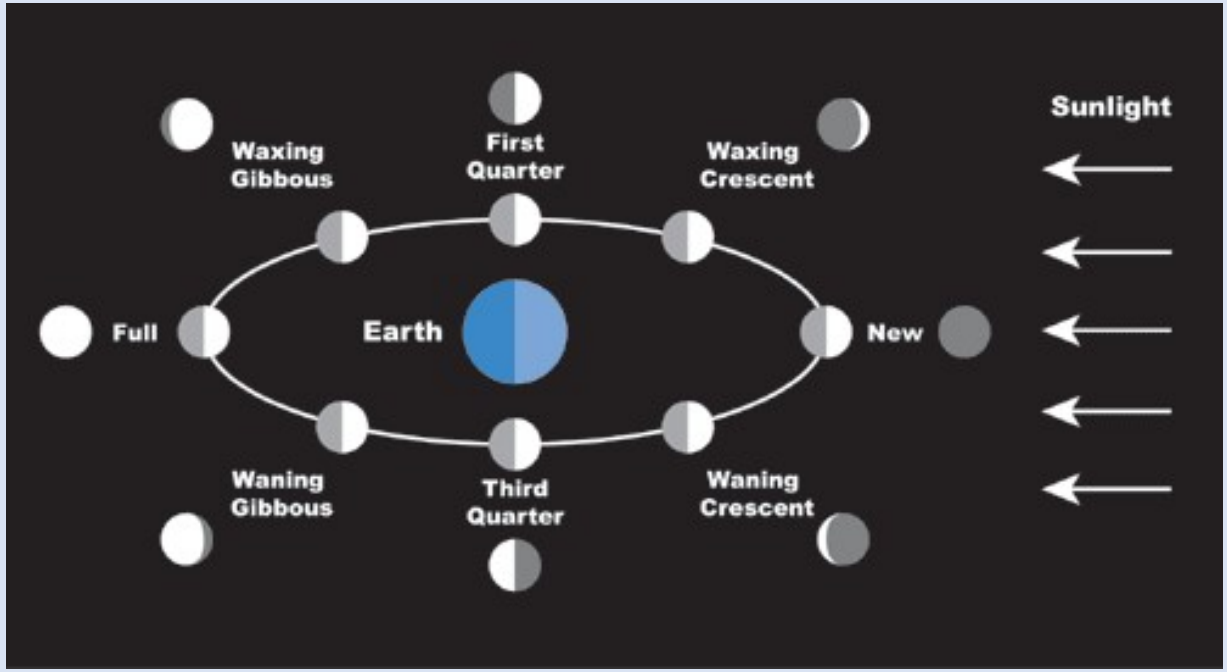
The Moon is a natural satellite that orbits the Earth.

It takes 28 days for the Moon to orbit the Earth. This period is called a lunar month.



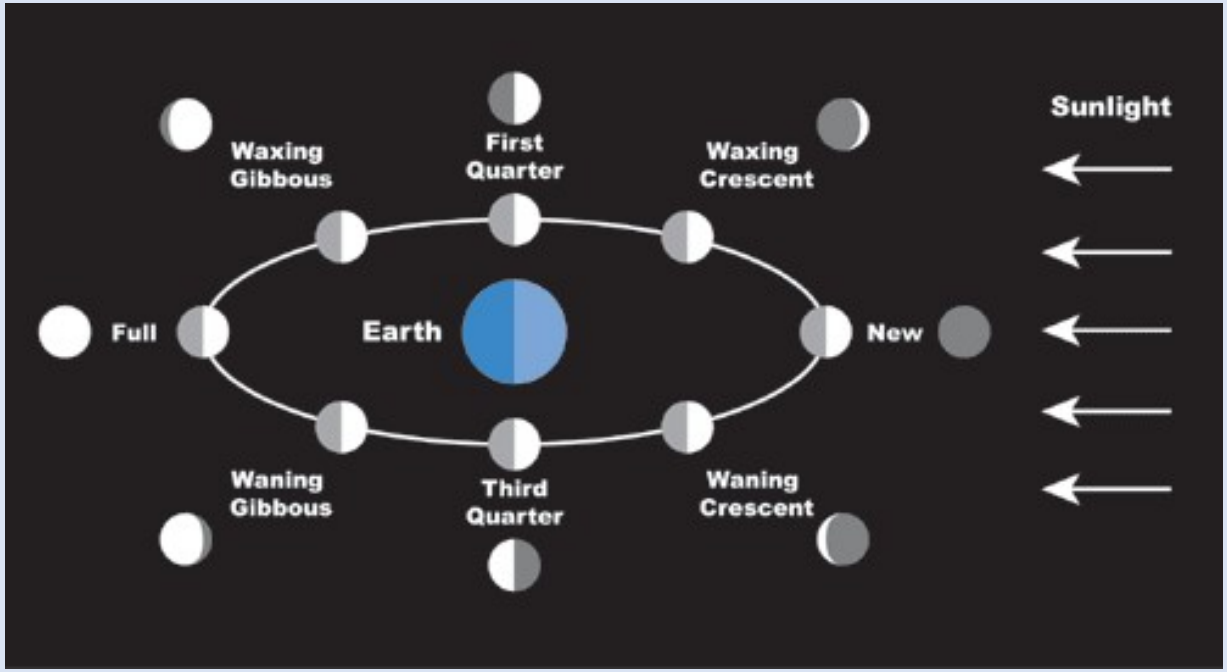
Phases of the Moon

The changing position of the Moon as it orbits the Earth allows us to see the different phases.



Phases of the Moon

The Moon's appearance changes at different time of the lunar month. These changes in shape are known as 'phases' of the Moon.



Phases of the Moon

Aim: To investigate the phases of the Moon.

Label your diagram

Method:

- Swivel chair
- A lamp
- A white polystyrene ball
- Pencil/ wire

Video link

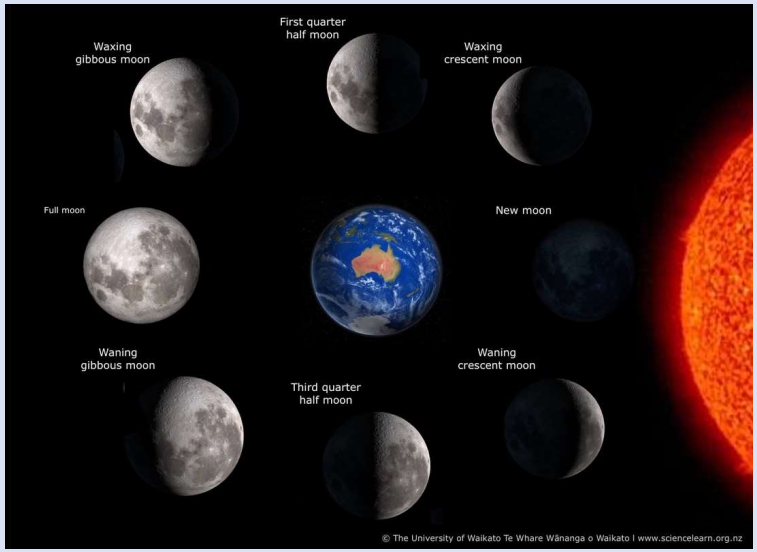
Phases of the Moon

Method:

- Sit in the swivel chair holding the ball on a stick. The ball should be held at arms length, slightly above your head and facing the lamp.
- The side facing you will be dark. This is the New Moon.
- Rotate anti-clockwise on the chair a quarter turn. What phase of Moon do you see?
- Continue to rotate a quarter turn and note down the phase until you are back to the start.
- Try recording the phases as you turn.

Phases of the Moon

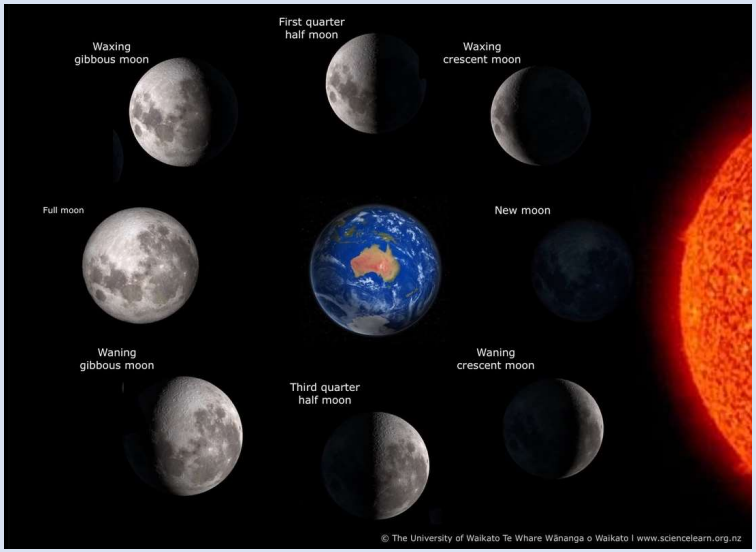
Results: *What did you observe about the phases of the Moon?*



Phases of the Moon

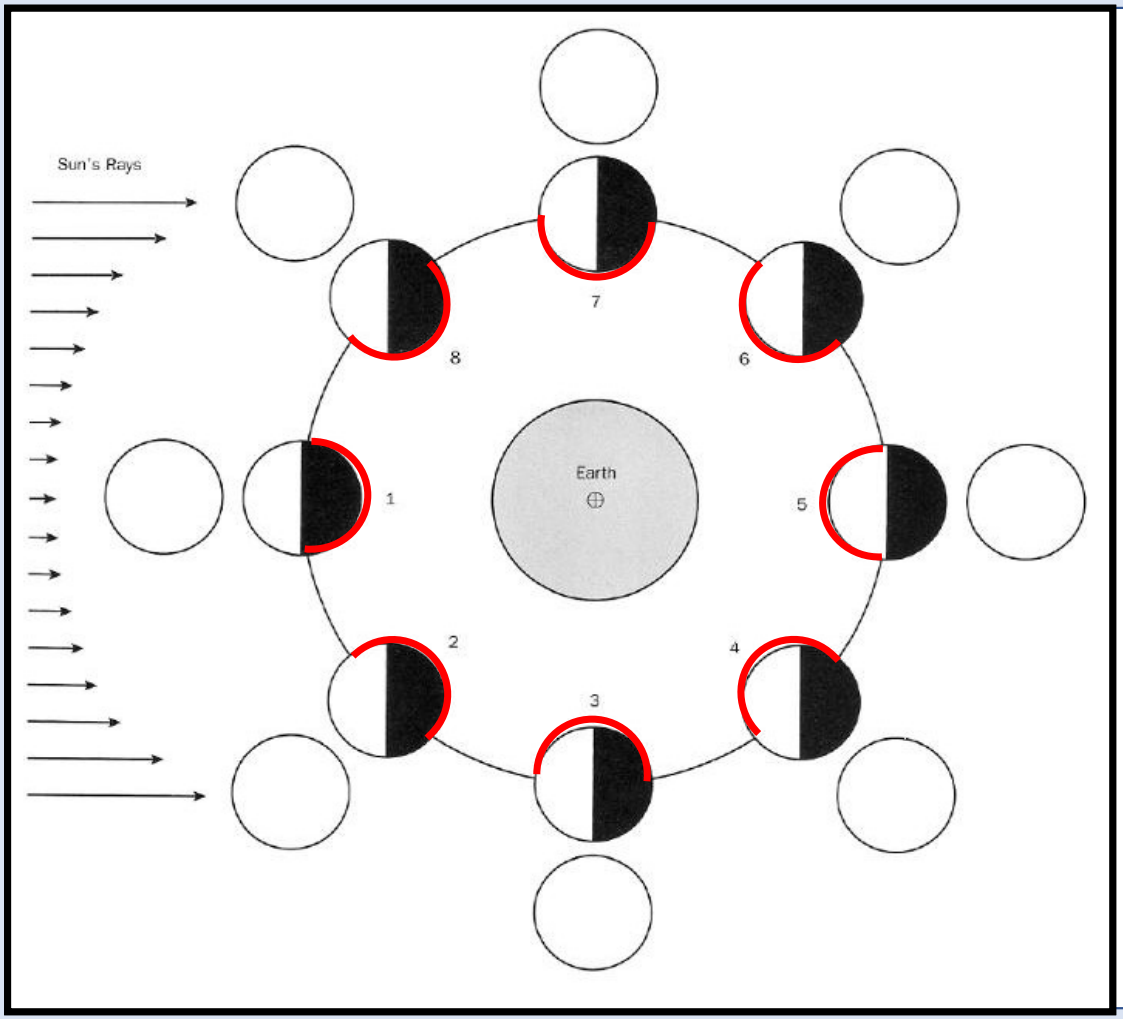
Only one half of the Moon is always illuminated by the Sun. The way we see it depends on how much of the illuminated half we can see.

When we see all the illuminated half we can see a complete disc, known as a full Moon.



Open ‘Phases of Moon PowerPoint’.

Phases of the Moon



KEY :

What part we can "see"

crescent moon

gibbous moon

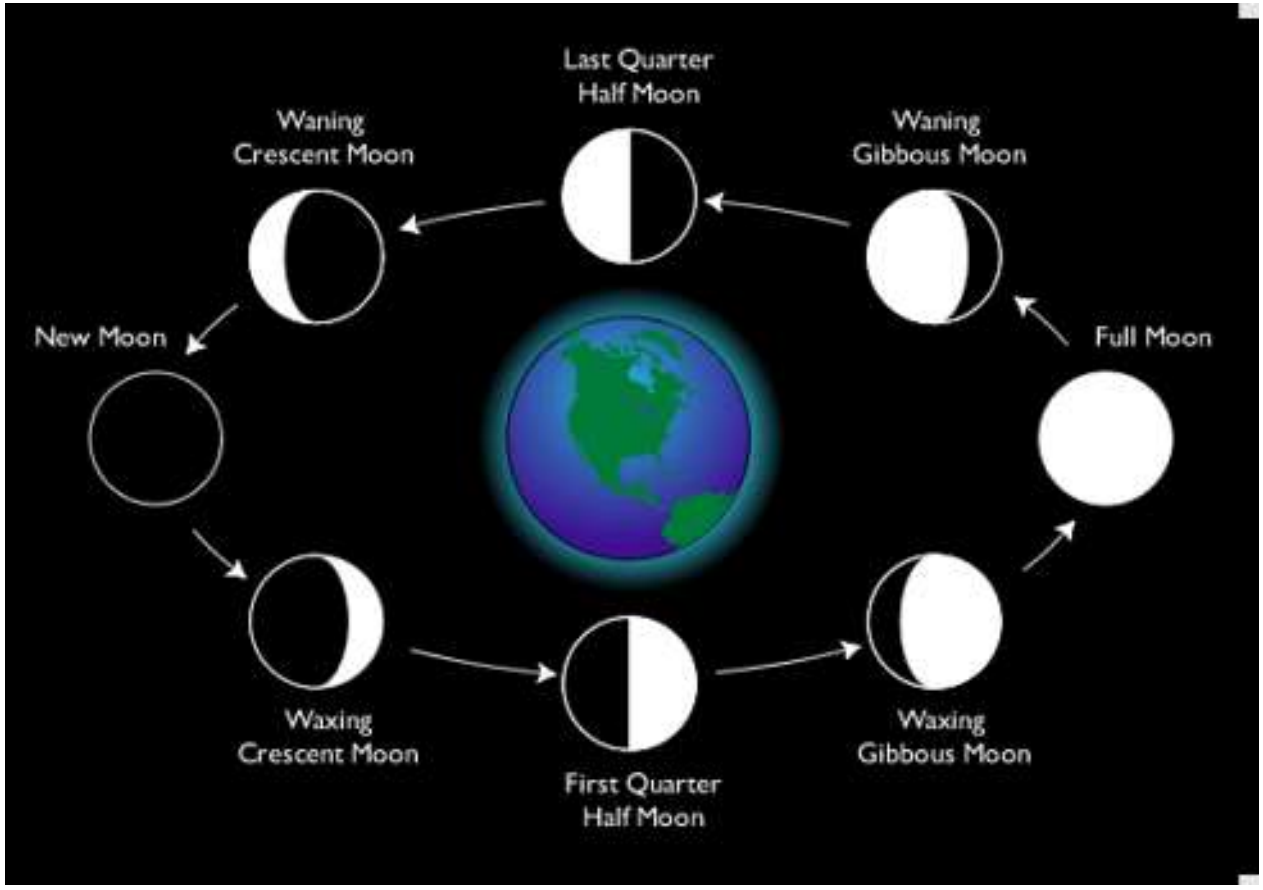
Waxing :

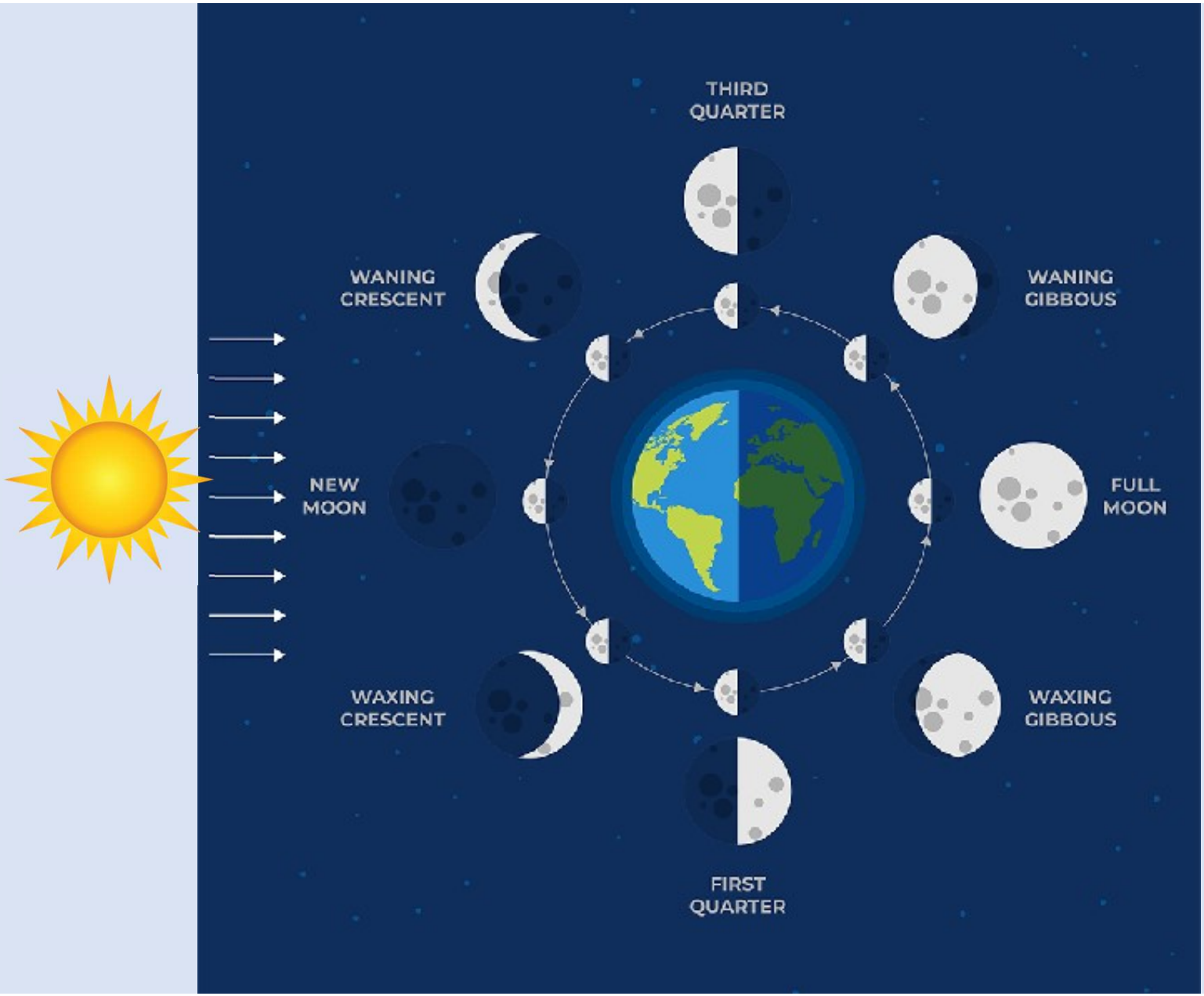
Waning :

Use the demonstration or 'Phases of Moon PowerPoint' to complete worksheet.

Phases of the Moon

Results: Check your diagram against the one below…




THIRD QUARTER
WANING CRESCENT
WANING GIBBOUS
NEW MOON
FULL MOON
WAXING CRESCENT
WAXING GIBBOUS
FIRST QUARTER

Phases of the Moon

Conclusion: *What did you find out about the phases of the moon?*

Aim: To investigate the phases of the Moon

Follow this link to find out what phase is visible in Kirkcaldy today…

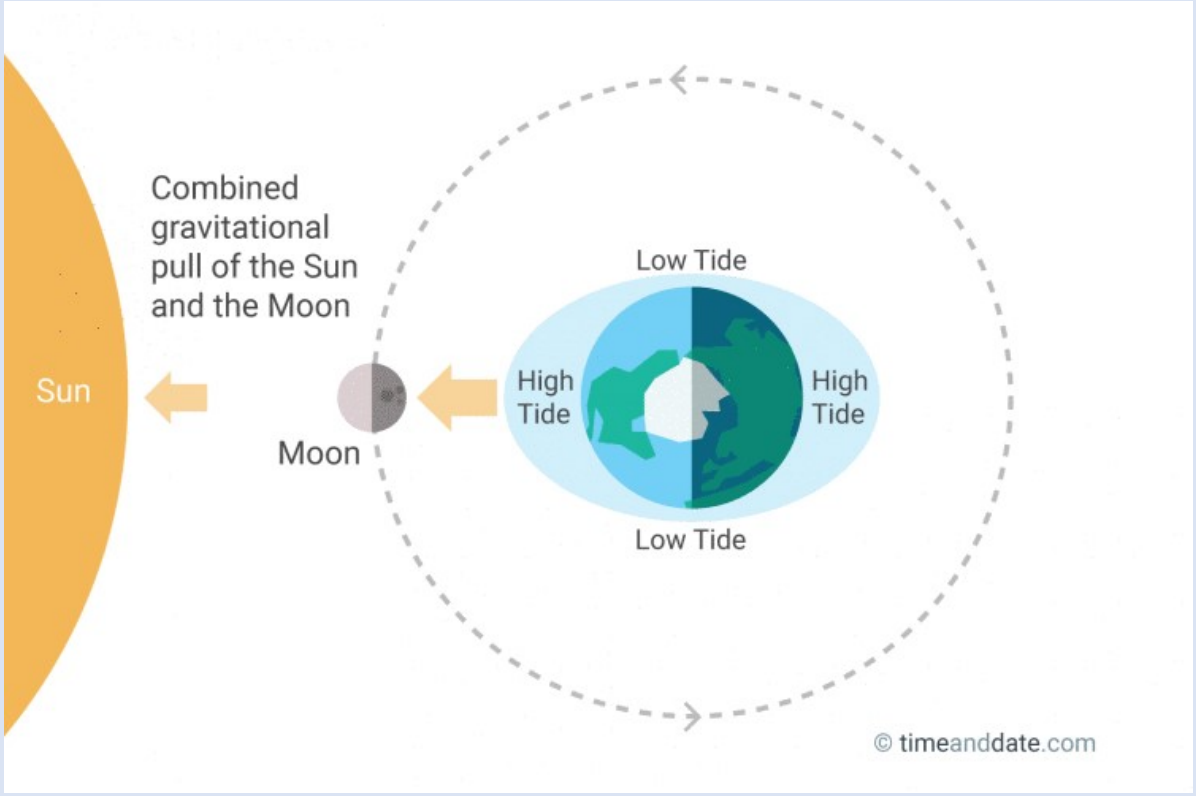
Moon Phases for Kirkcaldy,

Tides

DID YOU KNOW?

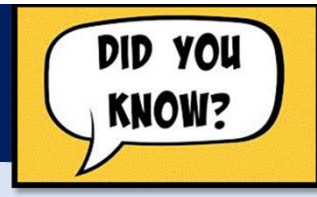
The phases of the Moon have an impact on the Earth's tides.

As the Earth spins on its axis, the pull of gravity from the Moon cause the ocean to bulge out in the direction of the Moon.



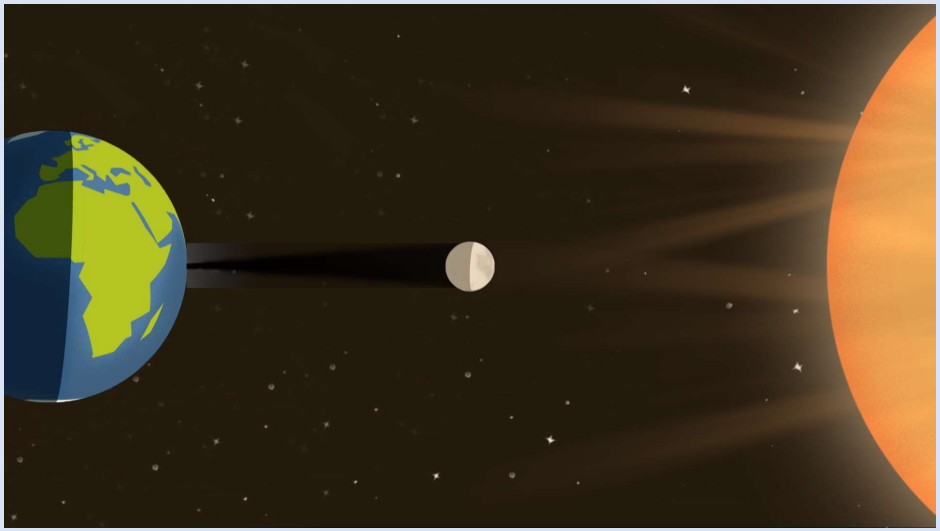
The Sun's gravity also has an impact on the tides.

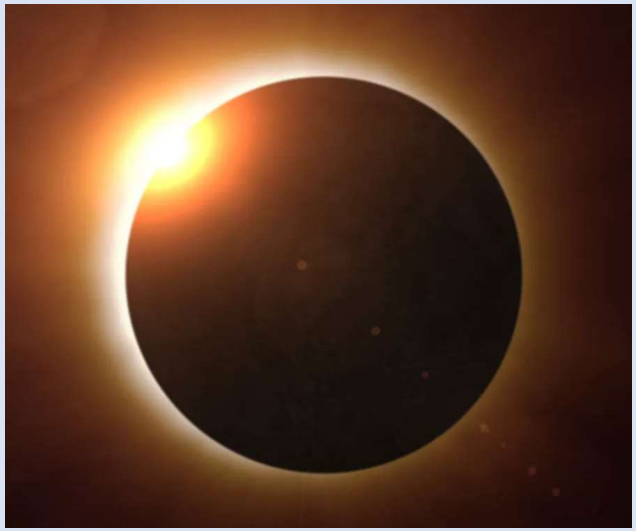
Solar Eclipse



The disc of the moon can block out the light from the Sun when the Moon's orbit takes it directly between the Sun and the Earth.

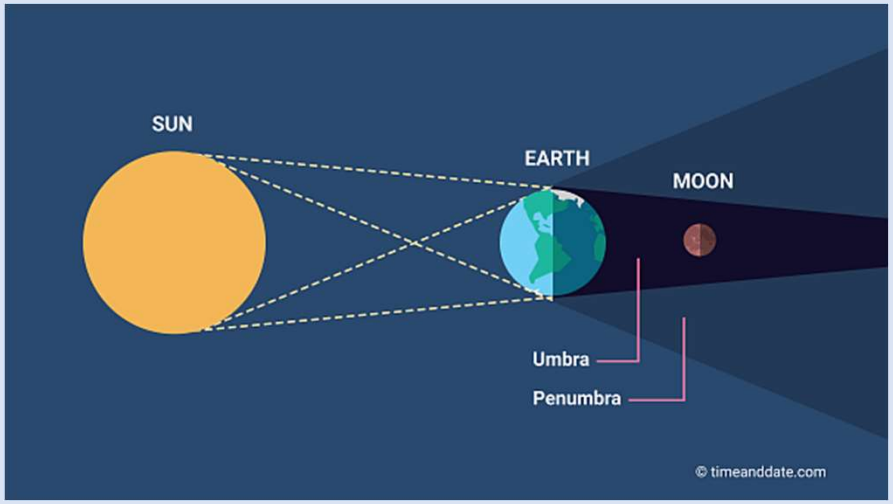
This is known as a solar eclipse.





The next total solar eclipse visible in the UK will not take place until September 2090.

Lunar Eclipse



In a lunar eclipse, the Moon passes directly behind the Earth into its shadow. This happens when the Earth is directly in between the Sun and the Moon.

The next total lunar eclipse visible in Kirkcaldy will not take place until 14 March 2025.

Check out the Royal Museums Greenwich for more on Lunar Eclipses…

Phases of the Moon

09/01/2025

Plenary:

The Moon does not emit any light.

1. Explain why we can still see the Moon.

2. Explain why the Moon looks different throughout a month.

Tick me at the end if ***you can*** …

Success Criteria

❑I can state that the rotation of the Moon around the Earth creates the phases of the Moon.

❑I can identify the phases of the Moon.

Moons

09/01/2025

Starter:

1. What is a moon?
2. How long does it take the Moon to orbit the Earth?
3. Explain why the Moon looks a different shape in the night sky.
4. How many moons are in our Solar System? (Estimate)

Moons

09/01/2025

Page x

Learning Intentions:

- To understand there are other moons in the solar system.
- To describe the conditions on the surface of the Moon.
- To discover the story of Apollo 11.

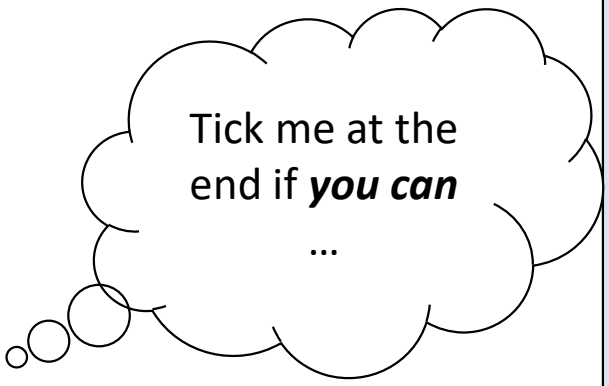
Moons

09/01/2025

Page x

Success Criteria

- ❑ I can state that there is more than one moon in the solar system.
- ❑ I can describe the conditions on the surface of the Moon.
- ❑ I can describe the story of Apollo 11.



Moons

The Moon orbits the Earth…….

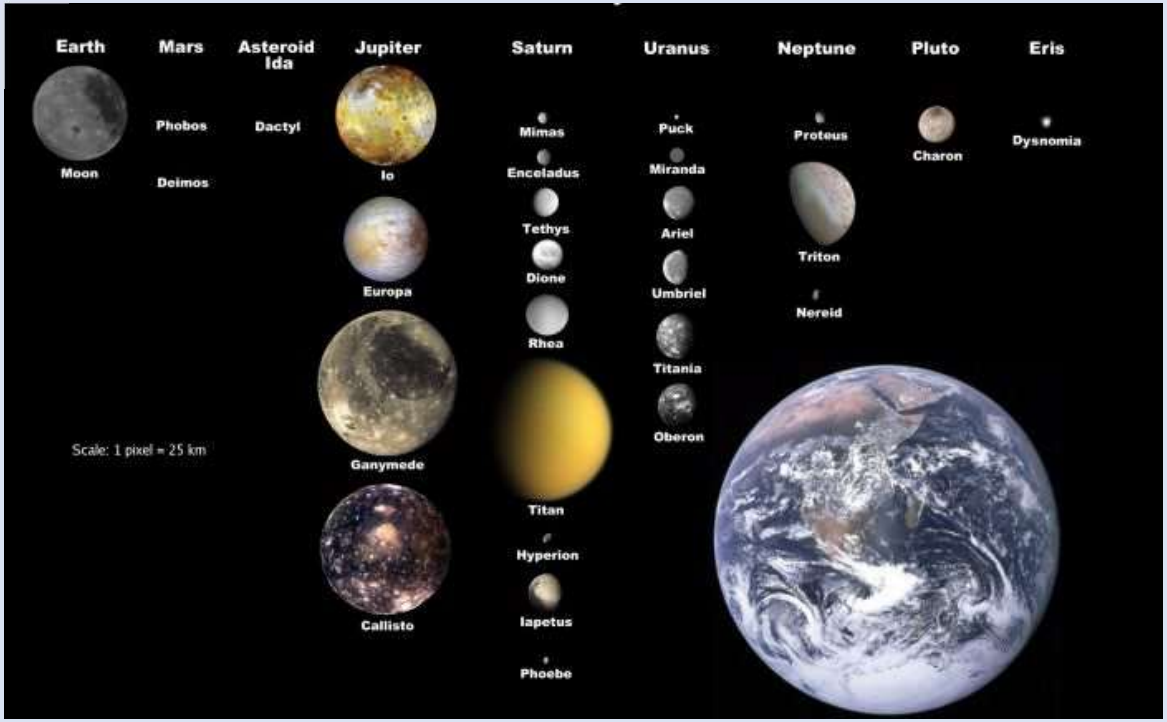
but other planets have moons too……..

Moons

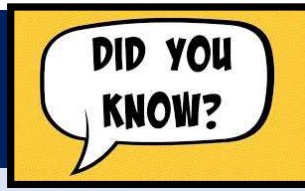
How many moons are in our Solar System? (Estimate)

There are more than 200 natural moons orbiting planets in our Solar System.

Most orbit the giant planets - Saturn and Jupiter.



Moons



Other moons….

- The Earth has a single moon named the Moon.
- There are more than 200 moons of the various planets in the solar system.
- The planets Mercury and Venus do not have any moons.
- Saturn has at least 82 moons orbiting it. They range from very tiny worlds of less than a kilometre in diameter to larger moons such as Titan.

The Moon Landings

In total 12 astronauts have walked on the Moon.

1. What do you know about the Moon landings?

2. What do you think it would feel like walking on the Moon?

Apollo 11 - The most famous manned space mission.

Apollo 11 was the spaceflight that first landed humans on the Moon.

Commander **Neil Armstrong**, Command Module Pilot **Michael Collins** and Lunar Module Pilot **Edwin "Buzz" Aldrin** formed the American crew that landed the Apollo Lunar Module Eagle on 20th July 1969, at 20:17 UTC.

The Story of Apollo 11 and the First Men on the Moon

Complete The Moon Landing Quiz as you watch:

The Story of Apollo 11 and the First Men on the Moon: the Moon Landing for Kids – FreeSchool (15mins)

The Moon Landing Quiz

1. What was the name of the first moon landing mission?
2. What date was the first moon landing?
3. How did the astronauts train for the mission?
4. How long was the journey from Earth to the moon?
5. Name the command module
6. Which astronauts were on the lunar module?
7. What was the name of the landing site on the moon?
8. If an astronaut and their space suit weigh 383lbs what would their weight be on the moon?
9. What did the astronauts do on the moon?
10. What date did they return to Earth?

The Moon Landing Quiz

1. Apollo 11
2. 20th July 1969
3. Land based simulators
4. 3 days
5. Columbia
6. Neil Armstrong & Buzz Aldrin
7. The sea of tranquility
8. ~68lb
9. Collected samples, put flag down, left medals to honour astronauts who lost their lives in space exploration, left a message of goodwill.
10. 24th July 1969

The Moon Landing Quiz

09/01/2025

Plenary:

A question I have about today's lesson is ……

Today I learnt ……

One thing I need to remember from today's lesson is……

Success Criteria

- ❑ I can state that there is more than one moon in the solar system.
- ❑ I can describe the conditions on the surface of the Moon.
- ❑ I can describe the story of Apollo 11.

Tick me at the end if ***you can*** …

Investigating Craters

09/01/2025

Page 11

Starter:

1. What did you learn about the Apollo 11 mission?

2. Describe the conditions on the surface of the Moon

Investigating Craters

09/01/2025

Learning Intentions:

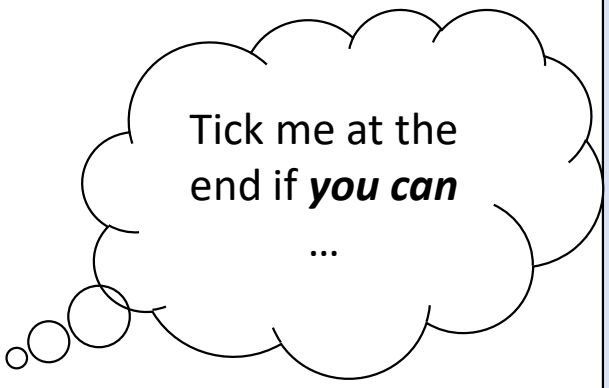
- To describe the conditions on the surface of the Moon
- To carry out an experiment to show how craters are formed on the surface of the Moon
- To draw a scatter graph with a best fit line.

Investigating Craters

09/01/2025

Success Criteria

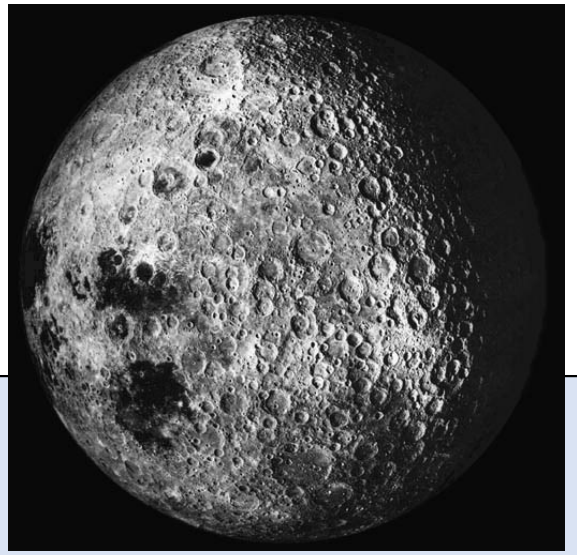
- ❑ I can describe the conditions on the surface of the Moon.
- ❑ I can carry out an experiment to show how craters are formed on the surface of the Moon.
- ❑ I can draw a scatter graph with a best fit line.



Investigating Craters

The surface of the Moon has many craters.

The craters on the Moon are caused by asteroids and meteorites colliding with the lunar surface.



Investigating Craters

Unlike Earth's surface, the lunar surface is covered with craters.

This is because the Moon has almost no erosion because it has no atmosphere.

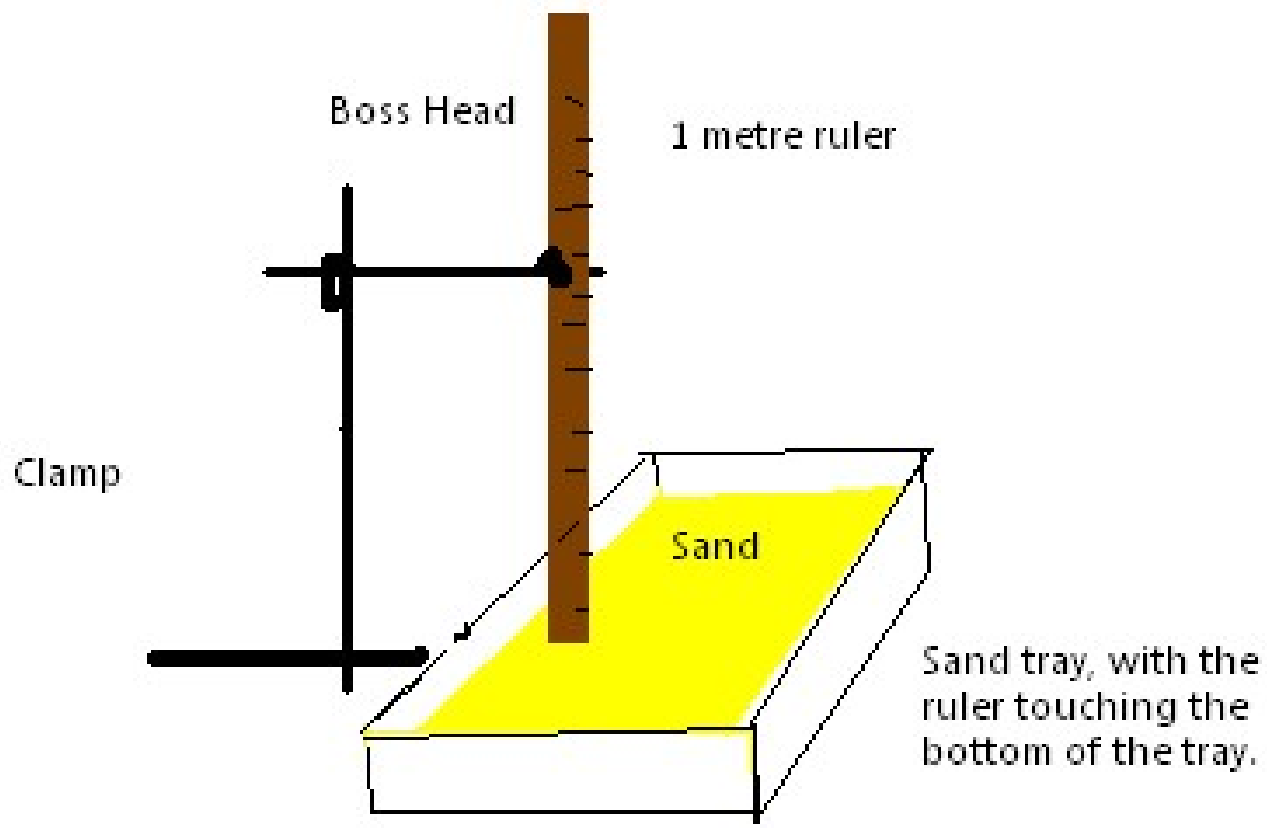
That means nothing can remove marks on its surface once they are made.

Investigating Craters

Aim: To investigate how the **diameter of an asteroid** affects the **width of the crater**.

Investigating Craters

Method:



Investigating Craters

Method: Variables

- I will change the _____ by

  _____

- I will measure the _____ using

  _____

- I will keep the _____

  constant.

Investigating Craters

Results:

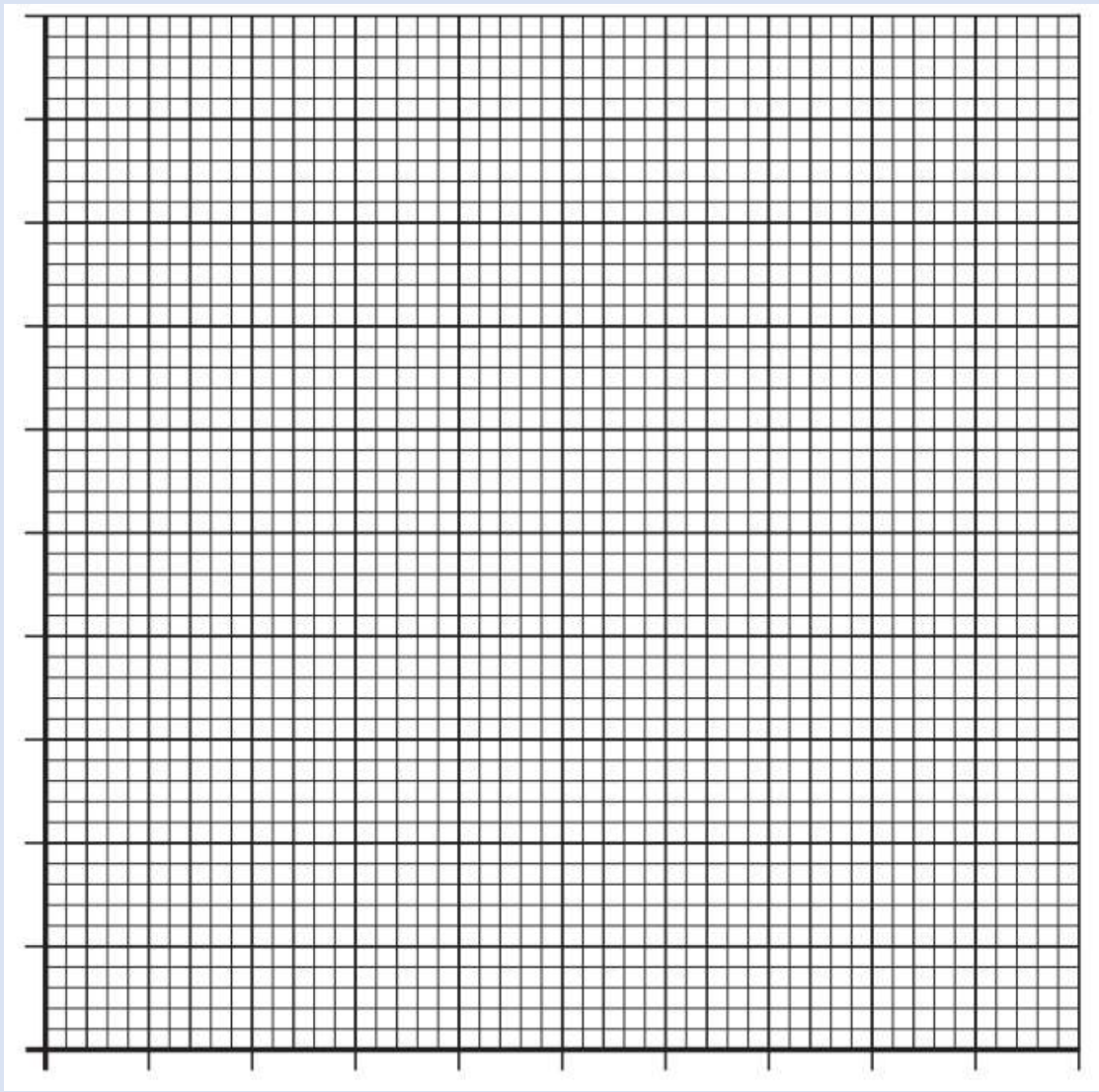
Diameter of asteroid (marble) (cm)	Width of crater (cm)			
	1	2	3	Average
1.5				
2				
2.5				
3				

Investigating Craters

Page 13

Graph:

Plot a scatter graph with a best fit line.



Investigating Craters

Aim: To investigate how the **diameter** of an asteroid from affects the **width of the crater**.

Conclusion: *Answer the aim*

Evaluation: *What went well? What could be improved?*

Investigating Craters

09/01/2025

Plenary:

What could you investigate further next lesson?

Tick me at the end if ***you can*** …

Success Criteria

- ❑I can describe the conditions on the surface of the Moon
- ❑I can carry out an experiment to show how craters are formed on the surface of the Moon
- ❑I can draw a scatter graph with a best fit line.

Investigating Craters (Extension)

09/01/2025

Starter:

1. Put these scientific investigation headings in the correct order.

Results Conclusion Title

Method Aim Evaluation

2. Select **two** of them and describe what they mean.

Investigating Craters (Extension)

09/01/2025

Learning Intentions:

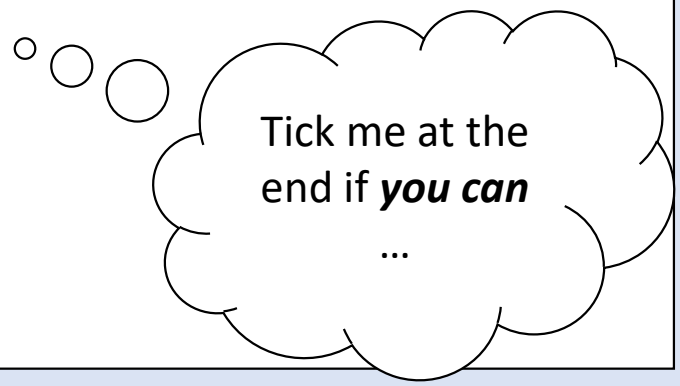
- To design, carry out and write up my own experiment
- To state the dependant, independent and controlled variables.

Investigating Craters (Extension)

09/01/2025

Success Criteria

- ❑ I can design, carry out and write up my own experiment
- ❑ I can state the dependant, independent and controlled variables.



Investigating Craters (Extension)

Now design your own investigation. What other factors could you investigate?

Investigate how changing the…

- diameter of the asteroid
- mass of the asteroid
- height the asteroid is dropped from

affects the…

- depth of crater.
- width of crater.

Investigating Craters (Extension)

Aim: To investigate how the _____ affects the _____.

Investigate how changing the…

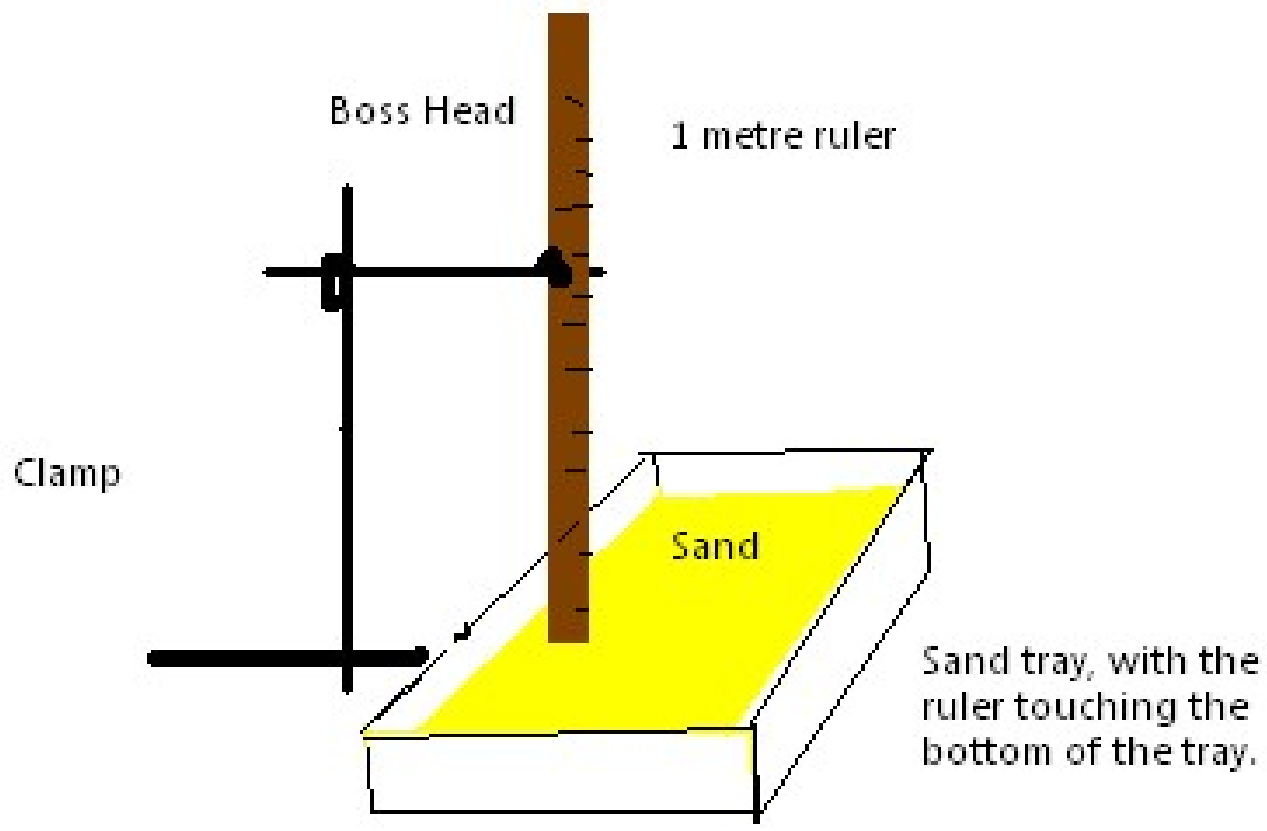
- diameter of the asteroid
- mass of the asteroid
- height the asteroid is dropped from

affects the…

- depth of crater.
- width of crater.

Investigating Craters (Extension)

Method:



Investigating Craters (Extension)

Method Variables:

- I will change the _____ by

  _____

- I will measure the _____ using

  _____

- I will keep the _____

  constant.

Investigating Craters (Extension)

Results:

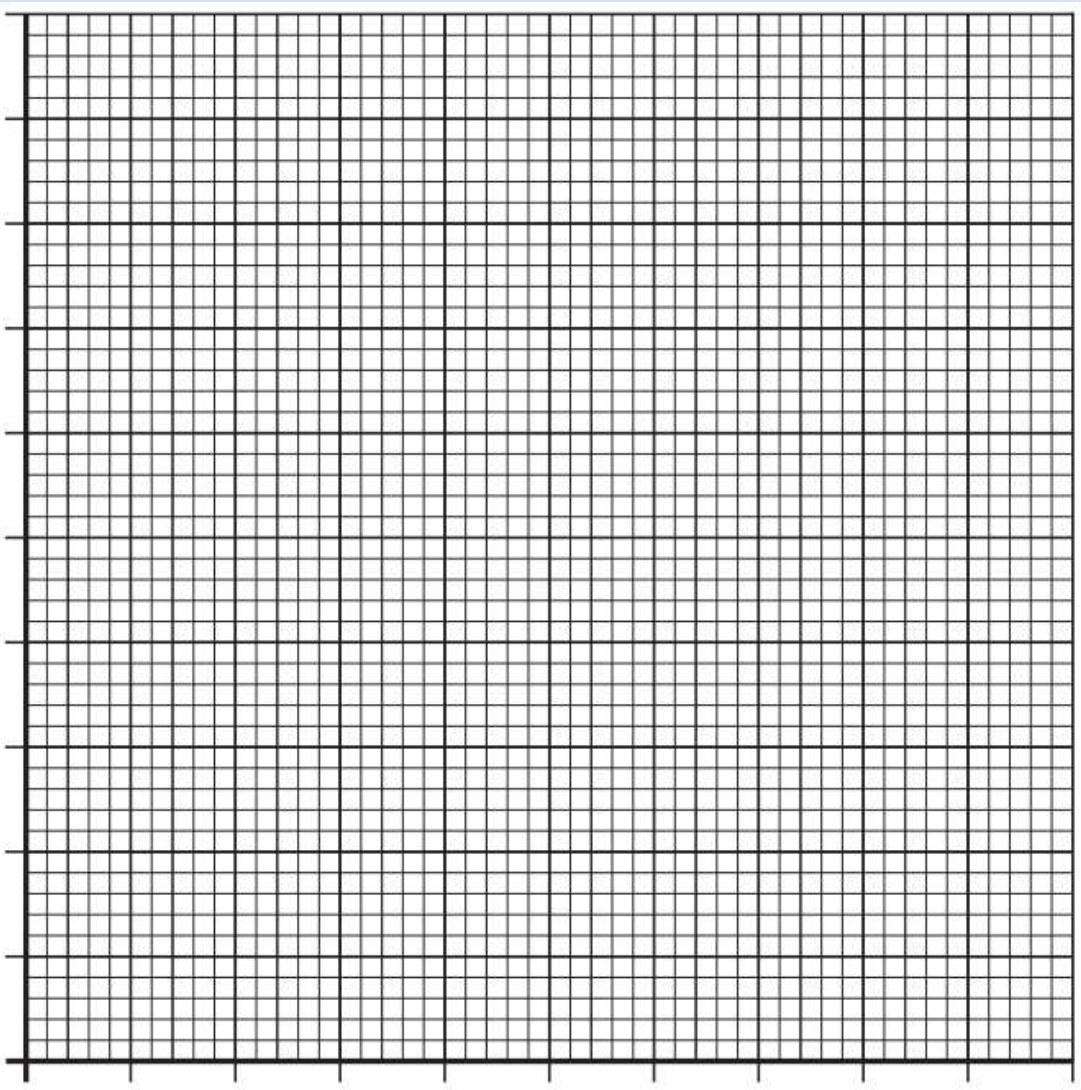
	1	2	3	Average

Investigating Craters (Extension)

Page 17

Graph:

Plot a scatter graph with a best fit line.



Investigating Craters (Extension)

Aim: To investigate how the **diameter** of an asteroid from affects the **width of the crater**.

Conclusion: *Answer the aim*

Evaluation: *What went well? What could be improved?*

Investigating Craters (Extension)

09/01/2025

Plenary:

What did you do to make your experiment a fair test?

Success Criteria

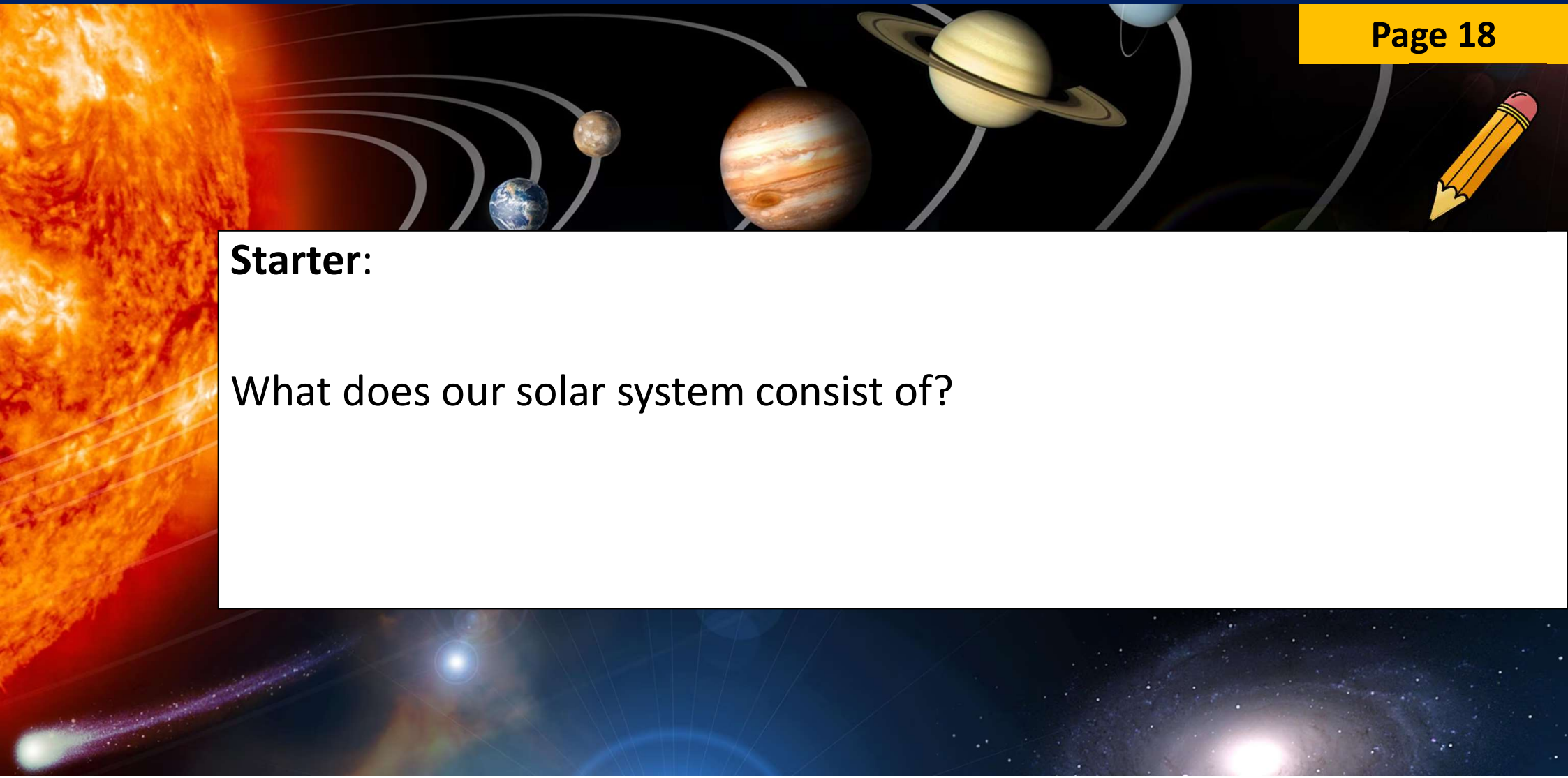
- ❑I can design, carry out and write up my own experiment
- ❑I can state the dependant, independent and controlled variables.

Tick me at the end if ***you can*** …

THE SOLAR SYSTEM

The Solar System

09/01/2025



Starter:

What does our solar system consist of?

The Solar System

09/01/2025

Learning Intentions:

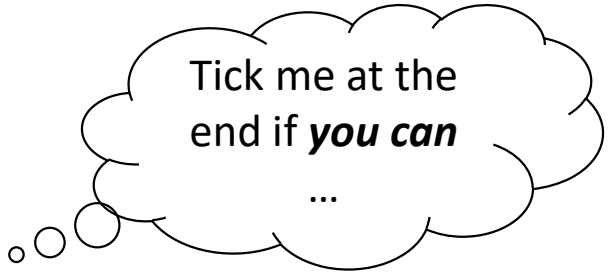
- To learn that the Solar System consists of eight planets that orbit the Sun.
- To list the planets in order of increasing distance from the Sun.
- To learn about the relative size and scale of the planets in the Solar System.

The Solar System

09/01/2025

Success Criteria

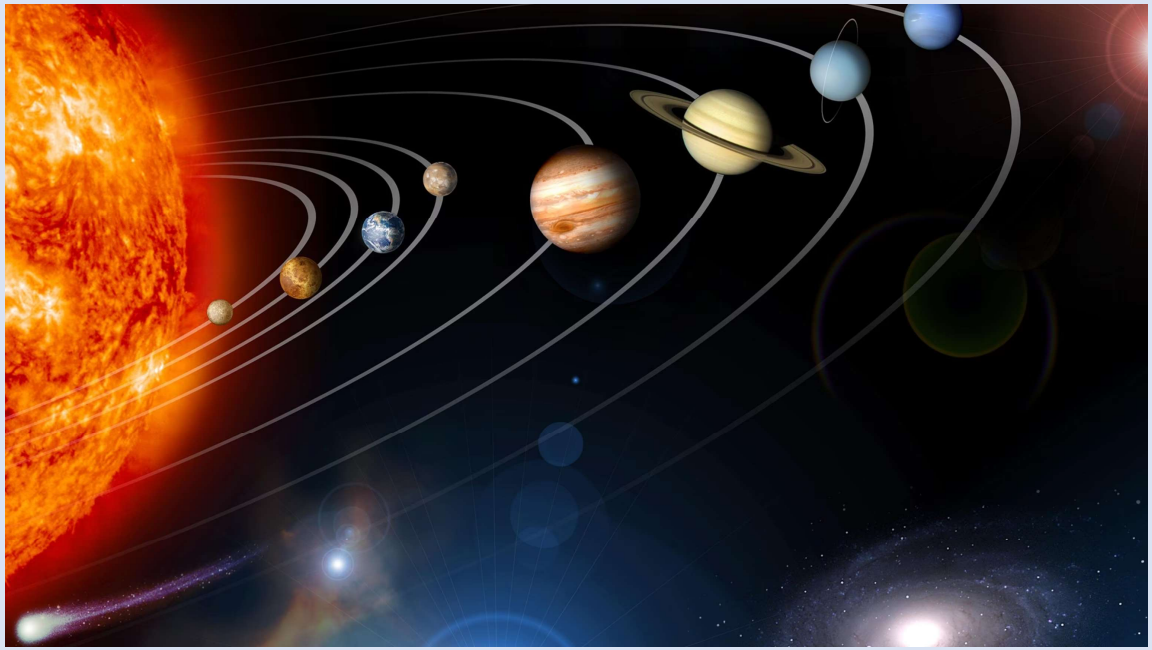
- ❑ I can state that the Solar System consists of eight planets that orbit the Sun.
- ❑ I can list the planets in order of increasing distance from the Sun.
- ❑ I can describe the relative size and scale of the planets in the Solar System.



The Solar System

Our solar system consists of our Sun and everything in its gravitational pull around it.

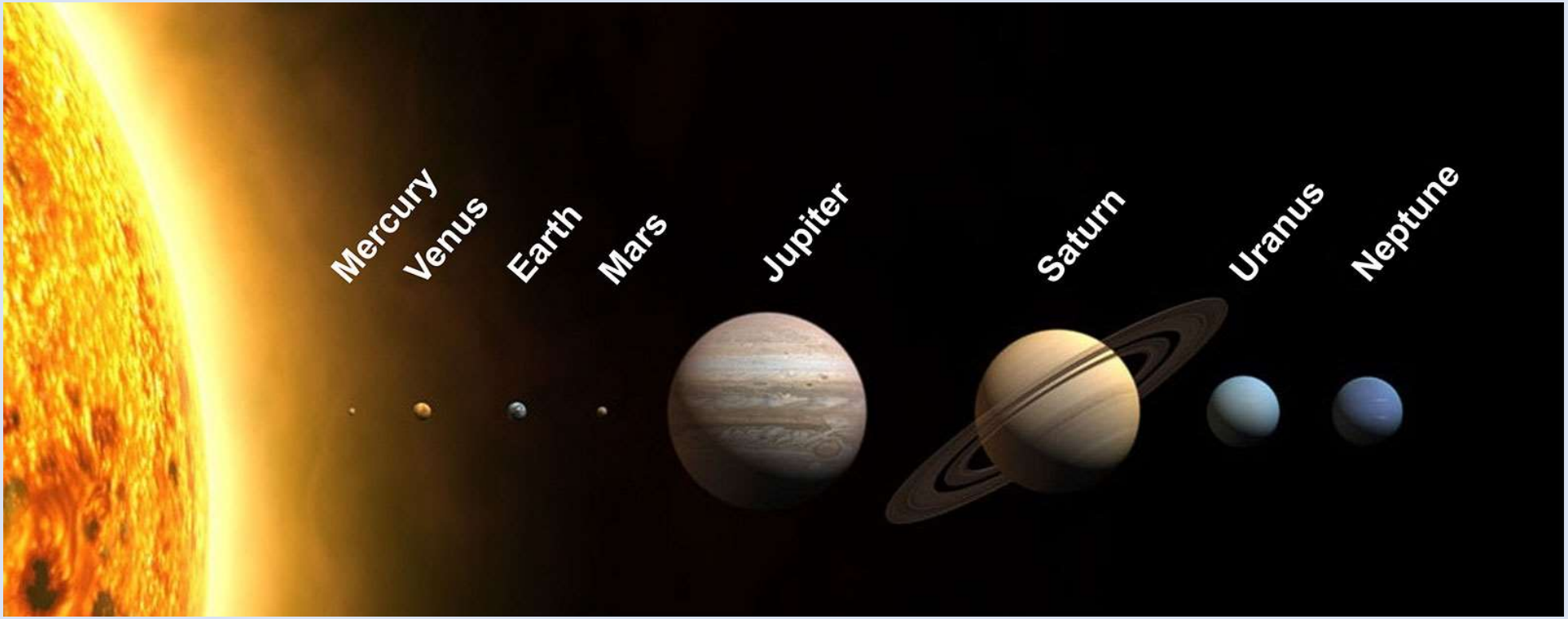
Planets, moons, asteroids, minor planets, comets, dust and gas all belong to the solar System.



The Solar System

Class question:

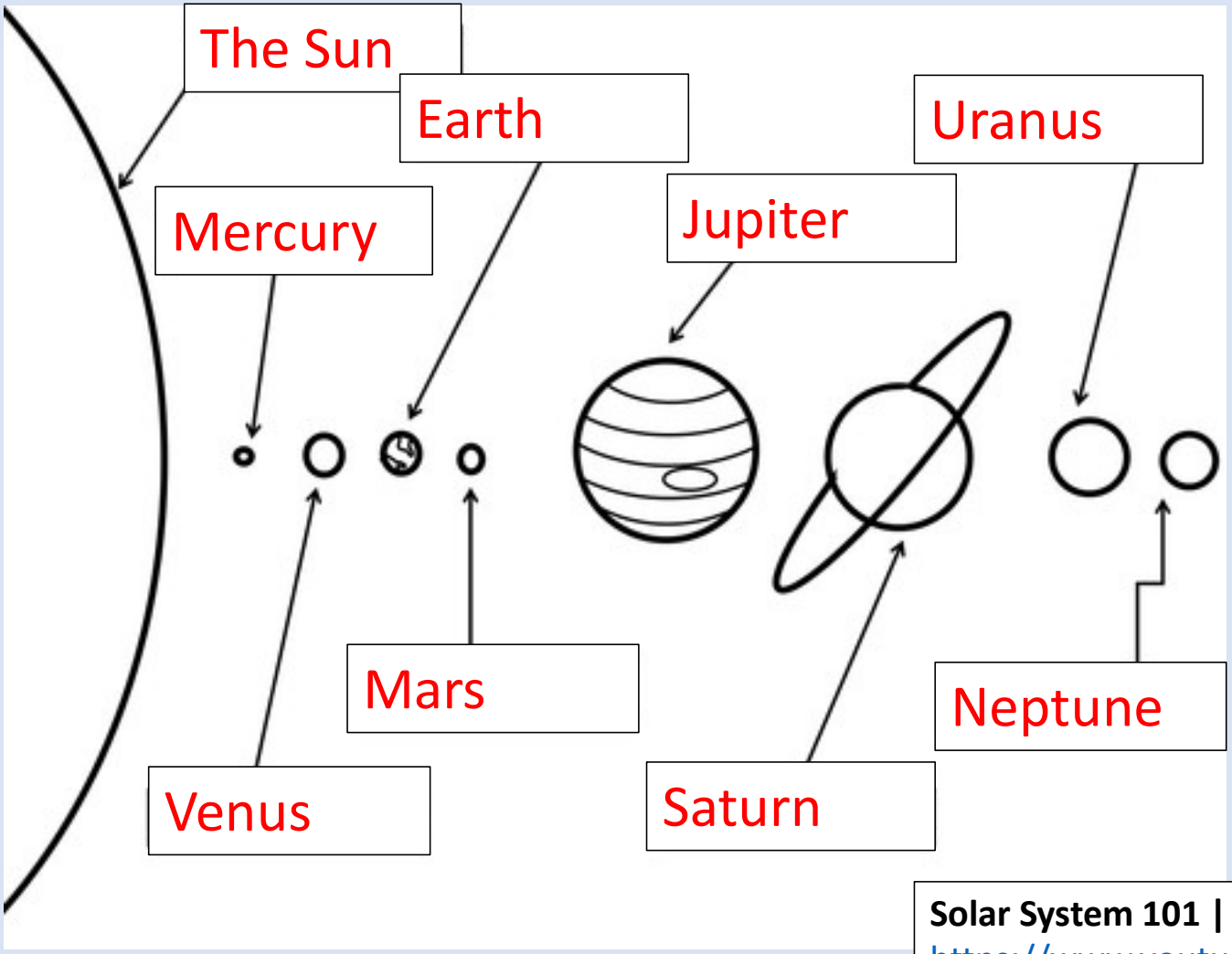
List the planets in order of increasing distance from the Sun.



The Solar System

The Earth is one of 8 planets which orbit the Sun. Together with other objects like comets, asteroids and dwarf planets, they make up the Solar System.

The Solar System



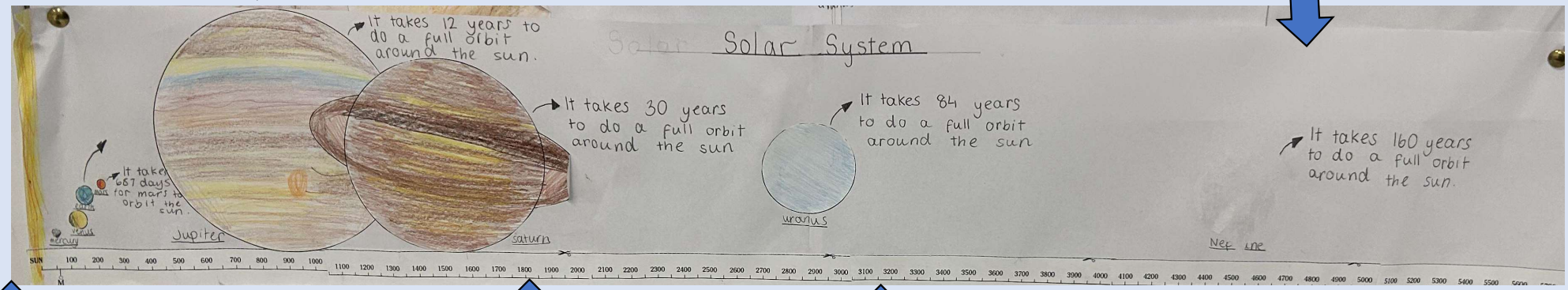
Solar System 101 | National Geographic 4:10
https://www.youtube.com/watch?v=libKVRa01L8

The Scale of the Solar System

Create a map of the solar system to show the scale of the solar system.

Planets coloured

Planet Facts



Include the Sun

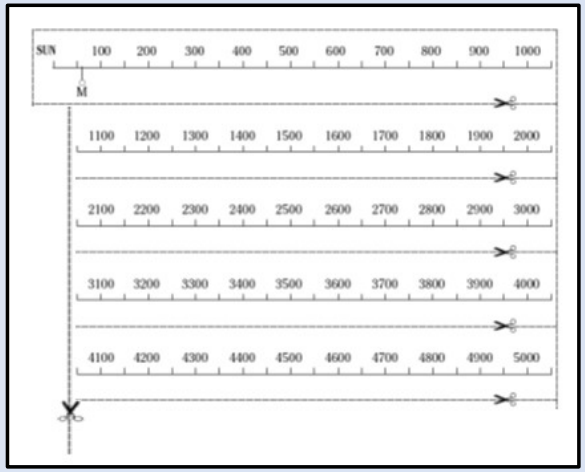
Solar System Scale

Planets placed at the correct distance

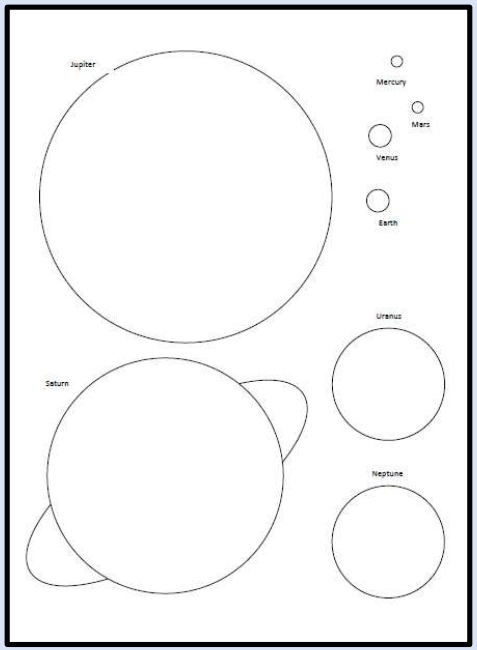
The Scale of the Solar System

Collect a ……

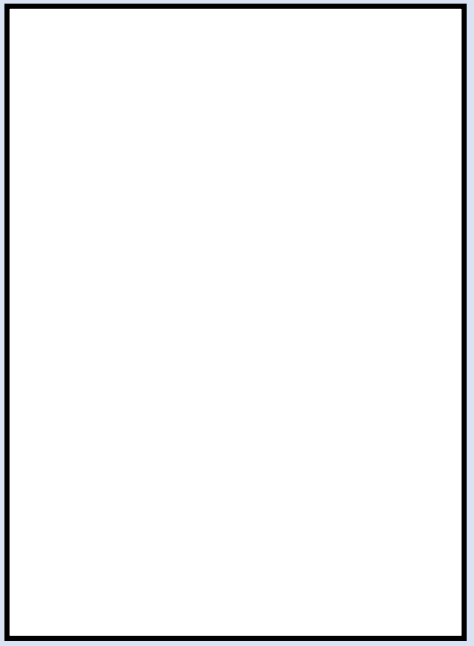
Solar System Scale



Planet diagram



A3 piece of paper



The Scale of the Solar System

1. Fold the A3 paper in half to create two long strips. Tape them together.
2. Cut out the ‘solar system scale’ and glue it along the bottom of your paper.
3. Mark each planet at the correct **distance to the Sun** using the data table in your booklet. Mercury has been completed.
4. Colour and cut out your planets the glue them on your scale at the correct **distance to the Sun** .
5. Add facts on your solar system map.

The Scale of the Solar System

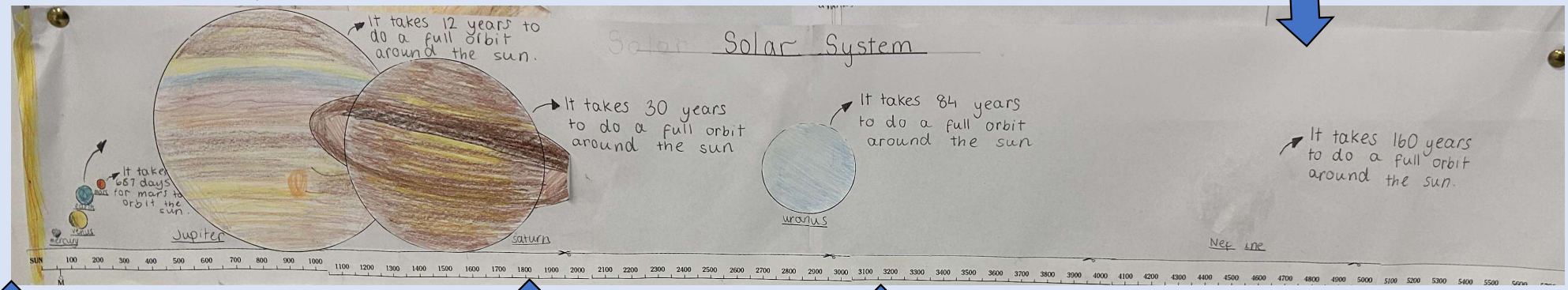
Planet	Distance to the Sun (million km)	Time for 1 orbit around the Sun (Earth days)	Average surface temperature (° C)	Strength of gravity (Nkg^{-1})	Moons
Mercury	60	88	167	3.7	0
Venus	110	225	464	8.9	0
Earth	150	365	15	9.8	1
Mars	230	687	-65	3.7	2
Asteroids	400	-	-	-	-
Jupiter	780	4330	-110	23	67
Saturn	1400	10800	-140	9.0	62
Uranus	2900	30600	-195	8.7	27
Neptune	4500	59800	-200	11	14

The Scale of the Solar System

Create a map of the solar system to show the scale of the solar system.

Planets coloured

Planet Facts



Include the Sun

Solar System Scale

Planets placed at the correct distance

The Solar System

09/01/2025

Plenary:

There are a number of mnemonics to help you remember the order of the planets in the Solar system.

Can you think of any others?

Success Criteria

- ❑ I can state that the Solar System consists of eight planets that orbit the Sun.
- ❑ I can list the planets in order of increasing distance from the Sun.
- ❑ I can describe the relative size and scale of the planets in the Solar System.

Tick me at the end if ***you can*** …

The Scale of the Solar System Continued ....

09/01/2025

Starter:

1. How does the size of the four **inner** planets compare to the size of the four **outer** planets?

2. Why are the sizes of the four outer planets so different from the four inner planets?

3. Saturn is 1400 million km away from the sun, Earth is 150 million km. Roughly how many times **further away** from the Sun is **Saturn** compared to the **Earth**?

https://www.bobthealien.co.uk/solarsystem/innerouter.htm

The Scale of the Solar System Continued 09/01/2025

Learning Intentions:

- To learn about the size of planet relative to each other.
- To learn about the distances between each planet and the Sun.

The Scale of the Solar System Continued 09/01/2025

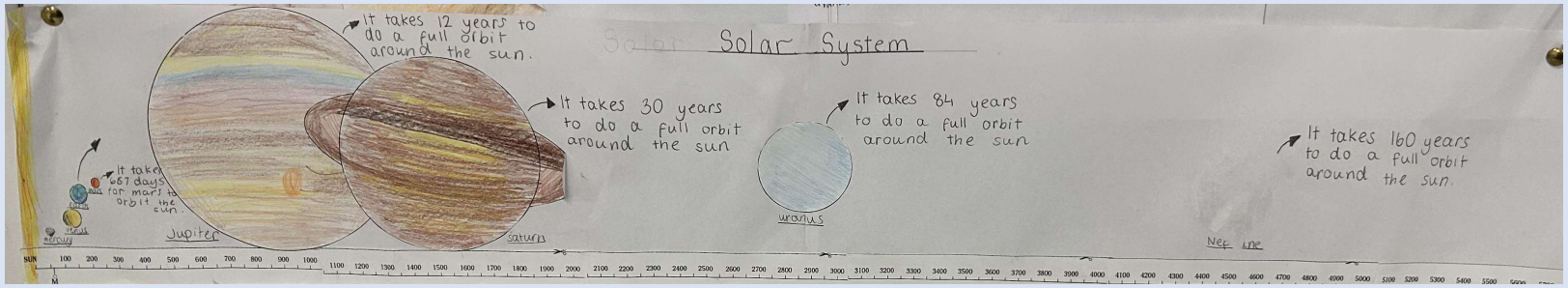
Success Criteria

- ❑I can describe the size of the planets relative to each other.
- ❑I can describe the distances between each planet and the Sun.

Tick me at the end if ***you can*** …

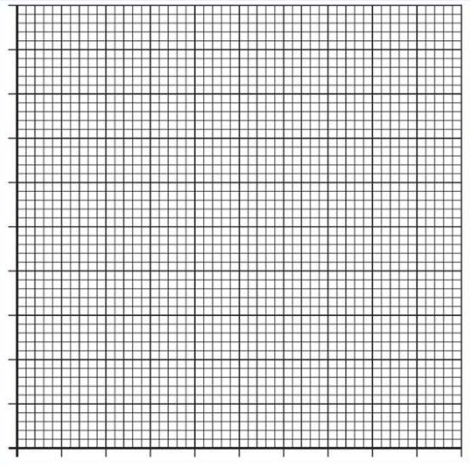
The Scale of the Solar System

Continue with your scale of the solar system poster.

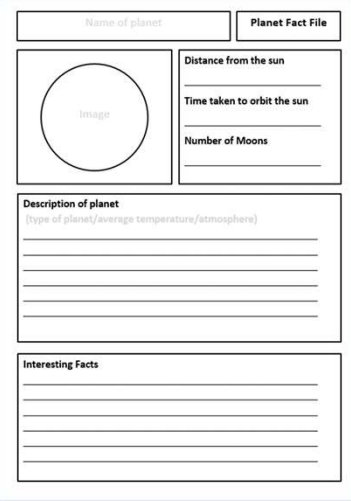


If finished, try the following extension tasks:

Bar Graph Practice



Planet Fact File



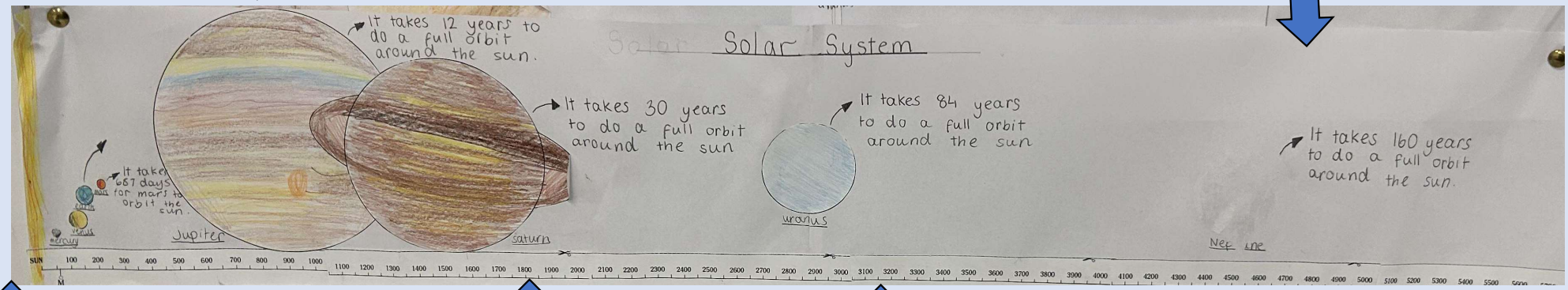
A model Solar System

The Scale of the Solar System

Create a map of the solar system to show the scale of the solar system.

Planets coloured

Planet Facts



Include the Sun

Solar System Scale

Planets placed at the correct distance

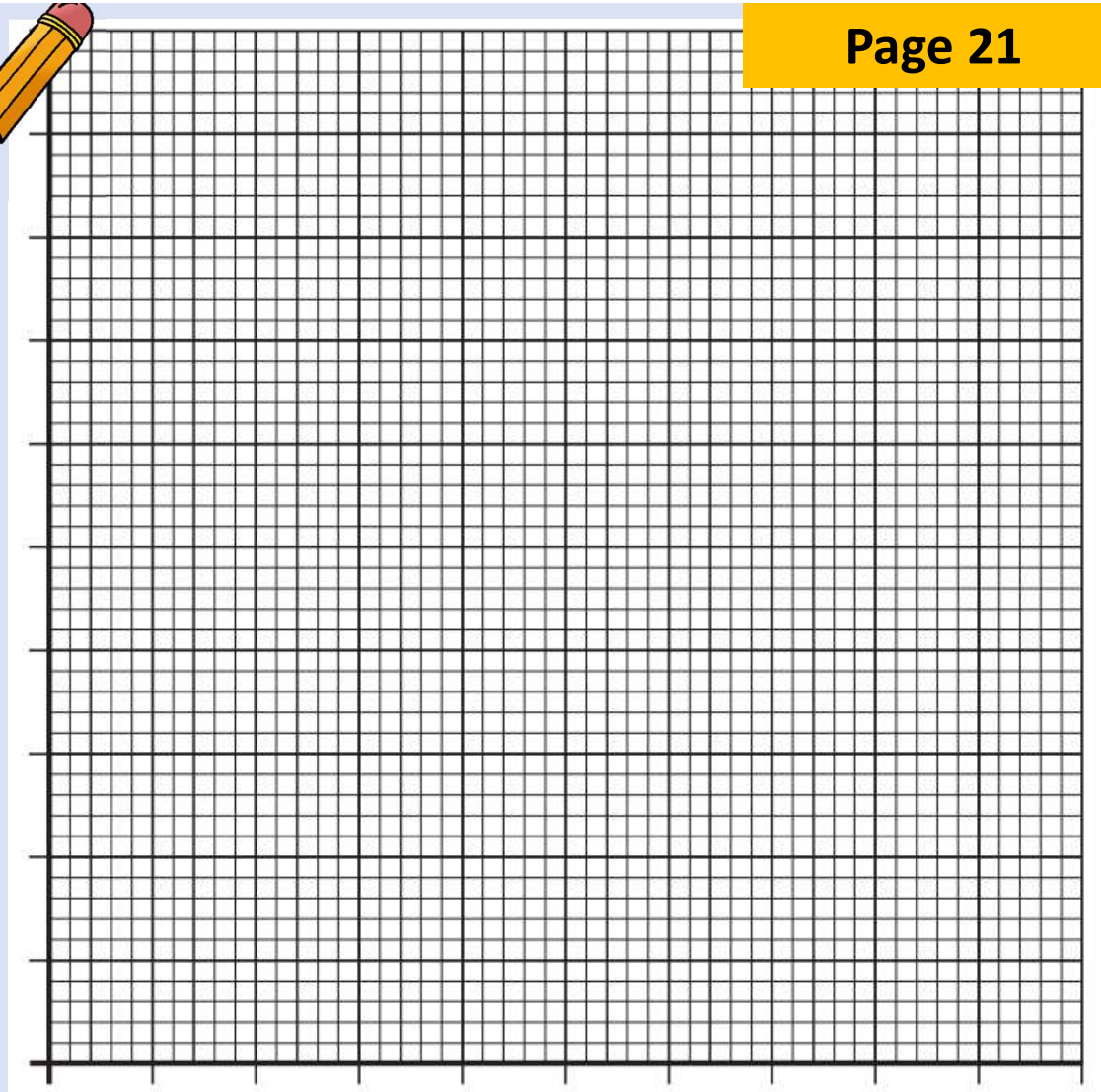
The Scale of the Solar System

1. Fold the A3 paper in half to create two long strips. Tape them together.
2. Cut out the ‘solar system scale’ and glue it along the bottom of your paper.
3. Mark each planet at the correct **distance to the Sun** using the data table in your booklet. Mercury has been completed.
4. Colour and cut out your planets the glue them on your scale at the correct **distance to the Sun** .
5. Add facts on your solar system map.

Bar Graph Practice

Extension: Plot this data on a bar graph

Planet	Distance to the Sun (million km)
Mercury	60
Venus	110
Earth	150
Mars	230
Asteroids	400
Jupiter	780
Saturn	1400
Uranus	2900
Neptune	4500



Planet Fact File

Name of planet	Planet Fact File

Image

Distance from the sun

_____

Time taken to orbit the sun

_____

Number of Moons

_____

Description of planet

(type of planet/average temperature/atmosphere)

_____

_____

_____

_____

_____

_____

Interesting Facts

_____

_____

_____

_____

_____

_____

(Optional) A model Solar System

Today you will be designing a model of the **solar system** to be displayed in the classroom!

Please collect the following:

- Paper plate
- Scissors
- Planets cut out
- Colouring pens/pencils

Remember the order of the planets from the sun!

The Scale of the Solar System Continued 09/01/2025

Plenary:

I was successful when I ……..

The part of the lesson I enjoyed the most was……

The skills I used in today's lesson were……..

Success Criteria

- ❑ I can describe the size of the planets relative to each other.
- ❑ I can describe the distances between each planet and the Sun.

Tick me at the end if ***you can*** …

Asteroids, Comets & Meteoroids

09/01/2025

Page 23

Starter:

Use your Solar System Information Table on page 19 to answer the following questions.

1. Which planet has the highest average surface temperature?

2. Which planet has the longest year?

3. How many more moons does Jupiter have compared to Saturn?

4. On which two planets is the strength of gravity the same?

5. Which planet has more moons than Saturn?

The Scale of the Solar System

Planet	Distance to the Sun (million km)	Time for 1 orbit around the Sun (Earth days)	Average surface temperature (° C)	Strength of gravity (Nkg^{-1})	Moons
Mercury	60	88	167	3.7	0
Venus	110	225	464	8.9	0
Earth	150	365	15	9.8	1
Mars	230	687	-65	3.7	2
Asteroids	400	-	-	-	-
Jupiter	780	4330	-110	23	67
Saturn	1400	10800	-140	9.0	62
Uranus	2900	30600	-195	8.7	27
Neptune	4500	59800	-200	11	14

Asteroids, Comets & Meteoroids

09/01/2025

Learning Intentions:

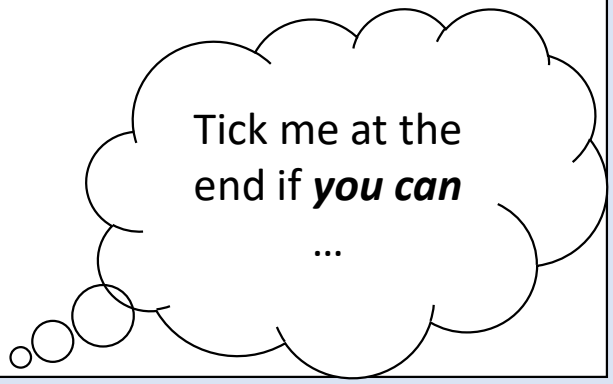
- To learn about comets and other small objects that orbit the Sun
- To state the difference between asteroids, comets, meteoroids, meteors and meteorites.

Asteroids, Comets & Meteoroids

09/01/2025

Success Criteria

- ❑ I can state that comets and other small objects that orbit the Sun.
- ❑ I can describe the difference between asteroids, comets, meteoroids, meteors and meteorites.



Asteroids, Comets & Meteoroids

There are several other objects which are in the solar system.

Use the video and PowerPoint slides to complete the table below.

Object	Definition
Asteroids	
Comet	
Meteoroids	
Meteors	
Meteorites	

Asteroids, Comets & Meteors

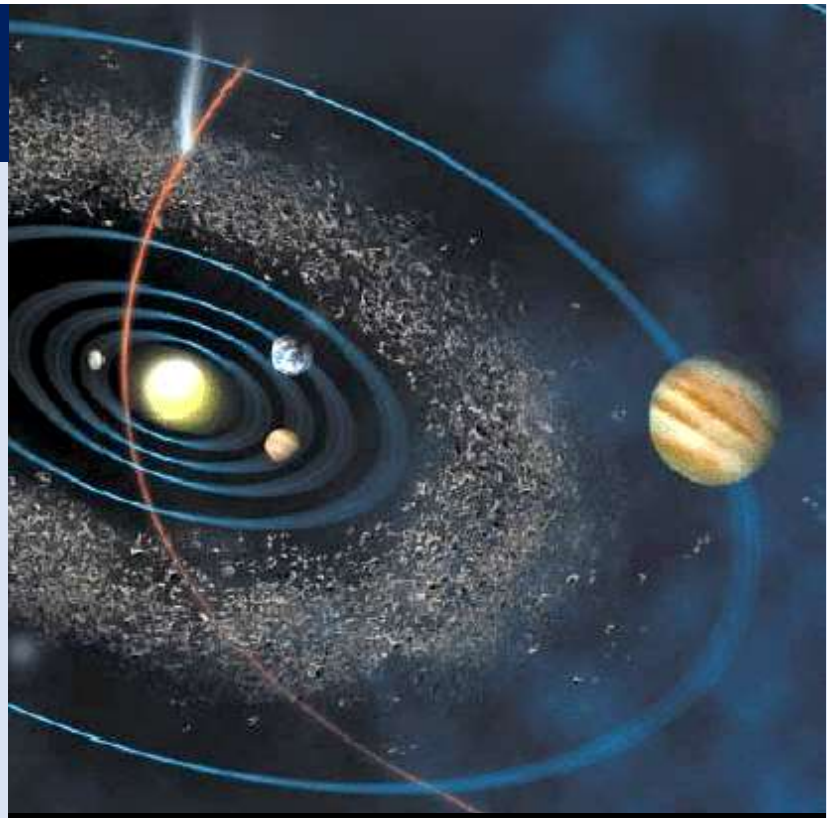
What Are The Differences Between Asteroids, Comets & Meteors? | The Space Rocks Song! KLT (2:49)

Asteroids

Asteroids are small, rocky objects that orbit the Sun.

They have been left over from the formation of the planets 4.5 billion years ago. They are often known as 'minor planets'.

There are thought to be billions of these chunks of rock. Most of them lie in a doughnut-shaped 'main belt' between the orbits of Mars and Jupiter.



Asteroids, Comets & Meteoroids

There are several other objects which are in the solar system.

Use the posters or PowerPoint slides to complete the table below.

Object	Definition
Asteroids	Small, rocky objects that orbit the Sun.

Comets

Comets are small ice worlds that orbit the Sun.

They have been left over from the formation of the planets.

Billions of comets are thought to exist on the edge of the Solar System, beyond the orbit of Pluto.

Comets are made of ice and dust while asteroids are made of rock.

The heat of the Sun makes the ices turn into gas that streams for millions of kilometres into space. Despite their length, the dust particles they contain are no bigger than grains of sand.

Meteoroids

Small chunks of rock (space rock) that travel through space are known as meteoroids.

Meteoroids range in size from dust grains to small asteroids.

Meteors

When meteoroids enter a planet's atmosphere and burn up, they are then seen as meteors.

Meteors (often called "shooting stars") are very common sights. Anyone who stares at a clear night sky will eventually see these brief trails of light.

Meteorites

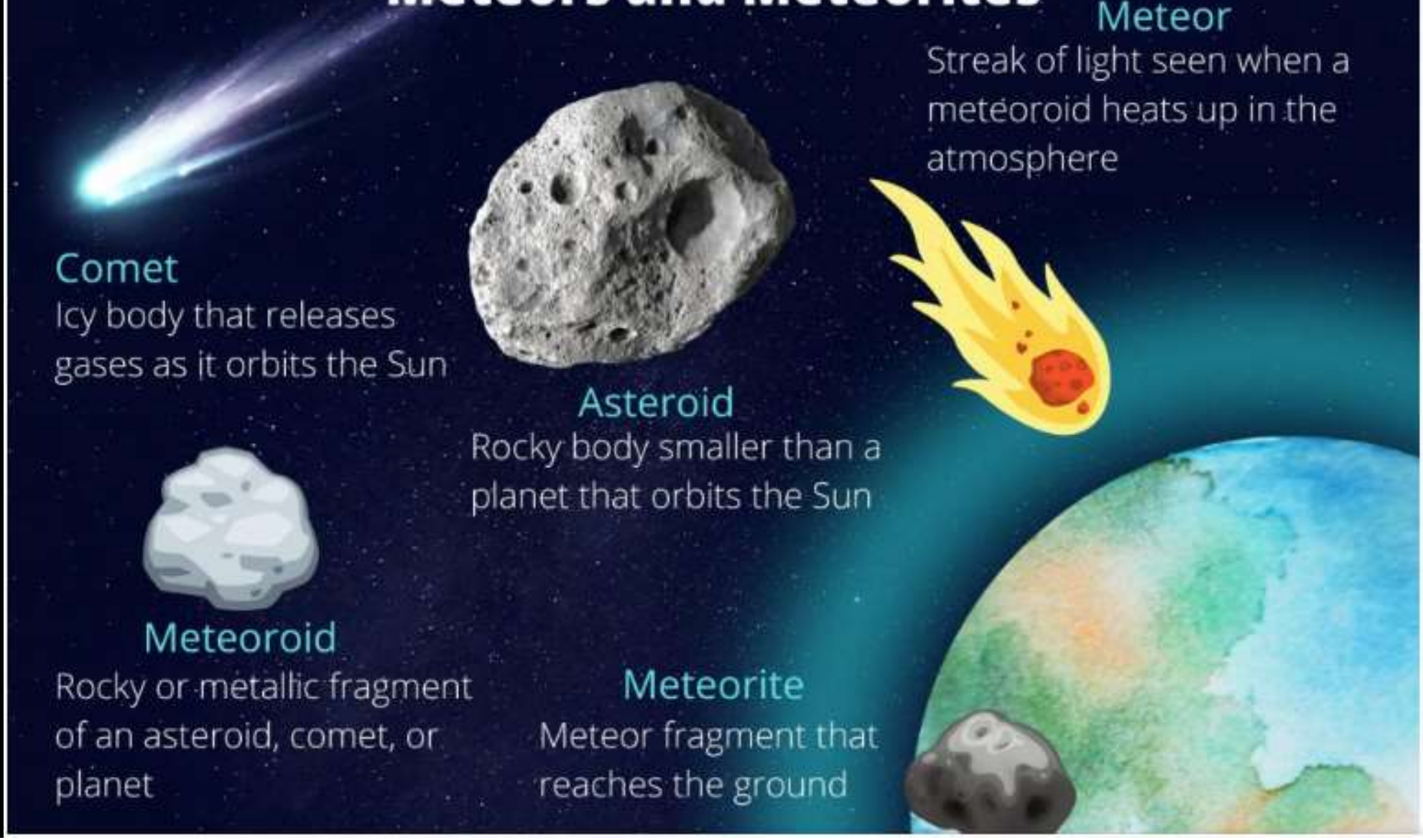
If a meteoroid survives its trip through Earth’s atmosphere and lands on the Earth’s surface, it is called a meteorite.

Meteorites are space rocks that fall to Earth's surface.

Asteroids, Comets & Meteors

Object	Definition
Asteroids	small, rocky objects that orbit the Sun.
Comet	small ice worlds that orbit the Sun.
Meteoroids	chunks of rock that travel through space – “space rocks”
Meteors	space rocks that enter a planet’s atmosphere and burn up - “shooting stars”
Meteorites	space rocks that fall to Earth's surface.

Meteors and Meteorites



Comet
Icy body that releases gases as it orbits the Sun

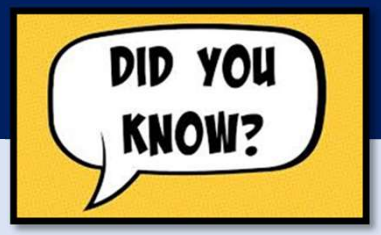
Asteroid
Rocky body smaller than a planet that orbits the Sun

Meteor
Streak of light seen when a meteoroid heats up in the atmosphere

Meteoroid
Rocky or metallic fragment of an asteroid, comet, or planet

Meteorite
Meteor fragment that reaches the ground

Rosetta space probe



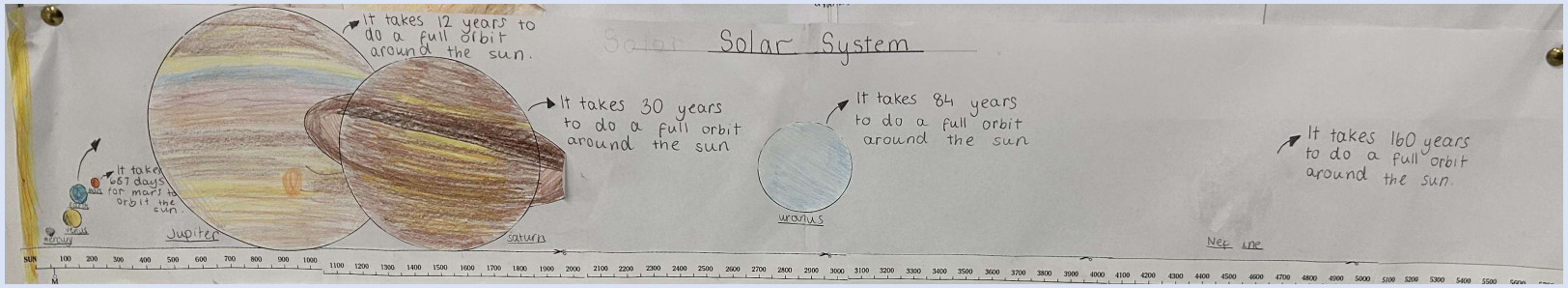
Rosetta was a space probe built by the European Space Agency launched on 2 March 2004.

Rosetta arrived at Comet 67P, on 6 August 2014.

It is the first mission in history to rendezvous with a comet, escort it as it orbits the Sun, and deploy a lander to its surface.

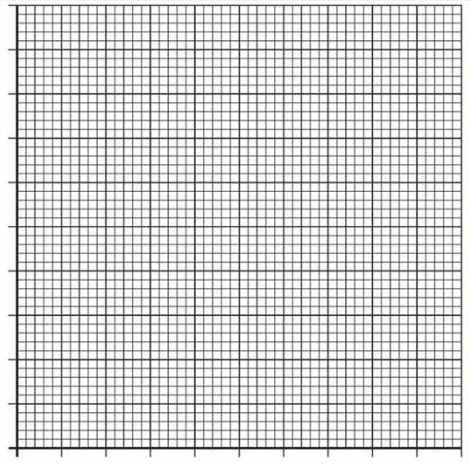
Asteroids, Comets & Meteoroids

Continue with your scale of the solar system poster.

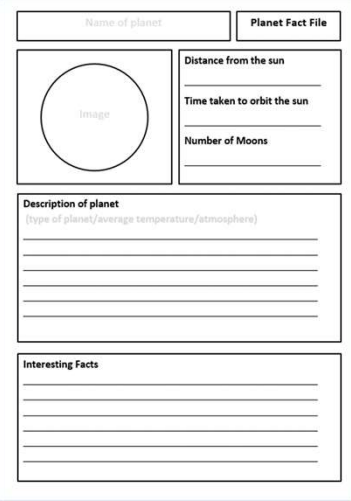


If finished, try the following extension tasks:

Bar Graph Practice



Planet Fact File



A model Solar System

Asteroids, Comets & Meteoroids

09/01/2025

Plenary:

Three boys are watching the stars while out camping. One boy spots a shooting star and thinks it is a comet. His friend thinks it is a meteor, and the third says it is a meteorite.

Who is correct?

Success Criteria

- ❑ I can state that comets and other small objects that orbit the Sun.
- ❑ I can describe the difference between asteroids, comets, meteoroids meteorites.

Tick me at the end if ***you can*** …

Beyond the Solar System

09/01/2025

Page 24

Starter:

1. What is beyond our solar system?

Beyond the Solar System

09/01/2025

Learning Intentions:

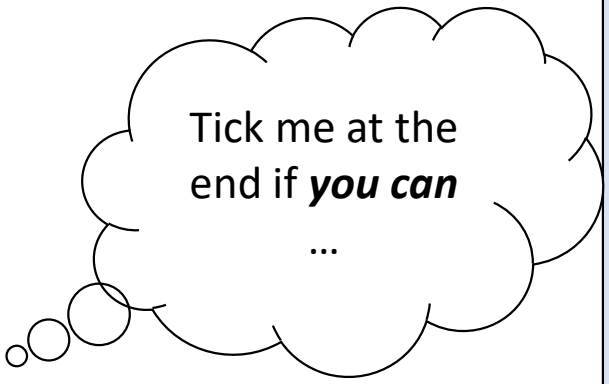
- To state and explain what is meant by the terms: planet, moon, star, Solar System, exoplanet, galaxy and universe.
- To understand the scale of the universe.

Beyond the Solar System

09/01/2025

Success Criteria

- ❑ I can state and explain what is meant by the terms: planet, moon, star, Solar System, exoplanet, galaxy and universe.
- ❑ I can describe the scale of the universe.

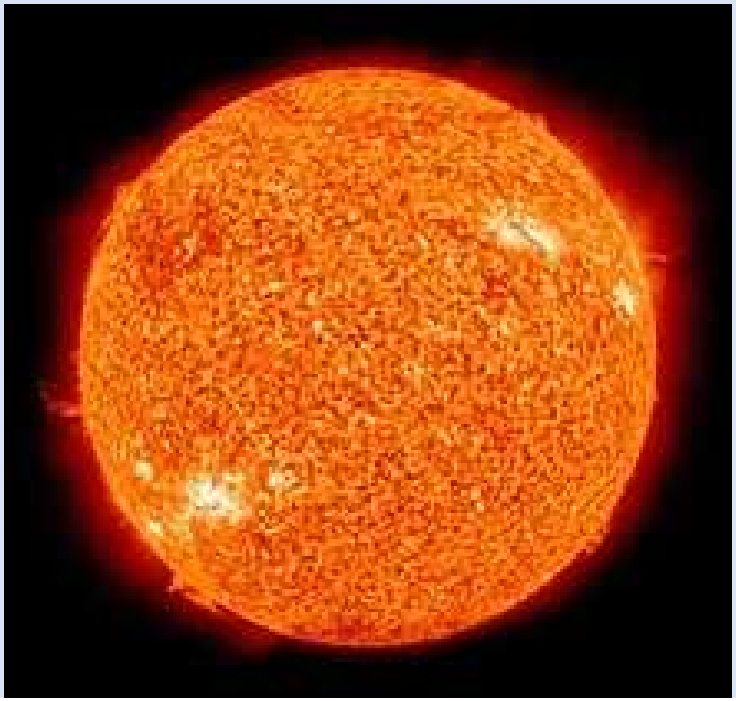


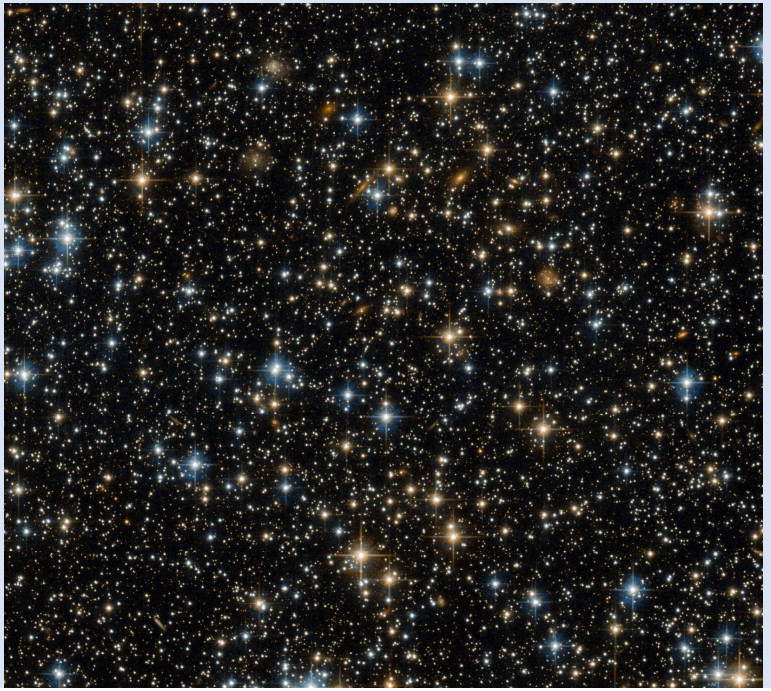
Star

A star is a huge sphere of gas that emits light and heat. Our Sun is the nearest star to the Earth.

The Sun is one of around 100 billion stars that make up our galaxy.

Many of these stars may have planets, known as **exo-planets** orbiting them.





More on **exo-planets** later….

Galaxy

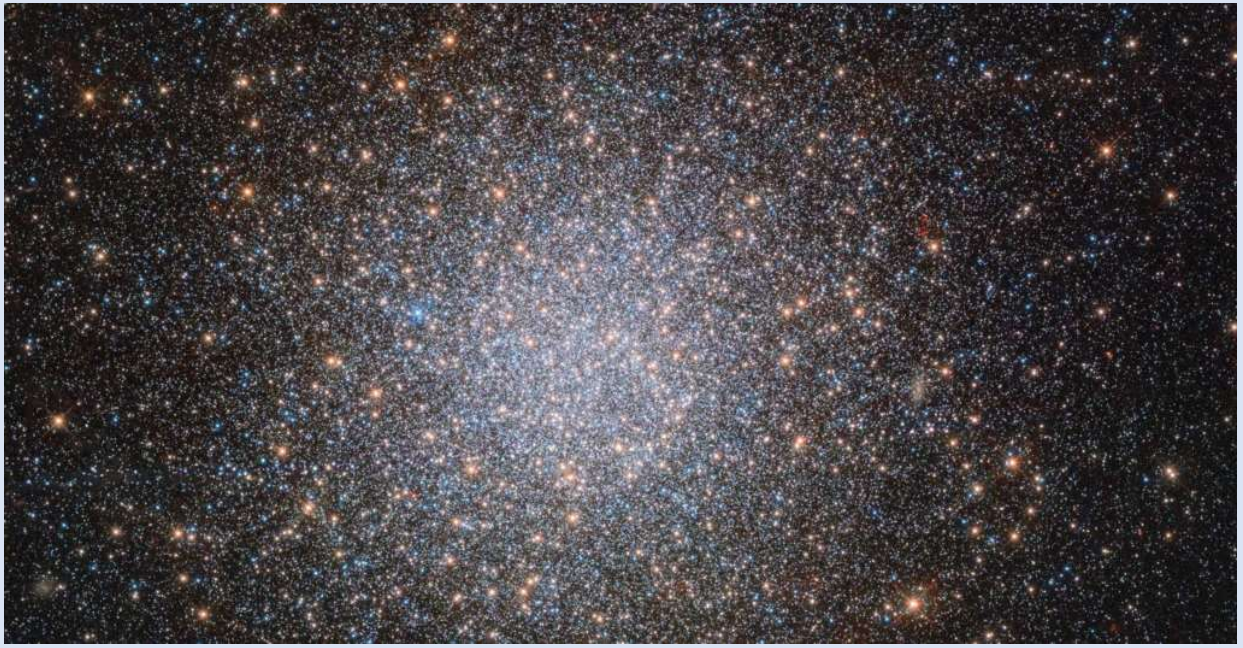
A galaxy is a huge collection of stars, dust and gas, held together by gravity.

Our galaxy is called the Milky Way.

The Universe

The Milky Way galaxy is just one of the millions of galaxies that make up the Universe.

The Universe is made up of everything that exists, including planets, stars, galaxies and all forms of matter and energy.

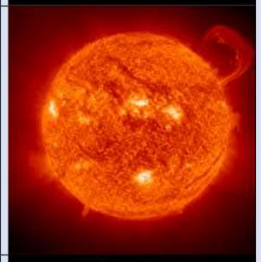


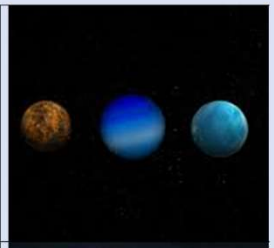
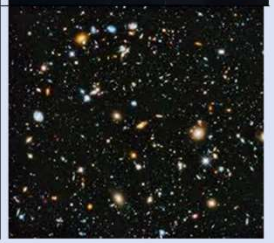
Important Astronomical Objects

Astronomical Object	Description	Picture
Planet		
Moon		
Star		
Solar System		
Exoplanet		
Galaxy		
Universe		

Card Sort

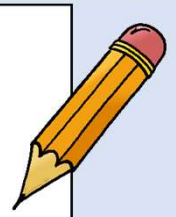
Important Astronomical Objects

Planet	An object which orbits a star.	
Moon	A natural satellite which orbits a planet.	
Star	A huge sphere of gas that emits light and heat.	
Solar System	A star and the objects that orbit it.	

Exoplanet	A planet outside our Solar System.	
Galaxy	A huge collection of stars.	
Universe	Everything that exists including all matter and energy.	

Important Astronomical Objects

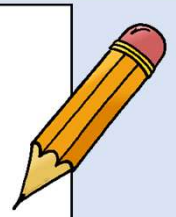
Planet	**Universe**	**Solar System**	**Star**
Moon	**Exoplanet**	**Galaxy**	



Astronomical Object	Description
	An object which orbits a star.
	A natural satellite which orbits a planet.
	A huge sphere of gas that emits light and heat.
	A star and the objects that orbit it.
	A planet outside our Solar System
	A huge collection of stars.
	Everything that exists including all matter and energy.

Important Astronomical Objects

Planet	**Universe**	**Solar System**	**Star**
Moon	**Exoplanet**	**Galaxy**	



Astronomical Object	Description
Planet	An object which orbits a star.
Moon	A natural satellite which orbits a planet.
Star	A huge sphere of gas that emits light and heat.
Solar System	A star and the objects that orbit it.
Exoplanet	A planet outside our Solar System
Galaxy	A huge collection of stars.
Universe	Everything that exists including all matter and energy.

The Scale of the Universe

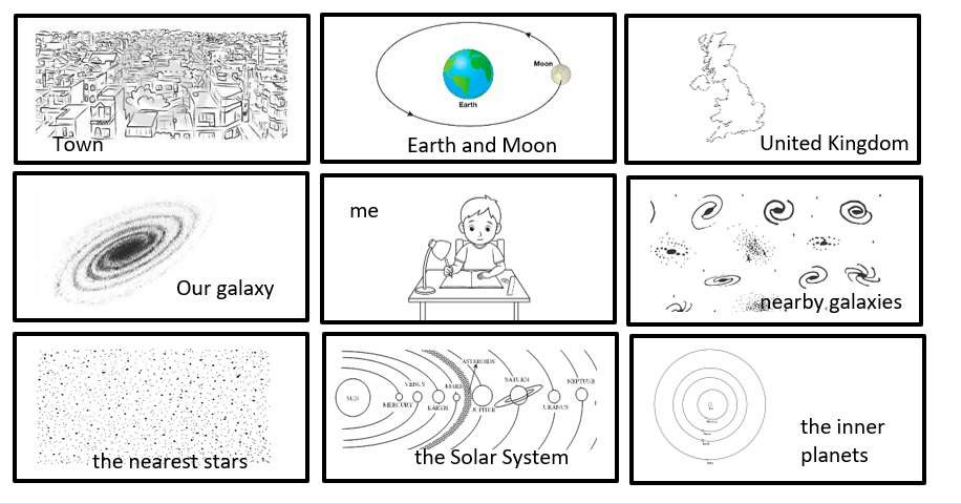
Use the scale of the Universe animation to explore the sizes of objects in space.

https://scaleofuniverse.com/ or video

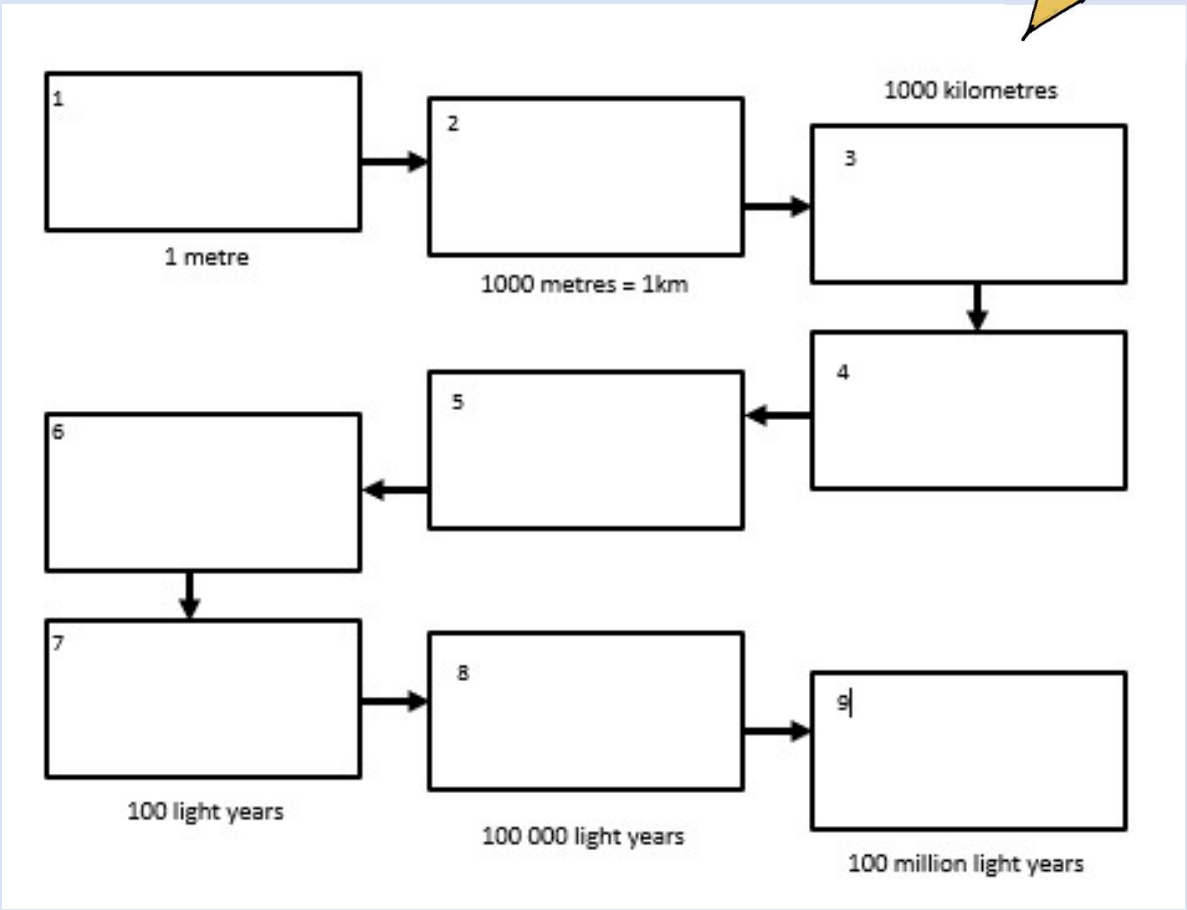
How Big Is The Universe? Insider Science (3:49)

The Scale of the Universe

Complete the diagram to show your place in the Universe.



1. Cut out the images.
2. Put them in the correct order
3. Get your teacher to check your work
4. Stick them in



The Scale of the Universe

More videos about the scale of the Universe…..

Mind Blowing! ...Earth Compared To The Rest Of The Universe - Amazing Graphic Presentation

VFX Artist Reveals the True Scale of the Universe, Corridor Crew (6:34)

Beyond the Solar System

09/01/2025

Plenary:

Choose **one** word from the list below. What does it mean?

Planet	**Universe**	**Solar System**	**Star**
Moon	**Exoplanet**	**Galaxy**	

Tick me at the end if ***you can*** …

Success Criteria

- ❑ I can state and explain what is meant by the terms: planet, moon, star, Solar System, exoplanet, galaxy and universe.
- ❑ I can describe the scale of the universe.

Space Observation and Exploration

09/01/2025

Starter:

1. Put these cosmology terms in order of their size:

Planet
Universe
Star
Solar system
Galaxy
Moon

Smallest ⟶ Largest.

_____ _____ _____ _____ _____ _____

2. Choose **one** term and state its definition.

Space Observation and Exploration

09/01/2025

Learning Intentions:

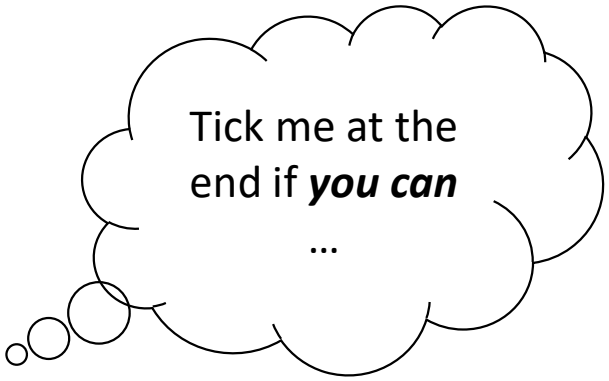
- To state the methods used to observe and explore space.
- To describe the impact that space observation and exploration has had on our understanding of the universe and planet Earth.

Space Observation and Exploration

09/01/2025

Success Criteria

- ❑ I can state the methods used to observe and explore space.
- ❑ I can describe the impact that space observation and exploration has had on our understanding of the universe and planet Earth.



Space Observation and Exploration

Until the middle of the twentieth century, the only way to explore space was through observing it by eye.

Galileo was an Italian astronomer who first used a telescope to look at the sky.

Space Observation

Many ground based observatories were built to observe light coming from space using telescopes.

Scotland has a number of working observatories. The most recent is the Scottish Dark Sky Observatory in the Galloway Forest park. The lack of light pollution in that area makes it ideal for observing the night sky.

Space Observatories

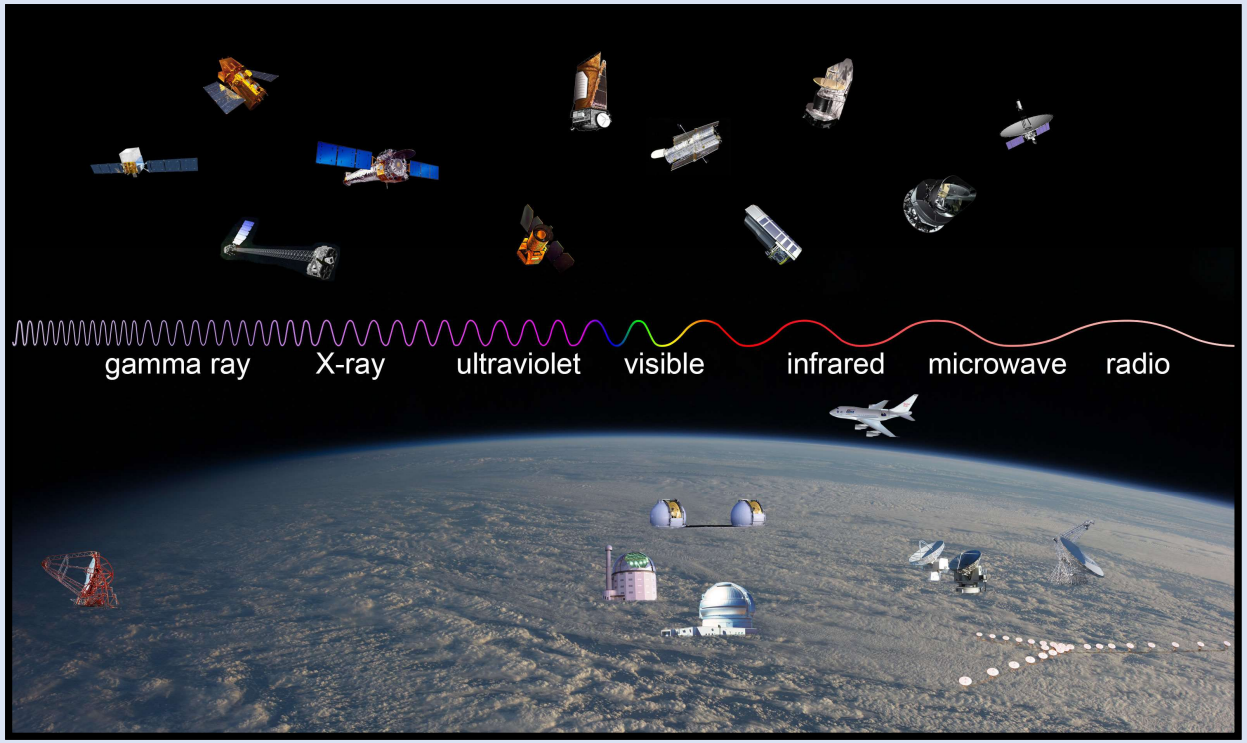
In 1968, America launched the first telescope into orbit.

These telescope (space observatories) eliminate the problems caused by light pollution.

Light pollution is when the observation of stars and planets is made more difficult due to the night sky in town and cities being brightened by street lights and other artificial lights.

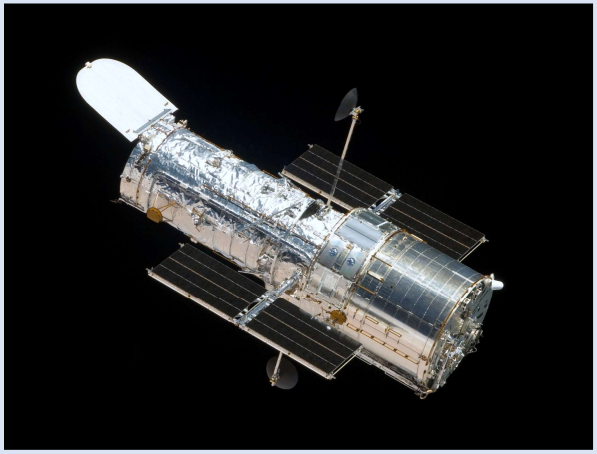
Space Observatories - Telescopes

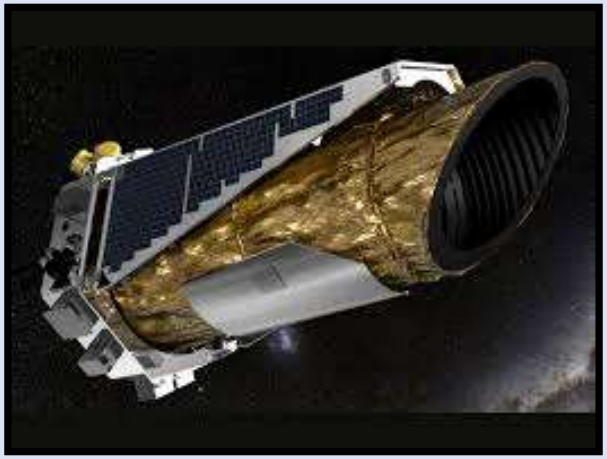
Space observatories such as the Hubble Space Telescope and the Kepler Observatory have significantly improved astronomers' understanding of the Universe.



Telescopes are used to detect radiation from all sections of the electromagnetic spectrum.

Space Observatories - Telescopes





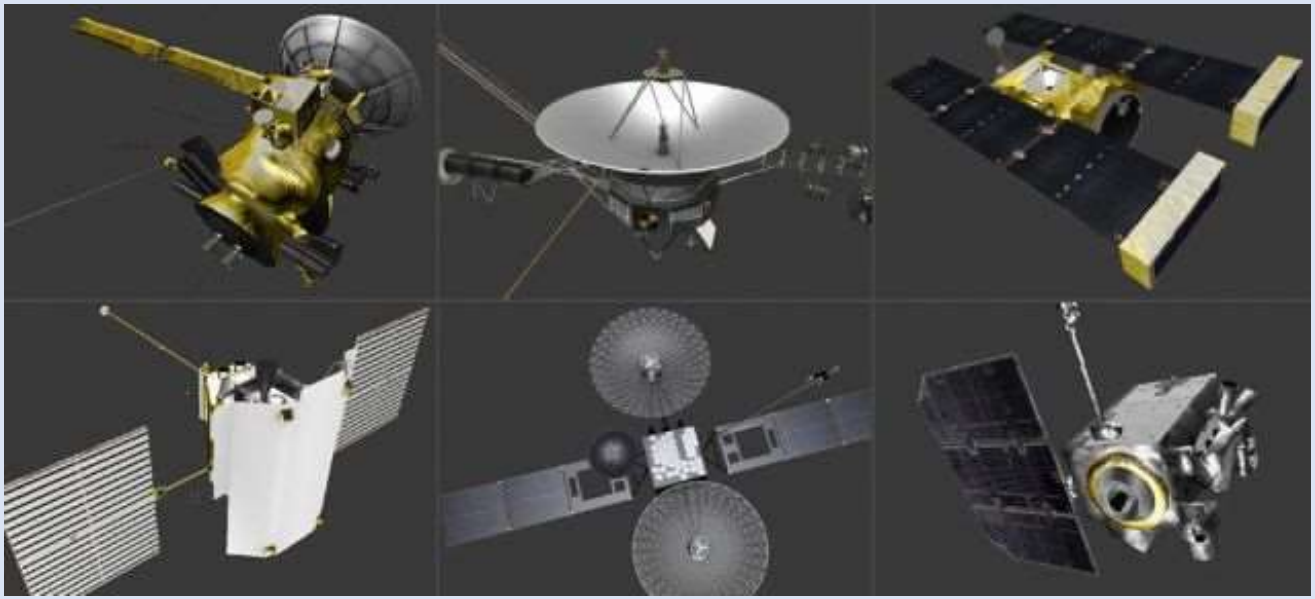
The Hubble telescope can view light from all parts of the electromagnetic spectrum. Images taken from the Hubble telescope have helped astronomers understand how the Universe has changed over time. It was launched into low Earth orbit in 1990 and remains in operation.
This is the first image taken by the Hubble telescope.

The Kepler observatory was launched in 2009 and is designed to discover Earth – sized planes orbiting around other stars. The Kepler telescope was retired in 2018. It detected 2,662 planets.

Space Probes

Space Probes are a robotic unmanned spacecraft used to explore space. Many nations have sent space probes into space to explore other planets, moons, asteroids and comets.

Missions involving space probes last for several years due to the large distances they need to travel.

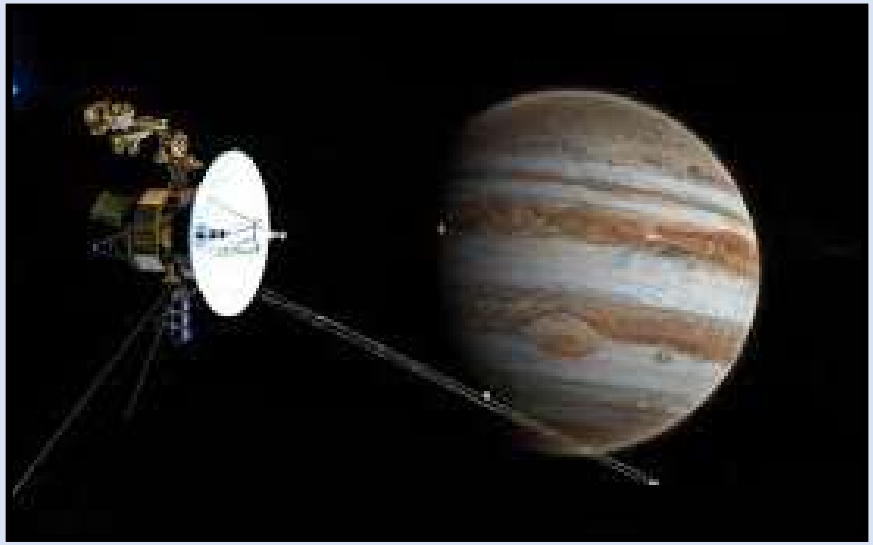


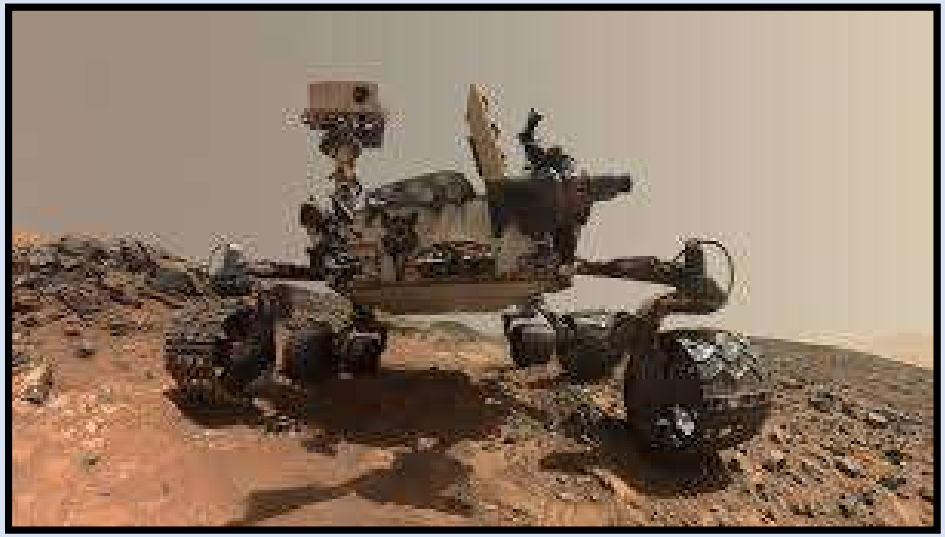
Space Probes

Voyager 1 is the longest lasting NASA mission to date. It was launched in September 1977 and has explored Jupiter, Saturn and their moons.

It is now travelling out with our Solar System into interstellar space. It still send data back to Earth.

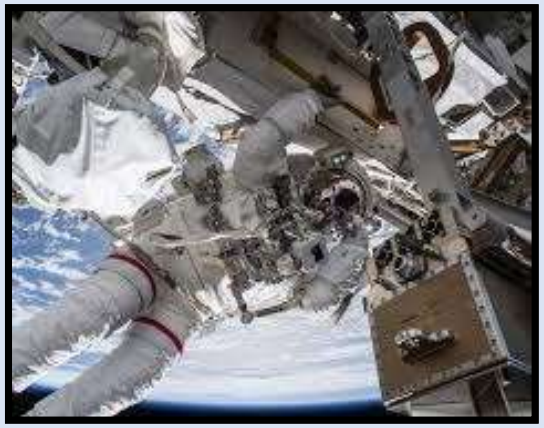
Some probe land robots on planets. The robotic rover, Curiosity has been on Mars since 2012 studying its climate and geology.





Manned Space Mission

- is space travel with a crew or passengers aboard the spacecraft.



- The first human in space was Yuri Gagarin, who flew the Vostok 1 spacecraft, launched by the Soviet Union in 1961.
- Humans have flown to the Moon nine times from 1968 to 1972 in the United States Apollo program.
- Humans have been continuously present in space on the International Space Station since November 2000.

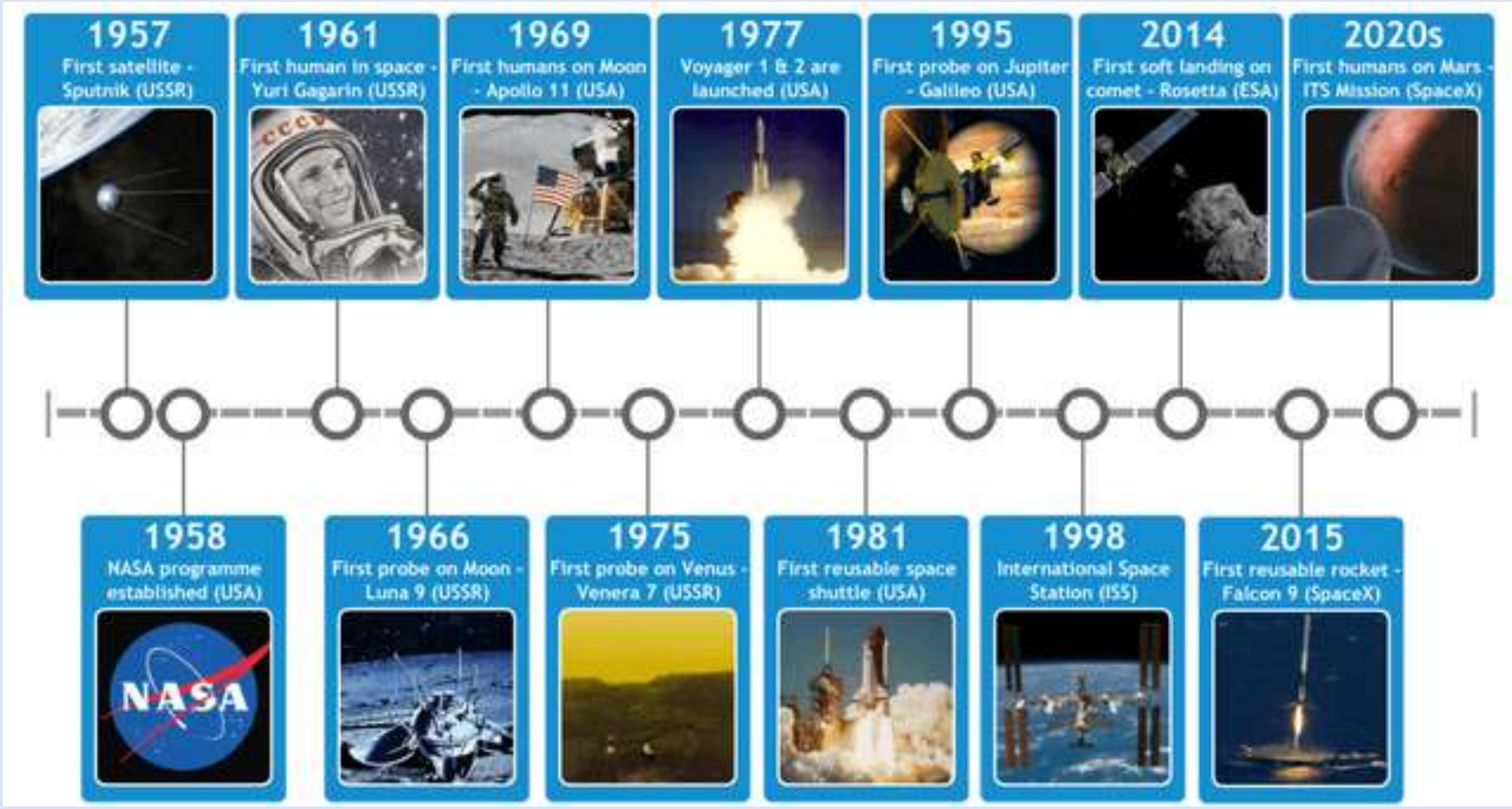
Space Observation and Exploration

Space can be explored through:

- Observation _____ using telescopes on Earth and in space
- Space probes _____
- Manned space mission _____

Space Exploration Timeline

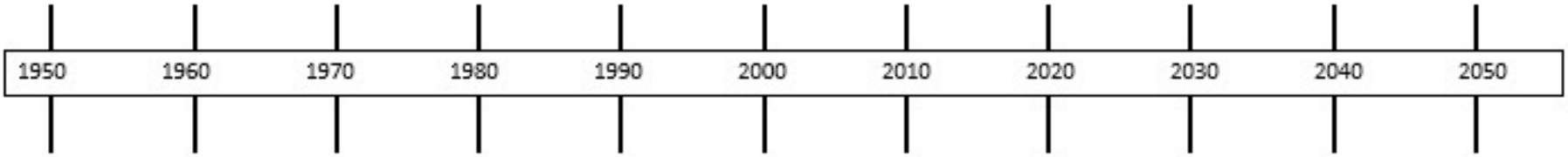
Quick history of space exploration: https://www.youtube.com/watch?v=PLcE3AI9wwE



Space Exploration Timeline

Create your own space exploration timeline. You can focus on a specific type of exploration (space probes, manned mission etc.) or choose events which interest you.

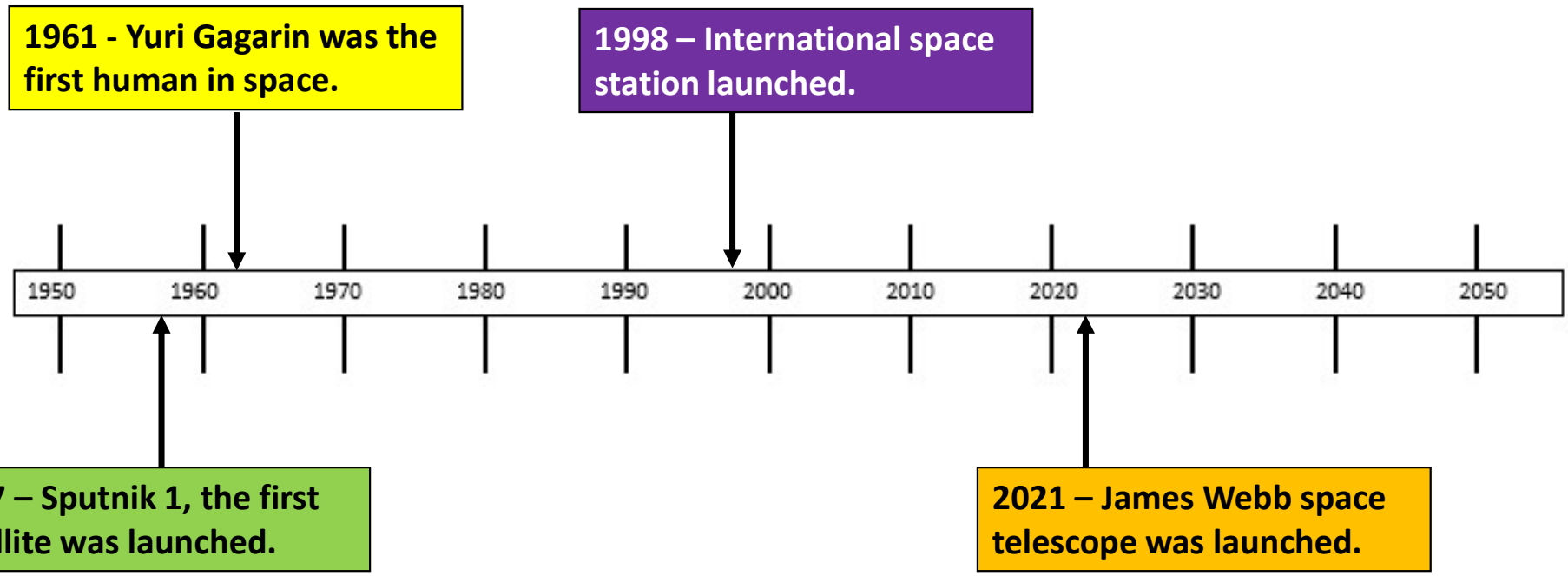
Search online to research the major events and add them to your timeline.



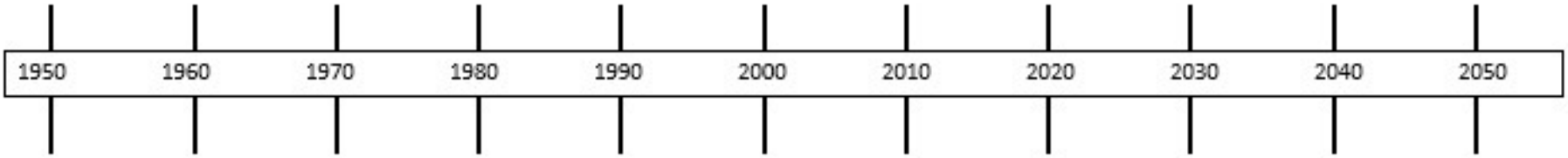
Space Exploration Timeline

Page 27

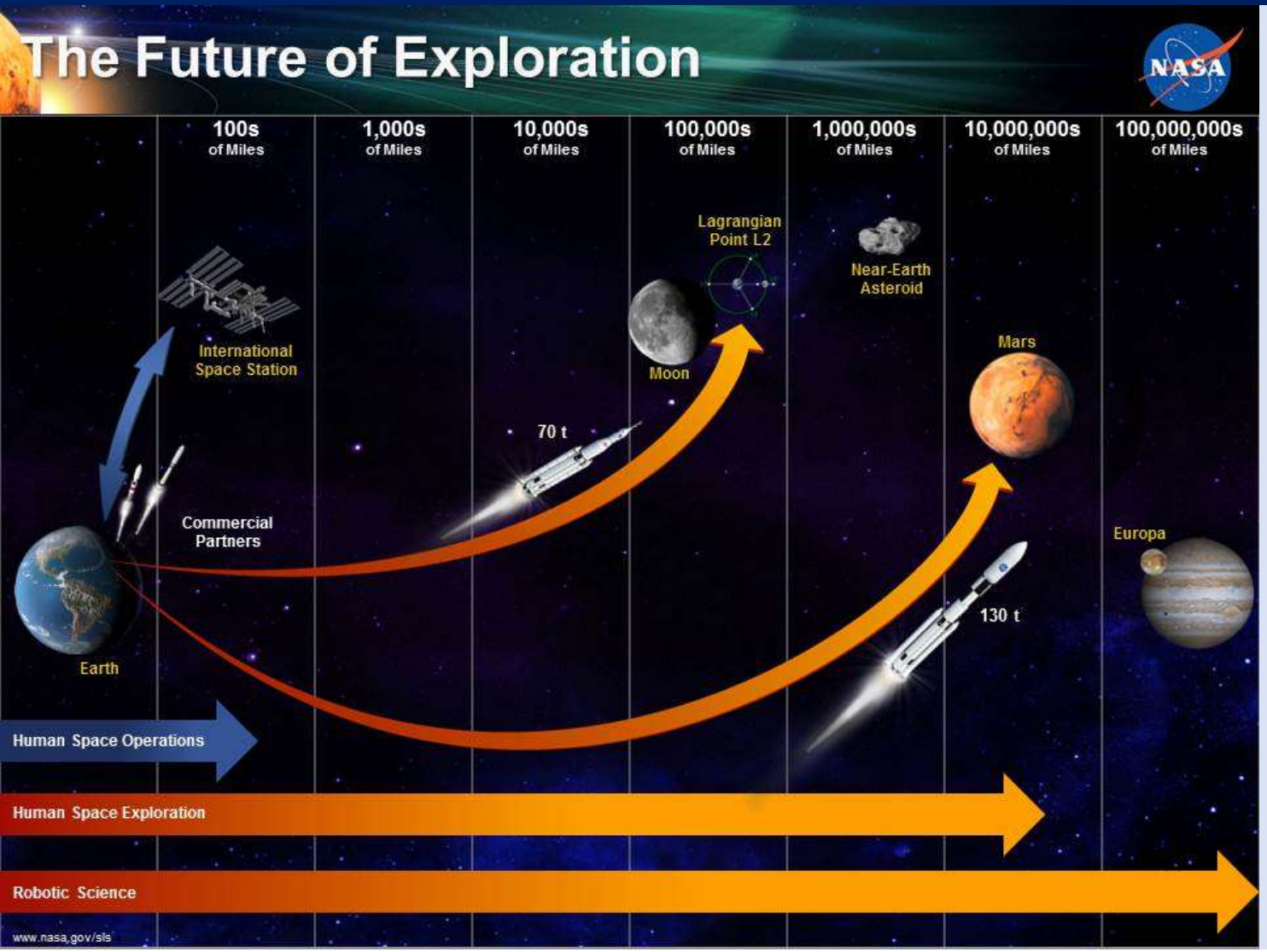
A few things to get you started…..



Space Exploration Timeline



The Future of Space Exploration



The future of space exploration involves both telescopic exploration and the physical exploration of space by unmanned robotic space probes and human spaceflight.

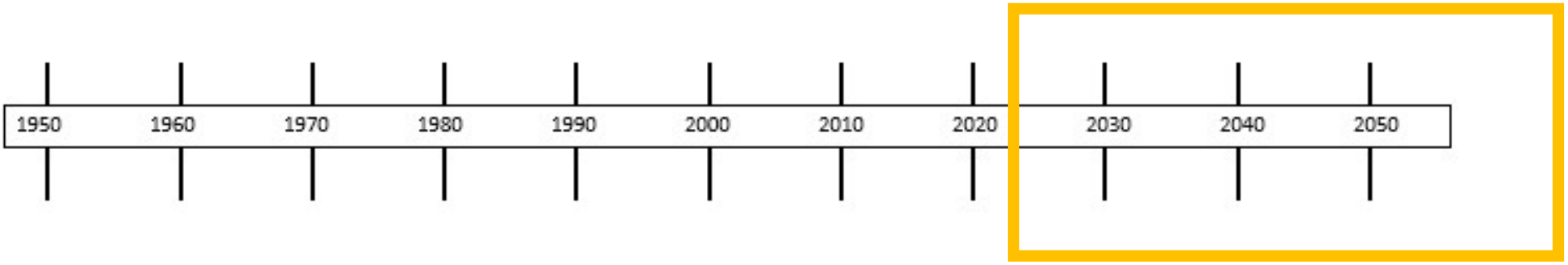
https://www.nasa.gov/sites/default/files/future_of_exploration_sls.jpg

The Future of Space Exploration

Page 27

Think about future

Research important current or future events and add them to your timeline.



Beyond the Solar System

09/01/2025

Plenary:

1. What are the **benefits** of space exploration?

2. What are the **risks** of space exploration?

Success Criteria

- ❑ I can state the methods used to observe and explore space.
- ❑ I can describe the impact that space observation and exploration has had on our understanding of the

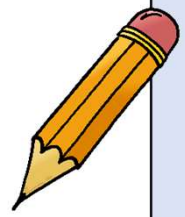
Tick me at the end if ***you can*** …

Space Observation and Exploration (Extension)

09/01/2025

Page 28

Starter:



1. List the 3 ways we can explore space.

2. Choose one of these methods of exploration and describe an important mission or milestone.

(use your timeline from last lesson to help you)

Space Observation and Exploration (Extension) 09/01/2025

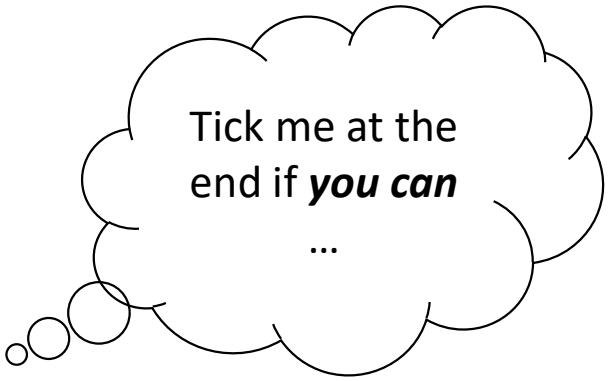
Learning Intentions:

- To describe the impact that space observation and exploration has had on our understanding of the universe and planet Earth.

Space Observation and Exploration (Extension) 09/01/2025

Success Criteria

- ❑ I can describe the impact that space observation and exploration has had on our understanding of the universe and planet Earth.



Space Probes Research

Choose one space probe. Carry out some basic research into your probe, answering at least the following:

- What is a space probe?
- What… did the probe look like?
- Who… sent it up?
- When… what date?
- Where… was it launched from?
- Why… was it sent up?
- Where … is your probe now?

Include some photographs to make your research look interesting!

List of space probes:
Sputnik – there was more than one!
Pioneer – there was more than one!
Voyager - there was more than one!
Mariner - there was more than one!
Mars Rover - there was more than one!
Rosetta
New Horizons
Galileo

There are also space telescopes to go looking into space …
Hubble Space Telescope
Kepler Space Telescope
James Webb Telescope

Space Observation and Exploration (Extension) 09/01/2025

Plenary:

Share something from your research project…..

Success Criteria

- ❑ I can state the methods used to observe and explore space.
- ❑ I can describe the impact that space observation and exploration has had on our understanding of the

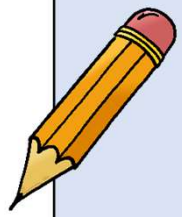
Tick me at the end if ***you can*** …

Life Beyond Earth

09/01/2025

Page 29

Starter:



The aim of the Mars Rover 2020 mission is to find life on Mars. The rover will drill down about 1-2 metres and analyse the rocks under the surface. Any life would be protected from harmful radiation and may have access to underground water supplies. This mission has a price tag of about US$2.1 billion.

State one **advantage** of exploring mars

State one **disadvantage** of exploring mars.

Life Beyond Earth

09/01/2025

Learning Intentions:

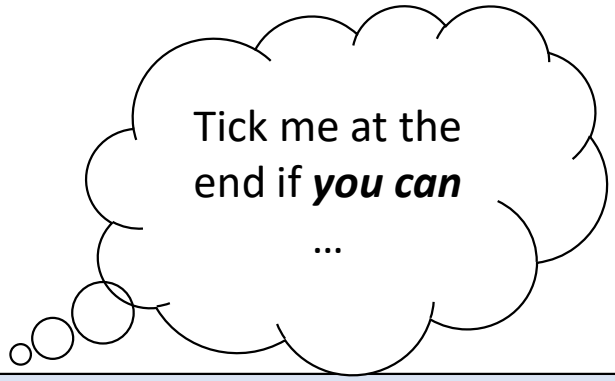
- To state what an exoplanet is.
- To explain what is required for life to survive on a planet.

Life Beyond Earth

09/01/2025

Success Criteria

- ❑ I can state what an exoplanet is.
- ❑ I can explain what is required for life to survive on a planet.



Life Beyond Earth

Humans often wonder if there is life in space……

Life does not mean human-like life. Bacteria and plants are also forms of life!

If there is life in other parts of the universe, it may not be of a similar form to life on Earth at all.

Life Beyond Earth

We know of only one planet in the universe that contains life…….

Earth

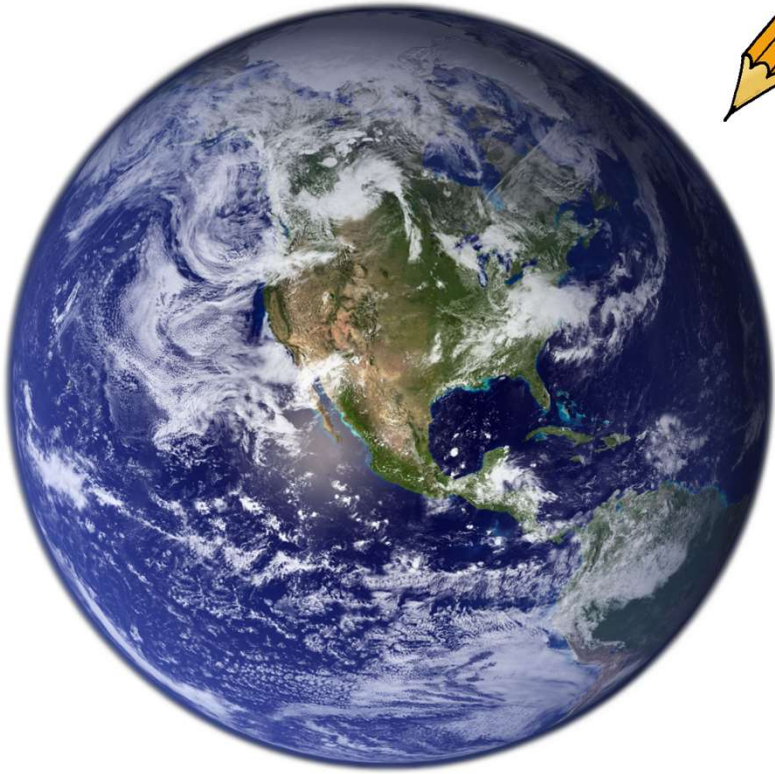
Requirements of life

What is required for life on Earth?

Requirements for Life

The requirements for life on Earth are:

- Liquid water
- Oxygen – to allow respiration
- Food - nutrients
- Energy from the sun – to provide warmth.



Candidates for life in our solar system

There are very few places in the Solar System, other than on Earth, that life could have evolved and still be thriving today. A few possibilities are Europa (Jupiter's moon), Titan (Saturn's moon) and Mars.

Candidates for life in our solar system

Europa

Europa is one of Jupiter's moons.

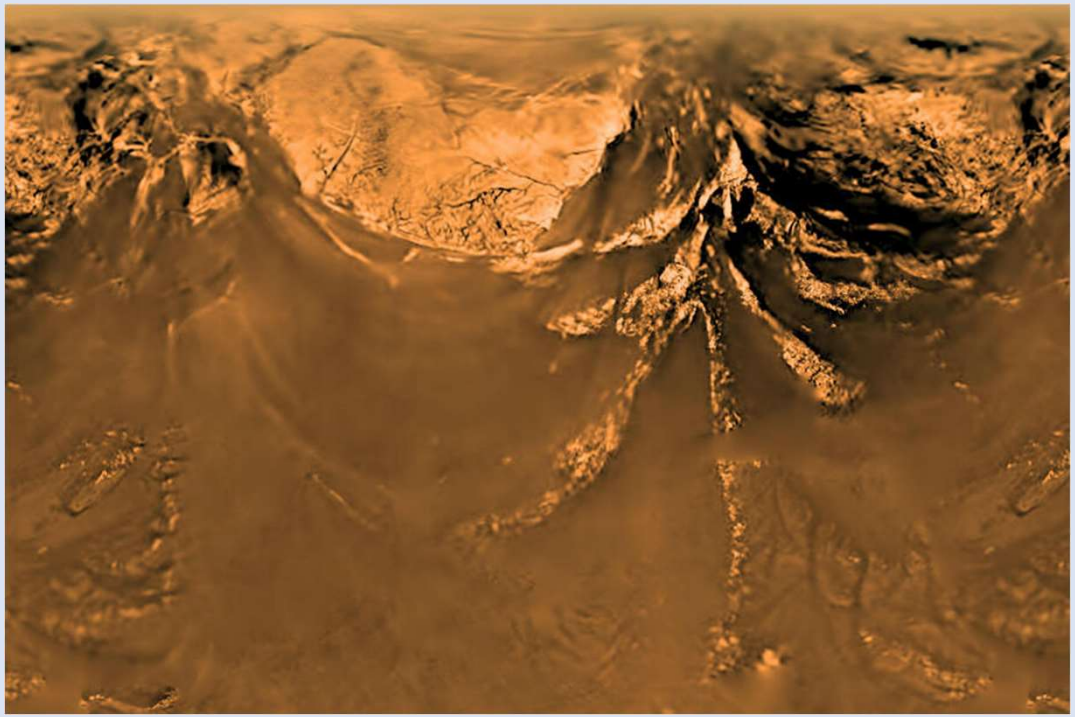
There may be a large volume of liquid water below the icy surface which could support some form of life.

https://www.bbc.co.uk/bitesize/guides/zmwfr82/revision/4

Candidates for life in our solar system

Titan

Titan is the largest of Saturn's moons. Its atmosphere is pure methane and life as we know it on Earth would never survive there. However, it is possible that life could evolve to respire using methane rather than oxygen.



Candidates for life in our solar system

Mars

Mars is like Earth but has no signs of life. It has water ice at both poles. Features on its surface, such as valleys, may have been created by historic liquid water.

Life in the rest of the universe

There is no real evidence of life in our Solar System.

- Could there be life outside our solar system?
- Where could scientists look?

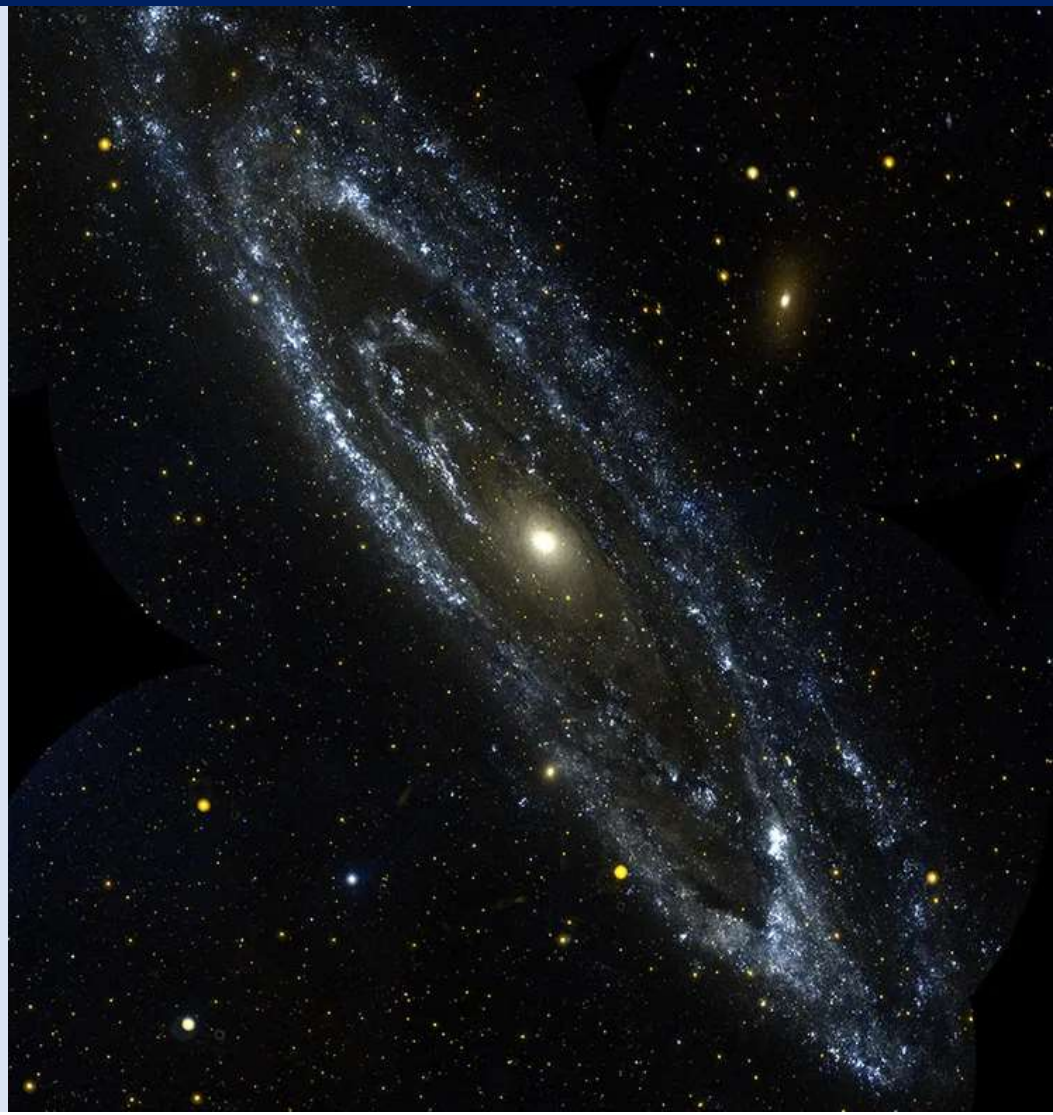
Life in the rest of the universe

There are billions of stars in our galaxy and an estimated 200 billion galaxies in the universe.

Each one of these stars may have planets and moons.

These **exoplanets** and moons may harbour life.

What is an **exoplanet**?



Exoplanets

An exoplanet is a planet outside our solar system.

It is a planet which orbits a star other than our own Sun.

Life in the rest of the universe

What is the likelihood of finding life on another planet?

Introduction to Exoplanets-ROE

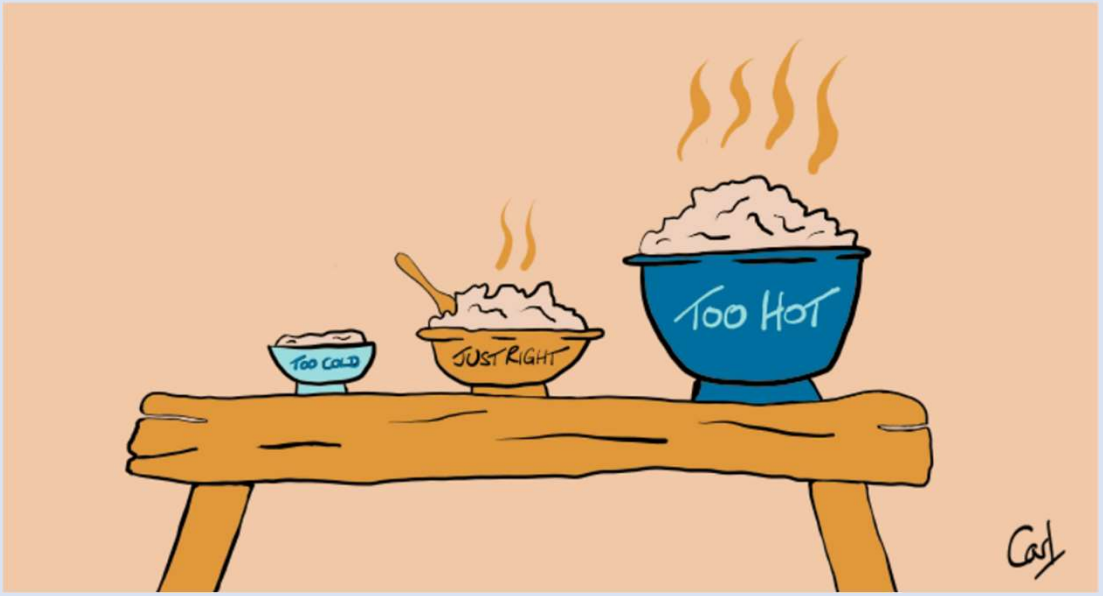
How many have we found now?

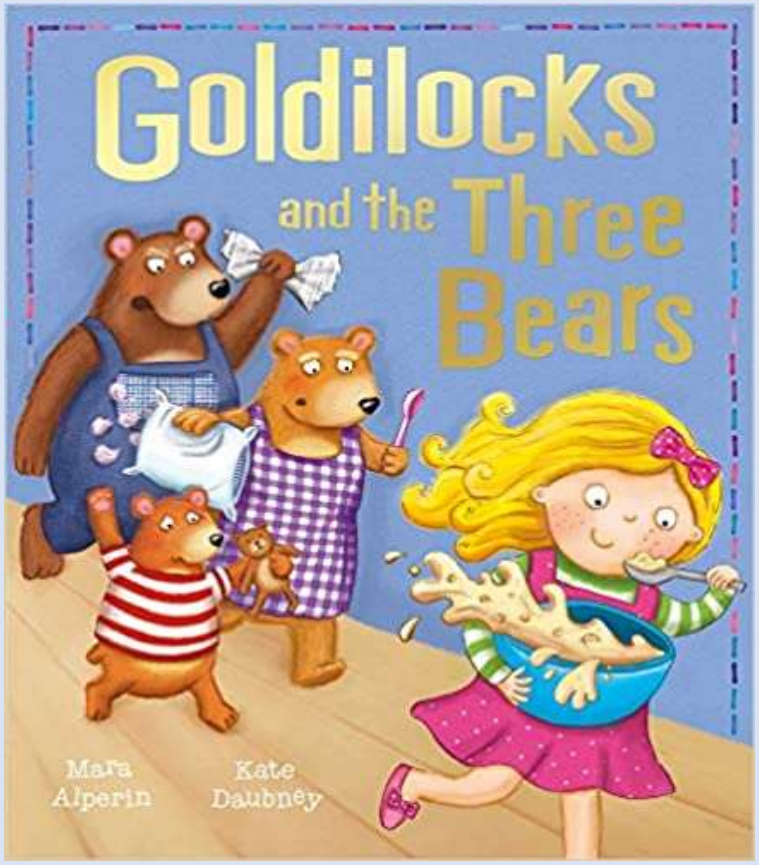
NASA Discovery Dashboard

The Habitable Zone

The **habitable zone** is the name given to an area around a star which is ‘just right’ for life.

Why is it also called the **Goldilocks zone?**

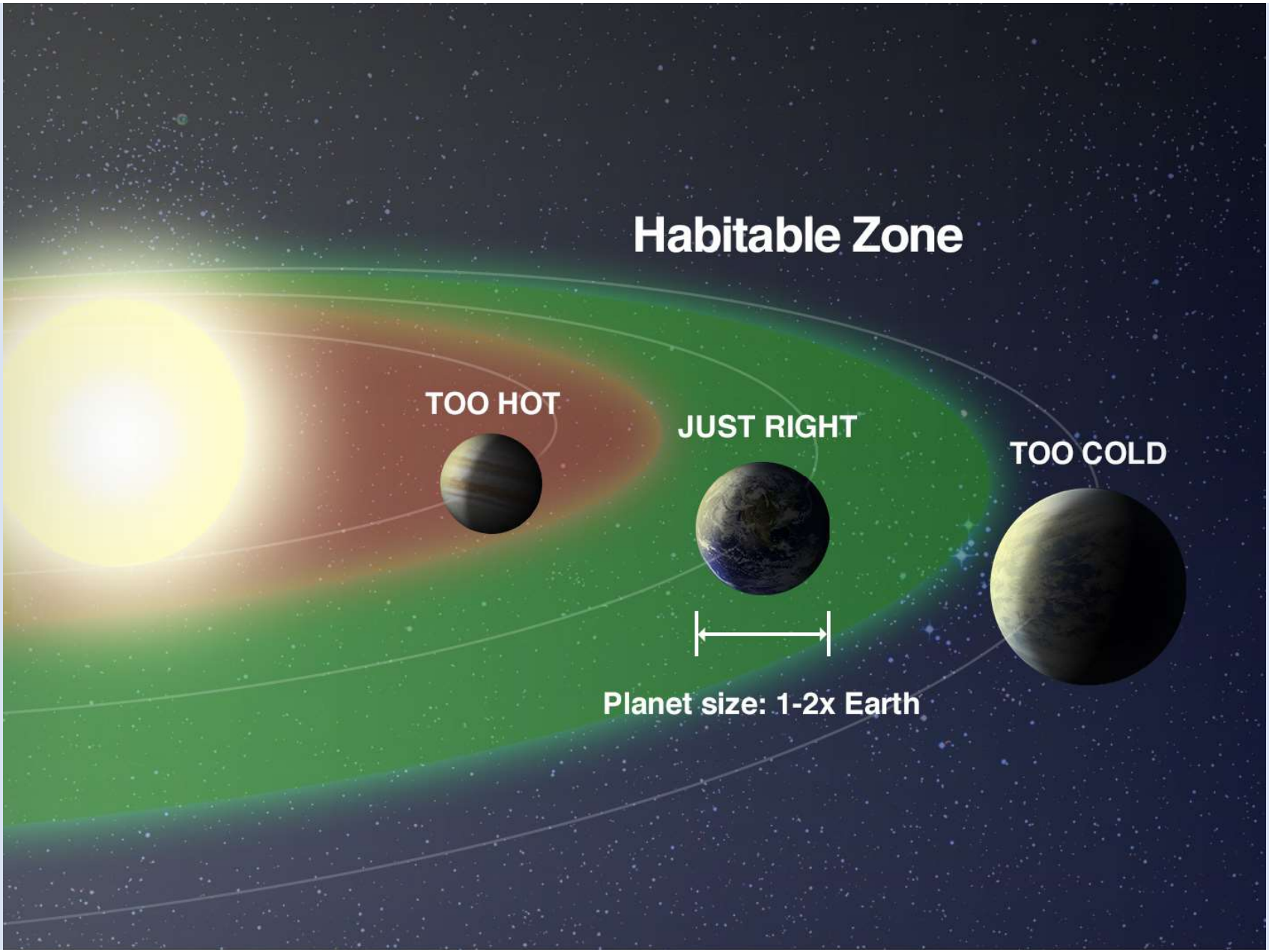




The Habitable Zone

The habitable zone (Goldilocks zone) is the name given to an area around a star which is ‘just right’ for life.

This area is not too hot or too cold for liquid water to exist on a planet.


Habitable Zone
TOO HOT
JUST RIGHT
TOO COLD
Planet size: 1-2x Earth

Beyond the Solar System

09/01/2025

Plenary:

I was successful when I ……

A question I have about today's lesson is …….

Today I learnt ……

Success Criteria

- ❑ I can state the methods used to observe and explore space.
- ❑ I can describe the impact that space observation and exploration has had on our understanding of the

Tick me at the end if ***you can*** …

Looking for Exoplanets

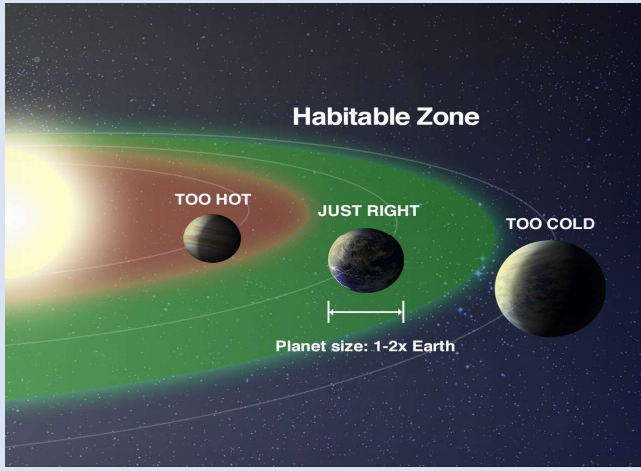
09/01/2025

Page 31

Starter:

1. Some exo-planets orbit stars in an area known as the habitable zone or ‘Goldilocks zone’. State what is meant by the habitable zone.

2. State 4 basic requirements for an exo-planet to support life.



Looking for Exoplanets

09/01/2025

Learning Intentions:

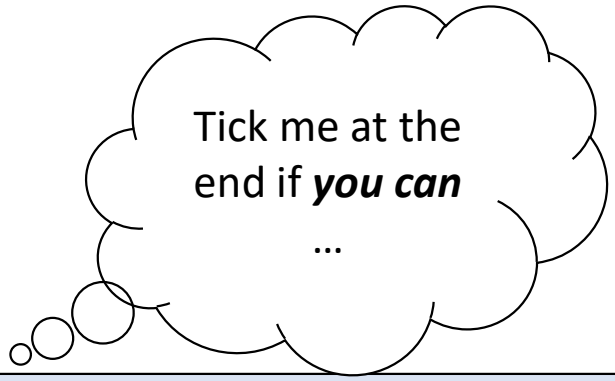
- To produce reasoned arguments on the likelihood of life existing elsewhere in the universe.

Looking for Exoplanets

09/01/2025

Success Criteria

- ❑ I can produce reasoned arguments on the likelihood of life existing elsewhere in the universe.



Looking for exoplanets

Discovering exoplanets is extremely difficult. They are so far away that we cannot simply look through a regular telescope and see them.

This means that exoplanet-hunting astronomers need to use some clever techniques!

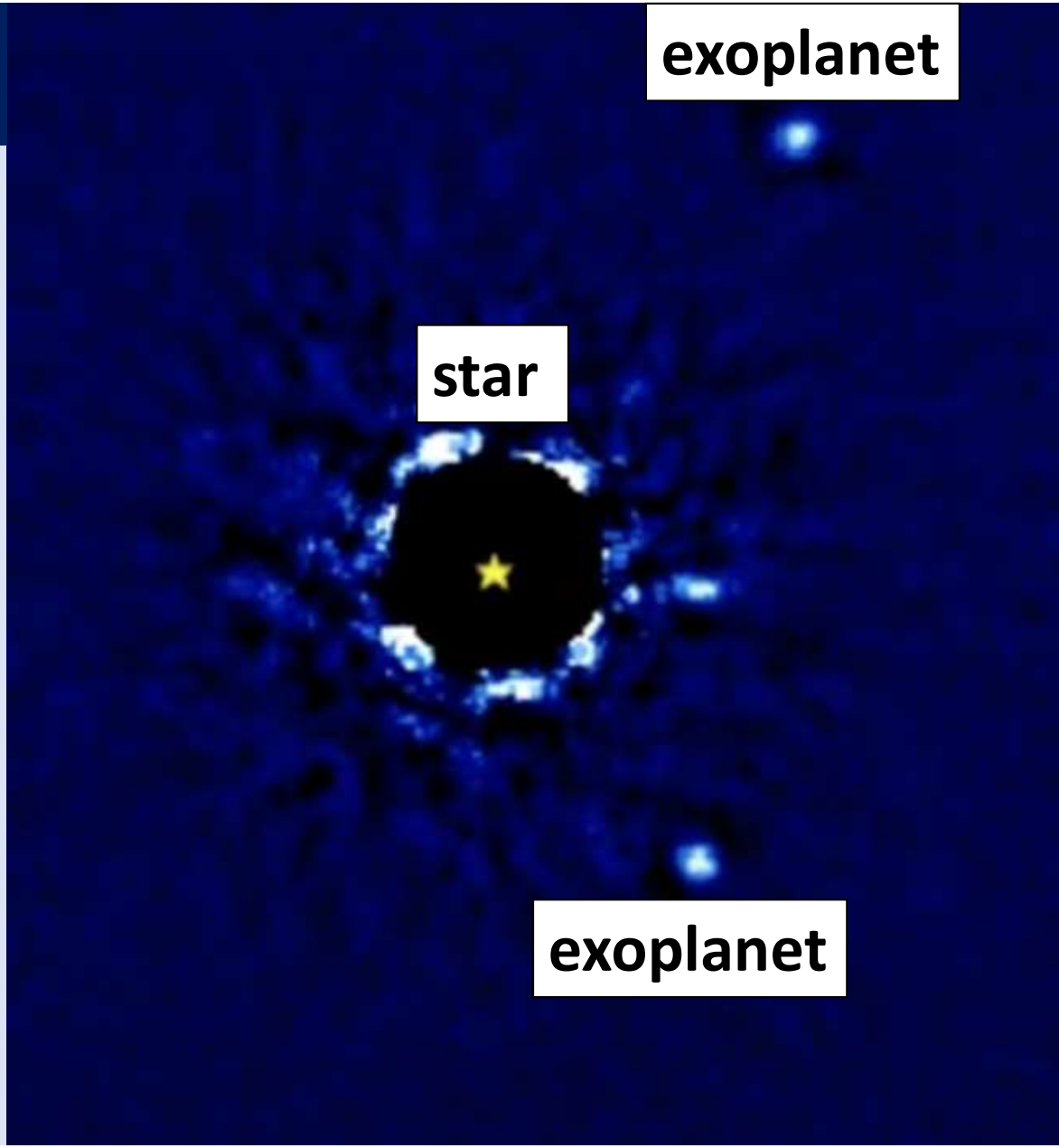
How to Find an Exoplanet:
minutephysics 2.35

Exoplanets 101 | National Geographic (3:53)

Direct Imaging

Exoplanets are very small, and faint compared to the stars that they orbit, this makes seeing them through a regular telescope difficult.

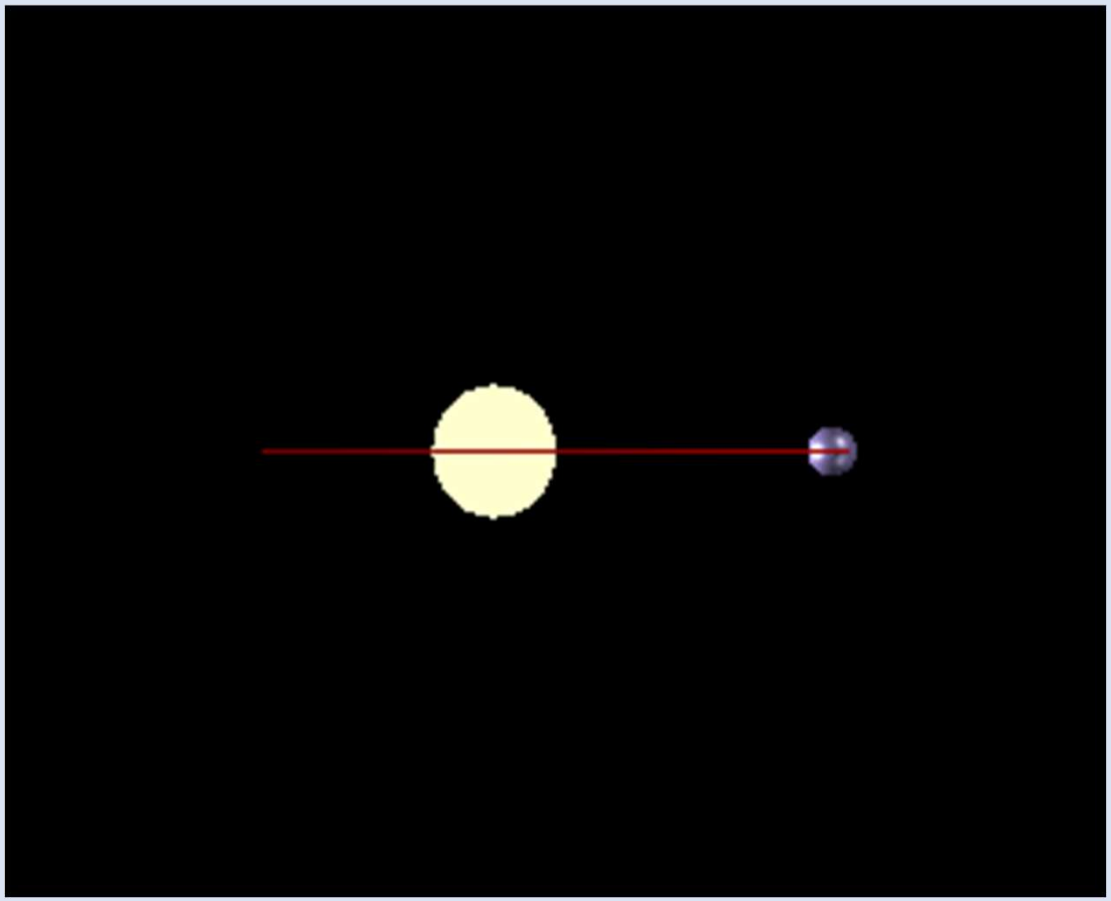
Scientist can block the light from the star to help see the exoplanets that are orbiting it.



Wobble Method

As a planet orbits a star, the planet's gravity pulls on the star, making the star wobble.

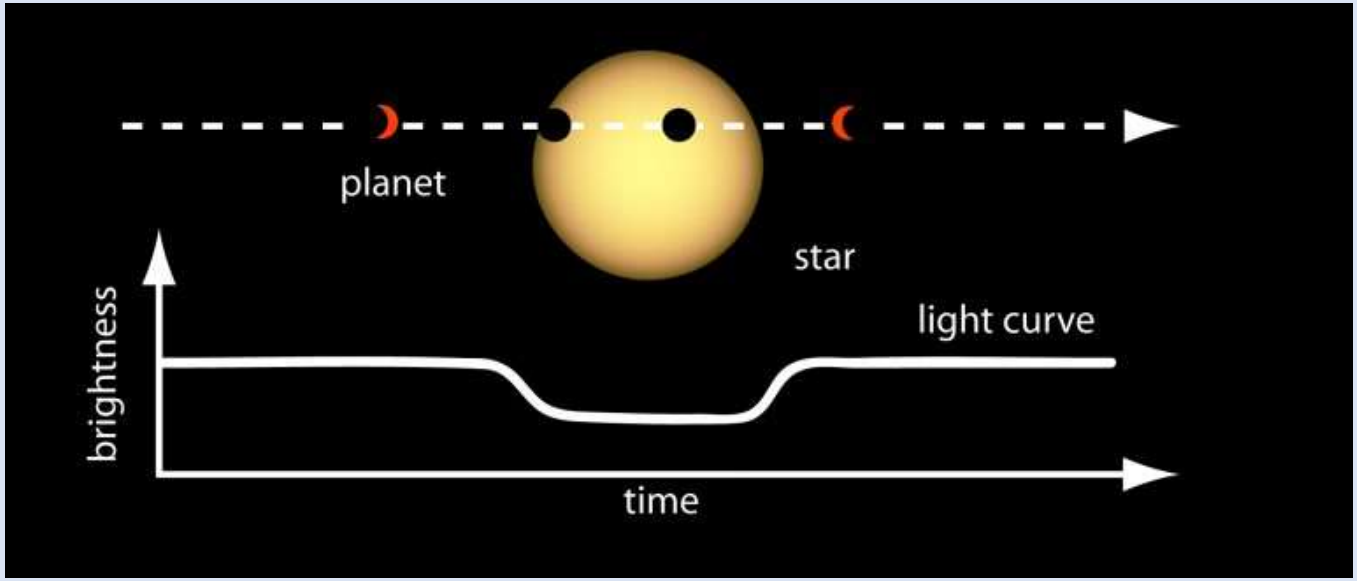
This wobble is evidence of an exoplanet.



Transit Method

The transit method is where astronomers detect very small changes in the brightness of stars.

When a planet passes in front of its star, it causes the light level from the star to drop slightly. The changes are observed over many years to prove a planet is orbiting a star.



Simulation: https://svs.gsfc.nasa.gov/13022

Finding Exoplanets

Exoplanets are very far away. They are also very _____small_____ and _____faint_____ compared to the stars that they orbit. This makes seeing them through a regular telescope _____difficult_____.

Finding Exoplanets

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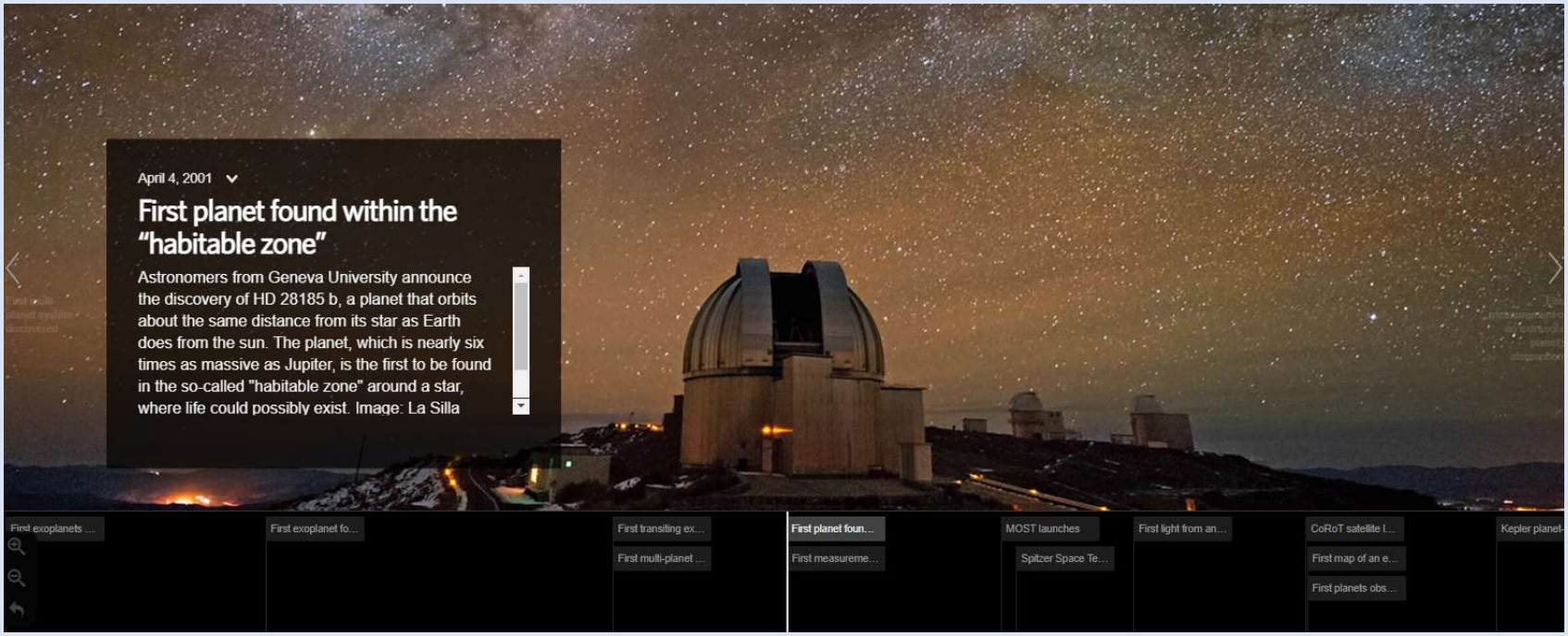
Detection Method	How it works
Direct imaging	Taking a picture of an exoplanet with a telescope
Wobble method	As the exoplanet orbits a star, the exoplanet's gravity pulls on the star, making the star wobble.
Transit method	Astronomers detect very small changes in the brightness of stars as an exoplanet passes in front of a star and blocks out a little bit of the star's light.

The Planet Hunters

Observing from Earth and from orbit.

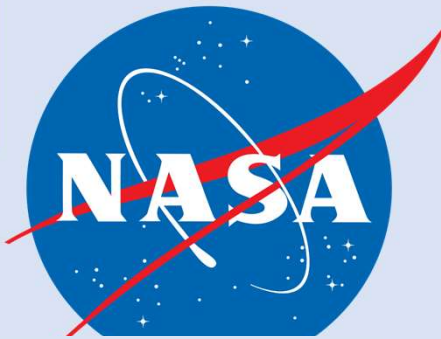
Finding Exoplanets

Explore the NASA Exoplanet Exploration Historic Timeline.



Find out about the Hubble Space Telescope, MOST, Spitzer Space Telescope, CoRoT satellite launched, Kepler Space Telescope, TESS

The Planet Hunters



Why do we search?

Whether life exists beyond Earth is one of the most profound questions of all time. The answer will change us forever, whether it reveals a universe rich with life, one in which life is rare and fragile, or even a universe in which we can find no other life at all.

The hunt for an answer also is revealing important details about our own place in the universe – where we came from, how life came about and, perhaps, where we're headed.

The goal of NASA's Exoplanet Program is to find unmistakable signs of current life.

A habitable exoplanet - what are we looking for?

The conditions for a habitable exoplanet are:

Page 32

liquid water

rocky
(not a gas giant)

A **suitable temperature**
(not too hot or too cold).

food
(conditions which allow food to grow)

oxygen

An **energy** source
(our energy comes from the Sun).

TED talk - What a planet needs to sustain life | Dave Brain.

Life elsewhere in the Universe

Class Question

Use all the information in this section to explain, with reasons, whether you think there is life elsewhere. Think about the requirement for life, what is meant by life and the size of the Universe.

_____

_____

_____

_____

Different Exoplanets

Extension

Page 33

What Is an Exoplanet? NASA (4:34)

Exoplanet Types: Worlds Beyond Our Solar System (1:42)

Exoplanets: Weird, Wondrous Worlds (1:59)

Facts from the NASA Exoplanet series:

Space Tourism

Extension

Page 33&34

Design a travel poster advertising space tourism.

Identify a favourite exoplanet, planet or moon.

Imagine what the surface and conditions of that exoplanet might be like.

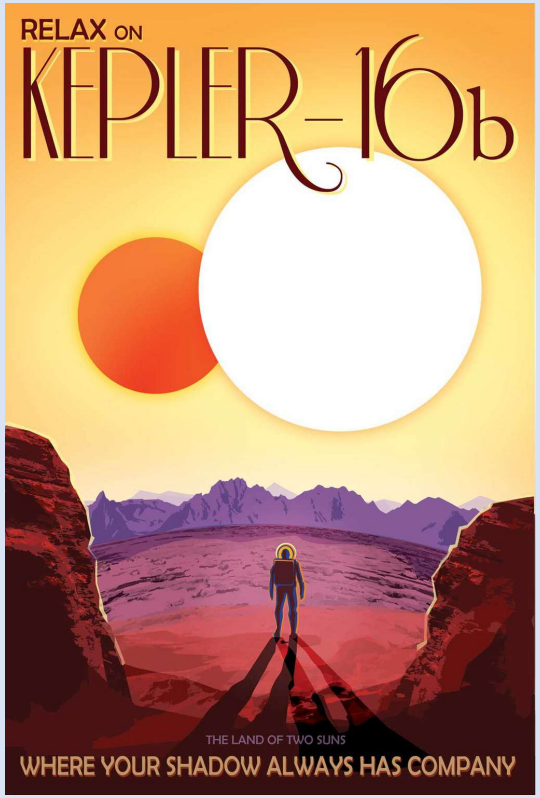
Design a travel poster highlighting the key characteristics of the exoplanet.

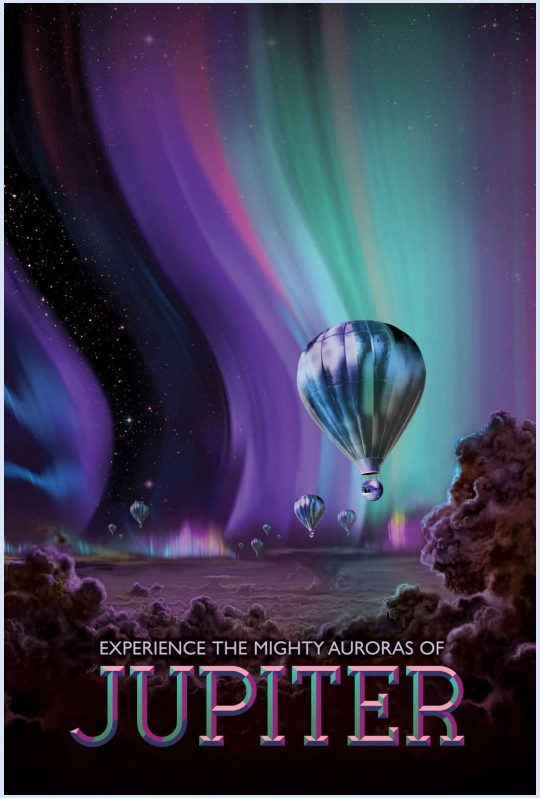
Check out NASA's travel posters and be creative!

Space Tourism

Extension

Page 33&34





Looking for Exoplanets

09/01/2025

Plenary:

Congratulations! You have now completed “Space”.

Think about the whole topic and complete one of the thoughts below.

The part I enjoyed the most was……

One thing I need to remember is……

I was successful when I ……

Expectations and Outcomes Learner Evaluation

- **Topic:** Space

Page 2

Experience and Outcomes	Date Completed (dd/mm/yy)	Evaluation How happy are you with it? (☺ ? ☹)
I can state that day and night are caused by the Earth rotating on its axis.		
I can state that the Earth orbits the Sun once in one		

Extension Tasks

Exoplanets - NASA

Find out about exoplanets using the NASA exoplanets website. Click on the tabs across the top and explore. Make any relevant notes in your jotter.

https://exoplanets.nasa.gov/

Explore

Discovery

The Search For Life

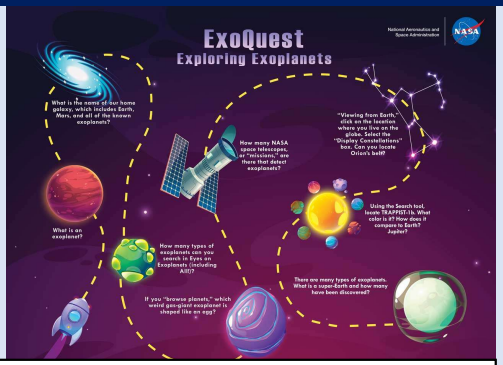
What is an Exoplanet?

Explore the “Eyes on Exoplanets” animation – you will need to use it to complete the next task

Eyes on Exoplanets - ExoQuest

Using the Eyes on Exoplanets animation, explore the universe and complete the ExoQuest. Take the interactive ExoQuest quiz or answer the questions below.

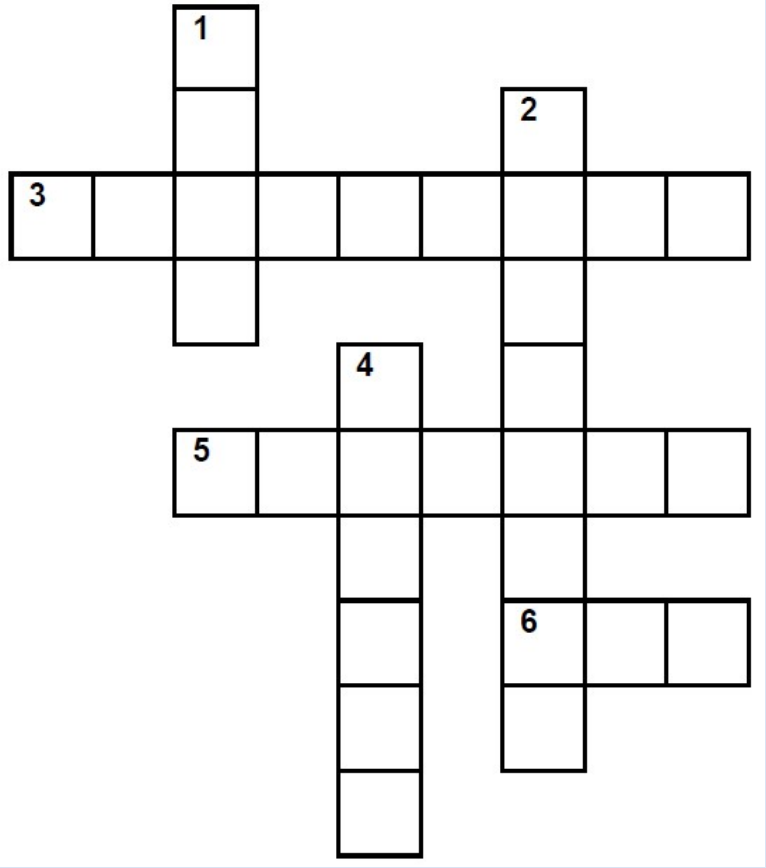
https://exoplanets.nasa.gov/



1. What is an exoplanet?
2. What is the name of our home galaxy, which includes Earth, Mars and all of the known exoplanets?
3. How many types of exoplanets can you search in Eyes on Exoplanets (including All!)?
4. If you “browse planets,” which weird gas-giant exoplanet is shaped like an egg?
5. How many NASA space telescopes, or “missions,” are there that detect exoplanets?
6. “Viewing from Earth,” click on the location where you live on the globe. Did you find it?
7. Select the “Display Constellations” box. Can you locate Orion’s belt?
8. Using the Search tool, locate TRAPPIST-1b. What colour is it shown as? How does it compare to Earth? Jupiter?
9. There are many types of exoplanets. What is a Super-Earth and how many have been discovered?

Eyes on Exoplanets - ExoQuest

Complete the crossword of astronomical terms.



Clues Across

3. A planet outside our solar system.
5. These orbit a star.
6. The star in our solar system.

Clues Down

1. A natural satellite.
2. All the space we can observe.
4. Our one is called the Milky Way.

Plenary - complete one of the sentences below

I was successful when I ……

A question I have about today's lesson is ……

Today I learnt ……

The part of the lesson I enjoyed the most was……

The skills I used in today's lesson were……

One thing I need to remember from today's lesson is……