Kirkcaldy High School

BGE Science

Science and the Environment

Space

Name:_____

Class:_____

Teacher:_____

Expectations and Outcomes Learner Evaluation

Topic: Space

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 year.		
I can explain how the seasons are caused by the tilt of the Earth.		
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 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 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.		
I can design, carry out and write up my own experiment.		
I can state the dependant, independent and controlled variables.		
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.		

Experience and Outcomes	**Date Completed (dd/mm/yy)**	**Evaluation How happy are you with it? (☺ ? ☹)**
I can describe the relative size and scale of the planets in the Solar System.		
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.		
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.		
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.		
I can state what an exoplanet is		
I can explain what is required for life to survive on a planet		
I can produce reasoned arguments on the likelihood of life existing elsewhere in the universe.		

Date: _____

The Earth

Starter

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

_____

_____

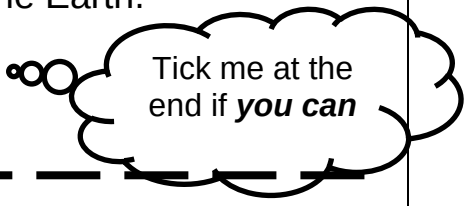
_____

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.

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

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.

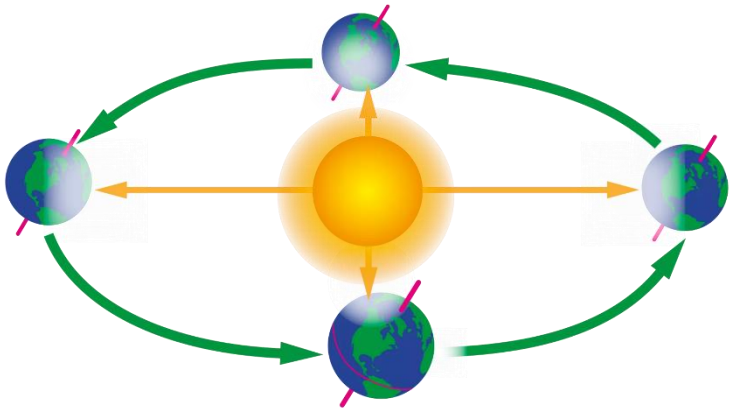
A Day

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

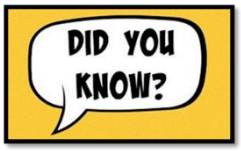
The Earth has a day of _____.

A Year

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

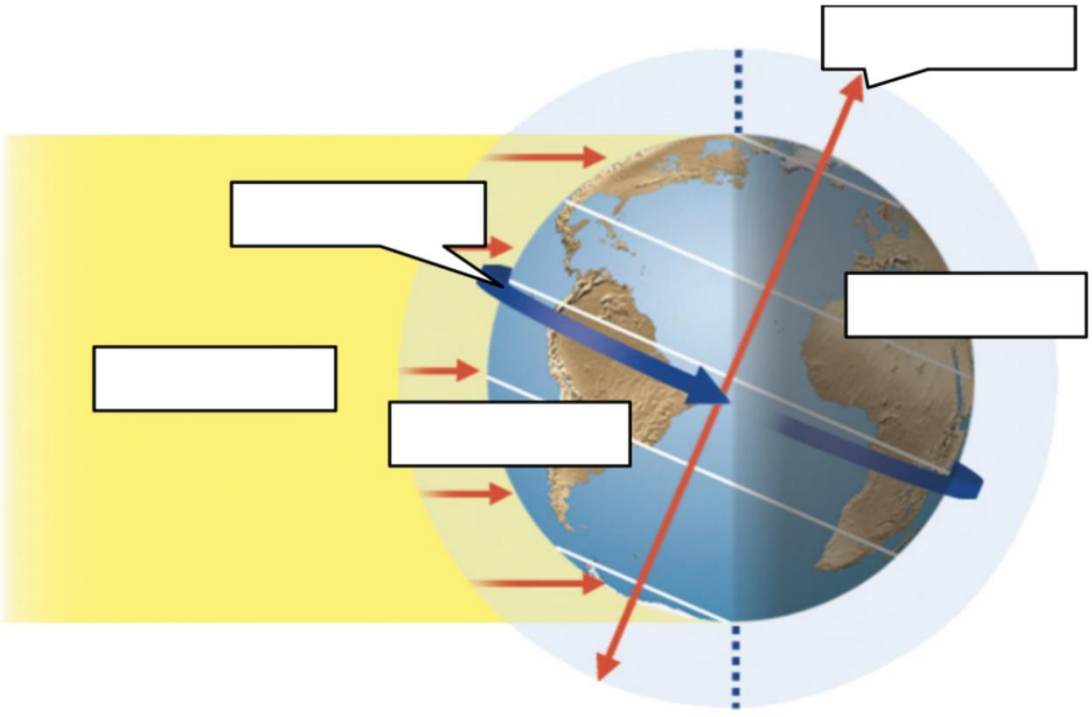


Our calendar year is 365 days. Every 4 years we have a leap year and add another day to the calendar. This makes up for the 4 missing quarters.



Day and Night

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



Day and Night Demonstration

Aim:_____

_____

Method:

Results:

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

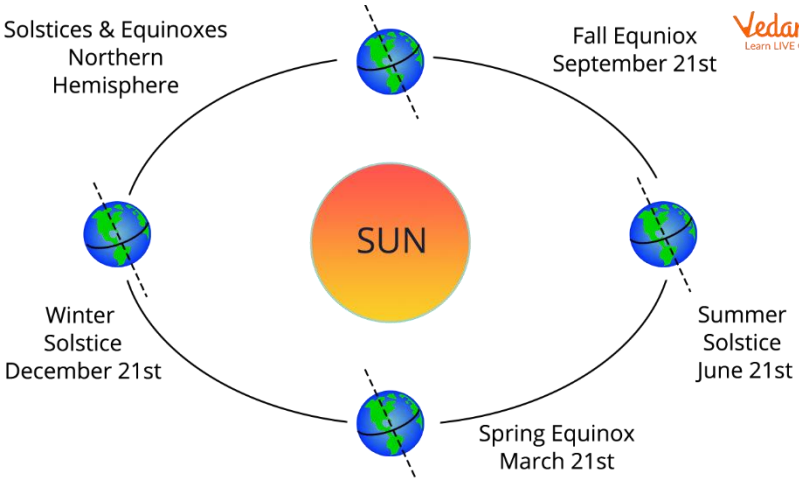
Conclusion:_____

_____

_____

The Seasons

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



Date: _____

The Earth and the Moon

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? _____

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.

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.

The Moon

The Moon is a natural _____that orbits the _____.

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

Phases of the Moon

Aim: _____

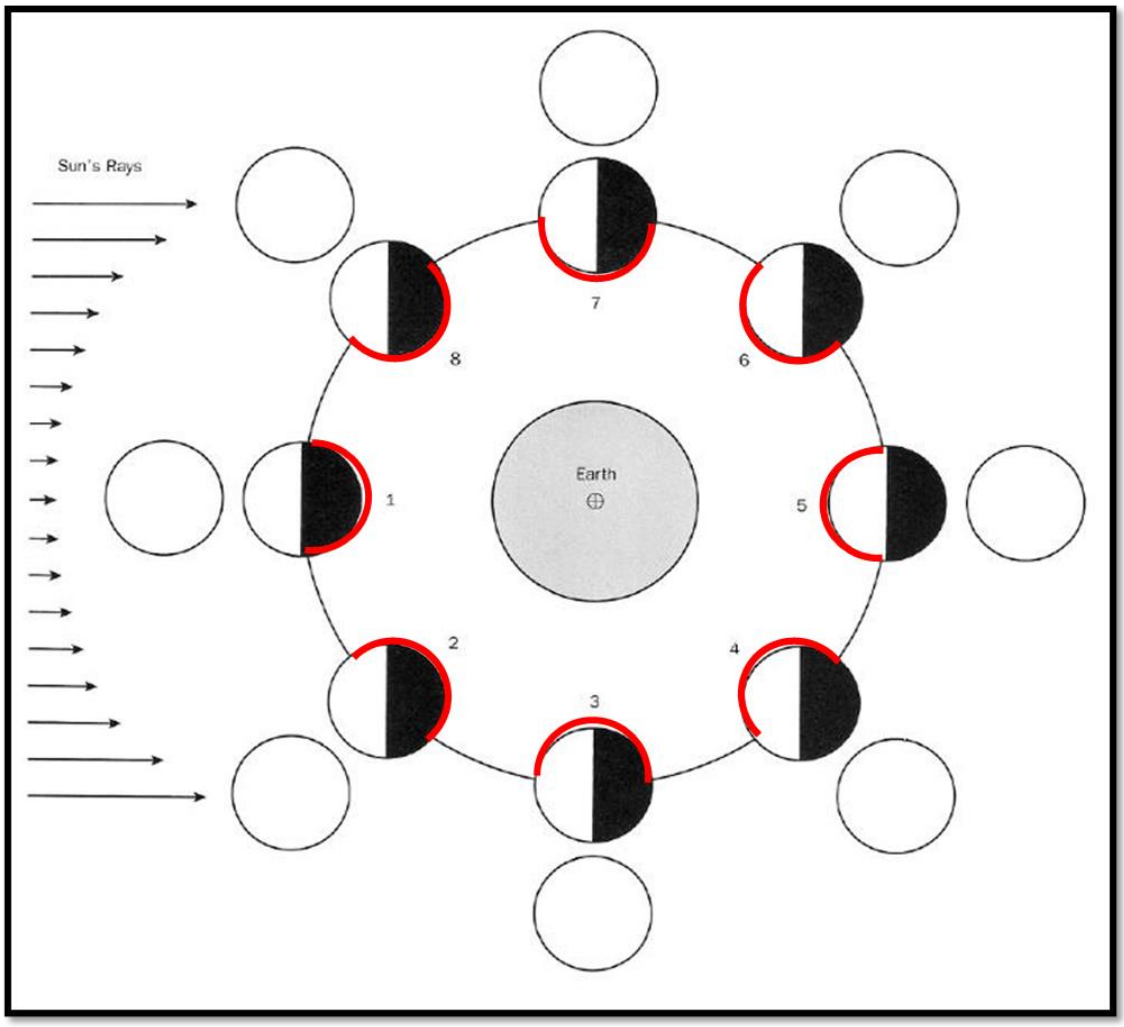
_____

Method:

Results:_____

_____

_____



KEY :

What part we can "see"

crescent moon

gibbous moon

Waxing :

Waning :

Conclusion:

_____

_____

_____

_____

Date: _____

Moons

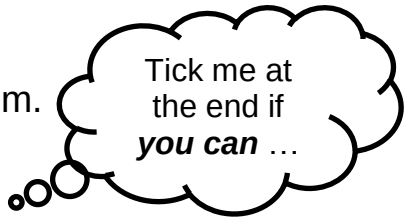
Starter

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) _____

Learning Intentions



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

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.

Moons

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

Most orbit the giant planets - _____ and _____.

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?

   _____

   _____

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?

    _____

Date: _____

Investigating Craters

Starter

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

   _____

   _____

2. Describe the conditions on the surface of the Moon.

   _____

   _____

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.

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

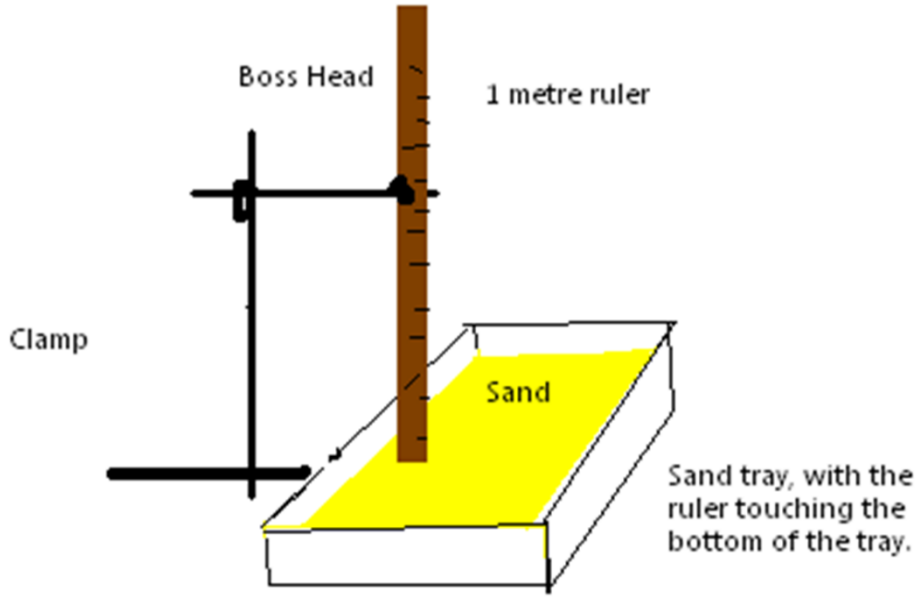
The surface of the Moon has many _____.

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

Investigating Craters

Aim: To investigate how the _____ affects the _____.

Method:



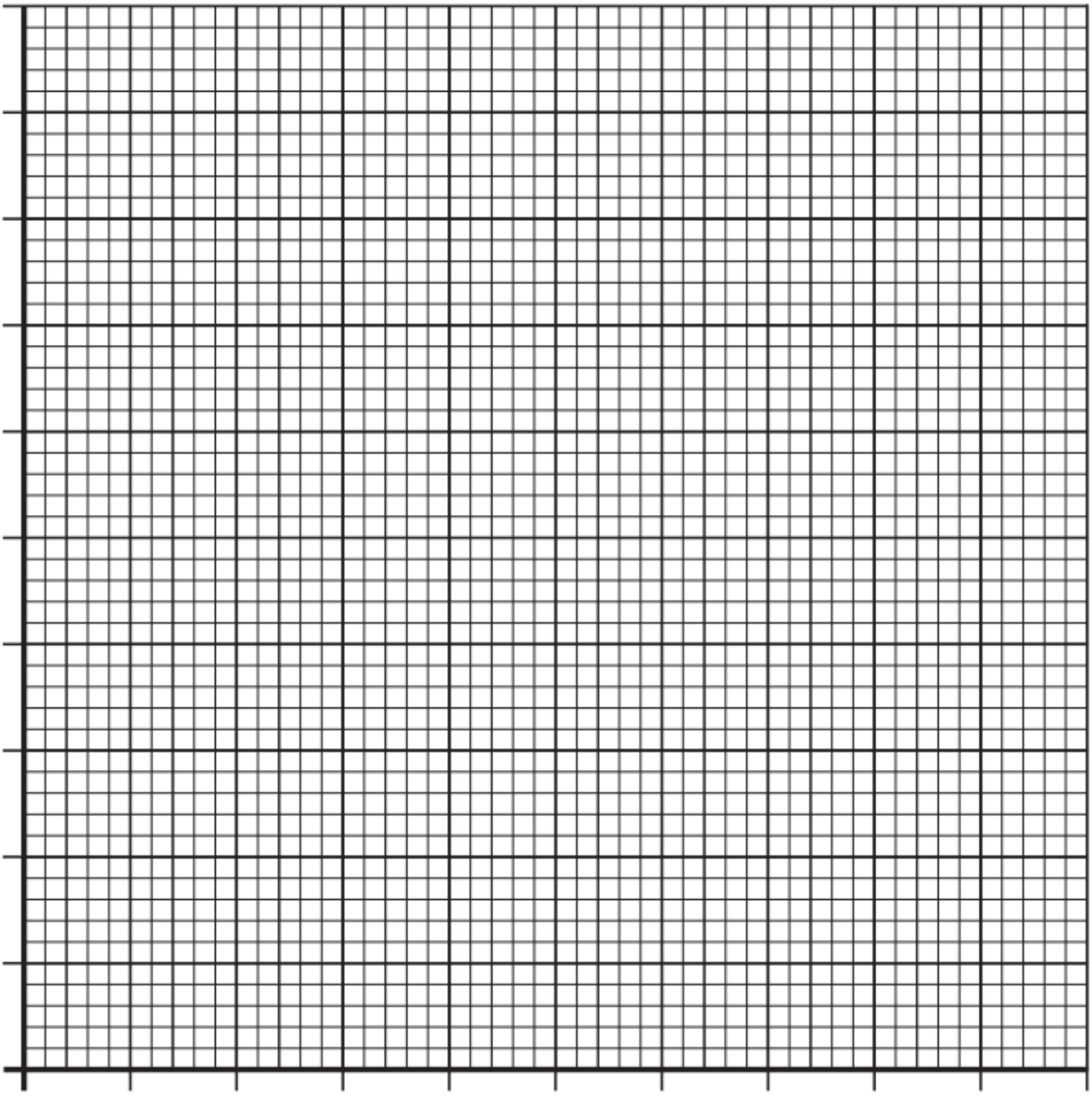
Variables

- I will change the _____ by _____ _____
- I will measure the _____ using _____ _____
- I will keep the _____ constant.

Results:

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

Draw a graph of your data …



Conclusion:_____

_____

_____

_____

Evaluation_____

_____

_____

Date: _____

Investigating Craters (Extension)

Starter

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

   Results Method Conclusion Aim Title Evaluation

   _____

   _____

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

   _____

   _____

   _____

Learning Intentions

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

Tick me at the end if ***you can*** …

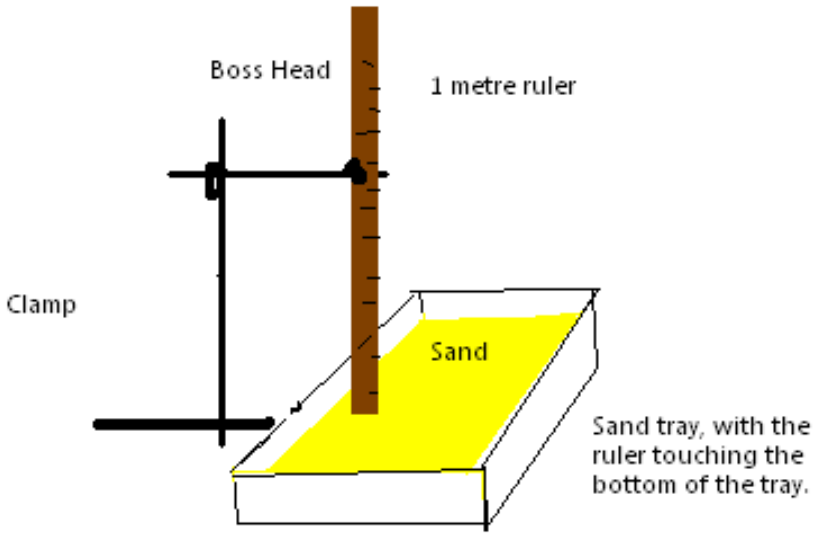
Success Criteria

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

Investigating Craters (Extension)

Aim: To investigate how the _____ affects the _____.

Method:



Variables

- I will change the _____ by _____
  _____
- I will measure the _____ using _____
  _____
- I will keep the _____ constant.

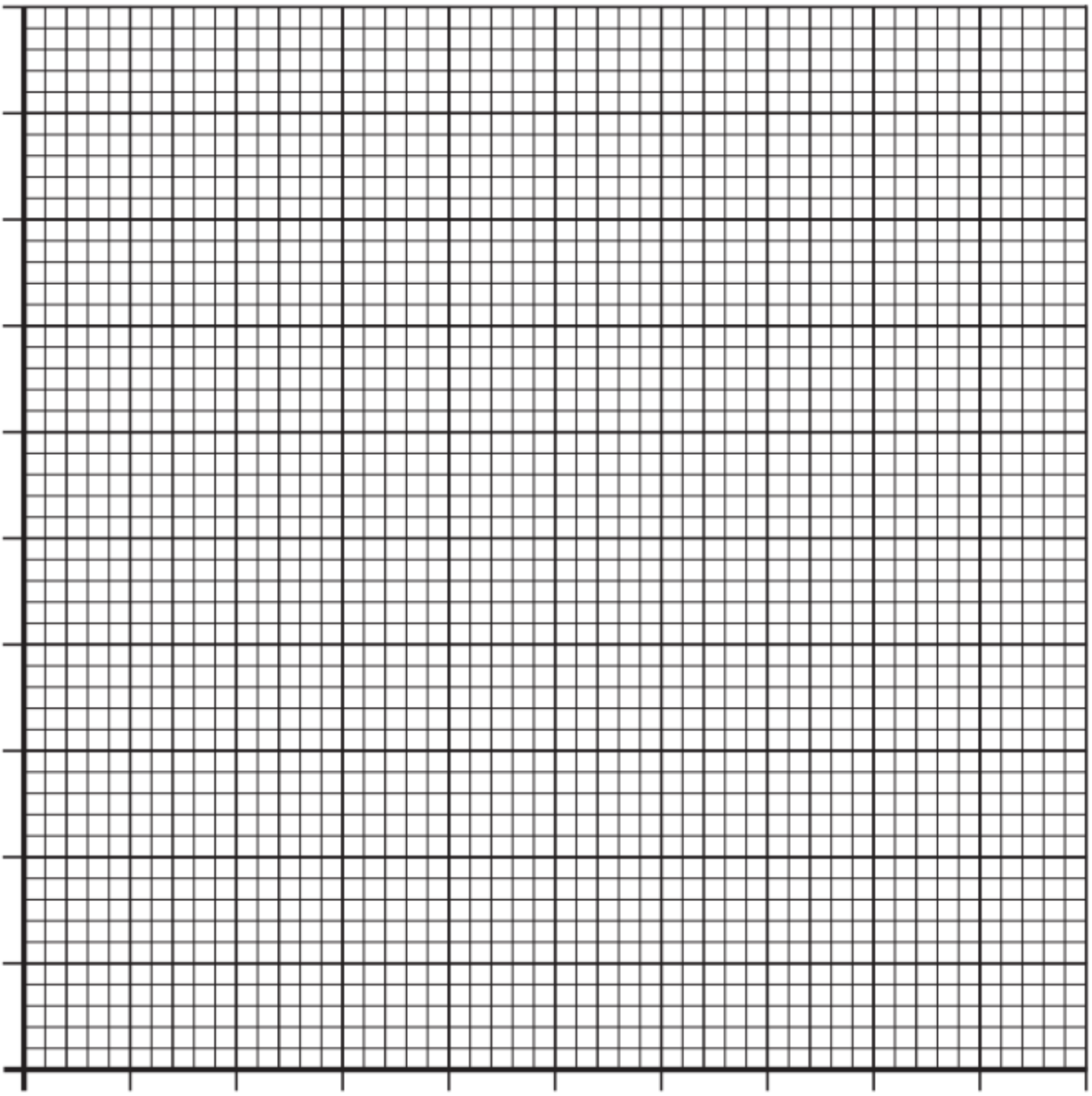
Results:

	1	**2**	**3**	**Average**

Conclusion:_____
_____
_____

Evaluation_____
_____
_____

Draw a graph of your data …



Date: _____

The Solar System

Starter

What does our solar system consist of?

_____

_____

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.

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

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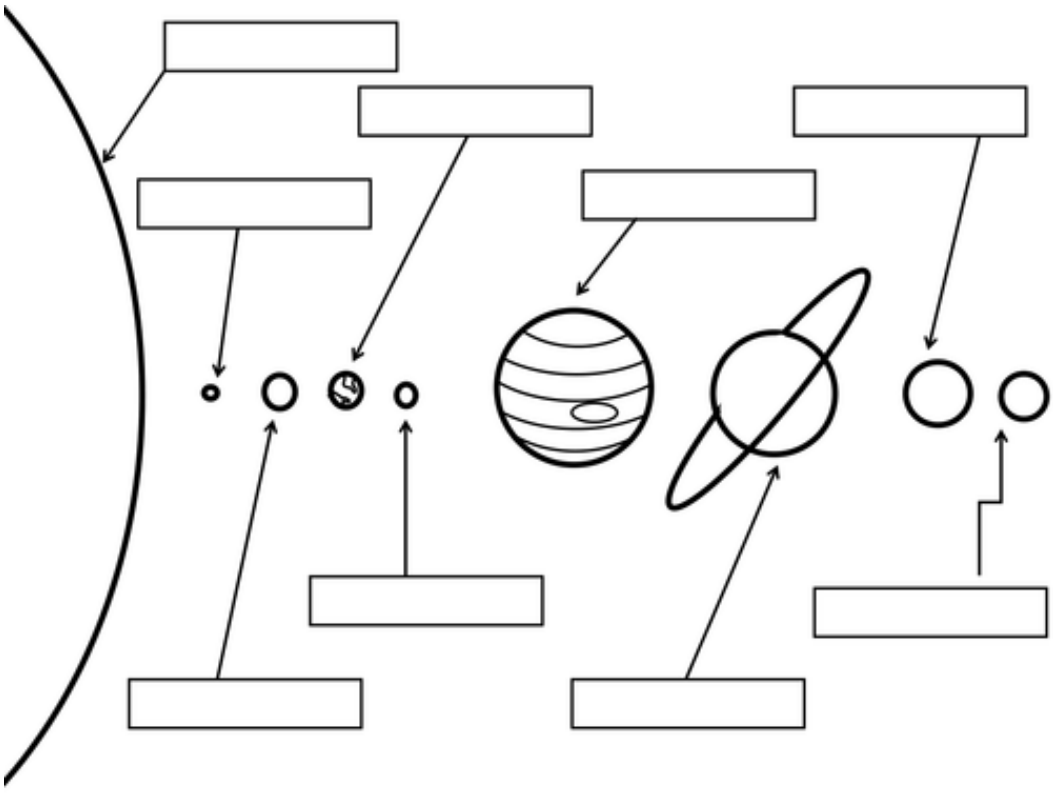
The Solar System

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



The Scale of the Solar System

Use this data table to help you create a map 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**

Date: _____

The Scale of the Solar System Continued ….

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**?

   _____

Learning Intentions

- To learn about the relative size and scale of the planets in the Solar System.

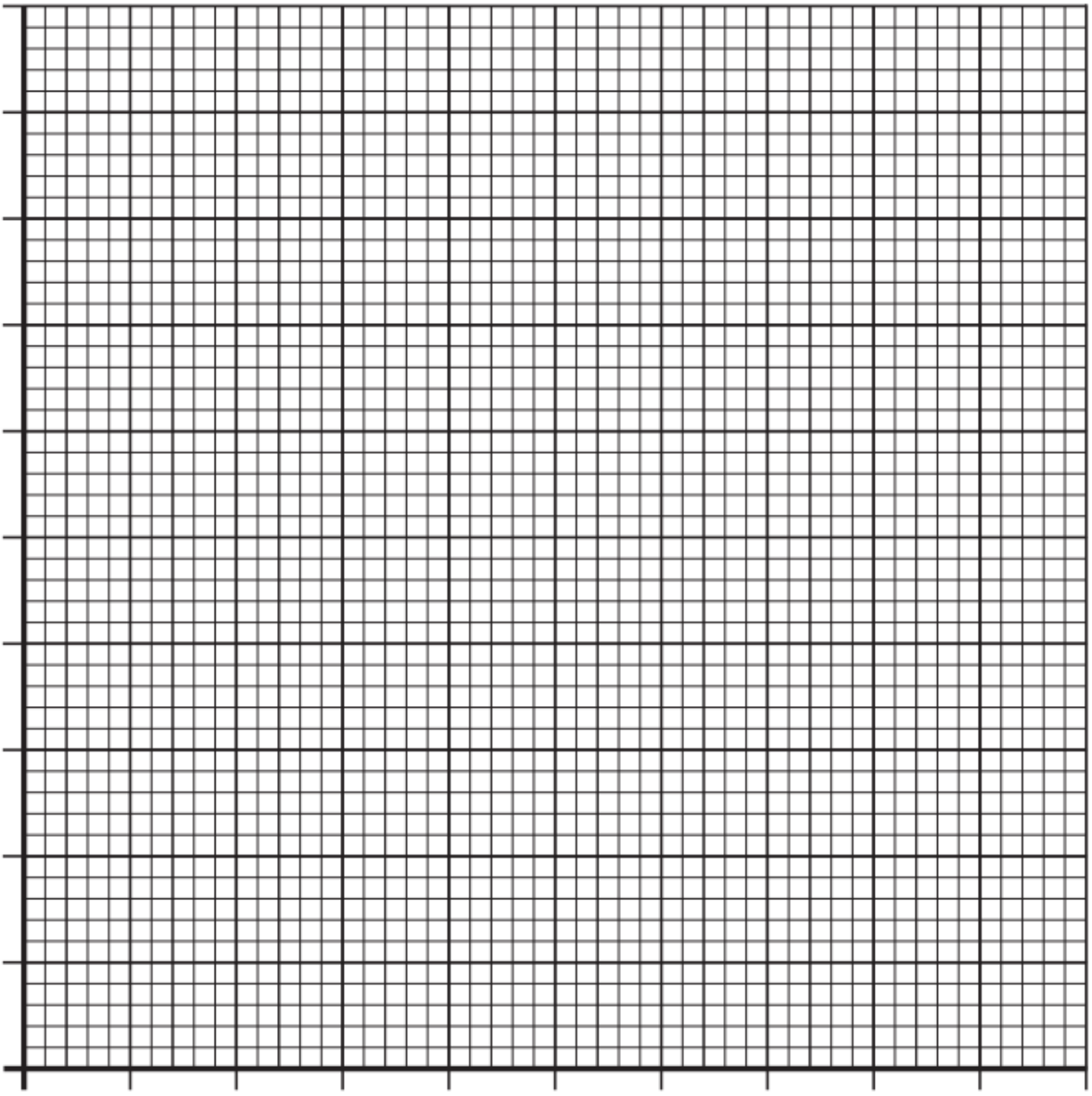
Success Criteria

❑ I can describe the relative size and scale of the planets in the Solar System

Bar Graph Practice

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



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

_____

_____

_____

_____

_____

_____

Date: _____

Asteroids, Comets & Meteoroids

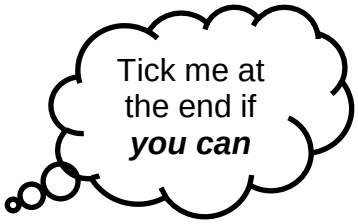
Starter

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? _____

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.



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

Object	Definition
Asteroids	
Comet	
Meteoroids	
Meteors	
Meteorites	

Date: _____

Beyond the Solar System

Starter

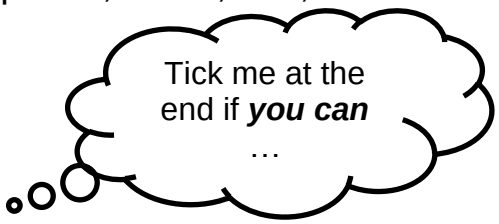
1. What is beyond our solar system?

_____

_____

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.



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.

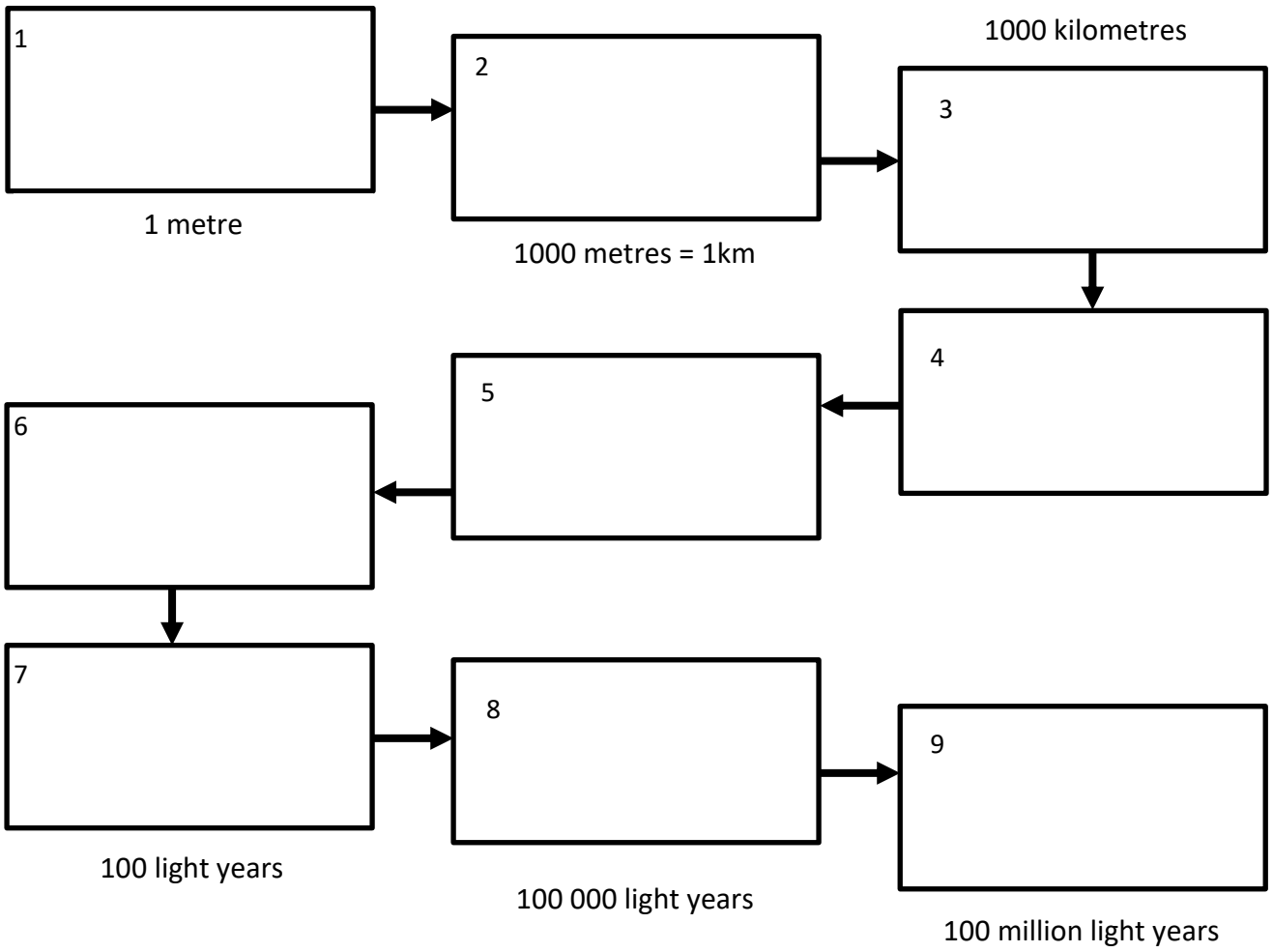
Important Astronomical Objects

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.

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

The Scale of the Universe

Complete the diagram to show your place in the Universe.



Date: _____

Space Observation and Exploration

Starter

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

Smallest ⟶ Largest.

_____ _____ _____ _____ _____ _____

Planet
Universe
Star
Solar system
Galaxy
Moon

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

_____

_____

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.

Tick me at the end if ***you can*** …

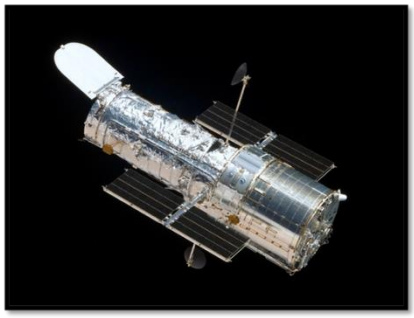
Success Criteria

- ❑ 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.

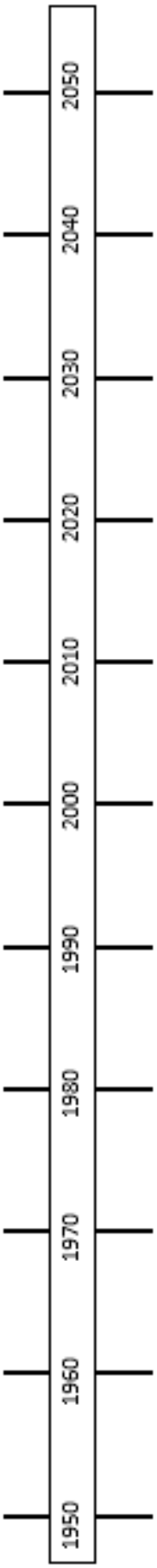
Space Observation and Exploration

Space can be explored through:

- _____ using telescopes on Earth and in space.
- _____.
- _____.



Space Exploration Timeline



Date: _____

Space Observation and Exploration (Extension)

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)

   _____

   _____

Learning Intentions

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

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

Date: _____

Life Beyond Earth

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.

_____

_____

Learning Intentions

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

Success Criteria

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

Requirements for Life

The requirements for life on Earth are:

- _____
  _____
- _____
- _____
- _____
  _____

Candidates for life in our solar system

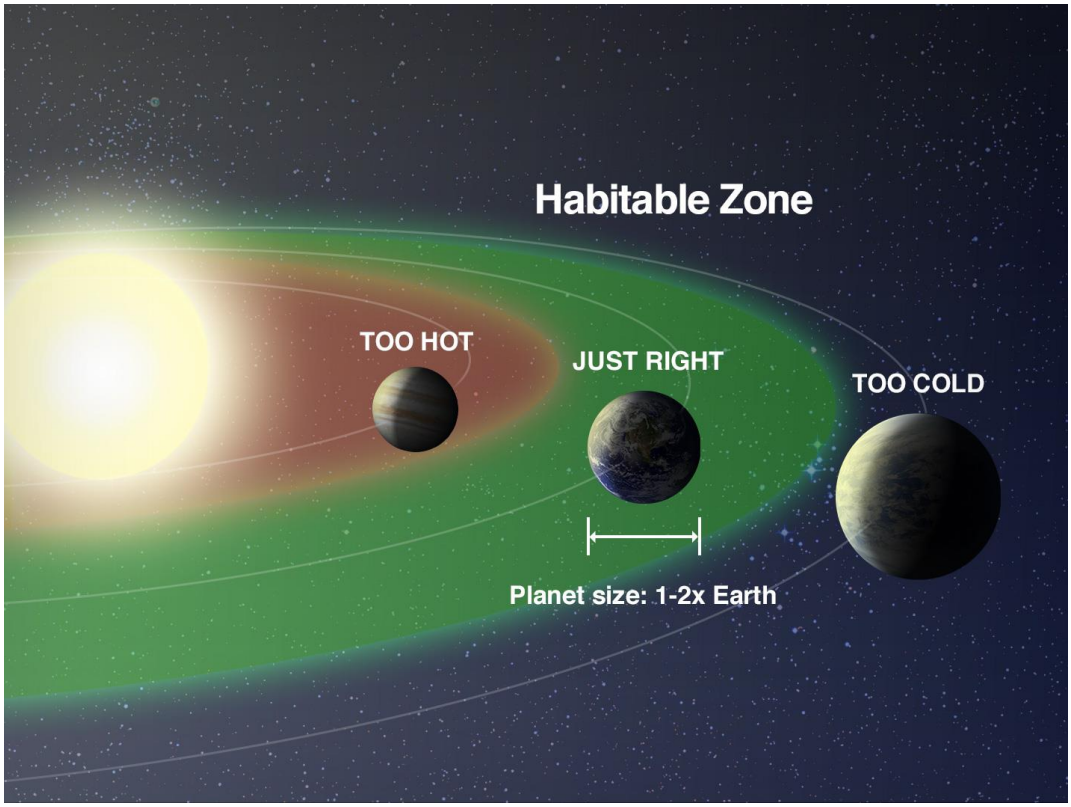
There are very few places in the Solar System, other than on Earth, that life could have evolved and still be thriving today. A few possibilities are _____, _____ and _____.

Exoplanets

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

The Habitable Zone

The _____ zone (Goldilocks zone) is the name given to an area around a star which is 'just right' for life.
This area is not too _____ or too _____ for liquid water to exist on a planet.



Date: _____

Looking for Exoplanets

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.

   _____

   _____

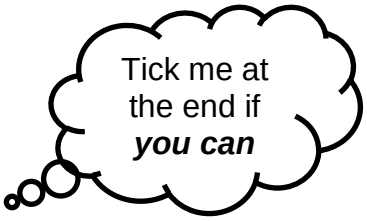
2. State 4 basic requirements for an exo-planet to support life.

   _____

   _____

Learning Intentions

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



Success Criteria

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

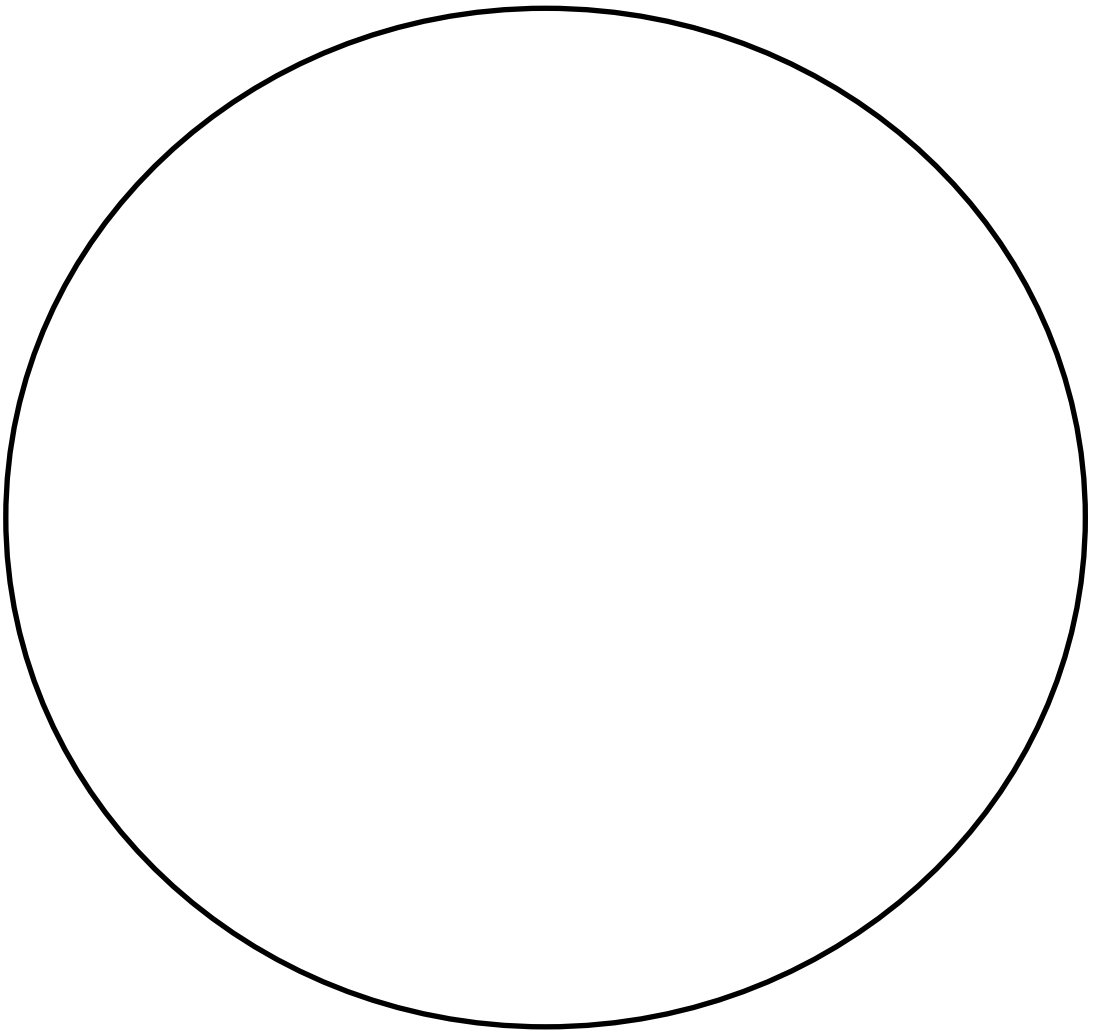
Finding Exoplanets

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

Detection Method	How it works
	Taking a picture of an exoplanet with a telescope
	As the exoplanet orbits a star, the exoplanet's gravity pulls on the star, making the star wobble.
	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.

A habitable exoplanet - what are we looking for?

The conditions for a habitable exoplanet are:



Life elsewhere in the Universe

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

Facts from the NASA Exoplanet series:

Space Tourism

Design a travel poster advertising space tourism.

Identify a favourite exoplanet, planet, or moon.

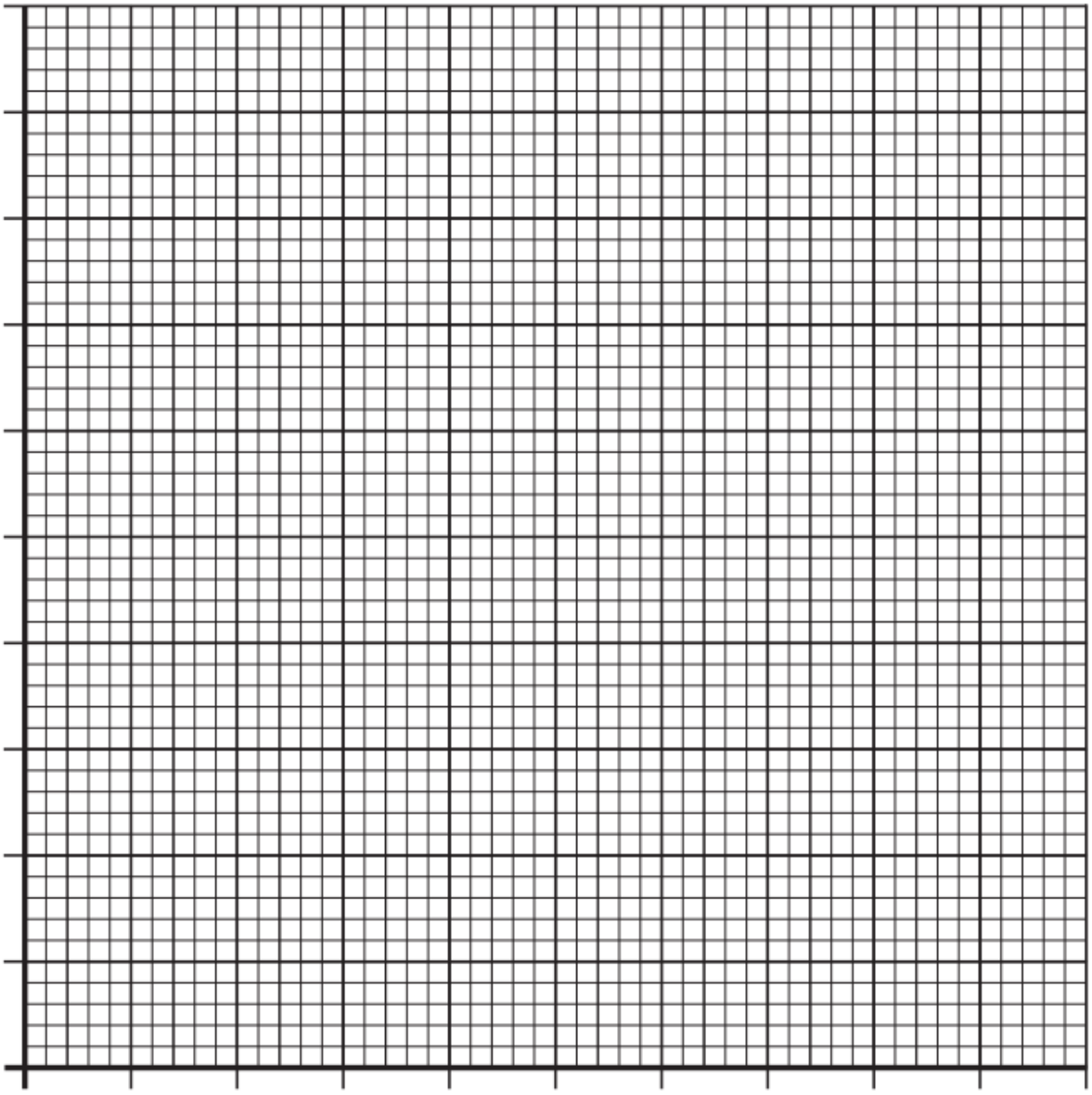
Imagine what the surface and conditions of that exoplanet might be like.

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

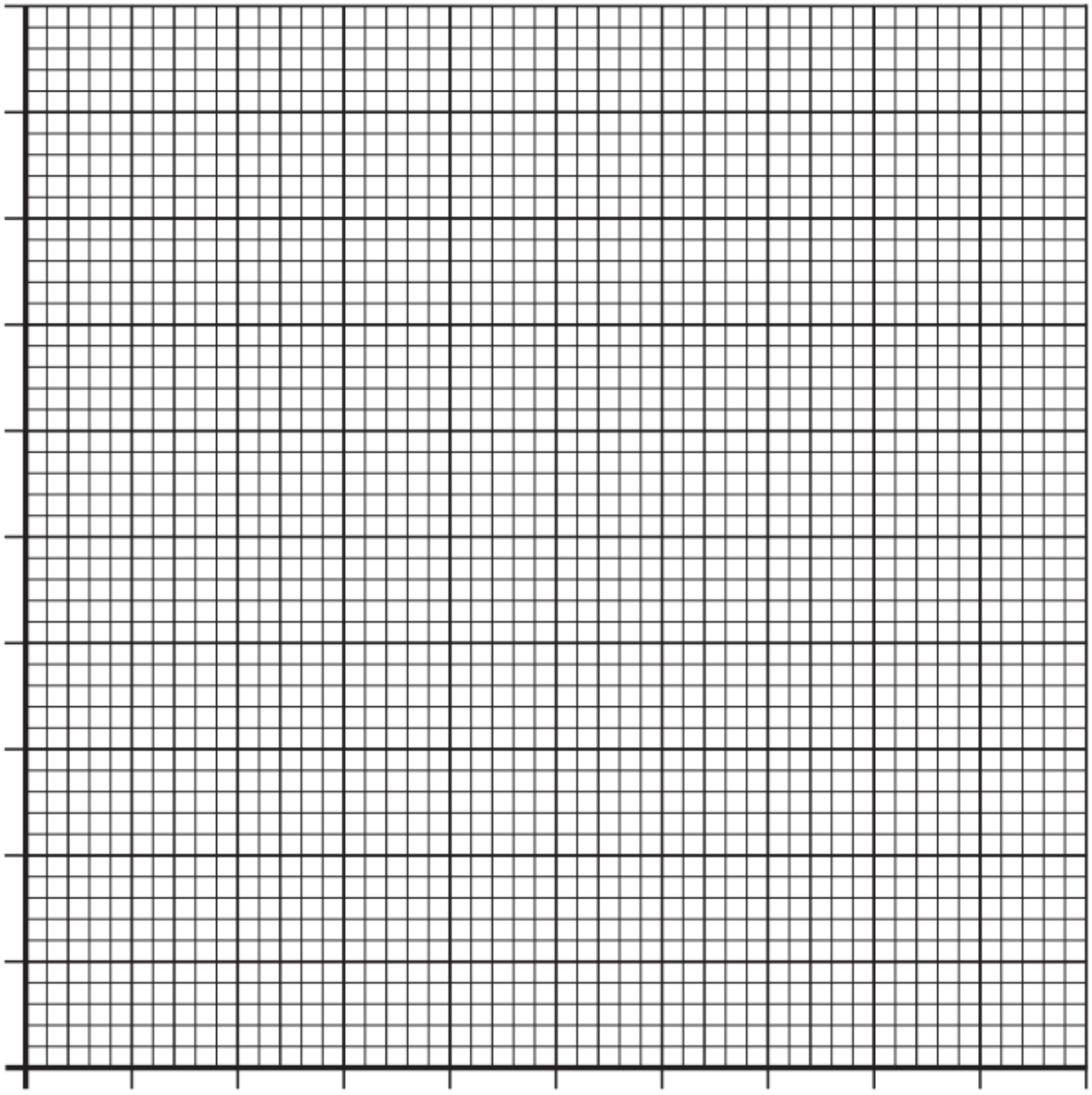
There is space on the next page for your poster.

Space for Space Tourism poster

Additional graph paper for numeracy tasks:



Additional graph paper for numeracy tasks:



Extension Tasks

Word Search

SPACE 1

H	H	W	A	N	I	N	G	S	L	I	E	C	T
M	T	S	S	C	R	E	M	M	U	S	E	H	M
A	R	N	A	W	R	E	T	N	I	W	Q	I	W
U	A	P	O	L	L	O	A	C	E	I	U	T	A
T	E	C	R	A	T	E	R	T	Y	E	A	R	X
U	A	A	N	E	C	E	I	R	R	S	T	S	I
M	I	E	A	I	S	L	I	A	O	E	O	H	N
N	A	S	L	C	L	N	X	H	T	A	R	H	G
C	T	P	E	E	O	I	L	L	A	S	R	T	T
R	S	N	T	O	S	X	U	N	T	O	T	N	E
E	T	A	M	A	P	Y	A	D	E	N	C	O	I
O	S	A	E	G	N	I	R	P	S	S	O	M	R
G	I	B	B	O	U	S	O	O	M	S	T	I	I
I	T	E	A	N	U	S	G	S	N	I	G	H	T

SATELLITE
MONTH
DAY
SUN
AXIS
ECILPSE
SPRING
APOLLO
WAXING
SEASONS
NIGHT
YEAR
WINTER
ROTATE
AUTUMN
SUMMER
EARTH
WANING
MOON
EQUATOR
GIBBOUS
CRATER
CRESCENT

Play this puzzle online at : https://thewordsearch.com/puzzle/6240759/

Extension Tasks

Word Search

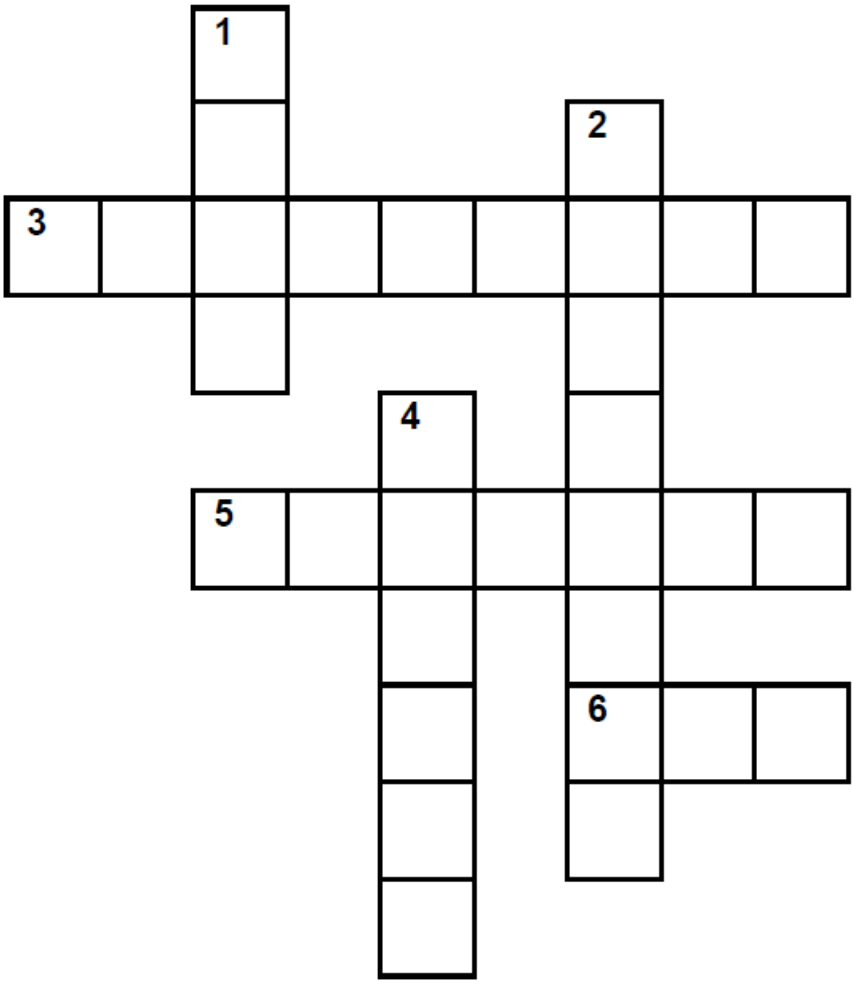
Space 2

N	R	M	T	A	L	A	H	T	E	M	O	C	K
E	V	M	E	R	C	U	R	Y	V	T	S	I	I
S	H	R	P	U	B	T	S	G	R	E	R	N	N
R	A	U	E	B	G	N	Y	A	A	E	E	P	T
E	B	R	L	I	M	S	T	H	L	L	G	E	U
T	I	E	O	A	R	U	E	R	G	Y	A	T	P
I	T	S	K	J	R	N	X	U	R	U	Y	X	S
P	A	V	K	O	U	A	O	N	A	U	O	B	Y
U	B	Y	E	T	R	R	P	I	V	E	V	X	M
J	L	T	P	N	U	U	L	V	I	S	T	A	R
S	E	E	L	K	U	O	A	E	T	N	R	A	U
M	N	T	E	A	T	S	N	R	Y	E	M	T	E
A	M	A	R	S	P	K	E	S	A	T	U	R	N
H	S	H	T	R	A	E	T	E	B	U	A	T	S

NEPTUNE
HUBBLE
VOYAGER
URANUS
GRAVITY
EXOPLANET
HABITABLE
STAR
SPUTNIK
GALAXY
SATURN
JUPITER
KEPLER
UNIVERSE
MERCURY
METEOR
EARTH
MARS
VENUS
COMET

Play this puzzle online at : https://thewordsearch.com/puzzle/6240783/

Crossword



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.

Colouring Sheet