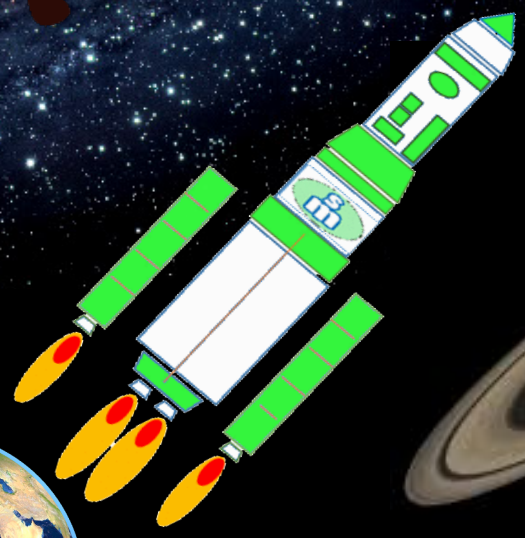




# Science Matters



Topic      Beyond the World Around Us

Name      \_\_\_\_\_ Class      \_\_\_\_\_

Awesome - it's the only word to describe our Universe. Scientists are always surprised and excited with all they discover. So will you.



The story is told that instead of what we have now- that is the Universe- there once was:-

- **No space - not even empty space.**
- **No stuff - just as well as there was nowhere to put it.**
- **No time - so no thinking back or looking forward.**

Then it happened:-

- **Space stretched out from nothing to give room for everything.**
- **Time began - there was now 'time' for things to happen and to get things done.**
- **Stuff appeared - particles called atoms appeared and came together to make all the complex stuff that is in our Universe.**

And since then our Universe has continued on as 'programmed'.

Surely this sounds a lot like science fiction! But not so!

Today scientists all agree that this is roughly what happened back at the beginning. They may not know why or how it happened or agree that God made it happen. But it happened and scientists have often referred to this beginning of our Universe as 'The Big Bang'.



**THE  
BIG  
BANG**



**NOW  
THIS**



**AND  
THIS!!**

since  
terms

And today we all in our own way encounter the Universe of which we are a part.

The Universe takes up a mind blowing amount of space. And most of the space our Universe takes up is empty - yes vast amounts of 'empty' space.

## Besides loads of space what is inside our Universe?

Well, our universe is populated with billions of Galaxies.

### So what is a Galaxy?

A galaxy is a cluster or group of billions of stars along with much smaller bits and pieces - planets, comets, asteroids, meteoroids ...

Our Sun is a star and is a part of one of these galaxies. The galaxy our Sun and Earth are part of is called the Milky Way. Our galaxy measures **1,000,000,000,000 million km** across with a ray of light taking **100,000 years** to travel across it.

Compare this with the light leaving our Sun taking only 8 minutes to reach Earth and light from the next nearest star taking 4 years.



**A Galaxy similar to the Milky Way**



### **AMAZING FACTS!**

**There is about 300 billion stars in the Milky Way Galaxy.**

**The Milky Way gets its name from the milky band of light formed by these billions of stars that stretch across the night sky.**

**This band is easy to notice on clear dark (moonless) night.**

Most of the specks of light that we see in the night sky are other stars that belong to our Milky Way Galaxy.



Why can we not take a picture of the Milky Way?

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When compared to other stars in the night sky why does our Sun, which is a star, look so big and bright?

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What Galaxy are we on planet Earth a part of?

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Galaxies are huge yet if you imagine your classroom to be the Universe then a Galaxy would be no bigger than a speck of dust floating inside the room.

So our Universe is a mind-blowing - BIG!

## Earth and it's nearest star The Sun

All objects in space are on the move and our Earth is on the move traveling continuously around the Sun and spinning on its axis as it goes. Scientists tell us that the Earth has traveled around the Sun millions of times already with no sign of it slowing down talk about persistence.

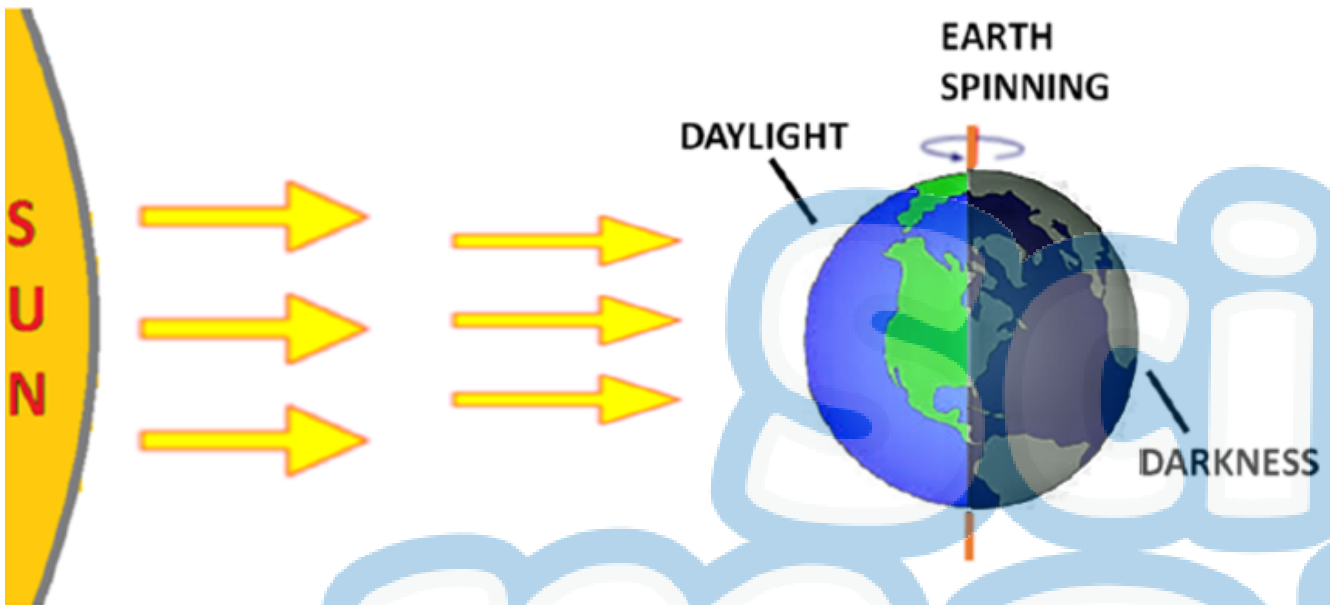
## The importance of our Sun

The Sun is our Earth's energy provider providing it with light and heat - the energy needed for all life on Earth.

You could say the Sun's job is to keep fuelling the Earth.

## Day and Night

The half of the Earth that is in sunlight will have its day time while the other half which is in shadow or darkness will have its night time.



Of great importance is the fact that the Earth spins on its axis (causing our Sun to appear to move across the sky). This means that during one spin or rotation which takes 24hrs the whole Earth will pass through daytime and night-time.



What might it be like if our Earth did not spin?

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What difference would it make if the Earth was to spin once every 12 hours?

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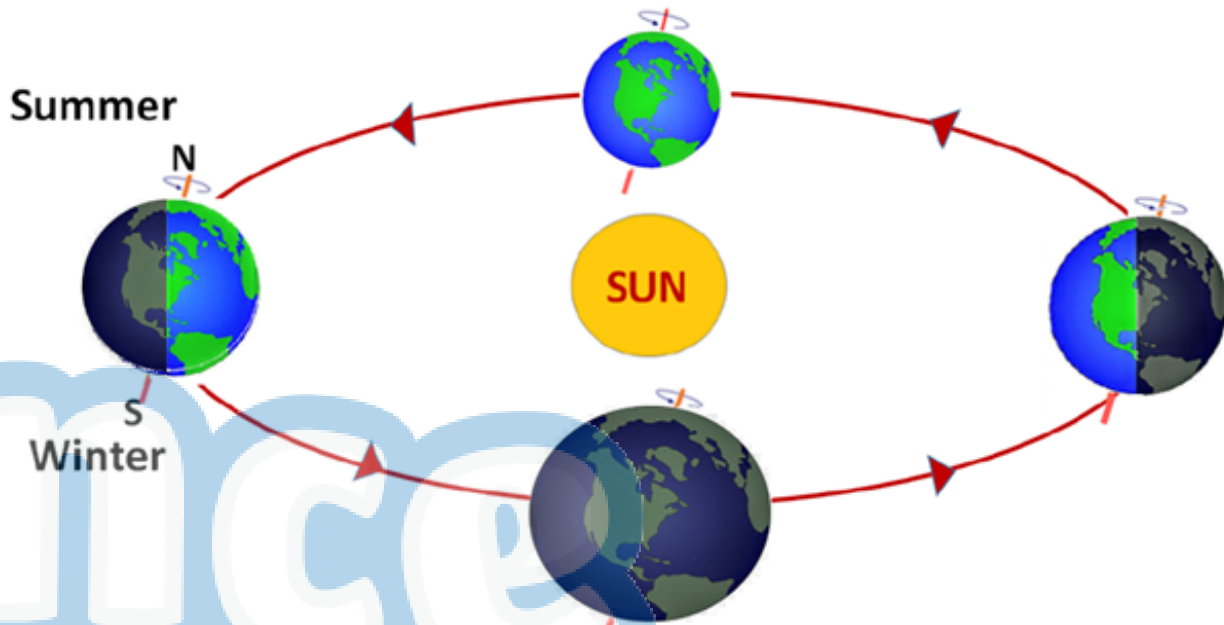


### AMAZING FACTS!

There is a force operating throughout the entire Universe keeping order, keeping things together and causing everything to run like clockwork.

This force is called Gravity, the same force that holds us to Earth. Gravity is the 'glue' that holds everything together.

## Year and Seasons



The Earth orbits the Sun once every year covering a distance of **600 million miles (976 million km)** traveling at a speed of **66,000 miles per hour (107,000 km per hour)**.

It is because the Earth's axis has a **slight tilt** that the Earth experiences the seasons **Spring Summer Autumn Winter** as it orbits the Sun.

Whatever season is occurring in the Northern Hemisphere the opposite will occur in the Southern Hemisphere.



**What variations do our seasons bring?**

**Winter** \_\_\_\_\_

\_\_\_\_\_

**Spring** \_\_\_\_\_

\_\_\_\_\_

**Summer** \_\_\_\_\_

\_\_\_\_\_

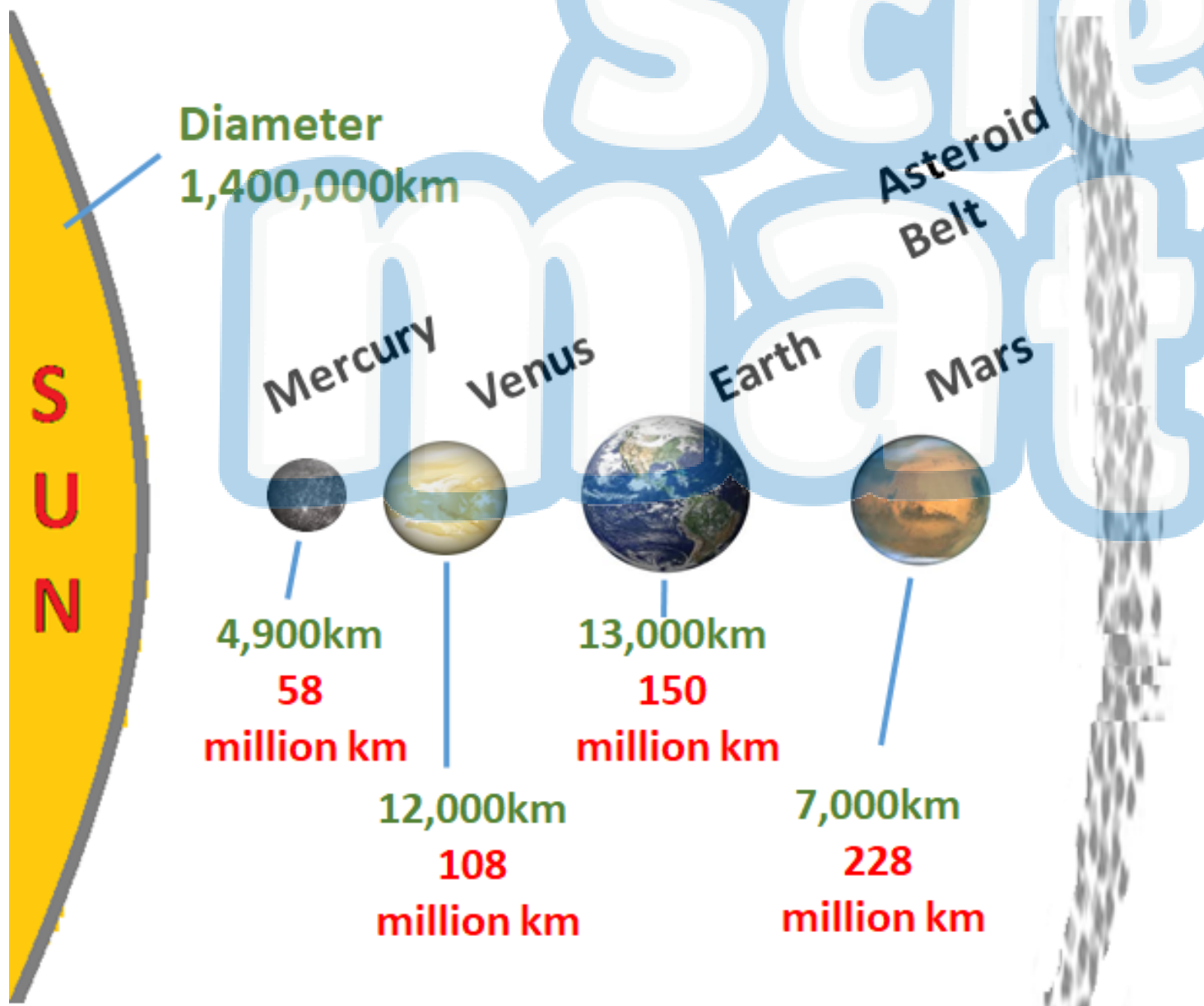
**Autumn** \_\_\_\_\_

\_\_\_\_\_

## The Solar System

The solar system is just a microscopic speck when compared to the whole Milky Way galaxy. Yet the Solar System is home to the Sun along with the eight Planets and the multitude of other space objects that orbit it. Other space objects include Dwarf Planets (example Pluto), Meteoroids, Asteroids and Comets.

The diagram below is certainly **not to scale** for example our Earth would fit into Jupiter more than 1000 times and Neptune is 30 times further away from the Sun than the Earth is.



**The Four Inner Planets - 'The Rocky Planets'**

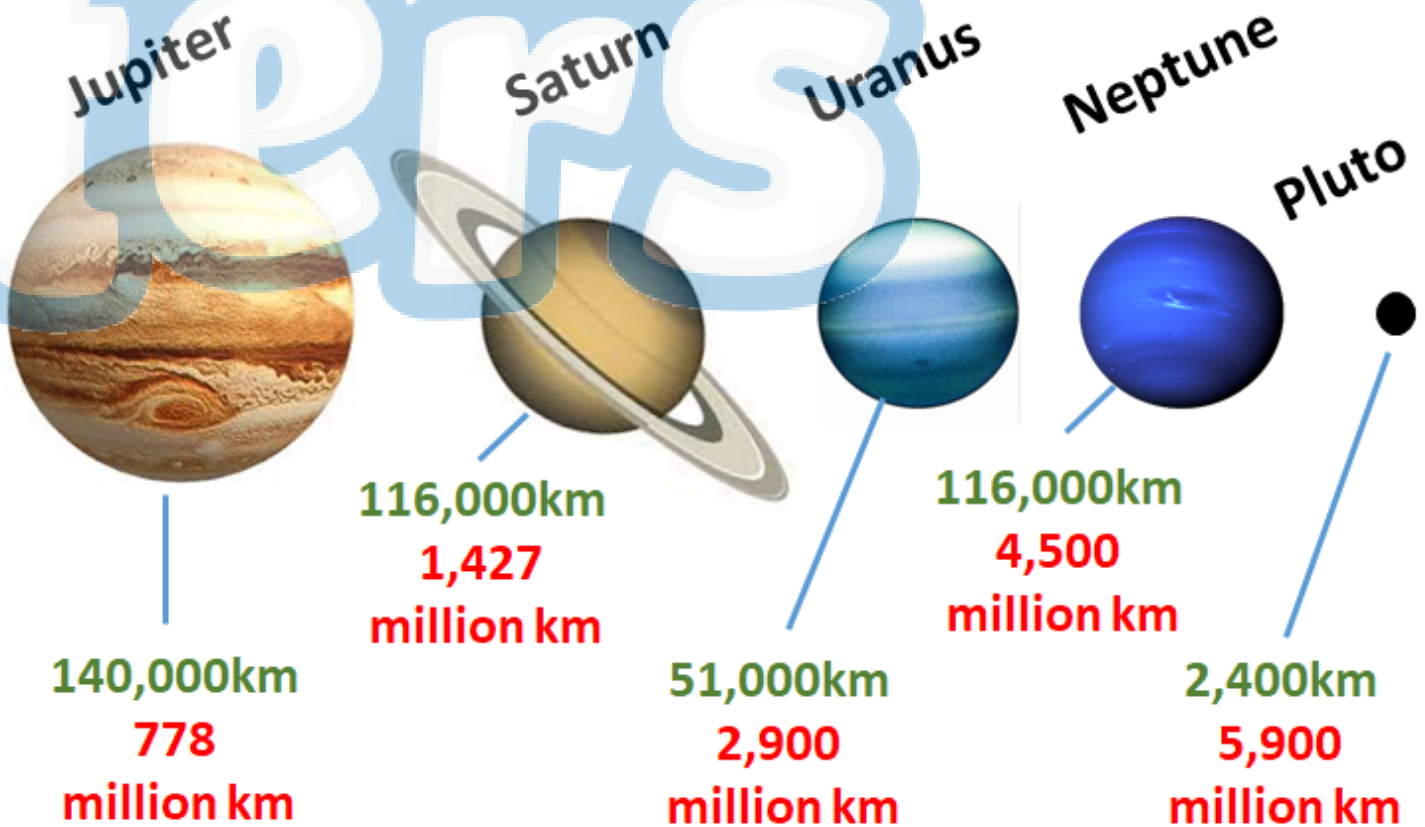


Pluto used to be treated as the 9th planet in the solar system. However since 2006 it has been reclassified as a Dwarf Planet

All of the planets apart from Mercury and Venus have moons - objects that orbit them.

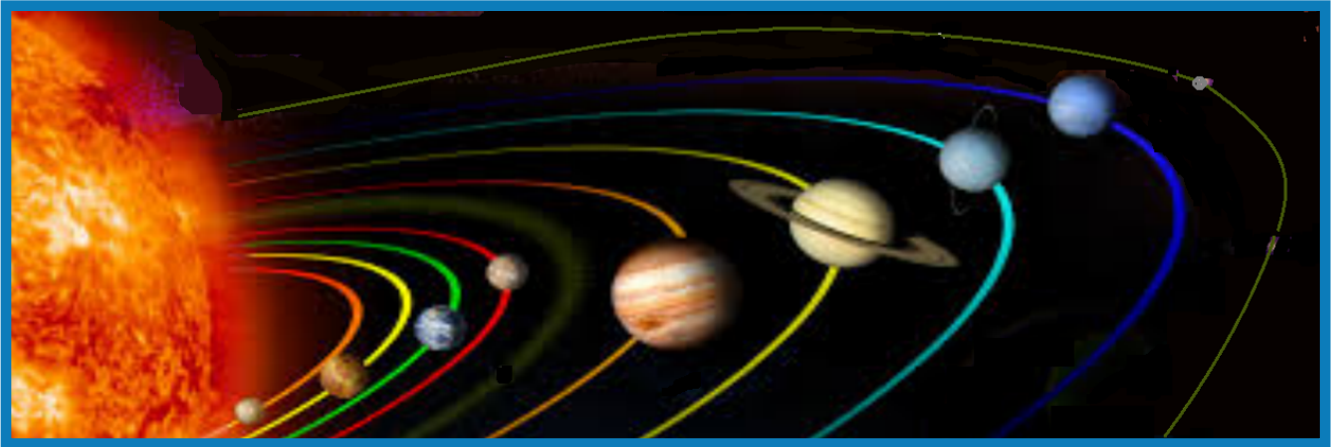
Earth has one moon, Mars has two and Jupiter the largest planet has more than sixty moons.

**Sizes (Diameters) —**  
**Distances from the Sun —**



### The Four Outer Planets - 'The Gas Giants'

## Orbit Time



All the parts of our Solar System whether big or small are constantly on the move. Where? On an journey that takes them on a path (orbit) around the Sun a journey which is continuously repeated. Objects further from the Sun will take much longer to orbit - Pluto takes \_\_\_\_\_ years while Earth takes 1 year.

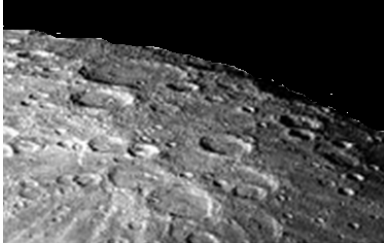
## Journey Time

|                        |                         |                        |
|------------------------|-------------------------|------------------------|
| Mercury _____          | Venus <b>225 days</b>   | Earth <b>1 year</b>    |
| Mars _____             | Jupiter <b>12 years</b> | Saturn _____           |
| Uranus <b>84 years</b> | Neptune _____           | Pluto <b>248 years</b> |



Well, what can I say? Simply, I am your perfect location with the very best there is to offer. Please take care of me so that others can enjoy .

# Planetary Detectives



Mercury

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Venus

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Mars

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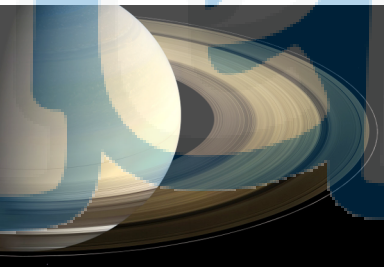


Jupiter

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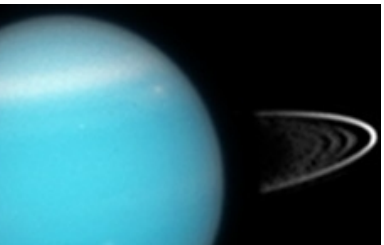


Saturn

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Uranus

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Neptune

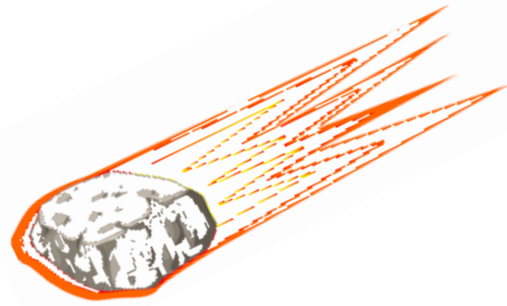
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## Intruders from Space

Here they come  
traveling at speeds  
averaging 80,000 mph



Before entering the Earth's atmosphere these intruders are called Meteoroids. Once they enter the Earth's atmosphere they are called Meteors.

### Where did they come from?

Meteoroids are fragments from Asteroids or Comets ranging from grain sized to large sized pieces of rock or ice.

### What happens next?

Entering the Earth's atmosphere causes these Meteors to slow down, heat up and burn up. On occasions many Meteors enter the atmosphere at once causing a Meteor Shower.



Those Meteors that are big enough do not burn up completely and what remains hits the Earth's surface. Those that hit the surface are called Meteorites. Every day hundreds of hockey ball sized Meteorites hit the Earth's surface. Some Meteors have been big enough to light up the night sky and cause damage on Earth.

## The Asteroid Belt

Asteroids are rocky objects that range in size from pebbles to dwarf planets which can be up to 1000 kilometres across.



**A Stony Asteroid**

Nearly all Asteroids are found in the Asteroid Belt a region between the orbits of Mars and Jupiter. In this region they keep orbiting the Sun. Some Asteroids however (usually smaller ones) have different orbits that take them closer to the Earth and each day many hit the Earth's atmosphere.

## Comets

Comets have a makeup that could be described as giant dirty snowballs - made of ice and dust. The **average comet** is less than **10 kilometers (6 miles)** across. A **small comet** is about the size of a house.

Comets have orbits that take them far out into the solar system before returning to orbit closer to the Sun.

Comets can take from tens of years to thousands of years to complete one orbit of the Sun.



As a comet gets closer to the Sun, its surface starts to vaporize and form a **cloudy tail of gas and dust**, This tail can stretch out from the core for vast distances e.g. **100,000 km (60,000 miles)**.

The most famous comet is called **Halley's Comet**.

Halley's comet takes about **76 years** to complete its orbit and for several months when it is closer to the Sun it can be seen from Earth.

Halley's comet last appeared in the night sky in \_\_\_\_\_ and it will not appear again until \_\_\_\_\_.

## Moon

Unlike Jupiter which has over 60 moons Earth has only one moon which we call 'the Moon' The Moon is Earth's closest neighbour at 400,000 kilometres away. The force of gravity from Earth causes the Moon to continually orbit around the Earth.

How many days does it take the Moon to orbit the Earth? \_\_\_\_\_

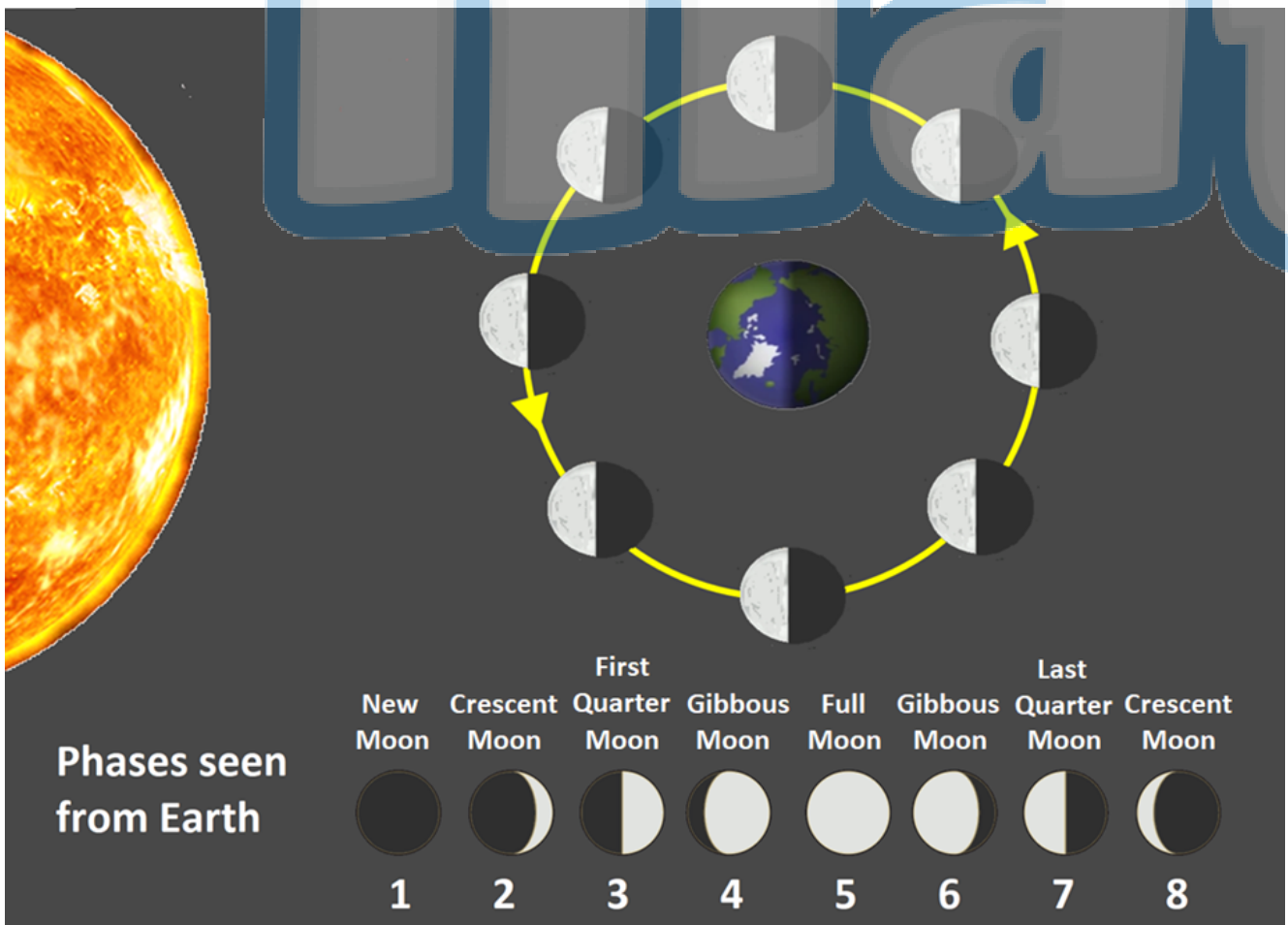


What causes the Moon to light up? \_\_\_\_\_

How much of the Moon is lit up? \_\_\_\_\_

The only part of the Moon that we can see is the part of the Moon that is lit up and also facing the Earth.

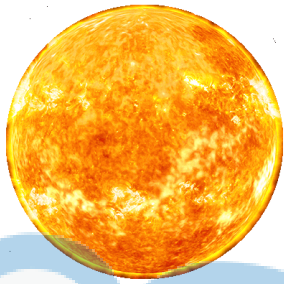
In the diagram number the positions of the moon (1-8) so that they correspond to the phases seen from Earth.



### The Moon's Mighty Pull

The Moon exerts a gravitational pull on Earth. This pull is so strong that it causes the seas of the Earth to move causing high and low tides.

## Stars and Constellations

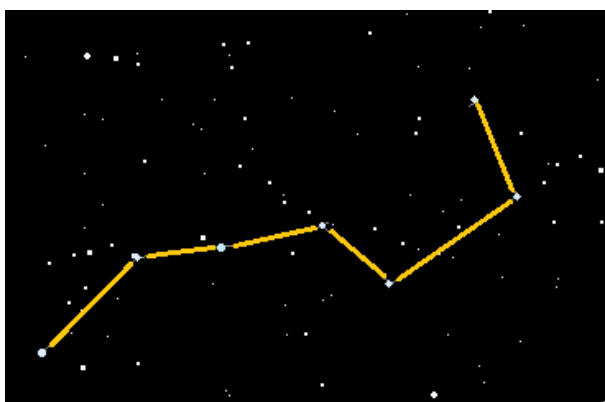
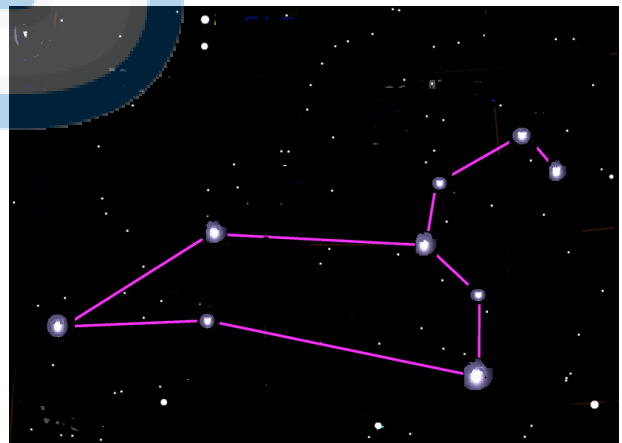


A star is a giant ball of glowing burning gas fuelled by nuclear reactions at its centre. The Sun is our nearest star and this is why it is so big and bright.

There are billions of stars in the Milky Way with only several thousand being close enough to be seen with the naked eye. Stars are divided up into regions called constellations (regions recognised by the pattern of their stars). A total of 88 constellations cover the night sky.

### Name the Constellations

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Nickname 'The Plough'



## Find your bearings

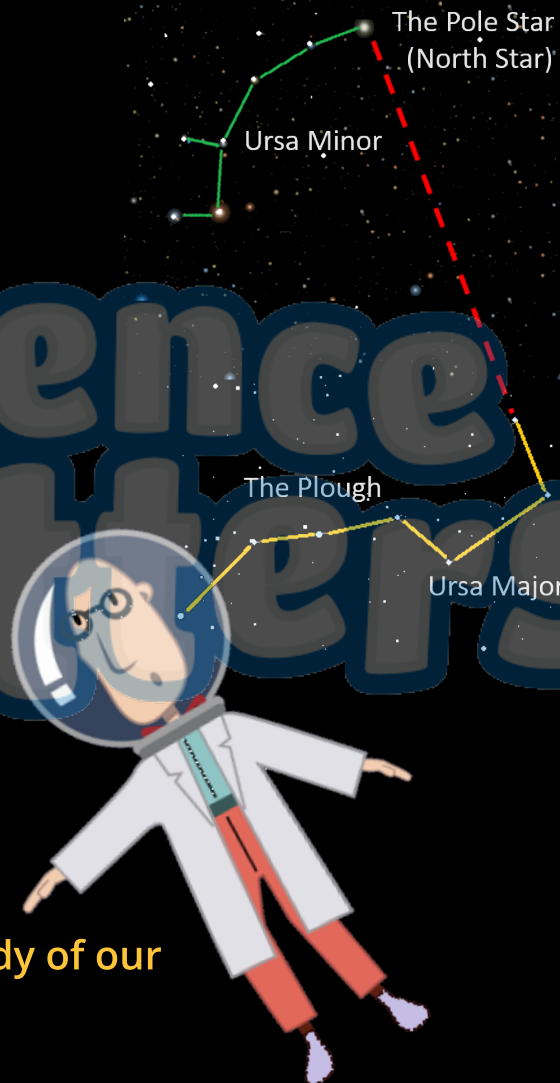
First of all find the **Pole Star or Polaris**. When you look in the direction of the Pole Star you're looking in the direction of north.

Why? Well the Pole Star is directly in line with (or above) the North Pole. This star is always in the same position in our night sky.

Finding the Pole Star can be difficult because Ura Minor and the Pole Star are quite dim and hard to spot.

The diagram shows how using the **Plough** can be an easy way to find the Pole Star.

Our Universe is AMAZING with even more to amaze with each new look!



What has amazed you in our study of our wonderful Universe?

My Amazement



