

KS3 Science

Independent Learning

Booklets

Universe

If you have internet at home, you can use bitesize to help you with some of the activities.

Try your hardest to work through the booklets



Stars and galaxies

Our Sun is a star. It seems much bigger than other stars in the sky because it is much closer to Earth. Stars form immense groups called galaxies. A galaxy can contain many millions of stars, held together by the force of gravity.

Our Sun is in a spiral galaxy called the Milky Way. The Sun is about half-way from the centre of the galaxy, on one of the arms.



Our galaxy contains millions of stars, including our Sun. It is just one of more than 100 billion galaxies in the universe

The solar system

The solar system consists of the Sun, with planets and smaller objects such as asteroids and comets in orbit around it.

The planets

There are eight planets in the solar system. Starting with Mercury, which is the closest to the Sun, the planets are:

- Mercury
- Venus
- Earth
- Mars
- Jupiter
- Saturn
- Uranus
- Neptune

This sentence is a way to remember the correct order: **My Very Easy Method Just Speeds Up Naming**

Years and seasons

A planet's year is the time it takes to make one complete orbit around the Sun. The Earth goes once round the Sun in one Earth year, which takes 365 Earth days.

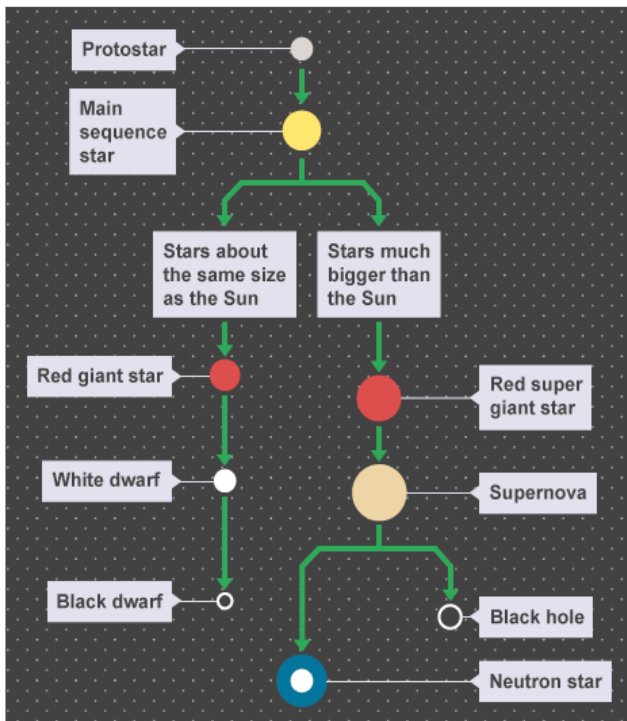
Seasons

The Earth's axis is the imaginary line through the centre of the Earth between the South and North poles about which the Earth rotates. This axis is tilted slightly compared with the way the Earth orbits the Sun.

We get different seasons (winter, spring, summer and autumn) because the Earth's axis is tilted. This is how it works:

- it is summer in the UK when the Northern Hemisphere is tilted towards the Sun
- it is winter in the UK when the northern hemisphere is tilted away from the Sun

The formation and life cycle of stars



The life cycle for a particular star depends on its size. The diagram shows the life cycles of stars that are:

- about the same size as the Sun
- far greater than the Sun in size

All stars begin life in the same way. A cloud of dust and gas, also known as a nebula, becomes a protostar, which goes on to become a main sequence star. Following this, stars develop in different ways depending on their size.

Stars that are a similar size to the Sun follow the left hand path:

red giant star → white dwarf → black dwarf

Stars that are far greater in mass than the Sun follow the right hand path:

red super giant star → supernova → neutron star, or a black hole (depending on size)

A nebula

A star forms from massive clouds of dust and gas in space, also known as a nebula. Nebulae are mostly composed of hydrogen. Gravity begins to pull the dust and gas together.

Protostar

As the mass falls together it gets hot. A star is formed when it is hot enough for the hydrogen nuclei to fuse together to make helium. The fusion process releases energy, which keeps the core of the star hot.

Main sequence star

During this stable phase in the life of a star, the force of gravity holding the star together is balanced by higher pressure due to the high temperatures. The Sun is at this stable phase in its life

Red giant star

When all the hydrogen has been used up in the fusion process, larger nuclei begin to form and the star may expand to become a red giant.

White dwarf

When all the nuclear reactions are over, a small star like the Sun may begin to contract under the pull of gravity. In this instance, the star becomes a white dwarf which fades and changes colour as it cools.

Supernova

A larger star with more mass will go on making nuclear reactions, getting hotter and expanding until it explodes as a supernova.

An exploding supernova throws hot gas into space.

Depending on the mass at the start of its life, a supernova will leave behind either a neutron star or a black hole.

Tasks:

1. complete the sentences using the words below:

- a. The universe contains thousands of clusters of stars called _____.
- b. Stars are spheres of gas that give out energy including _____ and _____.
- c. The _____ is the nearest star to Earth.
- d. _____ are visible from Earth because they are lights sources.

Stars heat Sun light galaxies

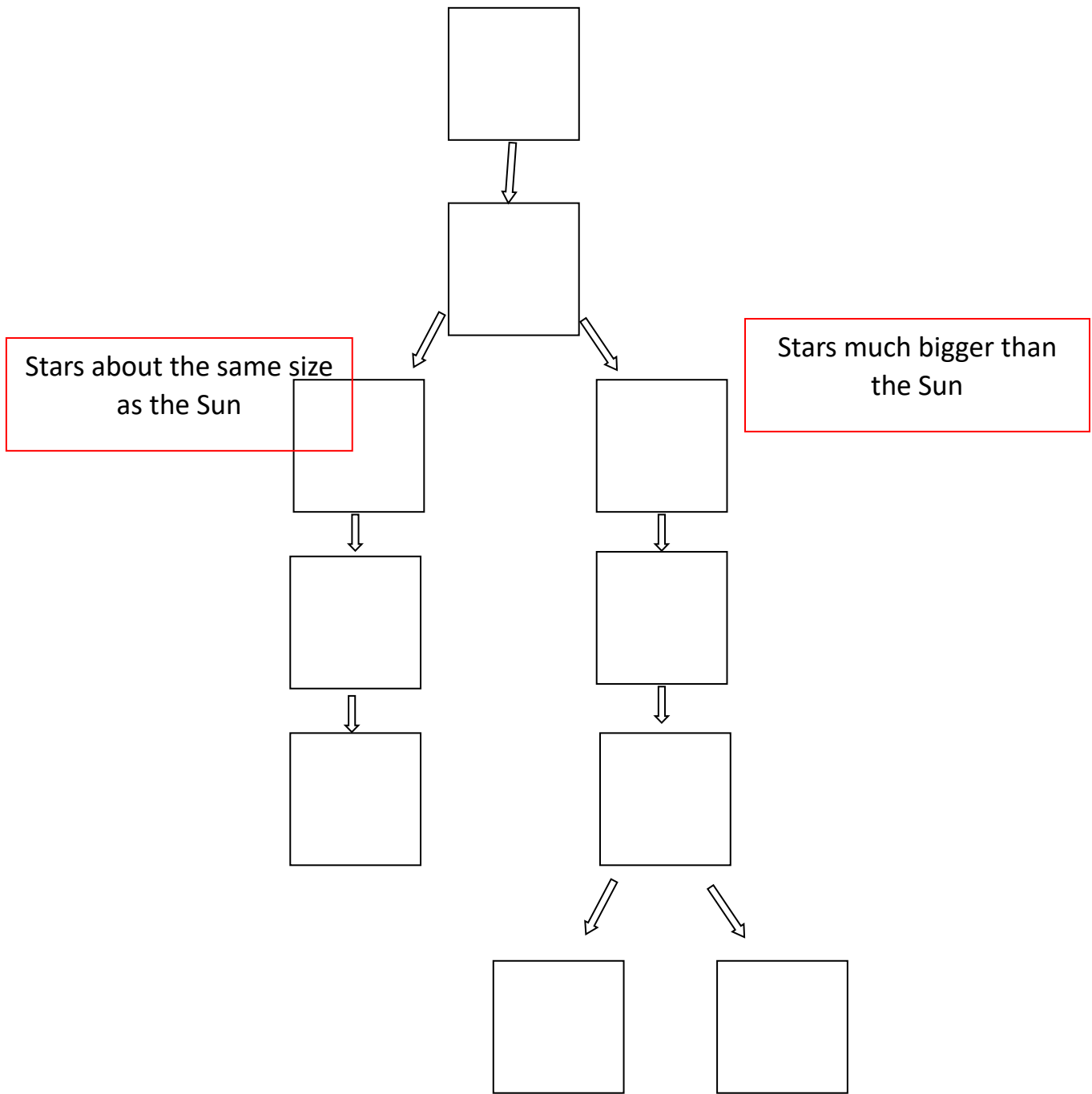
2. Come up with your own pseudonym for naming the planets in order. Start with the planet closest to the sun.

M
V
E
M
J
S
U
N

3. How do all stars start their life?

.....
.....
.....
.....
.....
.....

4. Fill in the flow diagram to show the formation of a star and add a description of each stage:



5. Using the information above fill in which hemisphere each scenario would occur in.

December	Summer in the _____ hemisphere.	Winter in the _____ hemisphere.
March	Autumn in the _____ hemisphere.	Spring in the _____ hemisphere.
June	Summer in the _____ hemisphere.	Winter in the _____ hemisphere.
September	Autumn in the _____ hemisphere.	Spring in the _____ hemisphere.

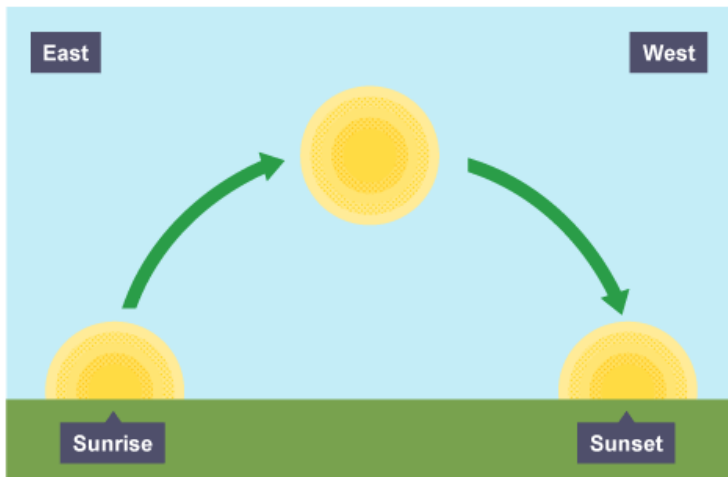
Days and nights

A planet spins on its axis as it orbits the Sun. A day is the time it takes for a planet to turn once on its axis. An Earth day is 24 hours long.

The Sun lights up one half of the Earth, and the other half is in shadow. As the Earth spins we move from shadow to light and back to shadow and so on. It is daytime in the UK when our part of the planet is lit by the Sun. And it is night in the UK when our part of the planet is facing away from the Sun.

Path of the Sun

During the day, the Sun appears to move through the sky. Remember that this happens because the Earth is spinning on its axis. In the UK, if we look south and follow the path of the Sun in the sky during the day, it looks like this:



The apparent path of the Sun as seen from the UK

The Sun appears to move from east to west. This is because the Earth turns from west to east. The Sun appears to:

- rise in the east
- set in the west
- be due south at midday

One way to remember which way the Earth turns is to remember 'we spin', which means that we (the Earth) spins from **w**est to **e**ast.

Path of the Sun at different times of the year

The length of the day (the time when the Sun shines on a particular part of the world) changes during the year, unless you are on the equator. Everywhere else, daytime is longest in the summer and shortest in the winter. In winter, the Sun still appears to rise in the east and set in the west, but it does not climb so high in the sky as it does in the summer.

Task:

Using the above information, create an information poster, including diagrams, on how day and night happens.