Galaxies

Most of **the Universe** is just empty space, but floating around in this space are **galaxies** like the Milky Way. There are billions of galaxies in the Universe. They contain millions of stars of all different ages. Some of these stars have special families like our solar system.

There are galaxies of various shapes and patterns, but they can be grouped into four main types – **spiral, barred spiral, elliptical, and irregular**. Like moons and planets, galaxies spin and move around in space. They are travelling away from each other at up to 112 651 km per second.

The largest galaxies in the Universe are giant ellipticals. They can contain a trillion stars or more, and span as much as two million light-years – about 20 times the width of the Milky Way.

The Andromeda Galaxy is the furthest thing we can see from Earth using just our eyes. It was discovered by Edwin Hubble in October 1923. Although it is a gigantic mass of stars, to us it looks like a tiny blur in our northern sky. If we were able to look out from the Andromeda Galaxy, the Milky Way would also be nothing more than a bright smudge in space.

The Milky Way

The Milky Way is the name of our galaxy. It is a **spiral** one. It is 100 000 light-years from one side to the other. Stars of different ages, sizes and temperatures travel around the middle of the galaxy in enormous, sweeping bands called spiral arms. The shape of the Milky Way is always changing – but very slowly.

Our galaxy contains all the stars we can see in the night sky. Mixed in with the stars are enormous clouds of gas and dust. These bits and pieces are the building blocks for new stars. Although the galaxy is made of millions of stars, it is mostly just empty space!

The Milky Way is flat when seen from the side, but it has a large bulge at the centre. Actually, it has three main parts: a **disk**, a central **bulge**, and a **halo.**

The disk, of the Milky Way has **four spiral arms** made up mostly of 'young' stars between a million and 10 billion years old.

Our star, **the Sun**, is just one of 200 billion other stars that make up our galaxy. Our solar system lies near the edge of a spiral arm called **the Orion Arm**. It takes 220 million years for the system to go once around the centre of the Milky Way.

The bulge is a dense central group of old stars about 10 billion years old. Astronomers think that a monstrous black hole lurks at the heart of our galaxy. The black hole may be a million times heavier than the Sun

The halo is a fuzzy cloud of the oldest known stars (10 -15 billion years) which surrounds the disk.

Galaxy watching

It is easy for us to see familiar objects in the night sky, such as stars - but space is a big place, so there is always more to discover. People practise astronomy to get a close, clearer look at things in space, or simply to try and see as far away as possible. Exciting new finds are being made all the time.

The first astronomers made **patterns of the stars** in our sky – like dot-to-dot pictures – to help them tell the stars apart. These patterns are called **constellations**. Each one has its own name, e.g. the Great Bear or the Centaur.

There is a special instrument, called **a telescope**, which helps astronomers to see distant objects in the Universe. It works like a very strong magnifying glass. Telescopes come in various sizes and strengths.

The first telescopes were made around 400 years ago. They were not as powerful and accurate as today's equipment, but helped astronomers to make important discoveries. In 1781, an English astronomer William Herschel discovered the planet Uranus using a wooden telescope.

Today, scientists do not have to look into the sky themselves, because their telescopes have special computers that can collect the information for them. Some telescopes work by tuning in to radio waves from space. The large dish collects up the waves and focuses them onto the antenna, which then turns them into electrical signals. A computer uses these signals to build up pictures of objects in space.

One of the most famous, **the Hubble Space Telescope**, is helping astronomers to make new discoveries about the Universe. It focuses on tiny areas of space to produce pictures full of dots and smudges. These pictures are of deep space, and the tiny specks are actually entire galaxies.

TASKS PART 2

1. Draw four types of galaxies. Give the example/name of each type. (max 20p.)
2. What does it mean: 'one light-year'? (max 5p.)
3. In which part of the Milky Way we can find the oldest stars? (max5p.)
4. List the names of ten constellations. Draw the scheme of your favourite one. (max 10p. + 5p. = 15p.)
5. Write 5 sentences about the Hubble Space Telescope. (max 5p.)

DEADLINE – 7th March 2014

Vocabulary

accurate – dokładny

billion – miliard

blur – mglisty zarys

bulge – wybrzuszenie, nierówność

constellation – konstelacja

contain – zawierać

distant – odległy

edge – krawędź, skraj

empty – pusty

entire – cały, całkowity

focus – skupiać

galaxy – galaktyka

light – year – rok świetlny

lurk – czaić się

magnifying glass – szkło powiększające

pattern – wzór

smudge – smuga

space – przestrzeń (kosmiczna)

span – rozciągać się

spin – obracać się wokół własnej osi

tiny – maleńki

tuning in – dostrajać się

various – różnorodny

wave – fala

wooden – drewniany