



We Know Where You Live - Teacher's Notes

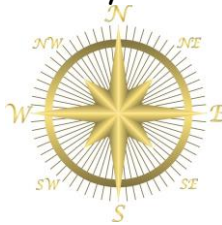
Aliens, they know where you live, or do they?

Many students, but not all, will have written their Universal address inside a diary, notebook or school bag.

Name	John Smith
Room	G22
School	XXX Primary School
Suburb or Town	Melville
State	Western Australia
Country	Australia
Hemisphere	Southern Hemisphere
Planet	Earth (third planet from the Sun)
Star System	Solar System
Galaxy	Milky
Location in galaxy	Western spiral arm



Most of the information contained in your Universal address could only be understood by someone who spoke your language and was familiar with Earth and its conventions. This information doesn't describe you, only where you were located at a specific period of time.



Once you have left Earth can you still use terms such as "North or South" for directions? Can we use the points of the compass and a compass itself to find our way on other planets or the Sun? **North and south on Earth are only determined by Earth's magnetic field or the plane of its rotational axis. Magnetic field lines run out from the South Magnetic Pole and return through the North Magnetic Pole. The magnetic poles are not the same as the geographic poles. Both Venus and Mars do not have magnetic fields.**





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North/south is determined by the rotation axis of each planet. Most planets in our Solar System have axes that are nearly parallel to Earth's. An exception is Uranus whose magnetic axis is tipped over 60° to its rotation axis.

The Sun' also rotates on its axis. Its magnetic poles flip regularly, about every eleven years.

How can astronauts accurately plot their location and trajectory in space beyond the Solar System?

Astronauts use the stars to find out where they are and to where they are moving.

The Galaxy itself rotates on an axis; if you're in deep interstellar space, you might use that as a frame of reference.



So far no astronauts have gone far enough out into space to need to find their location by using known stars. However unmanned spacecraft such as Voyager1 & 2 have travelled close to other planets using star locations

How could we communicate with another form of Life?

In 1974, the American astronomer Carl Sagan and others beamed a radio message from Arecibo in Puerto Rica to a star cluster 25,000 light years away.

1 light year = 63239.7Au or 9,461,000,000,000km.

Radio waves travel at the speed of light

At this time there were no personal computers, microwave cookers, mobile phones and Wi-Fi.



Santos & ESWA supporting earth science education



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The pictorial "Arecibo" message included:

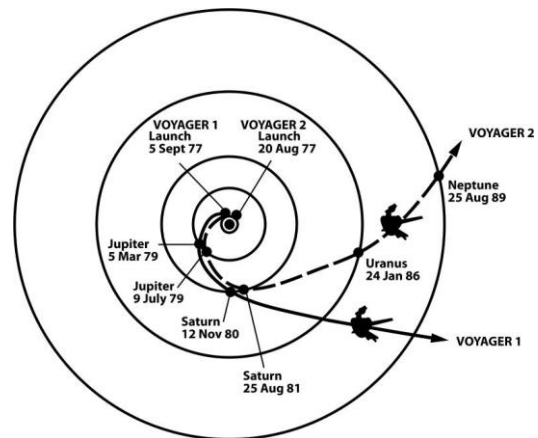
- Our position in our solar system.
- Basic principles we use in mathematics and in science.
- A picture of NASA's radio antenna.
- Pictures of human body shapes and a structure of our DNA.

How might life on the Star cluster know where the message came from?

1. They could follow the radio signal back to its source.
2. They might recognise the pattern of star and planets from their own discoveries.

Why do you think the message was described as a time capsule from Earth?
The message would take 25,000 light years to reach the star cluster, which is a very long distance from Earth. Radio waves travel at the speed of light in space. By the time it arrived the information would have been already 25,000 years old.

Space probes Voyager 1 & 2 were launched in 1977 and had gold plated phonogram records (similar to early vinyl phonogram records) which contained sounds, music and images of not only humans but of other species and of Earth's geography. These are still travelling outwards.



Since the search for exo-planets (planets in other solar systems) began, we now know that there are many exo-planets, some of which may be hospitable to life. In early 2017, NASA announced that its Spitzer Telescope had discovered a sun they called Trappist-1, which is orbited by seven planets. It lies about 39.5 light years away in the constellation of





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Aquarius in our own Milky Way Galaxy. Three of its rocky planets are in Earth-like orbits. We may not be alone!

Form groups of two or three. Take five minutes to write down your opinion on the following question.

What would be the advantages and disadvantages of alerting an alien planet to life on Earth.

Advantages	Disadvantages
They may teach us many things which are useful things We may be able to forge political alliances We may be able to trade with them.	They might destroy our planet They might eat us They might carry diseases we have no knowledge about

More information on exo-planets can be found at <https://exoplanets.nasa.gov>

