



GCSE

4781/03

SCIENCE B

UNIT 1: Space, Energy and Life

**Pre-Release for use in the following
examinations in January 2014:**

GCSE Science B Foundation Tier (4781/01)

GCSE Science B Higher Tier (4781/02)

Information for Teachers

The pre-release sets the scene for the questions in **Section B** of the foundation tier and **Section A** of the higher tier. Questions will be based around pre-release and related specification content. There will be an emphasis on data handling/analysis in this section. The questions on the pre-release will be common between the two tiers. These questions will be worth 24 marks.

No recall or terminology is required over and above that in the specification. Students will be expected to have discussed and studied the article together with relevant specification content prior to the examination. However, they will not be expected to memorise any part of it as a copy will be provided in the examination paper.

The following article is based upon information found at <http://www.bobthealien.co.uk>

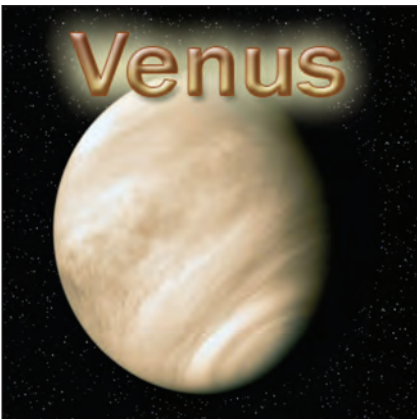
The Solar System

It is believed that the Solar System formed from a huge cloud of swirling gas and small rocky particles. Most of the cloud was attracted to the centre to form the Sun, whereas smaller amounts formed the gas giants and even smaller amounts formed the inner planets.

The Sun is a huge ball of gas which provides energy to its planets. It contains 99% of all of the matter in the Solar System and, at 4.5 billion years old, is about half way through its life. Without the Sun, life on Earth simply wouldn't exist. The Sun is just one of billions of stars in the Milky Way galaxy and is the closest star to Earth. Between the orbits of Mars and Jupiter is an area called the Asteroid Belt. Occasionally asteroids collide with each other, and may, one day, in millions of years, all join together to form another Earth-sized planet. The Solar System is constantly developing, and the Asteroid Belt may be a planet still in production.



Mercury has a rocky surface covered in craters, just like Earth's Moon, and has temperatures which can reach up to 350 °C on its sunlit side and -170 °C on its dark side. Mercury has no atmosphere, so the sky appears dark all the time.



Venus is the only inner planet in the Solar System to turn in a clockwise direction on its axis. Venus is covered in poisonous clouds containing sulphuric acid, and an atmosphere containing mainly carbon dioxide. Venus' surface remained a mystery because of its thick cloud cover until 1990-1994 when radar imaging equipment on the Magellan space craft managed to look through the clouds to reveal a rocky and volcanic surface.



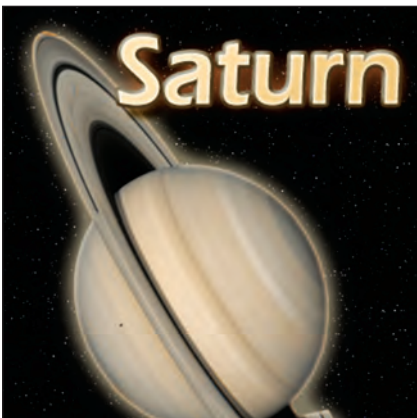
Earth is the only planet in the Solar System known to contain life. Earth is the only planet to contain water in its three forms, as a solid (ice), as a liquid (sea, rain, etc.) and as a gas (steam, clouds, atmosphere). It has a rocky surface.



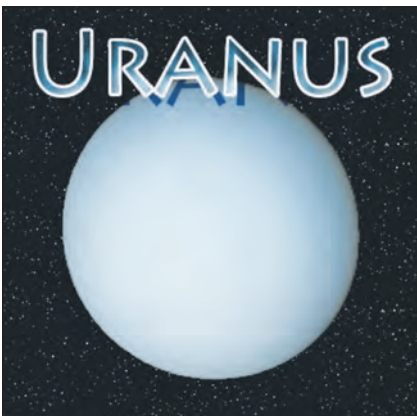
Mars is a small red, rocky planet with a very thin atmosphere of carbon dioxide. It is believed that it once had flowing water on its surface. The planet has a rusty surface and a pink sky. It is covered in rocks and impact craters.



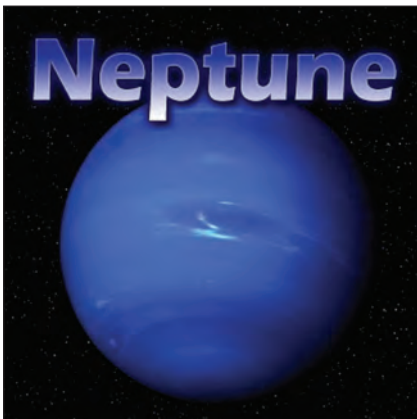
Jupiter is the biggest planet in the Solar System. The planet is a gas giant, made up mainly of hydrogen and helium. Its main feature is a Great Red Spot, which is a storm that has been going on for hundreds of years. It has a faint ring system around it.



Like Jupiter, Saturn is also made up mainly of hydrogen and helium. Saturn's most famous feature is its great rings. These are rings of small dust, rock and ice particles, probably what remains of a shattered moon which once orbited Saturn.



Uranus, a gas giant, has an atmosphere of hydrogen, helium and methane. The methane gives the planet a pale blue colour. The planet is tipped on its side, possibly from a collision with an object the size of Earth. It is so cold that some of the gas is frozen. Uranus has rings of ice and small rock particles. However, these rings are too faint to be seen from Earth.



Often considered to be a twin planet of Uranus, Neptune is a similar size and has similar composition. The winds on the planet are the strongest in the Solar System, with areas of high pressure shown by dark spots. Clouds of icy droplets of methane can also be seen in the upper atmosphere of Neptune. It also has a very faint ring system.



Comets are often described as dirty snowballs. Comets orbit the Sun in elliptical orbits, travelling from a great distance to become very close to the Sun. They spin around the Sun and are then flung back outwards. Some comets take thousands of years to orbit the Sun, some take a few years and some are thrown out of the Solar System for good after they spin around the Sun!

Table 1

Planet	Mean distance from Sun (AU)	Diameter (Mm or 10^6 m)	Length of day i.e. time to spin once on axis (Earth days)	Length of year i.e. time to orbit Sun (Earth years)	Mean temperature ($^{\circ}$ C)	Content of atmosphere	Known moons
Mercury	0.4	5	59	0.2	427	None	0
Venus	0.7	12	243	0.6	480	carbon dioxide (96%), nitrogen (3.5%)	0
Earth	1.0	13	1	1	14	nitrogen (77%), oxygen (21%)	1
Mars	1.5	7	1	2	-63	carbon dioxide (95.3%), argon	2
Jupiter	5.2	143	0.4	12	-130	hydrogen, helium	63
Saturn	9.5	120	0.4	29	-130	hydrogen, helium	61
Uranus	19.2	51	0.7	84	-200	hydrogen, helium, methane	27
Neptune	30.0	50	0.7	165	-200	hydrogen, helium, methane	13

Acknowledgements:

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SCIENCE B

UNIT 1: Space, Energy and Life

P.M. THURSDAY, 16 January 2014

Resource Folder (Pre-Release Article)

For use with:

GCSE Science B (UNIT 1) **SECTION B** of the Foundation Tier

GCSE Science B (UNIT 1) **SECTION A** of the Higher Tier

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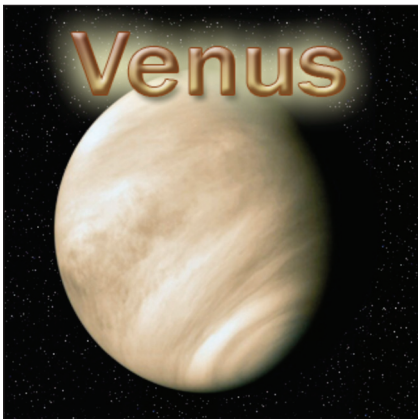
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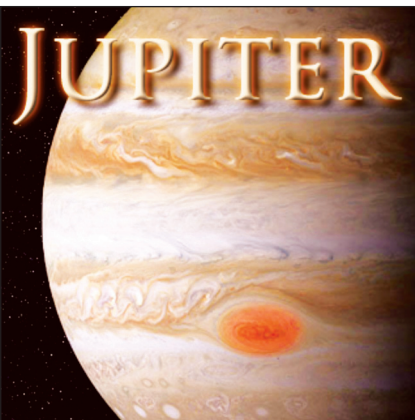
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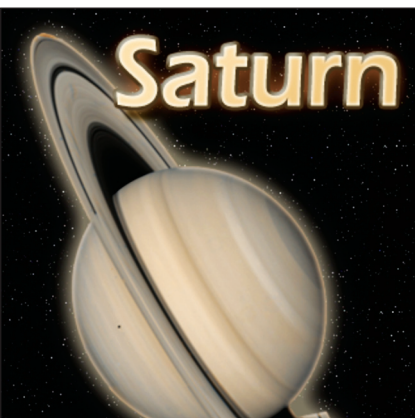
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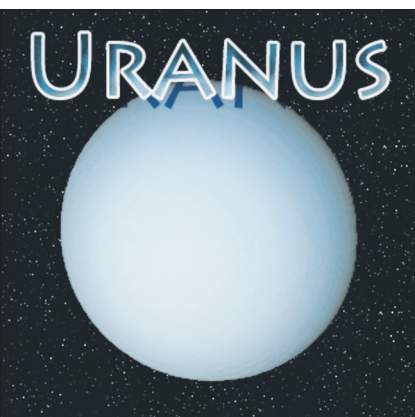
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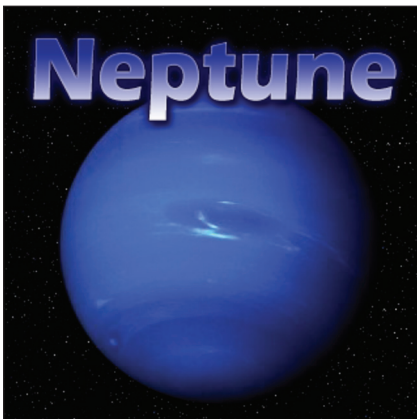
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