

# SPACE

Internet  
Inquiry

10+ years

- Internet activities designed to utilise an inquiry process of learning.



By Jane Bourke

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## Teachers' Notes:

# Learning About Space

The development of the Internet has brought outer space right into our reach. You can virtually travel to any corner of the universe and get a bird's eye view of what goes on, all at the click of a mouse. You can see what Earth looks like from space and find out exactly what it's like to be an astronaut. You can almost touch the red dirt on Mars!

With all of this information at their fingertips, students are ready to blast off with the activities and webquests in this book and develop their skills of inquiry in the process.

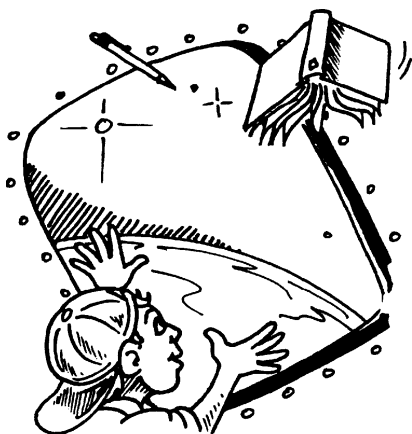
Astronomy is one of the most exciting sciences. Major advances in technology have allowed scientists to make accurate observations. Telescopes have been set up as orbiting observatories, while space programs such as the Global Surveyor mission to Mars, and the Hubble Space Telescope have provided a wealth of information.

Every day there is a new discovery made in space. It may be that a new star in a distant galaxy is found, or it may be that a planet is found to have fossilised remains of early life. All of these discoveries are significant and they allow scientists and researchers to make sense of our planet, our solar system and our universe.

Space and astronomy have always been exciting topics to work with in the classroom. With advances in technology, the study of astronomy has become more popular than ever and with events such as Halley's comet, the close encounter with Mars and the space shuttle tragedies, the topic is current and often in the news.

The content of this learning package focuses on the astronomy and physical aspect of our universe. Many of the activities involve research into areas such as:

- o The need to learn about space;
- o Hubble Space Telescope research;
- o The components of the universe;
- o The features of the solar system;
- o The phases of the moon;
- o The role and features of our sun;
- o Life cycles and features of stars;
- o Comets, asteroids and celestial bodies;
- o The search for extra-terrestrial life;
- o Space discovery and human missions;
- o Humans in space;
- o Space station features;
- o Sky wonders;
- o Discoveries and their implications for humans.



## Teachers' Notes

# The Inquiry Learning Process

This book is designed to facilitate the inquiry learning process, creating a platform for students to learn how to learn. The structure of the book is based on the premise that students will complete the activities in the order in which they are presented, starting with introductory fact-finding exercises and leading on to higher order processes and independent research.

### Each section will include:

#### Background Notes

Background information to act as an introduction on the topic for students.

#### ☒☒☒ Focusing Activity Gathering Information

Students will use these activities to navigate their way around the website and become familiar with available information sources.

#### ◆◆◆ Expanding Activity Using Information

These activities will allow students to clarify and refine their information sources and determine which materials will be relevant to the task, allowing them to explore the content in greater depth. Tasks will be more open-ended than the focusing activities. Students will need to be discerning in their use of information.

#### ○○○ Inquiry Activity Creating and Evaluating

At this stage students will be familiar with information sources for the theme. Students will be encouraged to combine their content understandings with the expansive array of information available on the Web, with the aim of making related investigations and reports following inquiry process. Extra inquiry activities are included at the end of the book with many of the activities containing multiple choices for "webquest" tasks.

#### ☐ Information Literacy

Students should be encouraged to follow the steps of the information literacy process. There are plenty of websites (e.g. ▶ [www.big6.com](http://www.big6.com)) that contain additional material about the steps involved in this process. A chart has been included on Page 7 and this can be photocopied and distributed to students as they prepare to undertake the inquiry tasks in this book.

#### ☐ Internet Use

Activities in all sections are designed to have students utilising websites that have been carefully selected for each task. It should be emphasised that the World Wide Web is merely a source of information, along with print resources such as an encyclopaedia and CD-ROM.

#### ☐ Evaluation

Evaluation and assessment complete the process for any learning experience. It is often difficult to assess creativity and inquiry learning skills as many students need the right outlet for their learning. These are only a sample of the questions that need to be addressed at the evaluation stage:

- ★ *Did the student communicate effectively in written form?*
- ★ *Did the student communicate effectively in oral presentations?*
- ★ *Did the student demonstrate proficiency in appropriate technologies?*
- ★ *Did the student reflect on his/her performance?*

#### ☐ Assessment Sheets

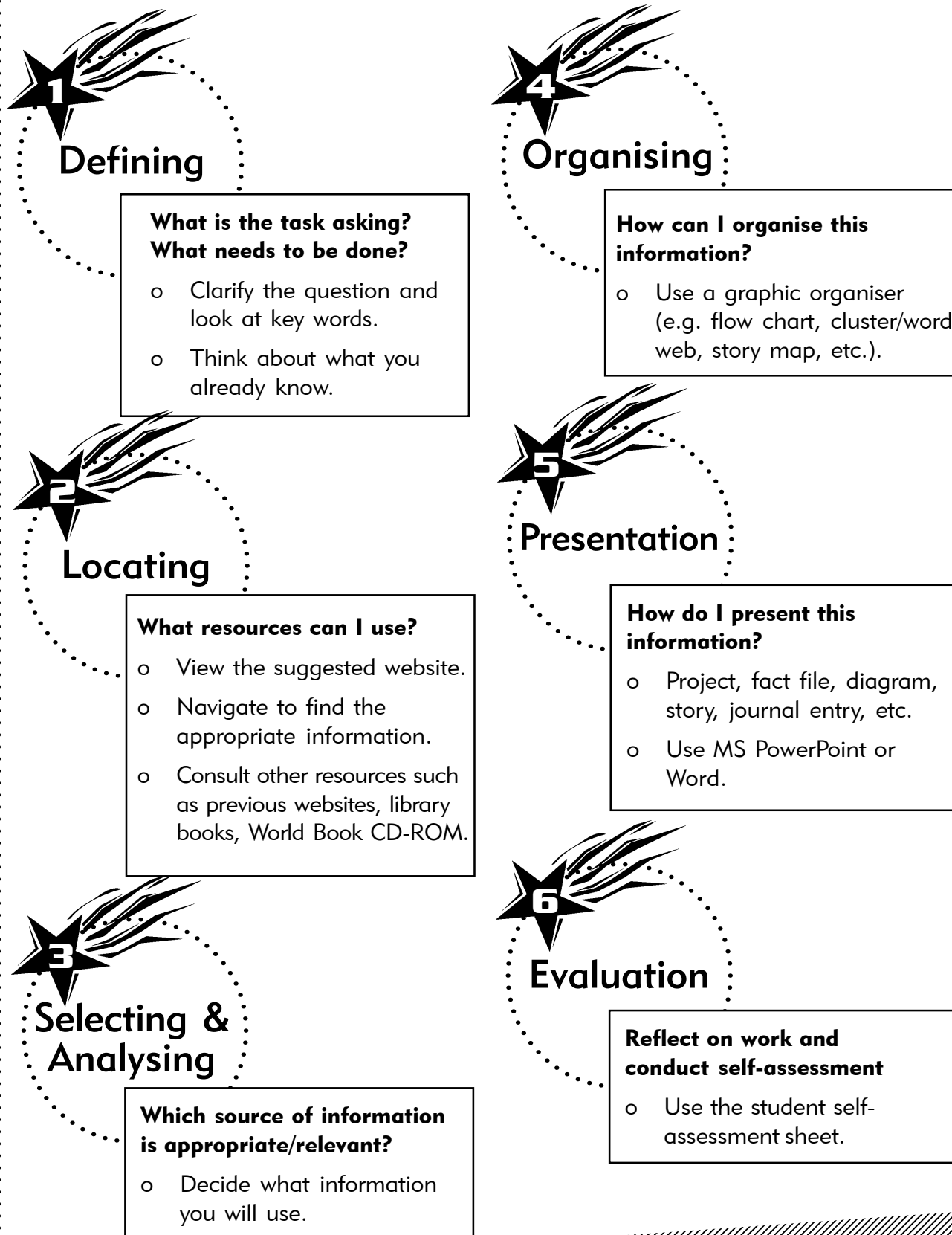
Pages 10-12 contain assessment forms to be used at the teacher's discretion. The forms have been tailored to particular activities and have been categorised as follows:

- Written Information
- Inquiry Skills
- Student Self-Assessment

The students should be encouraged to complete a self-assessment form as they complete each activity (*i.e. set them up in a box as part of the learning centre*). Teachers can then use these forms to help them assess the students' understanding of the inquiry learning process.

## Six steps

The activities in this book use an information problem-solving approach. This process incorporates technology skills across the subject areas of science and SOSE / HSIE / Society and Environment.



# The Universe

## background notes

The universe includes everything; all the matter, light, energy, space and time that exists. It includes our solar system and the galaxy in which it is contained. The solar system is only a small part of the universe. There are probably other solar systems just like ours with planets that revolve around a sun. The stars we see in the night sky are distant suns from other galaxies inside the universe.

No-one knows for sure exactly how big the universe is. Scientists have been able to see objects that are at least 12 billion light years from Earth.

For thousands of years, people thought that the solar system and the universe were the same thing. They thought that stars were just tiny glowing space bodies. It was not until the time of Nicolas Copernicus' theories that people understood that the tiny stars were probably as large as our sun but just millions of light years away. The sun is just a typical star.

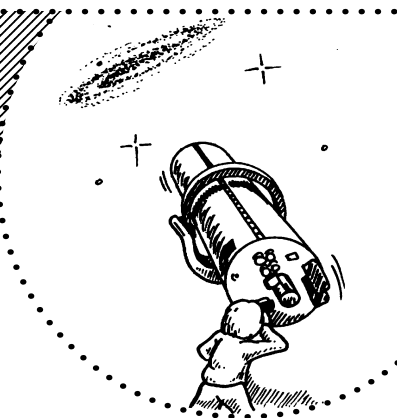
## How did the Universe Begin?

No-one is certain how the universe came to be, however, several astronomers and scientists have devoted their whole lives to finding out. New technology, such as improved telescopes and spectroscopes, has led to amazing and significant discoveries about the universe.

### □ The Big Bang Theory

This popular theory attempts to explain the beginnings of the universe. According to the theory, a huge explosion occurred at least ten billion years ago which sent matter flying in all directions. This theory was first put forward in 1927 by Belgian priest, Georges Lemaître. Then in 1929, American astronomer, Edwin Hubble found evidence to support the idea through his study of the movement of the galaxies. The Hubble Space Telescope is named after this great astronomer.

The Big Bang theory also attempts to explain why distant galaxies are travelling away from our solar system.



## Star Astronomers

We owe much of what we know about space, the solar system and the universe to the many great thinkers of our time. Their combined theories have enabled modern scientists to make sense of the world and how it came to be.

### □ Galileo Galilei

(1564 -1642) Became convinced that all the planets revolved around the sun and not Earth. In 1609 Galileo built a telescope and was the first to use such an instrument to study the sky.

#### Significant findings included:

- The moon was not smooth – instead it was rocky and contained craters;
- The planets revolved around the sun;
- Venus progressed through different phases, much like the moon;
- The sun contained sunspots;
- That objects fall at the same speed regardless of their weight.

### □ Sir Isaac Newton

(1642 -1727) Newton proposed that the universe was held together by gravity and put forward his theory of gravitation. In 1665, he suggested that every pair of bodies in the universe is attracted to each other, which explains why the moon orbits Earth and Earth orbits the sun. For twenty years Newton's ideas about gravity went unnoticed.

In 1704, Newton discovered that sunlight is a mixture of all colours. This discovery led to Newton inventing a different type of telescope which contained reflecting mirrors instead of lenses.

# What Do We Know About Deep Space?

**Go to:**

► [www.readyed.com.au/urls/inquiry/space.htm](http://www.readyed.com.au/urls/inquiry/space.htm)

and click on the website for *Page 17*.

**Site 1:**

Check out the slideshow at the website to get an idea of just how huge space is.

**Site 2:**

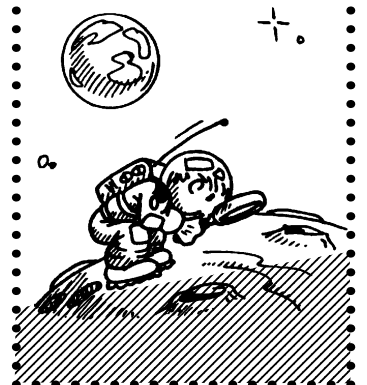
Now blast off to Site 2, click on the links and learn about the things that exist in our universe. Use your super sleuth skills to find answers to the following.

Choose your answers from the space words in the box.

- The study of planets, stars, galaxies, and intergalactic and interstellar space is known as \_\_\_\_\_.
- \_\_\_\_\_ allow us to see objects far away in the night sky. We can use them to study stars and galaxies, as well as many of the more mysterious objects in our universe.
- Astronomers learned that Earth's motion is responsible for the \_\_\_\_\_.
- By studying eclipses and the motions of the planets, astronomers eventually worked out that \_\_\_\_\_ controls the way things move in space.
- \_\_\_\_\_ are formed of bright stars which appear close to each other on the sky, but are really far apart in space.
- There are nine \_\_\_\_\_ in the solar system, including Pluto, a dwarf planet.
- Earth \_\_\_\_\_ around the sun.
- The sun is an average-sized \_\_\_\_\_.
- The solar system is part of the \_\_\_\_\_ galaxy.
- The Milky Way is a \_\_\_\_\_ galaxy and is home to billions of other stars.
- Our sun takes 200 \_\_\_\_\_ years to travel around the centre of this galaxy.
- Massive stars end their life in a huge explosion called a \_\_\_\_\_.
- A black hole is an object which has such high gravitational pull that not even \_\_\_\_\_ can escape.

## Space Words

- astronomy
- constellations
- galaxy
- gravity
- light
- Milky Way
- million
- orbits
- planets
- seasons
- spiral
- star
- supernova
- telescopes



# All About the Hubble

◆◆◆ Expanding Activity

**Go to:** ▶ [www.readyed.com.au/urls/inquiry/space.htm](http://www.readyed.com.au/urls/inquiry/space.htm)  
and click on the website for *Page 18*.

In the 1600s Isaac Newton built the first light-reflecting telescope and through the lens he made some amazing discoveries. The Hubble Space Telescope works on the same principles used in Newton's original telescope and has provided us with all kinds of knowledge about the universe, including the Milky Way galaxy and the solar system.

## Site 1:

Click on Site 1 and use the information at the links to help you complete the Fact File on this page about the Hubble Space Telescope.

Draw a detailed labelled diagram of the Hubble in the box to complete your report.



## ☐ The Hubble as a Spacecraft

Apart from taking amazing images of the universe the telescope needs to operate in space. Make notes for each heading below to show how it does this.

### Power Supply

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### Communications Equipment

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### Control System

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## ☐ Vital Statistics

Height: 

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Weight: 

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Size of solar arrays: 

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Size of primary mirror: 

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## Hubble's Orbit

How high above Earth is the Hubble telescope located?

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How long does it take to orbit Earth?

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