

In ancient times, various beliefs and legends emerged to explain the Earth and the sky. The ancient Chinese believed the universe began as a giant cosmic egg. Other Asian cultures believed that the Earth was carried on the back of a giant tortoise. Over time, scientists and astronomers made small but significant discoveries about the universe and began to dispel beliefs such as that the Earth is flat and that comets signify disaster.

## FAMOUS ASTRONOMERS

A study of famous astronomers will enable students to grasp the timeline of space astronomy and inspire them with a passion for discovery.

### Activity

On the reverse side of this poster is a timeline of famous astronomers through history. Allocate an astronomer to each student in the class to research in depth and present an information report to the class. Students should use library resources, museums if available, and the internet for their research.

For your reference, below is a summary of the astronomers and their discoveries. Download the *Famous Astronomers Research Report* blackline master from the Teacher Toolkit for students to complete as they research their allocated astronomers.

## A TIMELINE OF DISCOVERY

**Pythagoras (580–500 BCE)**—The first to create a star calendar.

**Aristotle (384–322 BCE)**—Believed the Earth was the centre of the universe and discovered the Earth was composed of earth, air, water and fire.

**Aristarchus (310–230 BCE)**—Disputed Aristotle's theory and claimed the Earth spins around while it orbits the Sun.

**Eratosthenes (276–194 BCE)**—The first person who attempted to map the Earth's circumference.

**Ptolemy (83–161)**—Developed a mathematical model of the motions of the solar system.

**Nicholas Copernicus (1473–1543)**—The first to find that the Sun is the centre of the universe and the Earth completes one revolution around it in a year.

**Tycho Brahe (1546–1601)**—Made accurate measurements of the solar system and over 700 other stars with his own inventions.

**Galileo (1564–1642)**—The first astronomer to build and use a telescope.

**Johannes Kepler (1571–1630)**—Proposed three mathematical rules for the orbit of the planets.

**Isaac Newton (1642–1727)**—The first to discover that gravity causes the motion of the planets and the Moon.

**Albert Einstein (1879–1955)**—Developed the Theory of Relativity and calculated the speed of light.

**Edwin Hubble (1889–1953)**—Discovered the existence of other galaxies. The Hubble Space Telescope was named after him.

**Brian Schmidt (1967–present)**—An Australian who was named joint winner of the 2011 Nobel Prize for Physics for his research into supernovae.

## THE SKA PROJECT

The universe is big! We currently can only see a tiny fraction of what is out there. Joint bidding nations, Australia and New Zealand, have been short-listed with South Africa to host the world's latest space technology project, the Square Kilometre Array (SKA) Project. The SKA Project will be the world's biggest radio telescope, consisting of over 3000 satellite dishes with a collection area of one square kilometre. Antennae will be linked electronically to form one enormous telescope. The Australian site, if our bid is successful, will be in the mid-west of Western Australia, one of the few ideal places in the world with the least amount of radio interference and the highest degree of observational clarity.

The announcement of the winning bid for this project will be made this year with the SKA site to be built by 2020. SKA will answer some of the biggest questions we have about the universe. How do stars and galaxies form? Is ours the only solar system with life? If Australia and New Zealand's bid is the winning one, we will need highly trained and skilled astronomers, engineers and scientists.

### Activity

Ask students to find out more about the SKA Project at [www.ska.edu.au](http://www.ska.edu.au), [www.ska.gov.au](http://www.ska.gov.au) and [www.skatelescope.org](http://www.skatelescope.org)

## TELESCOPES

About 400 years ago, Galileo discovered that glass lenses in a tube could be used to make a telescope. This could be used to collect light and give a magnified image of a distant object, such as the Moon. After Galileo first turned his small homemade refractor telescope towards the sky and began to see the Moon and the Milky Way, Isaac Newton, in 1668, invented a telescope that used a mirror shaped like a shallow bowl to collect and focus light. These telescopes, known as reflectors, paved the way for giant reflector telescopes built with bigger and better lenses which provide clearer images, such as the William Herschel Telescope that sits on top of a mountain in the Canary Islands.

Since 1931, when a backyard radio telescope was invented by Karl G Jansky and found to pick up static, radio telescopes have been built to collect radio waves from objects in space, in the same way that a satellite dish on your house collects television signals. A radio telescope converts these signals into images.

### Activity

Students may wish to build a simple telescope, such as the one Galileo used, to learn more about how light and lenses work. Download the *Build a Simple Telescope* blackline master from the Teacher Toolkit.

Please note: It is important to stress to students that telescopes of any kind should not be used to view the Sun or the sky in the daytime.

## HOW A REFRACTOR TELESCOPE WORKS

The lenses at each end work together to focus on a distant object and magnify it so that your eye can see it better. The lens on the outside tube is called the objective lens. This lens collects light from whatever you point the telescope at. The lens at the other end of the telescope is called the eyepiece lens. It takes the light that the objective lens has collected and makes it bigger so that when you see the image your telescope is focused on, you see it several times larger than you can see with your eye alone.

### Activity

Ask students to research a telescope used for space research. They may choose the Hubble Space Telescope, the Kepler Space Telescope, the James Webb Space Telescope (to be launched in 2018), the Parkes Radio Telescope, the Australia Telescope Compact Array near Narrabri, MOPRA near Coonabarabran, or other land-based telescopes. Students should begin their internet research at the student pages of [www.nasa.gov](http://www.nasa.gov) and [www.csiro.au](http://www.csiro.au)

Download the *Telescope Information Report* blackline master from the Teacher Toolkit for students to complete. As well as describing the purpose of their telescope, students should explain how their telescope works and attach a detailed drawing or a model of it made out of household materials.

Download the *Parkes Radio Telescope Cloze* blackline master for students to complete.

Download the *Map of Australia* blackline master from the Teacher Toolkit and ask students to mark up the sites of Australia's current and planned space-research stations.

## ASTRONOMY IN THE FUTURE

Astronomers around the world have big plans for big telescopes, both on Earth and in space in the years ahead.

### Activity

Focus on one big plan, such as the Square Kilometre Array (SKA) Project, and ask students to brainstorm the areas of research being undertaken by a project such as this, under the following headings:

- What astronomers KNOW
- What astronomers WANT to know
- HOW astronomers plan to find this out.

## GLOSSARY OF TERMS

### Activity

For a quick revision of a unit of work on space, download the *Space Words Matching Game* blackline master from the Teacher Toolkit.

# FAMOUS ASTRONOMERS

## Resources available in the 2012 School Essentials catalogue

- *Australian Curriculum Science*, page 151
- *Complete Super Science Activities*, page 157
- *Discover Science Readers Pack*, page 159
- *Earth & Space Science Variety Pack*, page 172
- *Our Solar System: Bulletin Board*, page 172
- *Planet Quest Game*, page 172
- *Inflatable Solar System Set*, page 173
- *Earth & Space Voyage Complete Set*, page 173
- *Voyage to the Planets 2-DVD Set*, page 174
- *Giant Magnetic Solar System*, page 175

## FREE Teacher Toolkit Resources available at

[www.scholastic.co.nz/schools/bookclub](http://www.scholastic.co.nz/schools/bookclub)

- *Famous Astronomers Research Report* blackline master
- *Build a Simple Telescope* blackline master
- *Telescope Information Report* blackline master
- *Parkes Radio Telescope Cloze* blackline master
- *Map of Australia* blackline master
- *Space Words Matching Game* blackline master



 SCHOLASTIC

In partnership with New Zealand schools for 50 years.