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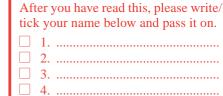
Secondary students can do either Junior Science, Physics, Senior Science, Biology, Design & Technology, Peer Support or Business Studies. Primary students can do Science & Technology, Mathematics, and/or English.

Luna Park Sydney is also a great venue to have a special reward day for your students, or to have your school's foundation day celebrations, or simply to have just a fun day out of school, especially for those end-of-year celebrations.

Let your school Principal know that any faculty can book a Fun Park Excursion through Physics is Fun and save \$\$\$.

Bookings can be made on either one of the special education days, or on another school day by special arrangement.

Plan your visit now! It can be just a fun day at the end of the year, or an educational excursion.



☐ 5.

☐ 6.

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See pages 1, 3, & 12

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the Australian Society for Medical Research

Careers Seminar for Secondary Students in Years 10–12 *Medical research – is it the career for me?*

Thursday 10 June 2004, 10 am–12 noon Coles Lecture Theatre, The Powerhouse Museum, Ultimo in ASMR Medical Research Week (7–11 June 2004)

For information, contact Dr Sheridan Henness by email: S.Henness@pharm.usyd/edu/au or ph: (02) 9351 4698

INSIDE SCITALK >>> Science Teachers' Workshop: Uni of Syd ... 5 Photospot: Skeleton from the Ocean Depths ... 6 • FUN PARK EXCURSION at Luna Park 1, 7 How to Achieve Success in the HSC 6 Diary Dates / BOS Update 2 Senior Science Luna Park Excursion 1, 7 Out and About3 • Evaluating Science 9 • IEE Faraday Lectures 4 BHP Science Awards 9 Michael Faraday – a great experimentalist.. 5 • Science Tests for the School Certificate ... 4, 6 Transit of Venus; Emu in the Sky 10/11 PAST HSC Questions & Answers 4, 6 Competition Corner 12

Diaky Dates

2004

	200
JUNE	
2, 4	Physics is Fun at Luna Park Sydney. Enquiries: ph (02) 9939 6107, fax (02) 9939 6105
4	Program for students/teachers at Sydney Observatory: The Transit of Venus –
•	its meaning to Australia. 5–8 pm. Details: (02) 9217 0485. Details on page 10.
5	World Environment Day. Details: www.unep.org/wed/
5–20 Dec	Exhibition at Sydney Observatory: Transit of Venus: the scientific event that led
	Captain Cook to Australia. Details on page 10.
6	Sydney Observatory: A discussion 'Science meets history: the Transit of Venus', 4 pm.
8	Transit of Venus. Viewings at Wollongong Science Centre, and at Sydney Observatory.
17–18	Science Teachers' Workshop on HSC Physics Syllabus: Syd Uni. Details on page 5.
18 / 19	Schools Titration Competition 2004. Alasdair Hey, email: ajhey@nswtitration.com
21	Winter solstice
JULY	
2	Closing date Eureka Prize School entries (for Earth, Environmental and Planetary
	Sciences, and for Biological Sciences). Enquiries: www.amonline.net.au/eureka
2	Closing date BHP Billiton Science Awards. See page 4 of this <i>SciTalk</i> for details.
18-24	National Chemistry Week. Details: www.raci.org.au/national/events/chemistryweek.html
22	National Chemistry Quiz. Details: Charles Fogliani, (02) 6338 4758, email: cfogliani@csu.edu.au
23	HSC Biology Teachers Professional Development Program. See page 12 for details.
30	Closing date Olympiad National Qualifying Exams. Details: www.rtaso.org.au/
AUGUST	
3–5	Science in the City – for secondary schools. Ph (02) 9320 6389, www.scienceinthecity.net
6	Jeans for Genes Day: To raise money for Children's Medical Research Institute's
	work into the causes of childhood genetic diseases. 1800 677 260, www.jeans4genes.com.au
10–12	Science in the City – for primary schools. Ph (02) 9320 6389, www.scienceinthecity.net
14	Great Australian Marsupial Night Stalk. http://www.perthzoo.wa.gov.au/nightstalk/default.htm
14–22	National Science Week 2004. Enquiries: http://scienceweek.info.au/
16, 20	Physics is Fun at Luna Park Sydney. Enquiries: ph (02) 9939 6107, fax (02) 9939 6105
18, 19, 20	Australian Science Festival – school events. Canberra. Ph: (02) 6205 0588, www.asflimited.com.au
25	Physics Olympiad National Qualifying Exam. Closing date: 30 July. (02) 6125 9645
SEPTEMBER	
1	Biology Olympiad National Qualifying Exam. Closing date: 30 July. (02) 6125 9645
5	National Threatened Species Day. www.deh.gov.au/biodiversity/threatened/information/

26–30

14, 17, 20

OCTOBER
 18 Oct–13 Nov Shell Questacon Science Circus Tour – Hay, Deniliquin, Mildura, Wilcannia, Broken Hill, Swan Hill, Echuca/Moama. \$4/student (GST free). Details/bookings: www.questacon.edu.au HSC examinations commence. Details of science HSC exams below.
 20 Chemistry Olympiad National Qualifying Exam. Closing date: 30 July. (02) 6125 9645
 22, 25, 26, 27 Physics is Fun at Luna Park Sydney. Enquiries: ph (02) 9939 6107, fax (02) 9939 6105
 23 Astronomy Open Night & Lecture. (02) 9850 7111. http://www.physics.mq.edu.au/astronomy/cal.html

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CONASTA 53: ACT. Ph (02) 6281 6624, fax (02) 6285 1336, www.conlog.com.au/CONASTA53/

NOVEMBER

 1, 2, 3,
 Physics is Fun at Luna Park Sydney. Enquiries: ph/fax (02) 9939 6107

 8–9
 School Certificate Tests. 8/11: English / Science. 9/11: Maths / AH,G,C&C

 15, 16, 19, 23
 Physics is Fun at Luna Park Sydney. Enquiries: ph (02) 9939 6107, fax (02) 9939 6105

 24, 26, 30
 Physics is Fun at Luna Park Sydney. Enquiries: ph (02) 9939 6107, fax (02) 9939 6105

DECEMBER

•

1, 2, 3, 6, 7
 Physics is Fun at Luna Park Sydney. Enquiries: ph (02) 9939 6107, fax (02) 9939 6105
 Ocean Care Day

17 HSC results released

JANUARY 2004 National Youth Science Forum. Forms to local Rotary club by 15/5/04, interviews in July. For Year 11 students in 2004 only. Enquiries: (02) 6125 2777, fax (02) 6125 8015, email: nsss@anu.au, www.nysf.edu.au/

While all dates have been checked to ensure that information in DIARY DATES is correct, no responsibility will be accepted by the publisher or Editor for any omissions or inaccuracies in it.

★ The Ultimate Survival Kit for Yr 10 ★

- Success in School Certificate English
 - by B & S Pattinson (\$10.95)
- New School Certificate Mathematics (2nd ed) ... by Sami El Hosri (\$35.95)
 - Science Tests for the School Certificate
 ... by Catherine Odlum et al (\$32.95)
- Success in School Certificate Australian History, Geography, Civics & Citizenship

... by B & S Pattinson (\$14.95)

* \div * \div *

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2004 HSC Science Examination Dates

22 Oct Chemistry: 9.25 am–12.30 pm **27 Oct** Senior Science: 1.55 pm–5 pm

29 Oct Earth & Environmental

Science: 1.55 pm–5 pm Biology: 9.25 am–12.30 pm

1 Nov Biology: 9.25 am–12.30 pm **3 Nov** Physics: 9.25 am–12.30 pm



Update on BOS matters

Amendments to Outcomes & Content of Science Years 7–10 Syllabus (BOS 19/04)

A tracked document showing changes to the outcomes and content of the new Science Years 7–10 Syllabus from the current (1998) Science Stage 4–5 Syllabus has been posted on the Board's website during Term 2, 2004.

This document will assist teachers in identifying the essential (core) content of the current (1998) syllabus that has been identified as additional content in the new Science Years 7–10 Syllabus. The tracked document should also assist teachers in making decisions about the level of programming change required to implement the new syllabus.

Implementation of new syllabus is in Years 7 and 9 in 2005 and in Years 7–10 in 2006.

Approved calculators for HSC (BOS 11/04) These are listed on BOS website.

BOS website

Teachers and students should go to the BOS website for the latest information and syllabuses – www.boardofstudies.nsw.edu.au

BOS enquiries

Ph (02) 9367 8111, fax (02) 9367 8484.

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Fun Park Excursions



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 $\star \diamond \star \diamond \star$

These days are a great way to learn SCIENCE and have FUN at the same time (see page 7).

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- Peer Support Business Studies Book your date now by ph (02) 9939 6107 or fax (02) 9939 6105 with Physics is Fun.

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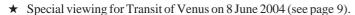
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 www.uow.edu.au/science centre

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WINNER: Tracey Warzecha, Riverside GHS won the IMAX Sydney family pass for *SciTalk No. 1–2004*.





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IEE Faraday Lectures

The Faraday Lectures were founded in 1924 to commemorate the life and work of Michael Faraday whose work laid the foundation for many of today's advances in technology. From his experiments came devices which led directly to the modern electric motor, generator and transformer. Faraday's discoveries are described on the opposite page.

Faraday was also the greatest scientific lecturer of his day, who did much to publicise the great advances of nineteenth-century science and technology through his articles, correspondence and the Friday evening discourses which he established at the Royal Institution in London.

The IEE Faraday Lectures are aimed at 14–16 year-old students. They present cutting edge technology in exciting and interactive presentations. Each lecture has explored a different aspect of electrical engineering, and highlighted the challenges and excitement of a career in this high-technology profession.

Students and teachers in Australia can experience these great lectures by downloading them from the IEE website. To obtain a copy of

the recent lectures from 2000–2004, as well as a range of extras such as Key concepts, Teacher Notes, student information booklets, pre-lesson and/or post-lesson worksheets you will need to go to two different addresses on the IEE website:

- http://www.ieee.org/organizations/eab/ precollege/faraday/index.htm
- http://www.iee.org/Events/Lectrs/Faraday/ PrevLect.cfm
- ★ The 2004 IEE Faraday Lecture: Sound *FX* – *Making Music with Technology* explores the use of technology in music making, both live and when recording. It provides a fly-onthe-wall look at what happens in the recording studio when singers and instrumentalists are recorded, paying particular attention to techniques that are employed to make modern recordings sound particularly effective. In addition, new ways of playing electronic musical instruments will be explained and explored on stage by members of the audience. The importance of making music live will not be lost though, as the lecture ends with an extravagant musical grand finale. It covers things such as: sound waves; electromagnetic induction; mixing desk functions and FX; as well as synthesised sound and FX.
- ★ The 2003 IEE Faraday Lecture: Fighting Crime with Science interactively simulates a police investigation using optics and computers to construct a crime scene and demonstrate the growing role for technology and forensics in creating a safe society. It explores the role of science and technology in the arena of crime detection and prevention. It covers things such as: DNA profiling; polymerase chain reaction; gel electrophoresis; infra-red spectroscopy; and sensing smells.
- ★ The 2002 IEE Faraday Lecture: Smart Living @ home with technology explores technologies which will deliver radical changes to the way we live, both now and in the future. Integrated command, control and communication systems will enable us to exploit technology to make our homes truly interactive environments. It shows how we can control our homes to make them safer and more efficient; provide new services in and to the home: link the home to outside networks; and improve residents' quality of life. It covers things such as: electrical currents; electrical energy; experiments with infra-red remote control; and fingerprint recognition; as well as design problem; load levelling; micro-generation; and remote control codes.
- ★ The 2001 IEE Faraday Lecture: Beyond the Square Window covers a range of new television entertainment and offers an exhilarating explanation of how digital technology is rapidly revolutionizing communications. It covers things such as: bandwidth; analogue and digital images; Morse code; communications; manipulation of images; resolution and coding; transmission time.
- ★ The 2000 IEE Faraday Lecture: *Time* and Place in the Communications Age covers how the ability to measure time with exact precision is taken for granted. Modern electronic technology has given us the ability to not only measure time accurately wherever we are but to measure distance, position, speed, and many other things. It covers things such as: satellites; global positioning satellites (GPS); seeing inside the human body; CD-ROMs; mobile phones; and the internet. Multi-media and 'live' demonstration show how these technologies are extending human capability.

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(See page 6 of this SciTalk for further details)

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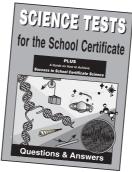
Students who have done the questions and answers in this book claim that their trial Science Test mark improved dramatically and they did better in the real Science Test.

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For more details about this book, or to order it ... see page 6.

SCIENCE EVENTS 2004 AT SYDNEY UNIVERSITY

June: Olympiad Training Begins*
June: Careers Advisors' & Science

Teachers' Breakfast*

July 14, 15, 16: Gifted & Talented Discovery Program 2*.

Aug 3–5: Science in the City–High Schools[§]
Aug 10–12: Science in the City–Primary Schools[§]

August 15: Science in the City – Open Day[§]
Aug: Sleek Geek Week (Sydney & Orange)*
Aug: Annual Physics Competition. Ph 9351 3201

Aug 28: Courses & Careers Day[#]

Sept 15: Sydney Science Forum 4*
Oct 12: Postgraduate Information Sessions*

Oct: Sydney Science Forum 6*

* Enquiries: ph 9351 5268 # Enquiries: ph 1300 36 2006 § Enquiries: ph 9320 6233

Michael Faraday – one of the greatest experimentalists who ever lived

Michael Faraday, the son of an English blacksmith, is remembered for his pioneering experiments in electricity and magnetism. Many of his discoveries have become common ideas in modern physics.

At 14 years of age, after only a primary school education, Faraday was apprenticed to a bookbinder. There he became interested in physics and chemistry. After hearing a lecture by the famous chemist Humphry Davy, he sent Davy the notes he had made at his lectures. As a result Davy appointed the 21 year old Faraday as his assistant.

Faraday's research into electricity and electrolysis led him into the field of electromagnetism. In 1785, Charles Coulomb had been the first to demonstrate how electric charges repel one another, but it was not until 1820 that Hans Christian Oersted and Andre Marie Ampere discovered that an electric current produces a magnetic field (i.e. electromagnetism). This led Faraday to undertake a series of experiments in 1821 that culminated in his discovery of electromagnetic rotation – the principle behind the electric motor – and to his describing the dynamo principle.

In 1823, Faraday discovered two new chlorides of carbon, and liquefied chlorine and other gases. He isolated benzene in 1825, and was appointed director of the laboratory.

Faraday's ideas about conservation of energy led him to believe that since an electric current could cause a magnetic field, a magnetic field should be able to produce an electric current. He demonstrated the principle of electromagnetic induction in 1831 in his famous experiment, where a galvanometer showed the existence of current in a coil wrapped around a current-carrying metal ring - the principle underlying the transformer. Later in the same year he hypothesised that a moving magnet could produce an electric current. In proving his hypothesis he created the first dynamo (or generator). Faraday expressed the electric current induced in the wire in terms of the number of lines of force that are cut by the wire. The principle of induction also made possible



Michael Faraday (1791–1867)

the electric transformer. This discovery allowed electricity to change from being a scientific curiosity into a powerful technology.

During the 1830s Faraday did further work with electricity, and along with William Whewell, coined many of the words now so familiar to us – electrode, electrolyte, anode, cathode and ion to name but five. In the latter half of the 1830s Faraday worked on a new theory of static electricity and electrical induction. This work led him to reject the traditional theory that electricity was 'an imponderable fluid or fluids'. Instead he proposed that electricity was a form of force that passed from particle to particle of matter.

Davy, who greatly influenced Faraday's thinking, had shown in 1807 that sodium and potassium metals can be precipitated from their compounds by an electric current (a process known as electrolysis). Faraday's further work on this in 1834 led to what became known as Faraday's laws of electrolysis and he coined the term 'ion' for the particles believed to be carrying current. He formulated the second law of

electrolysis: 'the amounts of bodies which are equivalent to each other in their ordinary chemical action have equal quantities of electricity naturally associated with them.'

Faraday had demonstrated the phenomenon of electro-magnetism in a series of experiments, however, his introduction of the concept of lines of force was rejected by most of the mathematical physicists of Europe. Faraday's work in electromagnetism however was taken up and mathematised by Thomson and James Clerk Maxwell who accepted the concept of lines of force, thus giving birth to modern field theory.

In the 1840s Faraday invented a chimney for oil burning lamps that allowed more of the products of combustion to be taken away from the lamp. It was installed in all lighthouses, Buckingham Palace and many other places.

Faraday spent a considerable amount of time, especially in the early 1860s, working on various systems of electric light that were proposed. These systems were tested in the Tynemouth and South Foreland lighthouses.

In 1845, Faraday observed the rotation of polarised light by magnetism, and found that light propagation in a material can be influenced by external magnetic fields – the magneto-optical effect, now known as the Faraday Effect.

Faraday also experimented with dielectrics in a capacitor. After further experimentation, he abandoned the concept of electrotonic forces in favour of 'lines of force'. He maintained that these lines could be made visible in a magnet using iron filings. Faraday was an advocate of the law of conservation of energy, believing that possibility of 'the production of any one [power] from another, or the conversion of into another'.

Faraday devised the laws of chemical electrodeposition of metals in 1857.

The unit of capacitance, the 'farad' (F) was named after Faraday.

Faraday's experiments in electricity and electromagnetism are in three volumes entitled *Experimental Researches in Electricity* (1839, 1844, 1855); his chemical work was chronicled in *Experimental Researches in Chemistry and Physics* (1858). A series of six children's lectures published in 1860 as *The Chemical History of a Candle*, is now a classic of science literature.



The University of Sydney

I Ith Biennial Science Teachers' Workshop STW2004: The HSC Physics Syllabus – Moving up the Learning Curve

When: Thursday 17 and Friday 18 June 2004

Where: School of Physics

The University of Sydney

Cost: \$275 inc GST for 2 days / \$220 inc GST for I day

These two-day workshops, run by the School of Physics and Science Foundation for Physics, will again look at the HSC Physics syllabus. Lectures and small-group sessions will cover content and provide practical ideas and resources that will be of use in the classroom. Registration will cover lunch, refreshments, the conference dinner, the session write-ups, and a copy of the book of the lectures given at the 2003 International Science School.

More information and the registration form are available from www.physics.usyd.edu.au/stw2004/ or please contact:

Dr Jenny Nicholls Science Foundation for Physics

School of Physics A28

University of Sydney NSW 2006

Phone: 02 9351 3622 Fax: 02 9351 7726

Email: scifound@physics.usyd.edu.au
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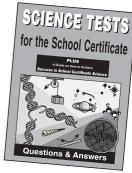
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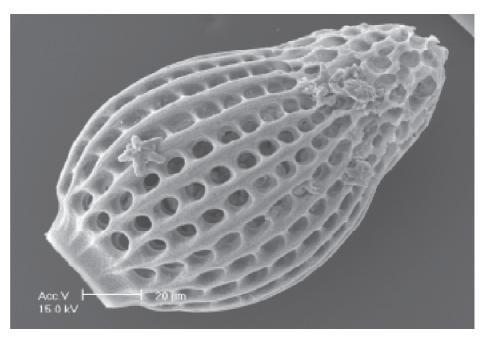
h₀T₀ Sp₀t Skeleton from the Ocean Depths

This image is of a radiolarian, the skeleton of a tiny sea creature that was found in deep ocean sediment from the Eocene era (40–60 million years ago). It is approximately 100 µm in length, the diameter of a normal human hair.

Radiolarians are symmetrically shaped and their skeletons are made of silica rather than calcite. Radiolarians are a group of unicellular marine protists that have existed since the Cambrian era and are common in sedimentary rocks of marine origin. They belong to the Class Sarcodina. Radiolaria are characterised by the symmetry and diverse morphology of their skeleton and range in size from about 30 µm to 2 mm in diameter. When the organism dies, the cell disintegrates and leaves a skeleton such as that shown in the photomicrograph.

The morphological diversity of radiolarians over time makes them useful microfossils for geologists to use in the correlation of and age dating of rock strata in the search for petroleum.

The round, segmented object towards the tip of the radiolarian, is a fossilised coccolith. It consists of calcite crystals enlarged with overgrowth and is 40



Photomicrograph of a radiolarian and article are by Dr Ian Kaplin. This was taken with an XL30 SEM in the Electron Microscope Unit, at The University of Sydney.

million years old. A coccolith is a minute plate, which is only a few microns wide. Such plates covered unicellular, planktonic algae known as coccolithophoroids. Some organisms thought to be similar to coccolithophoroids had star shaped plates and became extinct at the end of the Pliocene (~1.8 million years ago). The star-like plates are called discoasters and were calcite crystals. A discoaster can be seen to the left of the centre of this photo.



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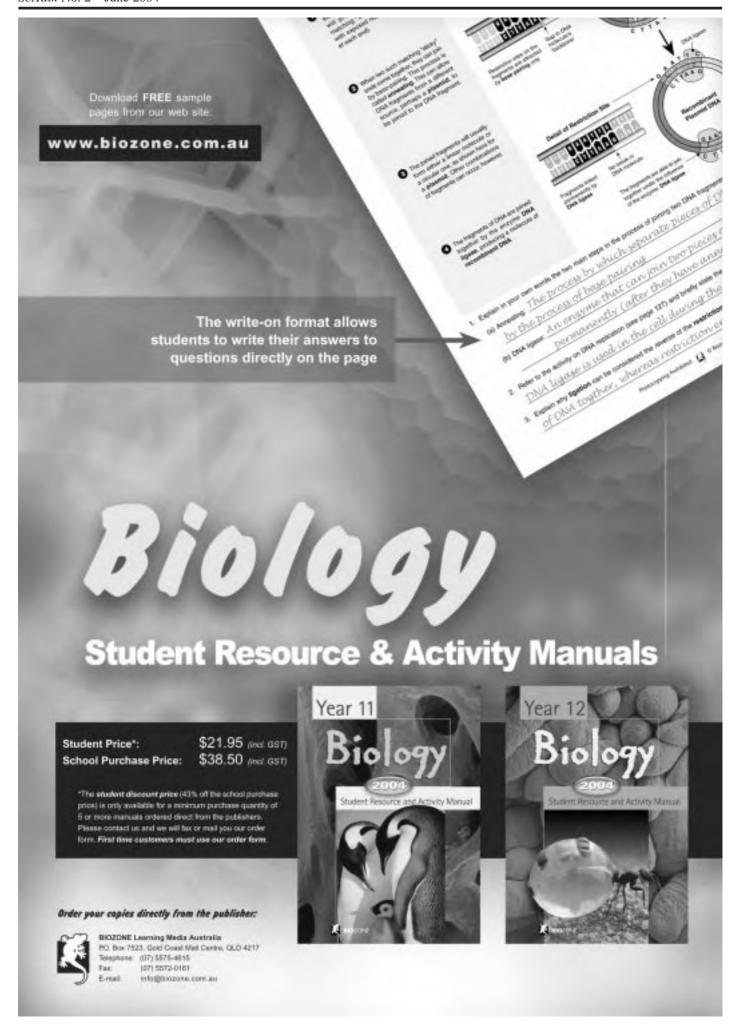
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Evaluating in science

The Stage 6 syllabuses for the various science syllabuses have the H1 Course Outcome: 'evaluates how major advances in scientific understanding and technology have changed the direction or nature of scientific thinking'.

The term 'evaluate' means to 'determine or estimate the value or worth of an argument, data, information, a conclusion, a procedure, etc.'1.

It is important to make sure that your students know the meanings of any terms that you have used, e.g. 'evaluate', BEFORE they are required to do an assessment task or an exercise in class.

The term 'evaluate' is one term that often causes difficulty. This not only causes problems with students however, but also with teachers who sometimes think that the student has not done their evaluation correctly, when in fact the student has, e.g. the student has given many positive outcomes of an advance having judged that these aspects were worthwhile.

Teachers need to be mindful that not all scientific developments have disadvantages in fact many have no disadvantages at all, or only a few. Many advances in scientific understanding and technology only have advantages and have resulted in many useful discoveries and/or technologies. Any new discovery or technology is in fact the direct outcome of a change in the direction or nature of scientific thinking, and evidence therefore of such a change.

To say that an advance has had advantages or resulted in positive outcomes, or that it has had disadvantages or resulted in negative outcomes is to give an opinion, and that is what judging or evaluating is all about.

An advantage that has resulted from an advance in scientific understanding and technology, indicates that the change was an improvement, and that the advance changed scientific understanding and thinking for the better. This is referred to as 'positive evaluation' and is making a positive judgement about the worth of the advance. A student who does this, has placed a value on this advance and judged it as worthwhile, even if they have not made a specific statement that it 'was worthwhile'.

Evidence of 'changes in the direction or nature of scientific thinking' is indicated, for example, by statements which state that:

- peoples' views of the world around them changed
- arguments and speculations occurred as a result of something
- resolutions of arguments occurred
- new discoveries were made possible
- new knowledge, beliefs or realisations were
- new disciplines in science were established as a result, etc. etc.

Similarly, if an 'advance' resulted in any disadvantages or caused scientific thinking to 'go backwards' in any way, then this should be clearly stated. This is referred to as 'negative evaluation' as not all outcomes were positive. Again, a person should not have to say specifically that an outcome was 'not worthwhile', if they have clearly stated that the advance resulted in or led to a problem and/or drawback, etc. Such a statement on its own is a judgement or evaluation of the 'advance' as not being totally worthwhile.

1. Odlum, C. (1982). 'Glossary of Examination Terms'.



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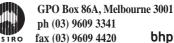
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Transit of Venus: the scientific event that led Cook to Australia

On 8 June 2004, Australians will be able to witness one of the rarest and most important events in the astronomical calendar – the Transit of Venus – when Venus will cross in front of the Sun. Sydney Observatory* has provided the following information about the Transit and how to view it.

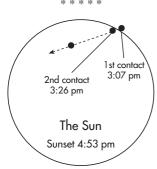
WARNING: It is dangerous to look directly at the Sun, especially through binoculars or telescopes. SERIOUS EYE DAMAGE MAY RESULT. You should view the Transit safely at an observatory using the correct type of solar filter to ensure safe viewing of this magnificent spectacular.

A transit occurs when, as seen from Earth, a planet appears to move *across* the disc of the Sun. Only the two inner planets, Mercury and Venus, can ever be found between the Sun and the Earth and therefore only they can ever be seen in transit. A transit does not occur each time Mercury and Venus are in the same direction as the Sun because usually they pass either above or below the Sun in the sky.

Transits of Mercury occur 13 or 14 times per century but transits of Venus are quite rare events. Transits of Venus occur in a repeating cycle separated by 8, 122, 8 and 105 years in turn. No person now alive on Earth has seen a transit of Venus. This year's transit of Venus will be the first since 1882. The next will be June 6 2012 and then not until 11 December 2117 then 2125, 2247 and 2255. In Australia we will see the start of this transit, but throughout Australia, the Sun will set before the transit ends. Seen from Sydney, Venus will appear to touch the Sun's disc at 3:07 pm and be completely immersed 19 minutes later. Venus will still be moving across the Sun at sunset at 4:53 pm.

Scientists in past centuries were keen to study transits of Venus as they provided a way of measuring the distance from Earth to the Sun, and they believed it would help them to draw up more accurate navigation charts. This technique was pointed out by Edmond Halley, of Halley's Comet fame in 1716. He realised that, due to parallax, observers at different locations would see slight shifts in Venus' track across the Sun.

To measure this slight shift Halley suggested that each separate observer should time the instants that Venus appears to touch the Sun. With such timings astronomers could compare the path of Venus across the Sun as seen from different locations and then use geometry to obtain the Sun's distance. Measurements made in 1769, 1874 and 1882 gave the Sun's distance to within 3% accuracy, however, this method subsequently became obsolete as more accurate results can now be obtained using radar.



The path of Venus across the Sun as seen from Australia. 1st contact refers to the time Venus just touches the edge of the Sun's disc. 2nd contact is when Venus is completely inside the disc, but still touching the edge.

This astronomical event has particular significance for Australians as it was the transit of Venus in 1769 that led to Captain James Cook's discovering Australia.

Cook, along with astronomer Charles Green, was sent out in the HM Bark Endeavour to observe the transit in Tahiti and to search for the southern continent. From Tahiti, Cook sailed to the east coast of Australia which he called New South Wales and claimed for the British Crown in 1770.

To celebrate the first transit for over a century, Sydney Observatory will be holding a special event to view the transit as well as presenting a series of school and public programs and exhibition.

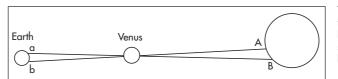
The exhibition *Transit of Venus: the scientific event that led Captain Cook to Australia* will explore Cook's 1769 observations as well as the transit of 1874, which was observed by the then Government astronomer Henry Chamberlain Russell from Sydney Observatory.

On display will be equipment used during viewing of both transits, original handwritten illustrations and manuscripts by Cook and Russell, and the Shelton Clock – an astronomical regulator built by John Shelton for the Royal Society which was used by Cook during the 1769 transit.

This exhibition will be open at Sydney Observatory from 5 June–20 December 2004.

An associated publication, written by Dr Nick Lomb, curator of Astronomy at Sydney Observatory, can be purchased for \$5.95 from Sydney Observatory or from their website www.sydneyobservatory.com.au

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• Exhibition: Transit of Venus: the scientific event that led Captain Cook to Australia

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• The Transit of Venus
– its meaning to Australia
Friday 4 June, 5–8 pm

Especially for year 9–12 history students and teachers. The night includes a special 3D Space Theatre show, telescope viewing, lectures and

information on when, where and how to safely view the Transit.

Cost: \$10 students, accompanying teachers FOC (Powerhouse Member schools \$8 students). *Bookings essential. Ph:* (02) 9217 0485.

Public Programs

• Science meets history: the Transit of Venus Sunday 6 June, 4 pm

The meeting of science and history will be the focus of this discussion between Dr Nick Lomb, curator of astronomy at Sydney Observatory, and Paul Brunton, senior curator Mitchell Library. Cost: \$15 adult, \$12 concession, \$10 child, \$40 family (includes exhibition tours and telescope viewing).

Bookings and pre-payment essential. *Ph*: (02) 9217 0485.

Transit of Venus viewing* Tuesday 8 June, 2:30 pm

Dr Nick Lomb, curator of astronomy will provide an introduction and briefing followed by a viewing of the Transit from 3.07 pm to sunset at

4.53 pm through telescopes with solar filters and other safe devices in the grounds of Sydney Observatory.

Cost: \$22 adult, \$18 concession, \$12 children, \$56 family (includes access to the site for transit viewing, webcasts, talks and night viewing).

Bookings essential, numbers are limited. Ph: (02) 9217 0485.

* The actual Transit viewing will be followed by live webcasts from various parts of the globe, including Whitby, the birthplace of Cook, where the Endeavour replica will be marking Transit celebrations. The Transit is complete at 9:25 pm (EST). Gates will be open until 10 pm.

The shift in the track as seen from two points a & b on Earth leads to a larger separation A & B on the Sun. Not to scale.

Acknowledgments: • James Cook – *Picturesque Atlas of Australasia (1886)*. • Endeavour: The National Library of Australia.

[* Assisted by the Science Museum, London & State Library NSW. Supported by the Bruce & Joy Reid Foundation.]

Winter 2004: Birds and Sparks

Winter is always a great time to view the central bulge of the Milky Way as it traverses overhead and the 'Emu' is easy to distinguish. What is the Emu?

According to the Australian Museum website, an adult Emu is Australia's tallest native bird, reaching 1.6–1.9 m when standing erect. It weighs 30–45 kg, and is covered with shaggy grey-brown feathers except for its neck and head, which are largely naked and bluish-black. The wings are greatly reduced, but the legs are long and powerful. Each foot has three forward-facing toes and no hind toe.

To astronomers in Australia, the 'Emu', which is overhead in the night sky in the winter months, is a sight that once seen will never be forgotten. Many people are familiar with the Greek and Roman stories about the major constellations, but very few Australians know about the 'Emu' which is one of the largest shapes in our sky.

The 'Emu' has been important to Aboriginals for thousands of years. It has influenced their rock art, the design of ceremonial sites, when ceremonies should be held. The male emu's role in producing young emus by sitting on the eggs was seen by Aboriginal elders as being similar to their role in initiating boys into manhood.

First you should find Crux Australis (the Southern Cross). Just below alpha Crucis (the brightest star in the Southern Cross) lies a dark patch called the Coalsack, which is one of the most famous dark nebulae in the entire sky. This represents the Emu's head with the eye just visible. The Emu's long neck runs down through beta and alpha Centauri (the two Pointers to the Southern Cross) and into the Norma constellation. The body starts to form about here and continues across the Scorpius constellation and down into Sagittarius. Here the body ends and the legs come out from beneath the body and extend into the

faint constellation of Scutum.

The 'Emu' is best seen away from city lights, but rug up well as it will get cold before the Emu disappears into the dawn sky. The best time to see it is from 9 pm onwards in June, moving to earlier in July and August. Whilst out observing the Emu, you are very likely to see some good meteors with Southern delta and iota Aquarids in July and the Northern delta and iota Aquarids in August. Delta Aquarids display yellow to blue colours and about 10% of them have persistent trains. Iota Aquarids are normally very swift. Alpha Capricornids in early August are exciting to observe, with long trails and some fireballs.

Enjoy winter while it lasts, as spring will soon be here and there will be plenty of galaxies to look for.

... Don Whiteman





ABOVE: The 'Emu' as seen in our night sky, its head on the right. It appears to be 'flying' as its orientation is the same as in the picture below.

LEFT: This picture is from 'The Emu in the Sky' (by Peter D'Arcy & illustrated by Scott Towney) which is a great collection of Aboriginal astronomy stories from around Australia. This book, and its sequel, 'The Hunter in the Sky', can be bought from the Questacon Shop (www.questacon.edu.au).

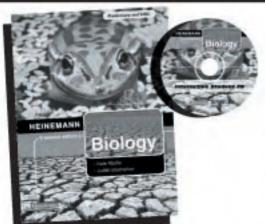
Special Program for the Transit of Venus at the Science Centre & Planetarium

University of Wollongong
• Explanatory Planetarium presentation at

- 2.20 pm runs 33 mins. Tickets: \$2/child, \$3/adult (max 65 seats).
- Interactive computer transit info presentation in Foyer (free) from 2.20 pm.
- Telescopes outside (free) from 3 pm, including feed from the Science Centre's solar telescope and telescopes provided by the Illawarra Astronomical Society.
- Transit begins at 3.07 pm.
- Explanatory planetarium presentation repeat: 3.40 pm–4.20 pm (while transit is underway).
- Sun sets at 4.53 pm.
- Science Centre closes at 5 pm.

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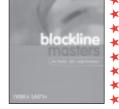
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Answer for SciTalk 1/04: Transit of Venus. *

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Please pass SciTalk around to all Science teachers at your school so that they can benefit from it ... and/or put it up on your notice board for further reference.

Contributions and advertising for SciTalk are welcome ... see below.

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CONTRIBUTIONS

SciTalk is due in schools mid-term. All contributions for SciTalk should be directed to the Editor (see below).

CLOSING DATES

- SciTalk No. 1-February 2004 ... Jan 23
- SciTalk No. 2-June 2004 ... April 16
- SciTalk No. 3-August 2004 ... July 2
- SciTalk No. 4-November 2004 ... Sept 24

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