

SciTalk

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Number 4 – October 2004

Teaching students to evaluate internet information and how to acknowledge internet sites correctly

Today, children are growing up knowing only a world of computers and advanced technology. So it is only natural for them to be more familiar and comfortable searching for information online as opposed to in the library.

The techniques for evaluating the reliability of web resources are quite similar to those that should be applied to printed materials. Learning how to analyse web resources can also offer students the proper tools to examine printed sources.

It is important to realise that anyone can (and probably will) put information about anything and everything on the internet. Hence it is equally important to question whether it is reliable, accurate, truthful, meaningful, thoughtful, and researched.

It is often difficult to ascertain the actual source of some information. This is essential if you are to know whether it is even worth reading. If it is not acknowledged, be wary!

Knowing whether the information is original is important, or if it has been

plagiarised, or quoted out of context. You need to ask if the information is up-to-date and current, and has it been quoted in context ... otherwise it is useless.

You need to question the authority of the author(s) – are they from a reputable establishment such as a university or well-known research laboratory, etc and has the information been checked or validated.

Things to check for when evaluating information and sources for accuracy, credibility, reasonableness, and support

- *Who is the author?* ... Does the author provide his/her contact information? Is he/she qualified to write the 'article'? What is his/her occupation, position, education, experience, any other 'works'? What are his/her credentials?
- *Are the facts accurate?* ... How does this information compare to what is found in other sources? When was it written? Is it up-to-date, comprehensive and factual?

... continued page 8

<http://homepage.mac.com/robertgarner>

PRIZES TO WIN!

★★ See pages 1, 3, 11 & 12 ★★
Send in your entries now
(ALL IN THE ONE ENVELOPE if you prefer!)

★★ ATTENTION ★★

After you have read this, please write/tick your name below and pass it on.

- 1.
- 2.
- 3.
- 4.
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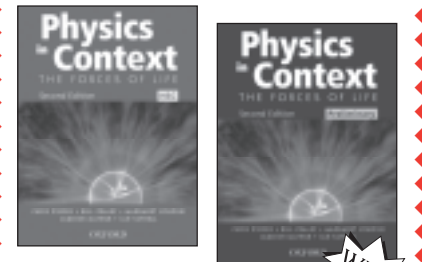
Book Giveaway

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Physics in Context HSC & Prelim texts + CDs

2nd Edition

Wiecek, Zealey, Hynoski, Mathur & Tatnell



rrp \$44.95 each

These comprehensive second editions, published by Oxford Uni Press, meet the requirements of the revised NSW Physics Stage 6 syllabus. They feature outcomes for each unit, clear examples with step-by-step solutions, revision & exam-style questions and answers, a glossary of physics terms, and a CD with spreadsheet activities, extension material and more. A Teacher's Support CD ROM will also be available for \$65.

TO WIN: Send in your name, address, ph. no. & school on the back of an envelope by 21 December 2004 to

Book Giveaway, PO Box 442, Harbord 2096

★★★

Winner for SciTalk 3/04

Congratulations to Alasdair Hey, St John Bosco College, who won *Core Science 1-4 (2nd edition)* by Haire, Kennedy, Lofts & Evergreen, donated by Jacaranda (rrp \$49.95 each).

Risk Assessment – how to take the risk out of your excursion to Luna Park Sydney



Physics is Fun, who conduct Fun Park Excursions to Luna Park Sydney, have developed a comprehensive information sheet to assist school teachers with the preparation of their excursion's Risk Assessment for visiting Luna Park Sydney through them. This document covers:

- Your fun park excursion: arrival & departure, height & safety restrictions, access issues, ride maintenance
- Luna Park's facilities: souvenir shops, food/beverages, toilets, disabled access
- OHS issues: supervision levels, working with children checks
- Public liability insurance
- Personal belongings: on rides, school bags, lost property

- Payment procedures: necessity of paying in advance
- Code of conduct: for both your students and other schools.

Whilst we cannot complete the Risk Assessment for teachers, what we have done however will make life easier for teachers as we have provided the information needed to prepare a Risk Assessment. Visit our website for a copy.

All this information has always been, and still is, in the Teachers' Guide in our Excursion Books which are provided to every school that makes a booking for an EDUCATIONAL EXCURSION or a FUN DAY through Physics is Fun.

INSIDE SCITALK ▶▶▶▶

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Diary Dates 2004-2005

- NOVEMBER 2004**
- 8–9 School Certificate Tests. 8/11: English / Science. 9/11: Maths / AH,G,C&C
 - 17 Ask A Scientist Lecture: 4.30-6.30 pm. Dr Fiona Cameron will address aspects of selective breeding, & reproductive technologies in future foods – at CSIRO Div of Industrial Phys, Lindfield. Enquiries/booking: ph (02) 9413 7731. www.csiro.au/sydcsirosec/programs/askscientist.html
 - 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 2004**
- 1, 2, 3, 6, 7 Physics is Fun at Luna Park Sydney. Enquiries: ph (02) 9939 6107, fax (02) 9939 6105
 - 7 Ocean Care Day
 - 17 HSC results released
- JANUARY 2005** 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/
- MARCH 2005**
- various dates Shell Questacon Science Circus: Armidale, Casino, Glen Innes, Gunnedah, Inverell, Moree, Narrabri, Tamworth, Tenterfield, Walgett. www.questacon.edu.au/html/on_the_road.html
 - 4 Schools' Clean Up Australia Day. Ph: 1800 024 890. Details. www.cleanup.com.au
 - 6–13 Seaweed 2005. Details. <http://www.mesa.edu.au/seaweed2005/> Some great resources are at: <http://www.marineteachers.org.au/news.asp?id=151>
 - 14, 18 Physics is Fun at Luna Park Sydney. Enquiries: ph (02) 9939 6107, fax (02) 9939 6105
 - 20 International Earth Day. <http://www.earthday.net/> & www.earthsite.org/
- APRIL 2005**
- 4 Physics is Fun at Luna Park Sydney. Enquiries: ph (02) 9939 6107, fax (02) 9939 6105
- MAY 2005**
- 2, 6 Physics is Fun at Luna Park Sydney. Enquiries: ph (02) 9939 6107, fax (02) 9939 6105
 - 4–6 Science at the Shine Dome. Australian Academy of Science awards for teachers to attend this symposium – application in by 11/3/05. Enquiries: www.science.org.au/sats2005/ta.htm
- JUNE 2005**
- 3, 6 Physics is Fun at Luna Park Sydney. Enquiries: ph (02) 9939 6107, fax (02) 9939 6105
 - tba RACI Nyholm Lectures. Enquiries: <http://www.chem.unsw.edu.au/raci> (in 2005)
- JULY 2005**
- 4–7 CONASTA 54: *Science Education Unplugged*. VIC. www.conferences.unimelb.edu.au/conasta54
 - 13–16 International Science School: Yr 11 & 12 students, Uni of Syd. Details on page 4
 - 23–30 National Chemistry Week. <http://www.raci.org.au/national/events/chemistryweek.html>
 - 28 National Chemistry Quiz. Enquiries: A/P Charles Fogliani, cfogliani@csu.edu.au
- AUGUST 2005**
- 5 Jeans for Genes Day. Enquiries: CMRI, 1800 677 260, at <http://www.jeans4genes.com.au/>
 - 13–21 National Science Week: Theme is *Energy–Future Challenges*. <http://scienceweek.info.au/>
 - 19, 22 National Science Week: Physics is Fun at Luna Park. <http://homepage.mac.com/robertgarner>
 - 13–21 Australian Science Festival, ACT. School Activities: 17/8-19/8. www.sciencefestival.com.au
 - 24 Physics Olympiad National Qualifying Exam. Closing date: 29 July. (02) 6125 9645
 - 31 Biology Olympiad National Qualifying Exam. Closing date: 29 July. (02) 6125 9645
- SEPTEMBER 2005**
- 7 National Threatened Species Day. www.deh.gov.au/biodiversity/threatened/information/
 - 7 Chemistry Olympiad National Qualifying Exam. Closing date: 29 July. (02) 6125 9645
 - 13, 19 Physics is Fun at Luna Park Sydney. Enquiries: ph (02) 9939 6107, fax (02) 9939 6105
- OCTOBER 2005**
- 9–15 Earth Science Week 2005. <http://www.earthsciweek.org/>
 - 21, 24, 25 Physics is Fun at Luna Park Sydney. Enquiries: ph (02) 9939 6107, fax (02) 9939 6105
 - 26, 31 Physics is Fun at Luna Park Sydney. Enquiries: ph (02) 9939 6107, fax (02) 9939 6105
- NOVEMBER 2005**
- 1, 4, 14, 15, 18 Physics is Fun at Luna Park Sydney. Enquiries: ph (02) 9939 6107, fax (02) 9939 6105
 - 22, 23, 25, 28, 30 Physics is Fun at Luna Park Sydney. Enquiries: ph (02) 9939 6107, fax (02) 9939 6105
- DECEMBER 2005**
- 1, 2, 5, 6, 7 Physics is Fun at Luna Park Sydney. Enquiries: ph (02) 9939 6107, fax (02) 9939 6105
- JANUARY 2006** National Youth Science Forum. Forms to local Rotary club by 15/5/05, interviews in July. For Year 11 students in 2005 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.



Update on BOS matters

Online Multiple Choice website: HSC and SC Test Yourself

Students can test themselves by going to either www4.boardofstudies.nsw.edu.au or by clicking on the *Test Yourself Online* icon on the BOS website.

REMINDER: Stage 6 Science Syllabuses Amendments are for 2005 (refer to BOS 34/04)

All amended Stage 6 Science syllabuses will go onto BOS website during Term 4, 2004.

REMINDER: Implementation of new SC Science Syllabus (refer to BOS 11/04)

Yrs 7 & 9: 2005, and Yrs 8 & 10: 2006

Science things on the BOS website:

- **Science Year 7–10 Advice on Programming and Assessment**

Go to 'search' on the BOS website and type in 2004171 (or ISBN 1 7414 7065 X)

A support document designed to help teachers understand key aspects of the new syllabus, & to provide guidance for implementing a program, planning and sequencing units of work, and developing teaching and learning activities.

- **A Powerpoint Presentation on Science 7–10 syllabus:** at www.boardofstudies.nsw.edu.au/syllabus_sc/pdf_doc/science_710_syl_brief.ppt

- **2003 HSC Notes from the Marking Centre (including Marking Guidelines)**

- **List of Approved Scientific Calculators for use in 2004 HSC**

- **Science Years 7–10 Nov 2003 Syllabus with Tracked Changes to 1998 Syllabus**

BOS enquiries

Ph (02) 9367 8111, fax (02) 9367 8484
Website www.boardofstudies.nsw.edu.au

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Come for a **FUN DAY** or an **EDUCATIONAL DAY!**

These days held throughout the year are a great way to have FUN learning (see page 7).

Worksheets are available for:

- Primary Science & Technology
- Junior Science 7–10 • Physics, Senior Science, Biology
- Design & Technology
- Peer Support • Art • Business Studies

NATIONAL SCIENCE WEEK DATES

19 and 22 August 2005

Book your date now by ph (02) 9939 6107 or fax (02) 9939 6105 with Physics is Fun.

**Past HSC Exam
Questions & Answers**
by Odium & Garner

Past HSC books are available for
**Biology, Chemistry, Physics, Senior Science,
Earth & Environmental Science** (see page 6)
All books include: *How to Achieve Success in the HSC*



The University of Sydney

“Waves of the future”

33rd Professor Harry Messel International Science School for year 11 & 12 Science students

3–16 July 2005 at The University of Sydney
Applications close Thursday 10 April 2005

Application forms will be available from mid-February 2004 at: www.scienceschool.usyd.edu.au

In July 2005, 140 students from across Australia and around the world will gather at the University of Sydney’s School of Physics for 2 weeks of cutting-edge science. *Waves of the Future* will include daily lectures from world-leading scientists on topics ranging from the physics of beaches to psycho-acoustics, from the minute world revealed by electron microscopes, to the monsters lurking in the heart of galaxies!

ISS scholars will also participate in other activities — experiments, museums, lab tours, a harbour cruise — all designed to enthuse and excite their scientific curiosity.

All scholars are competitively selected at State level, and attendance is by scholarship only. Scholarships are valued at approximately \$2 000 and cover return travel within Australia, board and accommodation at Women’s College for the duration of the School, all events and activities organised by the Science Foundation for Physics and a copy of the official ISS book of lectures.

For more information contact: Dr Chris Stewart
ph (02) 9351 3622, fax (02) 9351 7726,
email scifound@physics.usyd.edu.au
or visit www.scienceschool.usyd.edu.au

★ Success in School Certificate Science ★

Science Tests for the School Certificate

by Catherine Odlum, Robert Garner, Mitch O’Toole, Rob Mahon

This book is **ESSENTIAL** practice for Year 10 students who want **SUCCESS** in their School Certificate Science Test.

This book was written specifically for the NEW school Certificate Science Syllabus. Make sure each student in Year 10 has one. **Get it onto your school’s Book List now for 2006!**

Students who have done these questions and answers claim that they did better in the real Science Test as a result.

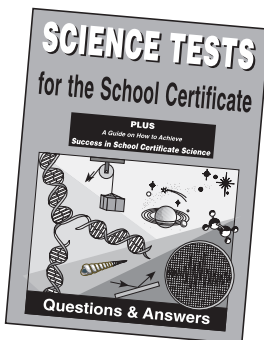
A complete set of answers (= Band 6) that would score full marks are included for all questions, with clear explanations for all answers to the multiple choice questions.

A BONUS SECTION with longer questions is also included.

★ ◆ ★ ◆ ★

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Year 10 Ultimate Survival Kit

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... 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**
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★ ◆ ★ ◆ ★

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Stop making excuses,
make progress. (Anon)

IMAX + Luna Park Sydney Joint Excursion

Come to a combined IMAX + Luna Park Sydney excursion for a great action-packed, fun time of interactive learning.

These excursions are a great way to capture your students’ interest. Combining an IMAX film such as one of the following with your visit Luna Park will save you \$\$\$.

● IMAX NASCAR 3D

There is no doubt that science, engineering, design & technology and team work play a major role in the motor sports industry. Seeing real world applications of these subject areas in such a dynamic setting will help to capture students’ attention and encourage them to want to learn more. Student worksheets and teacher notes for *NASCAR 3D* have been prepared by teachers from ‘Physics is Fun’ for Primary and Secondary Science and Design & Technology 7–10.



● IMAX ADRENALINE RUSH

A thrilling visual experience, this explores the psychological and physiological forces in extreme risk-taking, the physics in sky-diving, basejumping and parachuting, and uses modern science to test the 15th century specifications of Leonardo da Vinci’s first ever parachute.

● FUN PARK EXCURSIONS AT LUNA PARK SYDNEY

Interactive, hands-on learning is a great way to put fun into your lessons. See page 7 of this *SciTalk* for more details and how to book.

COST BREAKDOWN

IMAX: \$7.50* per student.

Luna Park: \$13.50* per student on scheduled dates, or \$15.00* per student on non-scheduled dates. Flat booking fee of \$16.50*.

Free Teachers: IMAX: 1:10 all student groups.

Luna Park: 1:20 secondary / 1:10 primary.

(*All prices include GST which can be claimed back as these are curriculum-based excursions.)

BOOK & PAY SEPARATELY AT EACH VENUE



PLANNING YOUR DAY

10.00 am IMAX screening

(Choose one of the two films listed. Term 4 special – you do this excursion with any IMAX film)

11.00 am Bus to Luna Park

11.15 am Luna Park Visit

Finish any time – Luna Park is open until 6 pm

* Excursions at Luna Park are available on selected dates. Additional dates are available upon request and incur a small surcharge.

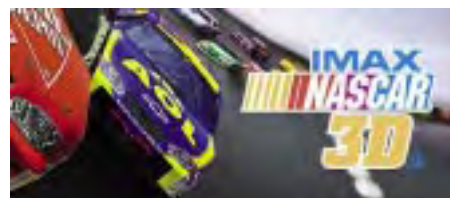


Photo Spot

Carbon fibre composite fracture surface

Carbon fibre is a polymer which is a form of graphite. It is made by heating another polymer, polyacrylonitrile. Each carbon filament is made out of long, thin sheets of carbon. These filaments are stranded into a thread. This thread can then be used to weave a carbon fibre cloth.

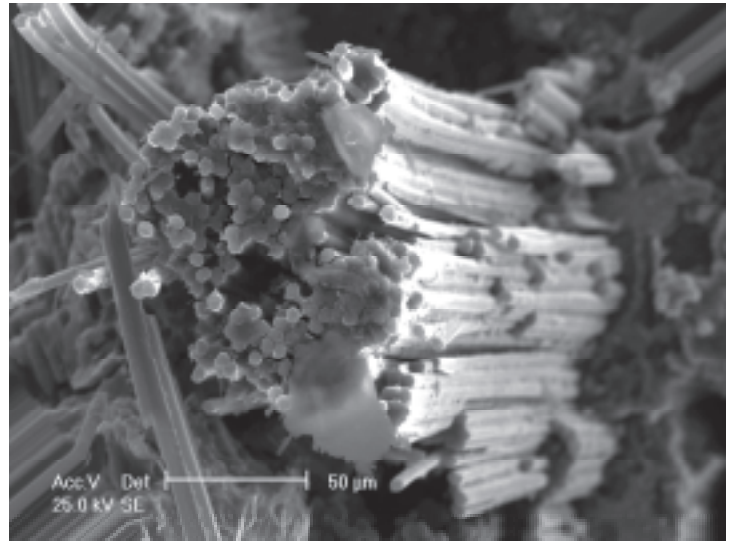
Carbon fibres are not used by themselves. Instead, they are used to reinforce materials like epoxy resins and other thermosetting materials. These reinforced materials are called 'composites' because they have more than one component.

Carbon fibre reinforced composites are very strong for their weight. They are often stronger than steel, but a whole lot lighter. Because of this, they are being used widely to replace metals in many uses, from parts for airplanes and the space shuttle to sporting goods such as bicycles, tennis rackets and golf clubs, and increasingly in motor vehicles, racing cars, motorbikes, power boats and civil structures.

Carbon fibre has a high torsional rigidity and high tensile strength. In addition to this, carbon fibre is flame and corrosion proof and, when properly used, shatters in an accident thereby absorbing a huge amount of energy and making it ideal for racing cars.

Carbon fibres are covalently bonded – the same strong bonds that give diamond its extreme strength and stiffness. Though very stiff and strong, the fibres are inherently brittle, and of course can carry load only in

Carbon fibre composite fracture surface.
Peter Hines,
Electron
Microscope Unit,
The University
of Sydney



tension. Binding the fibres together in a composite allows three-dimensional objects to be formed and lets the fibres transfer stress, sharing the load evenly.

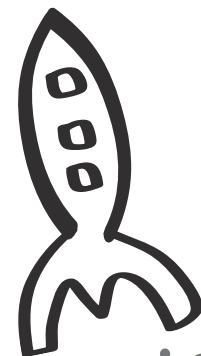
The matrix or binder phase performs another vital function – that of toughening the material. Fracture toughness is vital for being able to design structures that are both strong and safe. In practical terms it equates to the energy absorbed during fracture. Lots of energy is absorbed by cracks as they are deflected along the fibre, and as fibres pull-out of the matrix (as shown in this image). The fracture surface is more like a tough,

green tree branch than the sudden, clean break of dried timber.

Carbon fibre composites can be formed in a variety of shapes and as finished products have mechanical properties similar to high strength steels. Not bad for a material that weighs only one fifth as much. No wonder engineers love these materials! □

Further reading: 'Putting it together – the science and technology of composite materials' – on the Australian Academy of Science's *Nova: science in the news* website at <http://www.science.org.au/nova>

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Past HSC Questions & Answers

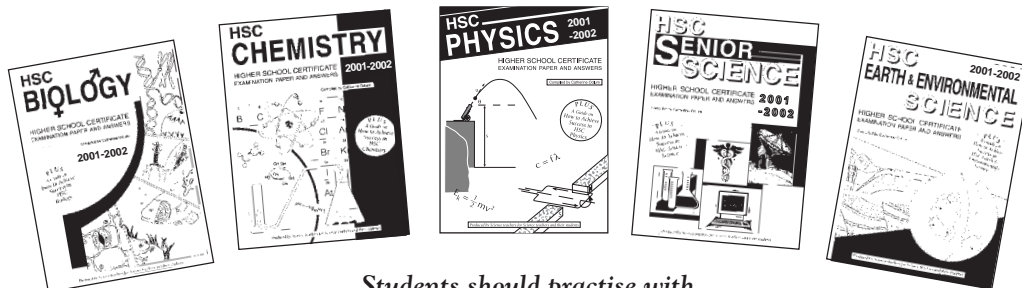


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Each title contains:

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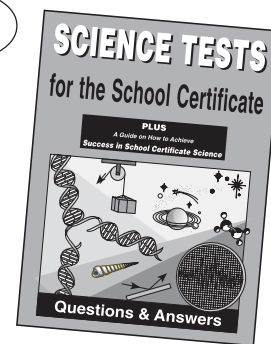
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... by Catherine Odlum, Robert Garner, Mitch O'Toole, Rob Mahon

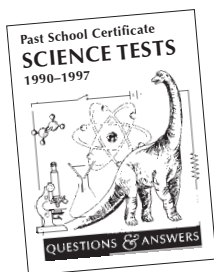
- Includes a guide on **How to Achieve Success in School Certificate Science**.
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- **BONUS** section of free response questions & answers.
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- **Process questions are still used in the current Science Tests**. This will book help your students to **learn how to answer** process questions.

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Produced by Science teachers for Science teachers and their students

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★ ALSO AVAILABLE FROM BOOKSHOPS ★

Some Science Resources, Websites, Workshops, and Student Programs

Science Focus: Books 1–4

These great NEW texts, by Kerry Whalley *et al*, published by Pearson/Longman, are for the NSW stage 4–5 science syllabus. Books 1 & 3 are out, 2 & 4 will be out in 2005. This series has a homework book, companion website, interactive student CD, teacher's resource pack. Enquiries: 1800 656 685 or go to www.pearsoned.com.au/schools/secondary/ and click on the Companion section. □

Interactive CD-ROM set that will make biology an exciting learning experience

These CDs from Bioscope Education contain biology material for today's science students to use in the classroom. Funded by the National Science Foundation, this BioScope Initiative is an exciting program, aiming to place first-class science material into every biology classroom: <http://www.bioscope.com.au/> □

Video: Silent Storm

Produced by Film Australia, this is the story behind the contamination of the environment with strontium 90 from British atomic tests. Was this harmful? Did it get into the milk supply? Is it going to lead to increased cases of cancer? Why the cover-up? □

CSIRO Teacher Resources available from www.csiroshop.com

- **DNA model (school set):** This allows students to build their own 3D cardboard model strand of DNA. It comes with 20 DNA models, information sheets and a poster on DNA and its functions. Cost: \$25.
- **A+ Projects in Biology** and **A+ Projects in Chemistry:** these contain many different experiments to do, many of which are great for science fairs. Cost: \$27.90 each. □

Science Teacher Workshops by the Australia Telescope National Facility

Ph: (02) 9372 4247

<http://outreach.atnf.csiro.au/education/teachers/>

- **Astronomy from the Ground Up**
A workshop for Science Teachers, Parkes Observatory: 13–15 May 2005. Cost \$260.
- **Astrophysics for Physics Teachers**
A workshop on Core 8.5 The Cosmic Engine and Option 9.7 Astrophysics at the Australia Telescope National Facility, CSIRO Radio-physics Laboratory, Marsfield, on 5 March, 2005. Time: 9 am–4.30 pm. Cost \$80. □

CSIRO Travelling Science Programs

CSIRO Education (Lindfield) has a wide range of Secondary science programs. Most of these can be held at either the CSIRO Science Education Centre or at your school through the 'Lab on Legs' program.

Enquiries: ph (02) 9413 7532, website:

<http://www.csiro.au/sydcsirosec/programs/> □

ANSTO Schools Tours

ANSTO runs specialised tours for Years 10–12 that complement the NSW physics and chemistry curriculums, and aim to enhance students' understanding of these areas by explaining the applications of nuclear science and technology, with particular relevance to Australia. School tours include a visit to the inside of HIFAR, a valuable scientific facility. Enquiries/bookings: 97173111, fax 97179274, www.ansto.gov.au/info/tour/index.html email: enquiries@ansto.gov.au □

US Geological Survey Hawaiian Volcano Observatory (HVO) <http://hvo.wr.usgs.gov/>

The HVO study the active volcanoes of Hawaii, Kilauea and Mauna Loa, which due to their usually benign natures, can be studied up close in relative safety. They do this to learn how to reduce the hazards associated with earthquakes and volcanoes. This is done by monitoring the volcanoes' behaviour before, during and after eruptions to determine the nature of their activity. This site has a lot of great, right up-to-date information on the current status, as well as the history of a number of volcanoes, plus links to other volcanoes such as Mount St Helens. □

Quitters never win and
winners never quit.
... Anon



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Teach your students to think in an ecologically sustainable way and to use water carefully

Precious water

A part from Antarctica, Australia is the driest continent in the world and therefore the driest inhabited continent. Its interior has one of the lowest rainfalls in the world and about two-thirds of the land is arid or semi-arid. Its fertile areas are mainly coastal and not really adequate to support the increasing population. Much of our land has become desert as a result of drought conditions or land degradation caused by human activities and the demands placed on it by an increased population.

People in country areas have traditionally been more careful about water than those in cities. However, all Australians need to learn to be more careful about water.

There is no more water falling in Australia now than when the First Fleet arrived (and in fact there is probably less water due to forestry and land degradation), yet there are millions of people here and more arriving every year to use the same small amount of water!

Australians must learn to conserve water ... as every drop counts! People have joked in the past with sayings such as: 'Conserve water – drink Teacher's Scotch neat!' or 'Conserve water – shower with a friend!' but the need to conserve water is now a very real problem and not really a joking matter.

Role of schools & teachers

Teachers can play a vital role in educating their students to use water in an ecologically sustainable way. Re-education of our community concerning water usage is essential if our increased population is to survive in the Australian environment.

Schools represent a major opportunity to reduce water use, particularly in cities. It has been estimated by Sydney Water that a minimum of 1 500 million litres could be saved per year if all schools in the Sydney, Blue Mountains and Illawarra regions became water efficient. This amount is close to one average day's water supply for all of Sydney.

A new approach needed

People must stop having long showers and realise that: 'a 1 minute shorter shower today saves 9 litres for tomorrow'. If everyone in Sydney were to do this, they would save enough water to supply 60 000 homes tomorrow!

There are many other ways that water can be saved. We must constantly remind our students of these, so that our society becomes more conscious of using sustainable water practices.

How to save water in schools

- Report leaking taps, bubblers and toilets.
- Use half flush toilet button when possible.
- Use a bucket to wash paintbrushes.
- Turn all taps and bubblers off after use.
- Install aerators on spring loaded taps.
- Install dual flush toilets and motion sensor urinals.
- Reduce the amount of water used when flushing by putting a filled 2 litre juice container in toilet cisterns.
- Install water efficient showerheads.
- Fix all leaks quickly.

- Install vandal proof taps.
- Use a broom/blower to clean outside areas.
- Mulch garden areas and plant native plants.
- Use tap timers or a controlled water irrigation system.

Water saving in the home

Turn off or fix any dripping taps: a tap that drips 25 times in a minute wastes 9 litres every day, and so one drip per second results in about 7 000 litres of water wasted per year!

IN THE KITCHEN

- Use a sink plug when washing vegetables and save up to 5 litres.
- Use a sink strainer and a bin for rubbish.
- Make sure the dishwasher is full before use and save up to 40 litres per day.
- Only use environmentally friendly cleaning products, e.g. phosphate free detergents.
- Put 'fats and oils' in the rubbish bin.

IN THE LAUNDRY

- Wash only full loads. A washing machine can use up to 150 litres per load.
- Do not hand wash under running water and



you can save 50 litres every 5 minutes. Do it in a bucket or put a plug in the tub.

IN THE BATHROOM

- Take shorter showers – a 1 minute shorter shower uses 9 litres less water.
- Turn off the tap when cleaning your teeth.
- Install a dual flush toilet or water saving device when possible.

OUTSIDE THE HOUSE

- Use a broom, not a hose, to clean pathways.
- Wash cars on a lawn using a bucket, not on the road or driveway with a hose.

IN THE GARDEN

- Install a rainwater tank.
- Water gardens in the early morning or in the evening when it's cool.
- Water the roots and soil around the plants not the leaves and flowers.
- Use trigger action hoses, not a running one.
- Use only a drip filter sprinkler with a timer. A forgotten sprinkler wastes ~1 000 litres/hour.
- Plant Australian natives, which use less water.

Reference: *Every Drop Counts in Schools: Education Resource* from www.sydneywater.com.au

Did you know these 'water' facts?

THE WORLD:

- Water covers 75% of the Earth's surface.
- 97% of this water can't be used by living things, as it is salt water in the oceans.
- Only about 0.5% of the remaining water on Earth is useable, fresh water. The rest is in ice caps, glaciers, atmosphere, & soil.
- 80% of the water we use is surface water.

AUSTRALIA:

- In the last 100 years there have been 37 years of major drought conditions in NSW.
- The hottest states use the most water.

SYDNEY CATCHMENT AREA:

- Water used inside homes would fill 450 Olympic pools and water used outside would fill 150 Olympic pools.

PEOPLE:

- Water makes up two-thirds of your body.
- People drink 6–8 cups of water, milk, fruit juice, soft drink, tea or coffee a day.
- Plants and animals are mostly water too.
- People use water for leisure activities, drinking, growing/processing/cooking food, putting out fires, cleaning, generating electricity.
- The average daily water use per Australian is about 500 litres.
- 20% of the water used in the home is for showering/bathing.
- 25% of water is used outdoors when watering gardens.

From page 1:

- *What perspective does it have?* ... Does the author have a bias? Does she/he express a particular point of view? Is the author affiliated with particular organisations, institutions, associations?
- *Does it have a bias?* ... Check why it was written. Is it directed toward a specific audience (e.g. general public, academics, etc)? Where is the information 'published'?
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- *Is it supported?* Are claims supported with statistics, and if so, where from? Do at least 3 other sources agree with the information.

How to acknowledge internet sites in a bibliography

Internet references should be done in a similar way to text references. You should provide the following information if it can be located, and insert the entry into the correct alphabetical spot in your bibliography:

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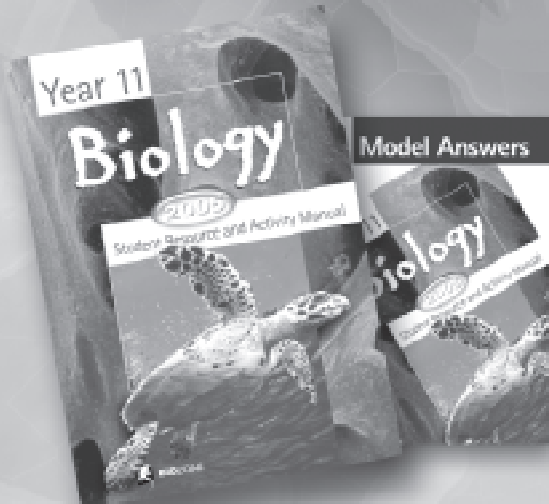
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Catherine Odlum

Reference: Prof D Scott Brandt, Purdue Uni (USA), May 2004, 'Why we need to evaluate what we find on the Internet', <http://www.lib.purdue.edu/itd/techman/eval.html>

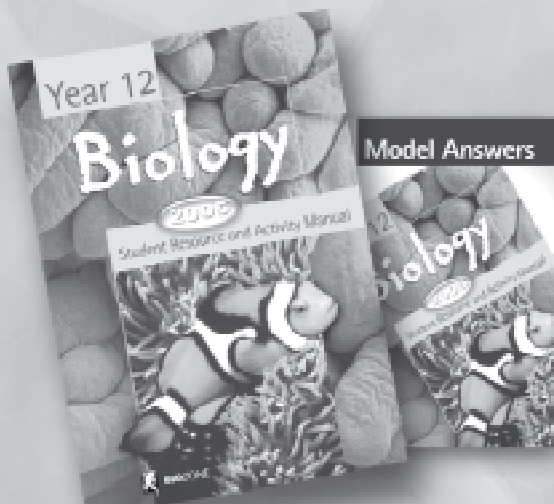
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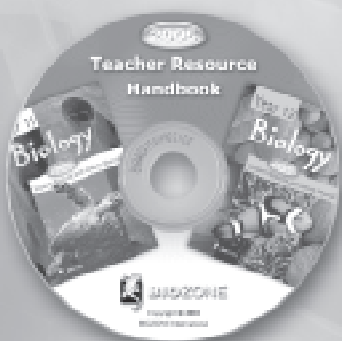
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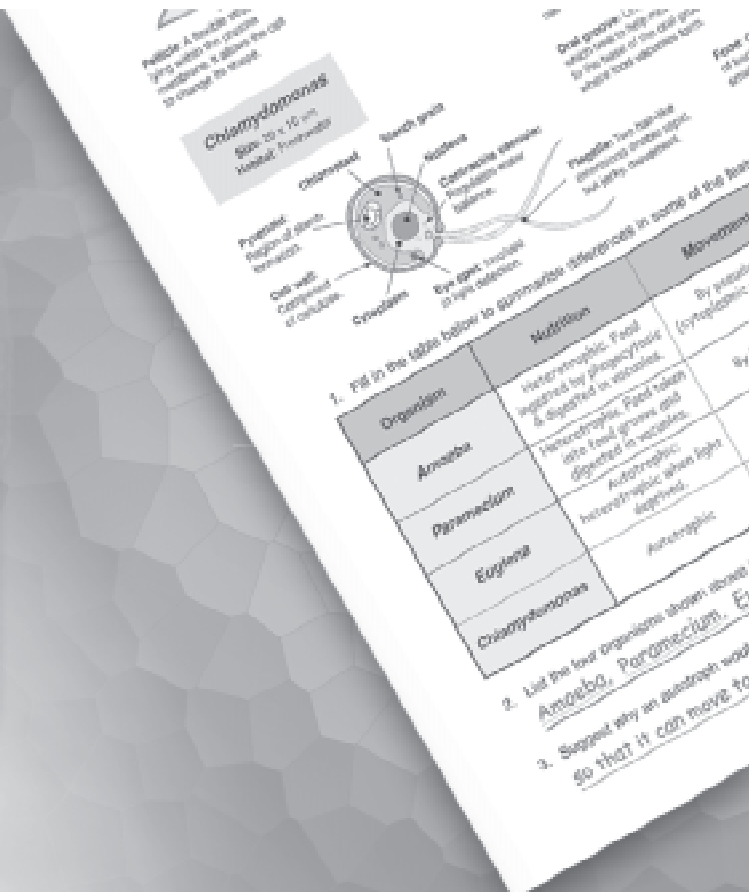


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Are Two Eyes Better Than One?

The first optical instrument that most of us get to look through is usually a pair of binoculars. Some of us or our students will venture out to buy binoculars at some stage, as they are a fantastic tool for viewing distant objects. Binoculars are however an instrument that most of us know little about and so we quite often buy the wrong pair, which can be easily avoided if you know what to look for.

How to buy the right binoculars

The first thing you should seriously consider is: 'What are you going to use them for?' ... whale watching, birdwatching, wild life viewing, on holidays to see things close up, on a bushwalk, at a sporting event, stargazing, or all of these things?

One of the first things to confront you on different binoculars will be a lot of numbers. These determine power, size, field of view, how bright the images are, and much more. Then there are words like fully multi-coated, waterproof, exit pupil, eye relief, PCF, DCF and phase shifted. But what do they mean?

What the numbers and words mean POWER & SIZE

Binoculars will always have 2 numbers on them, e.g. 7 × 50.

The **first number** represents the power, i.e. the magnification, or how many times closer the object will appear.

The biggest misconception in buying binoculars is that the more power you have the better they will be. If only that could be so, life would be very easy! Remember that the more you magnify anything, the more you magnify everything. That includes any movements you make whilst holding your binoculars steady. Things start to look a little shaky the more you appear to move.

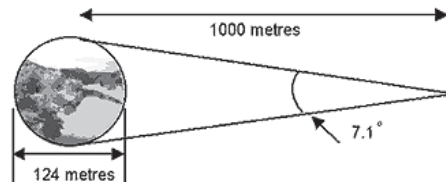


The **second number** represents the diameter of the main, front lens called the objective lens. The bigger this lens is, the more light that will enter the binoculars. This will go a long way in determining how bright the object appears. It will also determine the actual physical size of the binoculars. Big lens = big body. Big body = heavier binoculars. Heavier binoculars = hard to hold steady.

Instantly we can see that bushwalkers prefer lighter weight and therefore smaller bodied binoculars and thus their binoculars will tend to have smaller objective lenses. Astronomers on the other hand need as much light as they can get – let's face it, it's dark out there – and so they will opt for binoculars that have larger objective lenses and mount them on a tripod if too heavy to keep steady.

There may be other numbers on the exterior of the binoculars that represent the field of view. This is the area you see when looking through the binoculars. The numbers can be in two forms:

- degrees, e.g. 7.1°
- diameter at 1 000 m, e.g. 124 m at 1 000 m.



Generally the higher the magnification the smaller the field of view.

EXIT PUPIL

If you hold your binoculars at arm's length and look at the centre of the eyepiece lens, you can see a small circle of light. This is called the 'exit pupil'.



All the light leaving the binoculars is transmitted through the exit pupil, the diameter of which is determined by the ratio of objective lens diameter and magnification.

$$\text{Exit pupil} = \frac{\text{Objective lens diameter}}{\text{Magnification}}$$

The bigger the exit pupil, the brighter the image. Therefore, binoculars with bigger exit pupils are more suitable for watching at twilight or in the dark. Astronomers will like bigger exit pupils.

EYE RELIEF

Eye relief is the distance between the eyepiece and the eye-point (position of your eye to see the full image). When you place your eye correctly at the eye-point, you want to be able to see the whole field of view without any vignetting (a fall-off in brightness or clouding effect at the edges of the image). Binoculars with longer eye relief are recommended for people who wear glasses so they can see the whole field of view without any vignetting. This also makes it easier for the binoculars to be shared between users with different vision.

The better modern binoculars have twist eyecups to allow for those who wear glasses.

LENS COATINGS

Coatings help to reduce reflected light and increase the percentage of light reaching the eye. A single uncoated objective lens will transmit about 95% of all incident light, while a coated lens will transmit about 99% (depending on coating type and quality). Therefore in binoculars with 10 surfaces

(lenses and prisms), no coatings will result in an overall light transmission of about 65%, whilst good coatings can improve this up to 95% resulting in a much brighter image. The different coatings are:

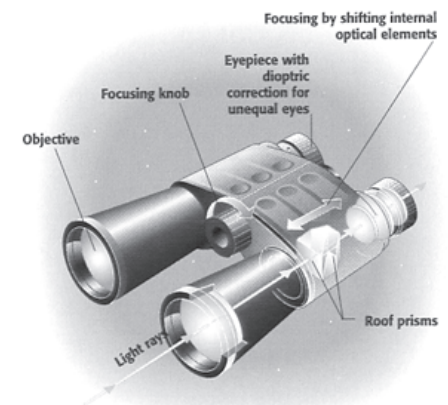
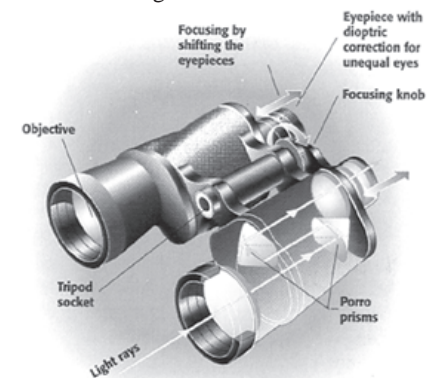
- Coated Optics – one or more surfaces or lenses coated. Light loss up to 35%.
- Fully Coated – all air-to-glass surfaces are coated. Light loss up to 17%.
- Multi-Coated – one or more surfaces or lenses coated with multiple layers of chemical film. Light loss up to 11%.
- Fully Multi-Coated – all air-to-glass surfaces have multiple layers of chemical film. Light loss is limited to less than 5%. This type of coating of lenses ensures the brightest possible image and is best for observing the night sky.

PRISMS

Binoculars employ prisms to correctly orientate the image from the inverted reversed image you would see in their absence. The prisms also provide multiple light paths so that binoculars can be much shorter than a telescope with the same magnification and objective lens aperture.

There are two basic prism designs: 'Porro prism' (off-set barrel) and 'Roof or Dach prism' (straight barrel).

Roof or Dach prisms are expensive to produce but result in binoculars with a more slimline design. Porro prisms provide increased image depth, and so produce a more 'life-like' image.



Most prisms these days are made with BaK4 optical glass which will give a round image when viewed through the eye lens at 30 cm. Some manufacturers still use the cheaper BK7 glass which will have a slightly hexagonal image and can result in vignetting and a decrease in image quality. BaK4 is the preferred glass for quality binoculars.



The focussing mechanisms

Before you can focus binoculars, you must set them specifically for your eye separation by moving the two halves (or barrels) closer together or further apart until you only see one field of view.

Good quality binoculars have both a central focussing wheel as well as a diopter adjustment on the right barrel which is used to compensate for the difference between an individual's strong and weak eye. This is set at zero before you focus. Looking only through the left side, you use the centre focus knob to bring the object into sharp focus on the left side. Then check the right side and if it is not in focus, use the diopter adjustment until a sharp focus is attained. If you are wearing glasses, you should not have to move the diopter adjustment.

Some cheaper binoculars have 'fixed-focus' often incorrectly called 'auto-focus'. Factory preset at infinity, most will be 'relatively' in focus from about 13 m (at 7x) or 25 m (at 10x) to infinity. Virtually all lack the ability to obtain genuinely sharp images with the absence of a focus knob. Also, the absence of a focusing-control mechanism precludes the ability to adjust for myopia (short-sightedness). In addition they do not have a diopter adjusting mechanism.

[Note: Binoculars that have PCF on them are Porro prism Centre Focus binoculars, while the letters DCF denote a Dach prism Centre Focus binocular.]

Waterproof

Most binoculars are not water proof, or even water resistant. Some may be fog proof, but this does not necessarily mean that they are water proof.

Waterproof means that the binoculars have been sealed to a watertight condition and could be submerged without damage, although most people would never willingly submerge their binoculars. Very often waterproof binoculars have been purged with the inert gas nitrogen to prevent fogging up under certain conditions. This can be a bonus for anyone contemplating binoculars for astronomy. It is a common mistake to assume that binoculars enclosed in rubber are waterproof when they are not. The only benefit of a rubber coating is to provide a better grip and protection against impact damage.

Care and Repair of binoculars

People who have bought a good quality pair of binoculars, 'don't really own them but are merely looking after them for the next generation'. For this to happen though, you must care for your binoculars correctly: always put the strap over your head to avoid dropping them, avoid exposing them to moisture (unless they are definitely waterproof), only clean the lenses with a soft, lint-free cloth or lens tissue (having first removed any harmful debris with a blower brush), do not touch the lenses with your fingers as skin oils can damage the coatings, always return the binoculars to their carry case, and if your non-waterproof binoculars do accidentally get wet take them to a qualified technician to prevent fungal growth occurring inside the barrel.



Summer night skies

Get out your binoculars over the holiday season and observe the summer Milky Way. If you are away from city lights, the Milky Way and constellation of Orion should provide spectacular night viewing.

On 6 December Venus and Mars will be close together in the pre-dawn night sky, and by 10 December they will be just below the Moon at about 4.45 am for those of you of can rise early!

Some of the highlights from now until February will be the return of the two gas giants Saturn and Jupiter which make great viewing.

On 25 December, Saturn will rise at 8.24 pm and by 10.30 pm it will high enough to see well. By mid January it will be rising at 6.45 pm. Jupiter will be rising just after midnight at this time and you will need to wait until at least 2.30 am to catch a good view of it. By 14 January, Saturn will reach opposition and be sitting high above Castor and Pollux (the twins of Gemini). On

24 January, it will be very close to the full Moon. Jupiter will be rising earlier around 11 pm by mid-January and will be near the bright star Spica (alpha Virginis). By 31 January, Jupiter will be within 0.9 degrees of the Moon! In February Saturn will be in the night sky all night for the whole month, rising around 6 pm at the beginning of the month and at 4 pm by the end of February. Jupiter will begin its retrograde motion in early February and will remain about 7 degrees from Spica for the entire month.

There should be some great meteor showers in December. The Geminids peak on 13 December (up to 120 per hour!) and since there is a New Moon on 12 December the dark sky should allow them to be more easily seen, hopefully even in Sydney despite the city lights!

The alpha Centaurids will peak on 8 February. This shower whilst not rich in numbers is known to have many fireballs with persistent, long trains normally yellow to bluish in colour. These can be fun to watch.

Don Whiteman

Ed: Remember, buying binoculars is like buying anything else – you generally get what you pay for. Quality binoculars are not cheap – and cheaper binoculars do not have good optics!

If you buy quality binoculars and a camera tripod to mount them on, you will often find that they will outperform most cheap telescopes for night sky viewing. Beware of claims of cheaper telescopes having magnification up to 600x and seeing trillions of km into space, etc which are usually empty promises and do not match the photos on the box! Such telescopes make great coat-hangers or door-stops! It is advisable to always purchase your binoculars or telescope from a reputable dealer, such as The Binocular and Telescope shop, or similar, not from a department store with Christmas specials that are often not so special!

★ WIN ONE OF TWO COPIES ★

ASTRONOMY 2005 – A PRACTICAL GUIDE TO THE NIGHT SKY

by Glenn Dawes, Peter Northfield, Ken Wallace

This is for beginners to advanced amateur astronomers for observing the night sky either with their eyes, binoculars or a telescope.

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With its many pages of facts, figures, charts, maps and illustrations of stars and planets for 2005, this book is great for science teachers to guide students in observing the night skies. All sky-watchers should have a copy.

It is available from book, telescope and Australian Geographic shops, or direct from Quasar Publishing (www.quasarastronomy.com.au) whose website offers much useful information.

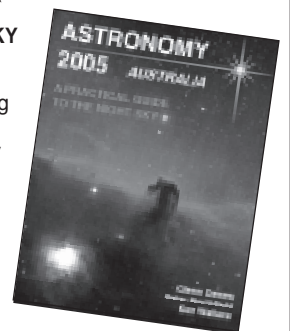


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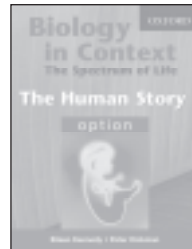
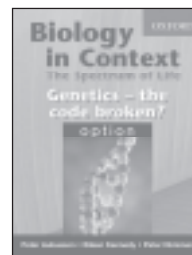
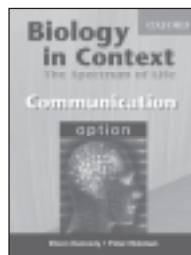
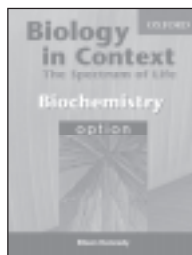
These are a companion to *Biology in Context: The Spectrum of Life* (2nd ed). These full-colour texts meet the requirements of the revised HSC Biology syllabus and have the same format as the core student text. These full-colour texts are well-researched, readable and are linked to key syllabus points. They include investigations, revision and exam questions and answers, a glossary, great illustrations, plus many useful website addresses.

QUIZ QUESTION: What name is given to an infectious protein particle?

Winner for SciTalk 3/04: *Biology in Context: the spectrum of life* (2nd ed): student text & CD (\$79.95), donated by Oxford Uni Press, was won by Sally Staniforth, Coolah Central School.

Answer for SciTalk 3/04: Kidney

HOW TO ENTER: Send an answer to the Quiz Question, your name, school, address, & home ph. no. on the back of an envelope to: Competition Corner, PO Box 442 Harbord NSW 2096 – by 21 December 2004.



Big fines for taking seahorses

SEAHORSES are now protected from exploitation under new rules introduced by the NSW state government in July this year, with huge fines (up to \$11 000 for individuals/\$55 000 for corporations) and jail terms (up to 3 months) facing anyone catching them without a permit from NSW waters. It is hoped that this will end the illegal trade in seahorses, many of which are used in traditional Chinese medicines, as souvenirs and to stock aquariums.

Councils will need to take a lot more care when fixing shark nets across beaches, so that seahorses are not damaged.

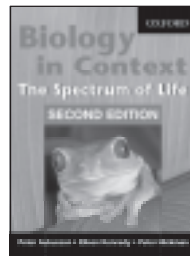
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SciTalk is a newsletter for secondary Science educators. It is produced quarterly and sent FREE-of-charge to all secondary Science faculties in schools and TAFE throughout NSW and the ACT. *SciTalk* aims to provide science teachers with up-to-date information, important dates, the latest products available, plus 'what's on' in various excursion venues.

Please pass *SciTalk* on to all Science teachers at your school so they can benefit from it – or put it up on your notice board for reference. Contributions and advertising for *SciTalk* are welcome ... see below.

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- *SciTalk* No. 1–February 2005 ... Jan 24
- *SciTalk* No. 2–June 2005 ... April 16
- *SciTalk* No. 3–August 2005 ... July 2
- *SciTalk* No. 4–November 2005 ... Sept 24

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