

SciTalk

ISSN 1323-7667

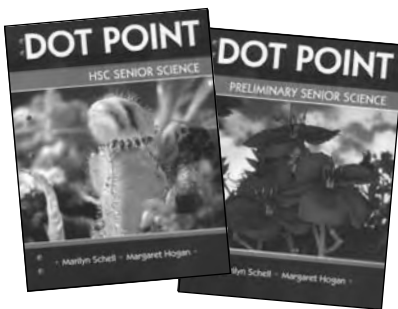
Number 3 – August 2007

Book Giveaway

WIN these DOT POINT books ...

- **HSC SENIOR SCIENCE**
- **PRELIM. SENIOR SCIENCE**

by Marilyn Schell & Margaret Hogan



Prelim ISBN: 978 0 85583 573 6
HSC ISBN: 978 0 85583 581 1



RRP: \$39.95 ea
Published by Science Press

These books cover every dot point from the Senior Science Syllabus. Each dot point has questions and answers that students should be able to do if they want to achieve well in their Preliminary Senior Science exams and in the HSC Senior Science exam. They also include questions on the first-hand investigations.

TO WIN: Send in your name, school and school address, on the back of an envelope by **21 September 2007** to

Book Giveaway, PO Box 442, Harbord 2096

★ ★ ★

Winner for SciTalk 2/07

Congratulations to Katherine Moore, Young High, who won Dot Point HSC Biology & Preliminary Biology (\$39.95 ea) published by Science Press.

★★ ATTENTION ★★

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

- 1.
- 2.
- 3.
- 4.
- 5.

Please return to file or noticeboard.

PRIZES TO WIN!

See pages 1, 4 & 12

Send in your entries now

(ALL IN THE ONE ENVELOPE if you prefer!)

This SciTalk & past issues are available at <http://homepage.mac.com/robertgarner>

Past HSC Papers with Worked Solutions 2001–2006

- **Biology** • **Chemistry** • **Physics**
- **Earth & Environmental Science** • **Senior Science**

All books contain CORRECT WORKED ANSWERS that would score full marks in the HSC. The answers are an appropriate length, indicative of the marks awarded. This is important as it provides students with the correct feedback on how much they should write.

Each book includes:

- a **QUESTION BY QUESTION TOPIC GUIDE**
- a **GUIDE ON HOW TO ACHIEVE SUCCESS**
- a **GLOSSARY OF EXAMINATION TERMS**
- comprehensive explanations for all multiple choice questions
- ALL diagrams, tables, graphs & photos used as a stimulus in the HSC exam questions
- answers to ALL option questions.

These books have been prepared by Science teachers who are experienced in HSC marking, HSC Advice Line and in advising and teaching students on HSC exam preparation and techniques. Their answers are what students and teachers have depended on since 1981 – they are the type of answers that students are expected to write.

Get your orders in now for these books. **Special school prices are available** – see page 7.

Go for quality ... get better value for your \$\$!

Odlum & Garner books are produced by Science teachers for science teachers & their students



★ NOW OUT ★



Why pay more?

SPECIAL SCHOOL PRICES FOR FUN DAYS FOR SCHOOLS at Luna Park Sydney

BOOK NOW THROUGH PHYSICS IS FUN

FOR CHEAPER DISCOUNT PRICES AND

SO YOU WILL NOT HAVE TO PAY GST (IF DOING A CURRICULUM-BASED PACKAGE)

Please tell ALL the other staff at your school !

Save \$\$\$... special DISCOUNT PRICES FOR SCHOOLS

Enquiries/bookings: (02) 9939 6107 ... see p 6 for full details

INSIDE SCITALK ▶▶▶▶

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Diary Dates 2007



Update on BOS matters

Regularly check the BOS website to ensure you have the latest information. It contains syllabuses, past exam papers, Official Notices, Board Bulletins, a statistics archive & more.

Stage 6 Science syllabuses references to Science Years 7–10 Syllabus (BOS 24/07, 25/07, 26/07, 27/07, 28/07)

The web versions of all Stage 6 Science syllabuses have been updated to align the numbering and wording of the Assumed Knowledge statements in the Preliminary modules with the *Science 7–10 Syllabus*.

Periodic table updated (BOS 31/07)

The periodic table of elements used by the BOS has been updated, in line with IUPAC recommendations. The updated version will be used in the Chemistry and Physics HSC examinations from 2007, and is on the BOS website in the 'HSC Syllabuses' section.

Approved scientific calculators for 2007 HSC examinations (BOS 07/07)

Make sure your students know which scientific calculators are allowed in the HSC. This list is now available at: www.boardofstudies.nsw.edu.au/manuals/calculators_hsc.html

On BOS website:

- HSC Marking Centre Notes & Guidelines
- Past HSC exams and SC Science Tests
- Amended Periodic Table (BOS 22/05)

BOS enquiries:

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

NOTE: Your purchase of the Odlum & Garner Past HSC Biology, Chemistry and Physics books helps to support the production of Past HSC books for Earth & Environmental Science and Senior Science. Thank you to all the teachers who support these projects.

2007 – International Polar Year (& International Year of the Dolphin)

AUGUST 2007

- 18–26 Australian Science Festival, ACT. School Activities: 15–17/8. www.sciencefestival.com.au
- 18–26 National Science Week – *Antarctic Science*. www.scienceweek.info.au/
- 17, 20, 23 Science Week events: Physics is Fun at Luna Park. <http://homepage.mac.com/robertgarner>
- 22 Physics Olympiad Nat'l Qualifying Exam. www.aso.edu.au/ 6125 9645
- 26 Geoscience Australia Open Day. ACT. www.ga.gov.au/education/events, 6249 9859
- 26 Earth Science Week. www.ga.gov.au/education/events, 6249 9859
- 28 Total eclipse of Moon – penumbral eclipse begins 5.52 pm; partial eclipse begins 6.50 pm and ends 10.23 pm; totality lasts between 7.52 and 9.22 pm.
- 29 Biology Olympiad Nat'l Qualifying Exam. www.aso.edu.au/ 6125 9645

SEPTEMBER 2007

- 1–16 Great Australian Night-Stalk. www.perthzoo.wa.gov.au/nightstalk/
- 7 National Threatened Species Day. www.deh.gov.au/biodiversity/threatened/ts-day/index.html & www.deh.gov.au/biodiversity/threatened/information/
- 5 Chemistry Olympiad Nat'l Qualifying Exam. www.aso.edu.au/ 6125 9645
- 13 Physics is Fun at Luna Park Sydney. Enquiries: ph (02) 9939 6107, fax (02) 9939 6105
- 21 Spring equinox

OCTOBER 2007

- 7–13 Earth Science Week 2007. www.earthsciweek.org/ & www.ga.gov.au/about/event/
- 18 Oct–13 Nov HSC exams (see box below for details)
- 19, 22, 26, 29 Physics is Fun at Luna Park Sydney. Enquiries: ph (02) 9939 6107, fax (02) 9939 6105
- 28 Astronomy Open Night & Lecture at Macquarie University. Macquarie Uni E7B. 6–10 pm. (02) 9850 7111, www.physics.mq.edu.au/astronomy/cal.html

NOVEMBER 2007

- 12–16 School Certificate Tests (see box below for details)
- 2, 8, 12, 16 Physics is Fun at Luna Park Sydney. Enquiries: ph (02) 9939 6107, fax (02) 9939 6105
- 23, 26, 29, 30 Physics is Fun at Luna Park Sydney. Enquiries: ph (02) 9939 6107, fax (02) 9939 6105

DECEMBER 2007

- 6, 7 Physics is Fun at Luna Park Sydney. Enquiries: ph (02) 9939 6107, fax (02) 9939 6105

JANUARY 2008

- National Youth Science Forum. Forms to local Rotary club by 15/5/07, interviews in July.
- Only for Yr 11 in 2007. Enquiries: 6125 2777, fax 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.

Learning is a treasure that will follow its owner everywhere.

... Chinese proverb

2007 School Certificate Tests

- 12 November
 - English: 9.20–11.30 am (includes 10 mins reading time)
 - Science: 12.50–3 pm (includes 10 mins reading time)
- 13 November
 - Maths: 9.25–11.30 am (includes 5 mins preparation time)
 - Australian History, Geography, Civics & Citizenship: 12.50–3 pm (incl 10 mins reading time)
- 14–17 November (each school on one of these days)
 - Computing skills test

2007 HSC Science Examination Dates

- 24 Oct Chemistry: 9.25 am–12.30 pm
Senior Science: 1.55 pm–5 pm
- 30 Oct Biology: 9.25 am–12.30 pm
- 5 Nov Physics: 9.25 am–12.30 pm
- 6 Nov Earth & Environmental Science: 1.55–5 pm



The Great Australian Marsupial Night Stalk 1 September–16 October 2007

Many Australian marsupials are on the brink of extinction and need your help. If you would like to help Australian scientists and conservationists, you can take part in this year's Night Stalk.

Anyone can do a Night Stalk survey – all you need is a torch. It's fun! It's free, and easy to do! Get a group together, count the number of marsupials you see in your local bush, record your findings on a spotter's log and send your results to Perth Zoo.

This annual national survey, now in its 10th year, runs from 1 September–16 October, and is designed to collect information about marsupial and feral animal numbers and their distribution.



For more information, please contact:
Lyndsay Fairclough

The Great Australian Marsupial Night Stalk in partnership with Tiwest

Ph: (08) 9474 0497 Fax: (08) 9474 4113

Email: nightstalk@perthzoo.wa.gov.au

Visit: www.perthzoo.wa.gov.au/nightstalk/



Fun Park Excursions



SPECIAL SCHOOL PRICES through Physics is Fun!

WHY PAY MORE? SAVE \$\$\$ ANY FACULTY CAN COME

★ ◆ ★ ◆ ★

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

These days are held throughout the year and are a great way to have FUN learning (see p 6).

Worksheets are available for:

- Primary Science & Technology, English, Maths
- Science 7-10 • Technology • Maths • Photography
- Physics • Senior Science • Biology • Art
- Peer Support • Commerce/Bus. Studies/Tourism

NATIONAL SCIENCE WEEK DATES

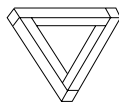
17, 20 and 23 August 2007

Book your date now by ph (02) 9939 6107.

**** Includes complete Risk Assessment package! ****

▶▶▶▶▶▶▶▶▶▶▶▶▶▶▶▶ **OUT AND ABOUT**

SCIENCE CENTRE & PLANETARIUM



University of Wollongong
Squires Way, Fairymeadow
Only 45 mins from southern Sydney.

- ★ **Taking bookings for 2007!**
- ★ **Star Trails Outreach Program 2007** – visiting schools with interactive Science Shows. Ask about our portable Planetarium.
- ★ We have an extensive range of *shows & exhibits*, including:
 - **Stellar Evolution** – planetarium program for HSC Physics
 - **Superconductors & Liquid Nitrogen** – live science show
 - **Zap! Understanding Electricity**
 - **Energy and Motion**
 - **The Changing Earth**
 - **Dinosaurs, Fossils & Coal ... NEW EXHIBITION!**
- ★ School entry includes two floors of hands-on exhibits, a science show, plus a *planetarium / laser show*.
- ★ **Also available:** environmental field trips, science shop, kiosk, science fun bags, membership programs.
- ★ **Book now** for an excursion. Information/bookings: (02) 4286 5000.
Website: <http://sciencecentre.uow.edu.au>

MUSEUM OF HUMAN DISEASE

2007 SCHOOLS PROGRAM

The Museum of Human Disease is a pathology museum at The University of New South Wales.

Our programs provide students with first-hand insights into the nature and progression of disease in its many forms. We offer curriculum-based programs in the following areas:

- HSC Biology** – *The Search for Better Health*
- HSC Senior Science** – *Bionics*
- Junior Science** – *Infectious & Non-infectious diseases, microorganisms*

Further information and bookings

T 02 9385 1522
E museum.hallofhealth@unsw.edu.au
W www.hallofhealth.med.unsw.edu.au



Australian Museum Schools Programs 2007

Involve your students in exciting exhibitions and stimulating curriculum-linked programs exploring nature and culture.

For secondary schools:

- ★ **Sessions with a Museum Educator** – these include:
 - Human Story (Yr 11-12)
 - Fossils (Yr 9-12)
 - Evolution of Australian Biota Trail (Yr 11-12)
 - Geoscience Days (Yr 11-12)
 - Investigations Days (Yrs 7-10)
 - Evolution Trail combo (Yr 9-10)
 - Aboriginal studies talks (Yr 7-12)
 - Site Study for History students (Yr 7-10)
- ★ **K-12 self-guided activities** are also available.
- ★ **Special Exhibitions for schools in Term 4, 2007:**
 - *African Impressions* (1 September to 26 November 2007)
Graphic images of diverse ethnic groups, contrasting landscapes and spectacular animals.
 - *On Track* (1 September to 18 November 2007)
Contemporary Aboriginal Art from Western Australia.
- ★ **Bookings & further information:** ph 93206163, fax 93206072
www.australianmuseum.net.au/visiting/education
- ★ **Australian Museum:**
Open daily 9.30 am–5 pm
6 College St Sydney (opp Hyde Park)



SCIENCE IN FOCUS AT IMAX

31 Wheat Rd, Darling Harbour, Sydney 2000



- ★ **SEA MONSTERS 3D:**
Starts 27 September – available for school bookings now.
Accompany a team of palaeontologists on an unforgettable prehistoric adventure as they work to solve an 82 million year-old mystery from the ocean world of the Late Cretaceous – meet some of the most awe-inspiring creatures of all time: dolichorhynchops, long-necked plesiosaurs, giant turtles, enormous fish, fierce sharks, and the mosasaur.
- ★ **An invitation to all teachers to come to our Term 3 FREE Teacher Preview screenings:**
 - Tuesday 11 September: – Sea Monsters 3D 6 pm
– Dinosaurs 3D 7 pm
 - Sunday 16 September: – Sea Monsters 3D 10 am
– Dinosaurs 3D 11 am
- RSVP Online:** www.imax.com.au/schoolsrvp
- ★ **For bookings & enquiries, contact our education office on:**
ph: (02) 9213 1600 fax: (02) 9281 3833
OR Email: education@imax.com.au
OR Visit our new website: www.imax.com.au/schools

COMBINE A FUN PARK EXCURSION AT LUNA PARK SYDNEY WITH EITHER IMAX / SYDNEY AQUARIUM

Combine your Fun Park Excursion at Luna Park Sydney with Physics is Fun with a visit (before or afterwards) to either IMAX or SYDNEY AQUARIUM for a great action-packed, fun time of interactive learning. These excursions are a great way to demonstrate learning in action.

• COSTS, BOOKING DETAILS & WORKSHEETS – GO TO:

IMAX: www.imax.com.au/schooltimetables
SYDNEY AQUARIUM: www.sydneyaquarium.com.au
PHYSICS IS FUN: <http://homepage.mac.com/robertgarner>



• PLANNING YOUR DAY:

Allow 1 hr for IMAX (any film),
or 2 hrs for a Sydney Aquarium excursion.
Allow 2-3+ hours for Luna Park Sydney (open 11 am–6 pm)



BOOK & PAY SEPARATELY FOR EACH EXCURSION

Science Teachers' Forums



Venue: Children's Medical Research Institute, Westmead, Sydney

When: May and November

Time: 9.45 am–4.30 pm

Content: These one-day Science Teachers' Forums focus on the use of Gene Technology in medical research, concentrating on topics relevant to the HSC Biology syllabus.

Cost: \$55 to cover cost of refreshments and comprehensive lecture notes.



For further information and teachers' forum registration details, contact Jane Fleming on (02) 9687 2800 or email: jffleming@cmri.com.au

Essential Secondary Science Assessment (ESSA) 27 November 2007

What is ESSA?

ESSA is a new Science assessment program that provides information about the scientific knowledge, skills, values and attitudes of secondary students in Year 8.

The assessment is based on the NSW Science Years 7–10 Syllabus, which mandates the teaching of science in contexts that assist students to see the relevance of science and to make meaning of scientific knowledge, understanding, skills, values and attitudes.

Who takes the test?

Participation is mandatory for all NSW government schools with Year 8 students who have completed two years of secondary schooling and learning in science. Non-government schools in NSW and independent

schools outside the NSW jurisdiction are allowed to register for the ESSA 2007 test.

What's in the test?

Students are asked to demonstrate their:

- knowledge and understanding in science
- skills in planning and conducting investigations
- skills in reading, understanding and responding to a range of scientific texts (which are presented in a stimulus magazine)
- skills in critical thinking and problem solving.

The 2007 test will contain three extended response tasks and approximately 75 multiple choice and short response items.

What are the results used for?

The test results provide information about student achievements which are used to support teaching and learning programs. Analysis of these results assists school planning and can be used by schools to monitor development of scientific knowledge, understanding, skills and attitudes through time.

Reporting

Schools will receive detailed reports containing data about individual student achievement as well as achievement of various groups within the school and the school's performance as a whole. Reports will be distributed to schools early in the year following the test. School staff will advise parents about how and when the parent reports will be distributed.




Enquiries: Dagmar Arthur, Leader, ESSA, DET.

Email: essa.program@det.nsw.edu.au

Ph: (02) 9707 6295 Fax: (02) 9707 6287

Website: www.schools.nsw.edu.au/learning/7-12assessments/essa/index.php

WIN A FAMILY PASS TO SYDNEY AQUARIUM




Sydney Aquarium at Darling Harbour is a great science excursion venue. It showcases Australian aquatic habitats, their fauna and flora, information on habitat characteristics, animal adaptations and conservation issues. Bookings are essential. Excursions are self-guided. Information: www.sydneyaquarium.com.au

* * * * *

TO WIN A FAMILY PASS TO SYDNEY AQUARIUM: (for 2 adults & 2 children worth \$66) ... send in your name, school, & school address on an envelope by **21 September 2007** to:
Sydney Aquarium Teacher Offer, PO Box 442, Harbord NSW 2096

WINNER: Melissa Gardner, Killara High, won the Sydney Aquarium family pass for *SciTalk* No. 2–2007.



WIN A FAMILY PASS TO IMAX

IMAX Sydney, at Darling Harbour, is open every day. More than 8 storeys high, it has the world's biggest cinema screen to give audiences the ultimate film experience. IMAX films are both entertaining and educational. Films are constantly changing and cover a wide range of themes. High quality resource materials & teacher guides are provided for school visits.

★ ☆ ★ ☆ ★ ☆ ★

TO WIN A FAMILY PASS* TO IMAX: (for 2 adults and 2 children worth \$50) ... send in your name, school, & school address on an envelope by **21 September 2007** to:
IMAX Give Away, PO Box 442, Harbord NSW 2096

* This pass will be valid for any one film for any session, except public holidays and films advertised as 'no free list'.

WINNER: Sarah Miles, Lurnea High, won the IMAX Sydney family pass for *SciTalk* No. 2–2007.




WIN A FAMILY PASS TO SYDNEY WILDLIFE WORLD

Sydney Wildlife World at Darling Harbour is a great NEW science excursion venue, which opened last September. It displays Australian fauna and flora in 9 different habitats. With over 6000 animals, this will link well to the syllabus. Details: www.sydneywildlifeworld.com.au

* * * * *

TO WIN A FAMILY PASS TO SYDNEY WILDLIFE WORLD (for 2 adults & 2 children worth \$68)

Send in your name, school, & school address on an envelope by **21 September 2007** to: *Sydney Wildlife World Teacher Offer*
PO Box 442, Harbord NSW 2096.

WINNER: Beth Dulin, Wenona School, won a Sydney Wildlife World family pass for *SciTalk* No. 2–2007.




Science Resources

• ANSTO offers nuclear science teaching resources

New programs developed by ANSTO provide Australian teachers and students with user-friendly information about nuclear science and technology. ANSTO education resources are available on the ANSTO website, are free, may be copied, and teachers may order class sets. To download copies, go to: www.ansto.gov.au/information_for/schools.html

These resources have been designed to help teachers present nuclear science topics as part of the junior science syllabus and for senior-level physics and chemistry.

Specific teaching aids, such as *Nuclear Science in Society* are easy to understand, and topical. They give young Australians a clear understanding of key issues, including radioactivity, life in a nuclear age and applications of nuclear medicine.

ANSTO produces an e-magazine called *Velocity* that features information on a range of Australian scientific breakthroughs, including those of ANSTO, as well as hard copy newsletters specifically on ANSTO-related science and issues called *Atomical*. To subscribe to these newsletters, email your contact details to ANSTO at: enquiries@ansto.gov.au (you can be removed from the database at any time) or call 02 9717 3168.

• Audio-visual resources from FILM AUSTRALIA

There are teachers' notes (written for secondary level) to accompany each of the following films, and they are available for free download from the Film Australia website (www.filmaust.com.au/learning). Order forms and details are also on this website.

★ The Winners' Guide to the Nobel Prize (DVD 55 mins, \$89 incl GST)

This film travels behind the scenes of the world's most prestigious prize and into the minds of two of the people – Australian scientists Barry Marshall and Robin Warren – who won the 'Nobel Prize for Physiology or Medicine' in 2005. These scientists made the remarkable and unexpected discovery that inflammation in the

... continued page 5

Success in Science series:

★ 2 titles NOW AVAILABLE ★

Years 7 & 8 Science Assessment

by Mitch O'Toole

ISBN 978-1-741302-86-8, rrp \$24.95

Published by Five Senses Education

This book has been written to help Year 8 students learn about science and to prepare them for doing tests such as ESSA (Essential Secondary Science Assessment).

It has been designed so that students can use it at home on their own, or with assistance. Full instructions are given (in case students are doing it without a teacher). By working through this book, students will develop some of the techniques needed to answer science test questions, e.g. multiple choice, matching, sequencing, labelling, short answer and extended answer questions.

The book includes TWO Science Assessment Tests that cover the Stage 4 outcomes from the BOS Years 7–10 Science Syllabus. Like ESSA, these two Science Assessments use a stimulus magazine to provide a common context for students who have worked through differing science programs.



Years 9 & 10 Science Summary

by Jeanette Rothapfel & Mitch O'Toole

ISBN 978-1-741302-87-5, rrp \$12.95

Published by Five Senses Education

This book has been written to help Year 9 and 10 students revise and summarise the essential knowledge content of the NSW School Certificate Science course.

Students will do this by using completing cloze passages on the various dot points of the syllabus. The answers are given as completed sentences as "Repetition Reinforces Learning". There are also some practise Multiple Choice questions, plus some work on science investigations.



Audio-visual resources from FILM AUSTRALIA

... continued page 4

stomach (gastritis) as well as ulceration of the stomach or duodenum (peptic ulcer disease) is the result of an infection of the stomach caused by the bacterium *Helicobacter pylori*. In 1982, when this bacterium was discovered by Marshall and Warren, stress and lifestyle were considered the major causes of peptic ulcer disease. It is now firmly established that *H pylori* causes more than 90% of duodenal ulcers and up to 80% of gastric ulcers. The link between *H pylori* infection and subsequent gastritis and peptic ulcer disease has been established through studies of human volunteers, antibiotic treatment studies and epidemiological studies. Marshall and Warren as well as others, have shown that patients could be cured from their peptic ulcer disease only when the bacteria were eradicated from the stomach. Peptic ulcer disease is no longer a chronic, frequently disabling condition, but a disease that can be cured by antibiotics and acid secretion inhibitors. □

★ Reef Route 66 – the colour cycle

(Video 27 mins, \$89 incl GST)

This film is the investigative journey of an environmentalist scientist as he sets out with a cameraman to capture the amazing and spectacular phenomenon that occurs once a year when corals spawn in the Great Barrier Reef and explode into the planet's largest mass-breeding event. It probes issues such as global warming, coral bleaching, pollution and over-fishing. □

★ Life at 1 (DVDs, 2 x 55 mins, \$125 incl GST)

This film unlocks the secrets of child development by following 11 babies and their families for 7 years. Watch the fascinating interplay between nature and nurture. □

★ Who killed Dr Bogle & Mrs Chandler (DVD 56 mins, \$89 incl GST)

This film provides an answer to one of the greatest unsolved cases in Australian crime history. Film director Peter Butt leads intensive forensic scientific and investigative research into this mystery and presents his fascinating findings in this documentary. □

AVAILABLE FROM ODLUM & GARNER. Ph 9939 6107. Fax 9939 6105. PO Box 442, Harbord 2096
<http://homepage.mac.com/robertgarner> AND FROM ALL LEADING BOOKSELLERS

ORDER FORM Please supply:

.... copies Year 7 & 8 Science Assessment ISBN 978-1-741302-86-8 \$24.95 ea

.... copies Year 9 & 10 Science Summary ISBN 978-1-741302-87-5 \$12.95 ea

Name:

School:

Address:

..... Postcode:

Phone no.....

Please send invoice to school: Yes / No (If yes, please send a School Order form.)

Orders of 15+ books (may be mixed) are supplied at 20% discount and are delivered freight free. All other orders attract a delivery charge of \$6.00

Science on the Web

New topics on NOVA: Science in the News – www.science.org.au/nova

● The water down under

Although Australia is such a dry country, many people are literally walking on water

In Australia groundwater provides more than 20% of the water used and is set to become even more important due to overallocation of surface water and the recent drought. It is a source of water for drinking, irrigation and industrial purposes. The most well-known source is the Great Artesian Basin, but there are many other sources. Until recently there has been an 'out of sight, out of mind' attitude about groundwater. The need for a sustainable policy

is now evident, especially as extraction of groundwater can also lead to salinity problems.

● Thinking ahead – fusion energy for 21st century?

Fusion is the oldest, and newest, form of energy – and may play a role in our energy-hungry future

At our present rate of use, experts predict that fossil fuels will become limiting within 50 years. To limit global warming, they believe a reduction in CO₂ emissions by making modifications to existing technologies is needed and to meet the increasing energy requirements of developed and developing countries a new generation of energy production technologies will be required. Some believe that energy produced from nuclear fusion may be one of them, as renewable energy sources such as

Sun and wind alone may not be adequate to meet the needs of a growing world population.

● Probing past and future materials with neutrons

With the opening of OPAL at Lucas Heights, neutron studies will be used more to probe the atomic structure of molecules and materials. Neutron scattering works more effectively than X-rays with lighter atoms like hydrogen and penetrates further into materials than X-rays do. This makes it possible to study samples inside large pieces of equipment such as aircraft engines or under more extreme pressures and temperatures. Neutrons can also be used to investigate the magnetic properties of materials such as superconductors, and to measure in detail the motion of atoms in molecules. □



FUN PARK EXCURSIONS

2007 DATES*

March 16, 19. April 2. May 10, 11.
June 1, 4, 8. Aug 17, 20, 23.
Sept 13. Oct 19, 22, 26, 29. Nov 2, 8,
12, 16, 23, 26, 29, 30. Dec 6, 7.

* Note: **OTHER SCHOOL DAYS**
(not Tues/Wed) are also available

TIME 11 am–6 pm

COST

\$18.50* / student
plus \$17* booking fee / school
Teachers **FREE:** 1/8 primary or
1/15 secondary students.

Entry to Luna Park is FREE. Extra
teacher ride tickets are \$22.00* ea.

* plus 10% GST (schools can claim this back
if doing a curriculum-specific excursion).

**JOINT EXCURSIONS
SPECIAL EDUCATION PRICES
ONLY THROUGH PHYSICS IS FUN**

A RISK ASSESSMENT, TAX INVOICE and BOOKING FORM

are available on our website at:

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

Come for a great day. Hands-on learning is fantastic fun!

Save \$\$\$... Why pay more?
We offer the cheapest
DISCOUNT SCHOOL PRICES

**ANY school faculty can book a FUN DAY
OR EDUCATION DAY at Luna Park Sydney
through Physics is Fun and save \$\$\$.**

Numbers are limited to ensure minimal
queues. Come and join us for a fun-filled day
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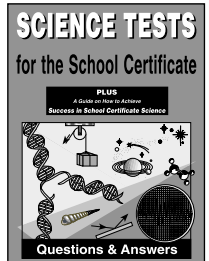
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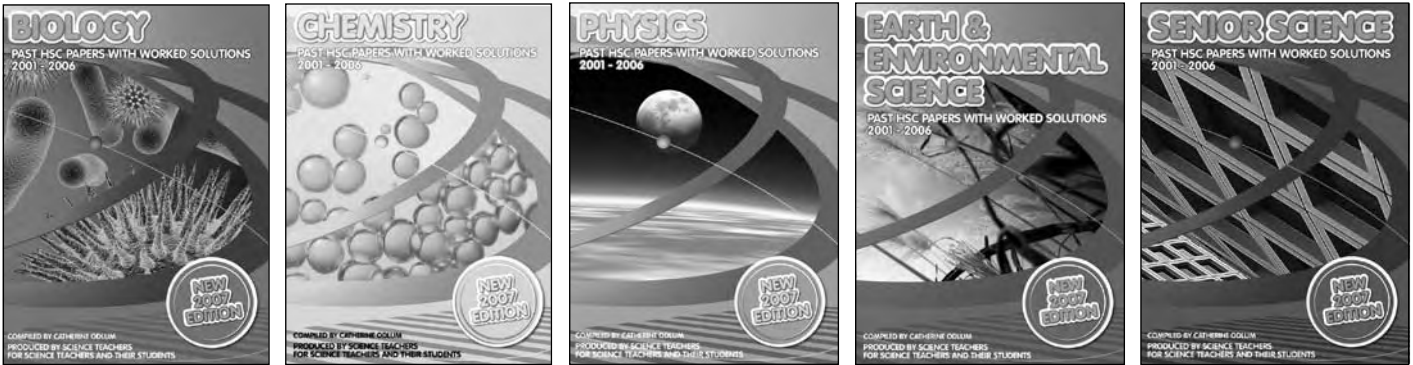


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Photo Spot Anther on a stalk from *Galium aparine* flower

Galium aparine is a small climbing plant, with tiny white flowers from the family Rubiaceae. It is an herbaceous annual plant, but easily maintains itself by self-sown seedlings.

Often called goosegrass or cleavers, it has a number of other names such as bedstraw, burrweed, catchweed, coachweed, common bedstraw, stickyweed, sweethearts, and velcro plant. It is native to North America and Eurasia, but is now found in many parts of world including Australia (mainly WA), Britain, and Wales.

The long stems of this climbing plant sprawl over the ground and other plants or fences, reaching heights of 1–1.5 m, occasionally 2 m. The leaves are simple and borne in whorls of six to eight. Both leaves and stem have fine hairs tipped with tiny hooks, making them cling to clothes and fur much like velcro. The white to greenish flowers are 2–3 mm across, with four petals. It flowers in early spring to summer, with the flowers occurring in most of the leaf nodes. The seeds are also covered with hooked hairs (a burr) that cling to animal fur, aiding in seed dispersal.

Galium aparine is a common weed in hedges and other low shrubby vegetation, and is also a common weed in arable fields, as well as gardens. As they grow quite rampantly and thickly, they end up shading out any small plants that they overrun. The seeds are similar in size to cereal grains, and so are a common contaminant in cereals since they are difficult to filter out. The

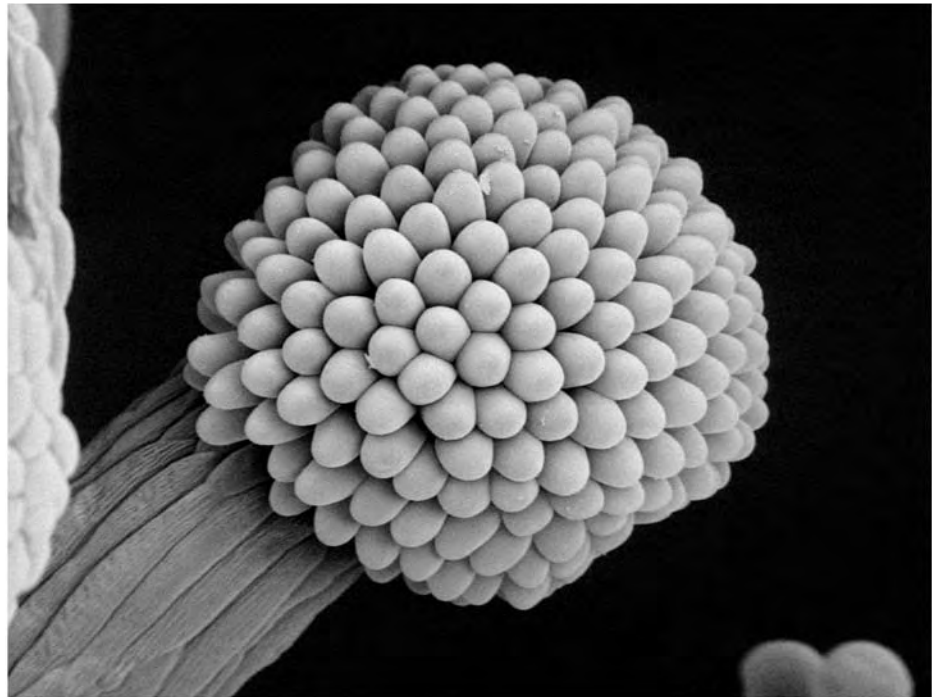


FIGURE 1: An anther in a flower from a *Galium aparine* plant. Magnification is approx 1000 x. This photomicrograph was taken by Sue Lindsay, Australian Museum, with a scanning electron microscope.

presence of some seed in cereals is not considered a serious problem as they are not toxic. When dried and roasted, the fruits of this plant can be used to make a coffee-like drink. The plant can also be made into a tea.

The plant was traditionally used to treat skin diseases. It has also been used as a diuretic, for healing wounds, for lowering

blood pressure and body temperature, as well as for cystitis. The whole plant is considered rich in vitamin C. Its roots produce a red dye, and the tea has been used as an antiperspirant (by the Chinese), and as a relief for head colds (home remedy), restlessness, and sunburn. As a pulp, it has been used to relieve poisonous bites. □



FIGURE 2: A stem with flowers from a *Galium aparine* plant, showing the leaf arrangement in whorls of six and the small white flowers.

What is an anther?

An anther, as shown in the top photograph, is on a stalk and is part of the stamen in a flower. The stamen is the male part of a flower. The anther produces pollen, the male sex cells.

For fertilisation to occur, pollen must be transferred to the ovary. The ovary is located in the pistil, or female part of the flower. The pistil contains the ovary, the style, and the stigma. Inside the ovary are the ovules. Each ovule contains an egg cell. So when an egg cell joins with a pollen cell, a seed may be produced.

For the pollen to reach the ovary, it must land on the stigma. When that happens, the pollen cell germinates resulting in a pollen tube growing down into the ovary. Inside the ovary are the ovules, which contain egg cells. When an egg cell joins with a pollen cell, a seed may be produced. Then the ovary becomes a fruit. Thus a fruit is a mature ovary holding the seeds.

How does pollen get from an anther to the stigma?

A flower garden is alive with insects. They are all after the nectar, which the flowers produce, near the bottom of the pistil. Flowers produce nectar to draw insects to them. Insects like butterflies, wasps, and bees come to get the nectar. As they land on the flower to collect the nectar, some of the pollen is brushed onto the hairs on their legs and body. The insect then carries the pollen to the next flower, and pollination takes place. Some plants rely on the wind, rather than insects, to spread their pollen. So these kinds of plants do not usually have pretty flowers as they do not need to attract insects.

AUSTRALIA'S OUTSTANDING SCIENCE OLYMPIANS

The students representing Australia in the 2007 Asian Science Olympiads held during July in Shanghai (Physics), and the International Science Olympiads in Canada (Biology) and Moscow (Chemistry) achieved great results. Their medal tally was 5 Silver, 4 Bronze, and 2 Honourable Mentions.

The Australian Science Olympiad (ASO) program enables students to enhance their scientific knowledge, understanding and skills. Of the 2 300 Year 11 students across Australia who were nominated by their teachers to sit the ASO National Qualifying Exams in Physics, Chemistry and Biology. 58 students went on to be ASO Scholars and attended a residential training school in Canberra. The teams were selected after completing a final exam in March and 16 students represented Australia.

As Mary Anne King, Acting Executive Director, Australian Science Innovations, said, "The International Olympiads are the science equivalent of the Olympic Games. The Australian Science Olympiad teams achievements at an international level reflect the outstanding talents of our science students and the hard work and dedication of their teachers."

Congratulations to the following students who gained an award:

● **PHYSICS:** 8th/29 countries

38th International Physics Olympiad

1 Silver Medal – Reiner Pope (Fort St HS, NSW); 2 Honourable Mentions – Kathryn Zealand (Brisbane Girls Grammar, QLD) & David Johnston (Centralian Secondary College, NT). Kathryn Zealand also had the best score among female students.

● **CHEMISTRY:**

42nd/68 countries

39th International Chemistry Olympiad

2 Silver Medals – Kartik Ramesh (Sydney Grammar, NSW) & Andrew Tulloch (Christ Church Grammar, WA); 2 Bronze Medals – Jim Ge (Sydney Grammar, NSW) & Nicholas Malouf (Sydney Grammar, NSW).

AUSTRALIAN
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● **BIOLOGY:** 33rd/49 countries

18th International Biology Olympiad

2 Silver Medals – Eshan Affan (Normanhurst BHS, NSW) & Dorothy Wai (James Ruse Ag HS, NSW); 2 Bronze Medals – Genevieve Martin (Kilvington Girls Grammar, VIC), Nicole Rollings (Sydney GHS, NSW).

* * * * *

Enquiries: ph 6125 9645, www.aso.edu.au □

Science Updates

Supercapacitors – devices for storing mobile energy

CSIRO researchers have recently developed supercapacitors—these are an electrochemical capacitor that can store more energy than a capacitor and deliver this energy much faster than a battery. With modern life being so reliant on batteries, supercapacitors promise to give safer, lighter, more powerful and longer lasting mobile energy storage.

Batteries can store lots of energy but have low power and discharge their energy relatively slowly. They cannot deliver energy quickly, whereas supercapacitors can, e.g. when an appliance is switched on or an electric car accelerates.

The advantages of supercapacitors are that they can be recharged quickly, they can be used in conjunction with a battery and this will extend the battery life by up to 5x, they can be made in any shape or size, retrofitted onto existing designs, and are made from low-toxicity materials.

Supercapacitors will allow manufacturers to use smaller, lighter and cheaper batteries, and to no longer need to fit oversized batteries to cope with sudden surges in power. Supercapacitors will have many applications from hybrid-electric vehicles, e.g. ECommodore, to notebook computers, digital cameras, mobile phones, and many more devices. □

[From: www.csiro.au/science/is2v.html]

Free-Drifting Icebergs: Hot Spots of Chemical and Biological Enrichment in the Weddell Sea

The proliferation of icebergs from Antarctica over the past decade has raised questions about their potential impact on the surrounding pelagic ecosystem. Two free-drifting icebergs, 0.1 and 30.8 square kilometres in aerial surface area, and the surrounding waters were sampled in the northwest Weddell Sea during austral spring 2005. There was substantial enrichment of terrigenous material, and there were high concentrations of chlorophyll,

krill, and seabirds surrounding each iceberg, extending out to a radial distance of 3.7 kilometres. Extrapolating these results to all icebergs in the same size range, with the use of iceberg population estimates from satellite surveys, indicates that they similarly affect 39% of the surface ocean in this region. These results suggest that free-drifting icebergs can substantially affect the pelagic ecosystem of the Southern Ocean and can serve as areas of enhanced production and sequestration of organic carbon to the deep sea. □

[From: *Science* 27 July 2007: Vol. 317. no. 5837]

Carpentaria Ghost Net Program

Northern Australia is under attack by a new threat – ghost nets. These are fishing nets that have been accidentally lost, abandoned or deliberately discarded, but continue to 'fish' indiscriminately.

Australia's proximity to intensive fishing operations in neighbouring regions, the difficulties in surveillance and enforcement of existing fish management arrangements with these neighbours and the particular configuration of prevailing winds and currents makes the Gulf of Carpentaria particularly susceptible to this threat.

Due to its unique shape and location, the Gulf of Carpentaria acts as a catchment for marine debris from the entire Indo-Pacific region. Nets are swept in by the monsoonal winds over summer, aided by the south-east trade winds during the winter season. The result is a steady stream of nets all year round. The Gulf also has a strong circular current which means the nets are stuck in an endless cycle of ghost fishing, bringing with them a huge and devastating catch of precious marine life.

It is estimated that only 5% of these nets originate in Australia, so it is going to be a long and difficult problem to fix up. The Carpentaria Ghost Nets Program has started work to collect and remove these nets from accessible coastline to stop them re-entering the ocean. Animals, such as turtles, are released from the nets if they are still alive. The

Sea Ranger teams that do this work are both trained professionals and volunteers. Their job is not going to be easy, e.g. one Taiwanese net hauled in recently weighed 6 tonnes, was 19 km long and took 5 hours to get from the water's edge to the landfill site. □

[From: *Waves* Vol 13 No. 2, 2007]

Printer emissions can risk health

Some printers release tiny airborne particles that can enter human airways and cause anything from increased respiratory irritation to effects on the cardiovascular system and cancer, new research shows. Workers face a potential health threat from office laser printers that emit large amounts of tiny particles into the air. The researchers do not know the chemical makeup of the particles or how they are released. But they recommend good office ventilation to minimise the chances of particles entering the airways.

They classified 17 of the 62 printers as 'high particle emitters'. One printer released particles, under experimental conditions, at a rate comparable to the particle emissions from cigarette smoking. But 37 of the printers were non-emitters. The study found printers emitted more particles when the toner cartridge was new and when printing images and graphics, as these require greater amounts of toner. These findings were made by chance while investigating the efficiency of ventilation in protecting office workers from outdoor pollution. The researchers tested a large open-plan office in the Brisbane CBD, surrounded by busy roads and about 120 metres from a freeway. They soon discovered that the indoor sources of pollution were far higher than the outdoor sources. □

[From: *ABC News in Science*, 31/7/07]

"Be curious always! For
knowledge will not acquire
you: you must acquire it."
... Sudie Back



Great feats of the past ... and our Spring skies

... Don Whiteman

George Ellery Hale, along with others such as Russell W Porter, had the vision to build the 200-inch Palomar Telescope, a giant optical telescope, which was their generation's equivalent of our Hubble Space Telescope.

For over 45 years the 200-inch Palomar Telescope was the largest telescope in the world. The hardships that were encountered on the way make it a wonder of the scientific world. Its 200-inch mirror was DOUBLE anything previously attempted and weighed 14.5 tons. Even the dome weighs 1 000 tons. The telescope tube weighs 150 tons. Final figuring of the mirror was done by hand over a period of a year. In all, 20 years were invested in its engineering and construction.

The US was in the depths of the depression in the 1920's when George Ellery Hale (1868-1938) began to raise funds to build the Palomar Telescope. Hale had previously in the 1890's secured funding for the establishment of the University of Chicago's Yerkes Observatory, in nearby William's Bay, Wisconsin. The observatory, which became fully operational in 1897, still harbours the world's largest refractor telescope – the 40-inch Yerkes Refractor. Hale also secured funds for the establishment of a solar observatory on Mt Wilson in California, of which he became director in 1904, and which long remained the best solar observatory in the world. He then convinced John D Hooker to contribute money along with the Carnegie Institute to fund what was going to become the largest telescope in the world – the 100-inch Hooker Telescope – completed in 1917.

Then in 1928 Hale secured a grant of US\$6 million from the Rockefeller Foundation for 'the construction of an observatory, including a 200-inch reflecting telescope'. The site chosen for this was Mt Palomar in southern California, east of San Diego, 1 707 metres above sea level, and, at the time, sufficiently away from city lights – although today the lights are becoming a real problem. Coming Glass Works were assigned the task of making a 200-inch mirror out of a new glass blend called Pyrex, a particularly heat resistant and stable glass that was a relatively new discovery at the time. There were many interruptions to making the telescope, as America went to war, however construction resumed straight after the war. The Palomar Observatory building commenced in 1936 under the guidance of Hale. Unfortunately Hale died in 1938, before his telescope was commissioned in 1949.

Today Palomar Observatory is run by California Institute of Technology (Caltech) and its partner Cornell University. It is used every clear night for research. A bust of George Ellery Hale is on display as you enter the observatory building. The 200-inch Palomar Telescope is named the 'Hale' in his honour.

* * * * *

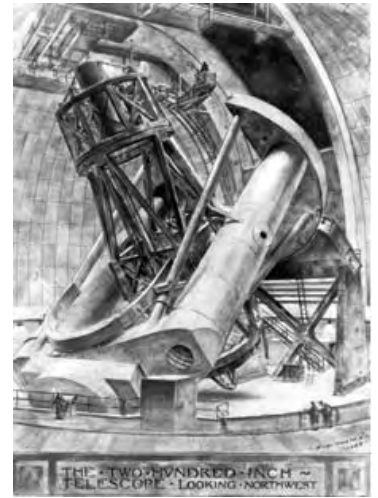
What's coming up in the skies overhead?

AUGUST: By end August (until late July 2008), Venus will be the morning star in the eastern dawn sky. Mars, in Taurus, will rise very early in the eastern morning sky (well into September). Jupiter will be high in the north-west sky after dark and close to the magnitude 1.0 star Antares. Look for it below the Moon around 21–22 August.

SEPTEMBER: Early September to mid-October, Mercury will be in the Virgo constellation and seen in the western sky quite early in the evening.

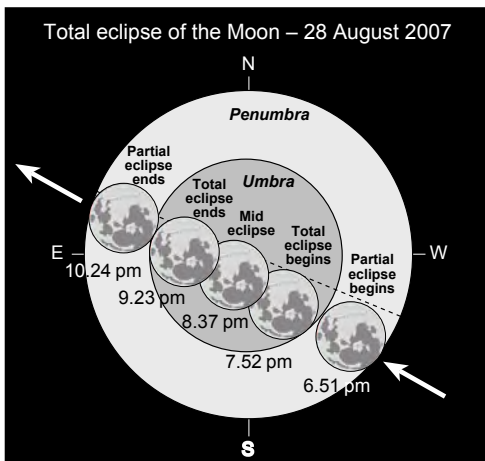
OCTOBER: Mars will be within Gemini and rising around midnight. By now the visual diameter of Mars will be around 10 arc seconds in size as it approaches opposition in December. The whole of October will be the time to look out for the *Orionids Meteor shower* which usually put on a good display with anywhere from 14–31 meteors per hour. The peak night will be 21 October.

NOVEMBER: Mars will rise by 10 pm in the north east. Mars will be very obvious with a magnitude of –1.0 and its size will be over 15 arc seconds making it appear as a big bright red planet. Don't forget the *Leonids meteor shower* happens 10–23 November. This year the hourly rate is predicted at around 10–15 with the maximum expected on 18 November. The *Taurids meteor showers* (North and South) should be also be visible – from late evening to early morning from 1 October–25 November – their maxima being around 5 November (Taurids North) and 12 November (Taurids South).



TOP: Russell W Porter's drawing of the 200-inch Palomar Telescope.

BOTTOM: The author outside the entrance to the dome at Palomar Observatory, which illustrates the massive size of this structure.



Adapted from a NASA diagram

Total eclipse of the Moon ... 28 August 2007

The whole of this eclipse will be seen by those living on the east coast of Australia. Further west, the beginning will be missed, but good viewing from the middle part should be possible. This eclipse can be seen safely with the naked eye (unlike a solar eclipse where it is not safe), but your viewing will be enhanced if you get out your binoculars or telescope.

A total eclipse occurs when the entire Moon moves into the Earth's shadow and is only illuminated by reddish light scattered from the Earth's atmosphere. This will only occur when it is a Full Moon. The Earth's shadow consists of two parts, one inside the other - the outer shadow, the *penumbra*, is where Earth blocks some but not all of the Sun's rays, and the inner shadow, the *umbra*, is where Earth blocks all direct sunlight from reaching the Moon. Only about 35% of lunar eclipses are a total eclipse.

This eclipse will start at a convenient time in the evening with the Moon moving into the Earth's shadow at 6.51 pm. Totality, when the Moon is completely within the shadow, will commence at 7.52 pm. The Moon will start coming out of the shadow at 9.23 pm and the eclipse will end at 10.24 pm.

A sequence of images showing the total lunar eclipse that occurred on 16 July 2000 can be viewed on Sydney Observatory's website at: www.sydneyobservatory.com.au/blog/?page_id=244 and is great for explaining an eclipse to students.

The colour and brightness of a totally eclipsed Moon can vary considerably from one eclipse to another. Since the Moon often takes on a vivid red or orange colour during the total phase, an eclipsed Moon is sometimes referred to as a 'red Moon'.

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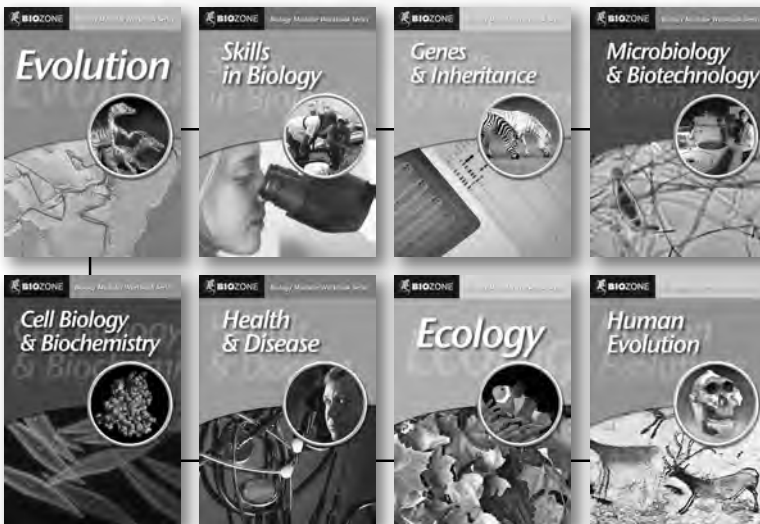
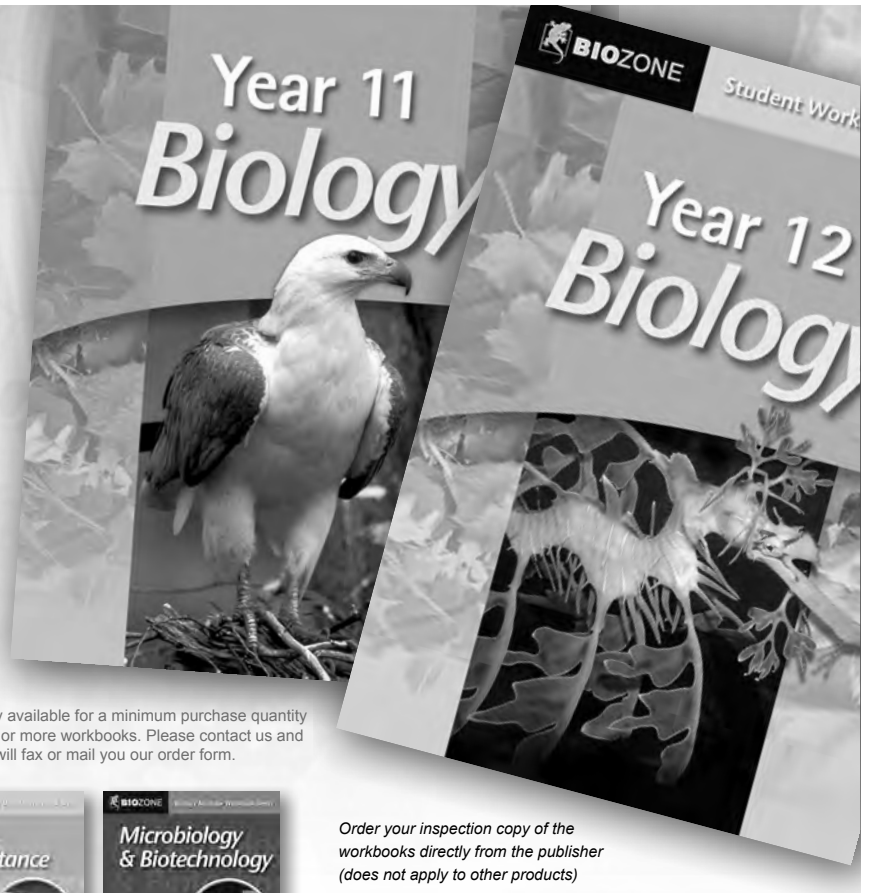
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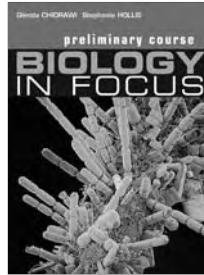
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SciTalk is due into schools mid-term. All contributions for *SciTalk* should be directed to the Editor (see below).

- CLOSING DATES**
- *SciTalk* No. 4–November 2007 ... Sept 28
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 - *SciTalk* No. 2–June 2008 ... April 11
 - *SciTalk* No. 3–August 2008 ... July 4

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