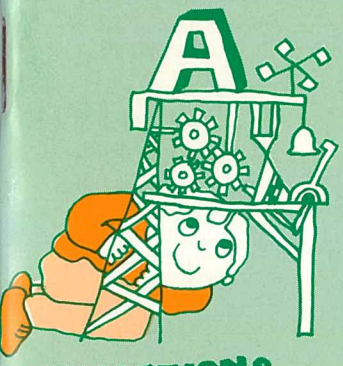
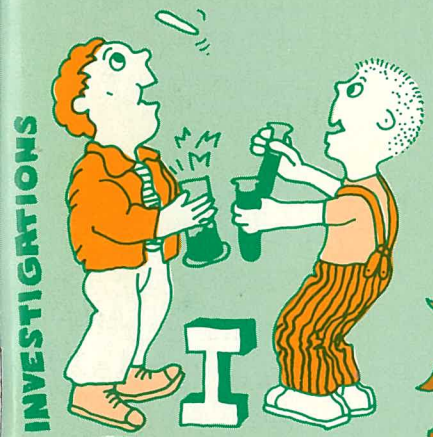
RESOURCE BOOK

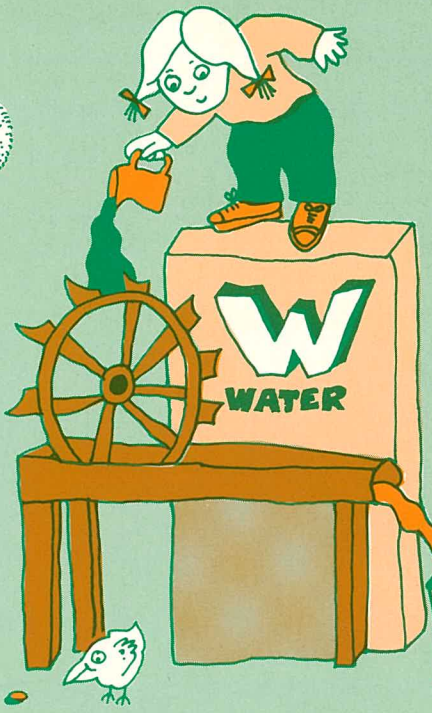
SPONSORED BY CSIRO, STANSENS, BHP + ASTA

An undertaking of the Australian Science Teachers' Association



Australian Science in Schools Week





13th-17th October 1986

AUSTRALIAN SCIENCE IN SCHOOLS WEEK
13–17 OCTOBER 1986

Australian Science in Schools Weeks aims to

- **focus community attention on Science and its importance in the school curriculum**
- **promote the image of Science**
- **involve students in a broad range of Science-related activities**
- **promote Science as being fun**

Resource Book Editor
Helen Burfitt

Cover design
Lesley Gordon

Most Other Drawings
Allan Pennicook

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FOREWORD

March, 1986! And there it hung in the eastern sky, tail to the zenith, proclaiming to the world once more that scientist, Halley, all those years ago, had indeed "got it right".

Some amongst us can still recall seeing comet Halley (C.H.) in 1910, and ancient art records regular past appearances. But this visit was different from all those previous events, because, for the first time, space probes rendezvoused with the comet, transmitting pictures and information back to earth. Thus, in the last 76 years, during which C.H. completed one orbit around the sun to again stand in our heavens, Science and Technology — Applied Science — rocketed humanity into the space age.

These scientific and technological advances have had an immense impact on all our lives. Consider a few of the more significant examples:

In 1910, when C.H. was at its perihelion (closest approach to the sun), the motor vehicle industry was in its infancy; electric windscreen wipers, tubeless tyres, automatic transmissions, air-conditioning and many other attributes of the modern motor car were still to come. Comet Halley had barely started on its journey to the fringes of the solar system when pedal wireless transceivers brought security to Australians in the outback. A quarter of the way around its orbit, fluorescent and neon lights joined the incandescent filament lamp in brightening our darkness. Within another 10 years television was being developed.

As C.H. approached and passed through its aphelion (furthest distance from the sun), radar, nuclear energy and the transistor were born. It was on its return trip to the sun when the first satellite was launched — an advance that was soon to revolutionize communications around the world; jet airliners became commonplace, and, halfway back, men stepped onto the moon. New food processing methods and new artificial fibres were developed — the latter giving us, amongst others, drip-dry, non-iron fabrics.

And, as C.H. zoomed in to swing around the sun, the ubiquitous microprocessor was inexorably pervading our lives, taking over so many previously manually-controlled operations and providing us with such conveniences as automatic banking and instant airline bookings.

Comet Halley is now outward-bound again as it continues unceasingly to orbit the sun, while just as unceasingly Science and Technology continue to change our way of life. For the latter reason, Australian Science in Schools Weeks (ASISW) is of great significance to all of us. It is a week during which students can gain a fundamental understanding of scientific principles that will help them contribute to, and interact with, the technology of the future. At the same time, parents, teachers and other members of the community can gain an awareness of the importance of Science in their everyday lives.

This Resource Book contains stimulating ideas for activities for each day of the week, as well as details concerning the Poster Competition. By joining in these activities of ASISW we can board spaceship "Science" for a voyage of fun and discovery along the path of "Technological Change".

Joy Bear
Senior Principal Research Scientist
CSIRO

(Dr Joy Bear was made a Member of the Order of Australia (AM) in the 1986 Australia Day Honours, for service to Science particularly in the field of Mineral Chemistry.) (Ed.)

NATIONAL POSTER COMPETITION

The Poster Competition has become a highly successful feature of ASISW since its inception in 1984. The National Executive is looking to this year's competition as an excellent way to promote ASISW. Its success will depend on your support and enthusiasm. Please encourage your students to enter. There are only two topics to choose from but their scope is limited only by the imagination of the students.

Topics

- SCIENCE BEYOND 2000
- SCIENCE AND YOU (in other words, what Science means to you)

Categories

- Primary
- Secondary

Requirements

- Approximately 30 × 40 cm in size
- Aim to promote ASISW in some way
- Incorporate the ASISW Logo in the poster
- The poster should be colourful and appealing and contain a slogan or simple message related to one of the two topics
- The poster should be original

Judging Guidelines

- Communication of the message
  Relevance to the topic
  Legibility at a distance
  Clear, original message
  Thought provoking
  Clever use of wording
- Design
  Well balanced and spaced
  Good initial impact
  Effective use of colour
- Technical execution
  Competence of basic drawing
  Attention to detail
  Media well handled
- Creativity
  Imaginative ideas
  Special effects used

Posters are to be sent to State Coordinators in the first instance. For information regarding closing date in each state, contact your State Coordinator of ASISW.

The five best posters in each category for each state will be forwarded to Darwin in early September for the national judging. Lego and Heinemann will continue to sponsor the prizes to be awarded to the 5 National Prize winners in each category. Further sponsorships are currently being investigated.

For further information contact the National Poster Competition Director or your State Coordinator.

Elizabeth Jacob
National Poster Competition Director

SPEAKERS SCHEME

Australian Science in Schools Week provides a special opportunity for teachers and students to meet women and men in Science-related occupations and to learn more about Science in the work-place and its importance to our society.

Many scientific organisations have been approached and are keen to be involved in the Speakers Scheme. Your ASISW State Coordinator has an up-to-date list of contacts who will arrange speakers for you.

Alternatively, establish your own contacts with people working in Science-related fields. It is not difficult to find women and men in your locality who use Science as an everyday part of their work. Try places such as:

- meteorological office
- wildlife reserve
- dairy factory
- pharmacy
- forestry station
- sewage treatment plant
- dental surgery
- hospital
- Telecom office
- geological field station
- abattoir
- garden centre
- fire station
- Pastures Protection Board

In addition, contact can be made with scientists working in universities, colleges of advanced education, CSIRO divisions, and large companies such as BHP, CRA, Shell, BP, etc.. Scientific societies such as the Australian Academy of Science, the Australian Institute of Physics, the Institute of Engineers Australia, the Royal Australian Chemical Institute, etc., can provide advice on speakers from within their membership.

Here are some ideas for you

- Arrange a visit to the work-place of a scientist or someone in a Science-related occupation so that your students can observe how Science is part of that person's everyday work.
- Invite a person in a Science-based career to visit your school and speak to your students about the role of Science in that occupation. Some speakers may have slides or a film to illustrate their work.
- Where access to practising scientists is difficult, organise your students to write to scientists asking them to respond to a few questions about their profession so that these can be shared in a special lesson during Australian Science in Schools Week.
- Arrange a series of visits to local places where Science-based careers can be seen in action. This will help your students to appreciate how Science is an important part of many careers.
- Set up a special area for a scientific display and regular demonstrations at lunchtimes during Australian Science in Schools Week. Students from local primary schools and parents could be invited to visit the display and to observe some spectacular and intriguing demonstrations. Invite a local scientist to give a brief address on the importance of studying Science at school.
- Organise a travelling Science show and visit neighbouring primary schools, shopping centres, etc.. Invite a local scientist to give a brief address. The show could also include several 'magical' demonstrations of scientific principles.
- Invite a local scientist to speak briefly at a school assembly during Australian Science in Schools Week on the occasion of launching your school's ASISW activities, presenting Science awards, etc.

Brenton Honeyman
Speakers Scheme Director

SHELL SCIENCE FELLOWSHIP

Both in 1985 and 1986 two Australian students and a teacher were awarded the Shell Science Fellowship to attend the Singapore Youth Science Fortnight in May/June. This prestigious award is sponsored by Shell Australia and is run in conjunction with the Australian Science Teachers' Association.

The 1986/7 Shell Science Fellowship winners will participate in the activities of the Singapore Youth Science Fortnight as a link with Australian Science in Schools Week. They will also have the opportunity to spend time in the fabulous Singapore Science Centre and take part in a Science Camp run for both Singaporean and other international students.

To apply students, in years 9 or 10 in 1986, should firstly complete an "application of a scientific principle" i.e. produce an **invention** or a **model.** This first part of the student application is best achieved by entering the state Science Talent Search or Science Fair run by the Science Teachers' Association in that state. The better entries in the appropriate "Models" or "Inventions" sections of those competitions will then qualify to apply formally for the 1986/7 Shell Science Fellowship. Selection of the two Australian Students will then be based on:

- the quality of the model or invention i.e. the "application"
- the academic ability of the student
- the interests of the student
- the suitability of the student to represent Australia at an international event such as this.

The final selection category will be determined by an interview of the student by teachers from the Science Teachers' Association in the that student's state.

The Fellowship winners will then be judged nationally by representatives of the Australian Science Teachers' Association, Australian Science in Schools Week and Shell Australia.

For further information, contact either:
Don Hyatt (ASISW National Director) or
your State/Territory Coordinator
(addresses on back cover)

Closing date: November 1, 1986.

A NATIONAL INVESTIGATING COMPETITION FOR PRIMARY SCHOOLS

Yes, at last, a National Investigating Competition for groups and classes of children in all primary schools in Australia.

Great State and National prizes, and every child involved in an entry receives a 'Certificate of Participation'.

The Australian Science Teachers' Association and the LEGO Educational Division (Aust) have devised a competition for classes and groups of primary school children using the ASISW themes:

APPLICATIONS SPACE INVESTIGATIONS
SURVIVAL WATER

It costs $4.00 to enter the competition, and when this is received you will be sent an 'Information Kit' full of ideas to help you get started.

Applications close on **August 30, 1986,** and entries must be in by **October 3, 1986.** The judging of entries will be held during ASISW.

So hurry and give your class the chance to achieve fame and fortune through investigating!

To find out more, contact your local LEGO Educational Consultant, Primary Science Consultant or ASISW Coordinator.

APPLICATION FORM FOR ENTRY TO NATIONAL INVESTIGATING COMPETITION

Please send an information kit to:

Contact name .....

Class .....

School .....

.....

.....

State ..... Postcode .....

Phone number.....

I enclose a money order/cheque for $4.00 payable to "National Investigating Competition'.

Signed..... date .....

Send this application form to
LEGO Australia Pty Ltd
Educational Division
2 Lincoln Street
Lane Cove NSW 2066

DESIGNATED ACTIVITY DAYS

Once again, the acronym **ASISW** has been used to produce themes for each day's activities during Australian Science in Schools Week. As students, teachers and the community celebrate Science on these days, they will know that others across Australia are participating in similar activities in similar ways.

MONDAY
13 OCTOBER — **A**PPLICATIONS DAY

TUESDAY
14 OCTOBER — **S**PACE DAY

WEDNESDAY
15 OCTOBER — **I**NVESTIGATIONS DAY

THURSDAY
16 OCTOBER — **S**URVIVAL DAY

FRIDAY
17 OCTOBER — **W**ATER DAY

The activities suggested in this book are in no way intended to be the only activities carried out during Australian Science in Schools Week. Some activities may need to be modified for climate, resources, and availability of personnel, times and places. All activities chosen should be stimulating and enjoyable, should involve all students and promote a positive image of Science.

APPLICATIONS

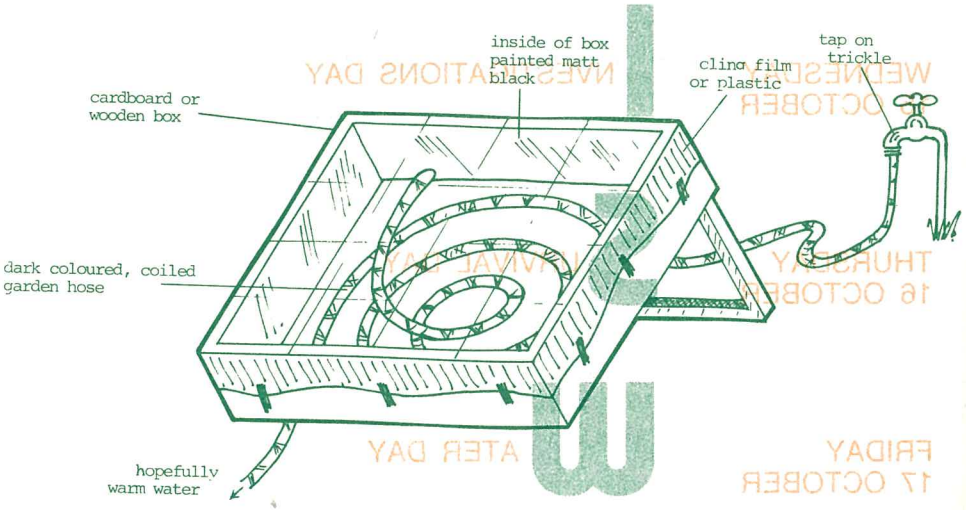
The applications of theory to practice, Applied Science, Technology — all these are encompassed in this theme. It is important to consider Science as having applications in the real world outside the laboratory.

PROJECT LEAP

Using two wire coathangers and six elastic bands, make an apparatus which will move, in part or fully, from a launch pad. Only cotton or string can be used for fastening purposes (no glue, or solder). The apparatus must be accompanied by a report predicting range. Students will make use of conservation of energy and projectile motion concepts. The force displacement curve for the elastic bands can be obtained from a class experiment.

Ian McMurtrie
Scots College, Bellevue Hill, NSW

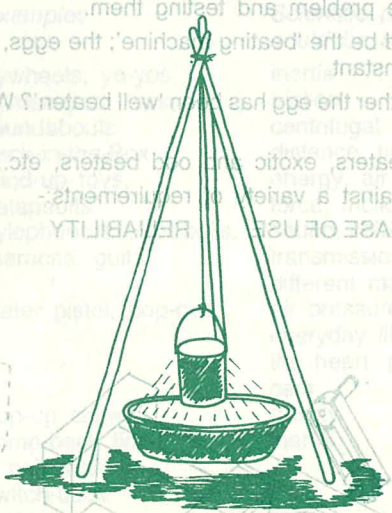
SOLAR HEATER



Set up an apparatus as shown above. The inside and outside of the box should be painted black. Cover the surface with a sheet of glass, perspex or cling film. Point the box towards the sun and start the tap slowly running. You will soon have a trickle of warm water coming from your solar heater. You will have to wait about thirty minutes to get a reasonable quantity of warm water, and may need to experiment to find out just how fast/slow the water flow from the tap needs to be.

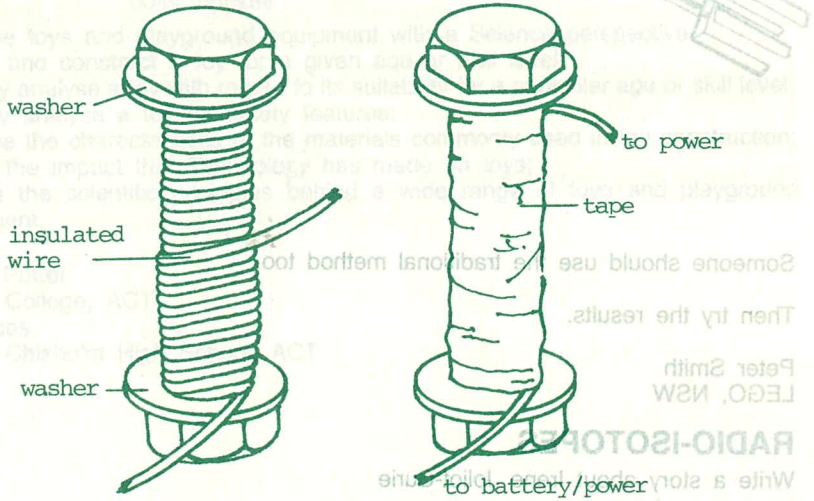
MAKE A SOLAR CUPPA' TEA

Line the inside of an old wash basin with aluminium foil. Paint the exterior of the basin matt black. Erect a tripod above the basin, suspending from it a billy can that has a matt black exterior. Place the billy can at the point where the sun's rays converge. See how long it takes to boil the water. Make this a class/group competition.



MAKE AN ELECTROMAGNET

Neatly wind a piece of insulated wire around a bolt. Fix the wire in place using tape. Join the exposed ends of the wire to the positive and negative terminals of a power supply . . . about six volts. Investigate what types of materials will be attracted to this electromagnet . . . plastic, nails, glass, cotton, copper, etc..



EGGSTRAORDINARY

Here are some fun activities that explore the design problems of a piece of common place kitchen equipment — 'the beater'. LEGO Technic make the job easy but other materials work too.

The job is to design the most efficient way to beat an egg. This means designing various solutions to the problem and testing them.

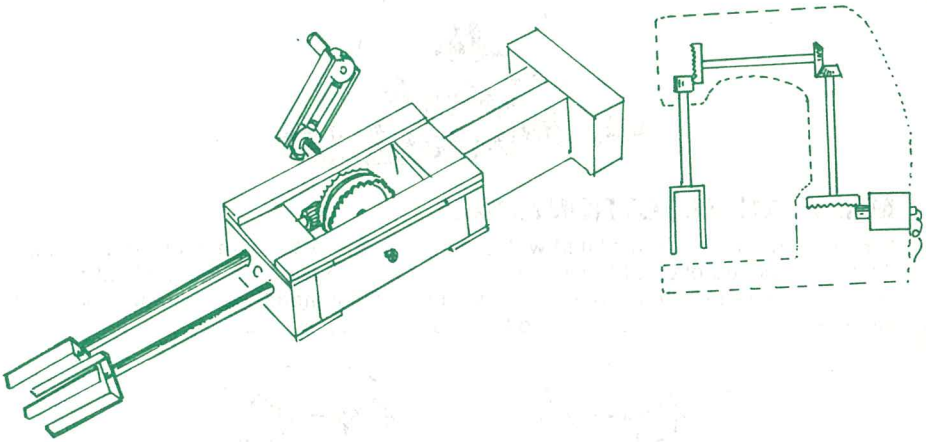
The only variable should be the 'beating machine'; the eggs, bowl, temperature and time should remain constant.

How do you decide whether the egg has been 'well beaten'? What indications are you looking for?

Try motors, multiple beaters, exotic and odd beaters, etc..

Rate each machine against a variety of requirements:-

SIMPLICITY EASE OF USE RELIABILITY EFFICIENCY etc.



Someone should use the traditional method too.

Then try the results.

Peter Smith
LEGO, NSW

RADIO-ISOTOPES

Write a story about Irene Joliot-Curie

SCIENCE FROM TOYS

The emphasis should be on hands-on experiences. Present students with toys with moving parts so that the students are able to investigate their mode of operation. Allow students to dismantle (and reassemble) toys. Where possible use a DESIGN/ PROBLEM SOLVING approach.

Type of Toy	*Examples*	*Scientific principles etc. which could be studied*
Spinning Toys	flywheels, yo-yos, gyroscopes, tops, roundabouts	inertia friction centrifugal force
Spring Toys	Jack-in-the-Box wind-up toys, catapaults	distance, time, speed, storage of energy, air resistance, centrifugal force, friction
Toys which make noises, sound	xylophone, tubular bells, maracas, guitar	sound, velocity of sound, frequency, transmission of sound through different materials
Toys and pumps	water pistol, pop-gun	air pressure, valves, pumps in everyday life, e.g. bicycle pumps, the heart, petrol and oil pumps in cars
Toys and gravity	pop-up clown come-back tin a ball-bearing switch-back	gravity inertia
Optical toys	periscope, kaleidoscope, pinhole camera	light
Flying toys	kites, paper planes, parachutes, boomerangs	aerodynamics
Electrical toys	remote control cars, dolls' houses	basic electricity

- examine toys and playground equipment with a Science perspective;
- design and construct a toy for a given age or skill level;
- critically analyse a toy with regard to its suitability for a particular age or skill level;
- critically analyse a toy for safety features;
- describe the characteristics of the materials commonly used in toy construction;
- review the impact that Technology has made on toys;
- discuss the scientific principles behind a wide range of toys and playground equipment.

Graeme Potter
Copland College, ACT
Vera Lucas
Caroline Chisholm High School, ACT

ERGONOMICS

Design and construct a prosthetic device that will allow a person who has lost the use of their fingers or hand to hold a pen for the purpose of writing.

In the solving of this problem students will need to carry out a variety of tasks. These will include:

1. Clarification of the problem — make sure students understand what is required.
2. Carrying out of research — this may involve a study of the structure of the hand, an analysis of the actual physical process of writing, anthropometric measurements related to various hand sizes, a study of arthritis, etc. and its effect on the hand's manipulative ability.

   Have students consider the various ways of collecting, collating and presenting data.
3. Development of possible solutions in sketch form. Analysis of solutions and the production of prototypes.
4. Trialling of prototypes and assessment of results.
5. Development and construction of final design.
6. Final evaluation.

Teachers should (1) guide *not direct* students through the design/problem solving (ii) question students on the validity of their research methods, resultant data and design solutions (iii) encourage students to always seek the best possible solution.

OTHER DESIGN ACTIVITIES

1. Assemble a selection of discarded materials and construct from them a form which can be totally articulated.
2. Design a device could be rapidly adjusted to accommodate varying sitting positions.
3. Design simple multi-purpose furniture for the Science room to accommodate display, storage, and working space.
4. Design a garment to fit all members of the group which would allow certain physical movements to be made without the garment splitting.
5. Re-design hand grips to replace broken handles on tools and domestic science utensils in the school.

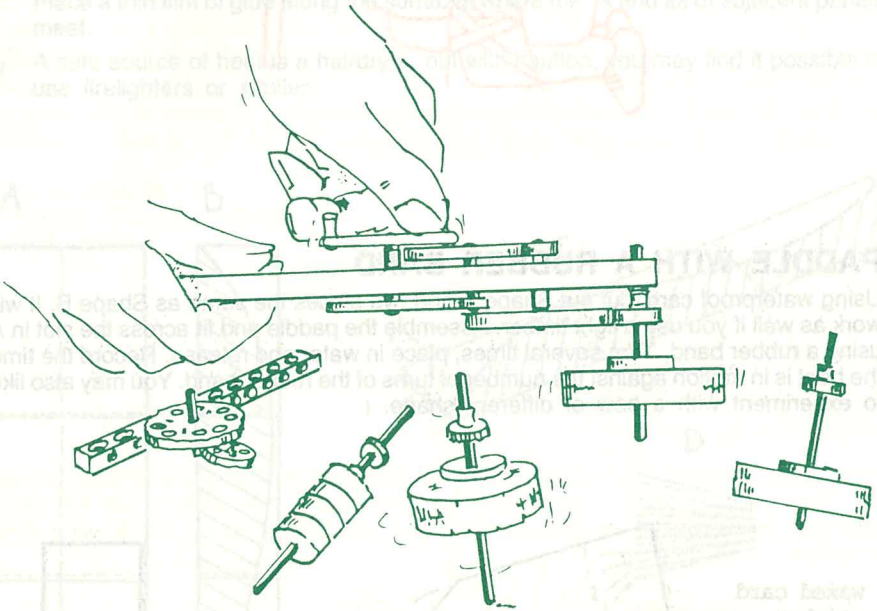
Allan Pennicook
Charnwood High School, ACT

TOP STUFF

Most children have played with spinning tops before. Not many children will have played with a 'Top Launcher'. Even fewer will have played with a 'MULTIPLE TOP LAUNCHER'!

These activities investigate the best designs for the 'Ultimate Spinning Top'. LEGO Technic is the easiest material to use, but other materials work too. The Top is really an object with lots of Kinetic Energy, losing it as slowly as possible — on the spot!

Could you design a 'launcher' that by hand or motor power spins a top so fast that the top would spin for minutes? To do that, the top would have to be very stable! What shape is the most stable? What is the best surface for it to run on?



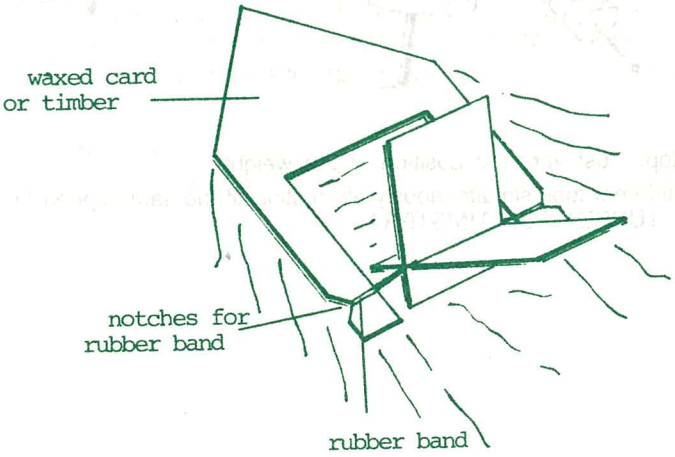
Try *constant mass* tops, just vary the position of the weight.

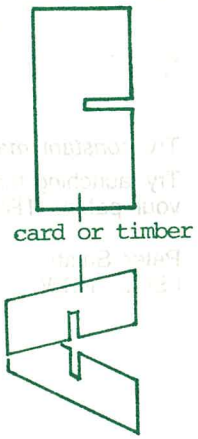
Try launching three different tops simultaneously all rotating at the same speed for your patent 'TRIPLE TURRET TOP TWISTER'!

Peter Smith
LEGO, NSW

PADDLE WITH A RUBBER BAND

Using waterproof card, cut out Shape A and two pieces the same as Shape B. It will work as well if you use a light timber. Assemble the paddle and fit across the slot in A using a rubber band. Turn several times, place in water and release. Record the time the boat is in motion against the number of turns of the rubber band. You may also like to experiment with a bow of different shape.





MAKE A HOT AIR BALLOON

You will need 24 sheets of tissue paper, glue, scissors and a piece of thin wire about 70 cm long.

a. Join the tissue paper end to end as shown, in sets of three.

b. Fold each lengthways as shown at B.

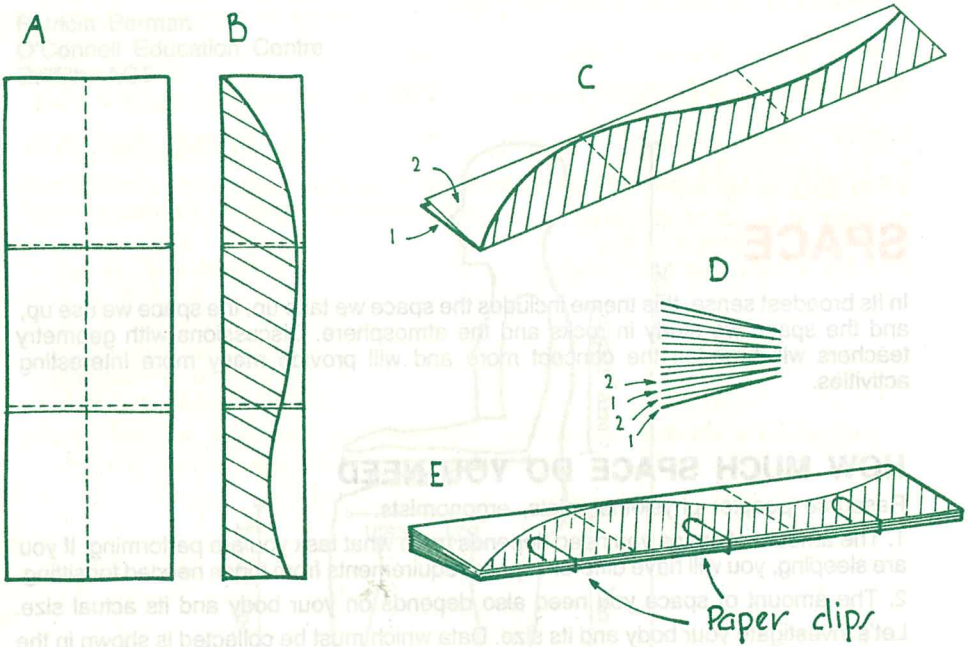
c. Number the bottom flap 1 and the top flap 2.

d. Place each set on top of another, being sure that number 1 flap is always adjacent to number 2 flap.

e. Hold the joined edges together with paper clips, and cut out the shape shown at B and C.

f. Place a thin film of glue along the surfaces where the 1s and 2s of adjacent panels meet.

g. A safe source of heat is a hairdryer, but with caution, you may find it possible to use firelighters or similar.



SPACE

In its broadest sense, this theme includes the space we take up, the space we use up, and the space we study in rocks and the atmosphere. Discussions with geometry teachers will broaden the concept more and will provide many more interesting activities.

HOW MUCH SPACE DO YOU NEED

Resource people: physiotherapists, ergonomists.

1. The amount of space you need depends upon what task you are performing. If you are sleeping, you will have different space requirements from those needed for sitting.

2. The amount of space you need also depends on your body and its actual size.

Let's investigate your body and its size. Data which must be collected is shown in the diagram. This data is referred to as *'anthropometric'* data.

- Find out why.

To collect the data you will need certain measuring tools.

- Determine what measuring tools you need.

Collect the anthropometric data for all members of your class on a data sheet.

- Design the data sheet.

Now let's examine the data and its significance

- You may produce graphs, etc..

Can the following statements be made?

— Males tend to have larger values for all anthropometric data than females at any given age

— One's height will determine the knee to foot (lower leg) length.

— The variation in data within the class is significant (you may like to try statistical tests to verify your answer.)

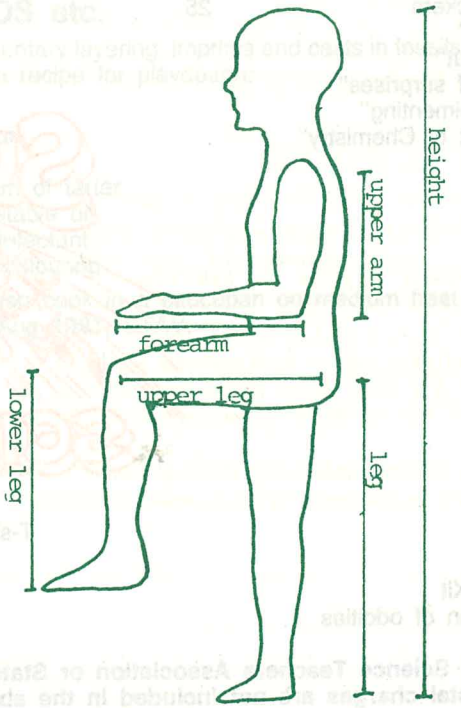
— The variation between individuals of any age is less than that between individuals of different ages.

What is the significance of the data for me?

Examine your working chair and determine whether it allows you to work comfortably and safely. Do its dimensions provide the space you need?

Invite a guest speaker to talk to you about their role in ergonomics. Ergonomists are concerned with providing optimal working space so that HUMANS are not placed in stressful postures and do not use awkward movements to achieve a task.

Patricia Berman
O'Connell Education Centre
Griffith, ACT



SUPPORT MATERIALS

ASISW Resource Book 1986 $1.50
- Extra copies are available crammed with lots of activity suggestions

ASISW Certificates 5c
- Certificate of Participation
- Certificate of Merit

ASISW Balloons with Logo 25c
- Use these to help you for the National Balloon Launch

ASISW Slogan Stickers 15c
- "Biology grows on me"
- "Science is FUNdamental"
- "Astronomy is out of this world"
- "How is your experimental technique?"
- "Biology is for the birds and the bees"

ASISW "Super Science" T-shirts $7.00

ASISW Badges with Logo 60c

ASISW Cartoon Stickers 25
- "We dig Science"
- "Science is far out"
- "Science is full of surprises"
- "Science is experimenting"
- "I get a bang out of Chemistry"

T-shirt design
$19.50

ASISW High Tech Kit
- A unique collection of oddities

Contact your State Science Teachers Association or State Coordinator for further details. Postal charges are not included in the above prices.

PAPER GLIDERS:

Get students to make paper planes — cut flaps on the end, add weights (paper clips) to the nose, design different shapes, and try other variations such as different lengths, different wingspans and so on. Have a competition for the one that flies the highest, the furthest, the straightest, the longest time in the air and so on. Design a certificate for the various awards.

BUILDING

Using a molecular kit (ie the straws and joins type) I had a group of students build a 'thing', finally called the 'Leaning Tower of David'. The structure reached the roof and had to be dismantled to get through doors. It was put on display in the school foyer. A great talking point.

Heather Evans
Corio North High School, Victoria

ANOTHER 'THING':

Construct the tallest free-standing structure you can using not more than ten strands of spaghetti and up to 30 cm of stickytape.

Ian McMurtrie
Scots College, Bellevue Hill, NSW

MAKING BEDS etc.

For showing sedimentary layering, imprints and casts in fossils and any other space/volume activites, a recipe for playdough:

1 cup of water
1 cup of plain flour
½ cup of salt
1 tablespoon cream of tartar
1 tablespoon vegetable oil
1 teaspoon of disinfectant
½ teaspoon food colouring

Mix all together then cook in a saucepan on medium heat for 3-5 minutes — in Late News Aug 1981, STAV.

SELF SUFFICIENCY

Outdoor pools (above/below ground) are an interesting DESIGN PROBLEM! How can the plain old 'Aussie Swimun' Pool' be a PROBLEM? It is similar to that of a gun or weapon or even a car! HOW YOU USE IT IS THE PROBLEM!?!

It is felt that many Pools in Australia are poorly utilised. They lay waste for most of the year. The space is wasted.

Design a DEVICE/SYSTEM for a 'Backyard Pool' (yours even) which enables it to be operational/functional for at least nine months of the year. The Operational/Functional Pool CAN have an Alternative Use.

Students:

1. Analyse a situation to identify the problem.
2. Identify factors affecting the problem.
3. Relate factors to define the problem/brief.
4. Gather information related to problem/brief.
5. Make valid and logical selections from all known alternatives, and specify a production procedure, recording information and experiments.
6. Apply relevant motor skills to produce a prototype.
7. Assess the prototype in terms of the brief.

The students will attempt to solve the problem by using the Design Process. A brief containing each stage of the process is to be submitted, with a prototype solution.

DARYL BURNETT
ACT

OTHER SPACE ACTIVITIES

- Interview an astronomer, write an article for your student newspaper.
- Find out about Caroline Herschel and Henrietta Leavitt — astronomers.
- Imagine you were aboard 'Giotto' as it passed through Halley's Comet. Write a story about those few minutes as you passed near the nucleus.
- Find out how and what astronauts eat and drink. What happens to their urine and faeces? Write a letter to NASA.

EVALUATION

It is three years since the Australian Science Teachers' Association began Australian Science in Schools Week. The theme days in 1984 were Balloon Launch Day, Land Yacht Day, Camera Day, ESP Day and Time Capsule Day; in 1985 they were Air Day, Sun Day, Inflation Day, Structures Day and Weather Day. The Resource Book has progressed from a one colour print (with colour advertisements) to a two colour booklet. The number of activities and the number of students participating have increased each year. Sponsorship has increased, publicity has increased and sales of the promotional material (stickers, T-shirts, logo badges) have been most pleasing.

Now is the time for you, the teacher and the school level organiser of ASISW, to tell us of your views and reactions to Australian Science in Schools Week.

Please photocopy these pages, (leave the original here for the next person), answer the evaluation questions and send your responses to your State/Territory Coordinator.

Thank you for taking the time to complete this evaluation.

STATE/TERRITORY.....

TYPE OF SCHOOL (lower prim., upper prim., lower sec., upper sec.).....

ASISW at my school in 1986 (only one person from each school to respond)

1. The approximate number of students involved.....

2. List special activities carried out by the school.....

.....

.....

3. What kind of publicity did the school give/obtain for ASISW (student newspaper, noticeboards, parent newsletter, radio, TV, newspaper etc.) .....

.....

.....

4. Was the school generally supportive for ASISW? .....

5. What was the level of community/parent involvement in ASISW? .....

.....

.....

6. How was the community involved? .....

.....

.....

.....

EVALUATION QUESTIONS FOR INDIVIDUALS (please comment as appropriate)

STATE/TERRITORY.....

TYPE OF CLASSES (lower prim., upper prim., lower sec., upper sec.).....

1.The level of contact/communication about ASISW from my State Coordinator/ Science Teachers' Association was (none, could be better, good, etc.) .....

.....

.....

2. The use of theme days is (a good idea, too restricting, not broad enough, difficult to organise, a useful way to select our activities, etc.).....

.....

.....

3. My students have participated in (tick as appropriate)

The Speakers' Scheme
The Poster Competition
The Shell Science Fellowship
The local Science (and Inventors) Fair
The BHP Prize
The LEGO Competition
The AMP/Towards 2000 Award

Comments on any of the above .....

.....

.....

.....

4. The Resource Book is (easy to use, should have more activities, is not suitable for my students, a useful publication, has/has not the right amount of detail for the activities, etc.).....

.....

.....

.....

5. The promotional material (stickers, badges, t-shirts) is (used as an incentive/as prizes for students, too gimmicky, too expensive a good idea/unnecessary, etc.) .....

.....

.....

GENERAL COMMENTS ABOUT ASISW

1. List 3 good things about each ASISW (note if you did not participate or don't remember)

1984 .....

.....

1985 .....

.....

1986 .....

.....

2. List 3 aspects of ASISW that could be improved in the future.

.....

.....

.....

For further comments, please attach another sheet of paper.

Return your responses to your State/Territory Coordinator (addresses on the back cover), after October 17 and ***before December 1.***

Thank you for your cooperation and participation in this evaluation.

BHP SCIENCE PRIZE

Gold medal, $5000 and 2 trips to America, courtesy of Westinghouse Electric, with other awards

Prizes awarded to original scientific research projects judged to achieve the highest degree of excellence.

To Enter:

Ask your Science Teacher for a copy of the BHP Science Prize Handbook and an entry form.

Entry forms must reach the Organising Committee by 30 June and research projects must reach the State Directors by 14 November 1986.

Organised by

Australian Science Teachers Association

BHP

CSIRO

For further information: BHP Science Prize, PO Box 86A, Melbourne, Vic 3001

INVESTIGATIONS

The essence of Science, this theme could take up a whole book in itself. Encourage students to hypothesise before carrying out any investigations, to design the experimental activity for themselves, to record data in their self-designed data sheets, and of course, to make conclusions about their hypotheses.

MAKING YOUR OWN INDICATOR

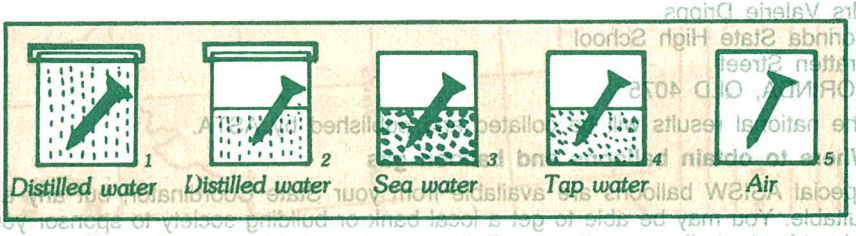
Slice up a red cabbage and soak the pieces in near boiling water for a couple of minutes (do not boil). Remove the cabbage and use this solution to test the acidity/basicity of various household products by noting the change in colour when they are added. You may need to add some water to obtain best results. (Don't forget to test the water itself and use neutral water — neither acid nor base). It is best to use a white container or a glass placed on a sheet of white paper. Some substances you might like to test are lemon juice, laundry powder, liquid detergent, vinegar, 'no tears' shampoo, orange juice, soapy water, ammonia cleaners, oven cleaners, anything that can be put into liquid form.

- For further investigation, find out what other natural substances can act as acid-base indicators. (Hint: Flower petals)

From 'The Double Helix — The Science Club' newsletter, Feb 1986
CSIRO

RUSTING OF NAILS

To investigate the rusting of nails under various conditions, you will need five steel nails. Clean them with sand paper or steel wool. Set them up as shown below in jars labelled 1 to 5.



Look at the nails once a week, and record any changes you notice. After about a month you should be able to answer questions such as:

- which nail shows the most rust?
- look at the nails in jars 3 and 4 — would living near the sea make rusting a greater problem?
- would using aluminium nails help in buildings?

From 'The Double Helix — The Science Club' newsletter, Feb 1986
CSIRO

NATIONAL BALLOON LAUNCH

For the third year in succession there will be national balloon launch to be held on the Wednesday of ASISW, this year on 'Investigations Day', October 15, at 12 noon EST. In previous years, thousands of tagged balloons from all over Australia were released, not just for fun but for a serious study of flight paths. This year we would like to add to the data already collected. We request that you tag your labels as shown below. This tag can be copied and duplicated from this page. Students should fill in the name and address of the school with a water resistant pen, and attach the tag to the balloon with a short length of light string.

This balloon was released on 15-10-86 by _____

as part of a national scientific experiment during the Australian Science in Schools Week.

PLEASE COMPLETE:

Found at _____

Time _____ Date _____

PLEASE RETURN THIS TAG TO:

_____ School

_____

_____

Thank you for your help

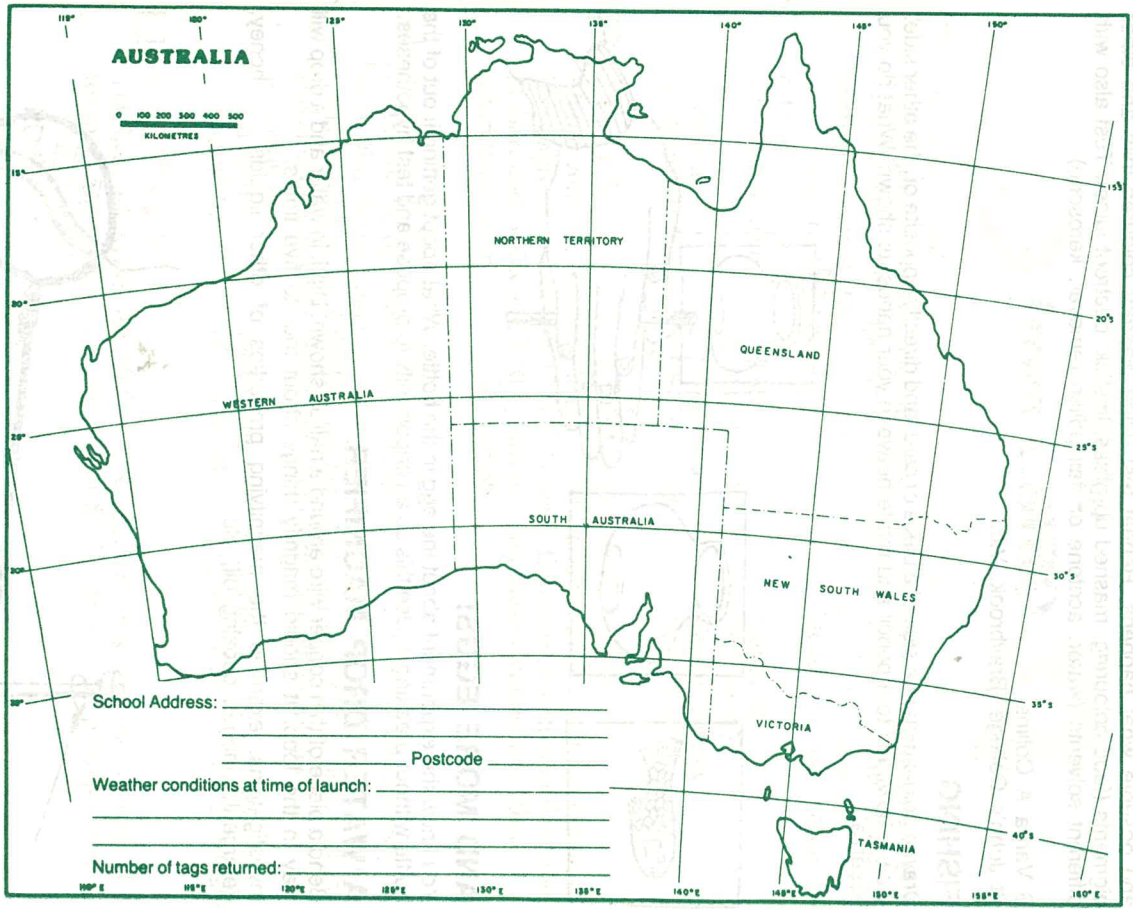
As a balloon lands after its journey, we hope that the finder will complete the appropriate section of the label and return it to your school. When it seems that no more tags will be returned, we ask students to plot balloon flight paths on the map of Australia. Join the launching point to the landing point with a straight line. Use an arrowhead to indicate the direction of travel. Note on the map the weather conditions, especially wind direction and speed, which prevail at the time of the launch. When completed, send the map to:

Mrs Valerie Dripps
Corinda State High School
Pratten Street
CORINDA, QLD 4075

The national results will be collated and published by ASTA.

Where to obtain balloons and balloon gas

Special ASISW balloons are available from your State Coordinator, but any are suitable. You may be able to get a local bank or building society to sponsor your school for the balloons and/or gas. Balloon gas is available from CIG who have once again kindly offered a rebate on gas used for the National Balloon Launch (eg a rebate of $25 on a G size cylinder — 200 balloons); see your State Coordinator for details. It is important that you order your gas well beforehand, and check that the appropriate regulator is available. The gas diffuses quite rapidly so fill the balloons as close as possible to the time of launching.


AUSTRALIA
0 100 200 300 400 500
KILOMETRES
NORTHERN TERRITORY
QUEENSLAND
WESTERN AUSTRALIA
SOUTH AUSTRALIA
NEW SOUTH WALES
VICTORIA
TASMANIA
110°
120°
130°
140°
150°
160°
15°S
20°S
25°S
30°S
35°S
40°S
110° E
120° E
130° E
140° E
150° E
160° E
School Address:
Postcode
Weather conditions at time of launch:
Number of tags returned:

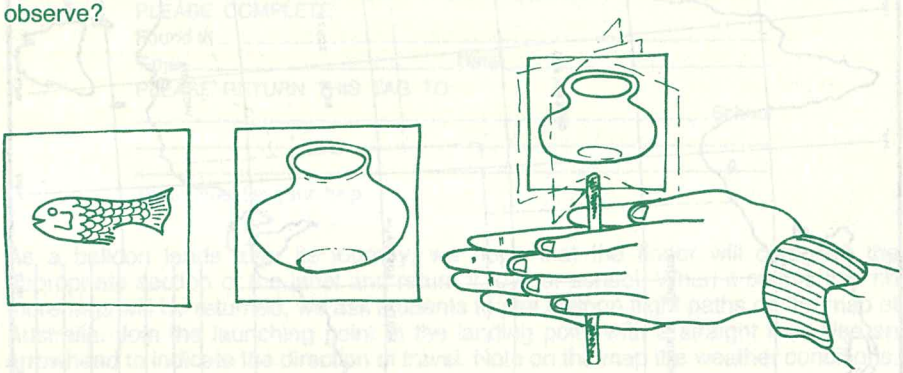
INVESTIGATING THE COMPONENTS IN INK

Using filter paper (or a round piece of blotting paper) place a concentrated dot of blue biro (keep dotting the same place) in the centre. Add a few drops of methylated spirits and observe what happens. Repeat test using different coloured inks and other pigments (food colouring, mashed up grass, lipstick, beetroot juice). Test also with different solvents (water, acetone or nail polish remover, kerosene).

S Varga A Collins
St John's College, Braybrook, Vic.

FISHING

Draw a goldfish on one side of a piece of card, and directly opposite on the other side, draw a bowl. Fix to a pencil and rotate between your hands as shown. What do you observe?



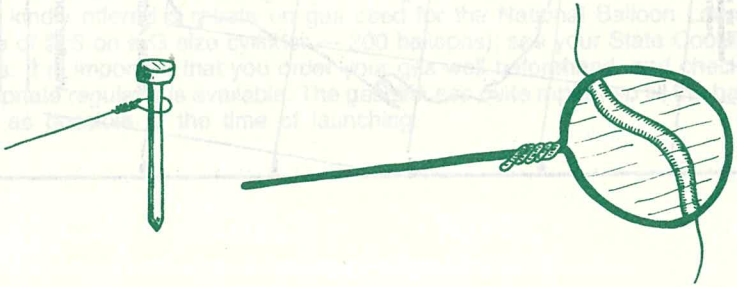
AND MORE EGGS!

You know the experiment about the egg in the bottle. What about getting it out of the bottle without breaking it. Use this as an opportunity to propose and test hypotheses.

A WATER DROP MAGNIFIER

Bend a piece of thin copper wire around a nail as shown. Dip it in water and a drop will stay in the loop. It should magnify things about four to five times.

Investigations: examine the magnifying properties of other liquids . . . honey, detergent, vinegar, cooking oil, etc.



NEW from CSIRO

Double Helix — The Science Club

CSIRO inaugurated a national science club for students — **Double Helix** — in January 1986. Operating from CSIRO's Education Centres, **Double Helix** hopes to develop an appreciation in students of the value of science in our society through competitions, tours, discussions and hands-on activities.

Information from:

Adelaide	Hobart	Melbourne	Canberra	Parkes/Sydney
☎ 08-2680125	☎ 002-206222	☎ 03-5550333	☎ 062-484477	☎ 068-623677

New CSIRO Science Education Centres

After several years of negotiation, CSIRO and State Education Departments have agreed to establish CSIRO Science Education Centres in Brisbane, Hobart and Sydney. CSIRO plans to open these Centres mid-1987.

Information from: ☎ 062-484586

CSIRO Women-in-Science Project

Launched by by Commonwealth Ministers for Education and Science last year, this Project aims to attract female secondary students to science. Visits to schools by CSIRO's women scientists and technicians, and the showing of a specially produced video form part of the project.

Information from:

Canberra	Melbourne	Sydney	Hobart
☎ 062-484477	☎ 052-265028	☎ 02-4676526	☎ 002-206260

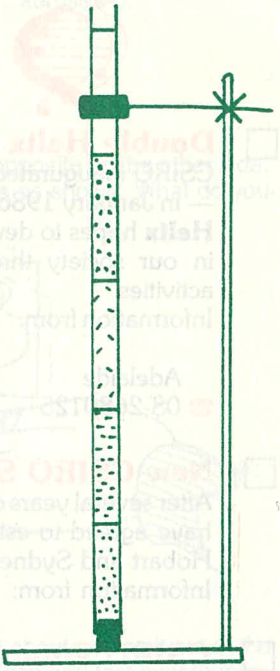
CSIROPRAC

This best selling ASTA/SASTA/CSIRO source book of science activities for teachers and students is available for $9.95 (plus $1.50 postage) from:

CSIROPRAC
PO Box 319
MAGILL, SA 5072

A QUICK, SAFE AND SIMPLE DENSITY COLUMN

To make this column a long narrow glass tube is needed. A barometer tube will do, or else a 1m length of glass tube (1 cm internal diameter or less) with a small stopper in one end. If you don't have either of these, a long thin test tube or similar container will do.



1. Clamp the tube in an upright position, with the sealed end downwards.
2. Prepare a saturated solution of common salt (NaCl) — ie. keep adding salt to water and stirring until no more will dissolve.
3. Pour sufficient of this solution to fill about one fifth of your tube into a small beaker and add some food colouring.
4. Slowly pour this coloured solution into the tube — you may need a small funnel for this.
5. Make sufficient solution to fill another fifth of the tube by mixing 3 parts of the saturated salt solution with 1 part of water. Add a different colour to it and then pour this solution into the tube also. It is best to try and pour the solution down the *side* of the tube which reduces mixing as you add each colour.
6. Add more colours by making up weaker and weaker solutions until you add water for the last one.
   ie layer 3 = 2 parts salt solution + 2 parts water
   layer 4 = 1 part salt solution + 3 parts water
   layer 5 = pure water
7. You might like to stopper your tube to prevent splashing or evaporation.

SOME INVESTIGATIONS TO CARRY OUT

- Look closely at the boundaries between different colours — do you now have more colours than you started with?
- You might like to try to make a density column with more than 5 layers — a competition between class members or groups, perhaps.
- Can you make a similar density column using other chemicals? (Check that they are not toxic or dangerous first)
- Do you need five different colours? Perhaps alternating only 2 colours would look good!
- How long will your density column last undisturbed?
- Someone always want to know what happens if you turn the whole thing upside down! Are you game to try?

Ian Loiterton (Heather Evans idea also)
Campbell High School, ACT

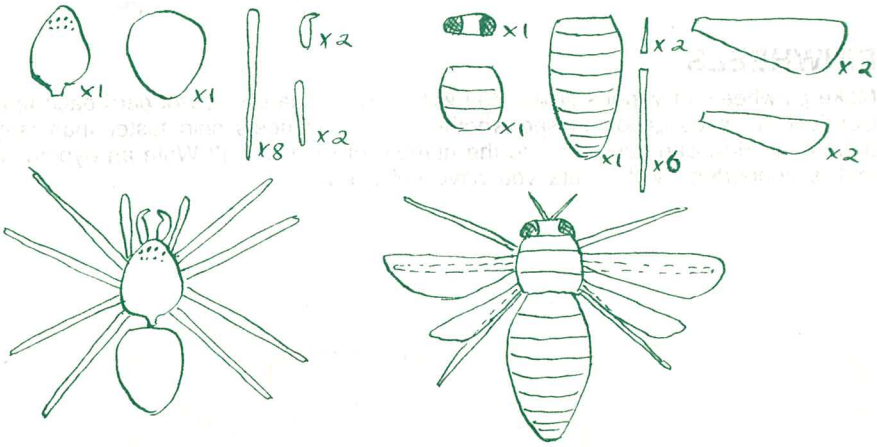
JUST HOW ARE INSECTS AND SPIDERS MADE?

To help accurate observations of the structure of spiders and insects, simple cut-out models can be very effective. Have on hand the following basic shapes and ask students to assemble them correctly. Also have specimens in jars if possible, and photographs for reference.

Legs can be bent to simulate real legs if desired.

It is surprising how often the students find themselves caught out and needing to refer back to the original to check the correct location of pedipalps in spiders, and even the legs on both spiders and insects, and they are pleased when it comes right. It makes them stop and think a bit about just where things belong without the frustrating labour of trying to draw the animals.

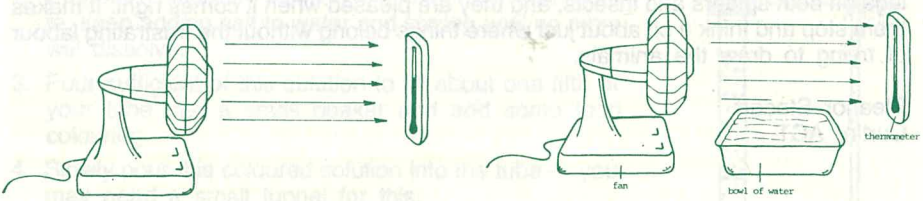
Eleanor Stodart
Curtin, ACT



INVESTIGATE THE COOLING EFFECT OF WATER

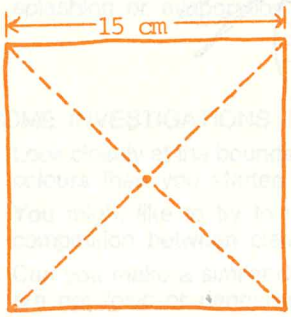
Set up an experiment as shown below. Take thermometer readings after the fan has been blowing onto the thermometer for about ten minutes. Compare the temperatures. What do you notice about the reading of the thermometer to the right of the bowl of water?

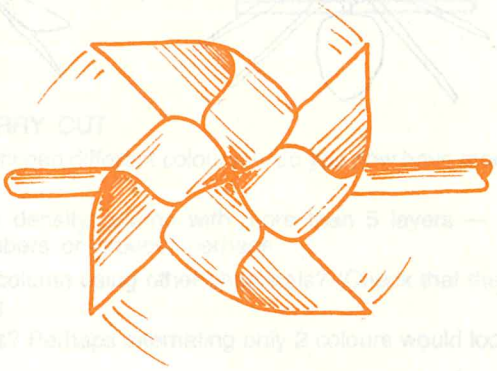
Try this activity with different fluids . . . make sure they are safe.



PINWHEELS

Make pinwheels of various sizes. You will need a square piece of card each time. Conduct an investigation to see whether small pinwheels spin faster than large pinwheels. How can you measure the number of revolutions? Write an hypothesis that is supported by the data you have collected.





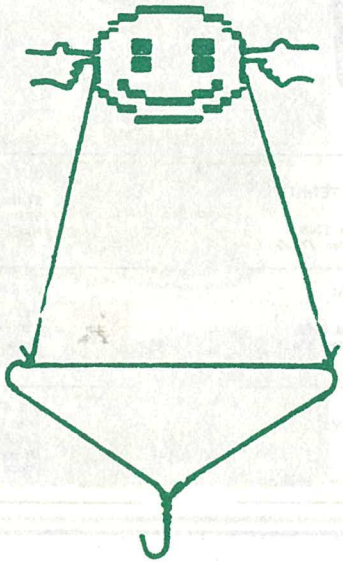
IT'S EASY TO GET THE HANG OF IT

1. Tie a piece of cotton or thin string about 1.5m long to a wire coathanger as shown in the diagram.
2. Place the string to rest on top of your head, so that the coathanger hangs freely in front of your body.
3. Use your index finger to press the string to the opening of each ear — your finger actually needs to close off the ear canal, with the string inside.
4. Bend forward slightly at the waist to allow the coathanger to swing freely away from your body.
5. Use gentle swinging movements of your head to set the coathanger swinging from side to side.
6. Let the swinging coathanger bump into solid objects such as the wall, a table or chair.

SOME INVESTIGATIONS YOU COULD TRY:

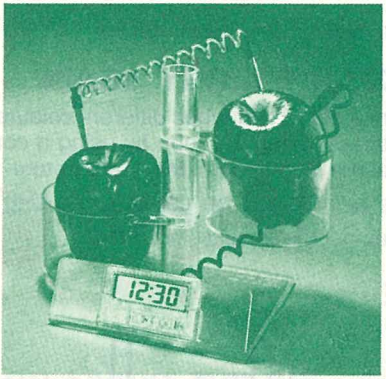
1. What happens with different types of wire coathangers?
2. What happens if you alter the length, thickness or type of string?
3. Do you get the same effect with a wooden or plastic coathanger?
4. Does it matter which part of the coathanger is struck?
5. What happens if you bend the coathanger out of shape?

Ian Loiterton
Campbell High School, ACT



TEACH YOUR STUDENTS THE VOLTAIC PRINCIPLE WITH

TUTTI FRUITY CLOCK™



TUTTI FRUITY CLOCK REQUIRES NO BATTERIES – IT IS POWERED BY AN ITEM CONTAINING NATURAL ACID – BI-METAL PROBES CONVERT NATURE'S ACIDS TO LOW CURRENT ELECTRICAL OUTPUT – EXPERIMENTING WITH THIS UNIQUE APPARATUS WILL LEAVE YOUR STUDENTS WITH A NEVER TO BE FORGOTTEN UNDERSTANDING OF VOLTA'S PRINCIPLE.

TRY:
- APPLES
- BANANAS
- CARROTS
- LEMONS
- ORANGES
- PEARS
- POT PLANTS
- SALT WATER
- SOFT DRINKS
- ??????????????
- ??????????????

ORDER NOW FROM STANSENS

ONLY $25.00 each

Including Delivery Charges

(apples, bananas, carrots, lemons, oranges, pears, pot plants, salt water, soft drinks and ????????? not included in price)

SEE PRECEDING PAGE FOR OUR ADDRESSES

REGISTERED DESIGN NO. 1021722

ALGAE IN THE SOIL

A glass microscope slide is buried vertically in the soil in a sunny position with about 100 mm uncovered. Light can now enter the soil and if algae are present they will begin to grow on the glass/soil interface.

By carefully removing the slide and then tapping it to free the soil, the extent of the algal growth can be determined by using a hand lens or a microscope. Comparisons can be made using different types of soils — sand, peat, wet, dry, fertilized, etc.

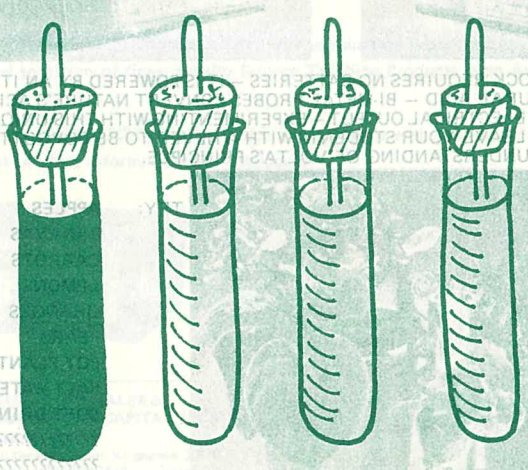
Late News, July 1981, STAV

SOLAR ENERGY AGAIN

Paint a set of test tubes different colours. Into each place a thermometer, sealing the air space within the tube by using a cork or plasticene. Place the tubes in sunlight. Measure and record the temperature of each tube at regular intervals.

This activity can be carried out using coloured water instead of paint.

What do the results indicate?



OTHER INVESTIGATIONS

- Construct and test a gear system.
- Have a "magnet" race.
- Place two mushrooms downwards on a piece of black paper and a piece of white paper; leave for one day. Study the spore print — fix with hairspray.
- Study the labels on a variety of household products. Make a list of the chemical names on the labels. What does each chemical do for the product?
- Research the work of Gerty Cori (biochemist) and Dorothy Hodgkin (chemist).

SURVIVAL

Survival of the individual or survival of species — two quite different concepts. Some characteristics may no longer contribute to the survival of the organism, others may be more important now than they once were.

EFFECT OF TEMPERATURE ON LIVING THINGS

A simple experiment can demonstrate the effect of temperature on the processes of living things.

Measure out three, or multiples of three, equal volumes of dried seeds (they can be measured by weight if a balance is available). Soak one group in cold water (20°C or less), one in warm water (about 30°C) and another in boiling water (no need to keep it boiling, just ensure there is sufficient water to heat the seeds to at least 80°C). Wrap a towel or other insulator around the warm and hot water containers, or, better, stand them in a water bath such as an electric frypan to keep them at the required temperature.

At half hour intervals measure the volume (or weight) of the seeds without the water and then return them to their water. Next day measure them again. Graph or otherwise compare rate of absorption with ultimate level of absorption and draw conclusions.

Keep some of each lot of seeds moist till germination. Take care that broken seeds are excluded. Where is the food store? How many seed leaves? Compare the rate of germination in each group. Why do seeds from boiling water go mouldy? Does mould appear before or after germination.

Eleanor Stodart
Curtin, ACT

'THINGS GO BETTER WITH COKE'???

Explore the effects of different materials on the growth of plants. Using fast germinating seeds such as radishes, styrofoam cups for pots, soil and various solutions such as salt, sugar, soap, detergent, vinegar, coca cola, and any others that fire the imagination of students, (all made up to the same formula — ¼ teaspoon of solid to 1 litre of water, or 50/50 liquid/water). Set up the cups with soil and plant 6 seeds in each, not too far down, and place in a warm place (eg window-sill). Water each with the same amount of solution each day. Don't forget to set up a control, watered with tap water only. Examine each day and chart the germination rates for each one.

Questions to ask:

1. What will happen to the lawn if you throw on it the water from washing the car/the dog/the windows?
2. There are many variations to this theme:

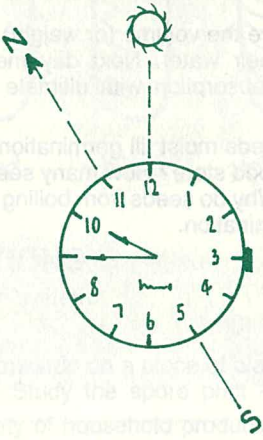
a. the effect of different types of soil on germination rate.
b. the effect of different types, amounts of fertilisers on the growth rate of plants.
c. the germination rates for different types of seeds.

A SOLAR COMPASS

If you have a watch or clock, like the one illustrated, you have a ready-to-use compass, if the sun is shining. If you point the 12 of your clock towards the sun, NORTH will be midway between the approaching o'clock and the twelve. In the case of the clock below, the o'clock is 10, and the midpoint is approximately 11, therefore the 11 is in the direction of NORTH.

PROBLEM 1: What adjustments do you have to make if your State is on Summer Time?

2: What can you do if all you have is a digital watch?



GERMINATION RATES

Aim: To compare germination rates of different seeds.

Method: Use a large jar with a stocking (or similar fine material) for a lid for each type of seed. Choose 'sprouting' seeds that can be eaten at the end of the experiment. Fill the bottle with water and add to each bottle the same number of seeds (eg 100). Secure the 'lid' with an elastic band, leave overnight to soak. Empty the water, fill and empty a couple more times, then place the bottle in the dark for the first day. After 3-5 days, count the number of germinated seeds. Express the result as '% germinated'. If this was done at home, the results can be eaten!

Research: what is hydroponics
what seeds will sprout
recipes using sprouts
the nutritional value of sprouts

Kate Mitchelson
Darwin High School, NT

WHICH SEEDS ARE DISPERSED BY WIND?

Collected samples of 6 or more species of seeds. From a set height above ground (eg. 3 metres), out in the school yard, release the seeds. Mark the distance from the point of release to the landing point. Repeat a number of times for each seed variety and calculate the average distance travelled by the seed. Which seeds are most likely to be dispersed by wind?

Further research:

- compare this experiment done inside with one done outside.
- vary the height above ground for release.
- Graph distance travelled against release height.
- Devise an experiment to determine which seeds will be dispersed by (a) water, and (b) fur of animals.

HAVE YOU CLEANED THE AQUARIUM?

While it might look a bit murky, an 'unclean' aquarium can be a very useful teaching resource. Set up an aquarium in the usual way. Every fortnight for as long as you can, examine

- the water
- the scum
- the slime/algae
- the light transmission
- oxygen content
- other organisms

Another activity: water in unemptied vases, in pot saucers and in greenhouses is a good resource.

OTHER SURVIVAL ACTIVITIES

- Safety in the Science room — do a safety audit of your laboratory. Have students make a list of safety deficiencies.
- Find out about colour-blindness. Test the class/the school for colourblindness. What careers are not possible for colourblind people?
- What is camouflage?

WATER

"The Universal Solvent" says the textbook; 'Australia, the Driest Continent' says another. The activities listed here will help your students discover some of the fascinating things about water, and they are all fun, too!

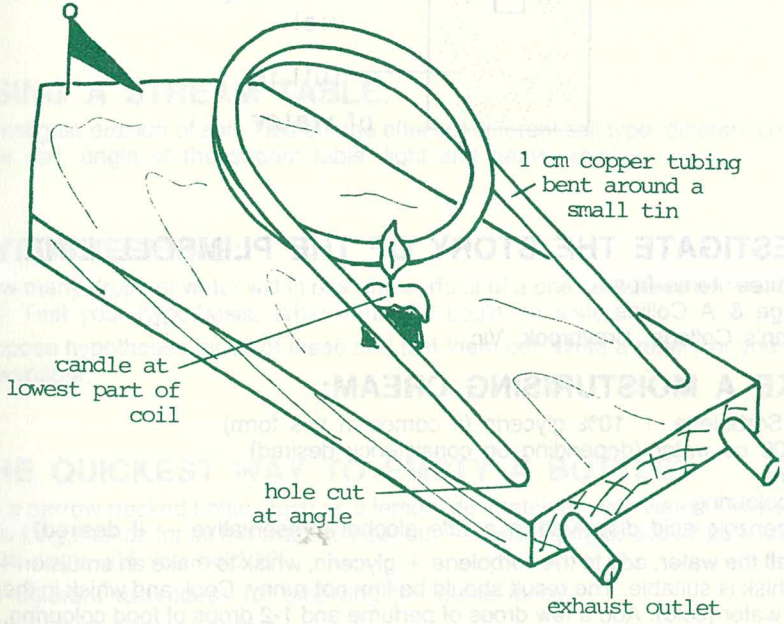
Boil water in a paper cup

Fold a sheet of paper into a small boat. Fasten corners with paper clips. Half fill the boat with water. Place over a tripod and heat.

Heather Evans
Corio North High School, Victoria

CANDLE POWER

Cut a piece of pine plank to about 30 cm by 10 cm. Shape as shown in the diagram. Obtain a piece of copper tubing about 1 cm in diameter, and shape as shown around a small tin. Drill holes and insert through boat shape. Fill the tube with water and place in a tub of water. Next, place a lighted candle at the lowest part of the coil. After about two minutes, the boat should start moving along of its own accord. Try two candles and see if you can make the boat move faster.



HOW MUCH WATER CAN YOU SAVE?

You've heard of energy audits. Australia is called the driest continent. You can do a water audit of your house, school. Design a program for conserving water.

S Varga & A Collins
St John's College, Braybrook, Vic.

MORE EGGS!

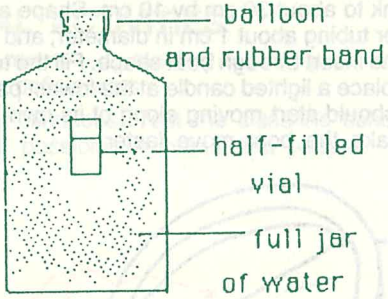
Place an egg in a jar or beaker of water. What happens?

Now add some salt. Describe what happens.

- What has the salt done?
- Investigate what happens when you use other substances such as boiled eggs, or other solutions — sugar, vinegar etc.

CARTESIAN DIVER

In the diagram shown, the tiny vial inside the jar can be forced to rise and sink by applying pressure to the balloon above the jar.



INVESTIGATE THE STORY OF THE PLIMSOLL LINE

Last three items from
S Varga & A Collins
St John's College, Braybrook, Vic.

MAKE A MOISTURISING CREAM:

100g Sorbolene + 10% glycerin (it comes in this form)
100-400 cc water (depending on consistency desired)
perfume
food colouring
0.5g benzoic acid dissolved in a *little* alcohol (preservative — if desired)

Boil half the water, add to the sorbolene + glycerin, whisk to make an emulsion — an egg whisk is suitable. The result should be firm not runny. Cool, and whisk in the rest of the water (cold). Add a few drops of perfume and 1-2 drops of food colouring, and the benzoic acid. Mix well. Put in glass jars. If not to be used immediately, store in the refrigerator. For class work, buy Sorbolene + glycerin by the 500-700g bottle, it is more economical.

Science points: emulsions, cosmetic chemistry, skin anatomy and physiology, consumer analysis — comparisons with and costs of other commercial moisturisers, packaging.

COMPARE SOFT AND HARD WATER

Place some hard water on a watch glass, and place this over a beaker of boiling water. Boil off the water on the watch glass. Examine the watch glass, record results. Repeat using soft water, rain water, sea water, aquarium water. Further investigation: water softening agents.

HOW MUCH WATER IS THERE IN SOIL?

Take a soil sample, weigh it and record this weight. Dry in a drying oven for at least 24 hours (more may be necessary), weigh again. Repeat the drying until no more weight is lost.

Calculate the percentage water in the soil sample.

Further investigation: different types of soil
does a microwave oven work just as well (take the usual precautions)
try the same experimental design on plants, calculate percentage water in the plants,
dry some herbs

USING A STREAM TABLE:

Investigate erosion of soil. Test out the effect of different soil type, different coverings over soil, angle of the stream table, light and heavy 'rain'.

HYPOTHESISING:

How many drops of water will fit onto the surface of a one cent piece without dripping off? Test your hypothesis. What variables could be tested?

Propose hypotheses for all of these and test them out. Write a report for your school newspaper.

THE QUICKEST WAY TO EMPTY A BOTTLE?

Fill a narrow-necked bottle, such as a lemonade container, with water. Time carefully how long it takes for all the water to pour out — does it gurgle, does it pour smoothly, what angle did you hold it?

Try different techniques for emptying the bottle faster —

- hold it at different angles
- twist the bottle as it is emptying
- blow air into the bottle through some rubber tubing

Questions: Why do many canned drinks have 2 openings in the top?
Why don't all cans have 2 openings?
Why would you want to empty a bottle quickly?

TAKE 5 DROPS OF SOLUTION X.....

A common instruction but do we know how much is one drop? To calibrate your eye-dropper-drops, drip 100 drops of water, at room temperature, into a 10cc measuring cylinder. Record the volume, determine the volume of one drop. Repeat a number of times and take an average.

Extension work:

- Design a different technique to calibrate the drops from a burette.
- Does the temperature of the water have an effect on drop volume?
- Does salt water, sugared water, detergent, etc. make a difference?
- One text uses 'rice grains' as a unit of measure. Calibrate a rice grain.

WATER, WATER, EVERYWHERE ... MORE ACTIVITIES

- Design and construct a waterwheel — test various designs.
- Visit your local sewage farm.
- Design, construct and calibrate a water clock.
- Investigate the effect of temperature on the rate of dissolving of soluble antacid tablets, aspirin, etc.
- How feasible is it to tow icebergs from the polar caps and to use the melted ice in areas of water shortage?

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