From: Dr Sue Dale Tunnicliffe
Tel: 01223 507111; Fax: 01223 507130;
E-mail:106013.1303@compuserve.com

PLEASE REPLY TO
18 Octavia
Bracknell
Berkshire
RG12 7YZ
Tel: + 44 1344 454283
Fax: + 1344 305284

Dear ICASE member

December 1998

The importance of the education of young children in science is increasingly recognised as a key issue. We acknowledge this in ICASE through our STEPPING INTO SCIENCE AND TECHNOLOGY PROJECT which is supported by the newsletter 'STEPS'. In our newsletter we present activities which can be carried out in class or at home or in clubs, at museums and other venues, or youth groups.

In response to requests of how these hands on activities for pre-secondary learners could be brought to the attention of science educators, we have put together this activity pack with a view to your Science Association presenting a focus on pre-secondary science at your Association meeting or Science and Technology Fair or a conference either through running a COME AND SHARE workshop or having a table/ display at a conference featuring one or two actvities for delegates to try out.

The pack contains a selection of activities for which resources are not difficult to obtain together with suggestions for highlighting the international origin of both the activities and the work of ICASE in which you play such as vital part.

We hope you find this activity pack useful and of course we welcome feedback. We are planning another source book of activities so please do send those which you and your pupils enjoy.

We must extend a very grateful and special 'thank you' to John Williams, Managing Director of TTS, (Technology Teaching Systems) and his staff for sponsoring this pack. They also sponsor, through providing equipment, workshops which we run at various conferences. They are a super firm to work with too when equipping your schools in science and technology (and history and religious education), so do contact them if you feel they could help you.

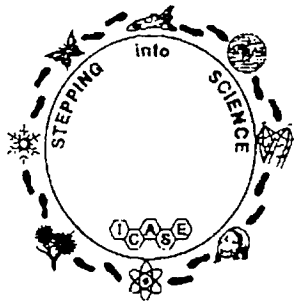
ICASE owes a tremendous debt of gratitude to Dr Zoe Zone Kavogli who has typed and designed the pages of the pack in a conscientious and professional way. We are indebted to her commitment to ICASE. We must also thank Norman Lowe for his usual patient but painstaking work for us and his help, advice and support.

Yours sincerely

Anna Garner — *Anna Garner*

Sue Dale Tunnicliffe — *Sue Dale Tunnicliffe*

PRESIDENT ICASE — Chair Stepping into Science project, ICASE



CONTENTS

Welcome to ICASE STEPPING into SCIENCE & TECHNOLOGY PROJECT Conference Pack.

The purpose of this pack is to assist you to mount an Exhibition Table in your school, in the community, in a conference or in meetings of your Science Teacher's Association as well as to run a workshop of pre-secondary practical science and design and technology activities as a COME AND SHARE session for delegates.

The theme is 'International' since ICASE is international - remember the 'I' - but, more importantly, for scientific and technological literacy for all to become a reality the communication and exchange of information between teachers of science and technology on a world-wide basis is essential. On a more national/local scale of communication within the community is equally important, so that the community are aware of what is going on in science and technology education in other countries. Working with pre-secondary or primary teachers is also a public understanding of science activity when teachers have not been trained in science and associated subjects.

For a very long time the majority of people have associated *science* with people in white coats working in special rooms called *laboratories* whereas, in reality science is part of every day life. Similarly *Technology* is part of every day life and we all use products of technology at home and in the workplace and the subject of design and technology is about encouraging pupils to identify a need, devise a solution and make it and then evaluate it after use, making adjustments as appropriate. If ordinary people had not designed a simple plough and a method of harnessing it to an animal, agriculture may not have progressed to the position it is today; scientists and technologists came later.

Scientists and technologists investigate the *How* and the *Why* of things and by so doing are able to use the knowledge to improve (or destroy!) our way of life.

It is therefore important that everyone is aware of the implications of science and technology not only so that they can benefit from them but appreciate and control the harmful effects on the environment and how to conserve those things that are beneficial and necessary to life on earth. This can only be achieved by communication.

The Conference Pack is a guide to producing a visual means of communication to a wide audience. We hope you find it useful and we are sure that once you have staged your own COME AND SHARE workshop or exhibition you will want to make the next one even better.

Finally, the STEPPING INTO SCIENCE & TECHNOLOGY PROJECT is not about examinations, it is about learning. A young person undertaking a simple project or activity at an early stage in his/her life, without the pressures of examinations, may become more efficient learner in the formal situation of a classroom. The aim of this project is **'to do'**, to undertake a hands-on activity and explain what they have been doing in their own words. As they progress through the Steps a certificate is awarded at each stage as a means of achievement and encouragement.

We wish you every success with the use of this pack and only ask that **you communicate with us** so that you can share your experiences and ideas with others via the Stepping into Science Newsletter.

Sue Dale Tunnicliffe
Chair Stepping into Science project, ICASE

ORGANISE AN ICASE INTERNATIONAL SCIENCE & TECHNOLOGY COME AND SHARE SESSION

Remember the **I** in ICASE - **I** is for INTERNATIONAL
at a
Conference, Exhibition, Meeting, School
by:

Firstly	*	arranging with the function organisers for a room with tables and chairs or other suitable space. As a guide allow one to one and half hours for a session.
Secondly	*	selecting a range of activities relevant to a science curriculum and which can easily be constructed and tested.
Thirdly		finding someone in addition to yourself to assist with staffing the display

You need:

Basic Materials

Tables and chairs	to provide working surfaces. An appropriate arrangement is a rectangular one in which you and your helper can move inside the rectangle and help the participants.
Water and any other services.	If heat sources are required the use of small spirit burners may be appropriate.
Activity sheets	Prepared and printed (photocopied) in advance. Enough should be reproduced to allow people to take a copy away with them.
Remember	for a successful session all activities should be tried out by yourself in the planning stage. It would be advisable to limit the number of activities to no more than ten but this would depend upon how many helpers you have.
Materials to carry out the activities.	These should be collected in advance and should be adequate for the expected numbers of persons likely to attend. For example, an activity with balloons requires a new balloon for each attempt.
Publicity	Have prepared signs, arrows, etc. indicating where the session is to take place and locate them before the opening of the meeting.
Procedure	As participants arrive invite them to sit at an activity and try it out (construct and use). From inside of the rectangle of tables you or your helpers can observe the progress of each and provide help as required. Some people may want to try more than one activity. Be prepared yourself to spend some time in individual discussion with the visitors (hence the need for helpers). Once an activity has been vacated it should be tidied up and made ready for another visitor.

STEPPING INTO SCIENCE

This project for primary aged school children, in pre-school and then formal schooling up to secondary school, is open to any group of individual. It is run under the auspices of ICASE, the International Council of Associations for Science Education who are represented in each country by the National Science Teachers' Association. There are associate members too who may be firms or institutions.

The project is targeted at primary schools and involves pupils doing a number of science activities which involve the science process as well as learning new knowledge. After being involved in at least six projects the pupil may be awarded a certificate and be said to have taken a "Step into Science". The science tasks are not prescribed because each country has its own curriculum and ways of presenting science. Teachers are encouraged to work with their Science Teachers Association to choose relevant and appropriate activities for pupils.

The STEPS are:
YELLOW pre school, GREEN age 6 Grade 1, BLUE age 7 Grade 2,
RED age 8 Grade 3, ORANGE age 9 Grade 4, GREY age 10 Grade 5, PURPLE age 11 Grade 6, BRONZE age 12 Grade 7, SILVER age 13 Grade 8, GOLD age 14 Grade 9.

The Step into Science is taken through being involved and not through getting an experiment "right". Some schools and out of school groups run a Stepping into Science Club for interested children whilst other teachers make the scheme part of their school science work and ask pupils to write a report on their work and award the certificates both to encourage their pupils and to introduce an international awareness into their work. The activities in the newsletter are often used for the award. The Stepping into Science Newsletter, sent to all members of ICASE and available to individuals on subscription, carries a number of activities from around the world which can be used and provide an additional international dimension.

CERTIFICATES

The Certificate printed below can be reproduced locally for awarding to children. They may be used as a white certificate with the colour of the step taken written in and additionally a star or other mark made showing the colour of the Step taken. Alternatively they may be printed on the appropriate coloured card or paper.

I C A S E

STEPPING INTO SCIENCE

.....

has sucessfully taken

A STEP INTO SCIENCE

Date:..... Place:..... Step level:.....

Signed:
on behalf of ICASE Stepping into Science project:

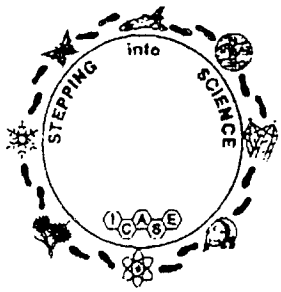
Sue Dale Tunnicliffe
Dr. Sue Dale Tunnicliffe
ICASE Primary Projects Officer

On behalf of the school:

.....

.....

The Steps into Science are: yellow: green: blue: red: orange: grey: purple: bronze: silver: gold



A Guide to using the Activity Sheets

We include in each issue of the ICASE STEPS Newsletters or the STEPPING INTO SCIENCE AND TECHNOLOGY PROJECT five activity sheets for use in the classroom. The activities in the pack are selected from them.

The use of these activities is, of course, at the discretion of the teacher.

Following the individual activity sheets are Teachers' notes for some of the activities where it seems necessary to have some explanation. These notes provide a guide to the teacher as to outcomes and any features of which to be particularly aware. There may not be Teachers's Notes for all activities.

We hope that you, the teacher, will use the activity sheets and involve your pupils in hands-on activitites and direct investigations rather than demonstrations. We also hope that you will show the activities to other secondary and university based colleagues in your science association to involve them in science for younger pupils.

REMEMBER through that:

* a successful activity period by the children is one that the teacher has practised beforehand to find out if there are likely to be any safety considerations or snags (we usually tell you about these in Teacher's Notes, if possible). It also gives you a guide as to how long the activity may take.

* we set "challenges" not recipes to follow. The pupils should be encouraged to think out the solution to the challenge for themselves. Occasionally we include activities which are straightforward instructional ones to help the pupils learn a skill such as filtering or joining different materials in Technology activities.

* the purpose is not to tell the pupils the expected outcomes. The educational aim is for the pupils to "Find out" and then explain their observations in the light of the science. Teachers may then discuss their scientific knowledge and understanding.

* encourage pupils to work out what they already know about the topic and what they think might happen (a prediction with a reason for their prediction based on the every day or scientific knowledge).

* the activity should be part of the overall science or technology learning programme and incorporated at the appropriate level and stage in that programme.

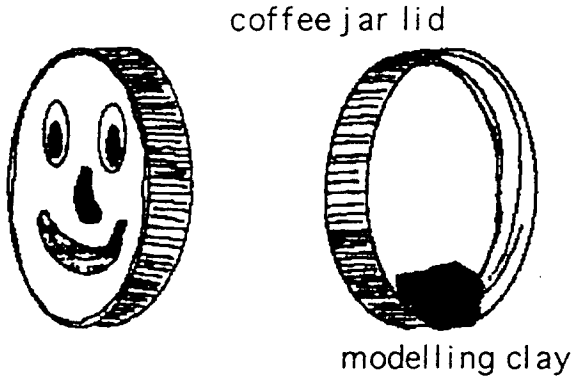
STEP ACTIVITY

Wobbly dolly

United Kingdom

Challenge: Can you make wobbly dolly?

What you need:
* large screw top lid from a coffee jar
* sheet of paper
* glue
* modelling clay
* a recording sheet



What to do:
1. Place it face down onto the sheet of paper and draw around it

2. Using the coloured pencils draw a face in the circle on the paper and then cut round the circle

3. Stick the paper face onto the lid

4. Stand the lid on its side with face upright

5. Let the children roll the face along the table and observe what happens.

6. Weight the lid with modelling clay on the inside behind the chin, and let them roll the face again and observe what happens.

More to do:
Describe what happened
* When the face was rolled without the modelling clay
* When modelling clay was added

* What you think might happen when two pieces of modelling clay were placed in the lid but opposite each other (at chin and top of head positions)? Try it.

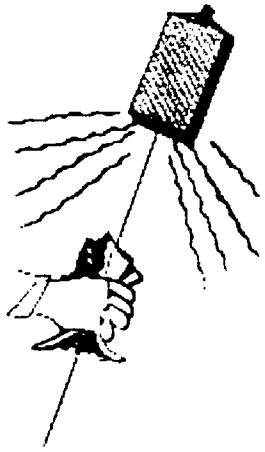
STEP ACTIVITY

Rooster crower

Greece

Challenge: Can you imitate a rooster crower?

What you need:
* a milk cartoon or a paper/plastic cup
* a string
* a piece of wet paper towel
* something to punch a hole
* button



What to do:
1. Punch a tiny hole in the bottom half of a milk cartoon and insert a string.

2. Knot or tie it through a button so that the string can not be pulled out.

3. Hold the string taut and

4. Stroke it with a wet paper towel.

5. What happens ?

More to do:
* Try to experiment with different sizes of milk or other cartoons, with different sizes of tin cans. What do you observe ?
* Try to experiment with different kinds of string. What do you notice if you use a chord or a fishing line instead of string ?
* What do you notice to the sound which is produced in all the above mentioned cases.
* Make your comments.

STEP ACTIVITY

Swimming fish

United Kingdom

Challenge: Can you make a paper fish swim?

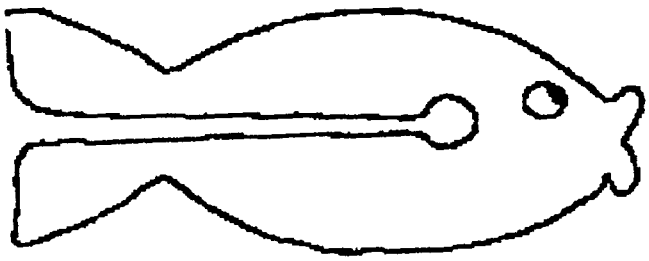
What you need:
* a paper fish
* a container of water
* some cooking oil
* a dropper

What to do:
1. Cut out the paper fish.

2. Gently lie the fish on the surface of the water in the container. Do not allow the top side to get wet.

3. Put 2 or 3 drops of oil into the hole cut out of the fish. Try not to splash the oil on to the fish. What happens?

More to do:
* Try and make the fish go across the container.



STEP ACTIVITY

Maize and mango leaves

Nigeria

Challenge: Are all leaves the same?

What you need:

* one maize leaf or a leaf that looks like it
* one mango leaf or a leaf that looks like it
* leaves from four maize like leave, e.g. from rice, wheat, millet, guinea corn, spider plants, iris, bamboo
* leaves from four magno like leave, e.g. from bean, guana, melon, acacia, peas, geraniums

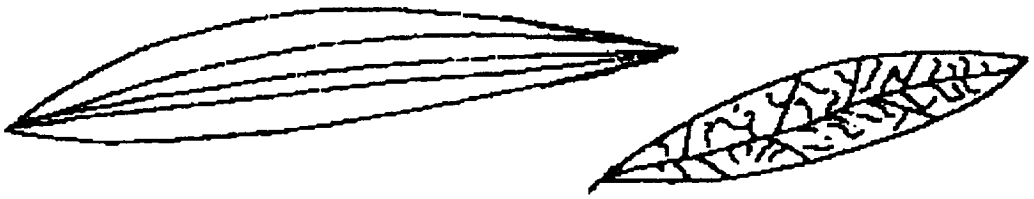
What to do:

1. Look at the two leaves. What features do they share? What are different?

2. Examine the two sets of leaves. What do you see? In what ways are the two sets of leaves different?

3. How might you describe each set of leaves ?

4. Can you find a name for each set of leaves? Take a closer look at each set of leaves. What are the similarities? Can you name the plant from which each leaf comes? What type of plant is it?



STEP ACTIVITY

Lift some books by using air

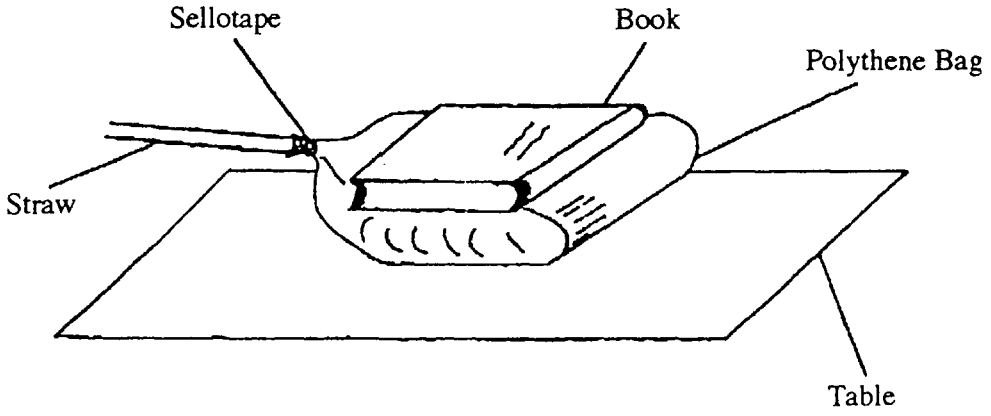
Nigeria

Challenge: Can you raise books using air?

What you need:
* a polythene bag
* some paper bags or balloons
* some books to lift
* a flat surface

What to do:
1. On the flat surface of a table, place one book on the polythene bag, as shown in the drawing.
2. Blow into the bag. What happens and why?

More to do:
1. Try the same activity with a balloon. What do you observe?
2. Then try the event with the polythene bag and make your comments.
3. Which bag is better?
4. What about the balloon?
5. Place another book upon the first one and blow into the bag or the balloon. What happens?
6. What do you observe if you try with three books? Make your comments.



STEP ACTIVITY

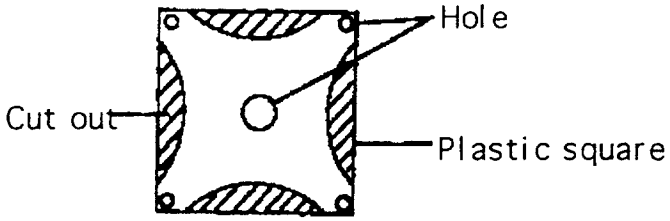
A parachute

Nigeria

Challenge: Can you make a parachute?

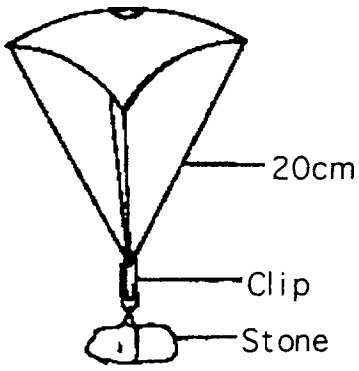
What you need:

* 25 cm square paper
* thread - 4 pieces 25 cm long
* paper clip
* another small piece of thread
* small stones



What to do:

1. Tie a thread to each corner
2. Attach to ends to a paper clip
3. Drop a parachute from a height. What happens?
4. Tie the small stone to the paper clip and drop the parachute from the same height. What happens?



More to do:

* Repeat the activity with other shapes of parachutes. What shape of parachute is the slowest?
* Modify the parachute to make it go sideways. Can you make it go the furthest sideways?

STEP ACTIVITY

The floating straw

United States of America

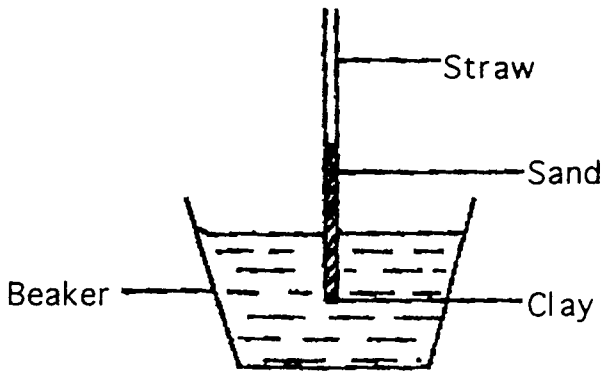
Challenge: Can you make a straw to float?

What you need:

* a small funnel
* hot water
* silver sand
* crayon or marker pen
* see through beaker
* clay plasticine

What to do:

1. Half fill the beaker with water.
2. Seal one end of the straw with plasticine or clay.
3. Fill the straw with a little sand and test the straw. Keep filling it with sand until the straw floats upright.
4. Take out the straw. Pour away half the water and replace it with hot water.
5. Place the straw in the water. What happens? Mark the water level on the straw.
6. Pour out the water and replace with iced water.
7. Float the straw again. What happens?



STEP ACTIVITY

Water magnifiers

United Kingdom & Nigeria

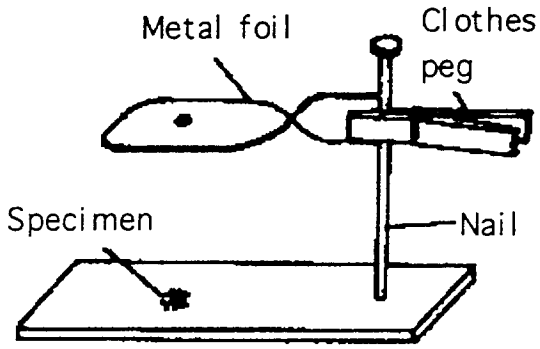
Challenge: Can you make a "simple microscope"?

What you need:

* a strip of a thin aluminium foil
* a clothes peg
* a liquid dropper
* a piece of flat wood
* long nail
* hammer

What to do:

1. Using the piece of flat wood as a stage, hammer the long nail firmly into the wood.
2. Make a hole in the strip of aluminium foil using a suitable tool (the tip of an old ball point pen if the foil is thin enough, or a nail of suitable diameter).
3. Fold the end of the foil through 90 degrees to act as a clamping surface.
4. Clamp the foil to the nail using the clothes peg.
5. Using the dropper place a drop of water over the hole in the foil.
6. Place a small object on the "stage" and, by easing the peg a little, adjust the height of the water drop until the object is in focus.



STEP ACTIVITY

The "dancing" salt

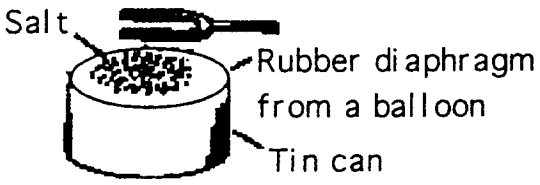
Greece

Challenge: Can you make the salt dance?

What you need:
* a tin can
* a tuning fork
* a big balloon
* salt

What to do:
1 Stretch a rubber diaphragm from a big balloon over the open end of a tin can. Take care with any sharp edges.
2 Sprinkle some salt on the rubber.
3 Strike a tuning fork and hold it about 1 inch over the diaphragm.
4 What do you observe?
5 What does this show about sound?

More to do:
* How can you make the salt "dance" using a tuning fork?
* What happens if you use different sizes of tuning forks? Compare results.
* Can you workout a relationship between the tuning fork and the salt?



STEP ACTIVITY

Electrostatic attraction

India

Challenge: Can you pick up the pieces of paper with a strip of plastic?

What you need:

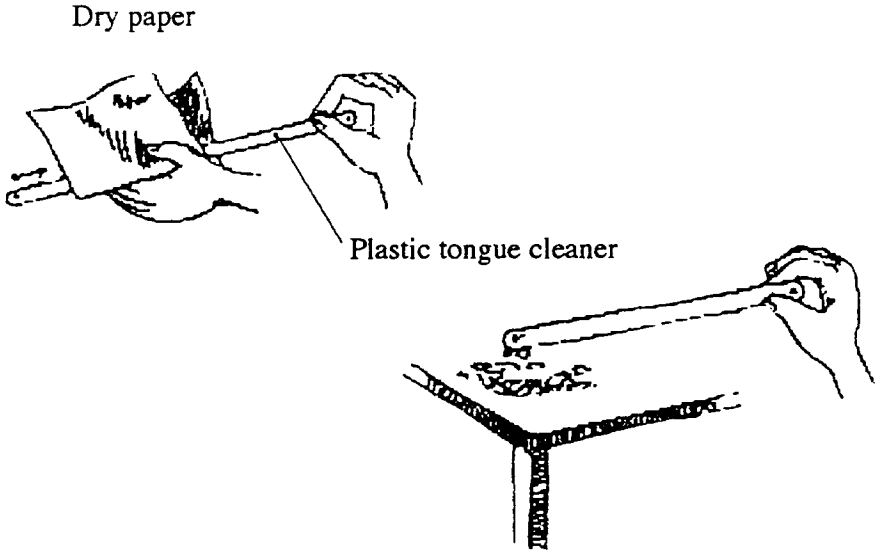
* a plastic tongue cleaner or a plastic tea stirrer or a thin strip of plastic rounded at each end
* a sheet of paper (notebook size)
* 10 - 15 small pieces of paper ("confetti" size)

What to do:

1. Take a plastic tongue cleaner and rub it with the sheet of paper at least ten times.
2. Bring the tongue cleaner near to the small bits of paper spread on a table top.
3. Ask the pupils to describe what they observed.
4. Next ask the pupils for their explanation of what they observed.

More to do:

* Investigate how does the number of paper bits, attracted by the plastic tongue cleaner, change with the number of times it is rubbed with the paper.



STEP ACTIVITY

How to make a pooter

Australia

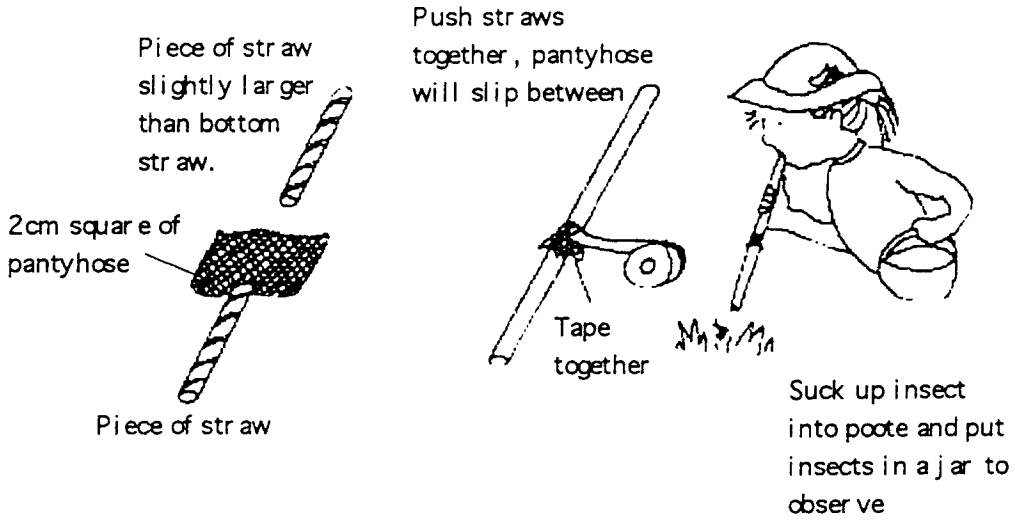
Challenge: Can you collect small-creatures?

What you need:
* two drinking straws, one able to fit inside the other
* a 2cm square piece of fine mesh, e.g. pantyhose/stocking
* sticky tape
* a jar

What to do:
1. Wrap the piece of pantyhose over one end of the smaller straw.
2. Push the straws together so that the pantyhose will slip between them.
3. Tape the two straws together.
4. Suck up insect into pooter and put insects into a jar to observe.

NOTE:
The pantyhose will prevent the swallowing of insects or other small-creatures sucked up into the pooter.

WARNING:
Mini-creatures are fragile and easily hurt. Be gentle when observing them and let them go as soon as possible.



STEP ACTIVITY

The Indian rope trick

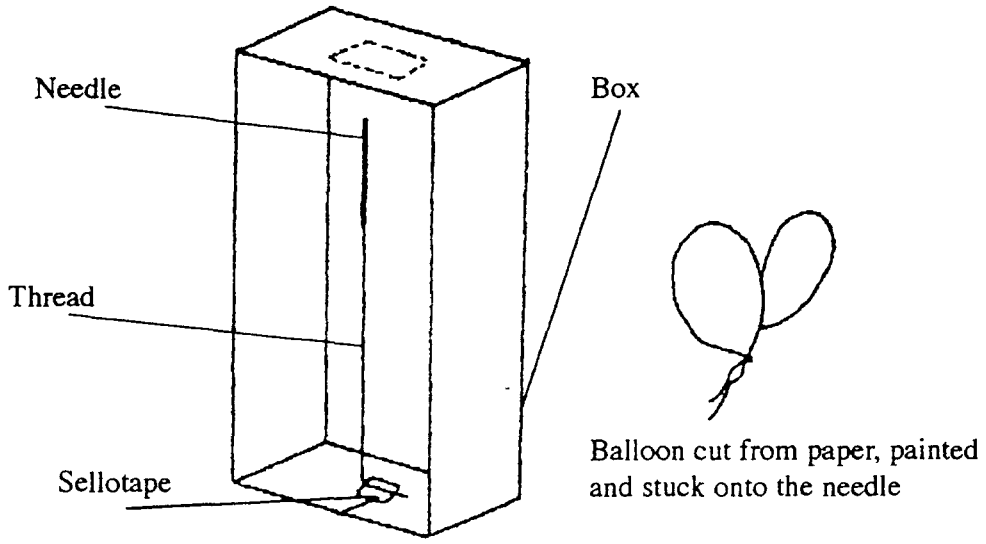
India

Challenge: Can you make the thread stand up?

What you need:
* a small box
* thread - length depends on the size of the box
* sellotape
* magnet
* needle

What to do:
1. Thread the needle and tie a knot so the needle does not come off.
2. Tape the other end to the inside of the box.
3. Tape the magnet to the inside top of the box.
4. Lift the needle up to the magnet.
5. The thread should be about 1 cm away from the magnet. Adjust the length as necessary so that the needle remains suspended in air.
6. Why does the needle seem to float in air?

More to do:
* Put a piece of paper between the needle and the magnet. What happens?
* Try putting other things like thick card or coins between the needle and the magnet. What happens each time?



STEP ACTIVITY

New England magnet sticks

United States of America

Challenge: How can you investigate whether or not the magnet will attract all of the items?

What you need:

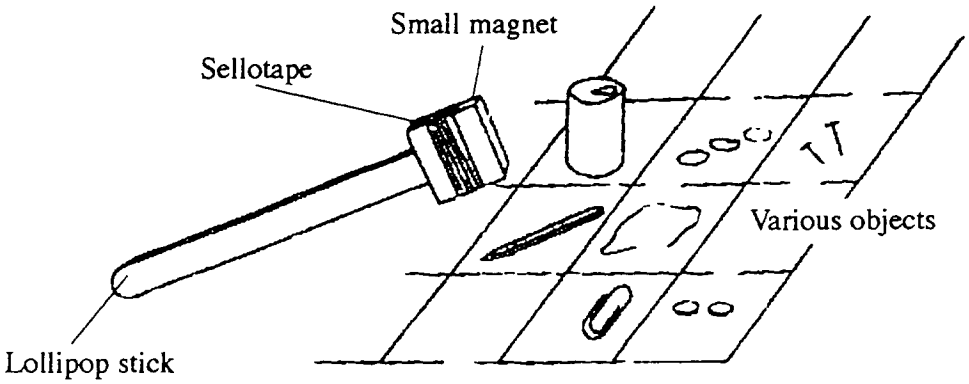
* clean lollipop sticks
* clear tape or glue
* small round or square magnets
* squared paper or similar grid
* things to test such as toy cars of various materials, pebbles, cloths with metal fastenings, coins, tin cans, paper clips, screw, nails etc.
* a recording sheet

What to do:

1. Show children the lollipop sticks and invite them to design and make a magnet stick to use in their item testing.
2. Ask them to plan a fair test and organise how they will do the testing and how they will record their results.
3. Let them do their investigation.
4. Is there any pattern in their results? Do certain materials attract magnets while others do not?
5. Make sure that you have plenty of non-magnetic materials available for children to test.

More to do:

* Suggest children walk around the classroom and predict if furniture and fixtures are or are not magnetic. After writing down their predictions with reasons, test each item with a magnet and record the result.
* Compare these with their predictions.



TEACHER'S NOTES

STEP ACTIVITY : Swimming fish

The oil tries to spread itself but it can not do this because of the shape of the fish so it spreads itself down the channel cut into the fish. This causes the fish to move forwards. Once there is a layer of oil on the water, get some fresh water before you do it again.

STEP ACTIVITY : Maize and mango leaves

This activity introduces the children to the idea of monocotyledons and dicotyledons. Monocotyledons have parallel veins and dicotyledons have branched venation. The activity also introduces pupils to the inquiry skills of observing, comparing and classification.
Examples:
Monocotyledons: rice, wheat, millet, guinea corn, spider plants, iris, bamboo.
Dicotyledons: bean, guana, melon, acacia, peas, geraniums.

STEP ACTIVITY : The floating straw

The floating straw event is an investigation of density. The less dense the fluid the higher it will float. Hot water is less dense than cold water. Iced water is more dense.
Density = Mass / Volume

STEP ACTIVITY : Water magnifiers

The water magnifiers event is an activity which teacher could use as part of a topic on lenses / magnification as well as one for observing small specimens in an activity on Living Things.

STEP ACTIVITY : The "dancing" salt

In this activity, when a tuning fork is held directly over a rubber diaphragm on which some salt is scattered, the salt starts to "dance". This is caused by the sound waves from the tuning fork. When the sound waves strikes the rubber, it has enough energy to cause the rubber to vibrate. Thus, the salt is tossed into the air by the vibration of the diaphragm. The effect does not occur if the tuning fork is moved more than a few inches away, indicating that the energy of sound quickly diminishes with distance.

STEP ACTIVITY : New England magnet sticks

The activity is an investigation into magnetic properties of materials. This is assuming the children have had some experience of magnets before.