



Commonwealth Secretariat

Low Cost  
Teaching Aids  
for Special  
Education

**Commonwealth Education Handbooks**

# Low-Cost Teaching Aids for Special Education

Commonwealth Secretariat, Marlborough House, London SW1

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## PREFACE

The Eighth Commonwealth Education Conference held in Colombo in August 1980 drew attention to the special educational needs of children and adults who suffer from physical or mental disablement. The Conference recognised that a fresh interest in special education, which would be generated by the 1981 International Year of Disabled Persons (declared by the United Nations General Assembly) provided an excellent opportunity for the Commonwealth Secretariat's Education Division to renew activities in this very important sector of education (8CEC Report, Paragraph 140).

In selecting an appropriate and useful activity, the Conference noted that one of the greatest difficulties facing administrators and teachers engaged in special education was the high initial cost and subsequent maintenance of teaching aids. In order to alleviate some of these difficulties, the Conference considered ways of providing practical assistance to practitioners in special education which would enable them to make the best possible use of limited resources and to reduce dependence on distant suppliers. Accordingly, it recommended that the Education Division should carry out a study to examine methods for the design and manufacture of low-cost teaching aids for use in special education, and to publicise the results of such a study. The present handbook represents a response to the concerns of the Conference.

The handbook is in two parts. Part One describes and illustrates a selection of simple tools and equipment which will assist special education teachers, with little or no expertise in the design and manufacture of teaching aids, to set up a suitable workshop. Part Two contains a selection of simple teaching aids, showing a step-by-step approach to their manufacture, based on diagrams and materials in everyday use. Some suggestions are also included on ways to develop these ideas towards further innovative designs, using low-cost materials readily available in Commonwealth developing countries.

The handbook is intended primarily for practising teachers in special education and for members of the community who offer their services in the provision of education to mentally and physically handicapped boys and girls. Although it is not always feasible or desirable that such children should undertake practical work involving the use of tools, there is scope for some participation by them in the design and manufacture of low-cost teaching aids, given close supervision and assistance. Such participation has obvious educational value and underlies the approach of the present handbook.

However, although the handbook is designed specifically for special education, the examples of low-cost teaching aids could also serve the educational needs of other children, particularly in terms of participation in design and construction and we would therefore commend this publication to educators generally.

The Commonwealth Secretariat is grateful to Mr Donald Caston of the City of London Polytechnic, our consultant for the study and to his colleague Miss Joan Thompson, for her excellent illustrations.

Rex E O Akpofure  
Director, Education Division  
Commonwealth Secretariat  
Marlborough House  
LONDON

## INTRODUCTION

There are many teaching aids and pieces of equipment which can be made in the school by both teachers and pupils if a few sets of simple and inexpensive hand tools are provided.

Some things which would prove too difficult for the school to make can sometimes be made by the local technical college as part of student course work, or by the technicians who have the skills and the equipment

The hand tools which make up the set are as follows:  
wood saw, junior hack saw, small screwdriver, hammer, craft knife, plane, hand drill, scissors and a metal ruler.

To overcome the damage to desks and tables while they are being used as work benches, it is recommended that small work tops are made. As can be seen from the drawings, these just rest on the desk or table tops to protect them from being damaged. This easily made piece of equipment also helps to make clearing up an easy job so that the room is easily converted back into a classroom.

Teachers should be encouraged by their schools to make things which will help them to be better teachers by providing not only a set of tools, but also a table and work tops in the common room or where they can work in peace.

Once this 'help yourself' approach is seen to be working it is very important that the school uses the money saved to buy classroom materials which the teachers, pupils and technical college cannot make.

Please note that all measurement sizes given are minimum sizes.

Part One

TOOLS AND  
EQUIPMENT

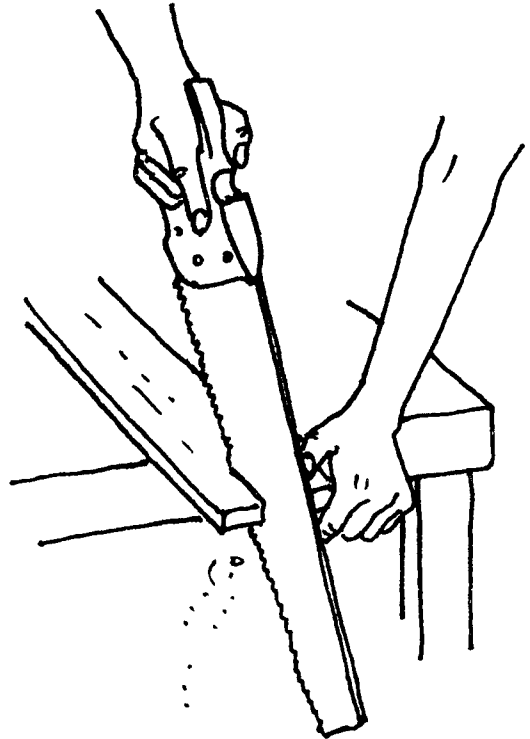
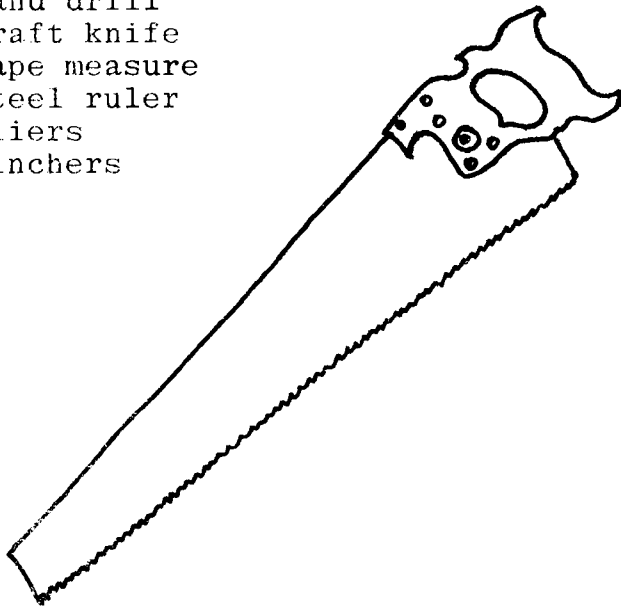


## TOOLS

There are no such things as really cheap tools, so it pays to buy the best you can afford. If there is not enough money to include a vice in the tool kit, buy a few 'G' clamps as these can very often be used to hold wood and metal while they are being worked on. Learn how to keep tools sharp and in good condition, as this will make it very much easier to use them. Always try to protect the blades when tools such as planes and saws are not in use.

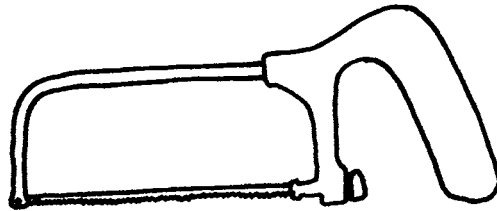
### Tool Kit

Hand saw 10" TPI  
Tenon saw  
Coping saw  
Junior hack saw  
Hammer 4 oz  
Screwdriver  
Plane  
Hand drill  
Craft knife  
Tape measure  
Steel ruler  
Pliers  
Pinchers

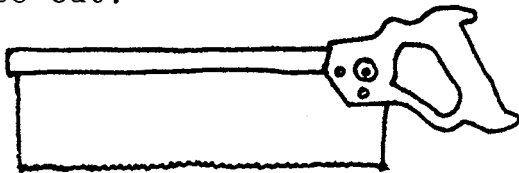


Hand saw 10" TPI is the best one to buy for cutting large pieces of timber and sheets of plywood as it leaves an edge which can easily be planed smooth.

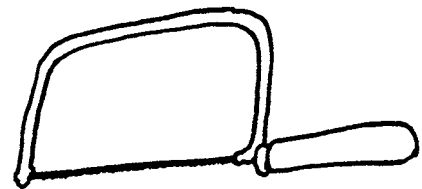
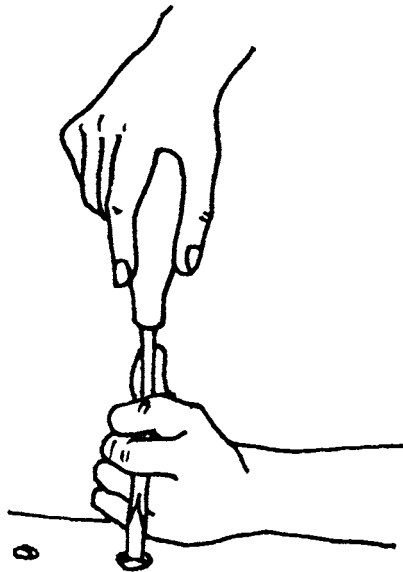
The junior hack saw is the cheapest saw that it is possible to buy for cutting up small pieces of metal or plastic. As the spare blades are not expensive, they should be regularly replaced.



Tenon saws are used for cutting small sections of wood, and when used with a bench hook and mitre block, very accurate angles may be cut.

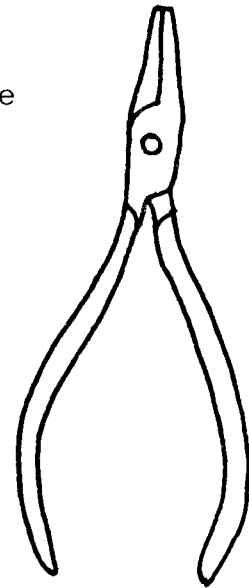
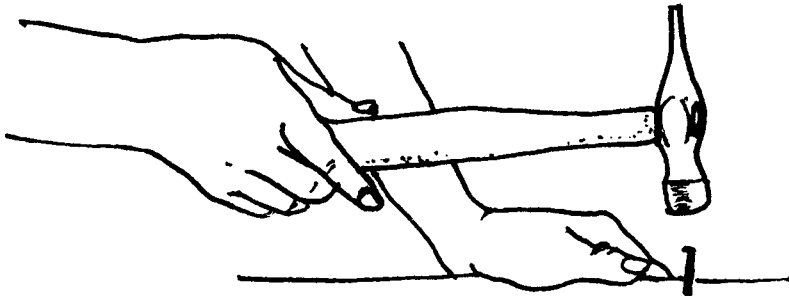


Coping saws with their replacable blades are for cutting out discs and all curved shapes.



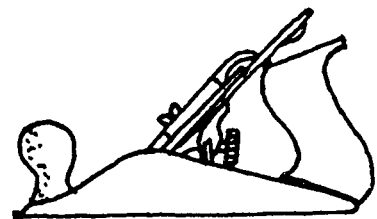
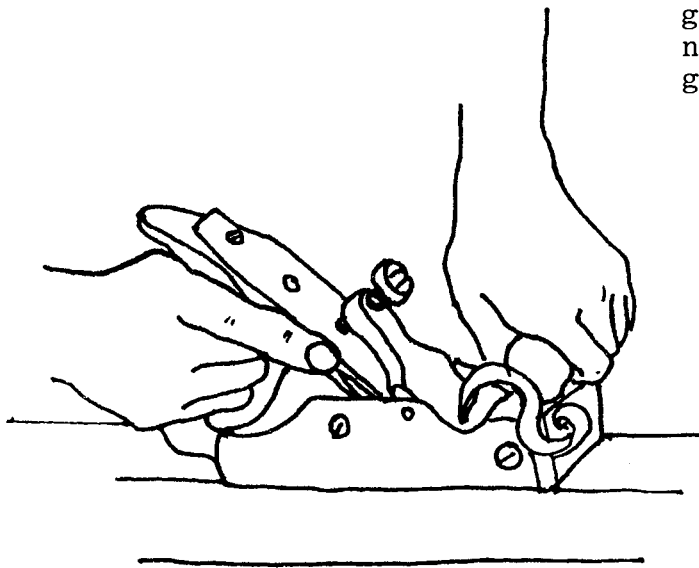
When choosing a screwdriver make sure that it will fit the slot of most screws you will use. Try and standardise on one gauge such as a No 8.

If possible buy both pinchers and pliers, but if a choice has to be made the pliers will prove the most useful of the two.



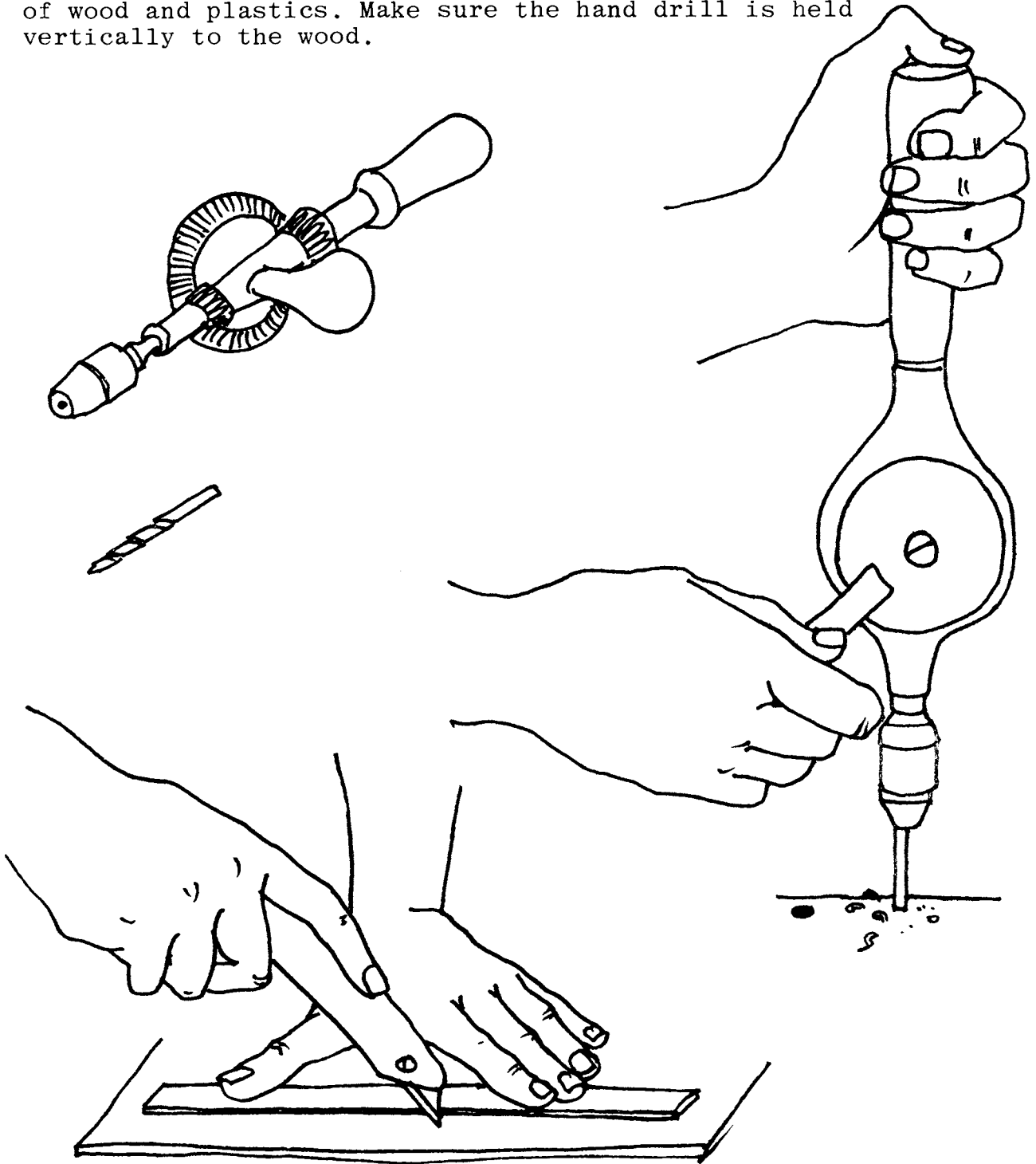
Do not buy a hammer that is too heavy for most jobs you will have to do. A 4 oz hammer and small thin nails are usually used for this type of work because modern glue makes a very strong joint and the nails only support the pieces of wood while the glue is setting.

When joining wood together by glue and screw, or glue and nail, try and use a waterproof glue.



A small plane speeds up the process of smoothing wood, and saves a great deal of glass papering. Make sure that the blade is finely set and true, is kept sharp and laid on its side when not in use. This saves the blade from damage.

Although a hand drill and the drills are really intended for metal work, they will work equally well on all types of wood and plastics. Make sure the hand drill is held vertically to the wood.

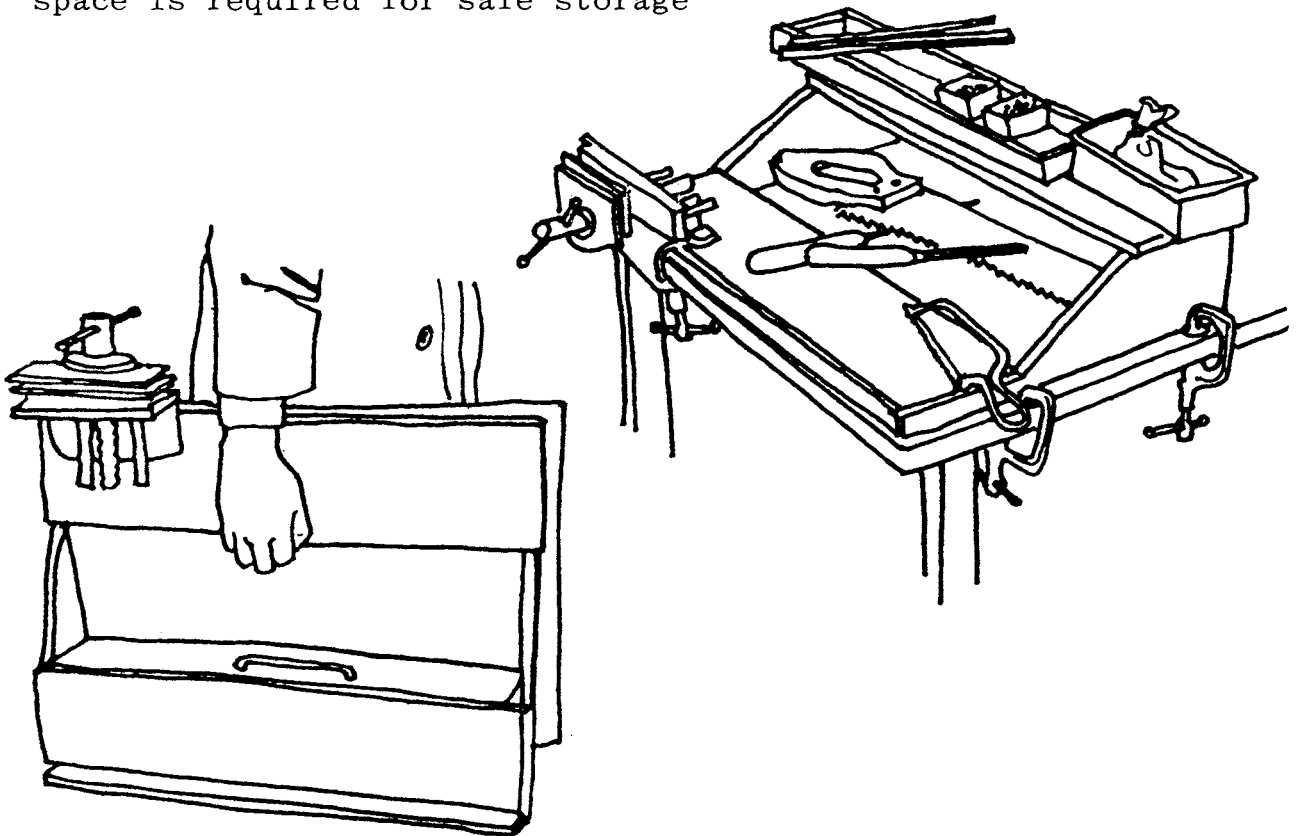


The craft knife is probably the most dangerous tool in any tool box unless it has a retractable blade, and even if it has been made safe it must still be kept away from children. When used with a straight edge, keep fingers away from the blade. To stop the metal edge from slipping, it helps to glue a fine piece of glasspaper to the underside.

## WORK TOP

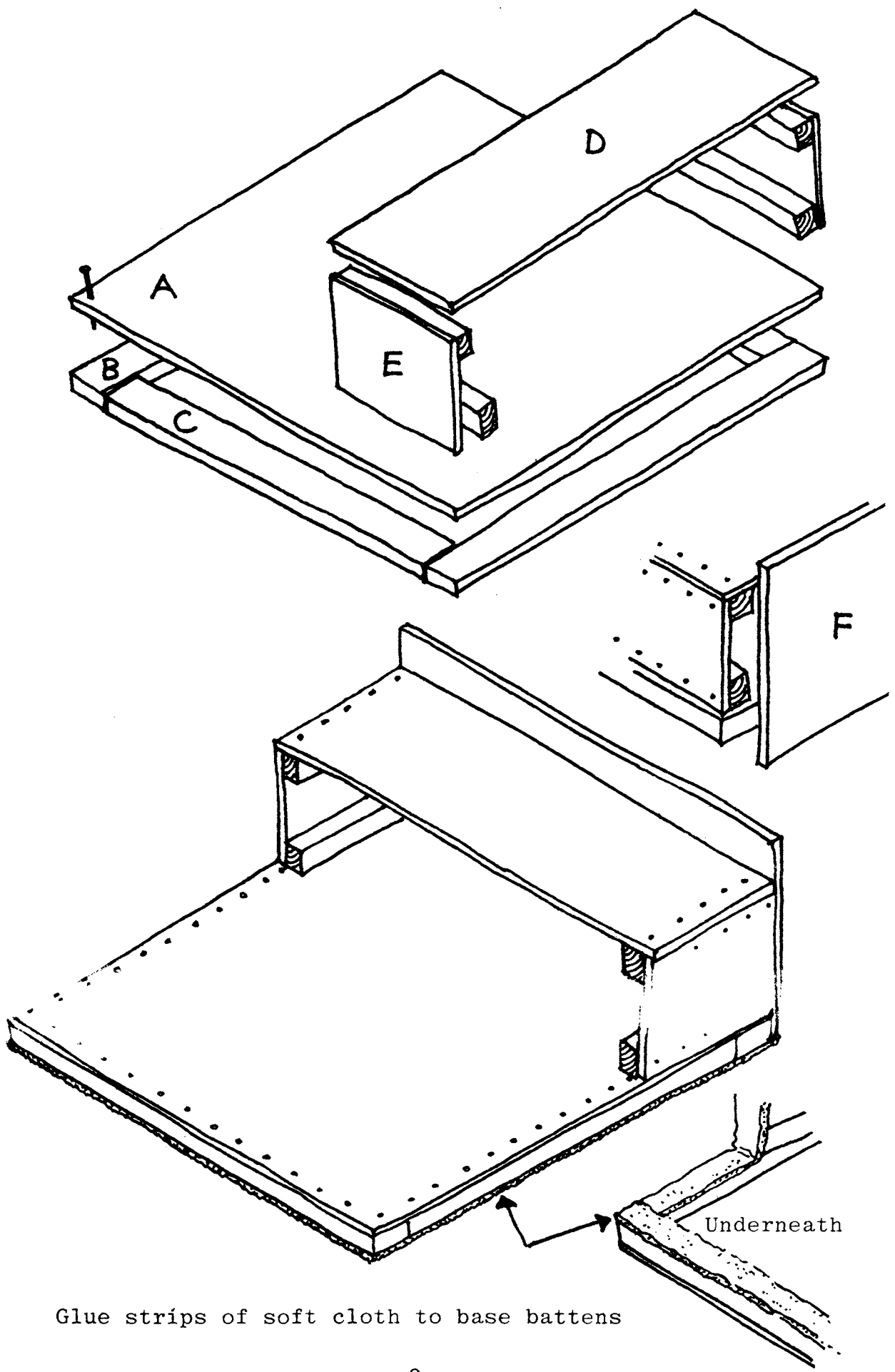
The problem for any teacher is not 'what shall I make' but 'where and with what shall I make it?'. The same is often said about practical work in the classroom.

The work top overcomes many of these problems as it not only provides a working surface and tool box, but instantly converts any table top into a work bench without causing any damage to the table's surface. If a number are made, any classroom can quickly become a workshop for practical subjects, and equally easily be converted quickly back again when the lesson is over. As the work tops are stored on end, very little space is required for safe storage



### Materials :

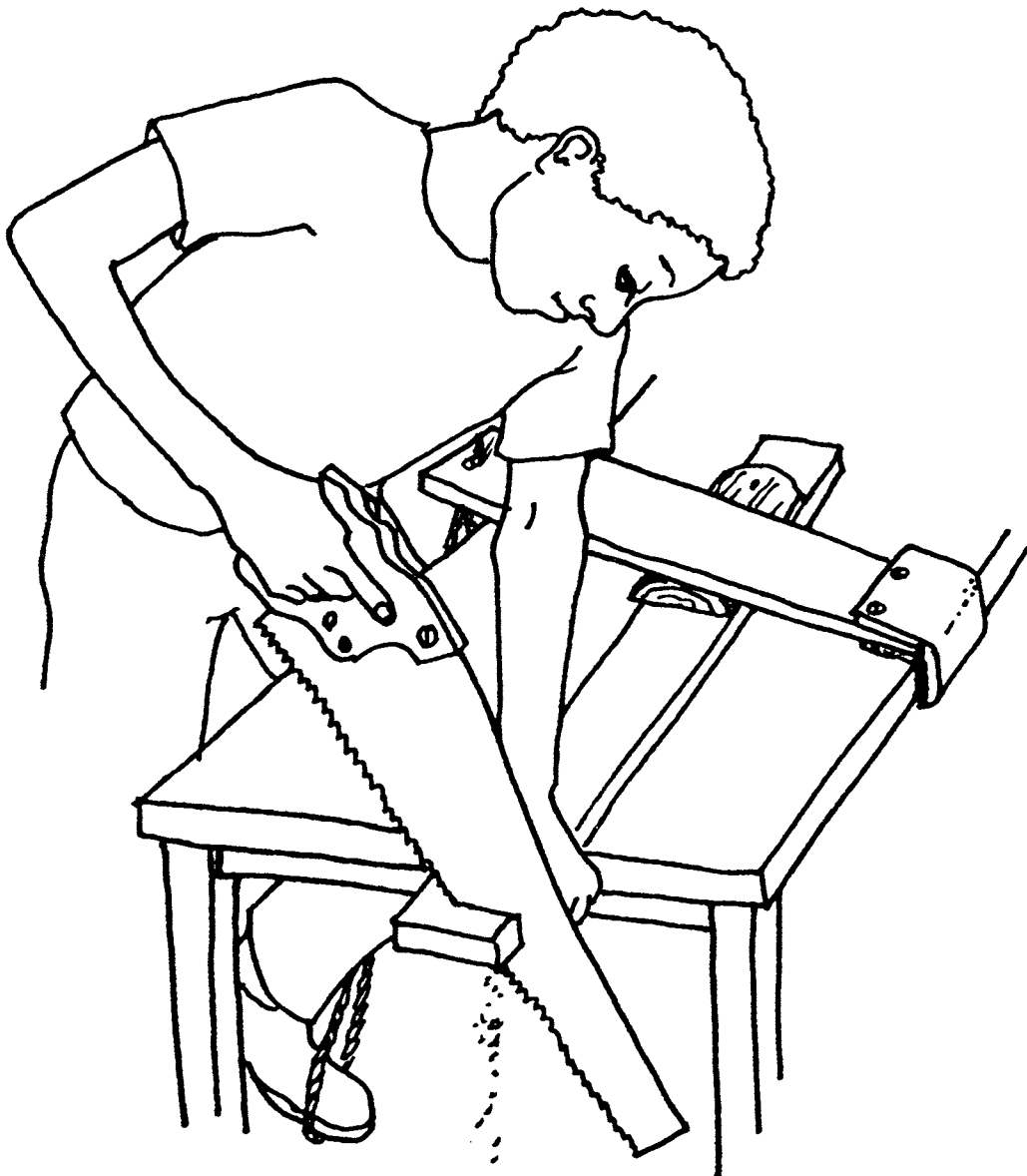
- A Plywood  $\frac{1}{4}$ " x 18" x 24"
- B Softwood  $\frac{1}{2}$ " x  $1\frac{1}{4}$ " x 24"
- C Softwood  $\frac{1}{2}$ " x  $1\frac{1}{4}$ " x  $15\frac{1}{2}$ "
- D Softwood  $\frac{1}{2}$ " x 6" x 24"
- E Softwood  $\frac{1}{2}$ " x 6" x 6"
- F Plywood  $\frac{1}{4}$ " x  $6\frac{1}{2}$ " x 24"

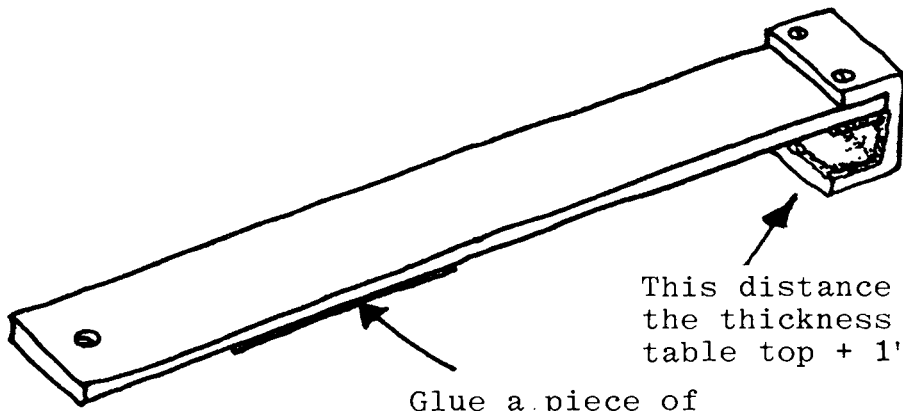


Glue strips of soft cloth to base battens

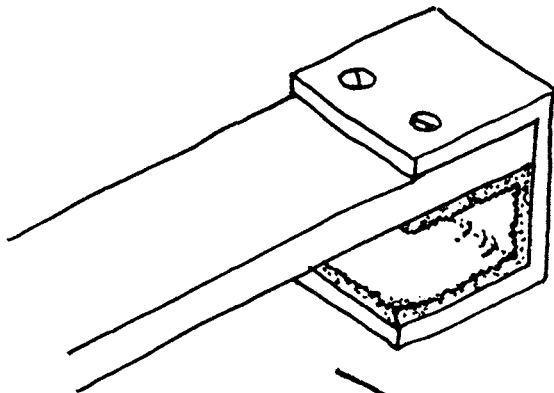
## WOOD VICE

This is a very easily made piece of equipment which replaces the standard metal vice which is clamped on the edge of a table. It can cope with both large and small pieces, and leaves both hands free to hold the saw, and give extra pressure to the wood. The illustrations show how it fits on the table without having to drill any holes in it. The timber used for the arm should be a hard wood so that it does not bend too much when in use. The table hook at the end of the arm is made from channel section, but if this is not available it can be fabricated from two pieces of angle aluminium or angle iron which are bolted together with smooth nut heads on the inside, so that the table edge is not damaged. Always keep the foot rope adjusted to the right length so that you are standing comfortably when sawing.

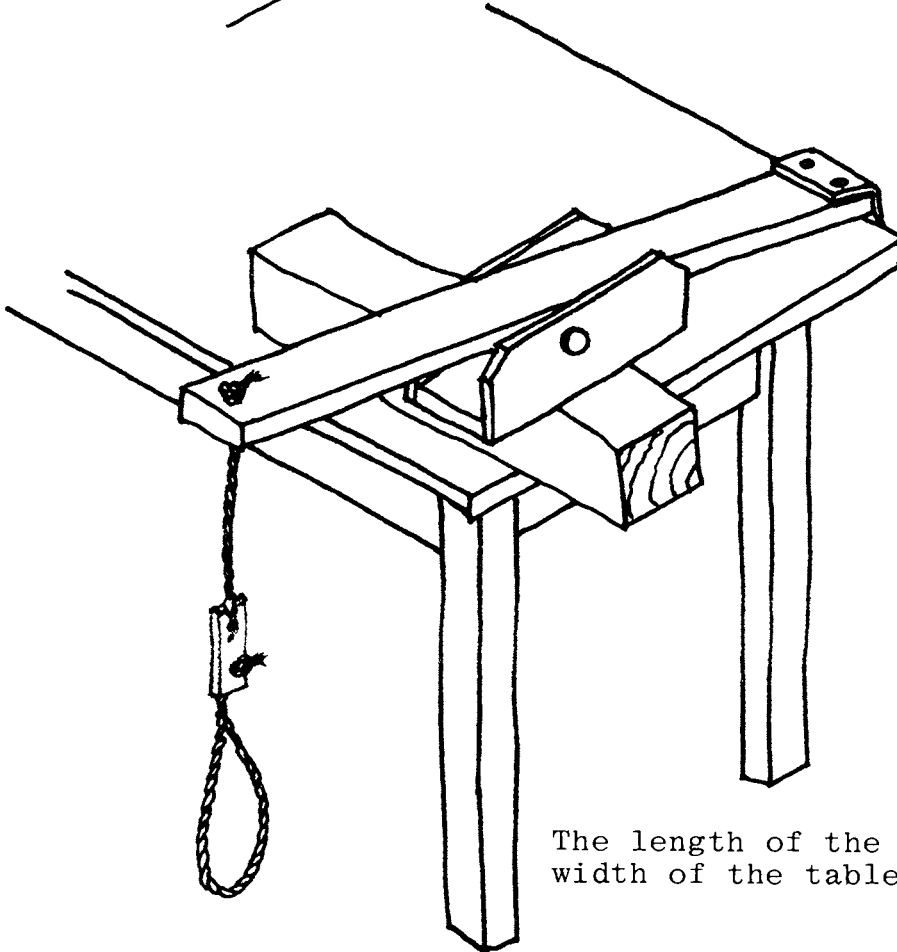




Glue a piece of glasspaper to help stop movement

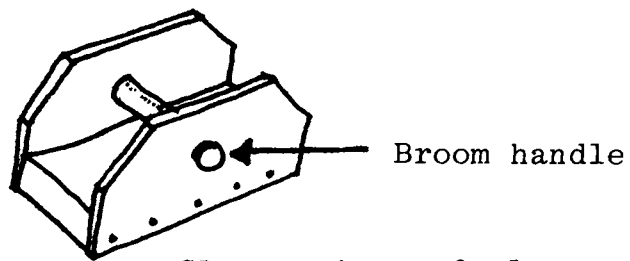


Glue cloth inside to protect edge of table

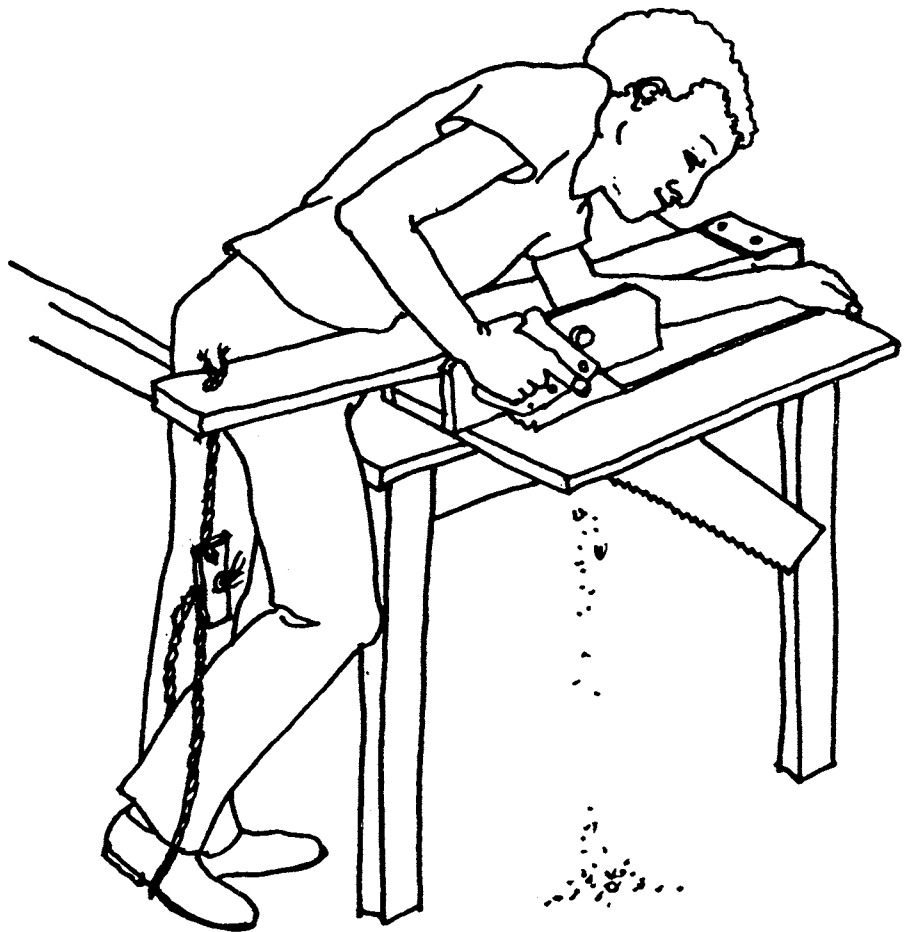


The length of the arm should be the width of the table + 3"





Glue a piece of glasspaper to base  
Base 3" x 8"



## PAINTING

Before buying any paint, make absolutely sure that it is safe to use on things that children are going to handle and use regularly. This is very important as some paints contain poisonous ingredients. Always follow the manufacturers' instructions to the letter and use a brand which dries quickly. Always have a place ready where freshly painted work can be left to dry without the fear of it being touched or becoming dusty. If possible find a dry and well-ventilated place. Drying lots of small pieces of wet wood is always a difficult problem to solve, but some of the ideas illustrated do help to overcome them. Surface preparation need not be a long and tedious job if the wood has been carefully selected, and the various pieces of equipment such as the sanding board are made.

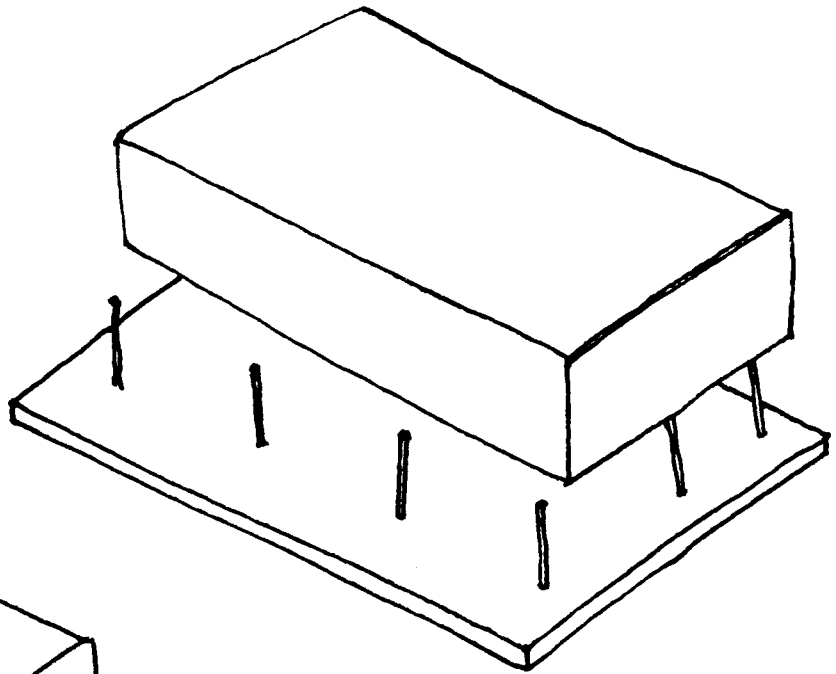
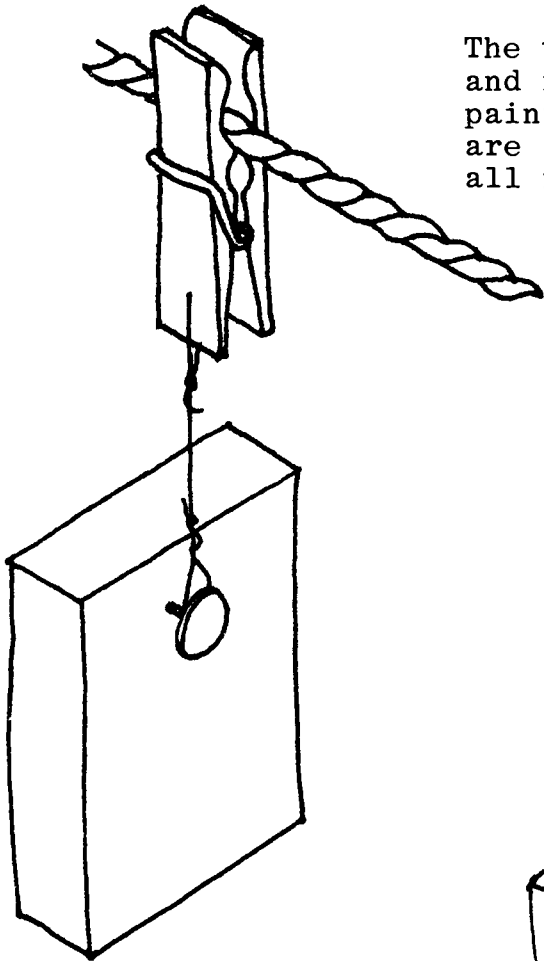
Thoroughly rub down all side with glasspaper to remove all roughness, sharp corners and edges. Fill any holes or bad joins with putty or a proprietary brand of wood filler.

Like hand tools, there are no good cheap paint brushes, so buy the best you can afford. Remember to clean the brushes thoroughly after use.

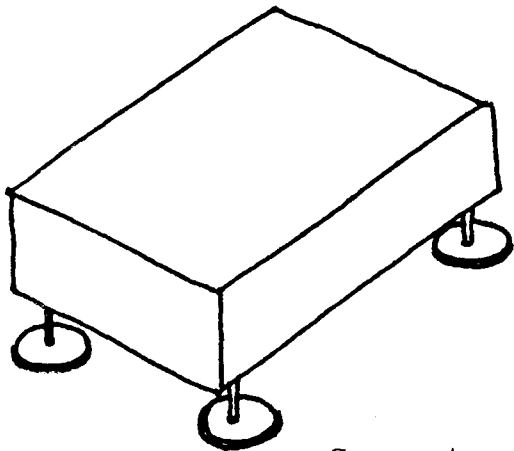
Before using the paint always stir well with a clean stick, making sure there is no solid matter left unmixed at the bottom of the can. An occasional stir should also be given while painting if a good quality finish is to be maintained. When applying both the undercoat and top coat, it is always better to brush on two thin coats rather than one thick coat, as this will reduce drying time, and there will be no runs, which sometimes never dry completely.

To obtain a really professional finish, and one which will last a long time, rub down the surface between coats so that the last one is applied to a very smooth and receptive surface.

The use of drawing pins, clothes pegs and nails for supporting work during painting and drying means all surfaces are free to dry, as air can circulate all round.

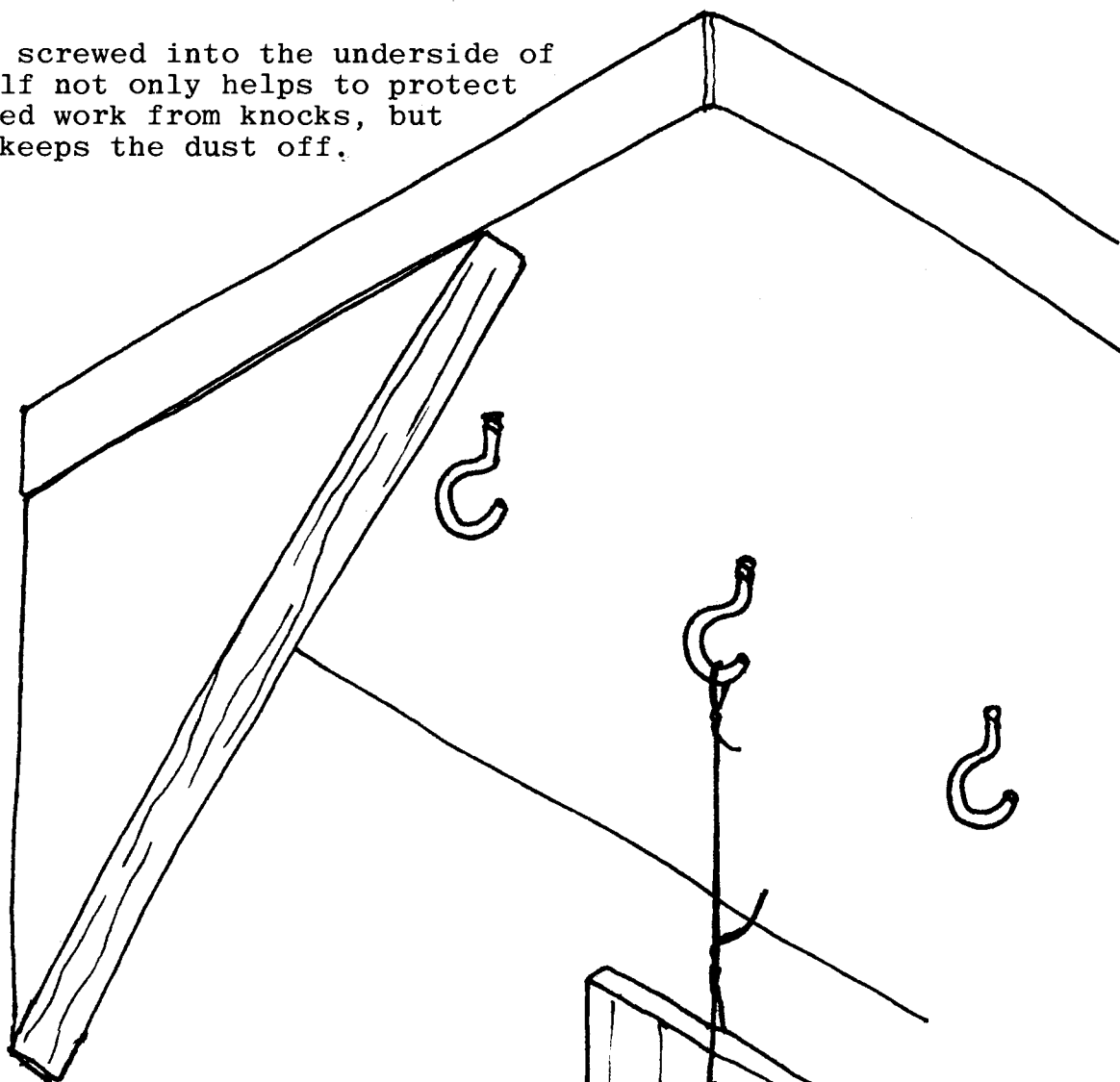


A pin board will act as a support and will only leave pin point marks. Carefully knock pins through pieces of thin wood or cardboard.

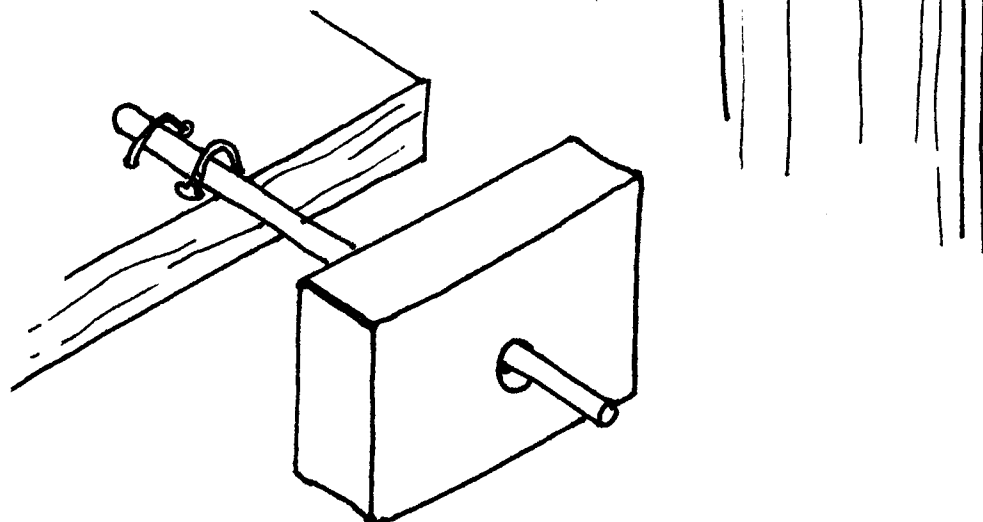


Support wet pieces of wood on drawing pins pushed lightly into the surface before painting. Always paint pin side first.

Hooks screwed into the underside of a shelf not only helps to protect painted work from knocks, but also keeps the dust off.



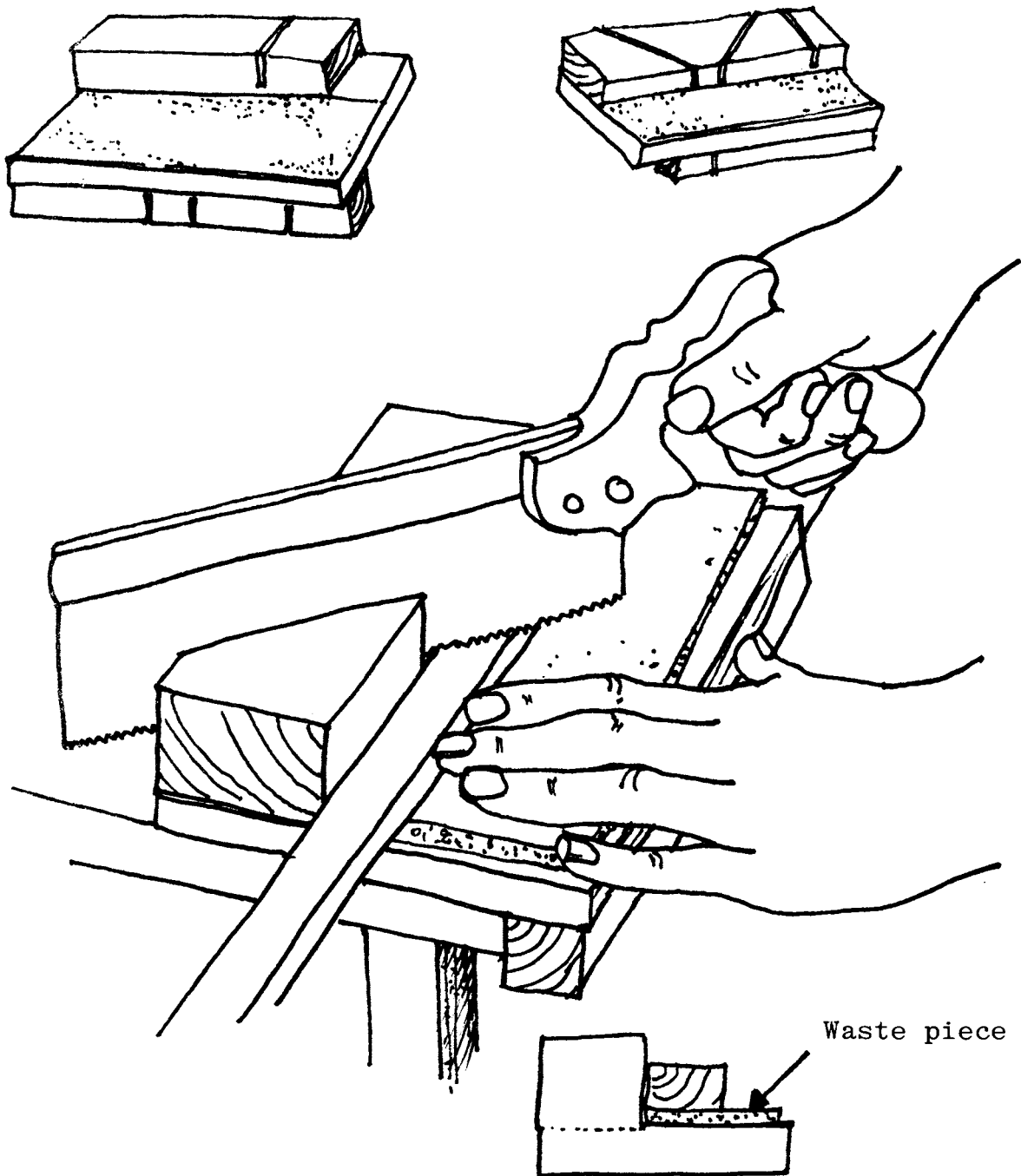
A piece of wood nailed to a shelf will support a piece of wood which has a hole in it.



## MITRE AND SANDING BLOCK

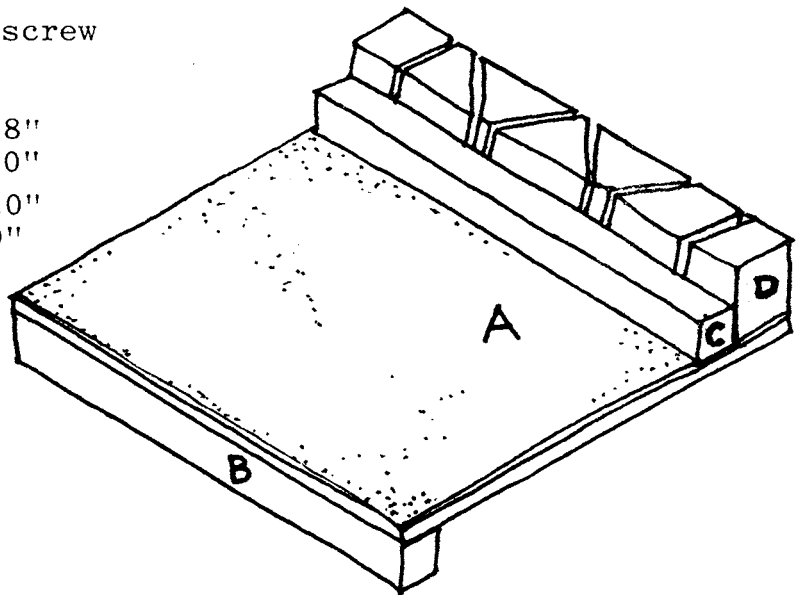
Sometimes it is possible to design a piece of equipment which will do several jobs, and the mitre and sanding board is one of them. Beside cutting corner joints (mitres) and glass papering, it can be used as a bench aid when sawing wood. Having cut a piece of wood at  $45^\circ$  or  $90^\circ$  it is possible to sand it exactly at that angle. A different glasspaper should be glued on each side.

It is the size of the sheets of glasspaper that determines the size of the base board, as can be seen from the illustration.

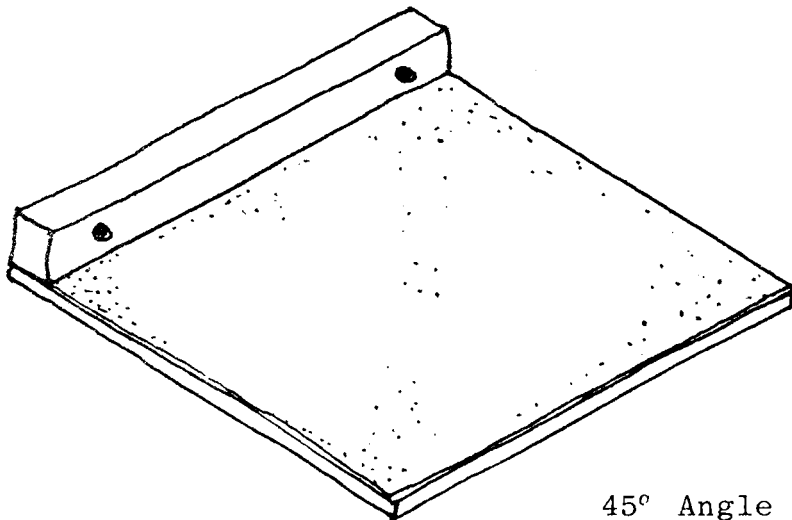


Construction - glue and screw

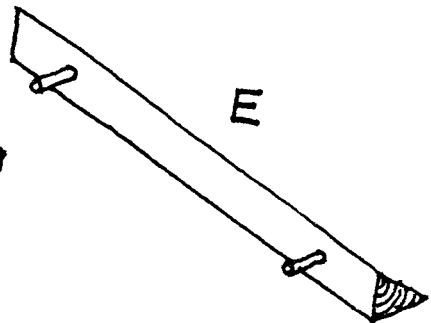
- A Timber  $\frac{3}{4}$ " x 8" x 10"
- B Hardwood  $1\frac{1}{2}$ " x  $1\frac{1}{2}$ " x 8"
- C Hardwood  $1\frac{1}{2}$ " x  $\frac{1}{2}$ " x 10"
- D Hardwood  $1\frac{1}{2}$ " x 2" x 10"
- E Hardwood 1" x 1" x 10"



Holes to suit dowel

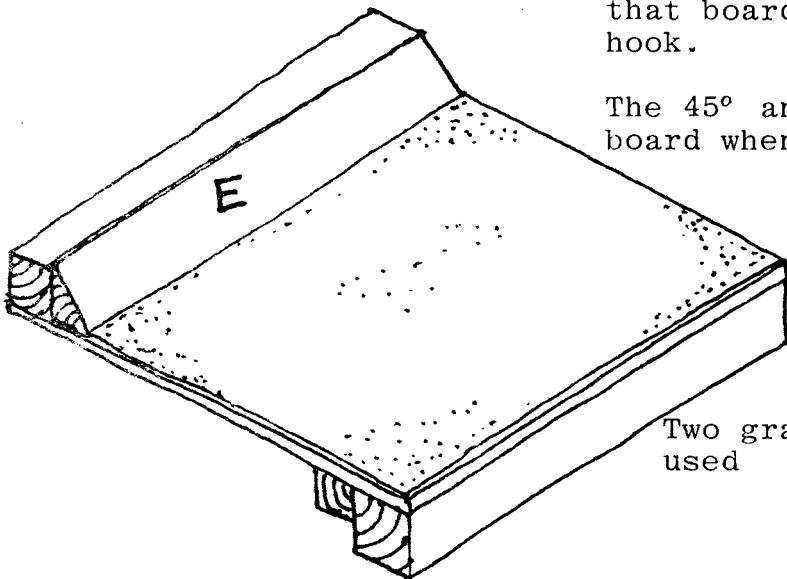


Wood dowel about 5/16" dia,

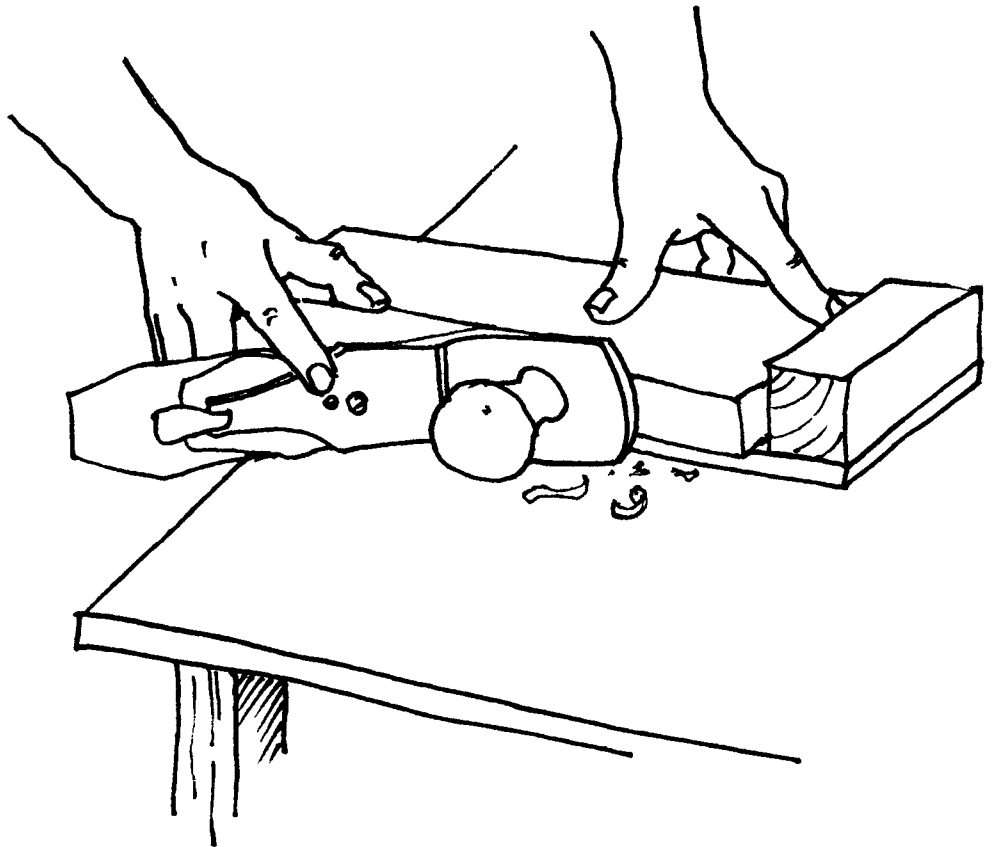
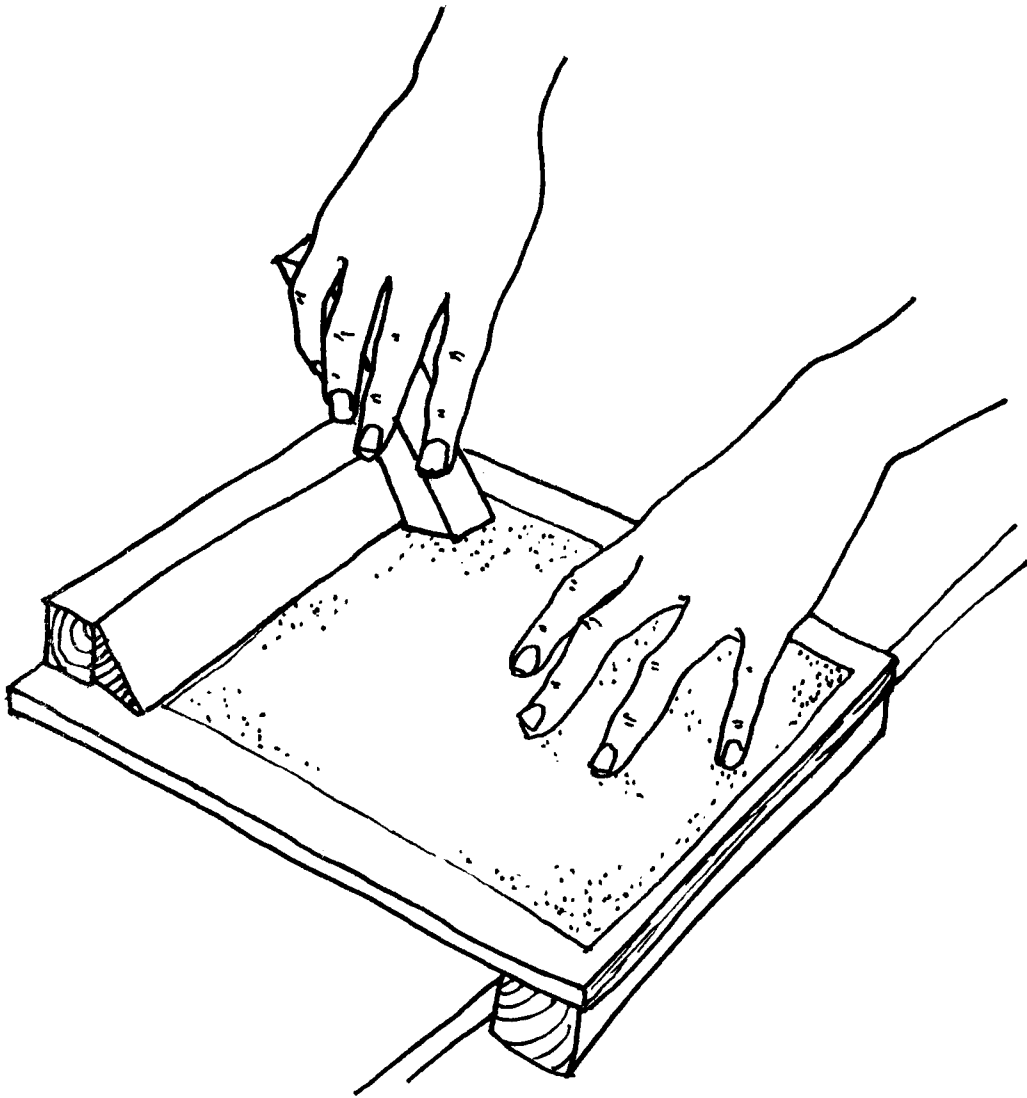


45° Angle piece can be removed so that board can be used as bench hook.

The 45° angle piece plugs into board when required for sanding.



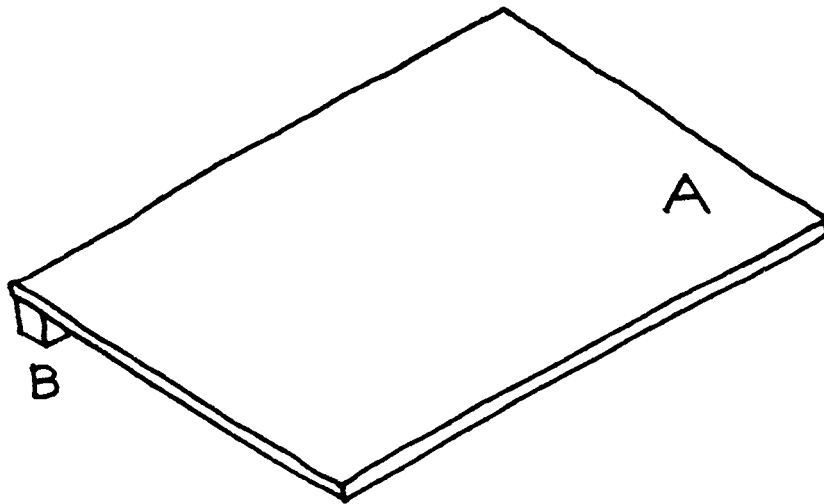
Two grades of sandpaper are used



## DRAWING BOARD

The drawing board can be made for many uses. One side can be used for technical drawing while the other side can be painted so that it can be wiped or washed clean after being used. If plywood or other manufactured board is not available thin seasoned timber can be glued and battened together, and sanded flat and smooth.

It is often better to make the board about the same size as the paper which will be used for technical drawing, for then clips can be used to hold the paper to the board instead of pins which always spoil the surface.



The desired angle can be obtained by placing or fixing a piece of wood under the top edge.

Construction - glue and nail

- A Plywood  $\frac{1}{4}$ " x 12" x 18"
- B Softwood  $1\frac{1}{2}$ " x  $1\frac{1}{2}$ " x 18"  
or Timber  $\frac{1}{2}$ " x 12" x 18"

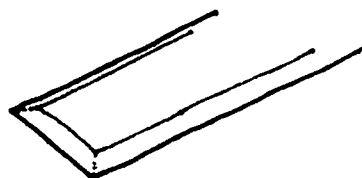
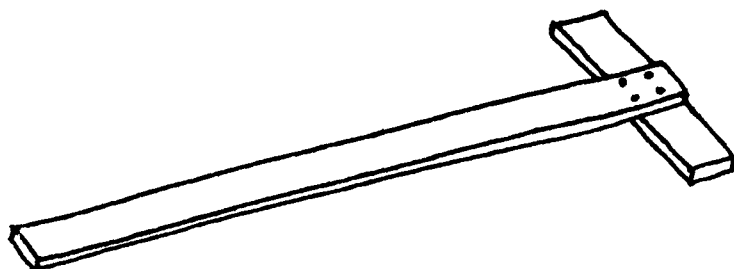


## T SQUARE

The size of the T square will be determined by the size of the drawing board it is to be used on. The secret of making this accurately is to glue and clamp the two pieces together exactly right, and only when the glue is fully set are the screws used.

Choose a good piece of seasoned hardwood for the slider and a length of plywood for the arm.

The average length of the arm is about 30" and the hardwood slider 6" to 8" by  $\frac{1}{2}$ " thick.

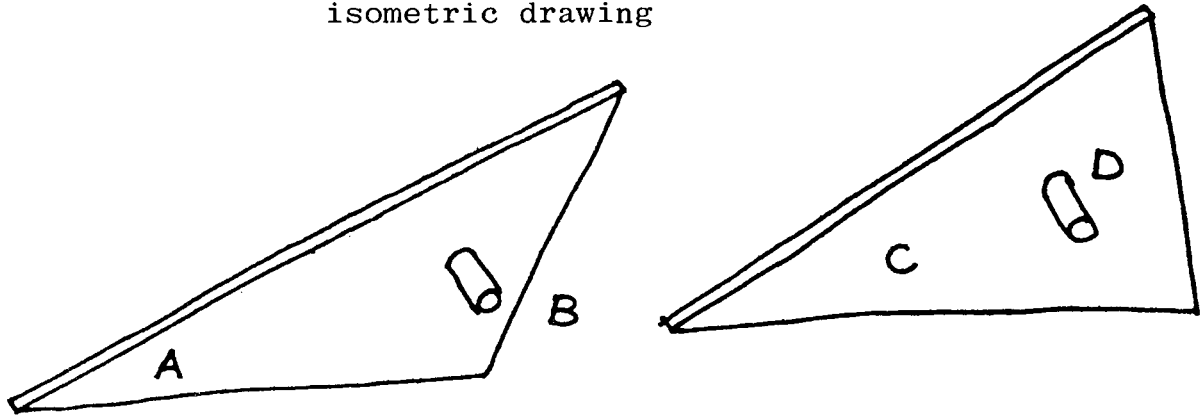


If possible cut the edge at about 45° on the drawing edges, but do not make a sharp edge, or it will quickly get damaged.

## BLACKBOARD GEOMETRY SET

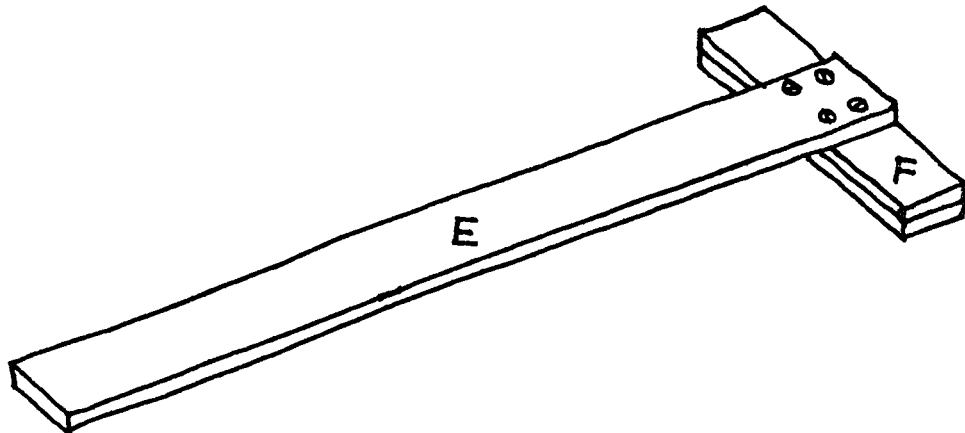
The size of these instruments will to some extent depend on the size and type of blackboard that they are used on.

30° and 60° triangle for isometric drawing



Materials for triangles :

A and C are cut from  $\frac{1}{4}$ " plywood about 10" x 10"  
B and D Dowel 1" dia. x 2"

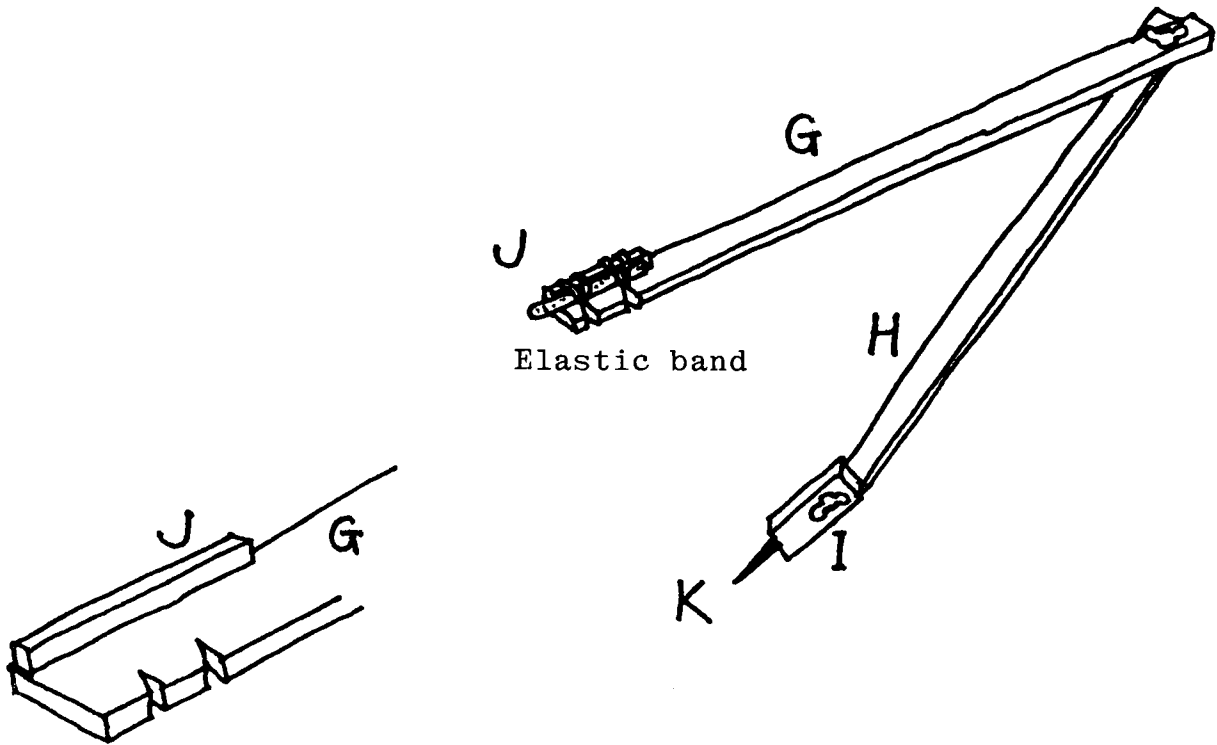


Materials for blackboard T square :

E Plywood  $\frac{1}{4}$ " x 2" x 27"  
F Plywood, two pieces,  
 $\frac{1}{4}$ " x 2" x 8"

## BLACKBOARD COMPASSES

An elastic band holds the chalk to the arm



Materials for compasses :

G and H Plywood, two pieces,  $\frac{1}{2}$ " x 1" x 18"

I Plywood  $\frac{1}{4}$ " x 1" x 3"

J Softwood  $\frac{1}{4}$  x  $\frac{1}{4}$ " x 3"

K  $1\frac{1}{2}$ " nail

Two elastic bands

Two screw wing nuts

Part Two

TEACHING AIDS

## NUMBERED FISH AND SNAKES

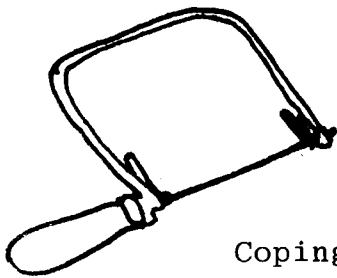
This is a fun way of starting to learn numbers as well as fitting together various shapes. If teachers make these themselves, they can decide just how hard or easy it is to make pieces fit together, as only they know what is best for the children in their classes. If the numbers are only stuck on one side, the fish or snake can be turned over, and the child can try to assemble the shape without the numbers.

The teacher can decide how big to make these teaching aids, but as a guide, they can be sawn from pieces of plywood about 12" x 4" for the fish and 12" x 3" for the snakes. The two and three piece snakes are only about half the length of the larger ones.

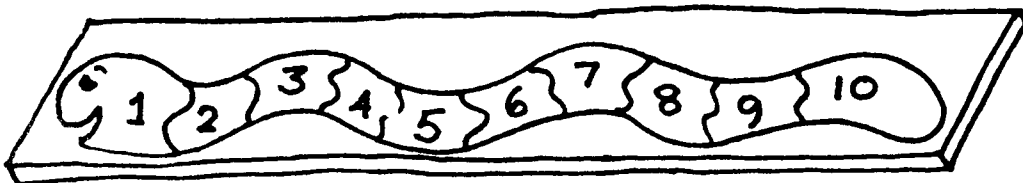
The blades of coping saws can easily break, so clamp the wood to the table to hold it tightly while sawing.

### Instructions :

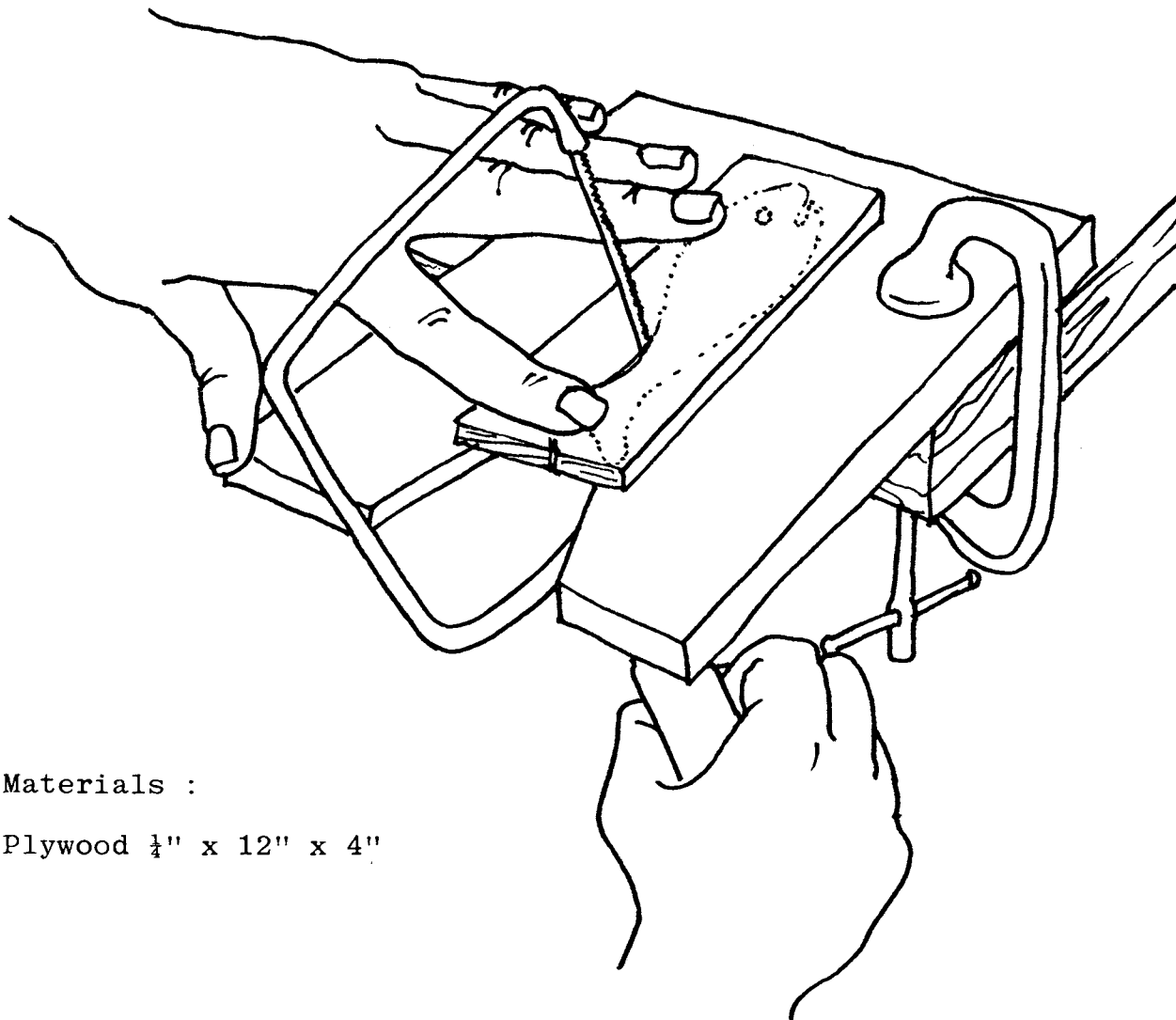
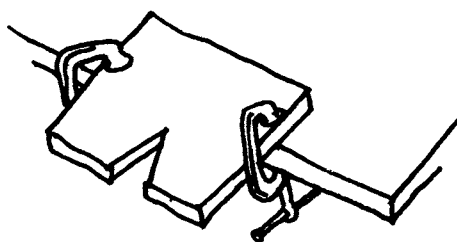
- 1 Draw shape on plywood
  - 2 Cut out with a coping saw
  - 3 Draw the ten shaped parts
  - 4 Cut out the shaped parts with a coping saw
  - 5 Glasspaper all parts
  - 6 Paint
  - 7 Number each part
- Each part can be painted a different colour



Coping saw

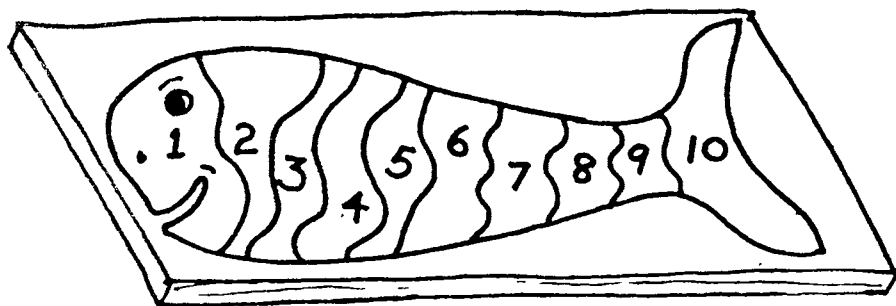


Sawing small pieces of wood is made easier if this little piece of equipment is made from wood  $\frac{1}{2}$ " x 6" x 6". The V is 1" wide,  $2\frac{1}{2}$ " deep.



Materials :

Plywood  $\frac{1}{4}$ " x 12" x 4"



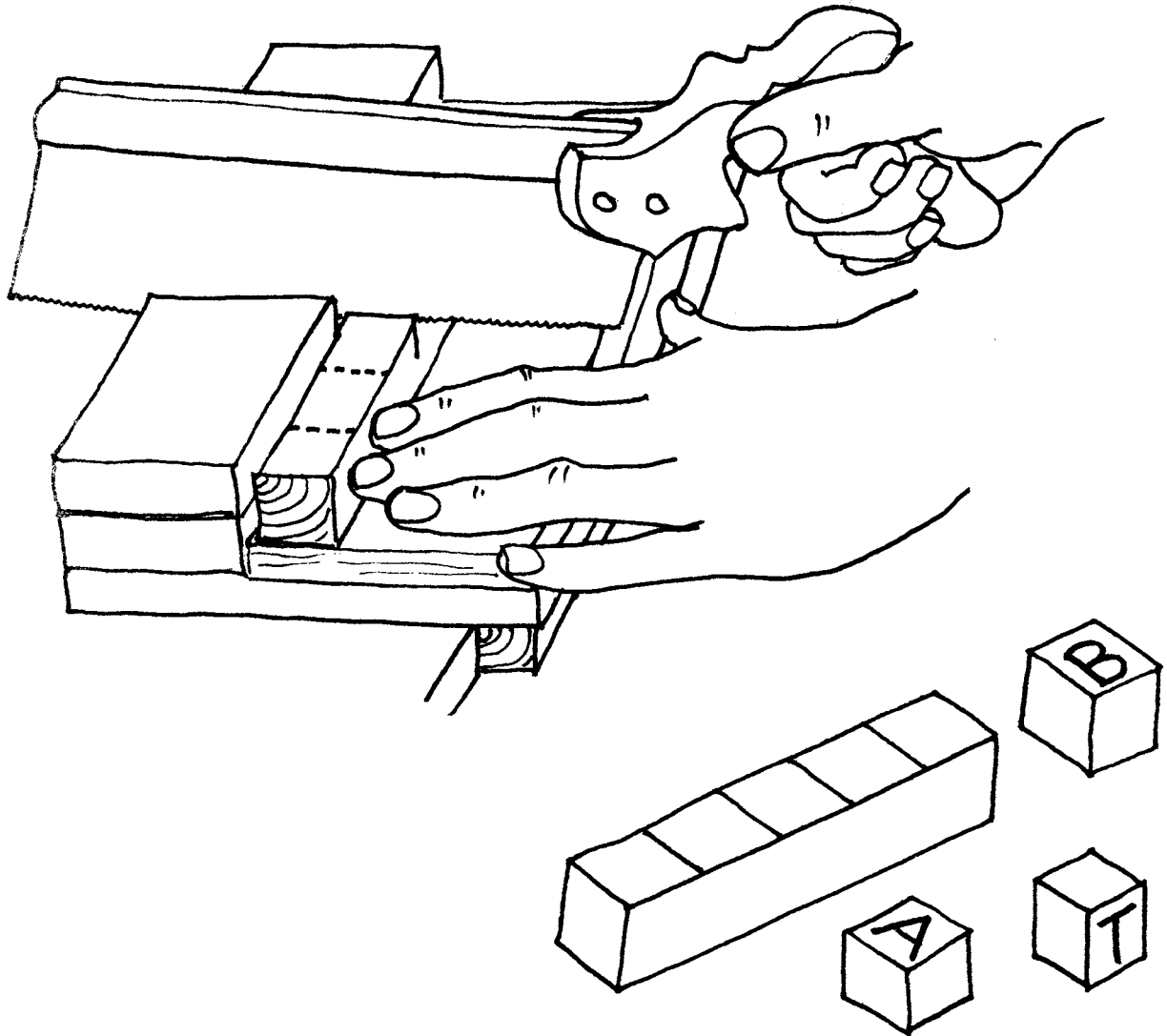
## WOODEN BRICKS

Bricks can play an important part in the early education of children. As they are easy to make, the children themselves can be involved in making them. For example they can sandpaper the sawn pieces of wood on sanding boards to get a smooth finish as well as stick on the numbers, letters or pictures.

If the bricks have to be coloured, this can be done by painting or dyeing with non toxic water-based dyes, as used for colouring icing sugar. Soak the wood in the dye for a few minutes and allow to dry. The children can now stick on the numbers etc, before the teacher finishes them with a coat of clear varnish.

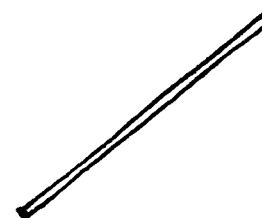
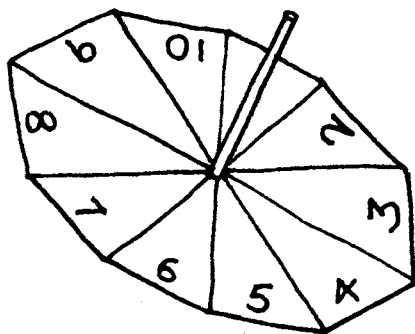
Another advantage of using bricks is that it allows groups of children to work together on word and number projects.

The best shape and size is a cube about  $1\frac{1}{2}$ " x  $1\frac{1}{2}$ " x  $1\frac{1}{2}$ ". Pieces of waste paper can be used for this project.



## NUMBERED TOP

Children with or without hand problems can play this game together, as the top can be spun with the fingers or just by knocking the pin. A second top can be made which has only +, -, x and ÷ signs. The players can then not only add up the score after each spin, but also solve the sums as they spin.

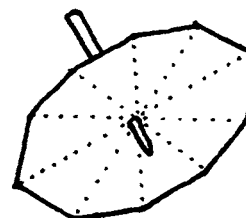


If dowel is not available, a pencil may be used. Before the pin is glued in position, find the best length. The sides will stop the top exactly at a number. Letters may be used instead of numbers.

### Materials :

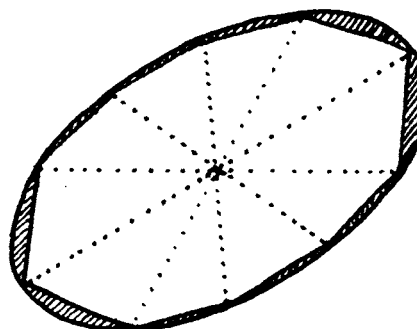
- A Disc of plywood  $\frac{1}{4}$ " x 8" dia.
- B Pin of dowel  $\frac{3}{8}$ " dia. x 6"

Construction - glue



### Instructions :

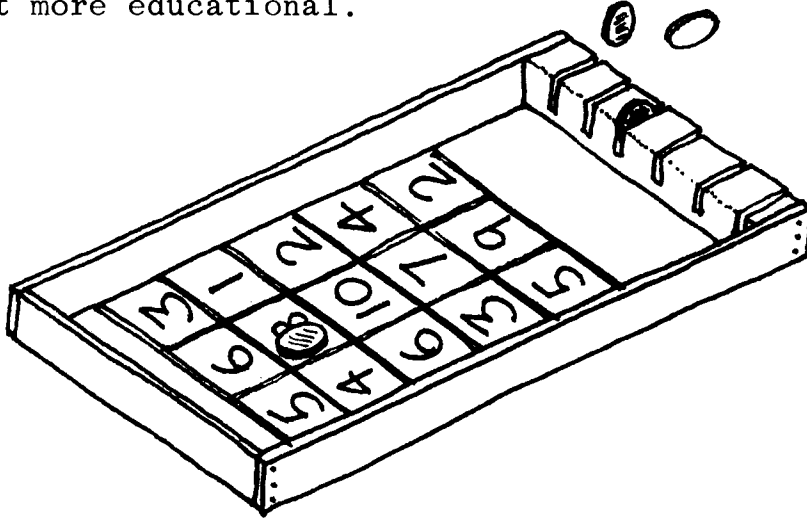
- 1 Divide disc into ten equal parts
- 2 Saw ten sides on the disc
- 3 Drill hole in the centre of disc - a tight fit so that the pin can be adjusted before glueing
- 4 Glue in pin





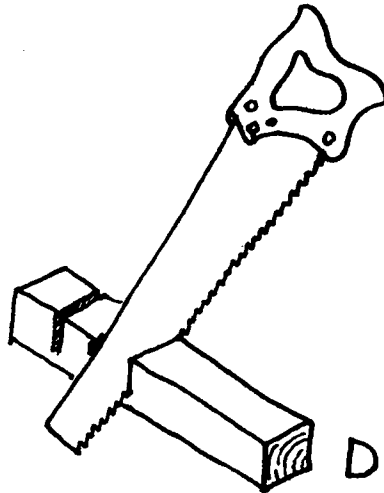
## ROLL A COIN

The angle and width of the slot must suit the size and weight of the coin. Saw slots to suit the coins. A range of sheets can be made, and some can include +, -, x and ÷ signs so that multiplication and division are included in the game to make it more educational.



Rules :

Place a coin in any of the slots and allow it to roll on to the squared and numbered sheet. The score will only count when the coin is in a square and not touching a line.



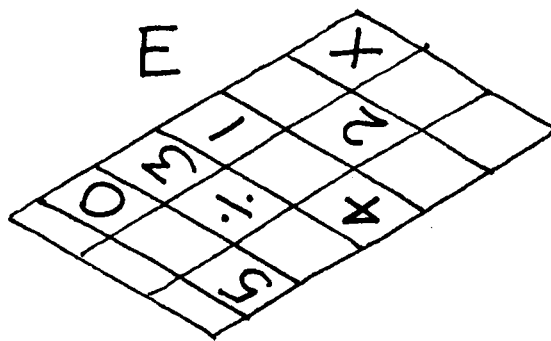
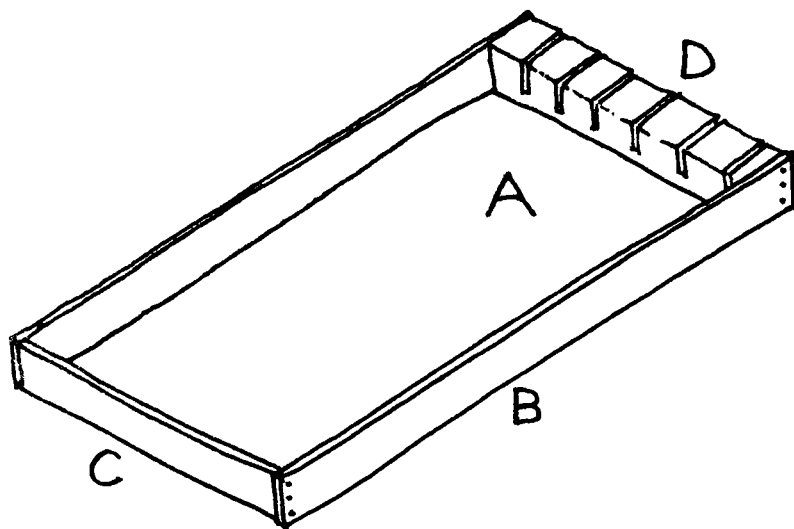
Construction - glue and nail

Instructions :

- 1 Saw slots in coin batten D, determine angle by trial
- 2 Fix coin batten D to bases board D
- 3 Fix sides B to base board A and coin batten D
- 4 Fix end C to sides B and base board A
- 5 Draw squares and numbers onto the stiff paper E as illustrated

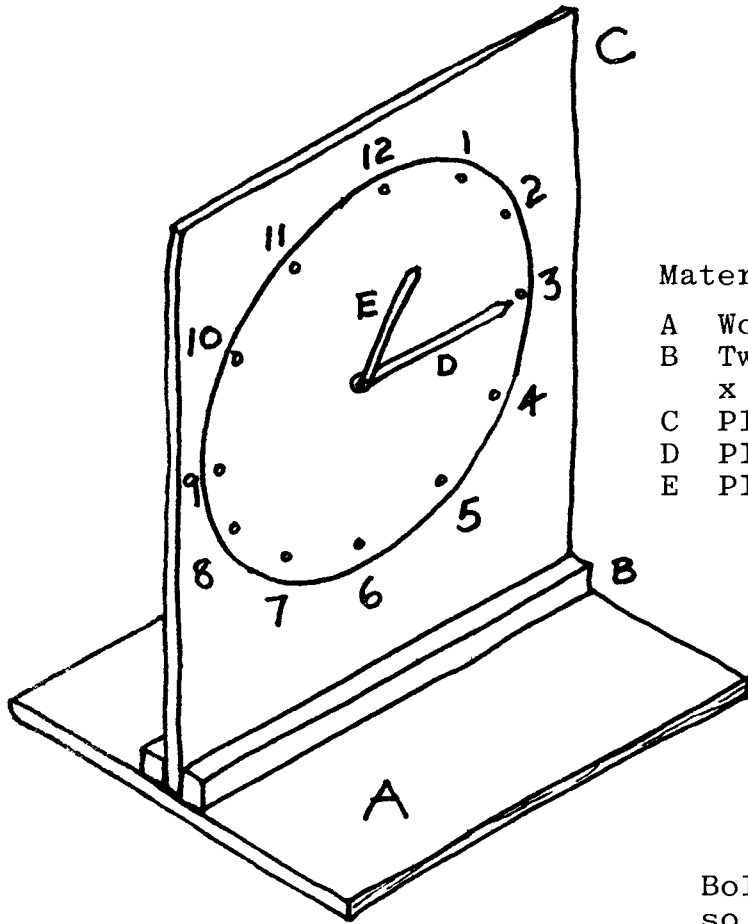
Materials :

- A Base board of plywood  $\frac{1}{4}$ " x 10" x 18"
- B Sides, two pieces of plywood  $\frac{1}{4}$ " x 2" x 10"
- C End of plywood  $\frac{1}{4}$ " x 2" x 10"
- D Coin batten 2" x 2" x 10"
- E Several sheets of stiff paper; draw on squares and numbers



As the children learn to use the board, change the design for one that has smaller squares.

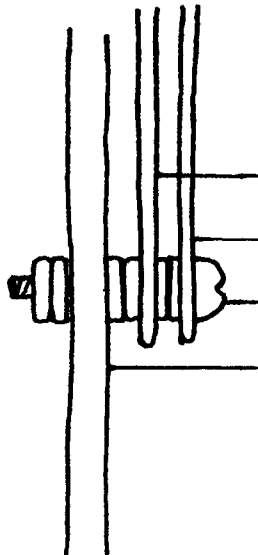
TELLING THE TIME



Materials :

- A Wood  $\frac{1}{2}$ " x 6" x 10"
- B Two pieces of wood 1" x 1" x 10"
- C Plywood  $\frac{1}{4}$ " x 10" x 10"
- D Plywood  $\frac{1}{4}$ " x  $\frac{1}{2}$ " x 4"
- E Plywood  $\frac{1}{4}$ " x  $\frac{1}{2}$ " x  $2\frac{1}{2}$ "

Bolt together tight enough so that the hands can be moved without slipping down.



Large hand

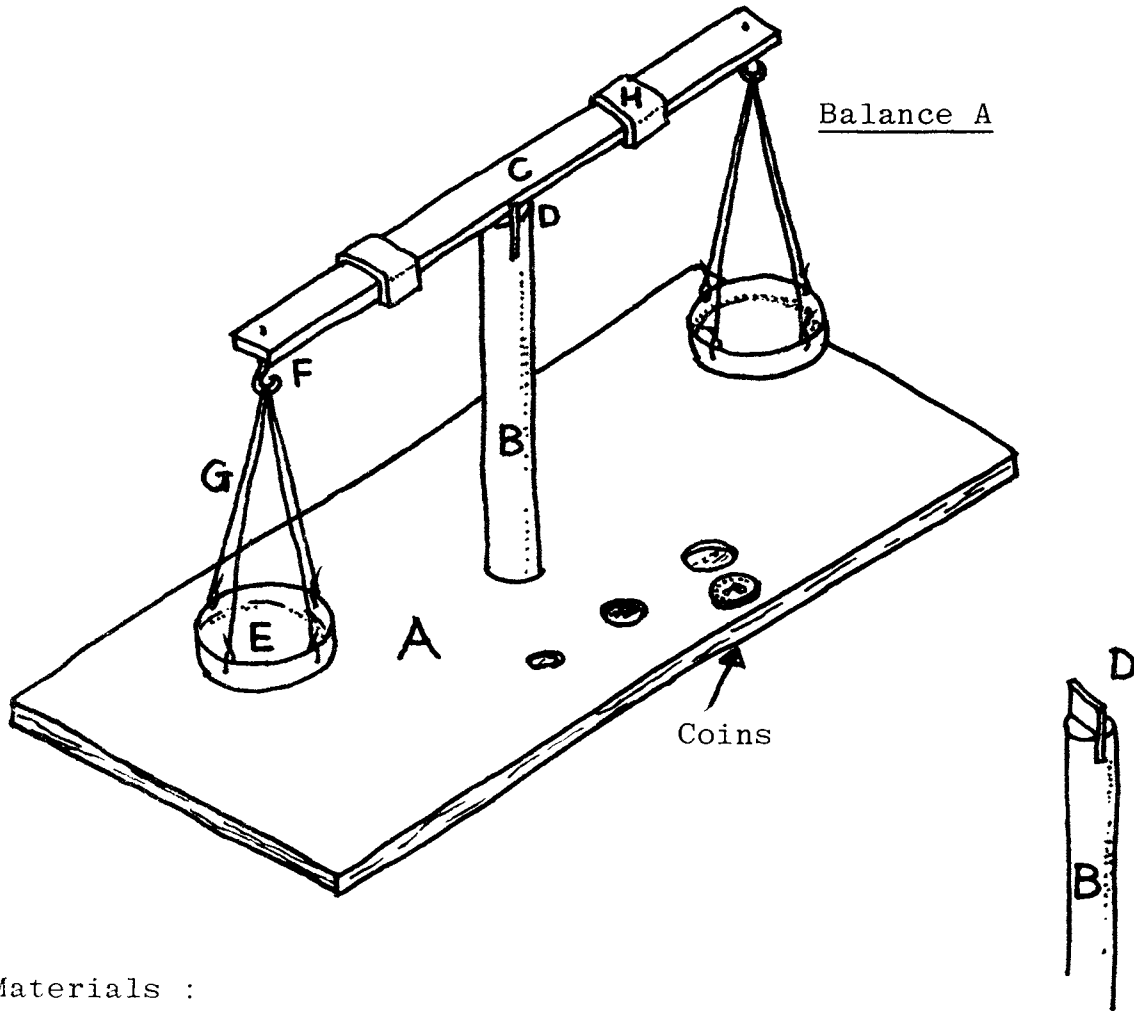
Small hand

Bolt  $\frac{1}{8}$ " x  $1\frac{1}{2}$ " with 6 lock nuts and washers

Clock face

## BALANCE

Balance A will give more accurate results than B but is not so strong. Some of each is the answer, as they are both easy to make. If the classroom is open, it will be necessary to fix a wind guard around the balance so that it is protected from the wind. Weights can be coins for which the weight is known. Instead of hanging dishes on the beams, clothes pegs can be used to hold weights and the materials to be weighed.



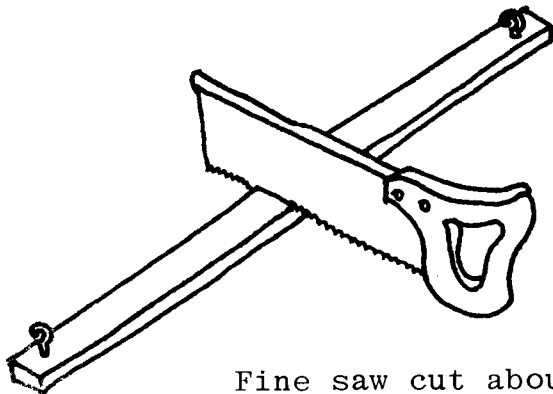
### Materials :

- A Base of softwood or plywood  $\frac{1}{2}$ " x 4" x 10"
- B Pillar of dowel or broom handle 8" x 1" dia.
- C Beam of plywood  $\frac{1}{4}$ " x 1" x 8"
- D Balance piece of tin cut from strong can
- E Dishes made from tin lids
- F Cup hooks
- G Nylon or string
- H Sliding weights cut from can or piece of metal sheet

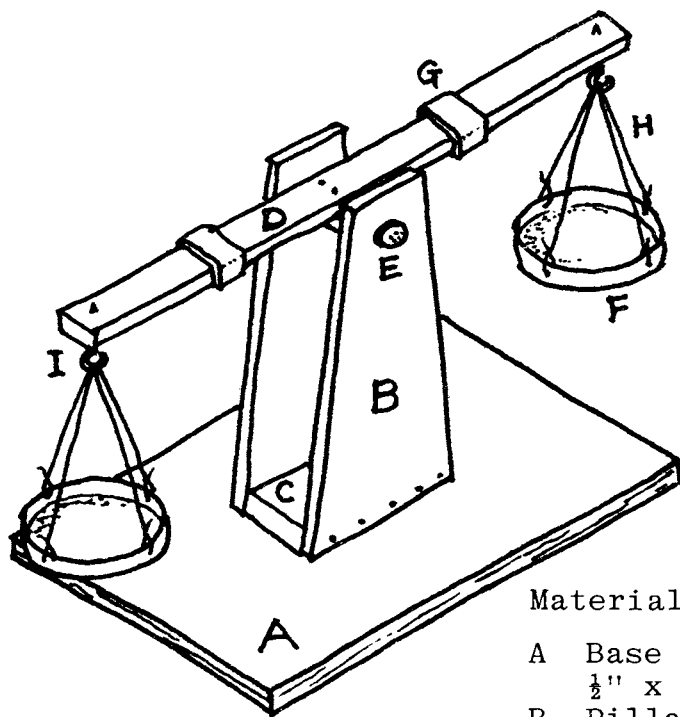
Instructions :

- 1 Drill hole in centre of base A for pillar B
- 2 Cut slot in pillar B for balance piece D
- 3 Cut balance piece D from can
- 4 Fit balance piece into pillar B. Check that it is square and glue into position
- 5 Glue pillar B into base A
- 6 Screw cup hooks into beam C on centre line and 3/8" from ends
- 7 Drill and fix nylon or string G to dishes E
- 8 Hang dishes E on beam C
- 9 Place assembled beam C onto balance piece D and when balancing carefully mark position
- 10 Make a fine saw cut on the underside of beam C at the marked position
- 11 Make sliding weights as illustrated
- 12 Place assembled beam C onto balance piece D, and adjust the balance with sliding weights H

Make the two sliding weights,  
1" wide, a good fit on beam



Fine saw cut about 1/16" deep



Balance B

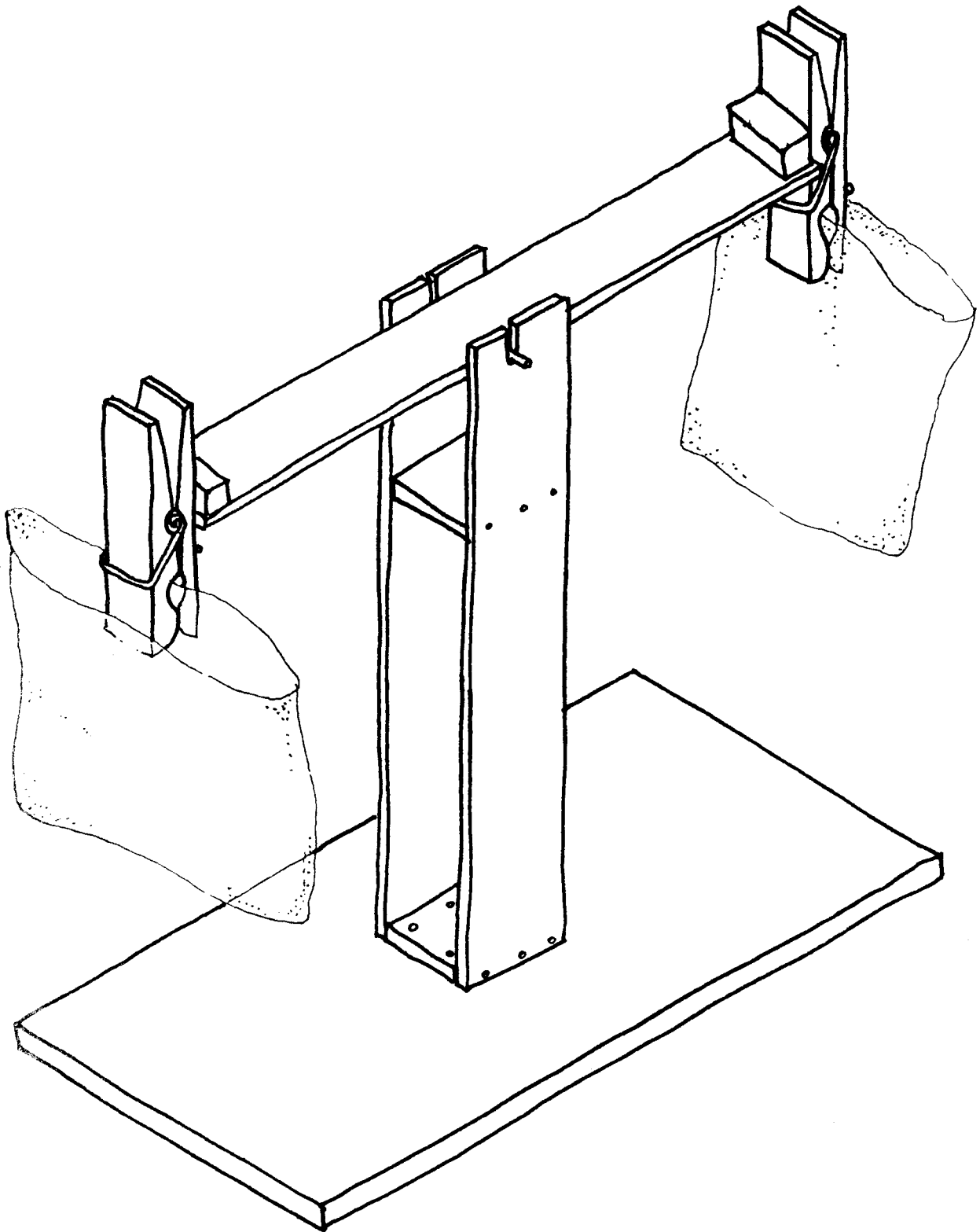
Materials :

- A Base of softwood or plywood  $\frac{1}{2}$ " x 6" x 8"
- B Pillar in two pieces in softwood or plywood  $\frac{5}{16}$ " x  $2\frac{1}{2}$ " x 6"
- C Pillar base softwood  $\frac{1}{2}$ " x  $1\frac{1}{2}$ " x 2"
- D Beam of plywood  $\frac{3}{4}$ " x 1" x 8"
- E Beam of rod dowel  $\frac{1}{2}$ " dia. x  $2\frac{1}{4}$ "
- F Dishes made of tin lids
- G Sliding weights, two pieces cut from can 1" x 2"
- H Nylon or string
- I Two cup hooks

Instructions :

- 1 Fix pillar base E to centre of base A
- 2 File a flat on beam rod dowel E for beam D
- 3 Fix beam rod dowel to the exact centre of beam D and screw in cup hooks I
- 4 Temporarily nail pillars B together and drill hole for an easy fit for beam rod dowel E
- 5 Assemble pillars B and assembled beam rod dowel and beam D and fix to pillar base C
- 6 Make sliding weights G and fit to beam D so that they are a tight sliding fit
- 7 Make up dishes F and hang on hooks I

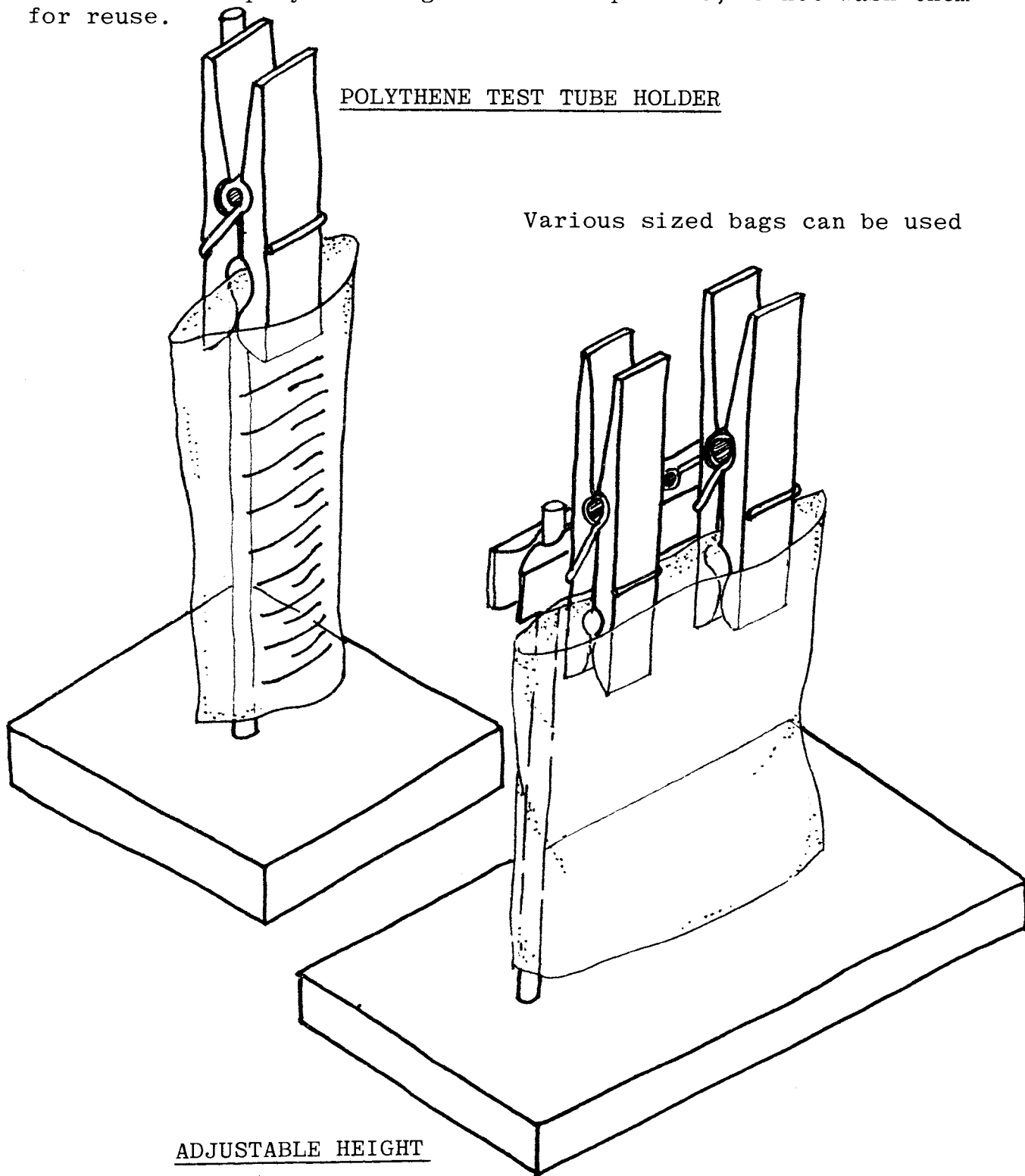
SCALES WITH POLYTHENE BAG



The size of these polythene bag test holders will depend entirely on the size of the bags to be used. So long as the base is heavy and large enough to support the bag when it is full with water it will be safe. Dangerous materials should never be used in the classroom and the experiments which the children are involved with must be safe and simple. Only use waterproof glue for fixing the pegs to the dowel and when fixing the pegs together. All parts should be well painted with a waterproof paint so that the holder can be thoroughly washed after use. As polythene bags are not expensive, do not wash them for reuse.

POLYTHENE TEST TUBE HOLDER

Various sized bags can be used



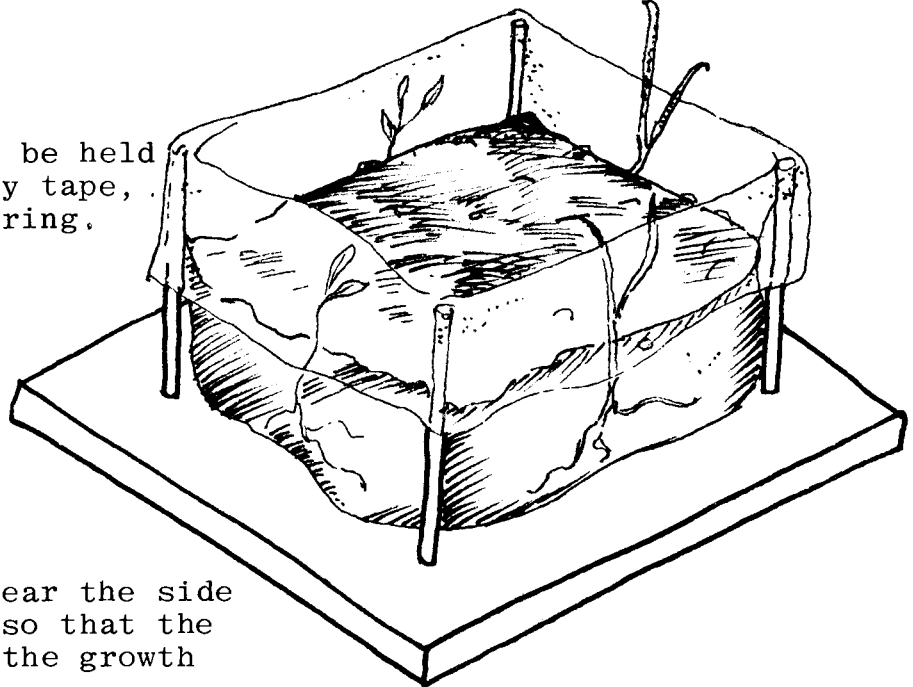
ADJUSTABLE HEIGHT  
POLYTHENE BAG HOLDER



## GROWING THINGS IN POLYTHENE BAGS

Growing things in the classroom is more instructional when clear polythene bags are used. A supporting frame can be made by drilling four holes in the wooden base, and glueing in  $\frac{1}{2}$ " wooden dowels. The size of the base and the distance between the dowels will depend on the size of the bags. The tops of the dowels must be rounded off and very smooth to prevent the polythene from being damaged. Use only the best quality polythene bags available, as they do not stretch so much.

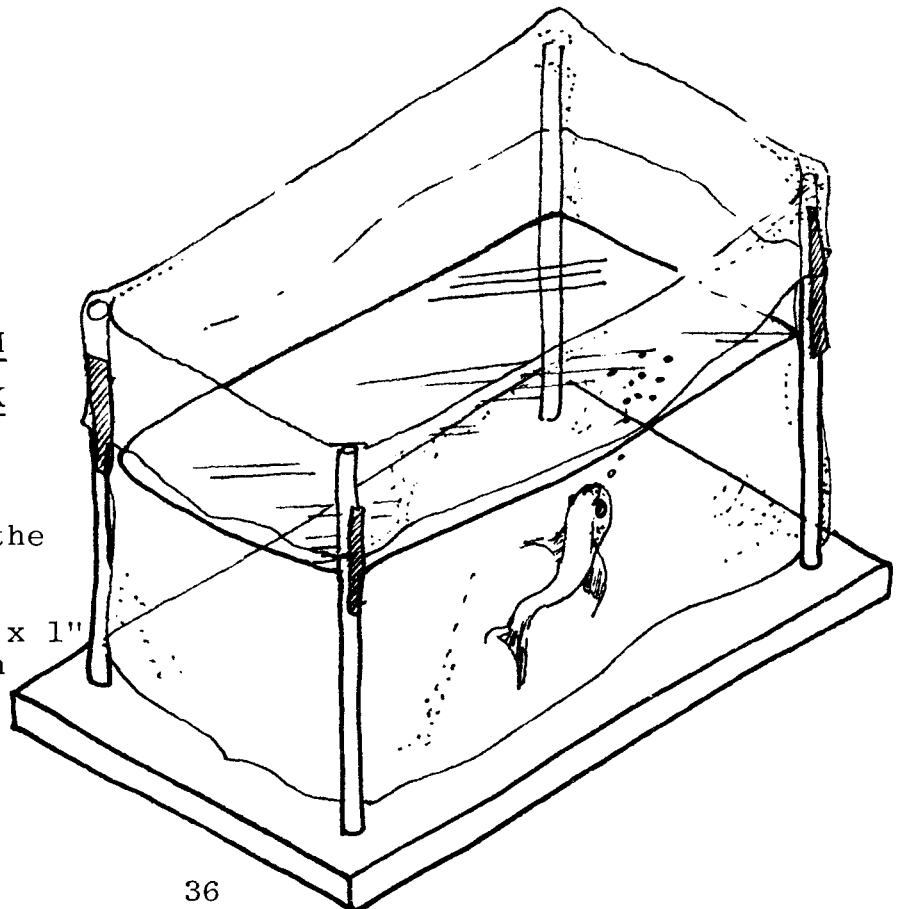
Polythene bag can be held in place by sticky tape, clothespegs or string.



Grow the plants near the side of polythene bag so that the children can see the growth pattern.

### POLYTHENE BAG FISH TANK

If the weight of the water stretches the bag, fix four pieces of wood  $\frac{1}{4}$ " x 1" between the wooden dowels.

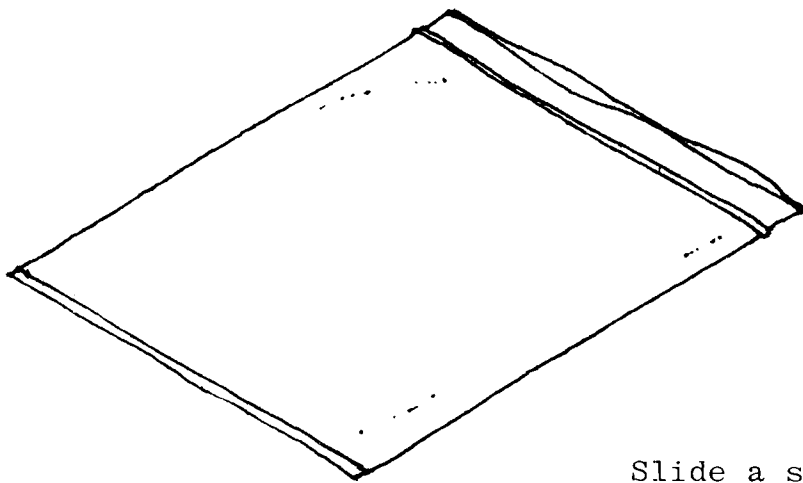


## RE-USABLE WRITING BOARD

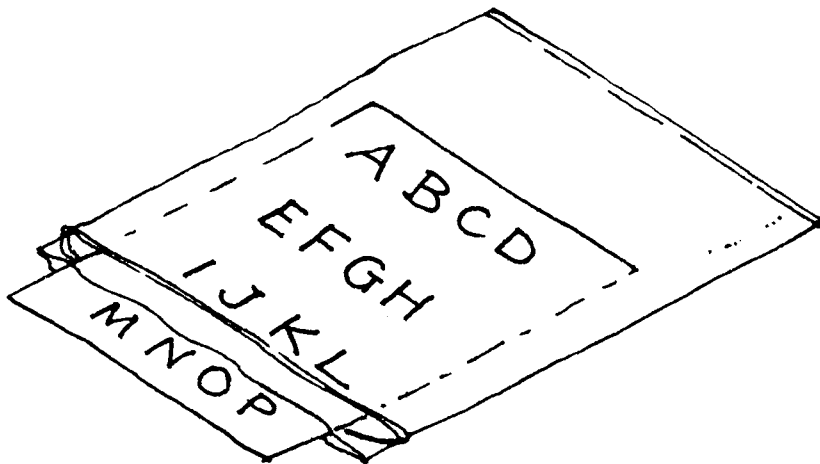
Place a piece of thin plywood, hardboard or strong card in a good quality natural coloured polythene bag, making sure it is a very good fit.

The teacher can prepare sheets of work which can be placed between the polythene and the stiffener. The child can read the teacher's lesson and answer it by writing on the polythene with a wax crayon. All the crayon writing can be wiped off the plastic with a soft cloth so that it can be used over and over again.

Polythene bags are available in many sizes including the popular A4.



Slide a stiffening material into a polythene bag, making sure that it is a good tight fit

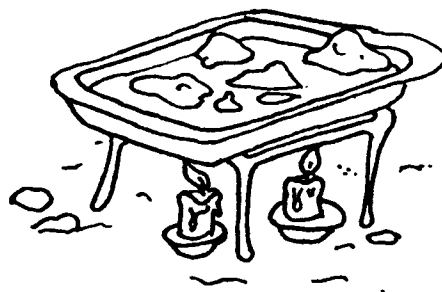
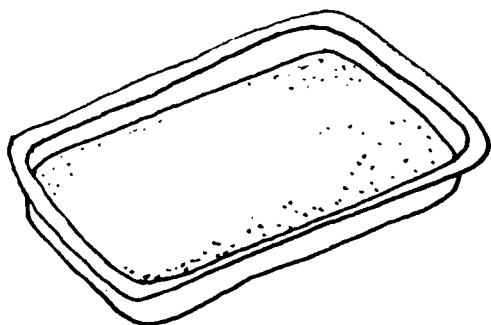


Slide lesson into the polythene bag

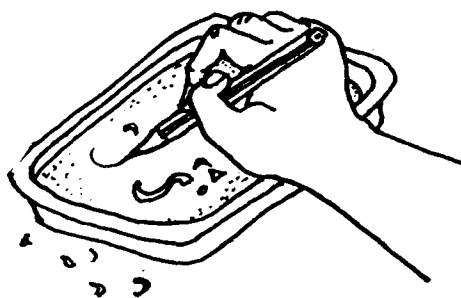
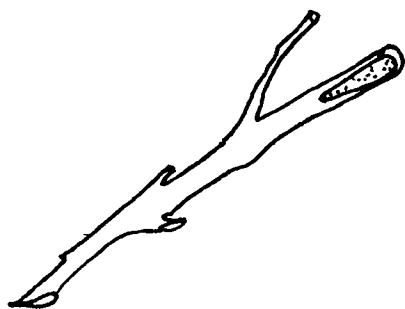
## HOW TO MAKE PRINTS FROM WAX

Heat the wax in a metal tray over a flame, or put the tray in a hot sunny place. When the wax has a smooth surface, let it cool.

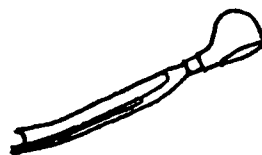
Tray for wax



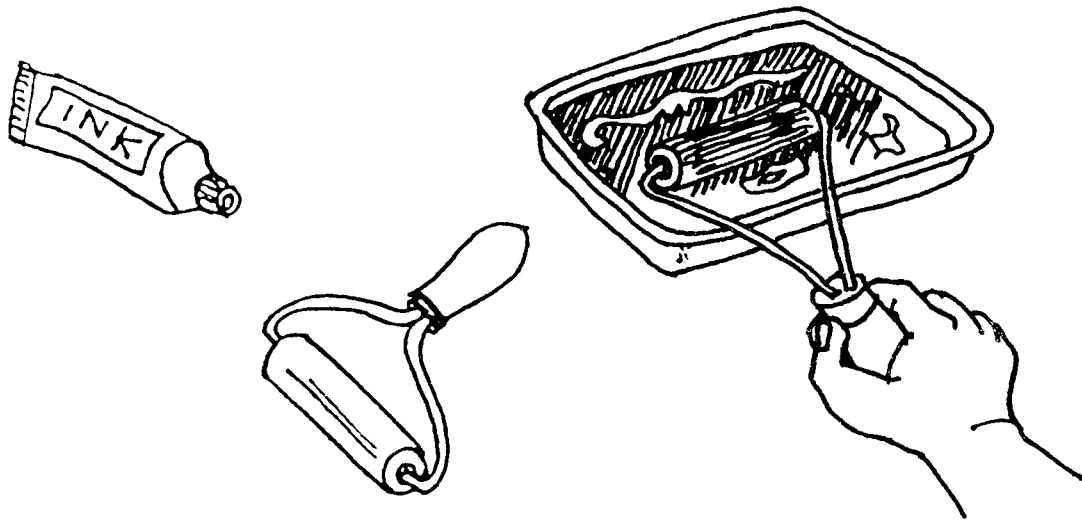
Cut or scratch your design on the surface of the wax. You can press a leaf, stone, or any object to make an impression. Keep the wax scrapings to melt again.



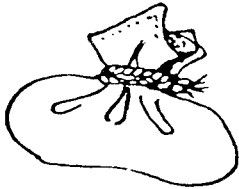
A twig will make a good tool



Lino tools



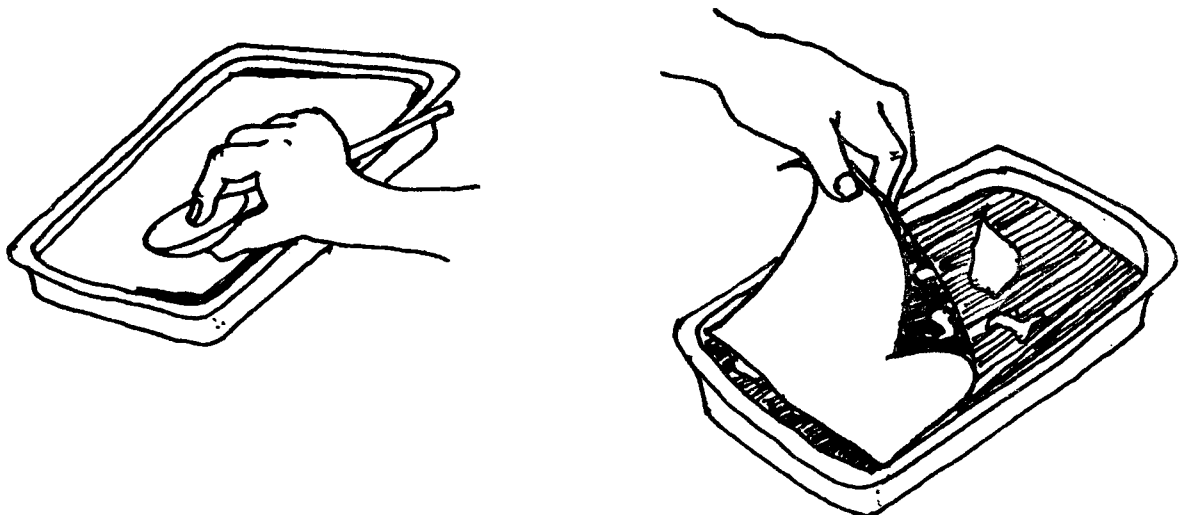
Roll, brush or use a dabber to ink the design



Cloth bag with absorbent filler

Place two sheets of paper over the design  
Burnish the paper with the back of a spoon,  
or rub with your hand.

You can use several colours, and wash off areas  
if you need a clearer colour in that part.

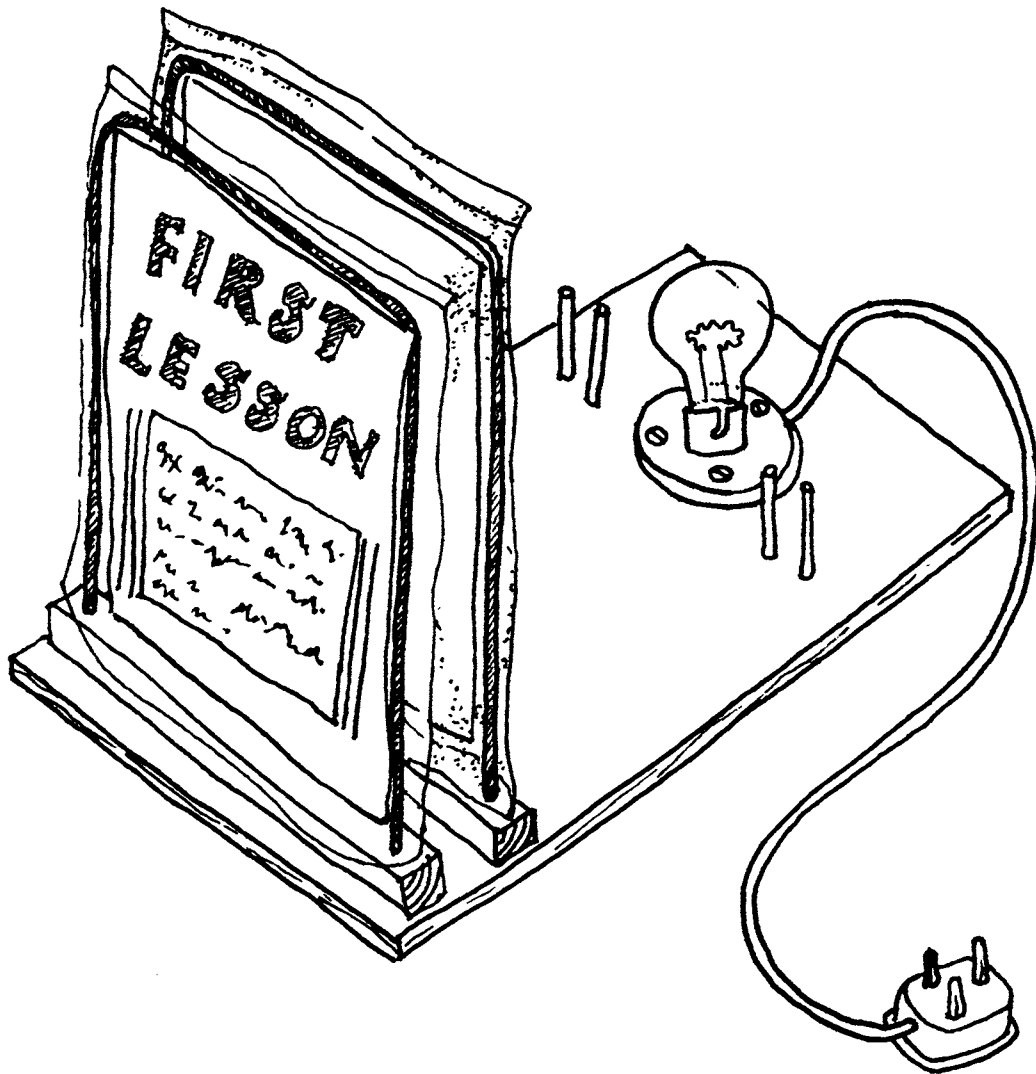


## THE ILLUMINATOR

The illuminator has proved to be a very effective and inexpensive teaching aid. It can be made in a hour or so from odd pieces of wood, card and two wire coat hangers. The light source can be from electric mains power, batteries, oil or gas lights.

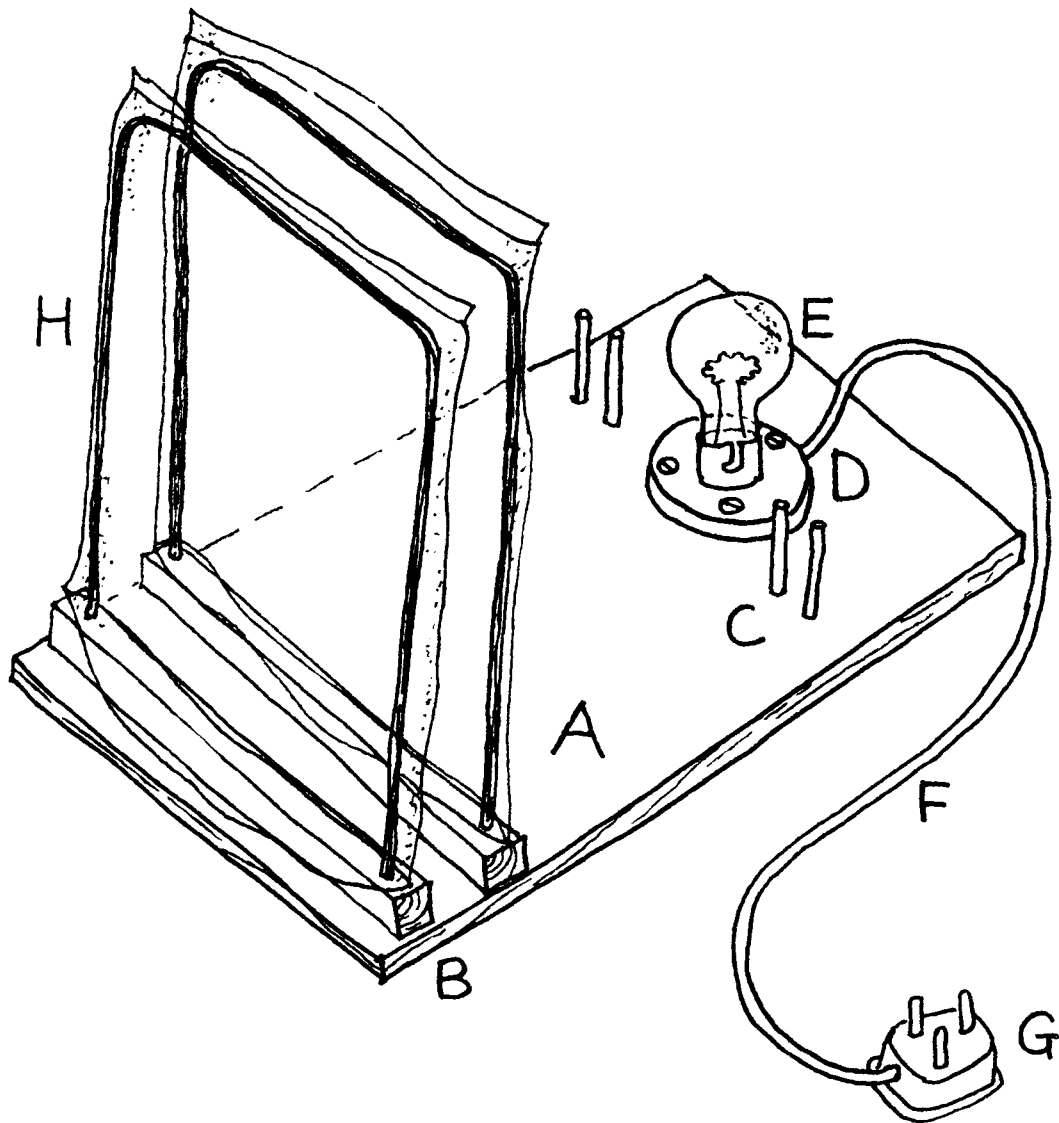
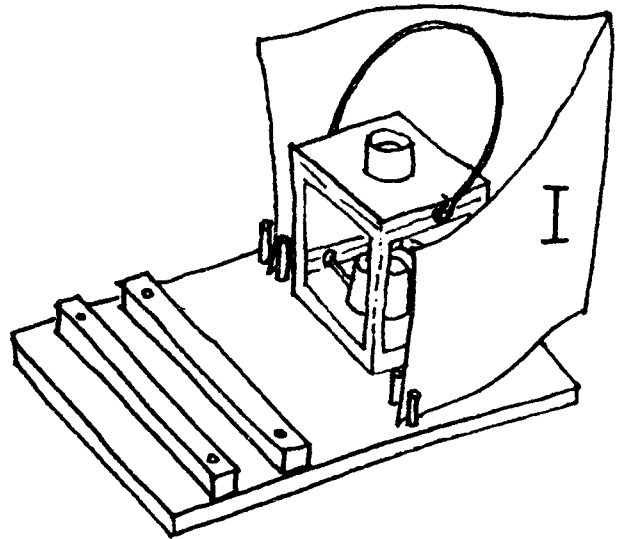
When a printed polythene bag is placed over the wire frame and illuminated, it looks like a small overhead projector picture. A4 size polythene bags can be used for small groups of up to eight children, and a larger one for bigger classes. Felt tipped pens, spirit felt tipped pens and some crayons may be used for drawing on the polythene.

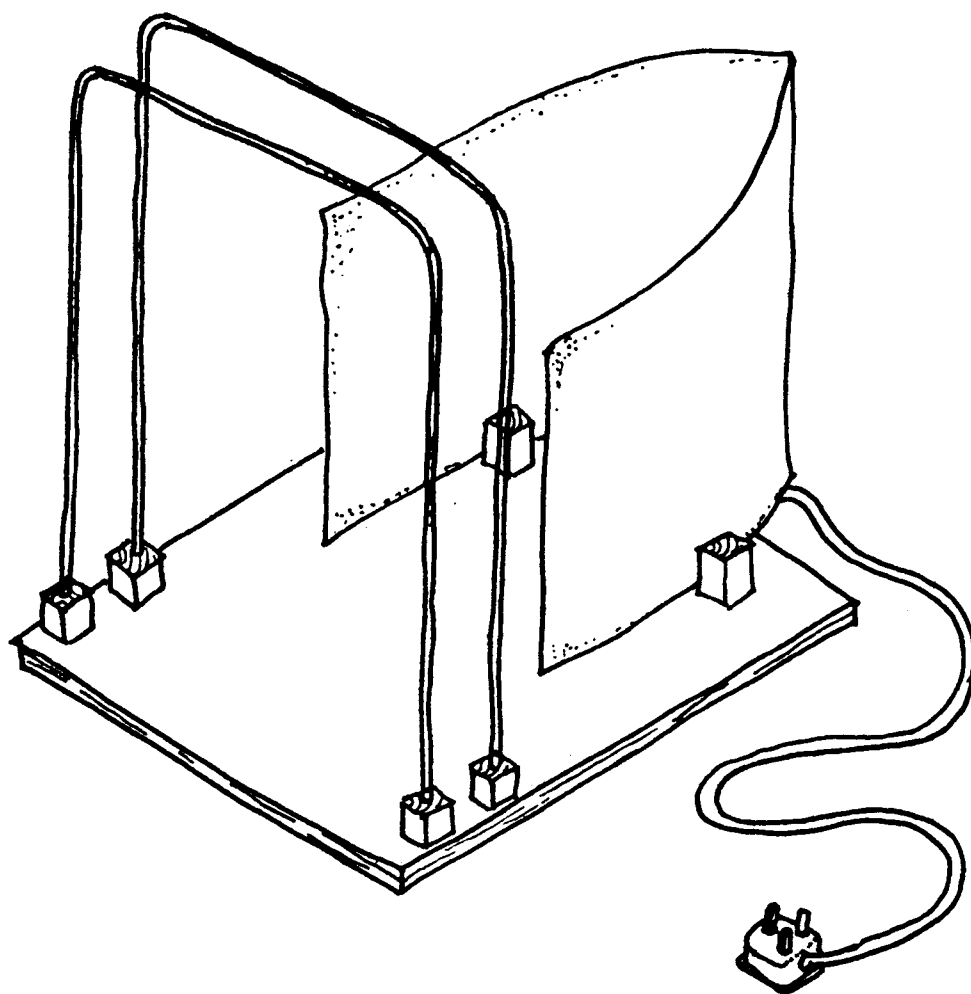
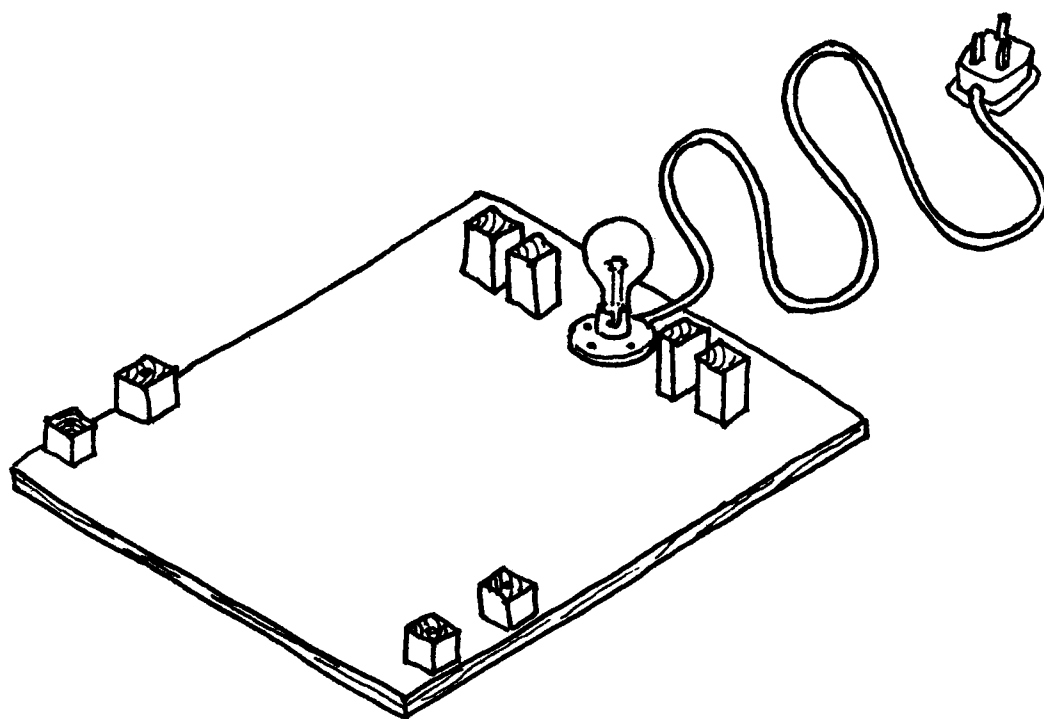
Caution must be used when using this piece of equipment when any of the light sources are used, except the dry battery or the torch bulb. The illuminator may be used without any lights if it is placed before a window.



Materials :

- A Baseboard of plywood or wood  
10" x 12" x ½"
- B Frame block of softwood  
1" x 1" x 10"
- C Reflector
- D Electric bulb holder
- E Electric bulb 60w - 100w
- F Length of electric wire
- G Electric plug
- H Wire frames, for instance  
coat hangers
- I Reflector - stiff white card





## FURTHER IDEAS

The examples of teaching aids given in Part Two show how it is possible to design and make simple teaching aids. The experience gained in making some of these aids will enable teachers to develop other forms of equipment suitable for their own particular circumstances. Further ideas for such aids may be obtained from books and catalogues, adapting designs to suit the needs of individual pupils and using materials which are readily available. For example, there are ways of using household objects to make suitable teaching aids. Wooden spring type clothes pegs can be used in a variety of ways - drawing letters on pegs and clipping them on pieces of cardboard to form words is one simple method.

Jigsaw puzzles can be made by glueing pictures or maps on to plywood, hardboard or thick cardboard. A fine blade coping saw can be used to cut the jigsaw puzzle into the required number of pieces.

Children enjoy making designs and feeling surface textures. A simple design cut on the head of a wooden hammer enables a child to make patterns on moist clay. The design, letter or number should be cut on to the hammer face in a reverse pattern.

If it is possible to carry out practical work in the classroom a simple worktop will be most useful. A piece of plywood, edged at top and bottom on reverse sides with strips of wood will make a work surface that will not slip when placed on a desk or table. One side can be used for clean work, and the other side for work operations which could damage a table top.

Finally, there is a very wide range of materials in everyday use which may be used to make teaching aids. Discovering new and innovative ways to use such materials in the manufacture of safe and useful teaching aids can be a most rewarding educational experience.



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