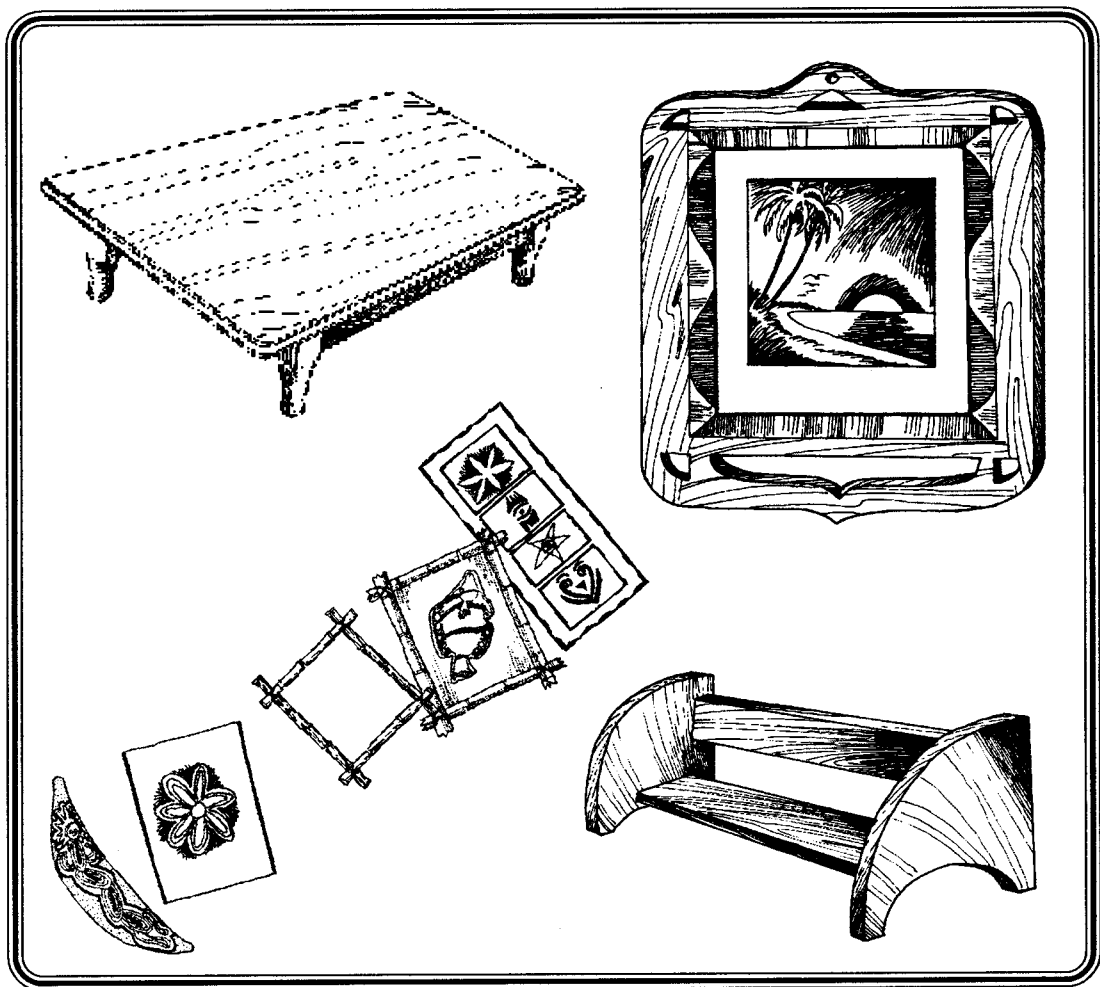


# TECHNOLOGY

## STUDENT'S BOOK



Years 9-10  
Trial Material



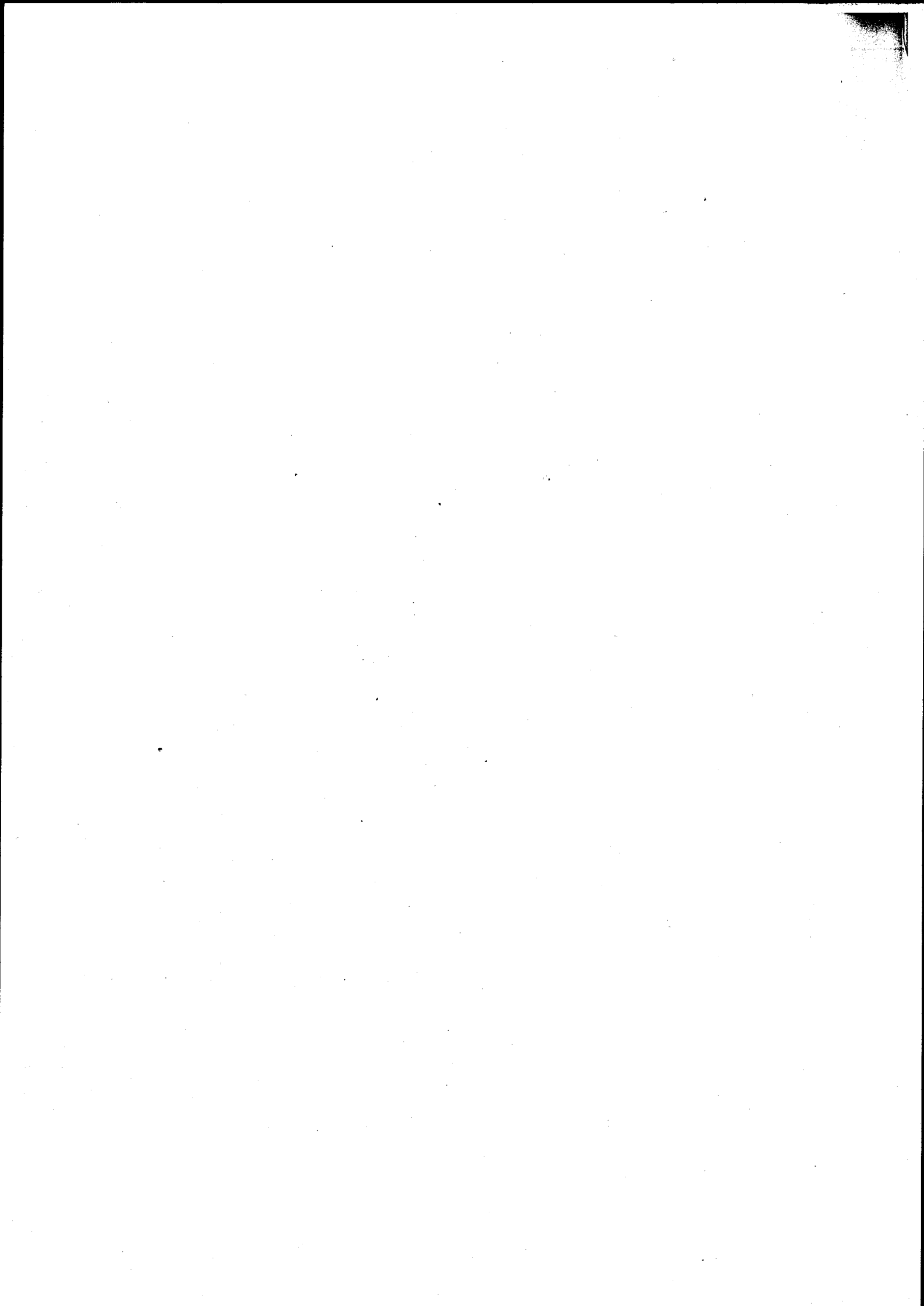
# **TECHNOLOGY**

## **STUDENT'S BOOK**



**Years 9 - 10**

**Ministry of Education  
Port Vila  
Republic of Vanuatu  
2001**



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## Skills learnt in Year 7 continue through next three years plus

### Woodwork

Year 7	Year 8	Year 9	Year 10
Measure timber etc. Plane Chisel Tenon Saw Hammer - nailing Mallet Trysquare Sandpaper Finishing Decoration Butt Joint Halving Housing Marking gauge Sketching Design Safety Gluing Preparation of timber	Joints: Butt Halving Housing Reboute Mitre Joint Metal Tinstrips Boring and drilling Electric drill Panel saw	Joints: Mortise and Tenons Wood Turning Wood carving Technical Drawing Screw driver Screwing Tool sharpening Setting a plane Crosscut saw	Pop Revets: Stapler Staples Bolts and nuts Electric Sander Ripsaw

### Sewing

Year 7	Year 8	Year 9	Year 10
Sewing equipment Stitches Setting up sewing machine Basic fabric construction Textile fibres - vegetable	Textile fibres - animal Applying designs Basic seams Cleaning agents and equipment	Textile fibres: Man-made -Patterns Fastenings Sleeves Pockets Collars Hems	Complete Year 9 work Internal Assessment Task



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# AIMS OF TECHNOLOGY

## The Aims of Technology are:

- to present courses in Years 7 to 10 which require students to express ideas in practical terms, by using selected materials and processes and through the application of the principles of good design and development of effective craft skills.
- to encourage and exercise equity in developing skills and knowledge in technology.

## Objectives

Students in Years 7 to 10 will:

- develop design skills that will allow the translation of knowledge and ideas into practical realities.
- be encouraged to obtain a sense of achievement and satisfaction through success in craft skills through multidisciplinary courses.
- gain experience in decision-making through practical problemsolving.
- develop self discipline and a range of practical skills which permit the safe and successful use of tools and equipment with soft and hard materials.
- be encouraged to use appropriate locally available materials and to maintain ethnic and cultural skills.
- develop the ability to recognise the properties of a range of materials and apply them correctly in a range of contexts.
- practice the skills of reading, measurement, calculation, reasoning and experimentation in solving practical problems.
- develop skills in researching information on an individual basis and presenting the findings in a logical and informative manner.
- develop the ability to make an honest appraisal of the quality of completed projects in relationship to their original design solution.
- learn how to maintain the projects made in their courses and extend this skill into their daily life.



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## **Courses of Study**

Courses of study at each year level are based on a number of units through design briefs.

The choice of design briefs in each course will ensure that students develop a range of design and practical skills, and investigate a range of materials and processes.

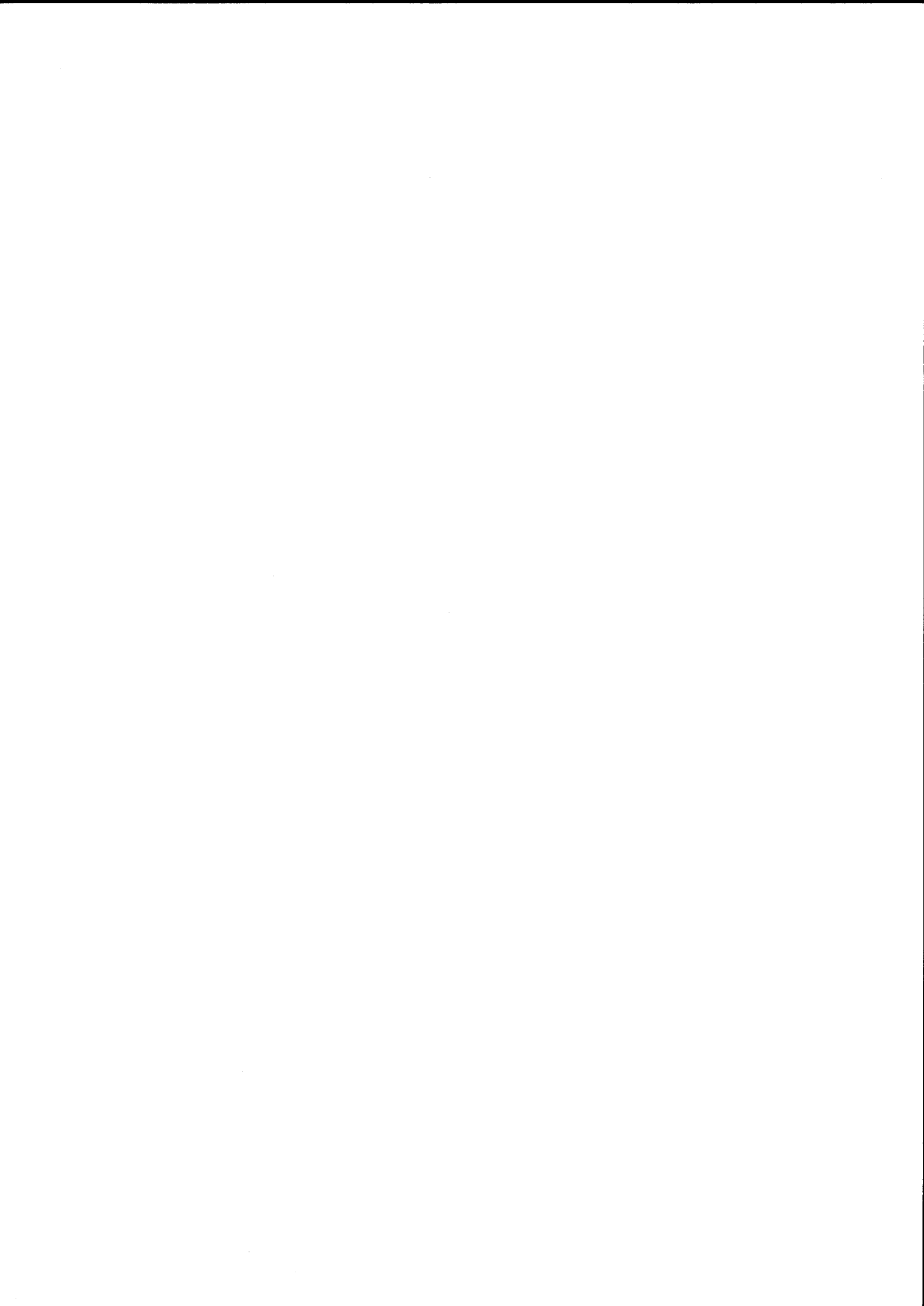
The number of projects will be determined by the complexity of the design brief and the workload that each imposes.

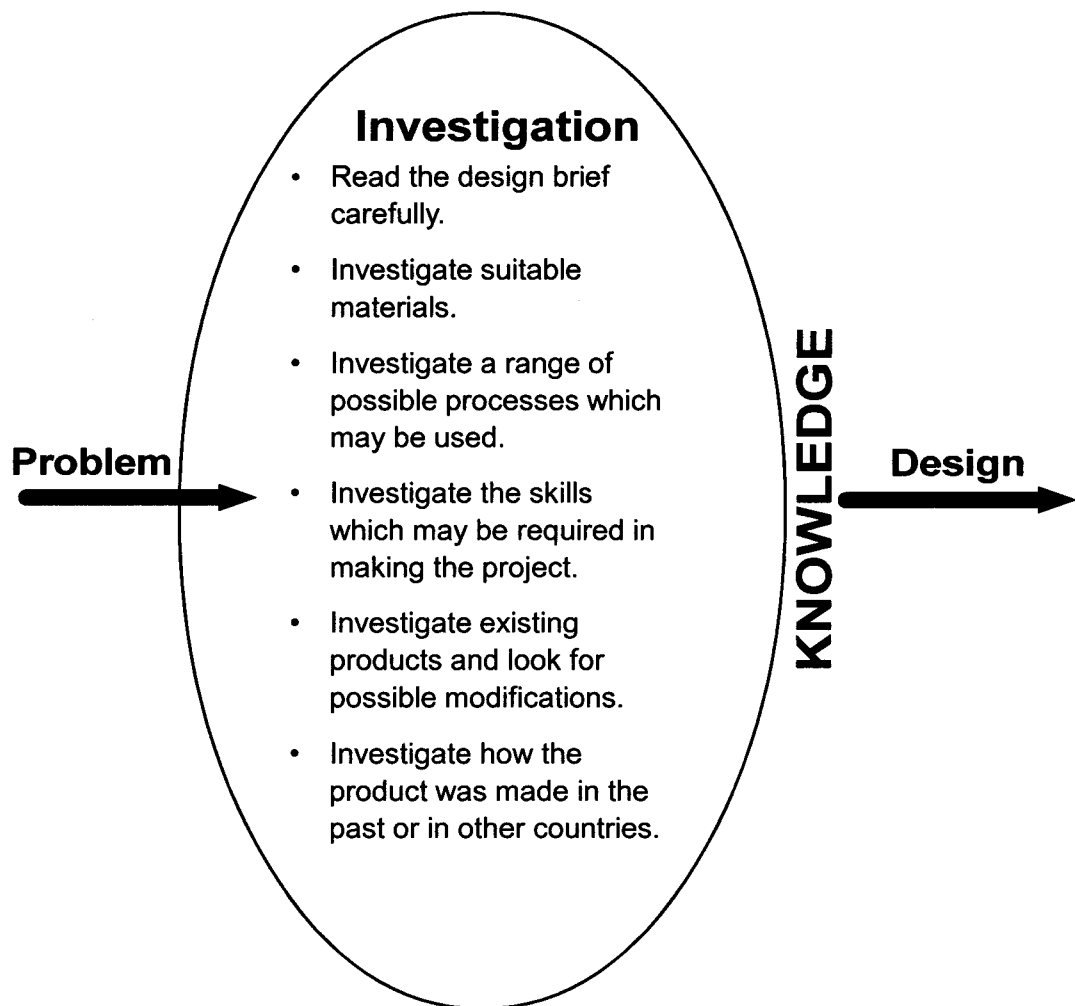
The course at each level will ensure that students are fully extended by the year of study.

A typical course will consist of six units each comprising practical, research and design aspects.

## **P.R.I.S.M.E.**

- P - Problem:** The problem is presented to the students in the form of a design brief.
- R - Restrictions:** on the design brief. Any restrictions on materials, (Requirements) size or items which must be included are given.
- I - Investigation:** The students will list and investigate the knowledge and skills required to assist them in designing a solution to the problem.
- S - Solution:** The design process is used to find a solution to the problem.
- M - Manufacture:** The final solution is manufactured.
- E - Evaluation:** The product is evaluated against the criteria set in the design brief to see if it meets or betters them.



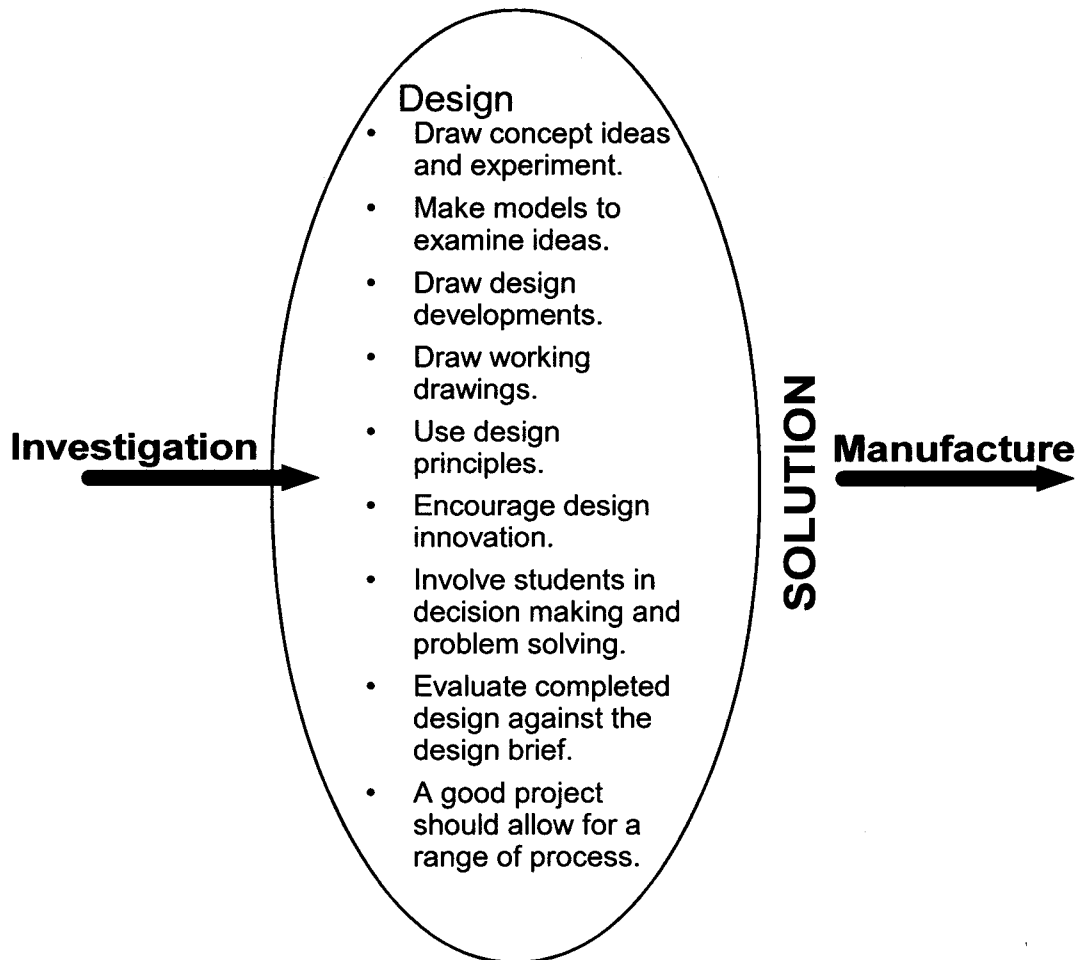


#### **Investigation is the first step**

- Investigate a range of materials which might be suitable for the project.
- Investigate the processes which might be useful in manufacturing the project.
- Investigate the needs of different people for this product. Some may prefer one idea, some another.
- Investigate the effects that the product is likely to have on other people and the environment.
- Investigate existing examples and look at how they could be modified.
- Investigate whether there are other possible ways of addressing the problem other than that initiated.





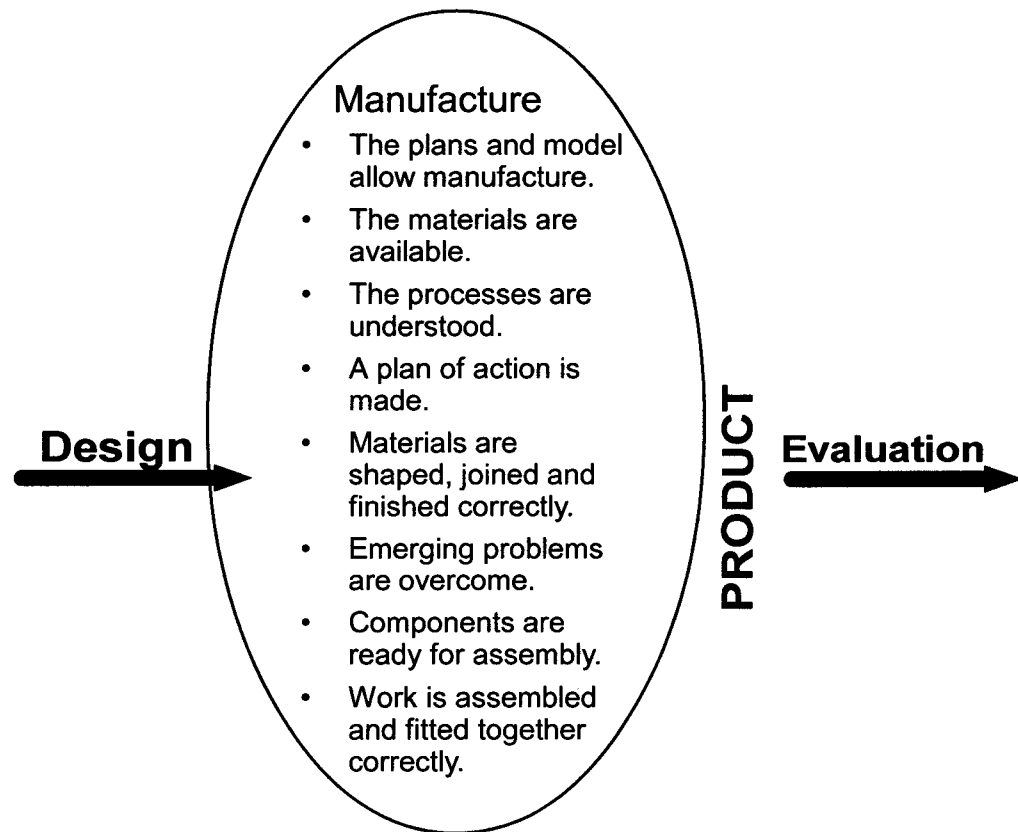


### **Design is the second step**

This process is broken down into aspects which should be covered.

- Concept ideas and Experiment - draw a range of possible ideas.
- Design development - develop the best idea by drawing details of each component and how joins are made, how seams are constructed, how materials meet and other details.
- Working drawings - drawings give measurements and information on material types.
- Design principles - form, aesthetics, proportion, function, ergonomics and balance.
- Design innovation - interesting solutions should be attempted.
- Decision making and problem solving - explanation of reasons for choice are given.
- Evaluation of final design - information on how the final design meets the brief is given.



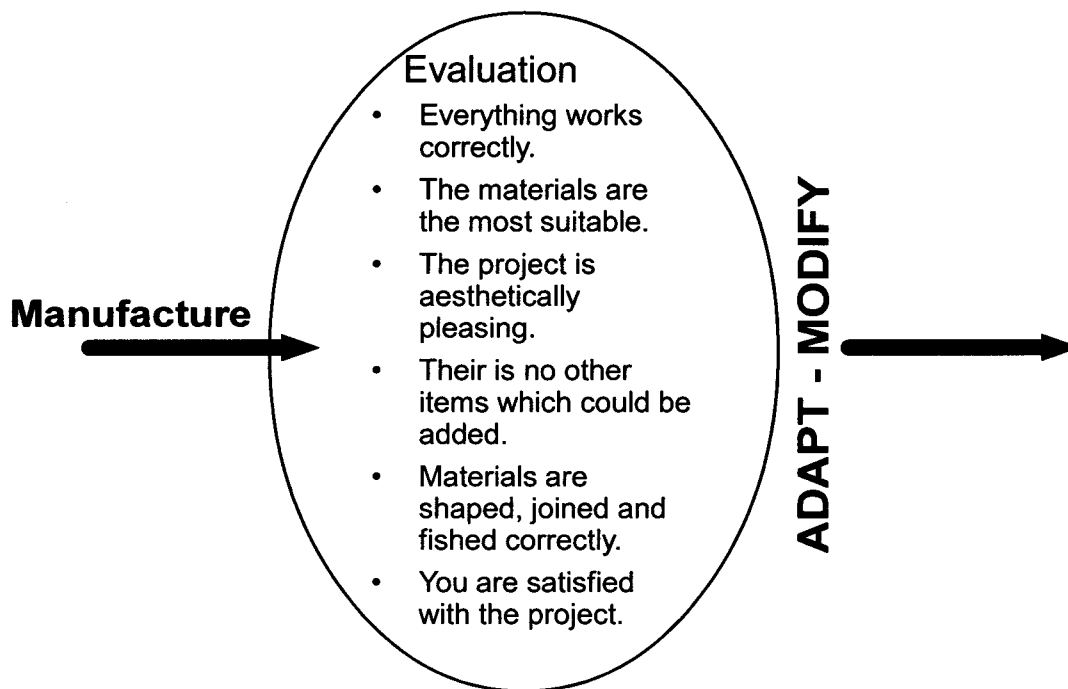


**Manufacture**

The following questions should be taken into consideration during manufacture.

- Does the product show a range of processes?
- Is there a better way to do this now I have begun?
- How will I fit this together?
- Will this assemble correctly if I change something?
- Do I need to make a drawing to clarify?
- Is the completed product the best I can make?
- Is it functioning well?





## HOW SHOULD DESIGN BE TAUGHT?

Here are some guidelines which may prove helpful in developing an understanding of *design* in your students.

### As a teacher you should:

- know what is good design and how you may distinguish between good and poor design.
- endeavour to illustrate good and poor design to help your students throughout their programme of work.
- ensure that students actively think about and discuss a wide variety of design features.
- encourage students to observe the many examples of sound and mediocre design in shops.
- know the basic elements of design which need to be considered when solving problems related to technology projects.
- teach these elements through illustration, discussion, assignments and practical work throughout the programme.
- teach students how to use and take advantage of sketches and drawings, to produce mock-ups, to check proportions, strengths and joining methods show students the materials that are available to them. Illustrate their various properties through practical demonstrations.



- 
- allow students to find out the working characteristics of materials themselves.
  - ensure that the students have sufficient knowledge and skills to satisfactorily manufacture a project.

## TECHNOLOGY EVALUATION

When students have completed their projects they should go through a process of evaluation. This will help them to recognise and learn from any skills or knowledge that they gained in the process of making the project. In some cases it is possible that the first attempt to make the project can be considered a prototype and a further example can be *manufactured* incorporating the changes or improvements which have been discovered in making the first.

### What should be evaluated?

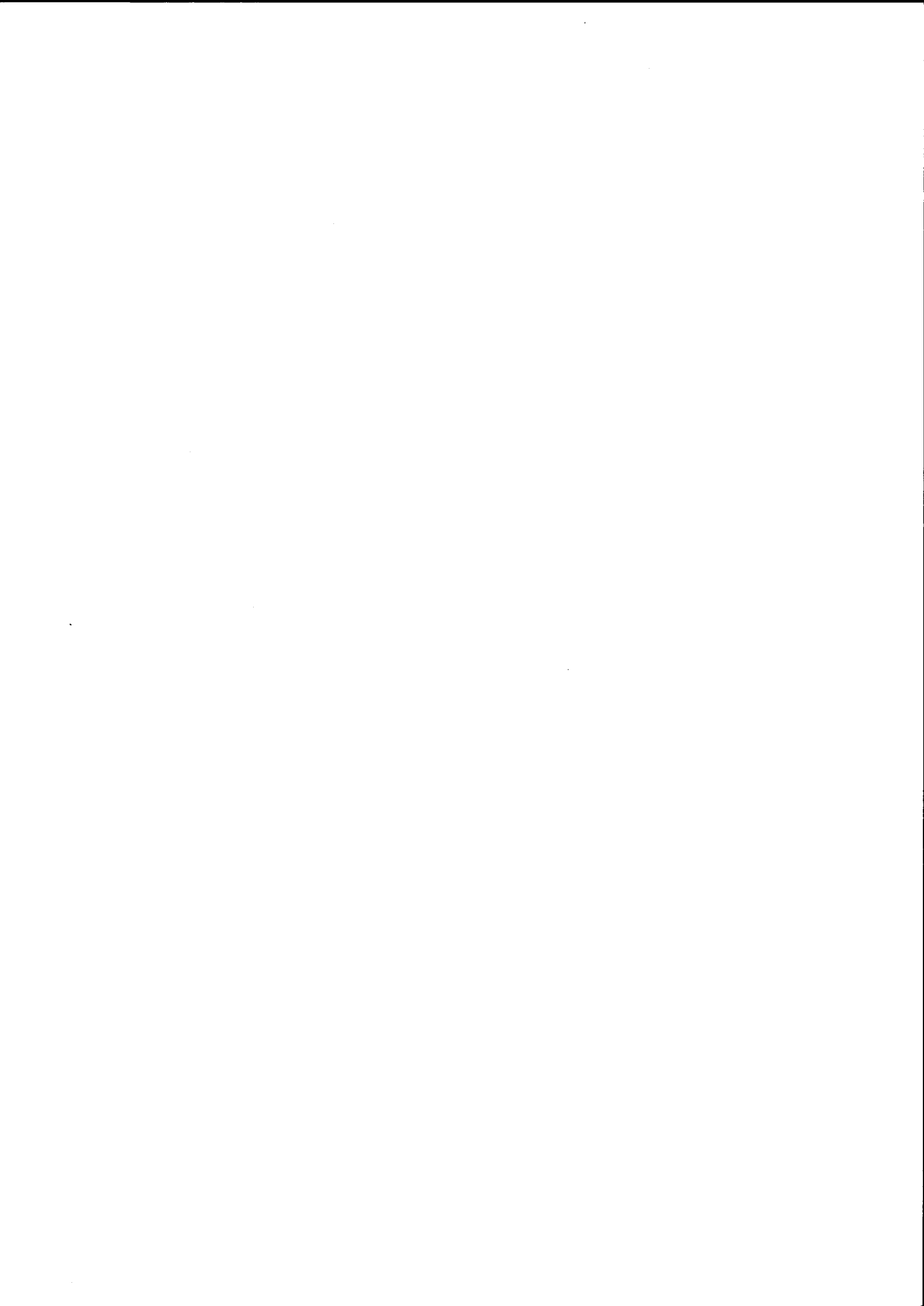
There are four areas:

1. Performance against the brief. Does the completed article meet all the criteria of the problem?
2. Appearance and aesthetics. Does the completed article look as good as was hoped?
3. Accuracy of the final article against the original design. Any problems which arose during the manufacture which led to change and how they were solved.
4. How the student felt about the process gone through and whether he/she is satisfied with the end result.

Note: When self evaluating students should try to answer using the 4 headings given above - using sketches to help explain where possible.

### Some checklist questions that could help evaluation

- Have you tested your project for its intended use?
- Does it work in the way intended?
- What difficulties and solutions have been met in the manufacturing process?
- How could you improve the function or appearance?
- Did you use the best materials for the project?
- State the best and worst features of your construction. List comments made by another person you asked for a peer evaluation.
- Does the completed project look like your final design drawing? If not then why?
- Did you complete the project within the time - if not why?
- Where did you need the most help in completing the project?
- Which parts of the project did you: (a) enjoy most? (b) enjoy least?





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Self evaluation is part of developing critical awareness of good design and manufacturing processes. Students will develop the ability to question their designs before proceeding into the manufacturing stages, resulting in fewer mistakes and more efficient processes.

A further stage in this development is the introduction of peer assessment or peer critical appraisal of work. This would be appropriate at Year 11 and 12 levels.

### **Note to the Teacher**

The design briefs at this level are to be used as a guide, and it is hoped the teacher will encourage the students to use their creative talents to improve the design brief by the use of alternative materials. Teachers should be prepared to help and assist students in all their endeavours.



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## **Design Brief: Wall Hanging**

### **Problem**

The dormitories have no spaces between the beds to put wooden cupboard or wooden shelves. The students have to design a hanging shelf (shelves) for storing the students' belongings (clothes, perfume, tooth paste etc.).

### **Restrictions**

None

### **Processes**

Designing, working with various materials, framing.

### **Investigation**

Select materials which could be used. Cloth, pandanus, bamboo parts of coconut palm. (This can be a combination of materials or one only.)

Materials and equipment – cloth, wood, plastic, aluminium, wire, bamboo, pandanus, scissors, saws, glue, paint, felt tip pens, knives, brushes and sandpaper.

Shape - it can be any shape, providing it can be hung.

Design - this can be traditional, contemporary or modern.

Students should sketch out a number of ideas.

### **Solutions**

Decide on size, shape, and type.

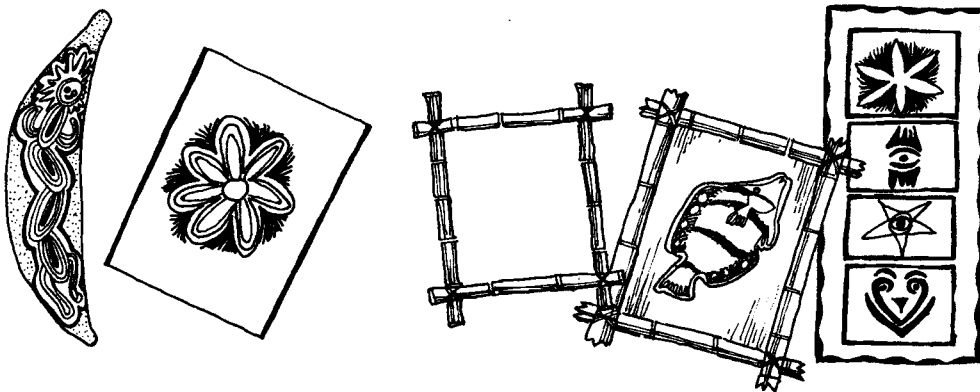
Students to research the various methods of fixing (fastening the different materials).

Students are to decide which materials they will use.

The finished project will be hung by string or wire.

They will design a frame for the hanging.





### **Manufacture**

The students will:

- make a mock up of the wall hanging and its frame to help visualise what it looks like.
- make the finished product.
- varnish the frame.

### **Evaluation**

Are the students satisfied with the final outcome?

If not, then why not?

Ask the them to suggest some of the features they might include in their future designs.



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## **Design Brief: Bottle Holder (Draft)**

### **Materials**

Timber Nails

Glue Bamboo

Material sizes required depending on own size required. The sizes of the bottles will determine material sizes. Tools Saws Planes Spoke shaves Squares Drills and bits Hammers Paring chisels Bush knife Steps in construction Find the appropriate materials. Cut, plane and shape to sizes where required. Fit the joints and assemble. Glue and nail. Clean and sand if necessary. Apply finishing.

### **Problem**

I would like to make some household items from the bamboo growing near my house.

### **Restrictions**

Nil

### **Investigation**

#### **Properties of Bamboo**

Flexible yet tough

Light but strong

Can be split (only one direction)

Can be pliant or rigid

Can be bent by heat

Straight yet has great tensile strength.

Uses of Bamboo

Varieties of Bamboo

Simple design for useful household items

Equipment

Hacksaw

Knife

Sandpaper

Glues

Carving tools

Finishes

### **Safety when cutting and using equipment**

What shapes, sizes etc of bags have you seen?

#### **Safety**

When cutting and using equipment.

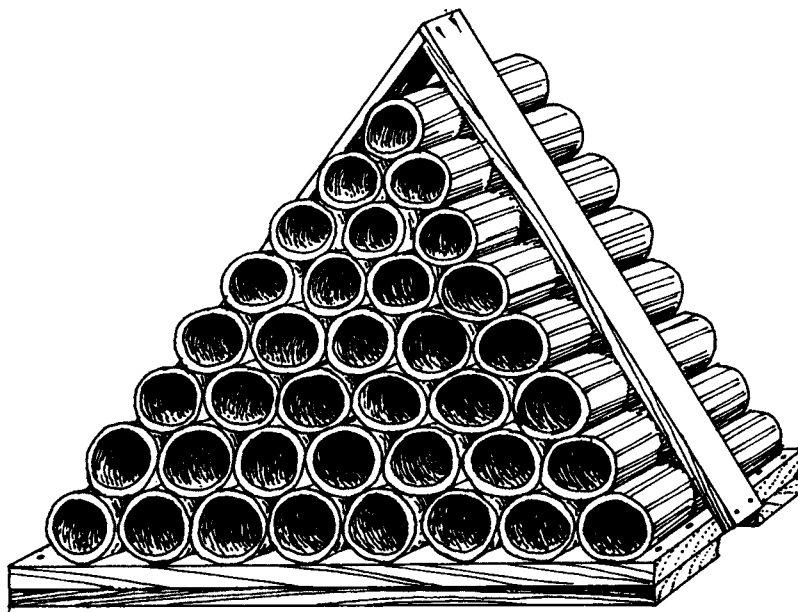
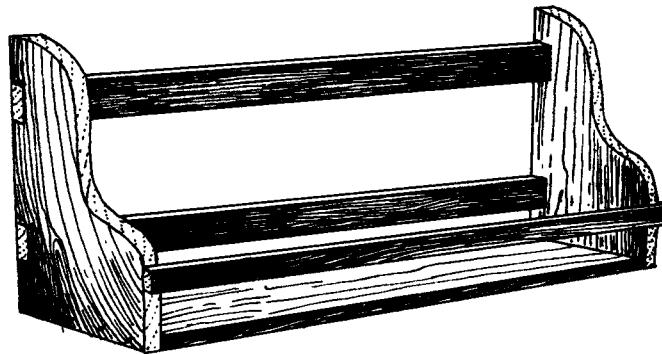




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**Solution**

Some household items.



Manufacture from designs  
Cutting, smoothing, finishing.

**Evaluation**

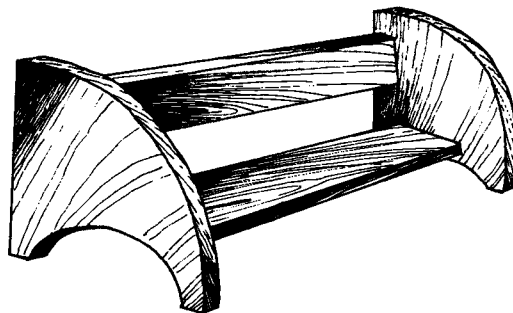
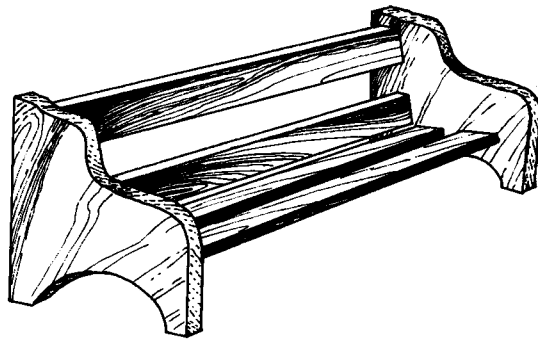
Does the students' finished piece do what it was designed for?  
Are they happy with their design?  
Did they find it easy or hard to complete?  
Could they make it again?  
Would they change anything?



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## Design Brief: Cassette Holder (Draft)

Materials Timber Nails Glue Glass paper Wood finishes Brush Dawels  
Material sizes required Ends – 2 pcs 200 x 250 mm x 10 mm Rails – 4  
pcs 300 x 15 mm x 10 mm Tools Saws Planes Chisels Rasps Coping  
saw Hard Brace and bits Steps in to construction Select the required  
timber Mark out the correct size for the ends. Cut out the two ends 200 x  
250 mm. Mark and cut out 4 rails at 10 x 15 mm. Mark and cut end to  
shape required. Cut out stopped mortise joint for rails. Clean and  
grasspaper all surfaces. Glue and nail rails and ends. Paint and varnish.





---

## **Design Brief: Hanging Shelves**

### **Problem**

The dormitories have no spaces between the beds to put wooden cupboards or wooden shelves.

Design a hanging shelf (shelves) for storing students' belongings (clothes, perfumes, tooth brush etc).

### **Restrictions**

It must be functional

It must hang well.

It should be made of soft – strong material.

It should be able to carry some weight.

### **Investigation**

#### **Materials**

Help the students to investigate the different types of material available, their properties and their suitability.

### **Processes**

Some examples are weaving, sewing, knitting, crocheting etc.

Finishing

Help the student to investigate the different types of varnish (clear, satin, mat).

### **Solution**

Each student will have to make four designs.

Develop one of the designs with all the details they wish to have on it.

Manufacture

If the students are using a machine to make up their item, make sure that they know how to use and care for it correctly.

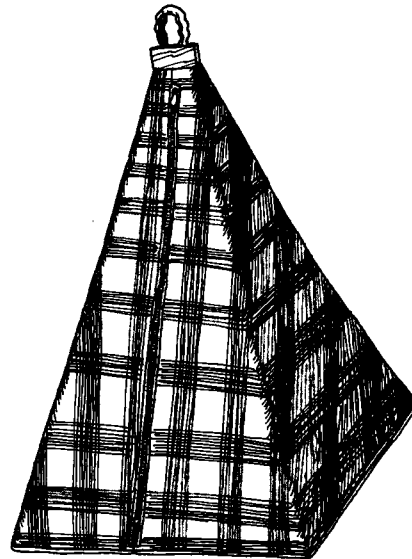
Help students produce in correct work sequence, the steps that they would follow to complete their shelf.

### **Evaluation**

Let the students check their own projects to see:

- that everything is completed and neatly finished.
- that the project looks like their final design solution drawing or not.
- that the project is functional.
- what changes might be required.
- that it meets the restrictions in the design brief.









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# Design Brief: Musical Instrument

## Problem

Design and make a musical instrument.

## Restrictions

It can be made from any available materials.

It must be strong.

It must be able to produce good sound.

## Investigation

### Materials

Suggested materials for use in this project are:

Bamboo

Timber

Coconut shell

Seeds

String

Board (plywood, hardboard)

Wood glue, super glue

Nails

Varnish, paints

Fishing line

## Safety

Consult the safety book for special concerns.

Correct use of knife, broken glass and other sharp edge tools.

Care should be taken when working with bamboo.

## Process

Describe all the processes that should be used in carrying out this project.

A step by step detailed description of each process must be written by students in their book. This should not be just those that they will use but also those of each possible material. Examples are given.

### Timber

Select timber (preparation of timber).

Determine its size and shape.

Dig or curve a hole.

Cover the hole with board.

And do other components.



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### **Coconut Shell**

Select a suitable size.

Remove the husk and clean it thoroughly outside.

Try to remove all the flesh inside without braking the shell.

Put some dry and hard seeds (sand, small sea-shells) inside.

Test it to get the good sound.

Construct the handle.

### **Bamboo**

Select a suitable size.

Remove knots and branches.

Determine its size (length) and cut it.

Complete other components.

### **Tools**

Steel ruler or measuring tape

Saws – cross cut, hacksaw

Files – rasps

Hand drill

Sand paper

Broken glass

Hammer

Hand plane

### **Solution**

Draw at least five different ideas for your instrument.

Choose one of these ideas and develop drawings if any special features involved in the design.

Draw a final solution in the three dimensions.

### **Manufacture**

Students should be encouraged to produce a sequence of work list before beginning making their solution. This ensures that they have worked out what parts have to be made first and which components are needed to be completed.

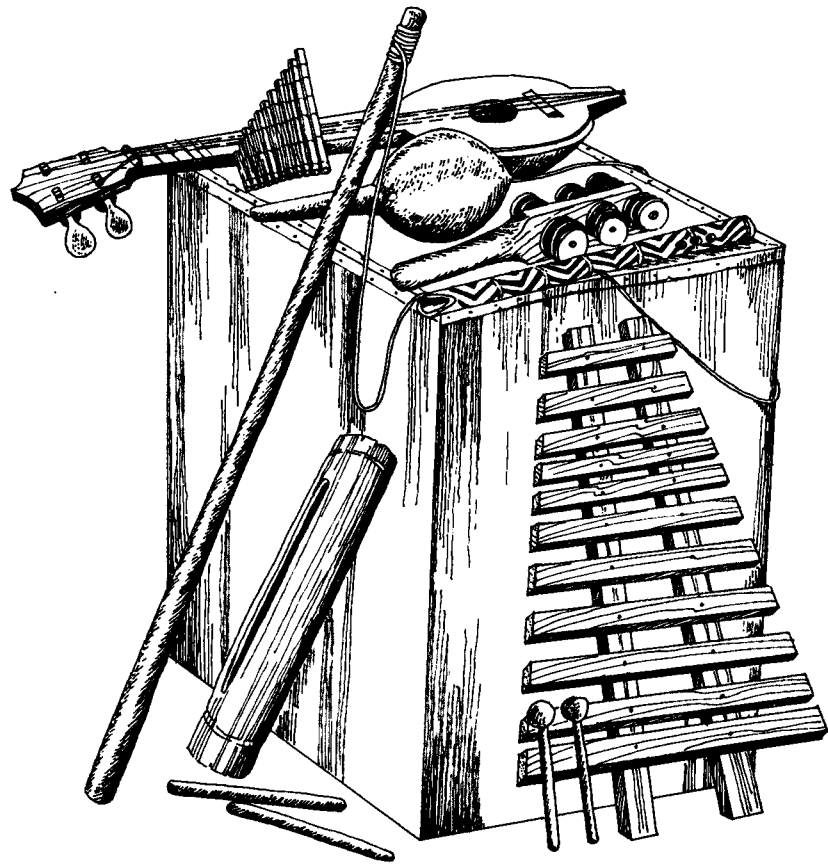
Safe working practices must be encouraged.

### **Evaluation**

All students must evaluate their own work against the requirements of their final solution. If their product do not include the features in the solution they should give reasons why.

What have they learned from the process?







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## **Design Brief: Picture Frame (Draft)**

### **Materials**

Timber  
Nails  
Glue  
Paper  
Masonite  
Plywood  
Screws  
Wire for hook, etc.

### **Tools**

Saws  
Spokeshave  
Coping saw  
Brace and bit  
Hammer  
Screw driver  
Pliers  
Mitre clamps  
G. Cramps  
Sash cramps

### **Steps in to construction**

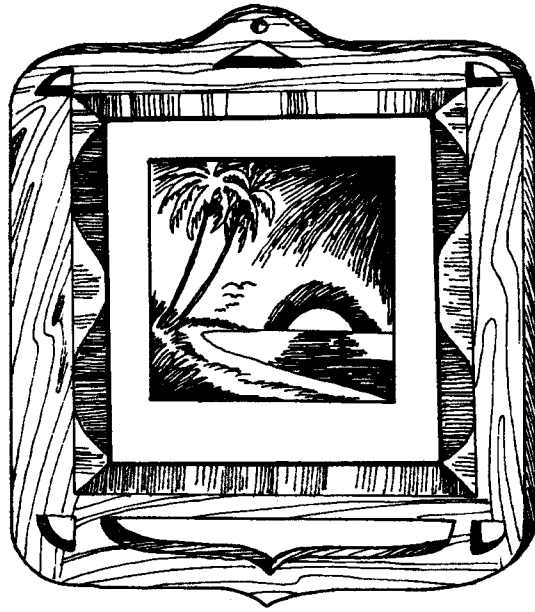
1. Find pieces of timber required.
2. Glue and nail timber together.
3. Shape according to design.
4. Fit plywood or masonite back.
5. Paste picture on and add moulding for decoration.
6. Sand paper and varnish.





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1.



2.





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## Design Brief: Controlling of Fullness

### Problem

We often need to create shape in a garment. How can we do it?

### Restrictions

Nil

### Investigation

#### Gathers

Use of machine to create a longer stitch: double rows

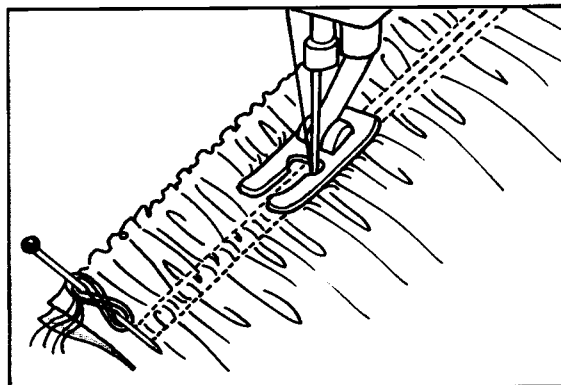
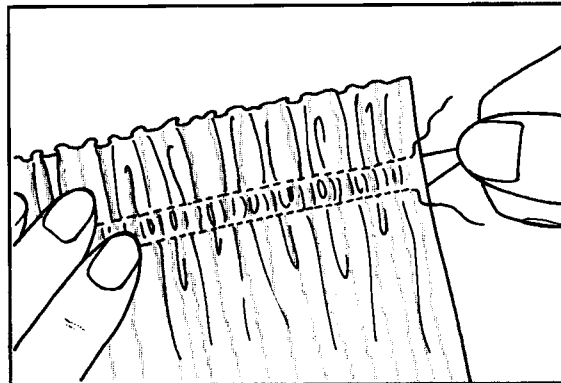
Use of hand stitches: double rows

Where gathers are used e.g. skirts to fit bodice, skirt to fit skirt, skirt to fit waistband, top of sleeve to fit armhole, puffed sleeves.

Evenness of gathers.

Pinning and machining.

Correct stitching.



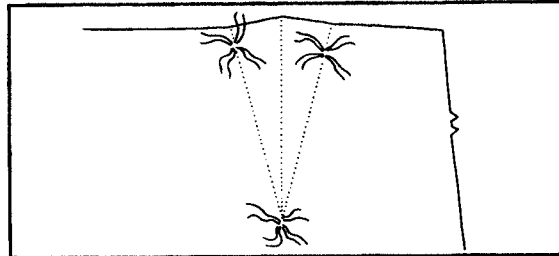
Finished effect. (Removal of gathering threads)



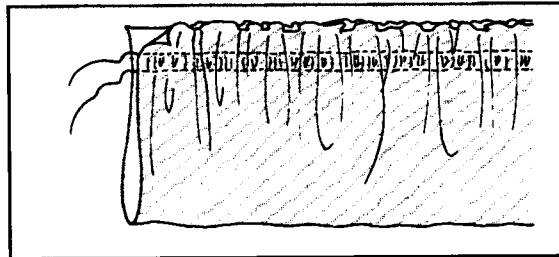
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## Darts

As the name suggests thin at one end – in a dart shape  
Usually a pattern will be marked with tailors tack holes.



The dart is folded in half, joining the tailors tack markings, then stitched from the widest to the narrowest point.

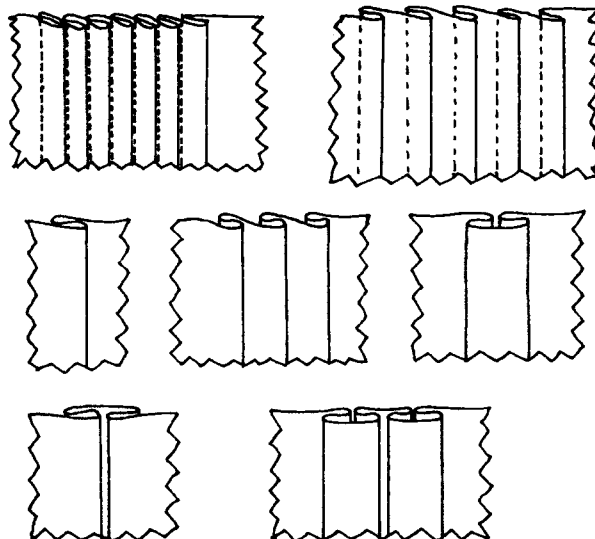


Threads should always be tied off. A dart will give shape to the bustline on a bodice or the hipline on a skirt. Darts can also be used as a design feature on garments.

## Pleats and Tucks

Folds in the fabric which can be stitched and made to fit another piece of pattern.

Tucks are usually smaller e.g. as a design feature.



Patterns are usually marked with the position of tucks or pleats.



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Fabrics suitable and unsuitable for each process.

Examples of where each process can be used on a garment.

Solution (Use one, or a combination of more than one and manufacture processes on a garment).

**Evaluation**

Has the process the students used created the right shape for the garment?

Does it fit?

Could they have used another process?

Would they change it if making this article again?





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## Design Brief: Fastenings

### Problem

Articles of clothing and other smaller fabric items need a closure. What type of closures can I use?

### Restrictions

Nil

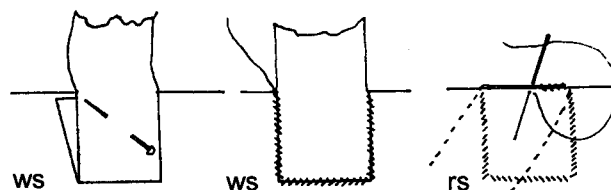
### Investigation

- a. Types of fastenings available.  
Some examples are button and button hole or loop; hook and eye; press studs; velcro; zip.
- b. Reasons for using fastenings  
The shape of the body is not even or regular. There are parts that are full and more 'round' than others. For this reason it is necessary to have openings in garments or items of clothing to enable the wearer to put garment over the body. Once the garment is in place, the openings are closed with the help of fastenings.  
  
On other items, eg. cushion covers, bags etc, it is necessary to have closures to put on and to remove covers. Also to prevent contents from spilling out, etc.  
  
Other articles - on the top or opening of bags; sides or ends of cushion, pillow and mattress covers; openings of purses, etc.
- d. Methods for attaching fastenings. These may be stitched on by hand or by machine. Also they may be 'clipped' on by a special kind of 'stapler'.

NB. For more information, refer to Teachers' Support Materials Package.

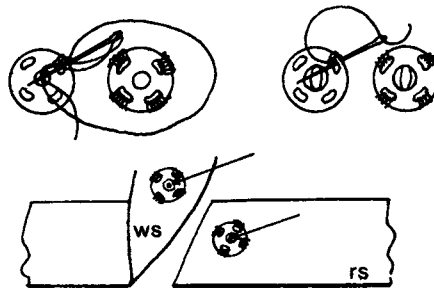
### Solution

- a. Tapes and Ribbons

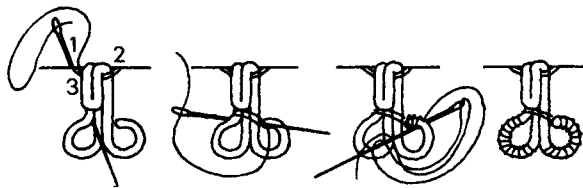




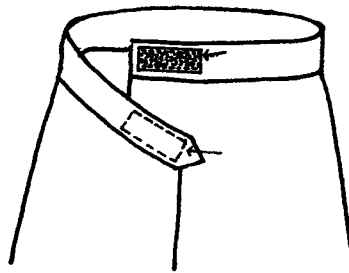
b. Press studs



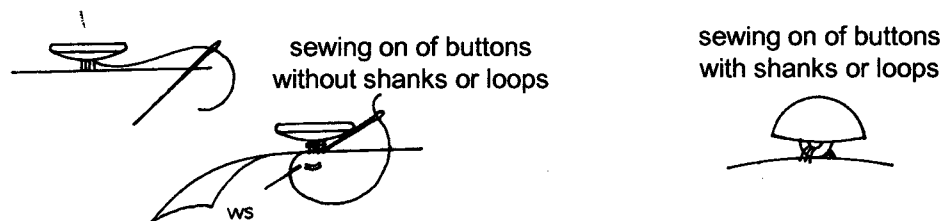
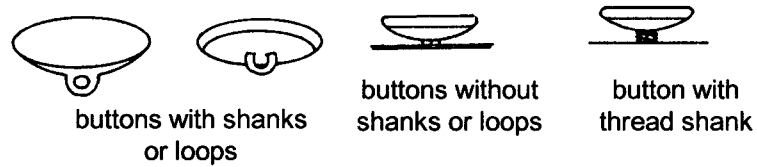
c. Hooks and Eyes



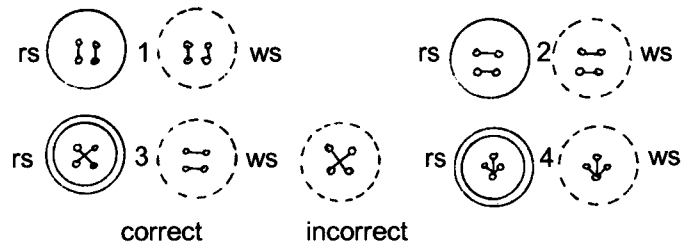
d. Velcro



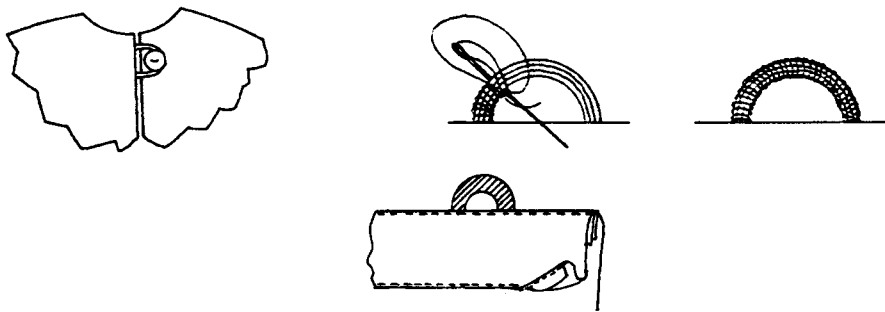
e. Buttons



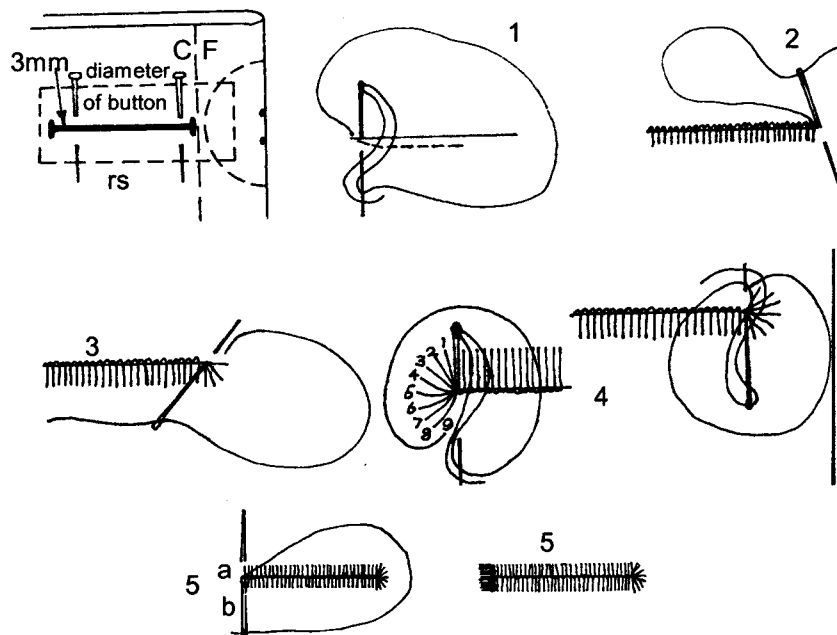




Worked loops or rouleau loops for buttons



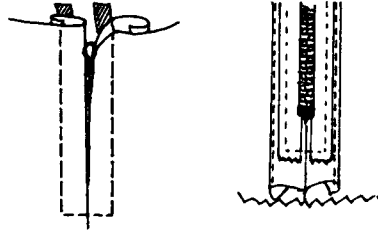
Worked buttonholes





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f. Zip fastener



N.B. For more information, refer to Teachers' Support Material Package.

**Manufacture**

Students have to attach fastenings to garments or articles they make. It depends on which is more convenient to your school (expenses and time) whether students make a separate article for this brief, or whether they make **one** item to include processes such as fastenings, methods for controlling fullness in a garment, sleeves, hems, pockets, collars etc.

Guide students in their choices to make sure the item they make is not too elaborate and difficult according to their ability and time you have.

**Evaluation**

Discuss the following points with each student in view of their article.

- Is the fastening used suitable for the material and item made?
- Does the fastening do what is supposed to do?
- Could you use another fastening instead?
- Did you find the attaching of the fastening easy or hard? Why?
- Would you make another article, again, exactly the same design as this one? Why?





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## Design Brief: Coffee Table

In this brief the design factors are in the choice of material, leg shape and top decoration.

### Problem

Table is needed to put coffee cups on.

### Restrictions

#### Size

length from 60 – 70cm

width from 35 – 40cm

height from 40 – 45cm

The table should be easy to move and light enough to carry.

It must be strong and well balanced.

### Investigation

#### Materials

Timber -

Plywood                      Formica

Broken tiles                 Varnish

Paint                         Stain

Oil                             Glue

Putty

#### Tools

Cross cut saw                Rip Saw

Mortise chisel                Marking gauge

Try Square                     Measuring Tape

### Processes

Select pieces of wood for rails and legs and plane them smooth.

Cut pieces of wood to length.

Mark joints and cut them out.

Sand the pieces of timber and assemble the side and end rails to the legs.

Fix the top to the frame punch every nail head and seal with putty.

Apply stain or paint or varnish or oil.

### Solution

Show any techniques required to draw the design drawings and final solution.

Sketching                      Oblique drawing

Exploded views                Isometric drawing

Dimensioning.

