

# Ross Taylor

VTA3135

Curriculum Development

Assignment 1

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**Program Description:** (aimed at students and parents)

Technology! Who uses it? Who can use it? Can I use it? Have you asked yourself these questions? In a nutshell everyone uses it and YES YOU CAN TOO!!

Technology classes will introduce you to a new way of learning and EVERYONE can participate. Technology education focuses on issues that are current and interesting allowing you to work in a variety of situations and use your imagination and creativity. Unlike manual arts classes you will have more input and self-direction in the projects you undertake. You will look at real life problems, work out solutions, make your own designs, work with others, and experience a range of materials and methods of producing items. You will have the satisfaction of saying that was my/our idea and I/we made it and it works! This subject gives you the freedom to express your ideas and opinions in realistic settings that you find interesting.

**INDIVIDUAL – CHOICE – EXPRESSIVE – SATISFACTION – REALISTIC**

**Curriculum Model:**

Curriculum development should be a means of bringing together all the variables that are required to construct a comprehensive and meaningful learning experience for students. This process can sometimes be ignored in preference to setting goals and instructional methods so that the program can be brought into practice. Hunkins (1993, p.329) claims curriculum development is frequently a disjointed procedure. For the purpose of this unit of work and work program, the interaction model of curriculum development will be used to help plan, organise and write the programs.

Brady (1995, pp. 74) describes two models that he claims “largely subsume other approaches to the development of curriculum”; the objectives model and the interaction model. He notes that there is no one right way to develop curriculum provided there are links that are consistent between the curriculum elements. This discussion does not preclude the objectives or linear model from future use. The interaction model is seen as the most effective way of dealing with curriculum development, considering the experience of the writer.

The interaction model (Brady, 1995, p.81) figure 2 is similar in process to the cyclical and interactive method of creating products proposed in the Draft Technology Years 1-10 Syllabus (2001, p.5) figure 1.

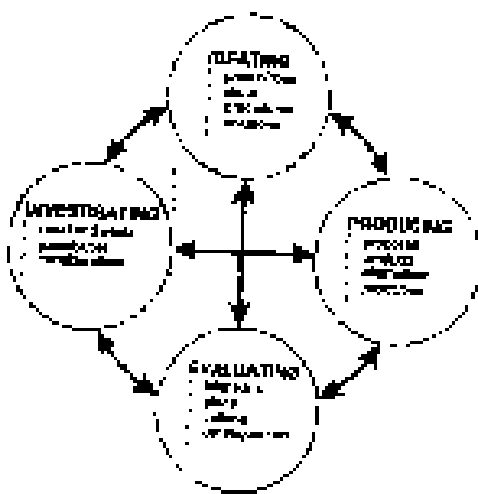


figure 1

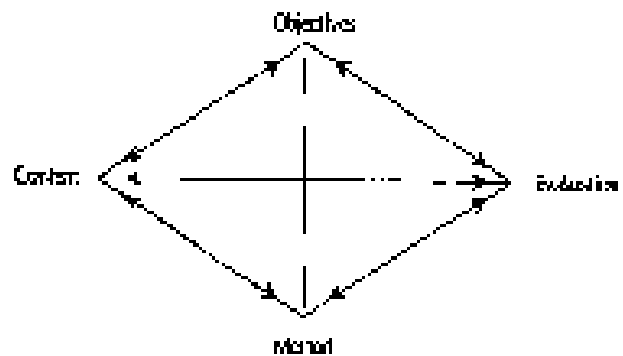


figure 2

The development of curriculum is the creation of a product and just as the production of a consumer product is the result of a continuing cycle of investigation, ideas, production and evaluation, all interlinked to produce the best solution, the development of curriculum can follow the same type of cycle of production. The major difference is that the interaction model can start at any of the elements of the cycle. As demonstrated in figure 2 the teacher can start with the content, then look at teaching methods and objectives, consider evaluation, revisit the content, modify the objectives, revise evaluation, change teaching methods and so on until they are happy with the outcome. This process can continue during teaching to accommodate any situations that may arise.

The process I have used while developing this one year work program follows this model very closely. I found it helpful to first think about the content of the units I was developing.

By doing this I was able to develop projects that would generate objectives that would give students a range of learning experiences in different contexts. Once the content was drafted I was able to consider the teaching methods I would like to use and in this process some minor changes were made to both the content and the objectives. I found myself constantly revisiting all aspects of the process outlined in figure 2. While thinking about one area I found sometimes I would be subconsciously changing another to suit. I found this model of curriculum development very applicable to my style. This is the way I would have developed this program even if I had been aware of this model.

Brady (1995, pp. 80-82) asserts that the interaction model reflects the reality of how curriculum is developed in schools and how people actually do things, allows for creativity and is less restrictive in the development process. The major benefit of this type of development is that it reflects the way most people go about learning and organising. It is very flexible, allowing constant adjustment and modification to allow for improvement as the curriculum is developed to its potential.

### **References:**

Brady, L. (1995). *Curriculum Development* (5<sup>th</sup> ed.). Sydney: Prentice Hall.

Hunkins, F.P. (1993). A Systematic Model for Curriculum Development. In G. Hass & F. W. Parkay (Compl.), *Curriculum planning: a new approach* (6<sup>th</sup> ed.), (pp.329-332). Needham Heights, Massachusetts: Allyn and Bacon.

Queensland School Curriculum Council (2001). *Draft Technology Years 1-10 Syllabus*  
Brisbane: Queensland School Curriculum Council.

## **One Year Work Program:**

### Design and Technology

#### **Introduction:**

Throughout human history, people have been involved in a continuing process of developing artifacts and processes designed to meet their particular needs. This process is one of continuing development as new and more complex technologies are developed. The use of technology to benefit humans has progressed from an exploitative system to one that considers a range of issues including but not limited to:

- ❑ Particular needs and wants of people.
- ❑ Cultural beliefs and values.
- ❑ Environmental impact and sustainability of processes.
- ❑ Moral and ethical values.

The process of designing, making and appraising (DMA) has underpinned the development of technologies as a continuing and interactive method of exploring and generating ideas, realising, improving and modifying products.

In the school curriculum, technology studies are designed to give students the opportunity to use different technologies productively, while exploring aspects of technology such as the appropriateness, the different contexts and how to manage people, including themselves, resources, constraints and limitations. Students will study technology through the four interdependent strands of the technology key learning areas:

- ❑ Technology practice
- ❑ Information
- ❑ Materials
- ❑ Systems

## **Rationale:**

Advances in technology are responsible for the way humans live in contemporary society. It can be argued that where we are now is both good and bad in respect to the benefits of technological advancement to society and the environment. Technology will continue to transform the world in which we all live. This course is designed to help students learn how to use appropriate technology practices in different contexts to develop products that meet human needs and wants.

The ideal result of school is students who have lifelong learning skills. Technology education aims to give students a lifelong ability to use and understand technology to the benefit of themselves and to the community. These students will have an understanding of technological processes and materials. They will be able to communicate information in an effective manner reflecting their knowledge and creativity using a variety of technological systems. They will be able to display reasoning and investigative skills and reflect logically upon choices and decisions. These qualities will equip students with life, thinking, communication and participation skills needed in a technological society.

During this year long work program students will undertake a variety of units of work incorporating design analysis exercises and skill development tasks. In the units of work they will experience a range of:

### Materials:

- ❑ Timber – units 2,3,5
- ❑ Metals – units 2,4,5
- ❑ Plastics – units 2, 4
- ❑ Textiles – unit 4
- ❑ Paper products – units 1, 5

### Contexts:

- ❑ Manufacturing and retail in unit 1
- ❑ Production systems and leisure in unit 2
- ❑ Engineering and construction in unit 3
- ❑ Industry, manufacturing and leisure in unit 4
- ❑ Energy sources and heating in unit 5

Students will experience various teaching and learning strategies including:

- ❑ Group work in units 2 & 4

- ❑ Modelling using graphical medium in units 1, 2 & 3
- ❑ Demonstrations in all units
- ❑ Research and analysis in all units
- ❑ Teacher directed investigations in units 1 & 5
- ❑ Peer collaboration and teaching, notably in units 2 & 4
- ❑ Interviewing and interpretation of results in unit 4
- ❑ Individual and group presentations in all units
- ❑ Product analysis and evaluation in units 1, 2, 4 & 5

Students will examine issues affected by technological expansion and development. These include:

- ❑ Environmental impact in units 1, 4 & 5
- ❑ Sustainability of practices and processes in units 1 & 5
- ❑ Social impact in units 2, 3 & 4
- ❑ Cultural impact in unit 4

As a consumer society, we have a voracious appetite for goods and services. This course is designed to help challenge student's thinking about technology and expand their focus towards the overall purpose and benefit/disadvantage of technology, rather than just see technology as a means of producing artefacts for the use and needs of humans. Students will be encouraged to make decisions related to their own values while considering other values such as those above.

During this course students will undertake a series of projects that are aimed at developing skills necessary for students to participate in actively in a technological society. These projects will attempt to reflect real life and lifelike challenges that are found in contemporary society today. Using this approach, students may develop the attributes of a lifelong learner identified in all key learning areas of all Queensland curricula.

During the project work students may develop:

- ❑ Thinking and reflective skills in all units
- ❑ Investigative and decision making skills in units 2, 3, 4 & 5
- ❑ Abilities to work and function within a group in units 2 & 4
- ❑ Understanding of materials and processes in units 3, 4 & 5
- ❑ Problem solving skills in all units
- ❑ Creativity in all units

- Knowledge of effect of technology on society and the environment in units 3, 4 & 5
- Communication skills in all units

Technology affects all people regardless of gender, culture or disability. This course offers no barriers to the inclusion of any student. All students will be able to actively participate in, and contribute to, this course to the best of their ability. Students may use and reinforce other areas of the school curriculum in all the units. Areas of literacy, communication, numeracy and science will contribute to the students' cross-curricular learning with technology studies.

The range of projects and exercises is designed to help students develop their investigation, planning, making and evaluating skills. The five projects progressively provide students with the opportunity to develop these skills as the tasks move from defined, restricted types to more open and less restricted. Short exercises during the projects are micro lessons on particular aspects of the project, such as:

- Investigations in units 1, 3, 4 & 5
- Design skills in all units
- Attribute analysis in units 3, 4 & 5
- Skill development in all units

## **Project 1 ~ Safe and Sound** **Year 9 Design and Technology**

**Topic:** Packaging for Glasses

### **Situation:**

Many fragile objects are transported safely around the world by conventional means of transport. In order to do this, fragile items must have a form of packaging that protects them from damage. This packaging has to be cheap, efficient in use of materials and preferably sustainable and recyclable. You have been approached by a manufacturer to design and make a packaging container for a new style of wine glass. The client requires that the packaging be simple to manufacture, sturdy, recyclable and environmentally friendly. It should also not be too labour intensive to assemble and require a minimum amount of fixings.

### **Brief Project Outline:**

This project introduces students to the concept of designing for a client. The client has specified their requirements for the product. Students will have to investigate the areas in the specifications and choose materials and processes that meet the requirements. Students will work individually to create the product and produce a design folio outlining their research into the areas of recycling, environment and sustainability.

### **Assessment:**

Students will be assessed throughout the unit and given verbal feedback at each stage of the design process. Each student will produce a design folio of their work incorporating:

- sketches of initial designs
- development sketches of their final solution
- detailed drawings of final solution
- any models or mockups they made
- discussion on the research and investigation into recyclable, sustainable materials
- final product with evaluation justifying their design

### **Unit 1 Teaching Process**

Project: Safe and Sound <b><u>Unit 1– Packaging for glasses</u></b>	New Knowledge	Skills	Research and design analysis	Supporting exercises	Learning outcomes
<p>This initial project gives students the opportunity to demonstrate their skills to design a packaging system for a set of 6 wine glasses. The aim is to design and make the packaging that is the most economical and efficient in respect to resources and manufacture – preferably in one piece. Students will work individually in a manufacturing, transportation and retailing context.</p> <p><b>Project focus:</b> Fundamentals of designing. Economics of material usage. Function and sustainability.</p> <p><b>Extension exercises:</b> Extend the package to hold two layers of 6 glasses</p>	<p>Packaging requirements</p> <p>Concepts of economy and efficiency when using resources.</p> <p>Using sustainable products.</p>	<p>Sketching and drawing techniques</p> <p>Accurate marking out and cutting</p> <p>Layout development techniques</p>	<p>Design and attribute analysis of a number of packaging types e.g. fast food containers, ordinary boxes etc.</p> <p>Investigate different types of cardboard for suitability.</p> <p>Analyse what is needed to protect glass products</p>	<p>Development exercises of cubes and prisms using paper – cut out and glue together</p> <p>Accurate measuring and marking with a ruler</p>	<p>Technology Practice</p> <p>4.1</p> <p>4.4</p> <p>Information</p> <p>4.1</p> <p>Materials</p> <p>4.2</p> <p>Systems</p> <p>4.1</p> <p>4.2</p>

## **Project 2 ~ Strike a Light** **Year 9 Design and Technology**

**Topic:** Timed Marble Run

**Situation:**

Some systems require a particular function to operate for a set length of time before performing another function. Some of these may be electronic and others may be mechanical. Whatever the system they all must be reliable and perform the task repeatedly. A novelty toy manufacturer is producing an “Infernal Machine” as a display of mechanical functions for children. They require you to design and make a prototype for them of one section of this machine. Your section requires a marble to be kept moving for at least 30 seconds, using a variety of systems and techniques, and trip a device for the next section. For the purpose of the prototype the marble must light a match at the end of the run.

**Brief Project Outline:**

This project allows students to work in groups to practice problem solving skills. The novelty value of this project should encourage some innovative and unique solutions. The students will most likely use trial and error testing to help them find a solution. This should encourage students to begin to become a reflective learner during this project. Students will have to constantly design and evaluate throughout the project as they refine ideas to get the “infernal” thing to work consistently.

**Assessment:**

Each student in this group project will be assessed as a member of the group and individually. As a group each member will be assessed on their involvement and input into the group. Each group member will complete an individual assessment questionnaire on each of the group members. The final product will be assessed as a group, looking at class presentation of their product, originality, timing, end result and function. Individuals will be assessed on teacher observations, enthusiasm, involvement and their design folio containing their own sketches, drawings, modifications, analysis and evaluation of designs, comments on how they solved problems as a group and individually. This could be in the form of a daily diary of notes about the group’s process of designing, problem solving, making and evaluating.



## **Project 3 ~ An Elephant Stand** **Year 9 Design and Technology**

**Topic:** Light, Strong Structures

### **Situation:**

Contemporary building materials and techniques allow designers to fabricate structures that make economic use of materials while maintaining structural integrity. Compared to historical building styles, modern practices allow for the efficient use of a limited amount of resources. Material quantities and expense are important considerations. The owners of a visiting circus has come into your engineering workshop and asked you to design and make them a new platform for their elephants to stand on during performances. It must be strong enough to hold the weight of their biggest elephant and light enough that two men can lift and load it.

### **Brief Project Outline:**

During this project students will make a scale model of their design which will be tested to destruction. Students will investigate and analyse structures for design, stability and stresses. The materials will be provided in a limited amount to each student from which they must make the lightest strongest structure within the size limits. This project models the way designers have to work with a finite amount of material to produce the most economical result.

### **Assessment:**

Students will be assessed throughout the unit and given verbal feedback at each stage of the design process. Each student will produce a design folio of their work incorporating:

- sketches of initial designs
- development sketches detailed drawings of their final solution.
- analysis of the research and investigation into construction systems and methods.
- final product with evaluation justifying their design.
- results and analysis of the testing of their product and suggested improvements.

Students will receive a mark for their ranking as a result of the destructive testing (ratio of mass of product to mass supported) of their product.



**Project 4 ~ A Shady Place**  
**Year 9 Design and Technology**

**Topic:** A Portable Shade Structure

**Situation:**

Outdoor events and activities are a part of school life. The damage to our skin by over exposure to the sun has long been recognised. It is important that protection from the sun is provided in the form of sun screen, hats or shade. During school outdoor events there is often not enough shade available for all students. The local primary school has approached you to design and manufacture a portable shade structure for them to use during school events such as the sports day, cross country race etc. It must be safe, light, easy to erect and large enough to shade a large group of students.

**Design Brief:** (indicative only – students to write their own)

Design and make a portable shade structure, to the clients specifications, that would be suitable for use at school outdoor activities.

**Project Outline:**

This project will use a real life context to teach students about the design process. The client for the shade structure will hopefully be either a local primary school or their own school. The class teacher will make contact prior to beginning the project, to establish the bona fides of the project and to identify a willingness to participate in the project. The students will have to identify who the contacts should be and make arrangements (through their teacher) to interview the appropriate people. Working in groups students will identify key points to be addressed and frame questions around them. Interviewing key personal will then allow students to identify design specifications.

The groups will then prepare design folios for presentation in class and subsequently to the client (with recommendations from teacher) for approval. Ideally one design will be chosen and all groups will work on producing the required number of shelters.

**Assessment:**

Each student will be assessed individually, Part a (60%), and as a group, Part b (40%). Each group member will receive the same group mark, except for an individual mark for participation. Each group member will be responsible for all the other group member's participation and involvement in the group work. This will foster tolerance, communication, consultation, negotiation, teamwork and mutual respect.

**Part (a)**

Each student will present a design folio of their own work. The folio should include:

- ✓ A need and a design brief.
- ✓ Analysis of the problem.
- ✓ Outline of information collected on problem.
- ✓ A detailed specification.
- ✓ A range of possible solutions.
- ✓ Justified reasons for final selection.
- ✓ Detailed drawings with procedure sheet.
- ✓ Evaluation of their product.
- ✓ Conclusion

Weighting – 60%

**Part (b)**

Each group will be assessed on the following criteria:

1. Realisation of design
2. Group harmony.
3. Involvement of each member of the group.
4. Individual mark for group involvement

Each member of the group will receive the same mark for points 1-3.

Weighting – 40%



## **Project 5 ~ Boil the Billy** **Year 9 Design and Technology**

**Topic:** Solar Heating

### **Situation:**

The most common energy sources used today rely upon a finite supply of resources that are neither sustainable or environmentally friendly. Solar energy has long been proclaimed as the energy source for the future. While research and development has resulted in some solar powered devices, the conversion to alternative energy sources such as solar is a long way from fruition. The local camping shop has asked you to design and make a small solar heating device that will heat a small container of water for drinking, or a “solar billy boiler”. The device must be able to hold a cup size container of water and be fairly robust.

### **Brief Project Outline:**

Students will be able to be innovative in their designs and use different materials in their design if they justify their use. This unit allows them to explore any option they may think will be suitable within the constraints of size. Students will be encouraged to use divergent thinking to explore all possibilities. Sustainable and environmentally sound practices will be explored in relation to the common energy sources.

### **Assessment:**

Students will be assessed throughout the unit and given verbal feedback at each stage of the design process. Each student will produce a design folio of their work incorporating:

- sketches of initial designs
- development sketches and detailed drawings of their final solution.
- discussion on the research and investigation into parabolas and their use in products
- discussion on the benefits/drawbacks of solar compared to conventional energy sources.
- analysis of reflective materials.
- notes on experiments and improvements
- final product with evaluation justifying their design

Innovative solutions will receive higher marks and students will receive a mark as a result of testing of their product.



## **UNIT OF WORK**

### **Project 4 ~ A Shady Place**

### **Year 9 Design and Technology**

**Topic:** A Portable Shade Structure

#### **Rationale:**

People use a vast range of resources and technology to produce solutions to problems of everyday life. Some problems have many different solutions, which may or may not be appropriate. A good design takes account of considerations of appropriateness and sustainability and designers make value based judgements in the context of the product.

This project gives students the opportunity to work in a life like context. Students will investigate, research, design, make and evaluate a portable shade structure for use at school activities. This will model for students how most of the products society uses are developed. This unit aims to begin to develop in students a sense of the considerations that have to be made when designing a product. Students will discover different materials and the processes used to manipulate them, how to interpret information and how systems can be controlled to provide an outcome.

#### **Objectives:**

The objectives of this unit are to allow students to:

- Develop design skills including
  - Writing a brief
  - Investigating
  - Generating and identifying the best ideas
  - Making and evaluating the design
- Identify appropriate sources of information
- Communicate ideas effectively
- Manipulate materials to meet design requirements.
- Select appropriate tools and equipment.
- Organise the sequence of manufacture

- Work co-operatively in a group situation.
- Observe and demonstrate safe work practices.

### **Situation:**

Outdoor events and activities are a part of school life. The damage to our skin by over exposure to the sun has long been recognised. It is important that protection from the sun is provided in the form of sun screen, hats or shade. During school outdoor events there is often not enough shade available for all students. The local primary school has approached you to design and manufacture a portable shade structure for them to use during school events such as the sports day, cross country race etc. It must be safe, light, easy to erect and large enough to shade a large group of students.

### **Design Brief:** (indicative only – students to write their own)

Design and make a portable shade structure, to the clients specifications, that would be suitable for use at school outdoor activities.

### **Project Outline:**

This project will use a real life context to teach students about the design process. The client for the shade structure will hopefully be either a local primary school or their own school. The class teacher will make contact prior to beginning the project, to establish the bona fides of the project and to identify a willingness to participate in the project. The students will have to identify who the contacts should be and make arrangements (through their teacher) to interview the appropriate people. Working in groups students will identify key points to be addressed and frame questions around them. Interviewing key personal will then allow students to identify design specifications.

The groups will then prepare design folios for presentation in class and subsequently to the client (with recommendations from teacher) for approval. Ideally one design will be chosen and all groups will work on producing the required number of shelters.

**Assessment:**

Each student will be assessed individually, Part a (60%), and as a group, Part b (40%). Each group member will receive the same group mark, except for an individual mark for participation. Each group member will be responsible for all the other group member's participation and involvement in the group work. This will foster tolerance, communication, consultation, negotiation, teamwork and mutual respect.

**Part (a)**

Each student will present a design folio of their own work. The folio should include:

- ✓ A need and a design brief.
- ✓ Analysis of the problem.
- ✓ Outline of information collected on problem.
- ✓ A detailed specification.
- ✓ A range of possible solutions.
- ✓ Justified reasons for final selection.
- ✓ Detailed drawings with procedure sheet.
- ✓ Evaluation of their product.
- ✓ Conclusion

Weighting – 60%

**Part (b)**

Each group will be assessed on the following criteria:

5. Realisation of design
6. Group harmony.
7. Involvement of each member of the group.
8. Individual mark for group involvement

Each member of the group will receive the same mark for points 1-3.

Weighting – 40%

### Assessment Criteria: Part (a)

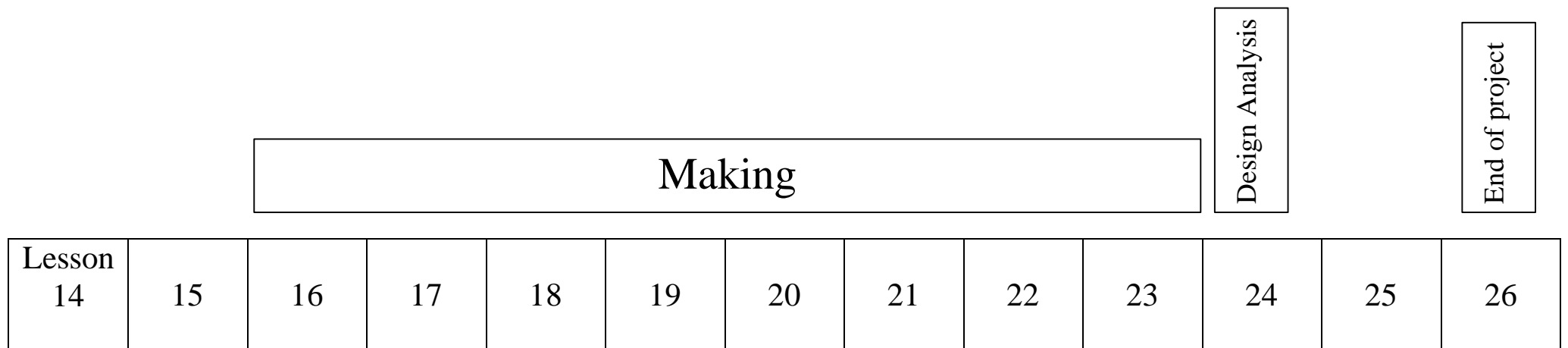
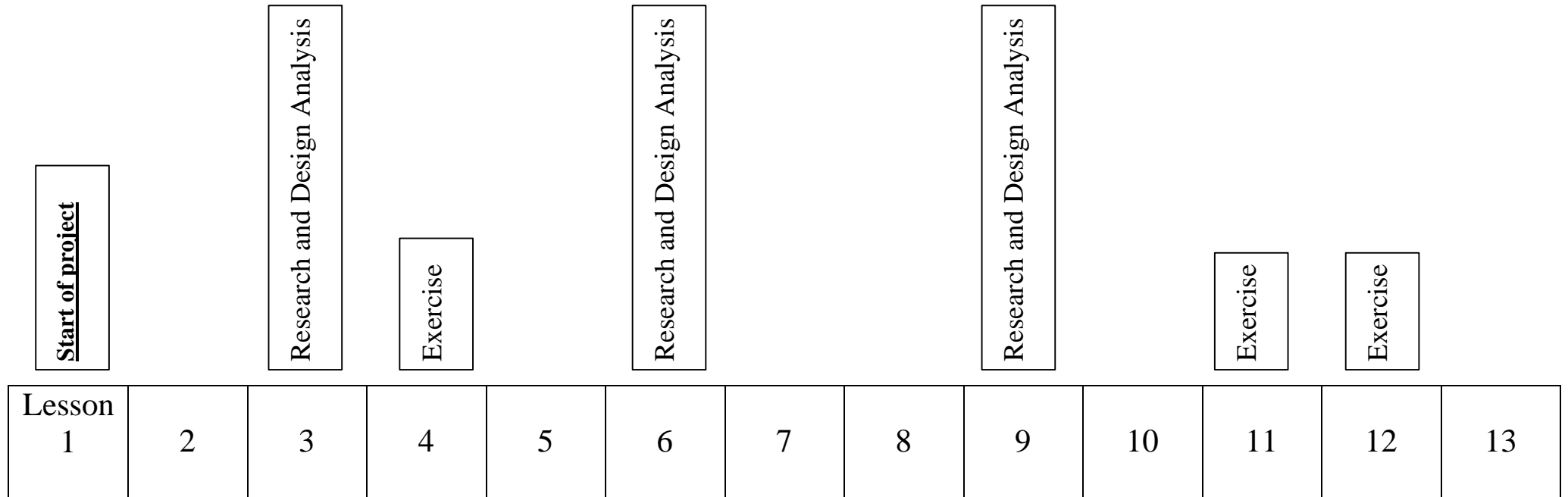
Criteria	Mark	Result	Comments
Investigation and research	4		
Design specifications: <ul style="list-style-type: none"> <li>➤ User requirements</li> <li>➤ Function</li> <li>➤ Size and materials</li> <li>➤ Method of manufacture</li> <li>➤ Cost</li> <li>➤ Ergonomic issues</li> </ul>	8		
Identification of relative issues: <ul style="list-style-type: none"> <li>➤ Environmental</li> <li>➤ Social</li> <li>➤ Economic</li> <li>➤ Sustainability</li> </ul>	5		
Initial ideas: <ul style="list-style-type: none"> <li>➤ Range</li> <li>➤ Creative</li> <li>➤ Suitable</li> </ul>	5		
Evaluation of initial ideas	3		
Design proposal: <ul style="list-style-type: none"> <li>➤ Suitable</li> <li>➤ Realistic</li> <li>➤ Original</li> <li>➤ Imaginative.</li> </ul>	10		
Justification of proposal: <ul style="list-style-type: none"> <li>➤ Logical</li> <li>➤ Technical</li> <li>➤ Values</li> </ul>	5		
Communication of final proposal: <ul style="list-style-type: none"> <li>➤ Organised</li> <li>➤ Good layout</li> <li>➤ Fluent</li> <li>➤ Accurate</li> <li>➤ Combination of text and graphics</li> </ul>	10		
Procedure and planning: <ul style="list-style-type: none"> <li>➤ Detailed</li> <li>➤ Logical</li> <li>➤ Justified</li> <li>➤ Safety</li> <li>➤ Correct use of tools and equipment</li> </ul>	10		
<b>Total Part a</b>	<b>60</b>		

**Assessment Criteria Part b:**

<b>Criteria</b>	<b>Mark</b>	<b>Result</b>	<b>Comments</b>
Realisation of design: ➤ Function ➤ Aesthetic appeal ➤ Client satisfaction ➤ Use of tools and equipment ➤ Safety ➤ Craftsmanship ➤ Overall finish ➤ Appropriate materials ➤ Economic use of materials	<b>20</b>		
Group harmony ➤ Organisation ➤ Cooperation ➤ Consultation ➤ Tolerance ➤ Respect ➤ Communication ➤ Teamwork	<b>5</b>		
Involvement of each group member	<b>5</b>		
<b>Individual participation mark</b>	<b>10</b>		
<b>Total Part b</b>	<b>40</b>		
<b>Total Part a</b>	<b>60</b>		
<b>Total Mark</b>	<b>100</b>		

## Unit 4 project outline

<p><b>Topic:</b> A Shady Place</p> <p style="text-align: center;">Portable Shade Structure</p>	<p><b>Year Level:</b> 9</p> <p><b>Format:</b> 26 x 70 minute lessons (30 hrs)</p>
<p><b>Project Summary:</b></p> <p>Students:</p> <ul style="list-style-type: none"> <li>• Investigate shade structures</li> <li>• Interview clients (school staff and students)</li> <li>• Design, make and appraise solution</li> </ul>	<p><b>Context:</b></p> <p>During outdoor activities sun protection is vital at all times. School sporting and outdoor activities often have no shade provision for students during non participation periods</p>
<p><b>Brief Task Description:</b></p> <p>Working in groups of 3-4, students research, design and make a portable shade structure suitable for use at school sporting and other events where sun protection is required. The client is the school</p>	<p><b>Teaching Considerations:</b></p> <p>To accommodate all students the groups should be of mixed ability. Project could be expanded to investigate fixed shade structures for the school</p>
<p><b>Project Start Up:</b></p> <p>Examine the need for shade – why is it needed</p> <p>Look at trends over the years in sun safety</p> <p>Discuss some commercial options – have examples if available</p>	<p><b>Expected Project Results:</b></p> <p>Students should gain skills in designing products to a clients criteria e.g. use, budget, limitations</p>
<p><b>Focus:</b></p> <ul style="list-style-type: none"> <li>• Structural design and stability</li> <li>• Safety of structure – liability</li> <li>• Suitable materials</li> <li>• Engineering and manufacturing skills</li> </ul>	<p><b>Cross Curricula Links:</b></p> <ul style="list-style-type: none"> <li>• Maths: budgets, calculations for materials</li> <li>• English: interviewing, communication</li> <li>• Social Studies: benefits to health and society</li> <li>• Graphics: detailed working drawings of product</li> </ul>



## Unit 4 ~ Lesson 3

### Design and attribute analysis of commercially available shade shelters

#### **Learning Objectives:**

On completion of this lesson each student should be able to:

- ✓ Recognise good and bad features of a design.
- ✓ Explain how to improve bad designs.
- ✓ Analyse examples for good and bad attributes.
- ✓ Identify and list the ideal attributes and design features for their project.

#### **Prior Knowledge:**

Students may have had some experience in erecting tents or similar products. Some student's inexperience in this may provide valuable information for all students about designing for people who have not had exposure to particular products.

#### **Preparation and Resources:**

- ✓ As large a range of shelters, tents etc as possible for students to erect.
- ✓ Tarpaulin, poles and ropes.
- ✓ Suitable area for erection of the above.

#### **Procedure:**

#### **Strategy:**

Stage 1: Discuss the lesson task with students.	Outline the points students will have to look at. Each group will erect one shelter and then will report to the whole class about problems etc they encountered.
Stage 2: Student groups erect shelters.	Divide students equally into groups for each shelter. Have students nominate one member to take notes as group goes about task. Remind them to look for good and bad points, ease of erection, instructions etc.
Stage 3: Each group looks at each	Have students prepare a table listing

erected shelter and notes attributes of each one.	features such as materials, properties, weight, cost, properties of each shelter.
Stage 4: Each group does an analysis of the design of each shelter.	Have students make observations about suitability, ease of use, appearances, safety, manufacture method for each shelter.
Stage 5: Each group makes brief presentation about the shelter they erected.	All members contribute to the presentation outlining the areas looked at in stage 2.
Stage 6: Each group makes brief presentation of stages 3 & 4	Similar to previous stage.
Stage 7: Revise lesson briefly <b>5 minutes</b> before end of lesson.	Discuss with students what they perceived as a good design for a shelter based on their observations.
<p><b>Learning Experiences:</b></p> <p>This should assist students to analyse the products for good and bad design and help show how to incorporate these tactics into their designing.</p>	
<p><b>Self and Lesson Evaluation:</b></p>	

## Unit 4 ~ Lesson 9

### Materials Investigation

#### **Learning Objectives:**

On completion of this lesson each student should be able to:

- ✓ Identify properties of materials.
- ✓ Select appropriate materials for purpose.

#### **Prior Knowledge:**

Students should be familiar with most of the possible materials, however knowledge of properties and applications may be limited. They may not have thought about how, when and why a particular material would be used.

#### **Preparation and Resources:**

- ✓ A range of samples of possible materials students may use.
- ✓ Information (printed and electronic) on the above materials.
- ✓ Scientific information about composition and properties.

#### **Procedure:**

#### **Strategy:**

Stage 1: Discuss lesson topic and objectives.	Discuss topic with students to discover their level of knowledge on topic.
Stage 2: Student groups investigate materials provided and note observations.	Break students into their working groups and give each group samples of the materials. Advise students to write down their ideas on the appropriateness, function, aesthetics, economics, environment and sustainability with regard to each of the materials.
Stage 3: Groups present their observations.	Teacher leads the presentation writing down each groups observations on board. Collate the results.
Stage 4: Compare observations to	Discuss the suitability of the materials on

information available.	the basis of observations and information. Remind students to consider environmental and sustainability issues when choosing materials for their project.
Stage 5: Each group considers the options for their project	Students list materials they would like to use.
Stage 7: Revise lesson briefly <b>5 minutes</b> before end of lesson.	Discuss with students some of the options available to them and the benefits of each material.
<p><b>Learning Experiences:</b> Students should have a greater appreciation of different materials in relation to their suitability and function. Students may consider different combinations for their project.</p>	
<p><b>Self and Lesson Evaluation:</b></p>	

## **Students Design Workbook**

**Name:** \_\_\_\_\_

**Grade:** \_\_\_\_\_

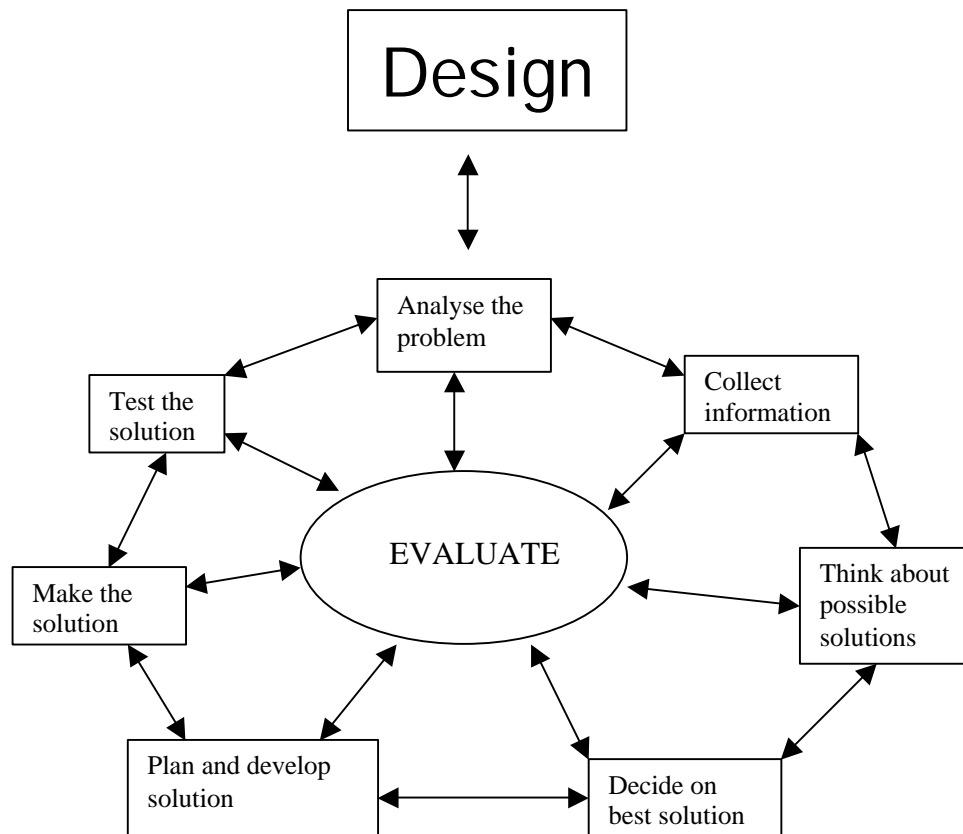
**Use these guidelines to help you through the design process. You should use a notebook or sketchbook to keep all your notes and sketches together. Use this information to help compile your design folio.**

## Design Folio Guidelines

### Steps in designing a solution:

- ✓ Think about the situation and problem posed - evaluate
- ✓ Collect information - evaluate
- ✓ Think about possible solutions - evaluate
- ✓ Decide on the best solution - evaluate
- ✓ Plan and develop the solution - evaluate
- ✓ Make the solution - evaluate
- ✓ Test the solution – evaluate

Evaluation is the key to the design process. Evaluation is a constant process as you work through the process, not just at the end. Decisions and choices have to be made at every step.



### Design Process

Use the outline that follows to guide you through your designing process. Write down any ideas, thoughts, answers you may think of that come under the headings. This format addresses the issues you should include in your individual design folio.

## **Analyse the problem and evaluate:**

Consider these questions when thinking about the problem. Write down some answers in an easy to understand way to assist you in researching and investigating the problem.

What is the problem?

Who is the solution for?

Who is going to use the solution?

Where is it going to be used?

Will there be any limits or restrictions on the design?

What, if any, are they?

What human factors have to be considered?

## **Collect information and evaluate:**

Consider what you know about the problem and possible solutions. You will need specific information to help you. Where and how can this information be found?

Consider these sources of ideas and information:

- Friends, parents, experts
- The customer
- The actual user
- Interviews and questionnaires
- Other similar products
- Libraries

From these sources you should be able to define some specifications for the required solution.

Consider these features of the solution:

- The actual function of the solution – why is it needed
- Any minimum or maximum size limits
- The cost of the product
- The overall appearance of the solution – is the look of the product important
- The type of materials that can be used in terms of weight, cost, availability, strength, finishing and joining.
- The safety of the solution in respect to manufacturing process, the maker and the user

## **Think about possible solutions and evaluate:**

You will need to develop some ideas about a possible solution. Let your imagination go and roughly sketch down any idea you come up with. As you will be working in a group you should have a range of ideas to discuss. Some strategies for collecting ideas are:

- ❑ Brainstorm with your group
- ❑ Collect pictures or drawings of existing solutions
- ❑ Sketch your own ideas
- ❑ Evaluate existing solutions
- ❑ Modify some other products
- ❑ Make a model
- ❑ Write down every idea as it may lead to more ideas

## **Decide on best solution and evaluate:**

Which idea is the best one? Your first idea may not be the best solution. You may have to combine several ideas to come up with the final solution. You may wish to make a list of good and bad points for each idea. Consider some of these points.

- ❑ Which idea solves the problem best?
  - ❑ Which one looks good?
  - ❑ Which one can be made easily?
- ❑ Are the materials suitable and readily available?
  - ❑ How much time have you got?
  - ❑ Which one best serves the purpose?
- ❑ How effectively will people be able to use it?
  - ❑ Is it energy efficient?
- ❑ Does it conserve resources as much as possible?
  - ❑ Is it sustainable?
- ❑ Do you have the skills, knowledge and equipment to make it?

Study your initial ideas and sketches and choose a final solution. Record your reasons for choosing it.

If you can't decide you may have to refine some ideas or develop more ideas.

## Plan and develop solution and evaluate:

You will need a plan of how to make the solution. You can't successfully make anything by just making it up as you go. A detailed drawing will be needed showing the dimensions, layout and assembly of all components. You may wish to add a pictorial drawing of the solution to show how it will look.

### DON'T FORGET ASSEMBLY INSTRUCTIONS IF REQUIRED

A separate parts list should be made showing all parts and materials to be used. For example:

PART	MATERIAL	SIZE	QUANTITY	COST

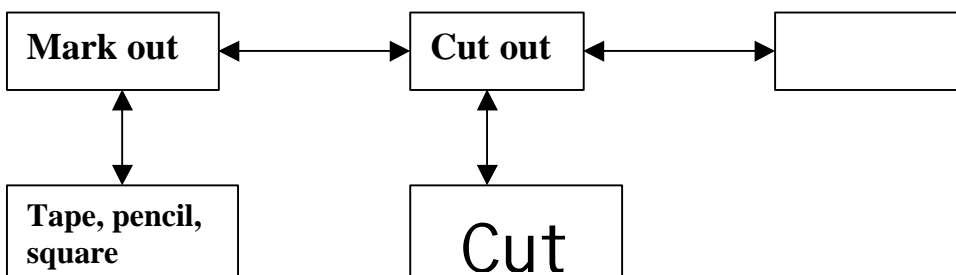
Be sure to include all items required such as bolts, screws, glue, rope etc.

How you are going to make your solution also has to be planned – when you are going to do what with what!! This is called the procedure and it can be recorded in different ways. For example:

As a list of steps and tools and equipment

1. Mark out item A (tape, pencil square)
2. Cut to length (cut off saw – **remember safety**)
3. And so on

Or as a flow chart



### **Make the solution and evaluate:**

Now comes the making part! You have decided what your product should look like, what it is to be made of and how it will be made and put together. However there are still points to keep in mind:

- ✓ Work safely and consider others in the workshop
- ✓ Do not waste materials or resources – there is not an unlimited supply of raw materials on this planet
- ✓ Always do the best job you can – do not rush
- ✓ Be sure you know all the correct ways to work with your chosen materials, tools and equipment.

**ASK THE TEACHER IF YOU NEED HELP!**

### **Testing and evaluating the solution:**

When you have finished making the solution you need to test it to see if it meets all the criteria.

Consider the following questions :

- Does it work well?
- Is it easy to use?
  - Is it safe?
- Will the client be able to use it?
  - Does it solve the problem
  - How could it be improved?
    - Does it look good?
  - What do other people think?

You can then make an overall evaluation of the solution and make some conclusions. You could make a summary of your thoughts. For example:

Good points	Bad points
✓	x
✓	x
✓	x

My conclusion is \_\_\_\_\_

# **Design Folio Example**

This is a basic design folio for a simple product. Your design folio will be more detailed than this because of the complexity of the product, however the concept is the same.

# CASE STUDY: THE DESIGN FOLIO

## THE SITUATION

I have trouble finding letters from my friends. At the moment, they're somewhere in the piles of papers on my desk. I want to be able to find them quickly.



## 1. DESIGN BRIEF

TO DESIGN AND MAKE AN OBJECT THAT WILL STORE AT LEAST 10 LETTERS IN A NEAT MANNER, SO THAT I CAN FIND THEM QUICKLY.

## 2. ANALYSING THE PROBLEM

### SIZE OF ENVELOPES:

Small



Large



(Both 2mm thick, including contents)

### TIME LIMIT:

I have 4 hours to make it.

### MATERIALS:

It could be made of wood, metal or plastic (e.g. 68x12; pine or mahogany; or 3mm thick acrylic).

### FUNCTION:

- \* It must hold at least 10 envelopes (large and small).
- \* It must store the envelopes neatly, and so they are easily identifiable.
- \* It must be movable (free-standing).
- \* It could also be used to hold pencils and pens.

### ERGONOMICS:

- \* The holder should be wide enough to allow the letters to be inserted and removed easily (at least 25mm wide).
- \* Make front and back same or different heights?

### APPEARANCE/AESTHETIC APPEAL:

To be colourful and glossy (to match decor of my room). Shape(s)? Texture(s)? Colour(s)?

### PERSONAL SAFETY:

There must be no sharp corners or edges. It must be stable (add feet?).

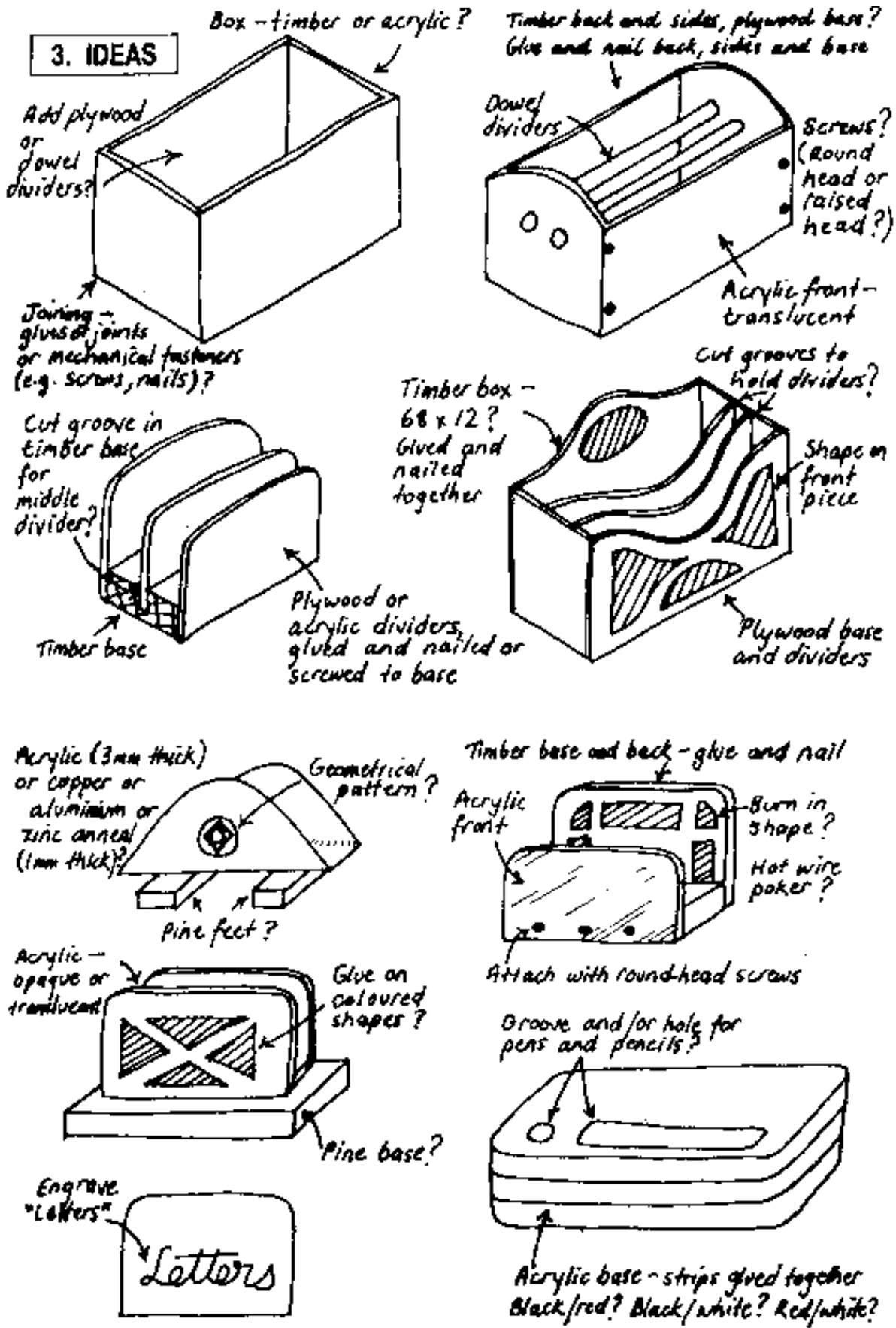
### DESIGN CONSEQUENCES:

It presents no danger to people or the environment. I will try to conserve resources by using leftover materials.

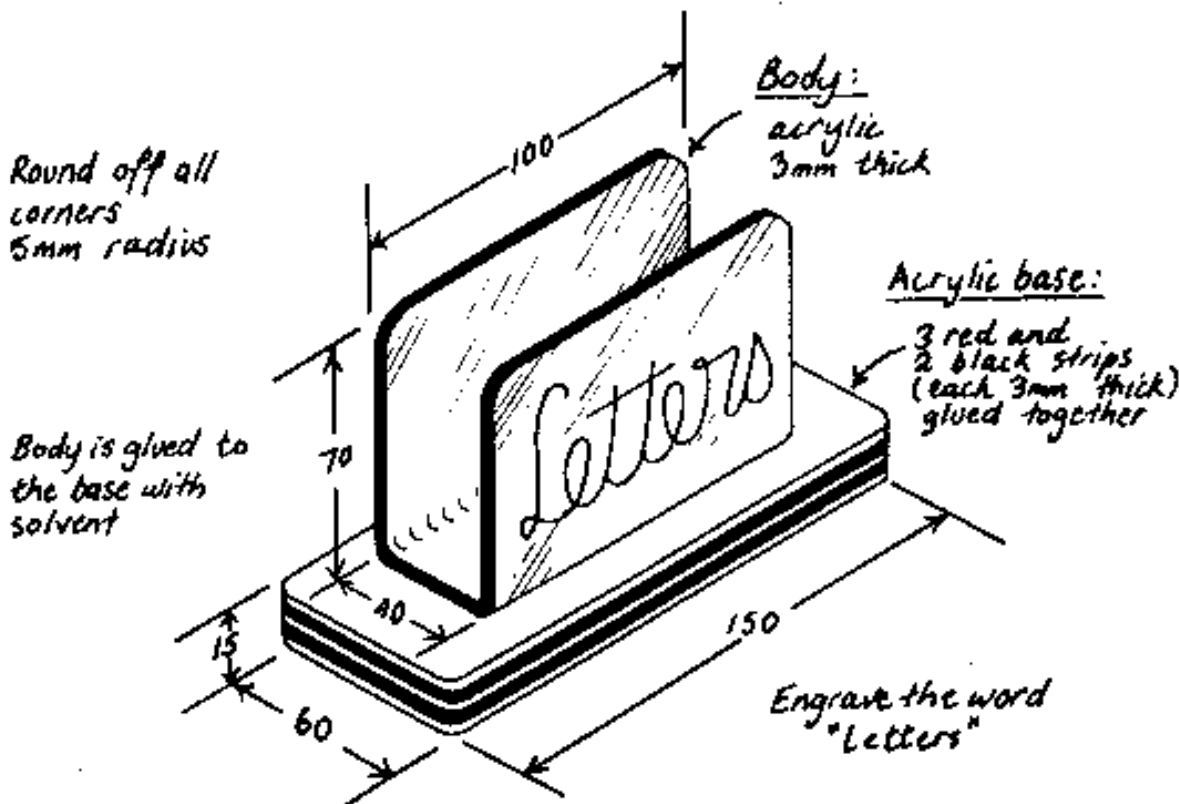
### CONSTRUCTION:

I have access to hand tools and a disc sander, electric drill and hand saw.

### 3. IDEAS



#### 4. FINAL SOLUTION



#### MY REASONS FOR MAKING THESE CHOICES:

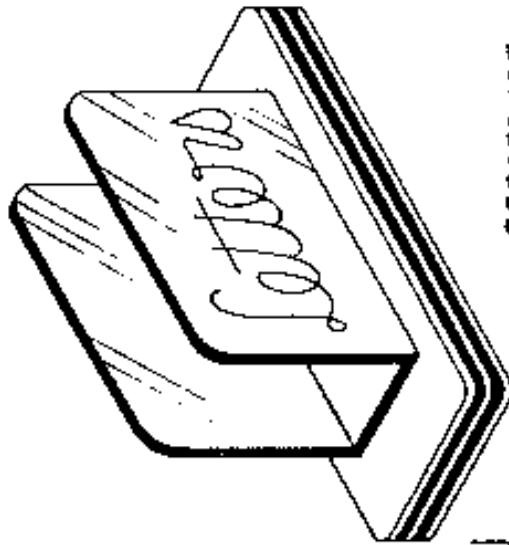
\* I have selected acrylic because:

- It looks good and I like the colours.
- It is strong enough for this purpose.
- It will fit in with the decor of my room.
- It will be safe to use.

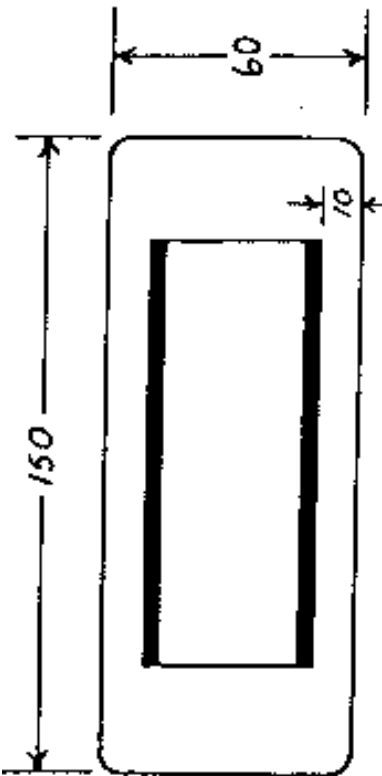
\* I have tested the size and shape of the item to ensure that it is stable and that it will hold at least 10 letters.

\* Cohesive bonding does not spoil the appearance of the item (unlike screws).

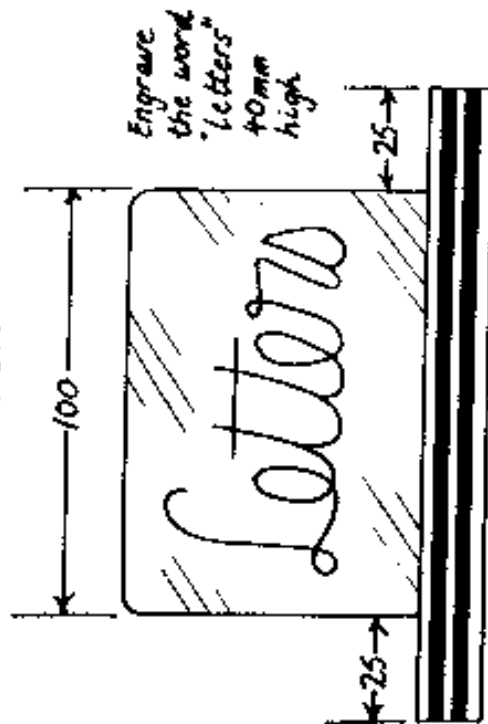
## 5. WORKING DRAWINGS



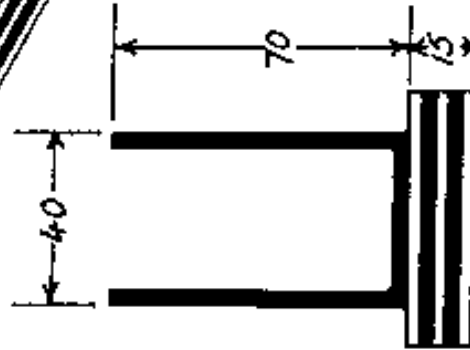
Round off  
all corners  
5mm radius



TOP VIEW



FRONT VIEW



RIGHT SIDE VIEW

### PROCEDURE :

1. Mark out pieces for base and body (pencil, ruler and square).
2. Cut out pieces for base and body (copying saw or hacksaw).
3. Give pieces for base (G-clamp or bench vice).
4. Finish off edges (files, scraper, buffing wheel).
5. Engrave "Letters" (engraver).
6. Bend body to shape (strip heater).
7. Give body to base (G-clamps).

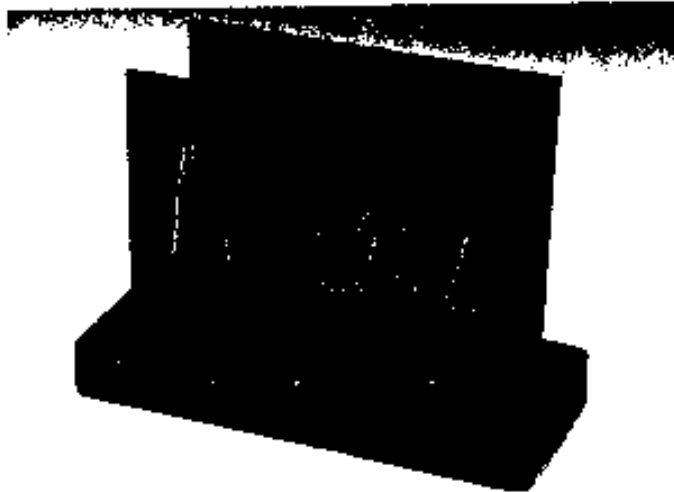
SCALE 1:2      BERNARD COOK

## MATERIAL LIST

COMPONENT	MATERIAL	SIZE	NO. REQUIRED	COST
1. BASE	Acrylic - opaque (black and red)	150 x 60 x 3	5 (2 black, 3 red)	...
2. BODY	Acrylic - translucent (black)	180 x 100 x 3	1	...
ADHESIVE	Ethylene dichloride			...
POLISH	Rouge			...
TOTAL COST				\$....

### 6. REALISATION

Make the letter holder, using the procedures outlined in step 5.



### 7. TESTING AND EVALUATION

GOOD POINTS	WEAK POINTS
<ul style="list-style-type: none"> <li>* It looks good.</li> <li>* It is easy to use.</li> <li>* It is stable.</li> <li>* It is safe.</li> </ul>	<ul style="list-style-type: none"> <li>* Two corners on the base are not rounded off well.</li> <li>* The body is at a slight angle to the base.</li> </ul>
<p><u>My conclusion:</u> It took 4½ hours to complete the task. The letter holder works well. I'm very pleased with it. (My friends like it too.)</p>	

FINALLY, TO KEEP YOUR WORK TOGETHER

Make a folder and put all your sheets in it.

Sketch your solution on the front cover and add the title and your name.



YOUR DESIGN FOLIO IS NOW COMPLETE.

*OHT MASTERS*

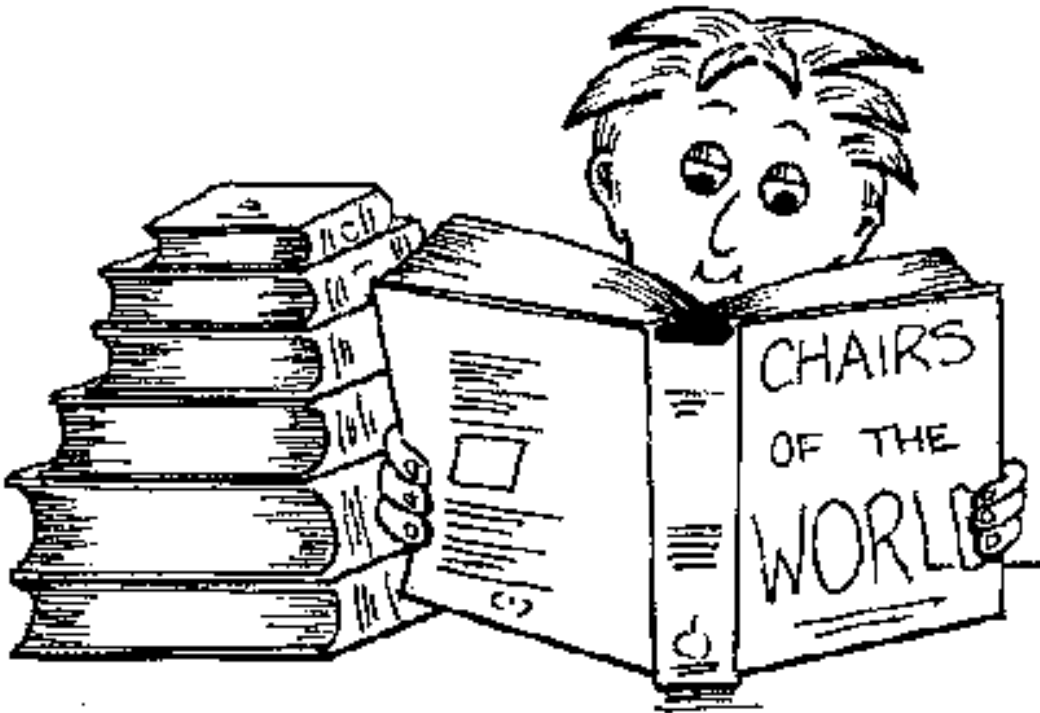
# ANALYSE THE PROBLEM



It is important to think about the problem first to make sure you understand it. Ask questions and write down some answers.

# EVALUATE

## COLLECT INFORMATION

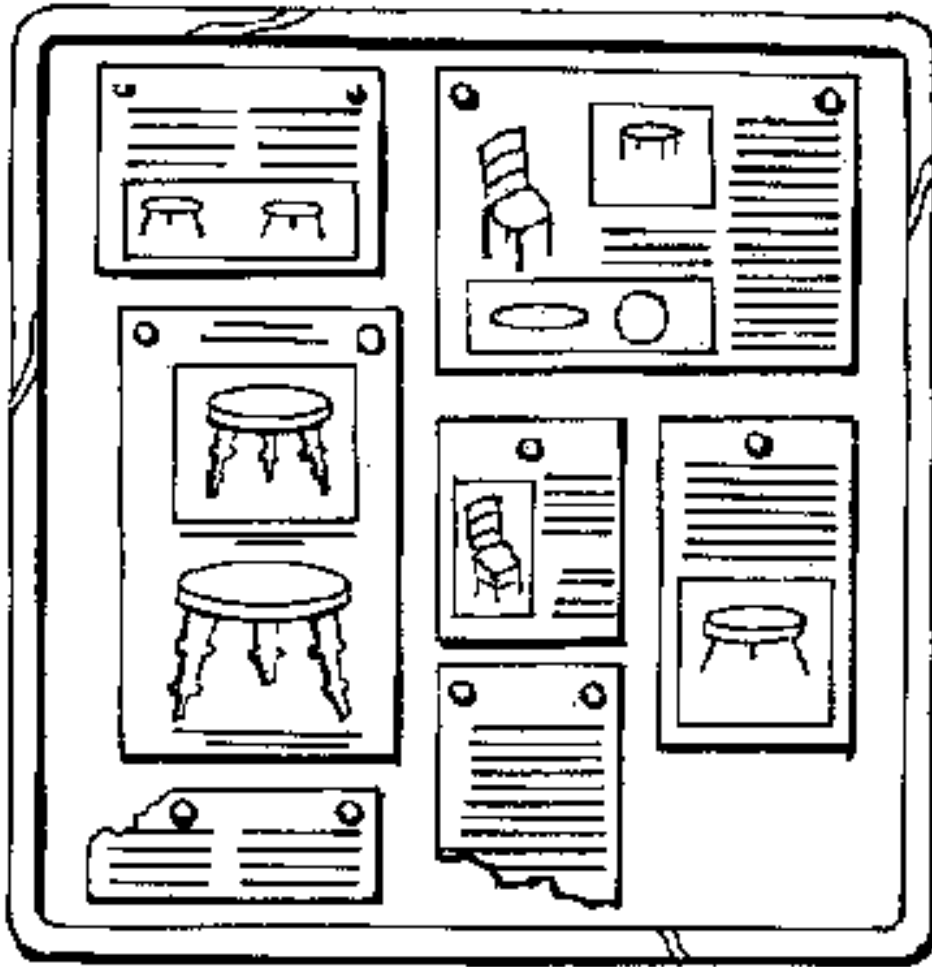


This is when you gather information to help you design your solution. Think about:

- Function
- Size
- Cost
- Appearance
- Material
- Safety

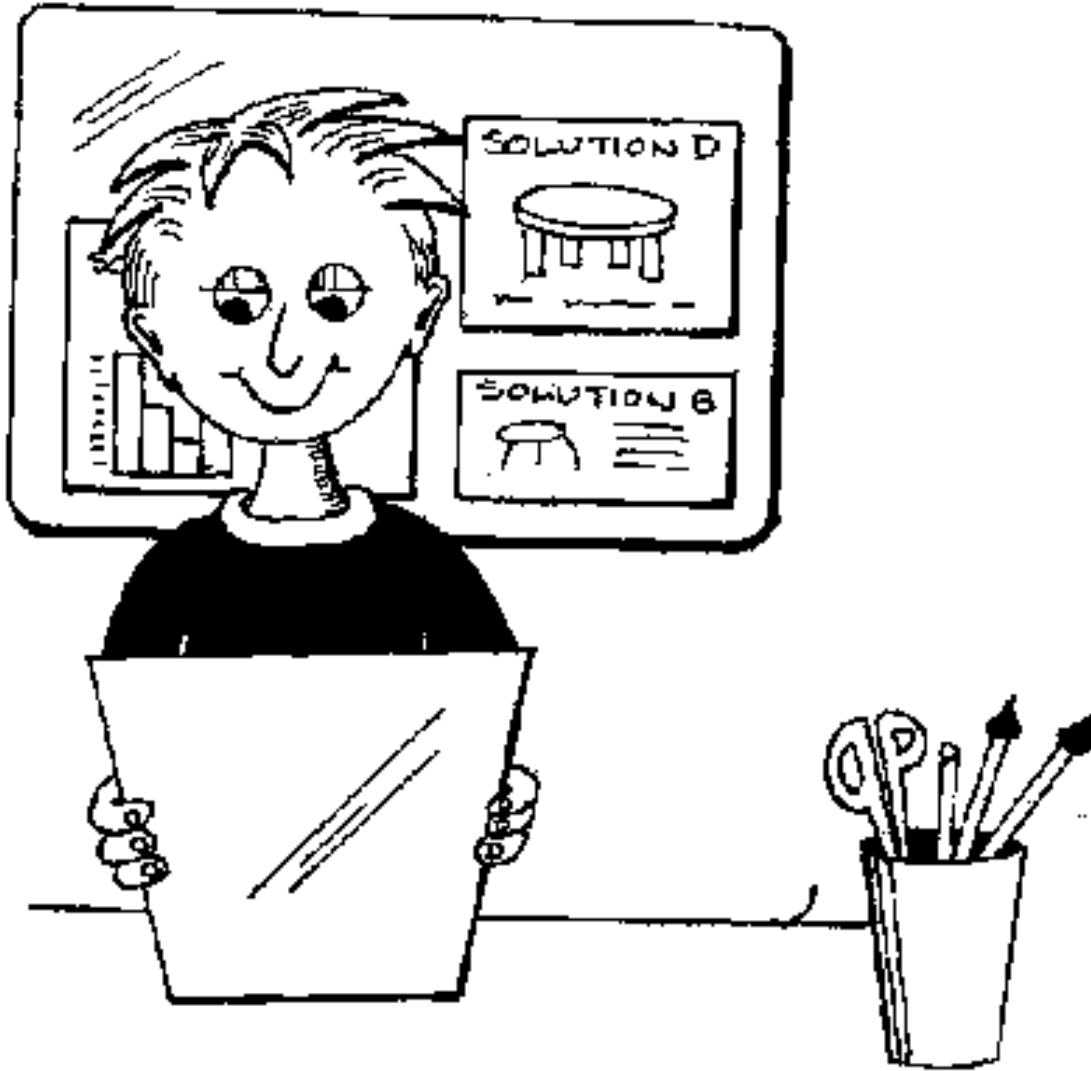
## EVALUATE

## THINK ABOUT POSSIBLE SOLUTIONS



- Use your imagination.
- Brainstorm with your group
- Look at other similar products
- Make a model
- Sketch all your ideas

## EVALUATE

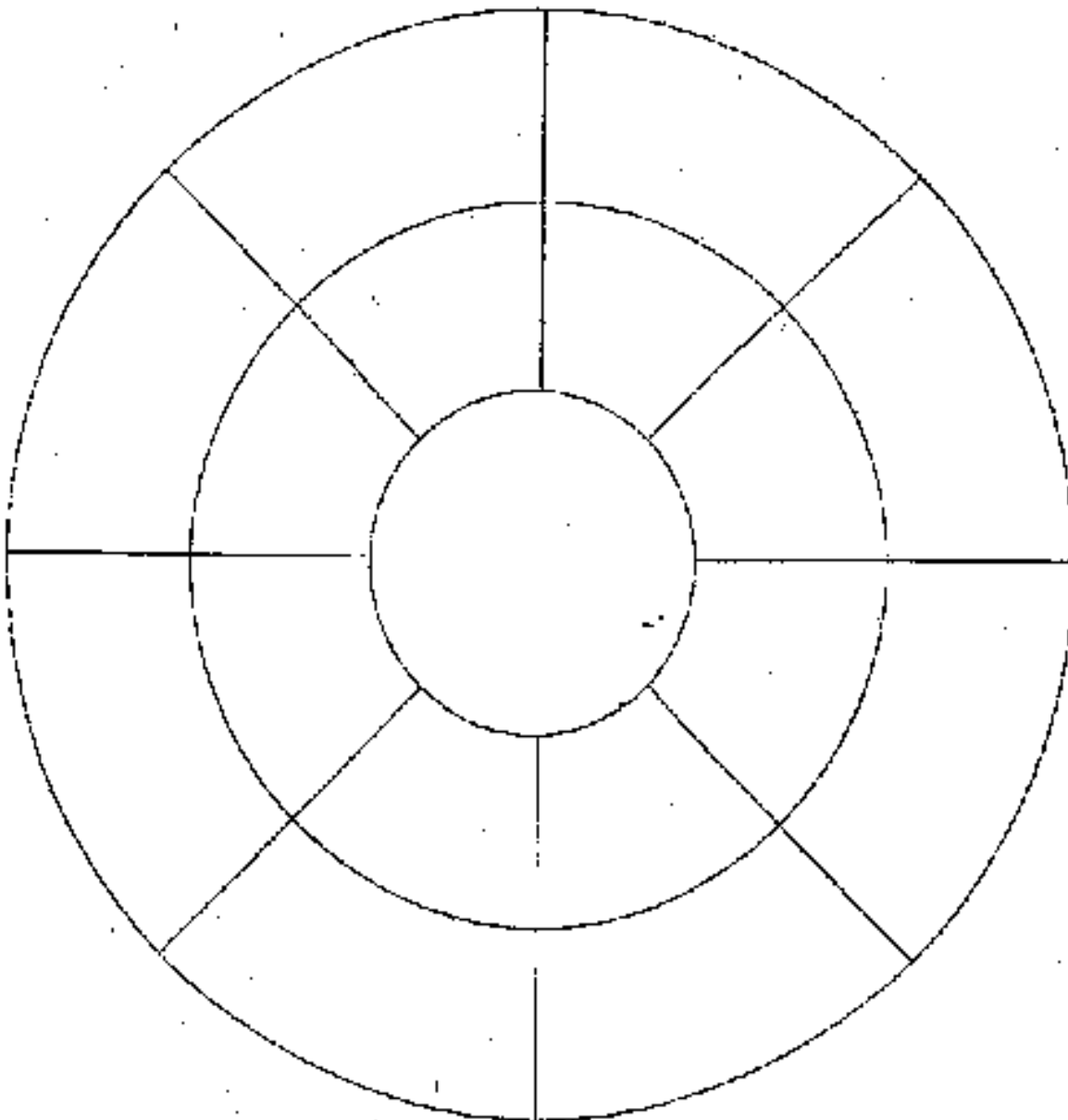


## DECIDE ON BEST SOLUTION

Which idea is the best one? How do you choose? Ask as many questions as you need to make up your mind. You have to consider many things!

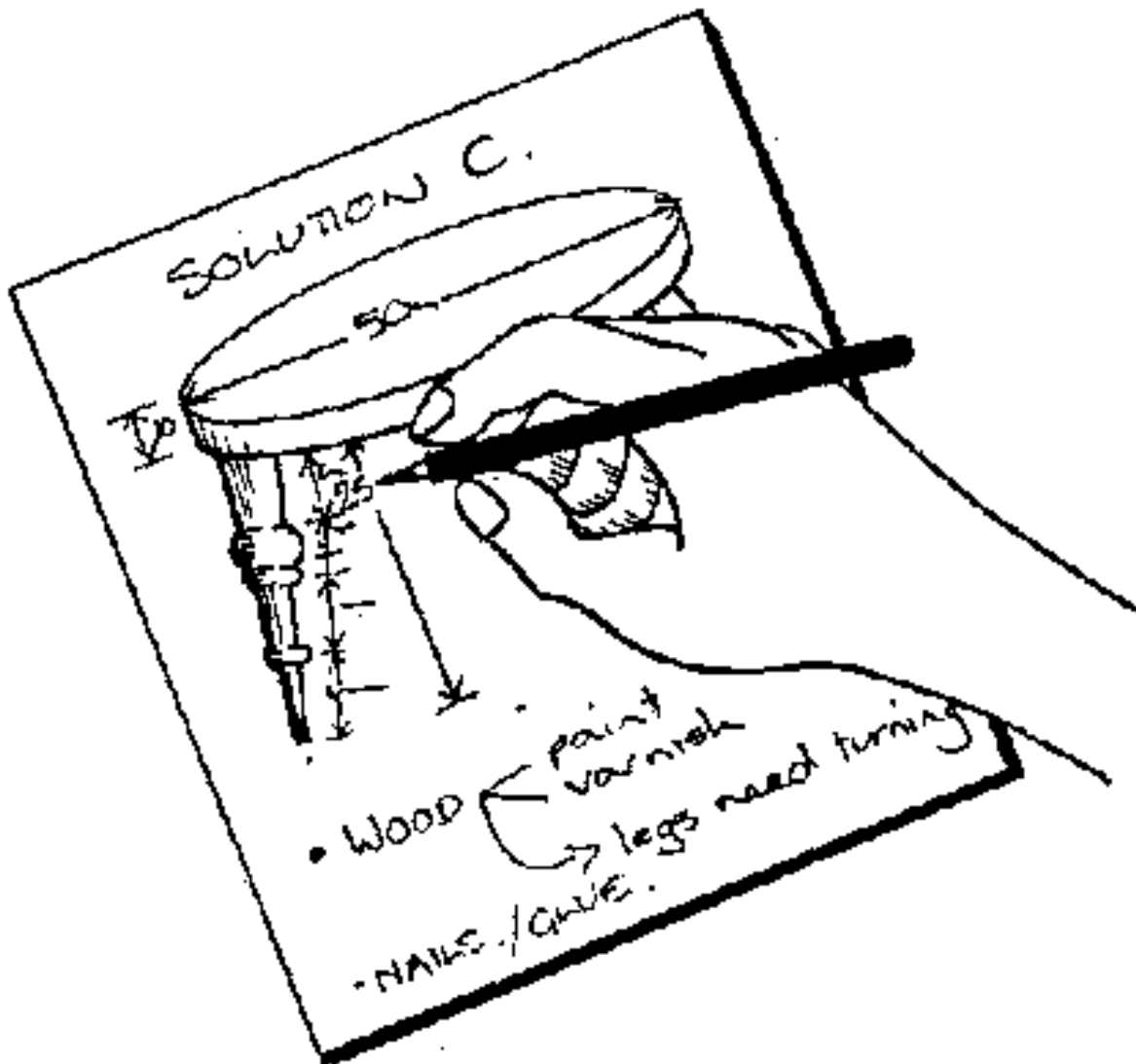
## EVALUATE

USE THIS WINNERS AND LOSERS WHEEL TO HELP YOU DECIDE



- Write the product name in the middle.
- Write those people directly affected by the design in the spaces in the first ring.
- Write those indirectly affected by the design in the spaces in the outer ring.
- Highlight the winners in one colour and the losers in another colour.
- Use the colours to decide if the idea is a good or bad one.

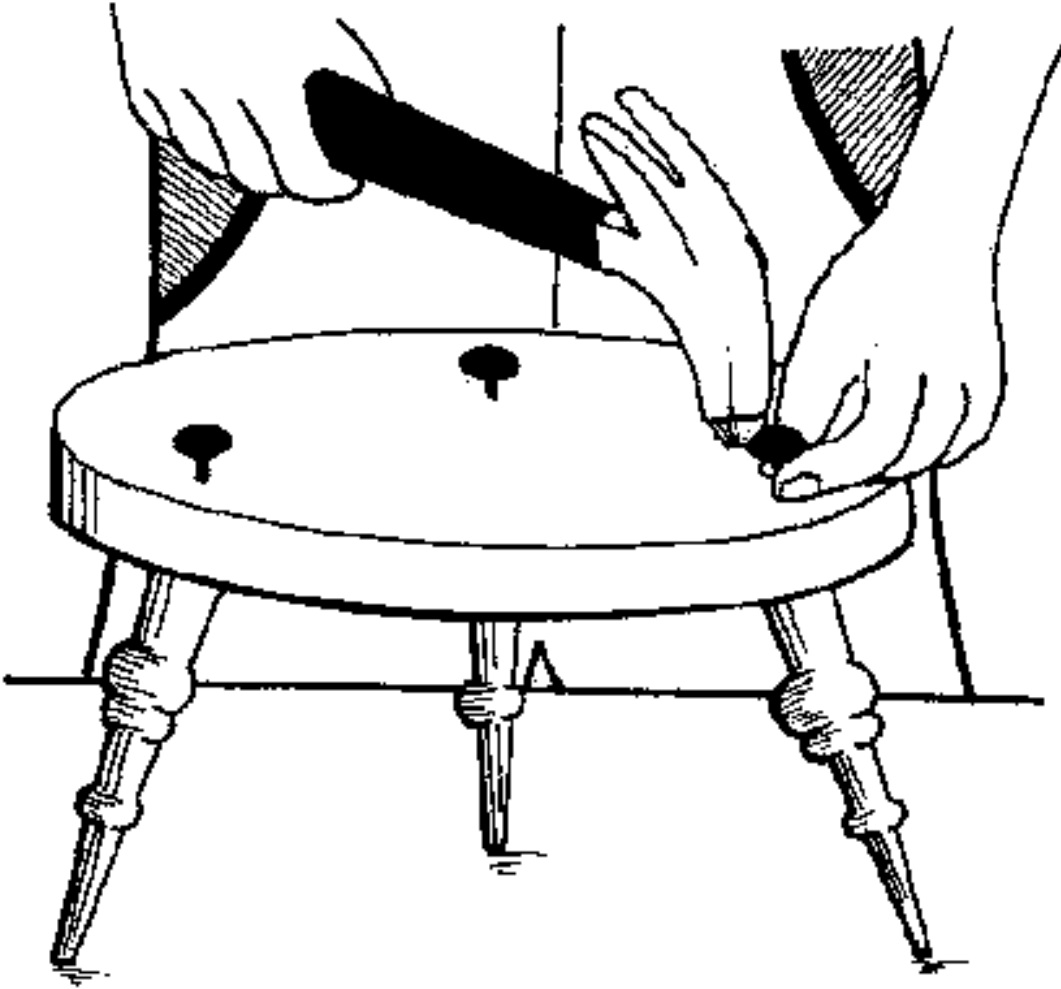
# PLAN AND DEVELOP SOLUTION



You will need to have a plan of how you will make the solution and not just make it up as you go!

# EVALUATE

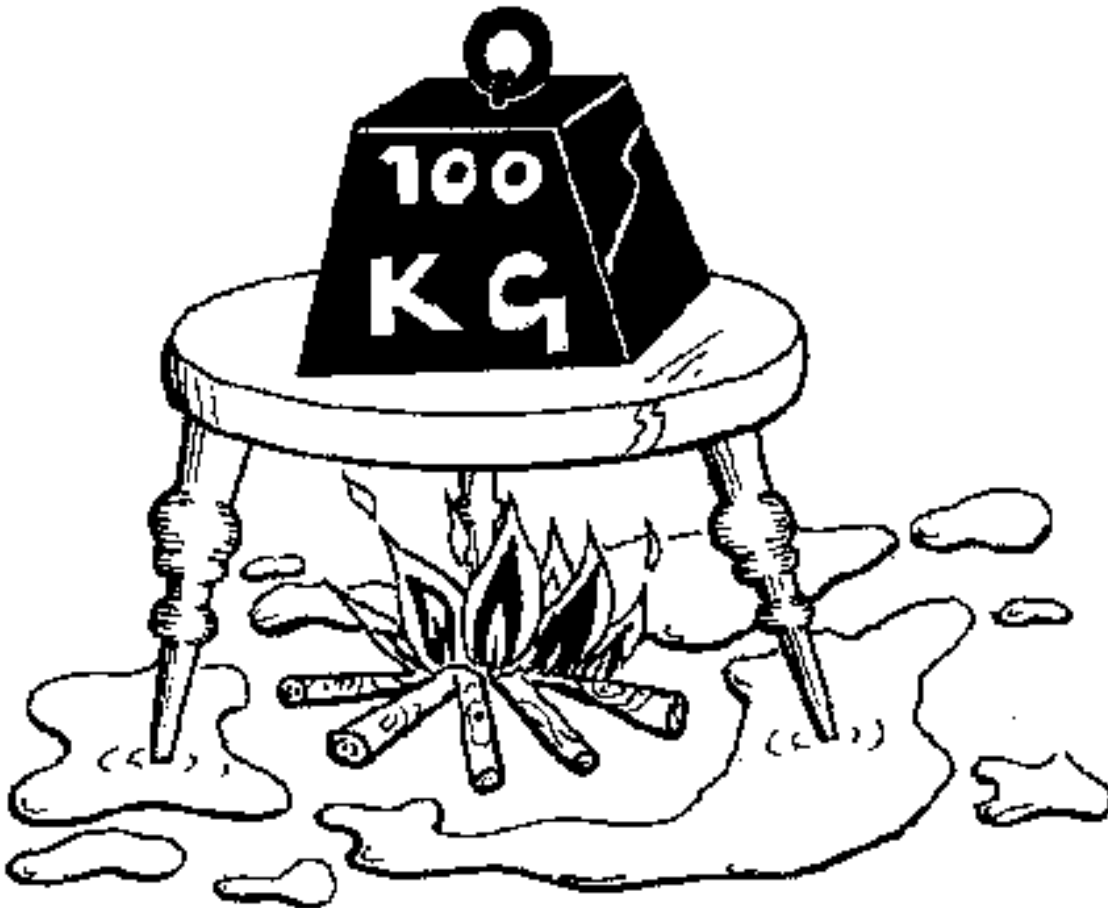
# MAKE THE SOLUTION



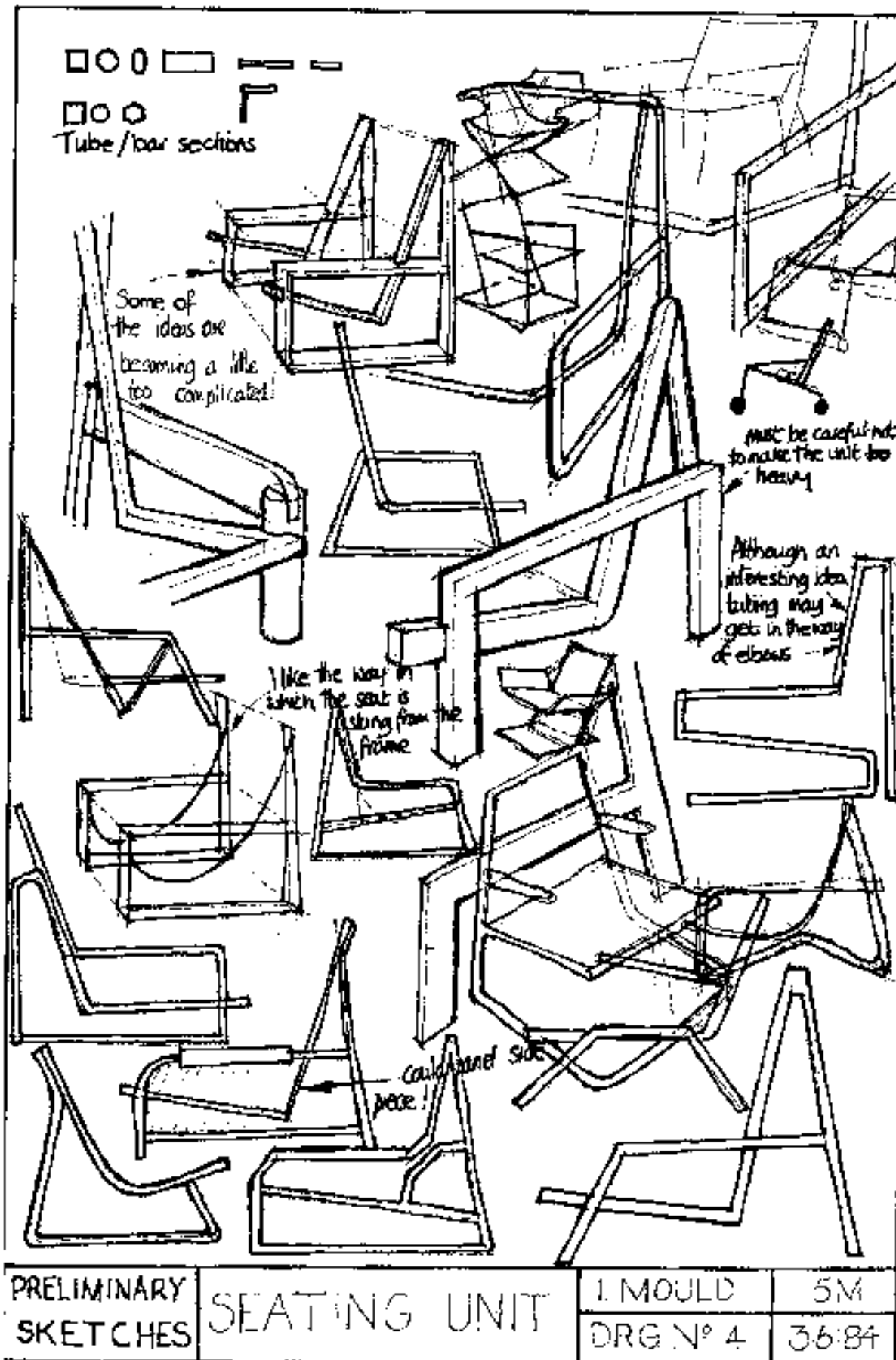
This is the action part – making it! BUT remember this:

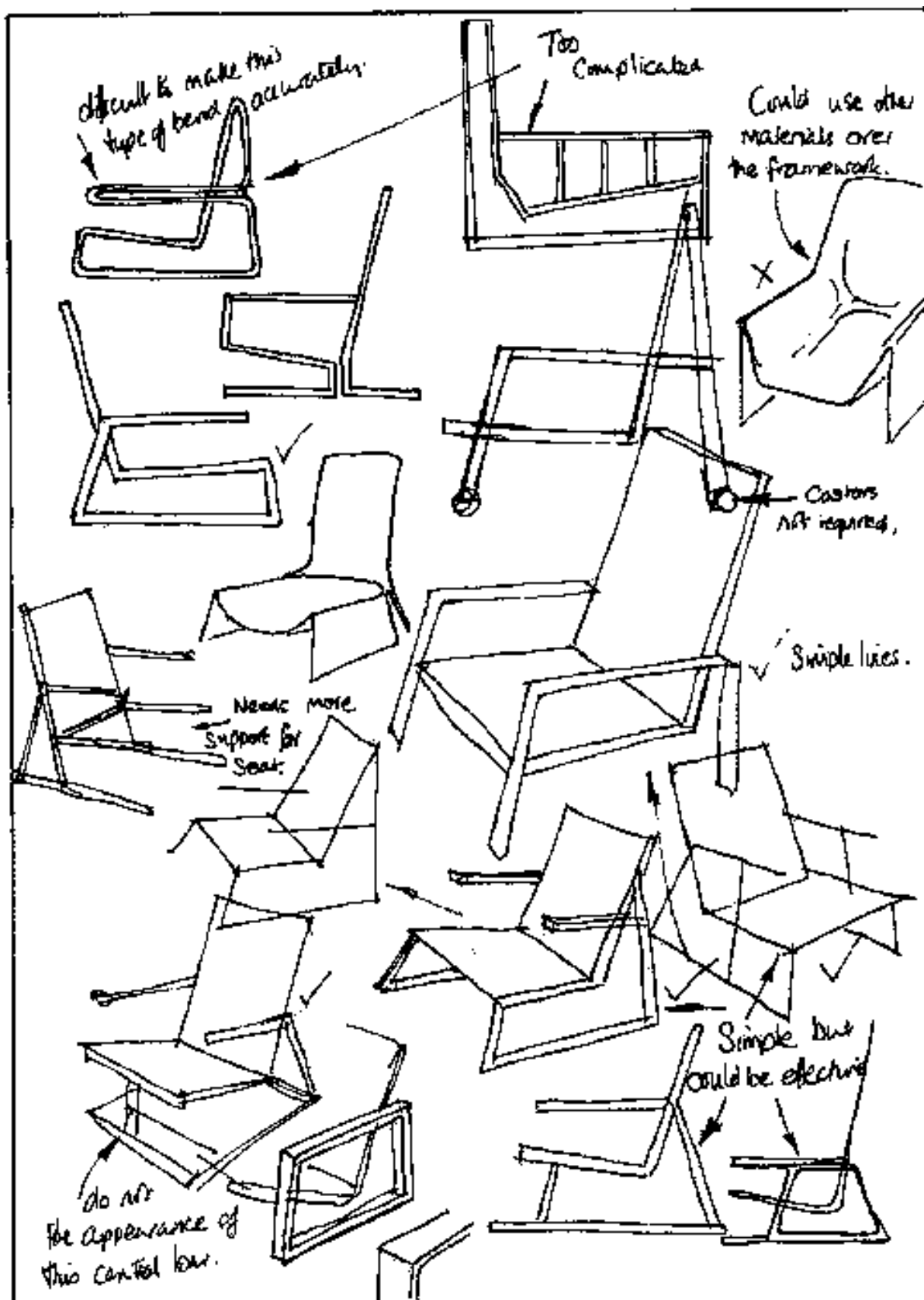
- ✓ Work safely
- ✓ Don't be wasteful
- ✓ Do your best
- ✓ Ask for help if you need it

# TESTING AND EVALUATING THE SOLUTION



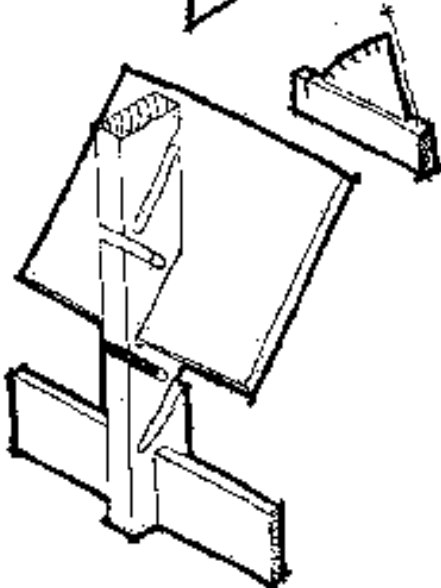
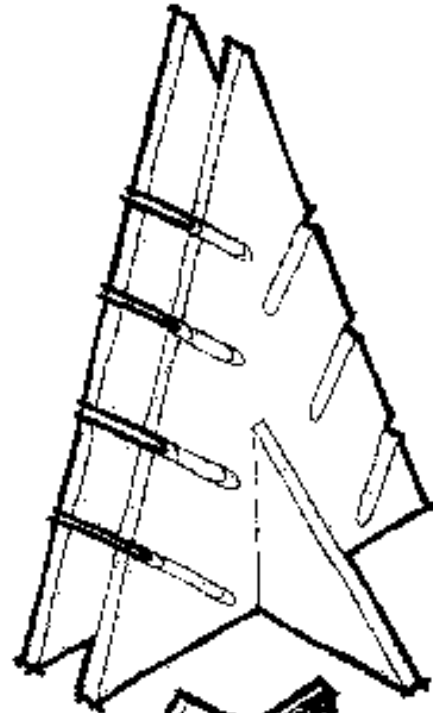
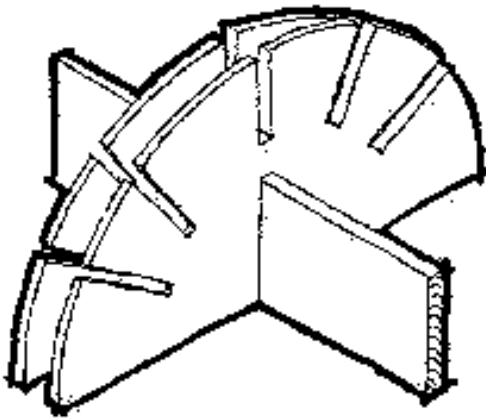
Now you have finished, does it do all the things it is supposed to? Be honest in your evaluation! List the good and bad points and come to some honest conclusion.





PRELIMINARY SKETCHES	SEATING UNIT	1 MOULD	5M
		DRG N° 5	3.6.84





**Sketches for CD rack**

# **Internet Resources**

**[www.instashade.com.au](http://www.instashade.com.au)**

**[www.wayoung.com.au](http://www.wayoung.com.au)**

**[www.sunsmart.com.au](http://www.sunsmart.com.au)**

**[www.shadebirdair.com](http://www.shadebirdair.com)**

**[www.invention.com/vasquez](http://www.invention.com/vasquez)**

**[www.shadestructures.com.au](http://www.shadestructures.com.au)**