Book 1

Year 10

Design and Technology

Design & Technology

Year 10

GOVERNMENT OF SAMOA
DEPARTMENT OF EDUCATION

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TABLE OF CONTENTS

Unit 1: DRAWING & DESIGN

Drawing & Design
At the end of this unit you should be able to:

- Use the design process to the solve practical problems in the workshop.
- Understand a design brief and work confidently through the design process.
- Produce a range of concept sketches that record your thinking.

Introduction
In Year 9 you were introduced to the design process as a way to solve practical problems. There are seldom any shortcuts. Generally you work through this process without even thinking about it. What will you wear? What is there to eat? How can you get from one place to another? You look at your options, select the best one, work on that idea, put it into practice, then evaluate it — did it do the job?

However, when you begin to solve practical problems in the workshop other things need to be considered: *e.g. How will the item being produced be used? Who will use it? When will it be used? Why will it be used? Have you got the material to make it? Have you got the knowledge to make it? What will it cost? What size does it need to be?* The questions are endless.

When you design, there is no correct answer. Good design is the best answer to a given problem. To have something look good is not the most important thing. How it works (functions) is far more important than looks (aesthetics). However, fast cars do look fast and comfortable chairs look comfortable. Form and function are what makes good design.

Activity 1 Form Follows Function

Look at the five kitchen utensils below, and note their main use (function). As you can see the form (shape) of each fits its function (use), *e.g. Rolling pin — it has a cylinder body to roll, handles to hold and apply pressure, and it is easy to clean*. Look at the other utensils and consider how the design of each fulfills its function.

Roll **Stab** **Fry** **Measure** **Beat**

Discussion Points

1. Choose any tool or household object and discuss form and function. How did the design evolve?
2. Once you begin to understand how design works, you will start to think like a designer. To be a good designer you must consider and solve all problems.
3. As you develop the ability to think a problem through it becomes important to write down or draw your ideas.

Concept Sketches

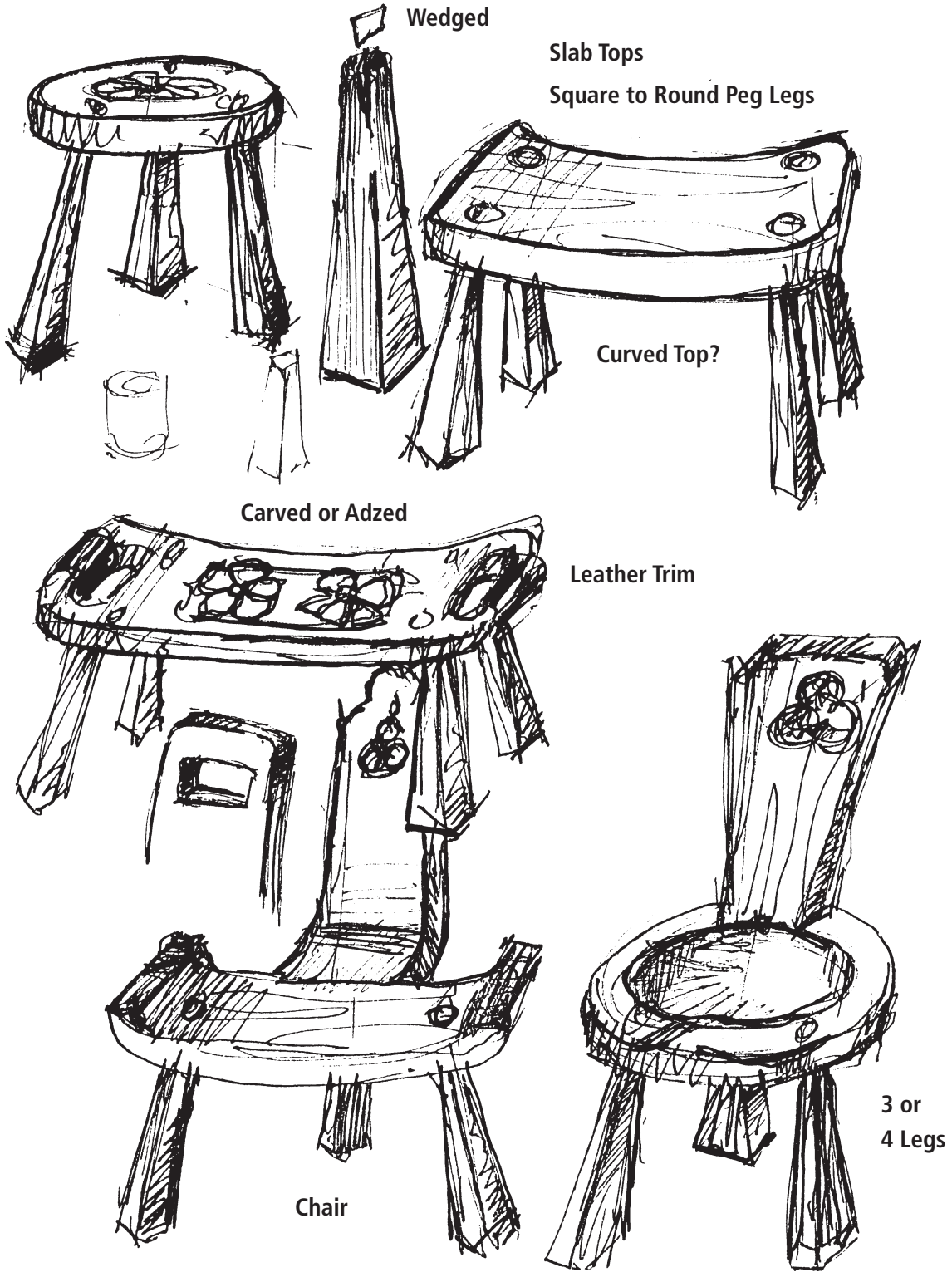
Concept sketches — thinking with a pencil — enables you to take an idea further and explain your ideas to others.You don't need to be an artist, look at the drawings that follow; each follows an idea.

You think with your sketches and explain with your drawings.

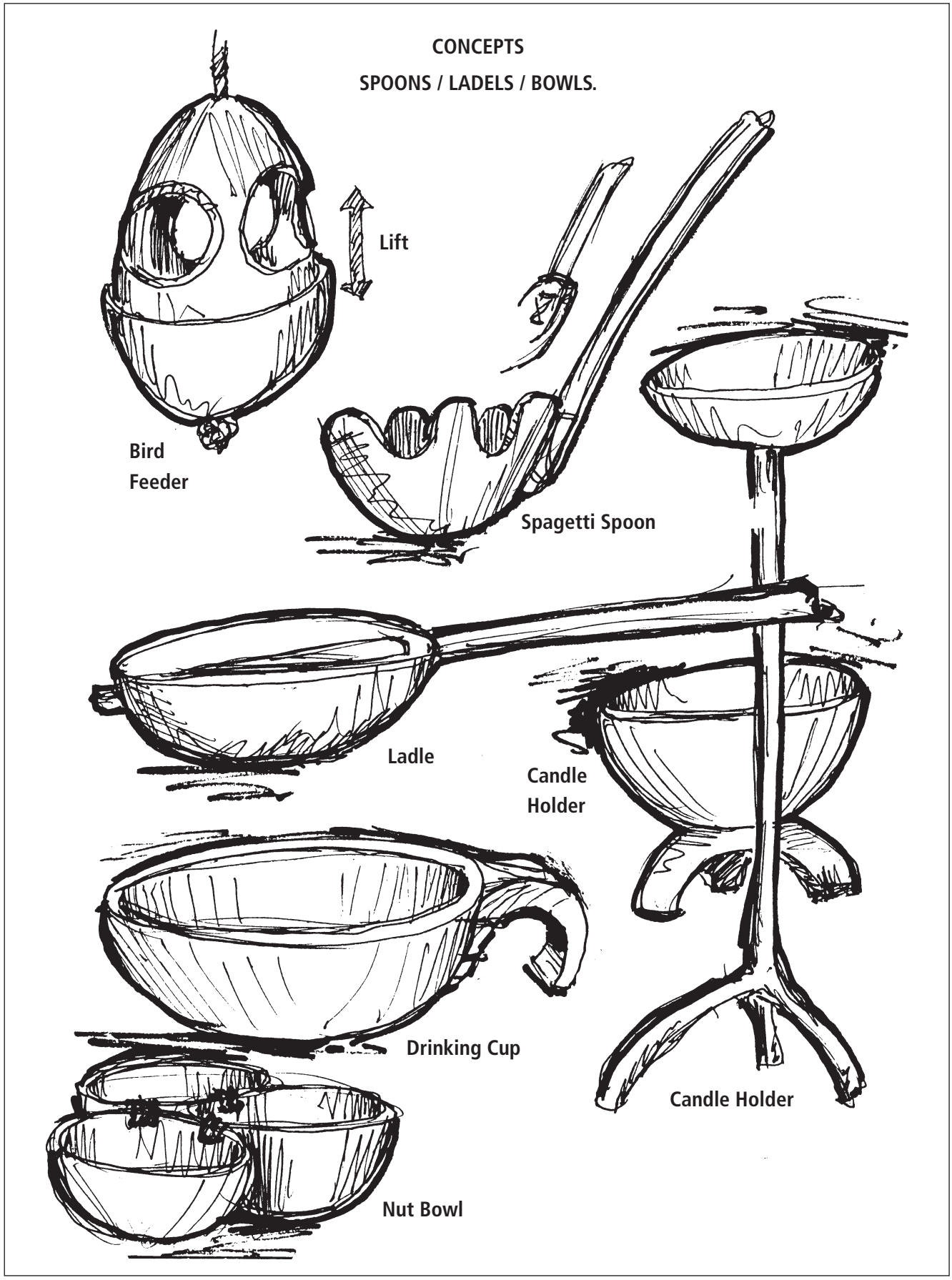
The sketches shown above record the design concepts for a playground. Note: *they are busy and casual but easy to follow — thinking with a pencil.*

Look at how each idea carries through to the next — is refined. You would usually complete several pages of these concept drawings before working up a final solution.

SLAB STOOL



The sketches below show a range of ideas — these are concepts only, with no chosen solution.



Shown below and on the next page, are drawings showing how to put together a simple floodlight.

Note: *thicker outlines, parts list, exploded details showing how each part goes together — clear stage-by-stage instructions.*

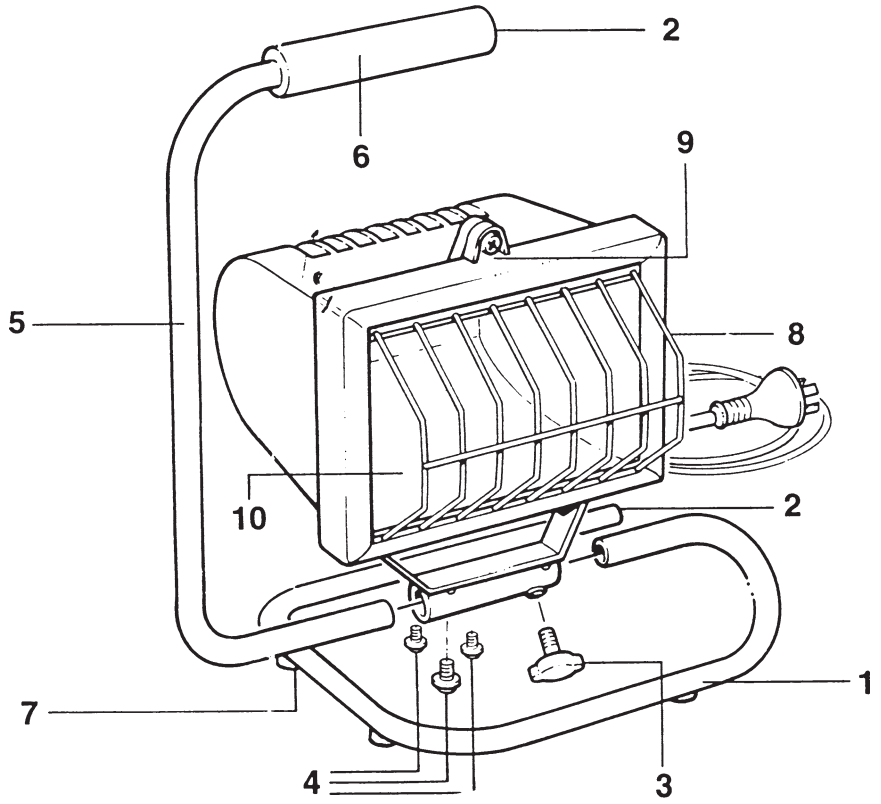
HPM **500W HALOGEN FLOOD LAMP**

BASE & HANDLE PARTS

NO.	DESCRIPTION
1.	STAND BASE
2.	END PLUGS
3.	ANGLE ADJUSTMENT KNOB
4.	SCREWS (3 ONLY)
5.	STAND HANDLE
6.	HANDLE COVER
7.	PLASTIC FEET

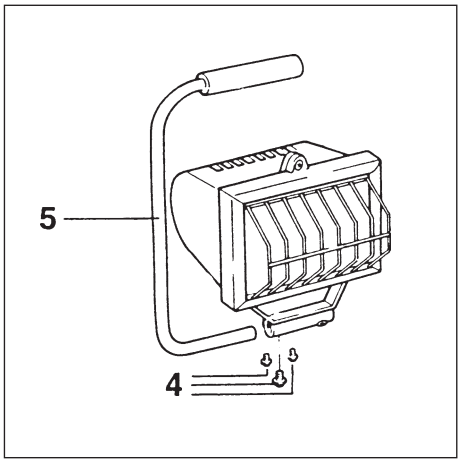
FLOOD LAMP PARTS

8.	METAL LAMP GUARD
9.	RETAINING SCREW
10.	TEMPERED GLASS FACEPLATE

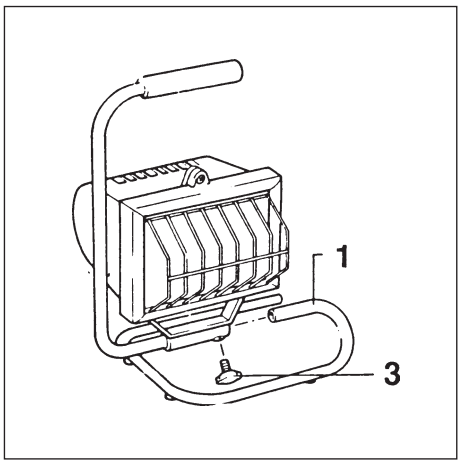


Assembly Instructions

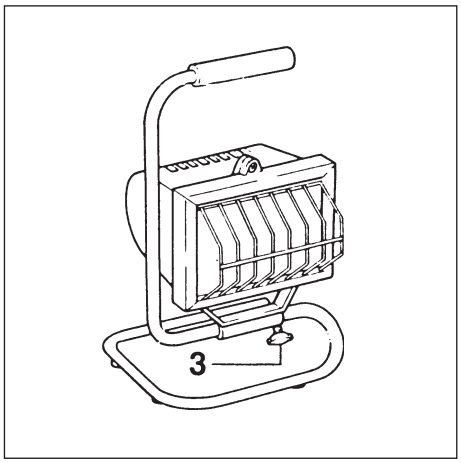
Do not attempt to assemble while plugged into power.



1. Insert stand handle (5) into tube at base of lamp. Line up screw holes in stand and tube, insert 3 screws (4) and tighten.



2. Insert stand base (1) into other end of tube. Use the stand handle to position the lamp to the desired angle. Insert and tighten angle adjustment knob (3).



3. Lamp angle may be altered simply by loosening the angle adjustment knob (3), moving the stand handle to bring the lamp to the desired angle, then tightening the angle fixing knob.

Brainstorming — Group Collective Thinking

A brainstorming session is when two or more people discuss creative ideas about a subject (or problem). During the session people exchange ideas — helping others to consider new alternatives.

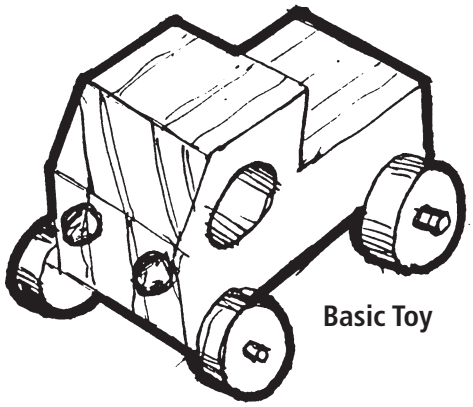
How to brainstorm:
First pick a problem then apply the following rules:

- Think first — judge later — any idea is a good idea.
- The wilder the idea the better — new ideas spark new thinking.
- Quantity — the more ideas the better — the greater the chance of a better solution.
- No idea is thrown away — deciding whether or not it will work comes later.
- Combine ideas — one could improve the other.
- Take a break — let your mind work and then return to the problem.
- Evaluate — decide how good each idea is.
- Put your ideas to work.

Activity 2 Design Brief

Given the simple wooden toys below, design and make your own truck.

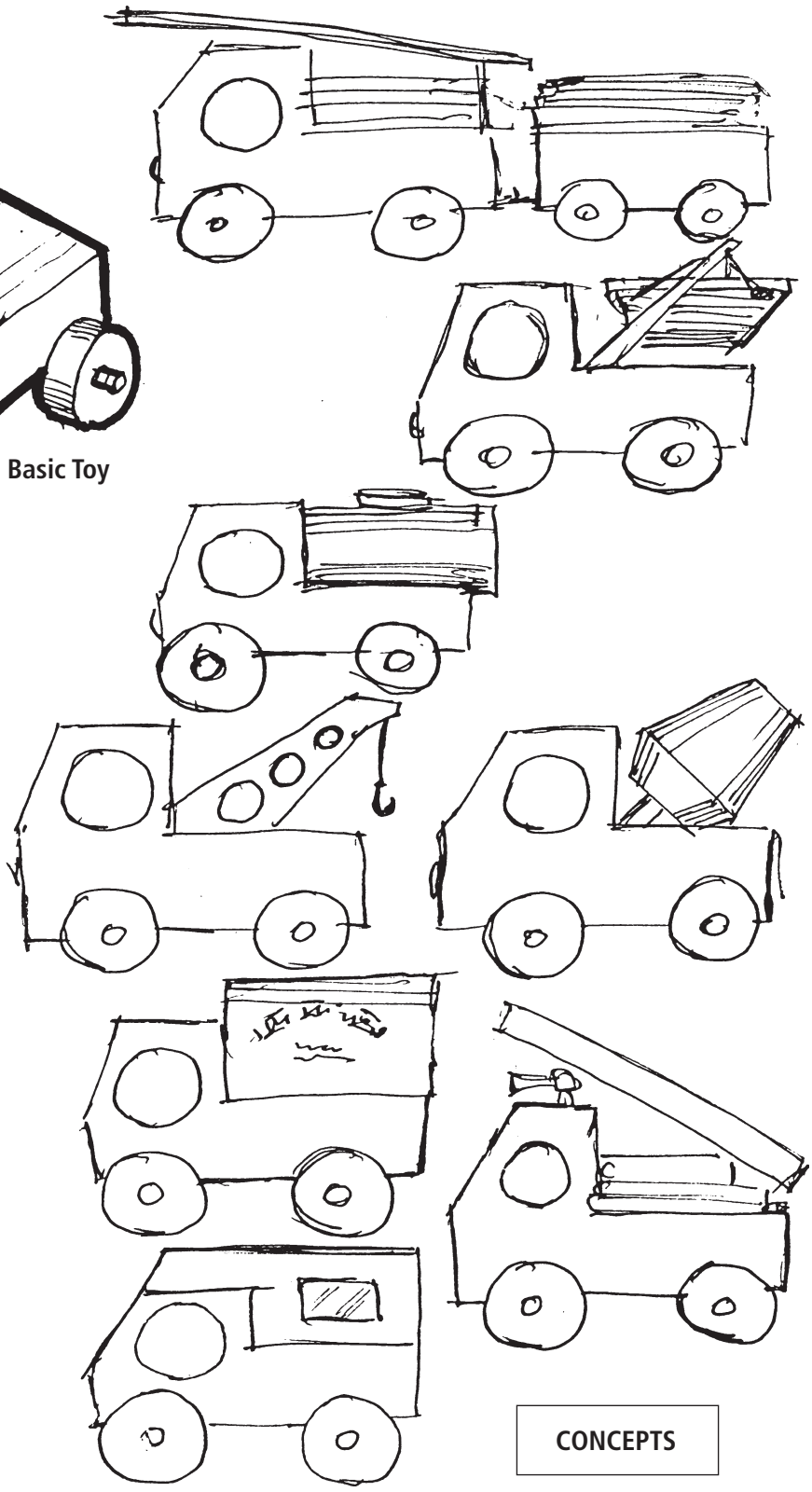
TOY TRUCK



Basic Toy

Brainstorm

- Tanker
- Tow Truck
- Van
- Milk
- Concrete
- Fire Engine
- Logging
- Container
- Jumbo Bin
- Car Transport
- Farm
- Beach Buggy
- Tip Truck
- Crane
- Truck & Trailer
- Tow Wagon
- Towing Aircraft
- Well Drilling
- Timber
- Ambulance
- Delivery
- Camper Van



CONCEPTS

Unit 2: PICTORIAL DIMENSIONING

Objectives

At the end of this unit you should be able to:

- Draw formal instrumental drawings and dimension them correctly.

Introduction

The ability to draw well helps you to examine and develop your ideas. Ideas can be developed or rejected. A good knowledge of drawing techniques not only helps you understand and read drawings but allows you to produce good, accurate drawings for other people to follow. You learn to *think with your sketches and explain with your drawings*.

The use of sketching combined with a knowledge of pictorial and orthographic 1st and 3rd angle drawing is a skill that you will use throughout life, not just in the workshop. You will find that you constantly need to read plans, follow diagrams or understand instruction manuals to assemble knock-down components that are a large part of today's worldwide markets.

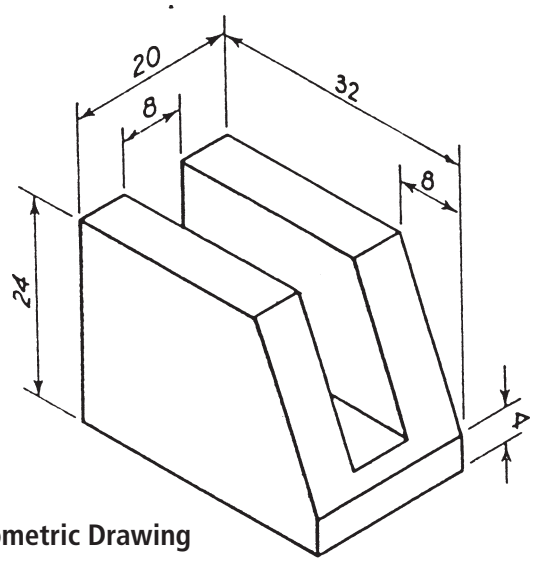
Drawing is the language of the designer.

Pictorial Dimensioning

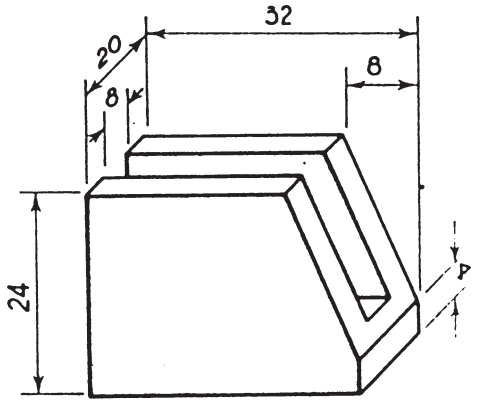
Pictorial drawings can be dimensioned in a similar fashion to multi-view orthographic drawings. However, it is difficult to give a complete size description of complicated parts.

Fundamental Dimensioning Rules

- Each dimension should be shown once.
- The dimensions are placed in the same plane as the projection lines.
- When used with inclined projection lines the dimensions may be turned either to the **right** or **left**.
- The guide lines for the figures are placed parallel to the dimension lines.
- The figures are parallel to the projection lines.
- Centre lines may be used as projection lines.
- Leaders should be drawn normal to the curve.

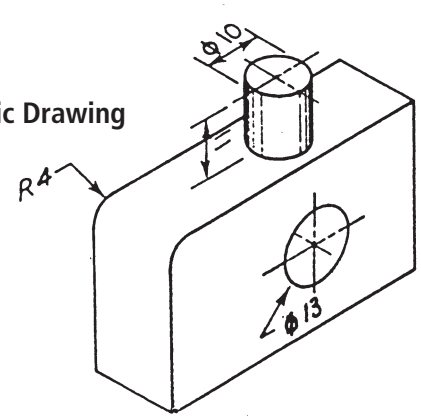


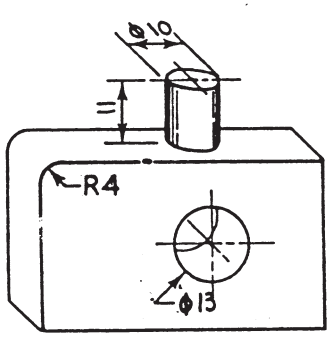
Isometric Drawing



Oblique Drawing

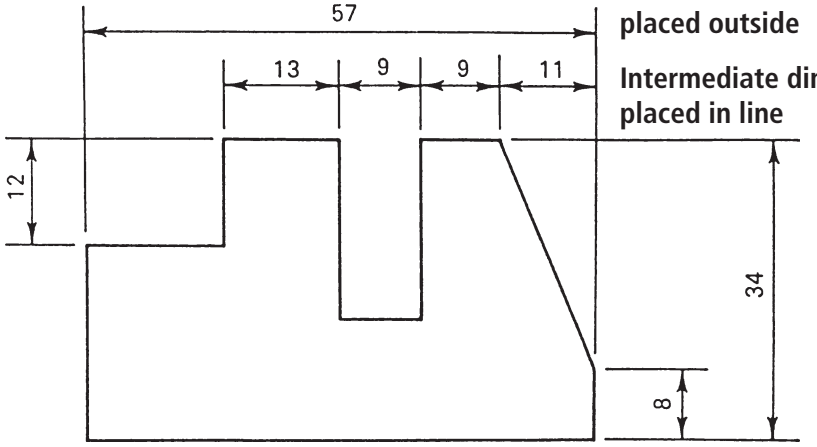
Isometric Drawing





Oblique Drawing

- Measure lengths in millimetres unless told otherwise.
- Decimal points should be bold and placed at the mid height of the numerals.
- Where the dimension is less than the units the decimal point should have a '0' before it, *e.g. 0.5*

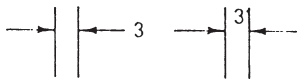


Overall dimensions placed outside

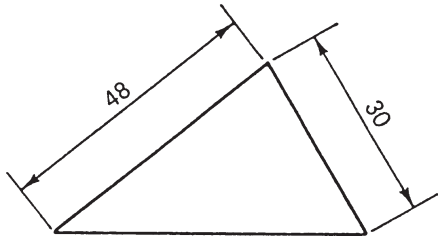
Intermediate dimensions placed in line

Figures on vertical dimension lines are read from the right hand side

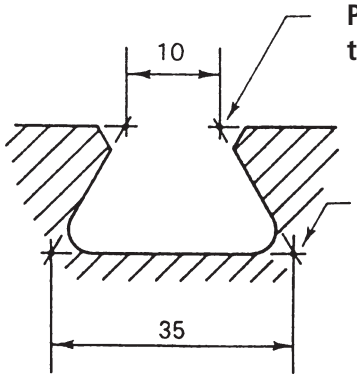
For small dimensions use



For oblique lines use

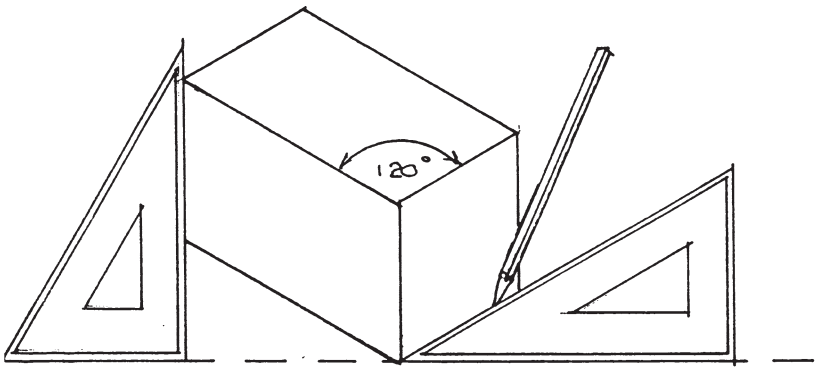


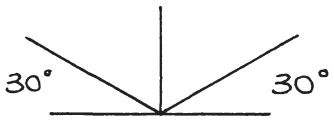
Points of Intersection

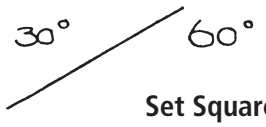


Projection line passes through or touches the point of intersection

Points of intersection may be emphasized with a dot



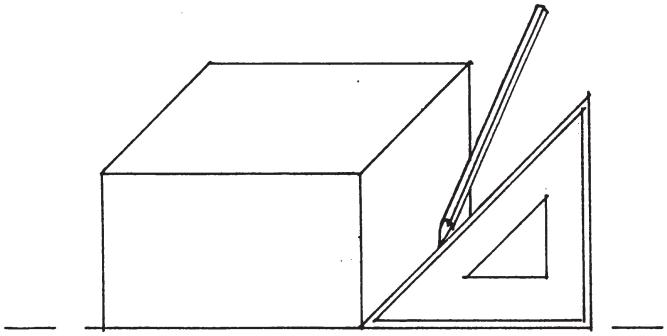


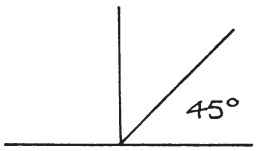


Set Square

Tee Square

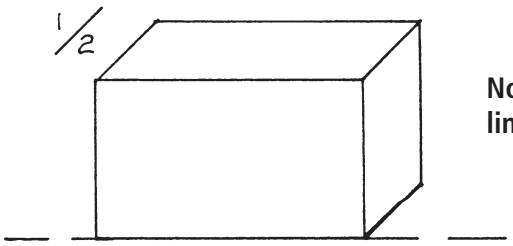
ISOMETRIC PROJECTION





45° Set Square

OBLIQUE PROJECTION (CAVALIER)



Note: all 45° projection lines are halved

OBLIQUE PROJECTION (CABINET)

Unit 3: TOOLS

Objectives

At the end of this unit you should be able to:

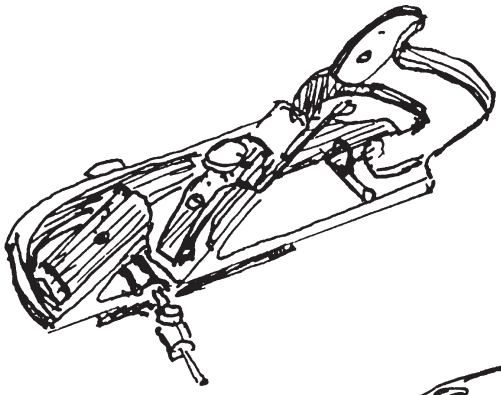
- Understand the need for, and function of, specialised hand tools: *e.g. Bench shears*, *pop riveters*, *plane*.
- Be able to use specialised hand tools appropriately.
- Maintain hand tools in a safe working condition.

Introduction

Design and Technology is a *design and make* subject. As your workshop skills improve, the need for, and use of, specialist tools will increase. Your teacher will introduce you to and show the use of these tools as appropriate. Many of these hand tools may not be readily available, or may be replaced by power tools such as routers or electric battery drills. However, each was designed for a specific purpose and will still make life easier.

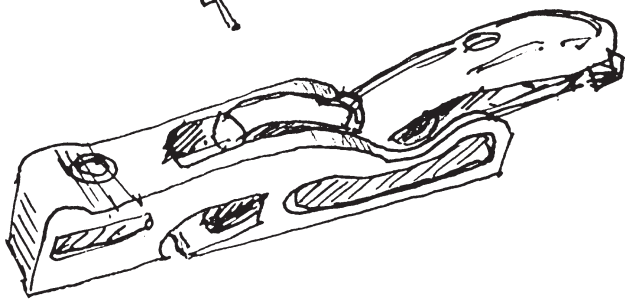
Tool maintenance is important. You can not do good work with blunt or damaged hand tools. The time spent in learning how to sharpen and maintain tools is well worth the effort. The rewards are the joy of working with sharp tools and the finish resulting from a well honed edge. Blunt tools are dangerous and will damage your work. Keep your tools sharp.

Special Purpose Planes



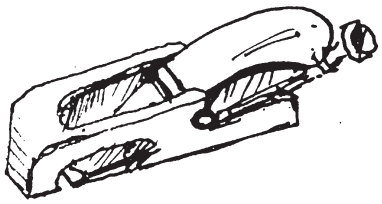
Rabbet Plane

Used to cut rebates along the grain — the blade can be moved forward for stopped rebates.



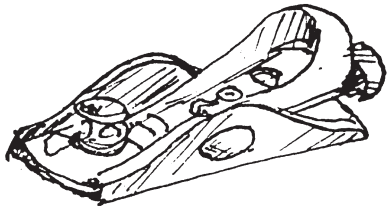
Shoulder Plane

Used to cut shoulders or joints — the blade is set low to slice through end grain.



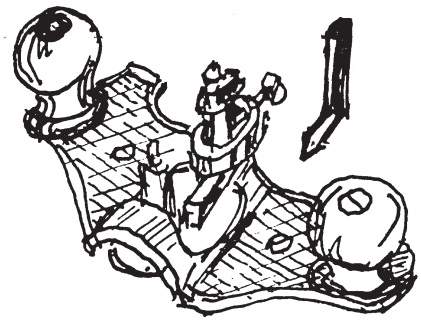
Bull Nose Plane

A smaller version of the shoulder plane used for trimming small joints.



Block Plane

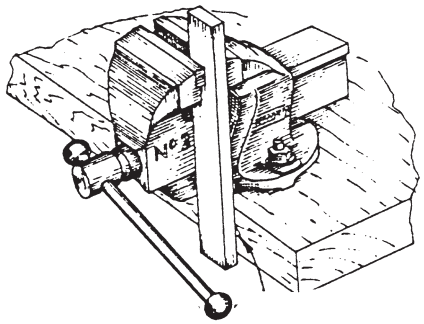
A small single handed plane used for trimming joints and cutting end grain.



Router Plane

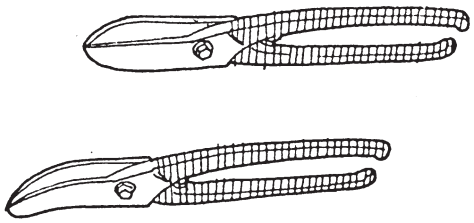
A hand plane, used to level housings, etc., is now replaced by a power router.

Metalwork



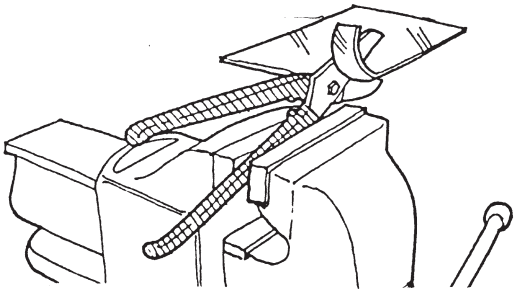
Vice

Vices are fitted with hardened steel jaw faces. The serrated jaws will mark unless vice clamps are used.



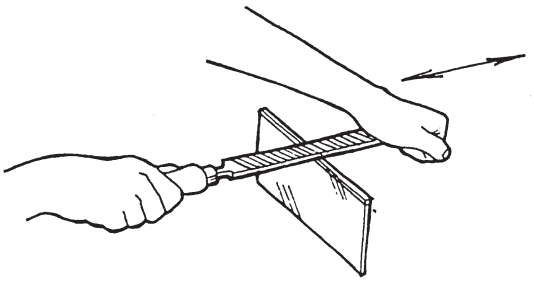
Tin Snips

Used to cut tin plate and thin metal. Straight or curved to aid in cutting out shapes.



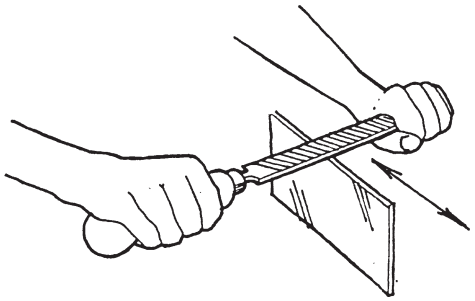
Tin Snips Placed In Vice

To gain better leverage when cutting heavier gauge sheet metal.



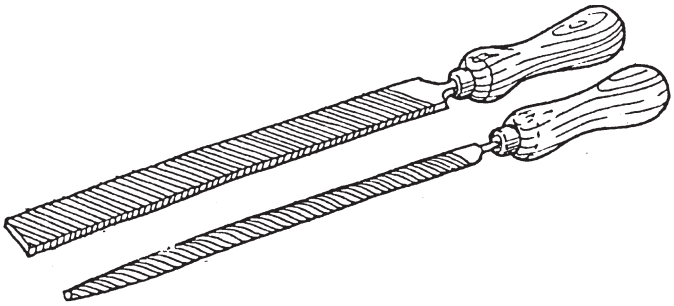
Cross-filing

Used to cut quickly down to a line.



Draw-filing

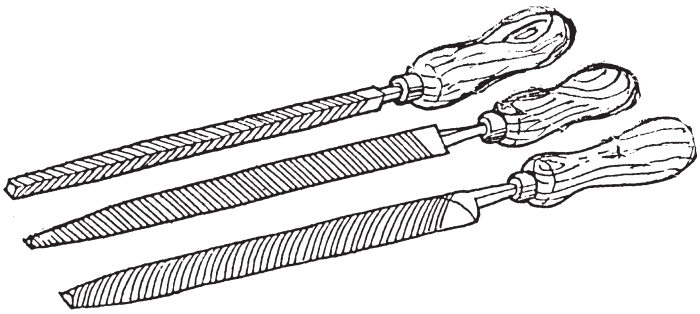
Used after cross-filing to produce a fine finish.



Files

Flat — single or double cut in varying grades of coarseness.

Round Taper — used to enlarge holes, etc.

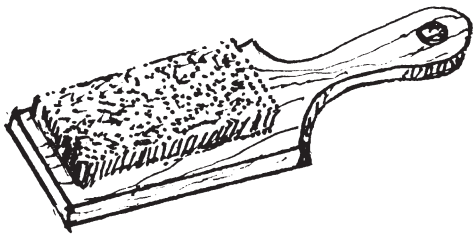


Square Taper

Used in pierced work slots, corners, etc.

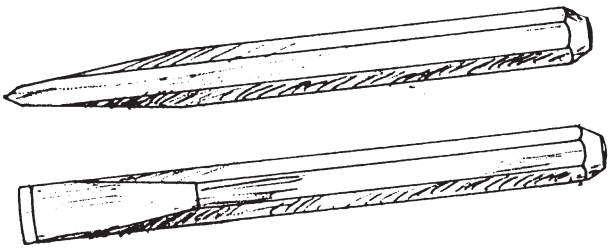
Triangular Files — used to sharpen saws, etc.

Half-Round — flat on one side and curved on the other.



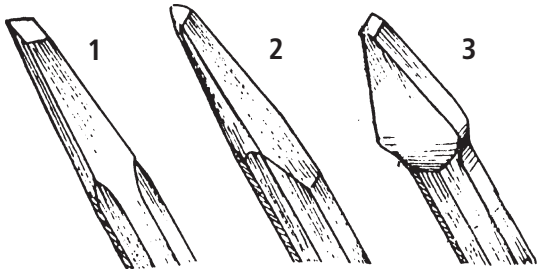
File Card

A wire brush used to clean files during use.

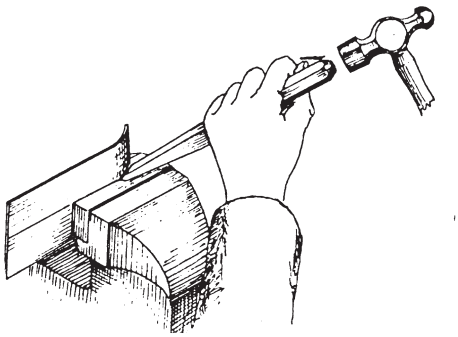


Cold Chisel

Forged from high carbon steel ground to a cutting edge.

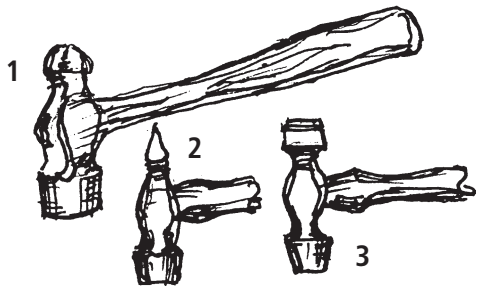


1. **Diamond Point**
2. **Round Nose**
3. **Cross Cut**



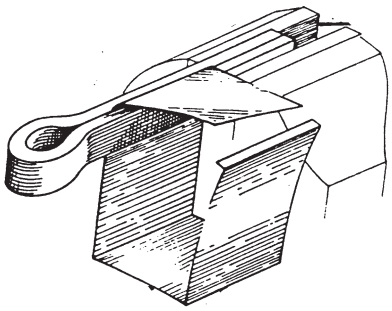
Cutting Sheet Metal

Using a cold chisel and vice to shear the material.



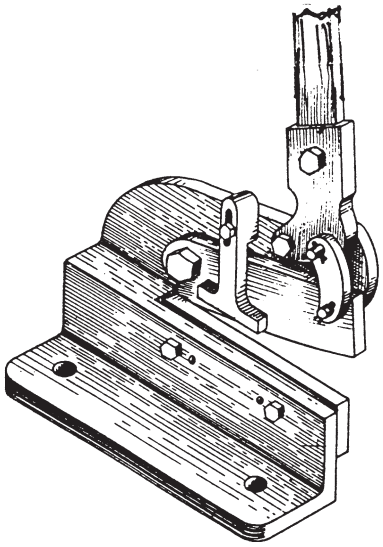
Engineers Hammers

1. **Ball Pein**
2. **Cross Pein**
3. **Straight Pein**



Folding Bars

Used for making right angled folds in sheet metal. For small work only.

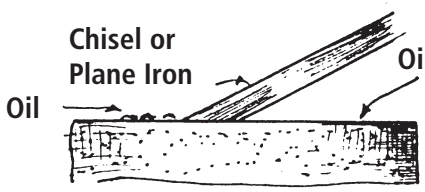


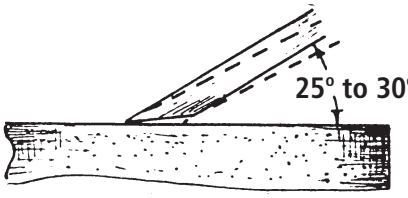
Bench Shears

Used to cut and shape tin plate and light sheet materials. Work is fed through the shears as each cut is made.

Unit 4: SHARPENING TOOLS

SHARPENING OR HONING PLANE IRONS AND CHISELS

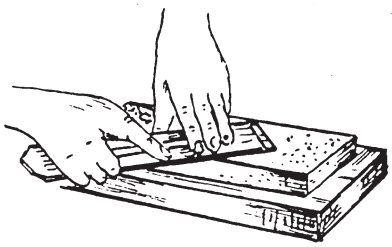




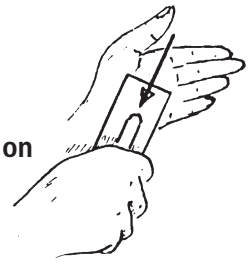
Rest tool with bevel flat on stone, then raise slightly

Burr formed

Honing the cutting edge

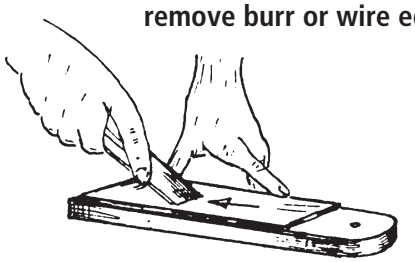


Honing the back side to remove burr or wire edge



Stropping on the hand

Stropping the edge

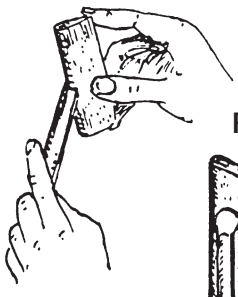


Stropping on a leather strop

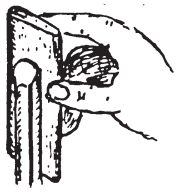
SHARPENING GOUGES

Honing outside bevel

Removing burr



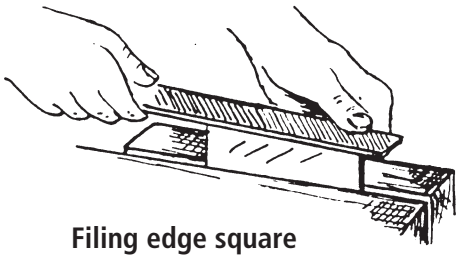
Honing inside bevel



Removing burr

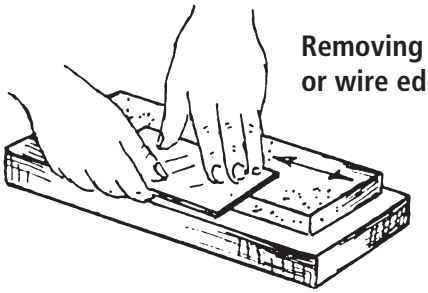
Cabinet Scraper

SHARPENING THE SCRAPER

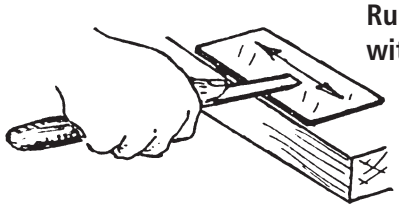


Filing edge square

Taking out file marks on oil stone



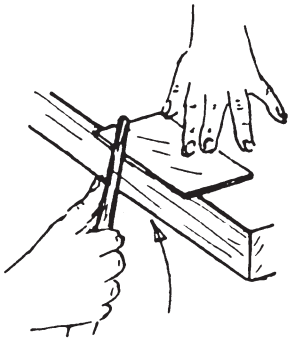
Removing burr or wire edge



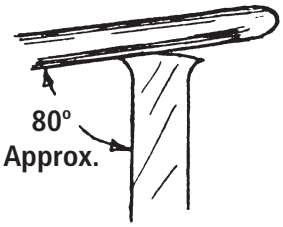
Rubbing down with gouge

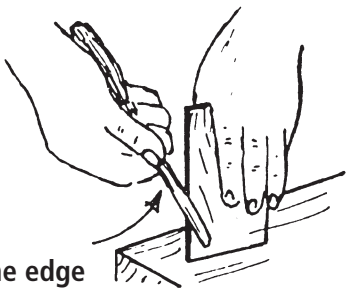
Burnisher

Burnisher — Gouge may be used



Turning up the edge (flat position)

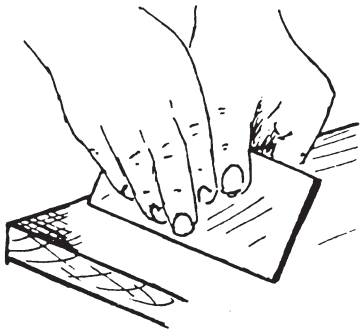




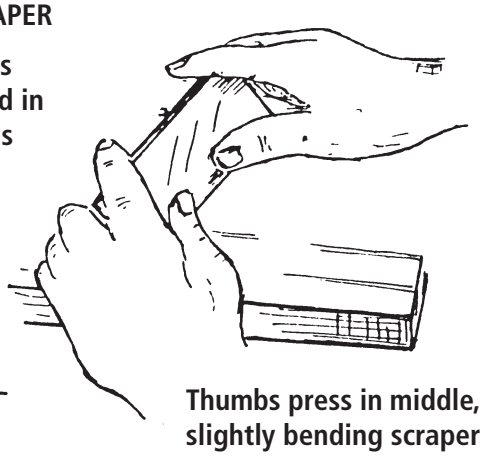
Turning up the edge (upright position)

USING THE SCRAPER

The scraper is inclined forward in both methods



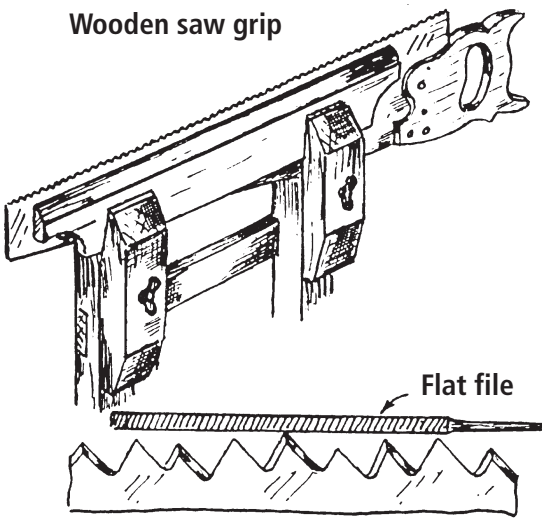
How scrapper works

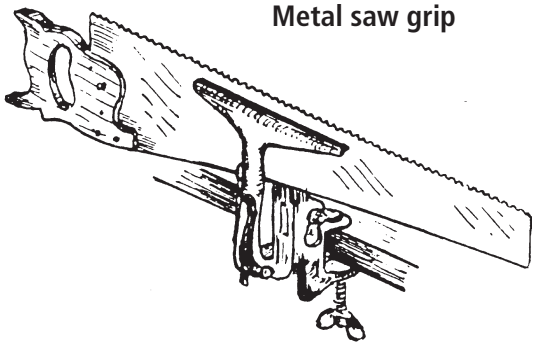


Thumbs press in middle, slightly bending scraper

Hand Saws

CROSS CUT SAWS



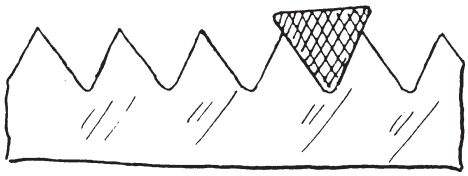


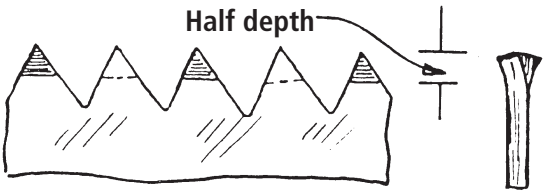
JOINTING or TOPPING

Tops of teeth filed to even heights

RESHAPING

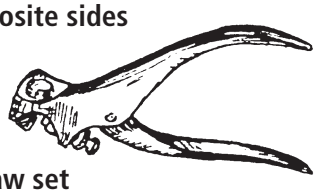
Each tooth filed to shape straight across at right angles



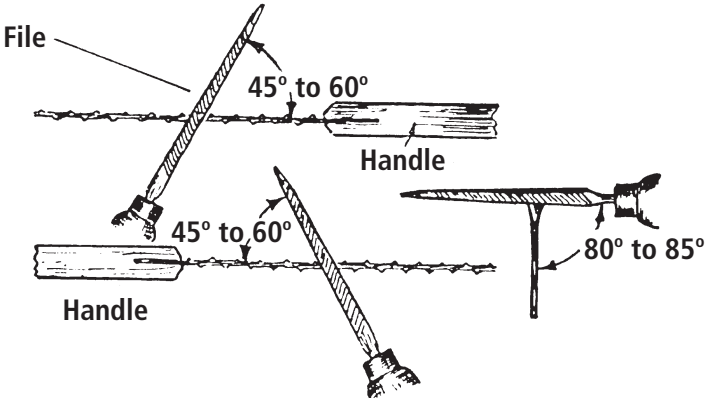


SETTING

Top half of each alternate tooth is bent over to opposite sides



Saw set



FILING

Each alternate tooth is filed at an angle of about 60°

Note: rip saw teeth are filed square across to give chisel-like teeth

Unit 5: MATERIALS

Objectives

At the end of this unit you should be able to:

- Understand the nature, characteristics and suitability of materials for the task at hand.
- Identify common species of trees both growing and when milled. Explore the conversion process and use the correct terms for the grading of timber products.

Introduction

The special properties (or features) of certain timbers make them more suited to specific needs.

- Close grained timbers are hard and strong, ideal for tools and handles, where strength is required.
- Hardwoods are generally more hardwearing than softwoods and used where heavy wear is expected; drawer runners, carcase construction, etc.
- Softwoods, while being soft and light, are often straight grained and very strong, but will rot easily when exposed to weather without being treated.

Some timbers have interesting grain, colour or texture which makes them the choice for furniture where appearance matters.

The more you become involved in the design and making of wooden articles the more you will need to understand the properties of the material you are working with. You need to be selective. Manufactured boards like particle board or MDF are often used in today's furniture and fittings. While convenient, they are hard to join and generally need covering with paint or veneer. They are designed for commercial use where machines produce the work. Craftmanship demands skill using solid timber construction. This unit looks at this.

Activity 1 Properties Of Timber

Strength, flexibility and straight grained timber without knots. Find out which of the woods used in Samoa have the above properties and fill in the table below.

Toughness Will it bend or flex? Will it split easily?

Durability Is it resistant to disease or insect attacks, rot, etc?

Hardness Is it tough and strong?

Density Is it light or heavy?

Odour Does it have a scent or smell?

Colour Important for identification. What colour is it?

Texture Smooth or rough?

Grain Does it have a distinct grain pattern?

Figure Does it have unusual or attractive grains or colour markings?

Working Qualities How easy is it to work with?

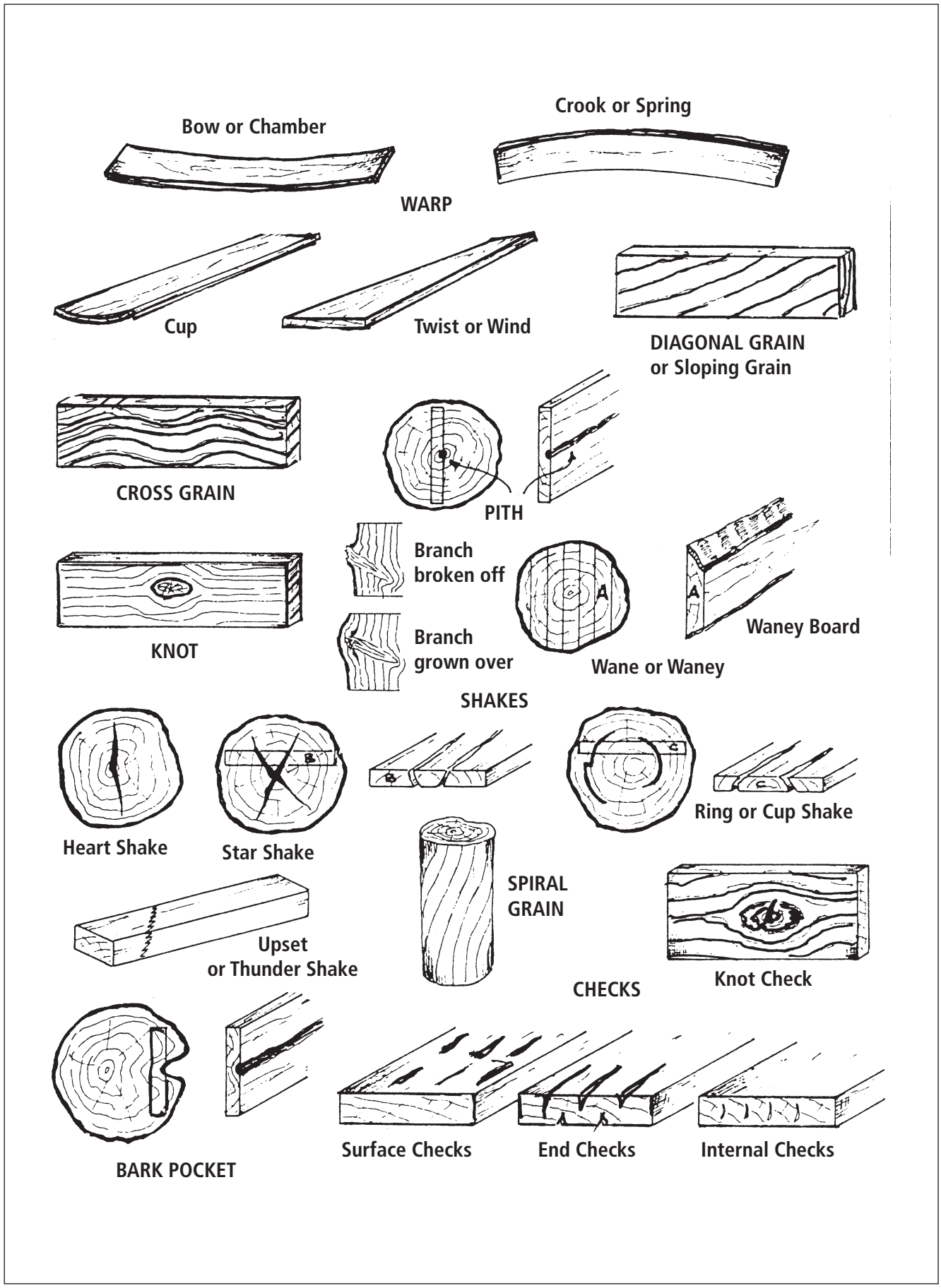
Name	Type	Colour/Texture	Qualities	Uses
Pinus Radiata.	Soft wood (NZ).	White with prominent grain.	Strong, large quantities available.	Furniture and building.

Timber Defects

A defect is any irregularity occurring in or on the timber that may lower its strength or mar its appearance.

Burr or Burl	A growth on the side of a tree (often used for figured veneers).
Checks	Lengthwise separation of the wood due to shrinkage.
Surface Checks	Only on the surface.
End Checks	Splits on the ends of boards, can be prevented by painting ends while seasoning.
Through Checks	From one side through to the other.
Knot Checks	Where knots dry out and split.
Cross Grain	The grain runs across the timber making it weak.
Decay	Rot due to attack by fungi.
Gum Streaks	Hard pockets of gum within the timber.
Interlocking	Confused growth pattern, making timber hard to work.
Grain Knot	Formed by a branch within the timber — tight or loose knots weaken the timber.
Pinhole	Dark ringed small holes left by wood boring insects which attack the living tree but die during seasoning.
Pith	A small, soft core in the centre of a log — common in soft woods.
Spiral Grain	Caused when a tree twists during growth.
Stain	A stain caused by sap or fungi which discolours the wood.
Shakes	A lengthwise separation of wood fibres which develops during the growth of the tree.
Heart Shakes	Extending from the heart.
Star Shakes	A number of shakes from the same source.
Cup Shakes	Separation of the growth rings.
Thunder Shakes	A fold causing bruising across the grain due to storm damage of felling.
Wane	The presence of bark on the edge of the timber.
Warp	Any variation from a true surface.
Bow	Timber curved on the face side.
Crook	Timber curved lengthwise on its edge.
Cup	Timber curved across the face.
Twist or Wind	End-to-end twist.

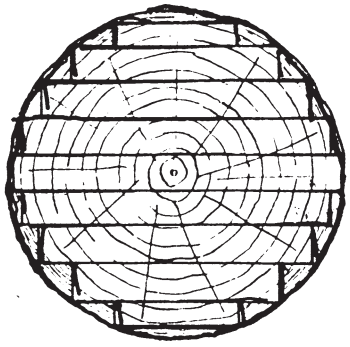
Timber Defects



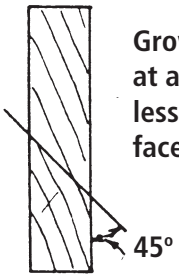
Conversion Of Timber

FLAT SAWING

Tangential — Slash, Plain or Back sawing

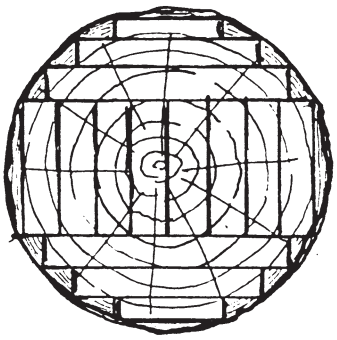


Method 1

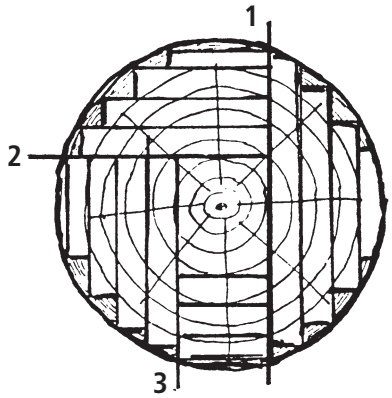


Growth rings are at an angle of less than 45° to face of board

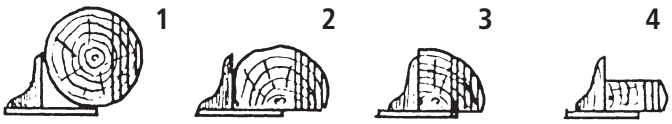
45°



Method 2



Method 3

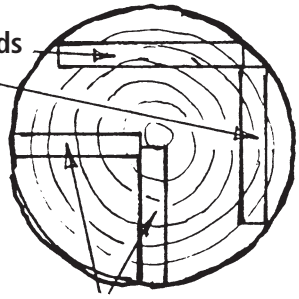


Flat sawing a log (Method 5)

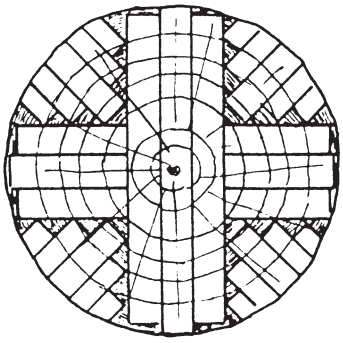
Flat sawn boards

QUARTER SAWING

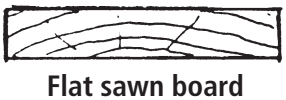
Radial Cut



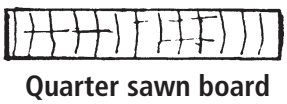
Quarter sawn boards



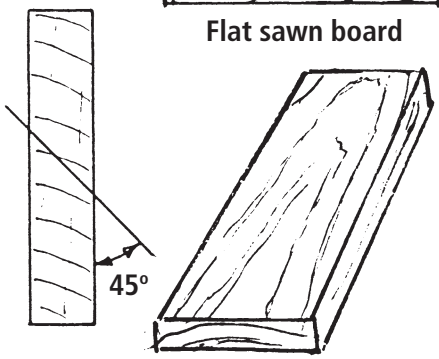
Growth rings are at an angle of more than 45° to face of board

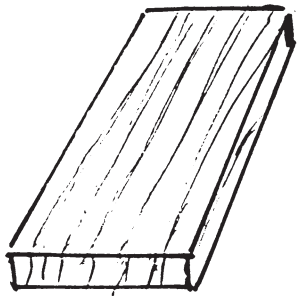


Flat sawn board



Quarter sawn board





Classification And Grading

Board Grades	For finishing and other uses.
Framing Grades	For timber construction.
Box and Common	Lowest grade for general use.
Engineering Grades	For timber construction which requires specific design.

Board Grades

Clears	Boards of specially selected timber.
Dressing 'A'	Boards clean on one face and edge.
Dressing 'B'	Suitable for paint finishes.
Factory	Some clear cuttings.
Merchantable	Boards suitable for covered surfaces.

* *Framing Grades not covered in Year 10.*

Terms Used In Timber Manufacture

Sawn Timber	Timber in the rough, straight from the saw.
Dressed Timber	Timber machine planed: (D1S) Dressed one side (D2S) Dressed two sides (D1S1E) Dressed one side and one edge (D2E) Dressed two edges (D4S) Dressed four sides

* *Unless stated otherwise, dressed timber is less than stated size.*

Unit 6: PROCESSES

Objectives
At the end of this unit you should be able to:

- Demonstrate correct construction and fabrication techniques and use the correct technical terms.
- Select and dress material, check measurements and cut it accurately to size.

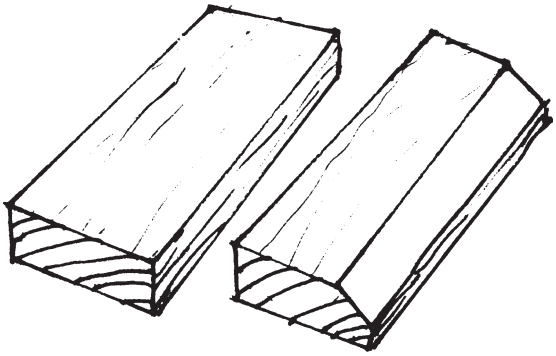
Introduction
Successful woodwork depends mainly on the correct and accurate jointing of pieces of wood. Attention to detail is all important.

Measure twice, cut once.

Check each step of the way. Mark all wastewood and cut on the waste side of the line. Always use face marks and mark so that work is put together the same way each time you test. Keep your work clean and safe from scratches and bruises. The cleaner it is the less you need to do to clean it up.

Cutting joints by hand and watching something go together is a satisfying experience — it is craftsmanship.

Technical Terms

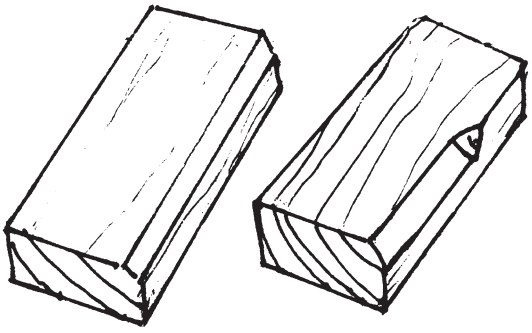


Arris

A name given to the sharp edge where two surfaces meet.

Bevel

The sloping edge of a piece of wood.

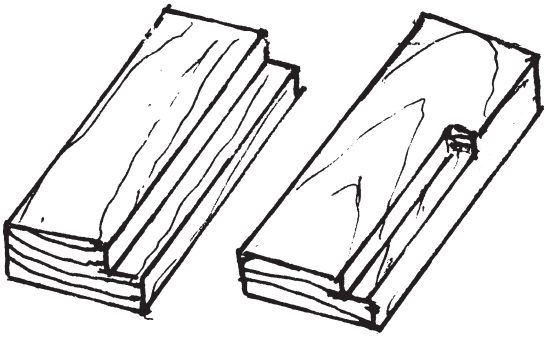


Chamfer

A 45° angle cut on a corner.

Stopped Chamfer

A chamfer which does not run right through, used for decoration.

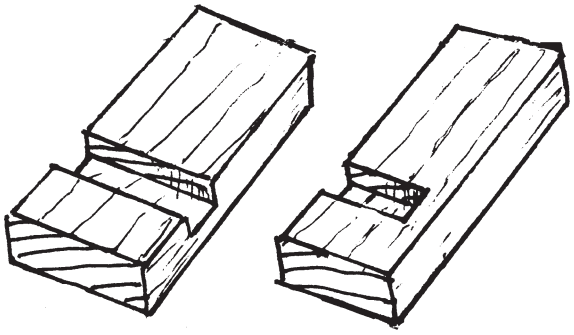


Rebate

A rectangular shoulder or recess cut on an edge.

Stopped Rebate

A recess which does not run the full length of the timber.

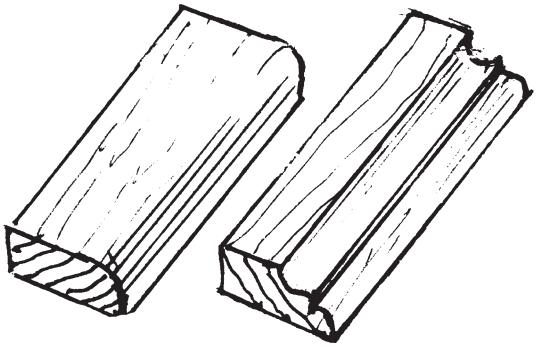


Housing

A recess cut across the grain.

Stopped Housing

A recess which does not run right across the timber.



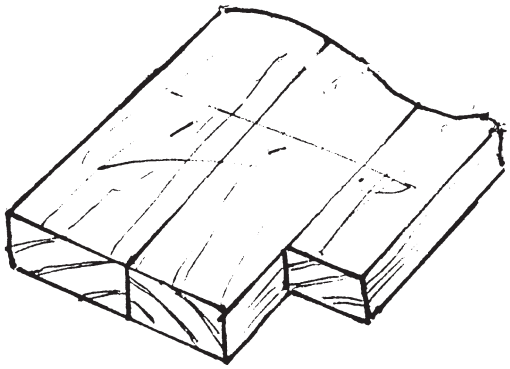
Nosing

A quarter round edge on a top or moulding.

Moulding

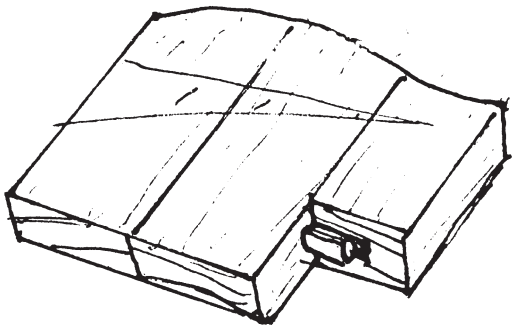
A shaped edge on a top or bead.

Widening Joints



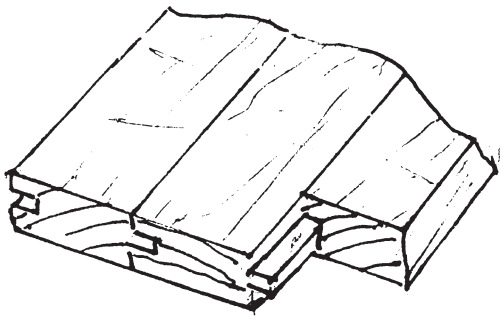
Butt

Edges slot square and butted together, glued and cramped.



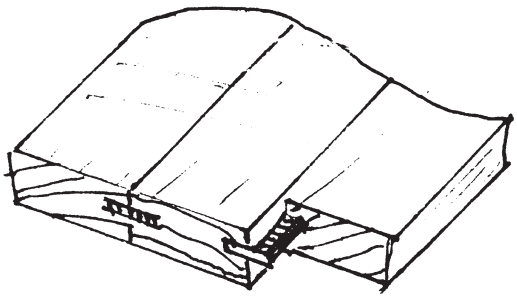
Dowelled Butt

Edges slot square and wooden dowels used to reinforce the joint, glued and cramped.



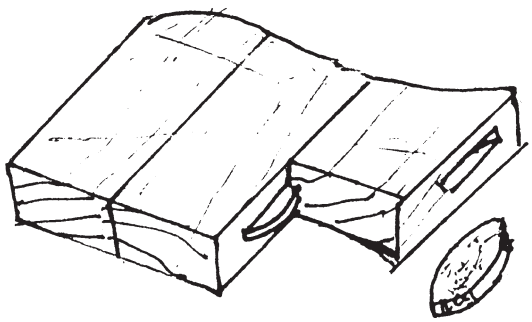
Tongue And Groove

A strong joint usually made by machine, used dry for T&G flooring.



Loose Tongue

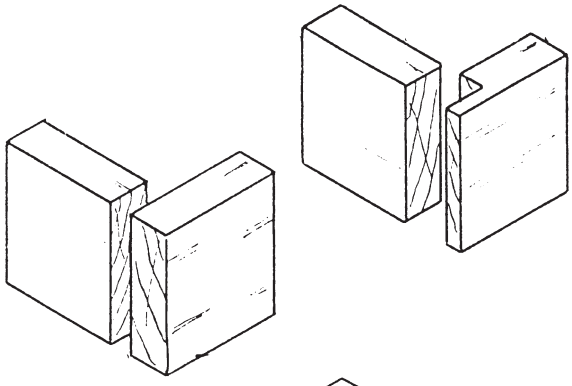
A plywood or cross-grained tongue is fitted into a groove on each edge, glued and cramped.



Biscuit Joint

Compressed wood biscuits are set into grooves, cut by machine, used in modern furniture construction.

Angle Joints

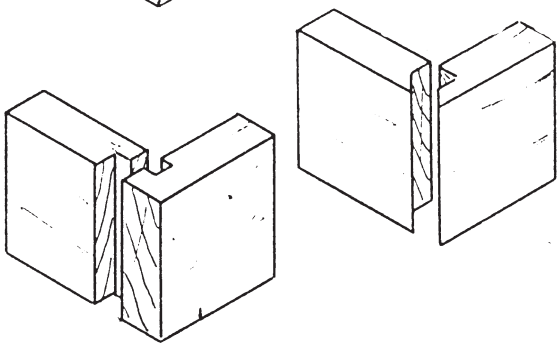


Angle Butt

Ends cut square and butted together — needs nailing.

Rebated Butt

Stronger corner joint, has glue surface, usually nailed.

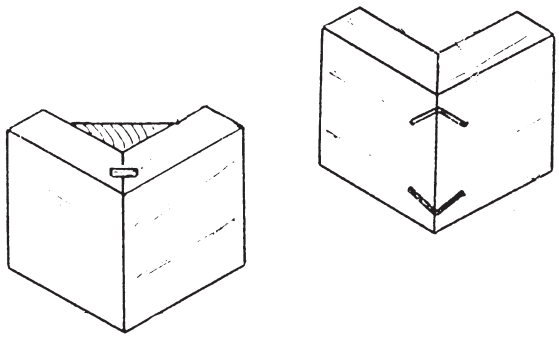


Tongued

Interlocking joint, strong and neat.

Mitred Rebate

The mitre is neat and strong with no end grain showing.

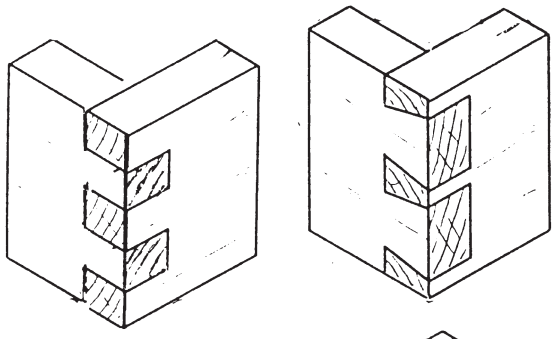


Mitre

Clean, but needs extra strength with glue, block or loose tongue.

Feathered Mitre

Dovetail sawcuts are featured with wood veneers, usually covered.

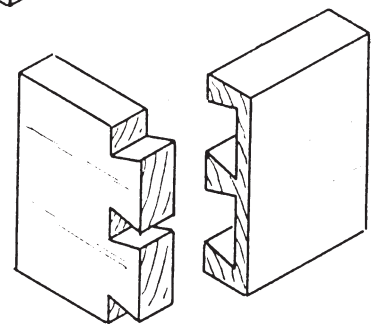


Box Pin

A strong interlocking finger joint.

Common Dovetail

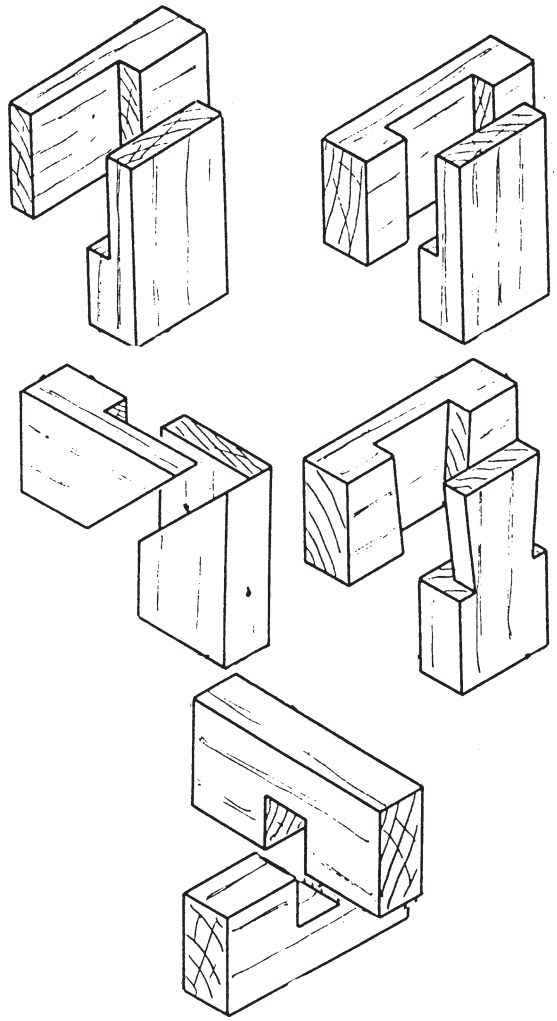
The strongest form of angle joint — used for tool chests, etc.



Lapped Dovetail

Used in drawer construction — the front is lapped to cover the end of the pins.

Halving Joints



Angle Halving

Each piece is halved and shouldered — used for frames and building work.

Tee Halving

Used to neat cross pieces in frames and building work.

Mitred Halving

A neat corner joint — used for frames, mirrors, etc.

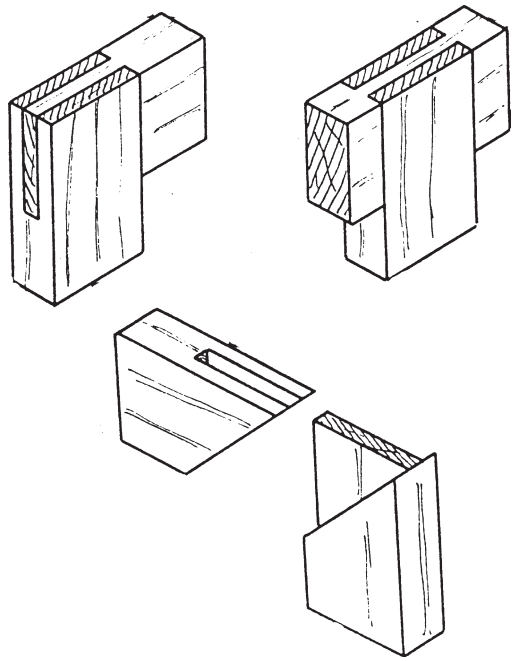
Dovetail Halving

A strong form of tee joint prevents the join from pulling apart.

Cross Halving

Used to give a strong flush joint where two pieces cross each other.

Bridle Joints



Angle Bridle

Usually glued and pinned with a dowel through the side.

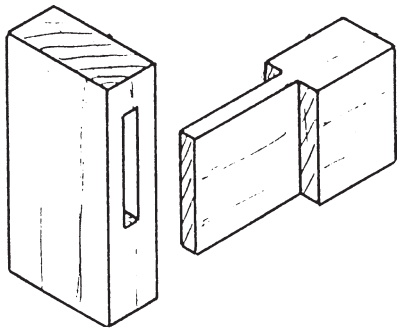
Tee Bridle

A strong joint used where a leg meets a table rim, etc.

Mitred Bridle

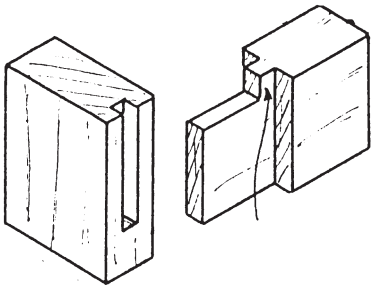
Used for frames when strength and neatness is important.

Mortise And Tenon Joints



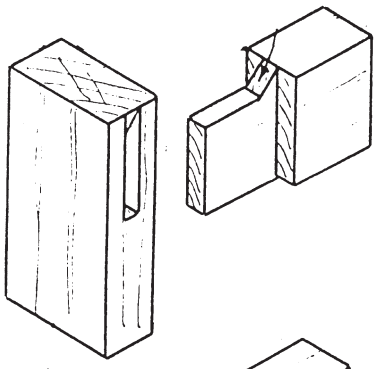
Mortise — Hole or recess
Tenon — Pin (M&T)

A very strong joint used for frames in furniture, building boats, etc.



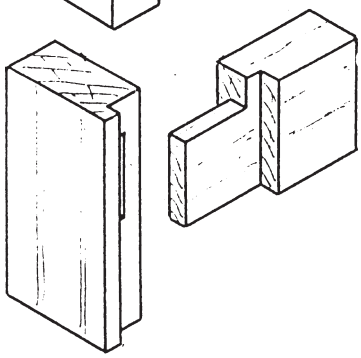
Haunched M&T

Used for door and window frames — the haunch prevents the rail from twisting.



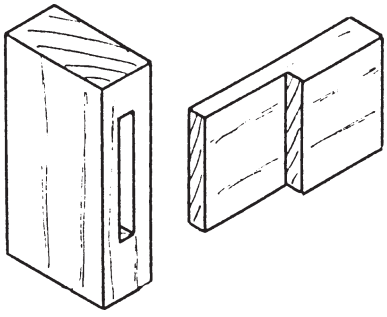
Splayed Haunch M&T

The haunch is hidden to provide a neater finish — used on chairs, etc.



Long and Short Shoulder M&T

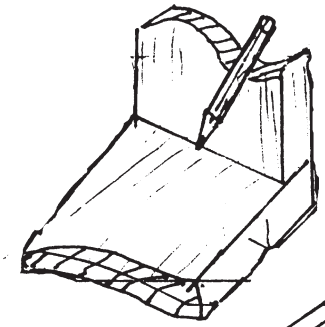
Used in door frames; panel inserted into, rebate at back.



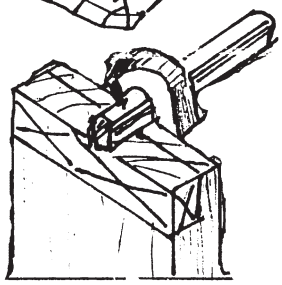
Bare Faced M&T

Used when the rails are thinner than the stiles. Table rails to legs or framed doors.

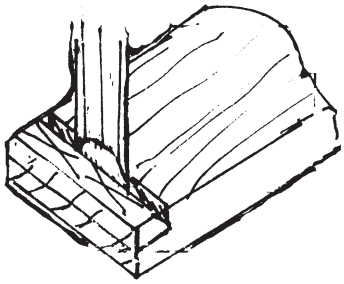
Cutting A Rebate Joint



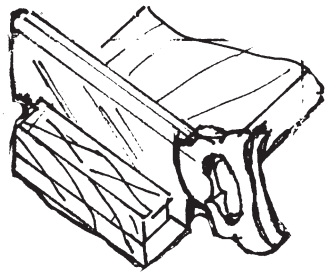
1. Width set out from timber thickness. Set out carefully and mark waste face marks outside.



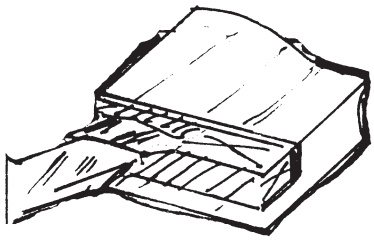
2. Square edges and gauge depth of rebate. Work from face side, a good deep cut.



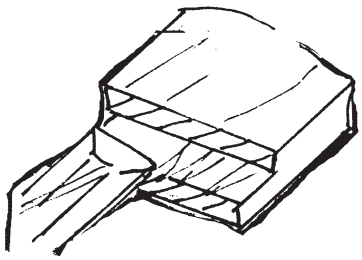
3. Chisel sawing trench. Cut a vee to set the saw against the waste side of the line.



4. Saw to gauge lines on waste side of line. Take care to keep saw flat — use short strokes.

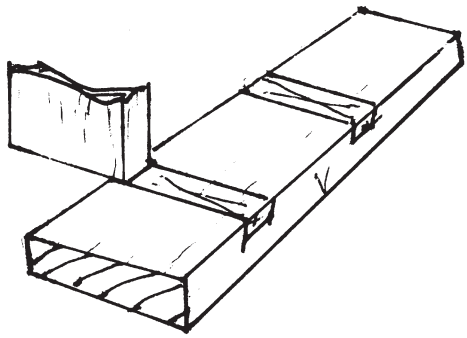


5. Chop out waste with chisel bevel down. Cut to depth in stages until just clear of gauge line.

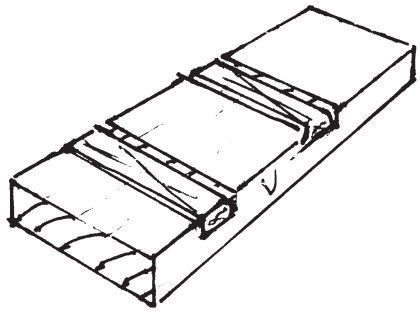


6. Pare to line with chisel bevel up. Carefully pare to line, keep chisel flat.

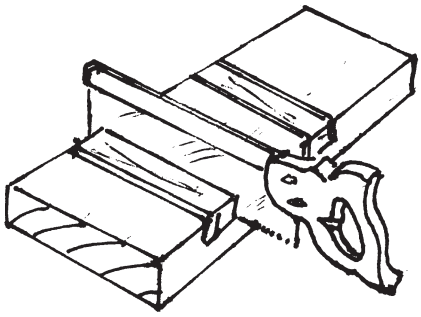
Cutting Housings



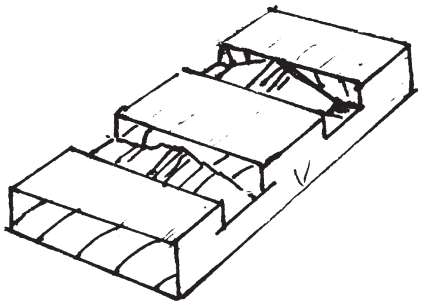
1. Set out housings. Square around sides and gauge to depth. Mark wastewood.



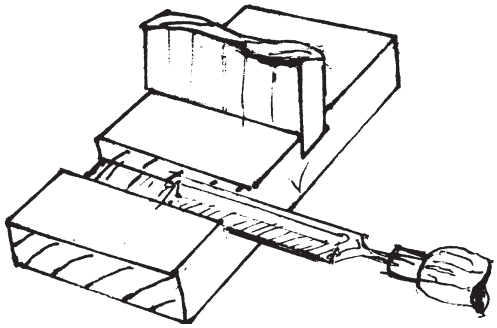
2. Cut a vee shoulder on waste side of line to aid saw cut.



3. Saw to depth, keep in saw level, use short strokes.

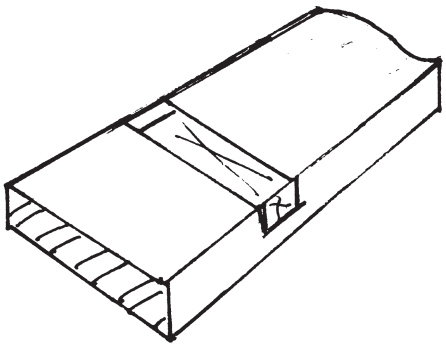


4. Chisel up to centre from each side, cut a level shoulder at depth to prevent cutting too deep.

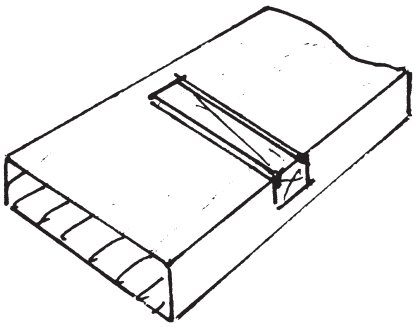


5. Pare away slowly until depth is reached — check for level with back of square.

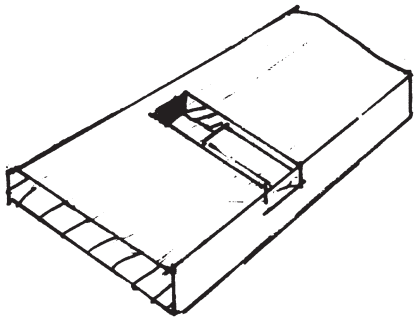
Cutting A Stopped Housing



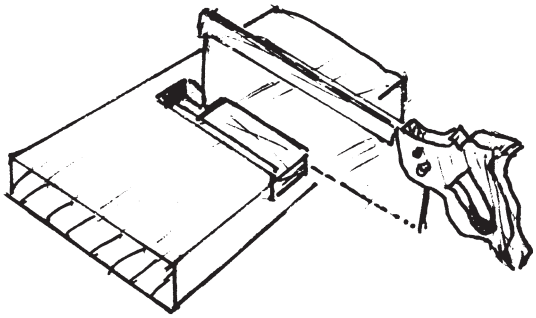
1. Set out work, square around edge and gauge to depth, mark wastewood.



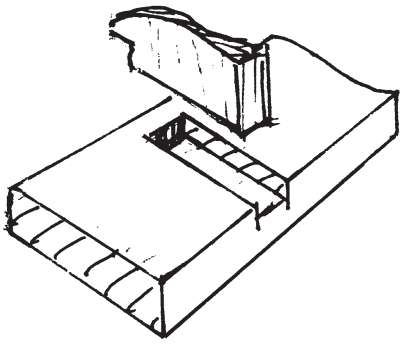
2. Cut a vee shoulder on waste side on line to and saw cut.



3. Cut a pocket to depth of housing, this allows saw to move without damage to surface and edge.

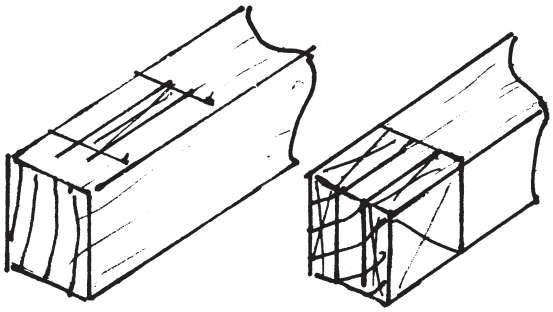


4. Saw to depth, keep saw level, use short strokes.

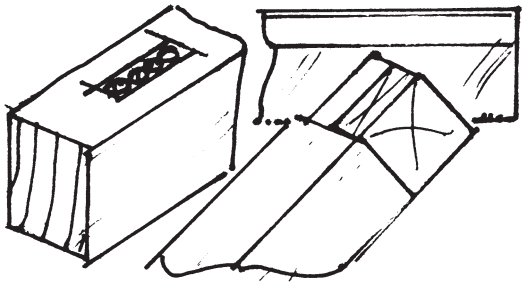


5. Pare out waste to depth — check for level with back of square.

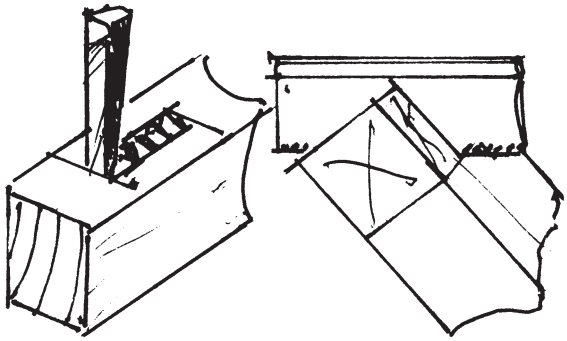
Cutting A Mortise And Tenon



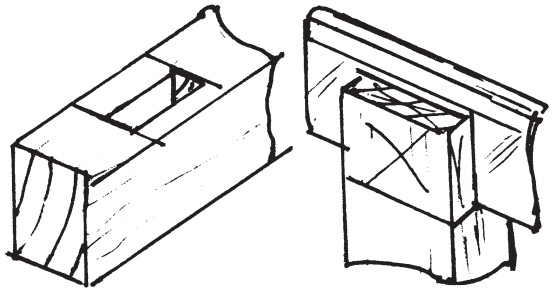
1. Set out work from face side to face side — using mortise gauge, mark wastewood.



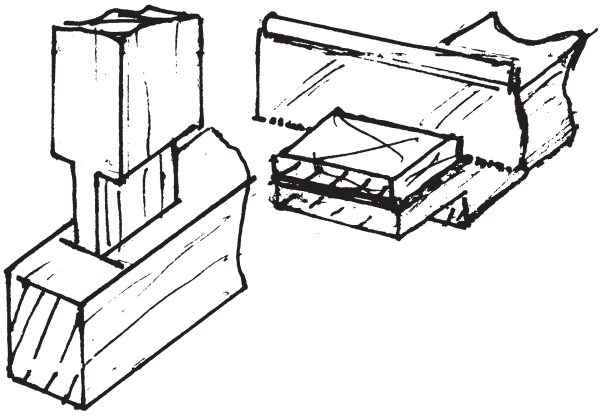
2. Bore holes to release wastewood in mortise. Saw tenons on waste side of line corner to corner.



3. Cut out waste using a mortise or firmer chisel. Saw other diagonal down to line on waste side.

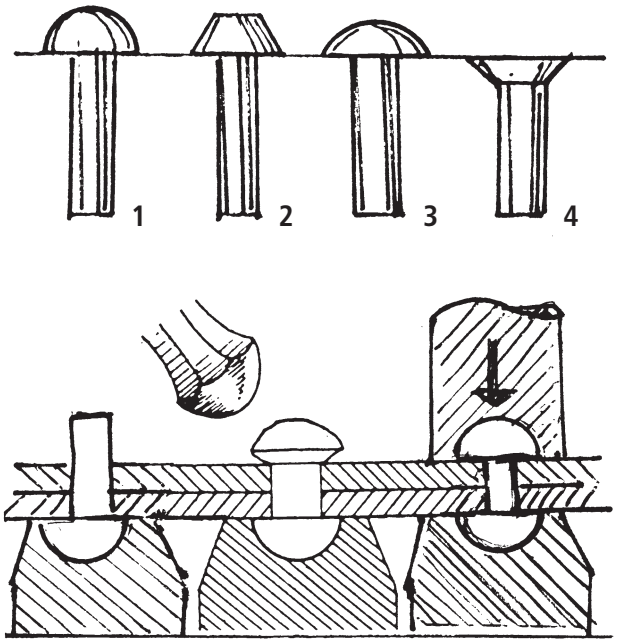


4. Clean out mortise from both sides. Saw tenon flat and square down to line.



5. Cut shoulders of tenon and test fit trim with chisel if required.

Riveting

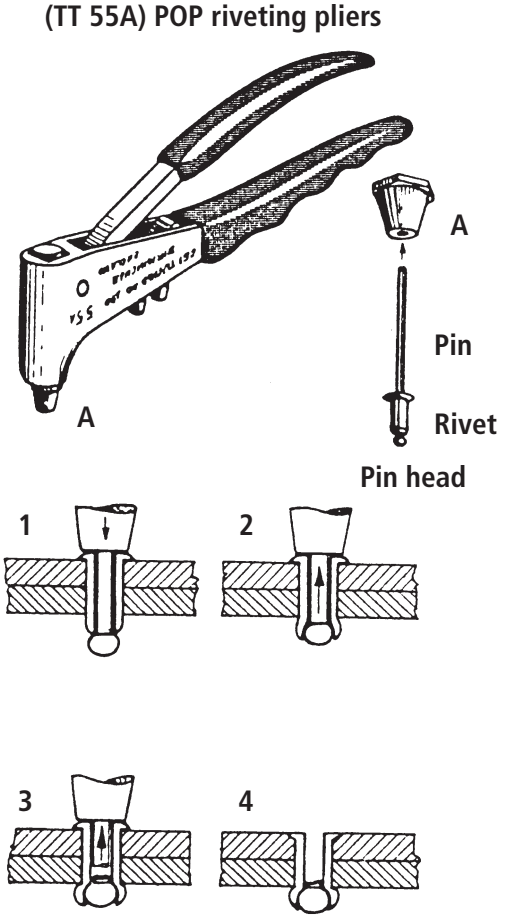


Riveting is used to join sheet metal — holes are usually punched and the rivets fixed by one or two blows on an anvil for a snap head or mushroom head, which is then shaped using a set and snap punch.

1. Snap head;
2. Dam head;
3. Mushroom head;
4. Counter sink.

A dolly held in the vice supports the rivet.

Pop Riveting



Pop riveting is a simple and effective method of securing light sheet metal components.

Rivets can be purchased in a large range of sizes and metals. Used in the aircraft industry and for aluminium boats and spars, quick, cheap and effective.

1. Pin gripped in pliers; rivet is then pressed home in the work.

2. As pliers close, pin is drawn through rivet, which is expanded.

3. Rivet fully expanded; pin head breaks off; pliers and pin withdrawn.

4. Countersunk rivet.

Unit 7: TECHNOLOGY

Objectives
At the end of this unit you should be able to:

- Investigate the changes that technology brings to Samoan culture.

Introduction
In Year 9 you looked at the place technology has in our every day lives and the good and bad effects it brings.

Increasingly, technology will change the Samoan lifestyle. The products seen only in magazines and films will be available in Samoa and change the way you live. Computer technololgy, cell phones, satallite communications, transport, new methods of farming and fishing, are all improved with new technologies. TV brings the world into your home, no longer is Samoa a remote island in the Pacific. The Samoa you will live in will be very different to the one your grandparents knew. Technological changes are going to influence you a great deal in your lifetime. Technology is all about change.

Discussion Topics

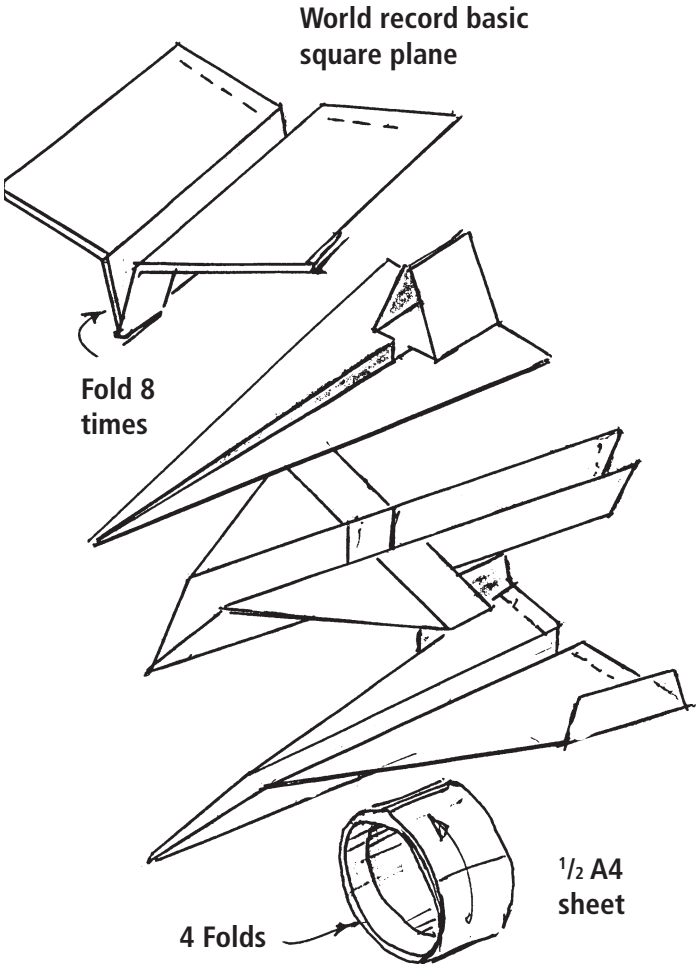
1. Most advances in technology are made through better design or production of new materials. Name some of these changes seen in Samoa, *e.g. Fishing boats*, *buildings*, *transport*, *TV*, *battery powered hand tools*.
2. What changes do you see in Samoa due to new technology? Consider culture, lifestyle, and the tourist trade.
3. Name an item in your village, home or school, that was designed to perform a simple task, yet is no longer used — what replaced it? Why?
4. Discuss some positive changes you think technology will bring to Samoa in the next 10 years.
5. Design and technology is a *design and make* course that involves you in solving problems and in the manufacture of simple products. What technology do you think could help you in the future?

Activity 1 Discussion Activities

Working in small groups discuss each question and report back.

1. Choose a material that is in constant use, that has been improved using new technology: *e.g. Wood — sawn into planks, dressed, treated, etc.*
2. Using the material list from question 1, explain how each improvement has changed the product and the way it is now used.
3. Select a common material or product — *Brainstorm* and record all the facts you know about it.
4. Choose two different (or similar) materials and make a comparison between the two. Workability, colour, texture, availability, etc.
5. Technology is not new. What technologies did your ancestors bring to Samoa?

Activity 2 Practical Activities — Technology Challenge



Design Brief
Using one sheet of A4 paper, design and make an aeroplane that will do one of the following:

- Stay in the air the longest.
- Travel the greatest distance.
- Land on a given target.

Paper was invented by the Chinese in 300 B.C. 20th Century flight technology now allows it to fly.

⋆ *The world record set in 1998 is 18.80 seconds flying time. Distance record is over 200ft over level ground.*