

WOODWORKING AND TIMBER: TERM 1

GRADE 8

CHAPTER 1

INTRODUCTION

What is Woodworking and Timber?

The subject lays the foundation for learning in the area of construction carpentry and joinery that includes furniture and cabinet making. The learner creates products from wooden raw material, to meet modern demands. It focuses on structures such as roof trusses, windows, doors and any part of a building that is made of timber including furniture building and cabinet making.

The subject has been designed to equip students with basic carpentry skills and an understanding of essential principles necessary to perform simple carpentry tasks in the construction and in the furniture industry.

Topics to be studied in Woodworking and Timber

1. Safety
2. Cutting list (Measuring, reading of drawings quantities)
3. Measuring (Templates, tools)
4. Materials (Wood types, boards, fastening)
5. Equipment (Machine, hand tools)
6. Graphics and communications Graphics
7. Finishing
8. Joining (Joints)
9. Fastening and fittings (Screws, nails, glue, hinges)
10. Doors (Types and installation)
11. Cupboards (Build in cupboards)
12. Ceiling (Types and installation)
13. Roof trusses

Specific Aims:

The learner is able to:

- Comply with good housekeeping practices by implementing health and safety in the work area
- Work with measurement in a variety of contexts
- Read and interpret (produce) basic work drawings
- Prepare cutting lists, set-out and mark off for machining purpose

- Produce basic hand-crafted furniture
- Produce sawn timber and board product components and products
- Produce planed timber product components and products
- Produce machine sanded timber and board product components and products
- Prepare products for finishing
- Prepare, manufacture and erect roof trusses
- Erect ceilings and timber frame partitions

OCCUPATIONAL HEALTH AND SAFETY ACT 85 of 1993 (OHS)

Introduction

OHS Act is regulation number 85 which was introduced by the government in 1993.

Meaning of OHSA: Occupational Health and Safety Act.

First Aid

First Aid is an emergency care or treatment given to an ill or injured person before professional medical aid arrives.



Source: Google pictures

Basic First Aid Kit

Basic First Aid principles

- Think before you act
- Only do what you have been trained to do
- Stay calm and do not panic
- Check the victim's level of consciousness
- Check if the victim is breathing
- Open the airway if the casualty is not breathing
- Check for pulse and bleeding
- Do not overcrowd the casualty

INJURIES

An injury is a physical trauma, damage to the body caused by external force. This may be caused by accidents, falls, hits, weapons, tools and other causes.

Reporting an injury

- Learners should report any injuries that occurs in the workshop, either it is minor or serious, to the educator or instructor.

Types of Injuries

- There are a number of injuries that a person may suffer from in the working place namely:
- Cuts may be caused by a chisel, blade, marking knife or the sharp edge of any material. This might cause bleeding.



- Burns may be caused by flames, heat, chemicals and electricity leading to injury.
- Fractures can be caused by tripping, slipping and falling.



Inhaling toxic fumes- May be caused by spilling and smelling dangerous chemicals. This can affect your lungs and even lead to death due to lack of oxygen. The fumes may come from petroleum products, toxic gases and fumes, carbon monoxide and solvents.



- Exposure to loud noise- May be caused by loud sound of machinery. Loud noise can damage to your ear drums
- Fights in the workshop- Must be avoided and reported to the teacher if there is one.

HIV/ AIDS

HIV means Human Immunodeficiency Virus

AIDS means Acquired Immune Deficiency Syndrome

To avoid further spread of HIV and AIDS the following safety precautions must be followed:

- Start HIV testing and support programmes
- Encourage those infected to seek medical help
- Educate people about HIV and AIDS
- Encourage people to be open and accept their status
- Raise awareness about HIV.
- Encourage those infected to take the antiretroviral drugs and treatment.

Substance abuse:

Substance abuse is excessive use of drugs such as alcohol, narcotics, and cocaine or any substance that has the potential to intoxicate a person.

Types of substance abuse.

- Paints
- Varnish
- Thinner based material
- Turpentine
- Contact glue

Workshop Rules and Regulations

It is important that all learners keep to the following rules whilst in the workshop:

- Never enter or leave the workshop without the teacher's permission.
- Respect your teacher at all times.
- Work only in the area allocated to you
- Never run in the workshop.
- Always clean your workshop before you leave
- Always carry sharp tools with its sharp part facing the ground.
- Never throw objects at other learners
- Do not eat, drink and play in the workshop.
- Do not leave tools and materials laying in the workshop.
- Always wear full personal protective equipment (PPE) in the workshop.

ACCIDENT

Definition of an accident

An accident is defined as an unplanned and uncontrolled event often caused by unsafe acts and/or unsafe conditions.

Accident prevention

If we eliminate unsafe acts and unsafe conditions, we can avoid accidents.

Unsafe acts

Unsafe acts are committed by the worker.

- Working without permission
- Working at a dangerous speed
- Using machines for the wrong purpose
- Refusal to use safety devices (PPE)
- Taking risks

Unsafe conditions

Unsafe conditions are hazards that have the potential to cause injuries or death. Some of those hazards include but not limited to:

- When tools and equipment are not well maintained
- Lack of ventilation
- Insufficient lighting
- Limited space in the workshop
- Lack of safety equipment

Housekeeping

Definition

Housekeeping means there must be a place for everything and everything in its place all the time.

Aims of housekeeping

The following aims are desirable:

- It saves time
- It eliminates potential accidents
- It saves space
- It can prevent fire hazards

Storage of chemicals

- Store all chemicals in a dry ventilated place.
- Store chemicals properly in a safe and secure place.
- Used chemicals should be resealed properly.

Safety signs

Purpose of safety signs





Safety signs are graphics (drawing language) that instruct people of what to do and what not to do in order to minimise accidents.

Identification of safety signs in terms of colour coding

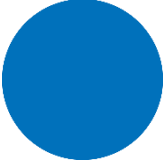



There are five main categories of safety signs namely:

- Prohibition
- Mandatory
- Warning
- Safe conditions
- Fire Safety





Prohibition signs are red on white background, on a disc, meaning do not do or stop.

	Meaning	Shape	Colour	Symbols		
Prohibition	Stop. Do not do.		Red			
		Round				





Mandatory signs are blue and white, on the round shape, meaning carry out the action given by the sign.

Mandatory	Meaning	Shape	Colour	Symbols		
	Carry out the action given by the Sign	 Round	Blue			





Warning signs are identified with red border with black/red image, on a triangular shape, meaning risk of danger or hazard ahead.

Warning	Meaning	Shape	Colour	Symbols		
	Risk of danger.	 Triangular	Red border with black/red image			





Temporary Warning signs are yellow and black, on a triangular shape, meaning risk of danger or hazard ahead.

Warning	Meaning	Shape	Colour	Symbols		
	Risk of danger.	 Triangular	Yellow			

Safe conditions signs are green and white, on a square shape, meaning you can or it is safe to do so.

Safe conditions	Meaning	Shape	Colour	Symbols		
	The safe route.	 Square	Green			

Fire safety signs are red, on a square shape, meaning fire safety or fire gear.

Fire Safety	Meaning	Shape	Colour	Symbols		
	Fire safety or fire gear	 Square	Red			

PERSONAL PROTECTIVE EQUIPMENT

Personal Safety

Personal safety refers to the manner in which a person should behave in a work place. In order to avoid risks or injuries, people must make sure that protective clothing / gear is worn at all times.

Clothing

Clothing refers to the manner in which a person should dress in the workplace. Workers and learners must avoid wearing loose clothes, jewellery, sandals. Long hair should be neatly tied at the back.

Woodworkers should wear:

Head gear to protect the head from falling objects where applicable.



Hard hat

Goggles should be worn in order to protect eyes from sparks and splinters/ wood chips.



Goggles

Ear muffs are used to protect their hearing from loud noise.



Ear muffs

Protective Boots to protect your feet from sharp objects and falling objects. They also protect you from slips.



Safety boots

Overalls must be worn at all times to protect your clothes.



Overall

Hand gloves must be worn to protect your hands from sharp objects and splinters.



Safety gloves

Dust mask or respirator must be worn to protect your lungs from dust.



Dust mask



Respirator

Face mask must be worn to protect your face from splinters or wood chips



Face mask

FIRE

Main common Causes of fire

- Cigarettes stubs thrown all over
- Faults resulting from electrical extension cords and appliances
- Improper handling of flammable materials
- Chemical reactions
- Heated surfaces

Classes of fires

There are 5 classes of fire namely:

- Class A – Ordinary fire with wood, cloth, paper, rubber etc.
- Class B - Flammable liquids and gases like petrol, grease etc.
- Class C- Energised electrical equipment and wiring lass D- Flammable metals such as aluminium, magnesium, potassium etc.
- Class F- Caused by high temperature more than 360 degrees Celsius especially in the hotels, restaurants and at home.

Fire triangle

There are three elements of fire Oxygen, Heat and Fuel. In order for the fire to ignite these elements are required.





- Oxygen- It is found from the air
- Heat- It is found from open flames, electric appliances, hot surfaces and static electricity.
- Fuel- It is found from anything that is used to keep the fire burning e.g. flammable solids such as wood, coal, paper etc.; gases and liquids such as paraffin, petrol etc.

ASSESSMENT 1



Activity 1

1. What is safety?
2. List 5 workshop rules and regulations.
3. List the five main categories of safety signs.
4. What does housekeeping mean?
5. Complete the following table

Picture	Name
	
	
	
	
	
	
	



Activity 2

6. Mention five classes of fire.
7. Draw and label a triangle of fire.
8. Explain the term First Aid.
9. What will you do when a person is injured in a workshop?
10. Match the columns. Match the most appropriate definition with the type of injury. Write the question number and the letter of the correct answer only e.g.

COLUMN A	COLUMN B
Type of injury	Definition
10.1 Fracture	A. be caused by loss of balance that happens when one or both feet is disturbed.
10.2 Cut	B. may be caused by flames, heat, chemicals and electricity leading to skin damage.
10.3 Trip	C. When an irregular body movement happens it disturbs balance
10.4 Fall	D. this is a very painful injury which can be caused by tripping, slipping and falling
10.5 Burns	E. May be caused by a chisel, razor, marking knife or the sharp edge of paper.

CHAPTER 2

TOOLS AND EQUIPMENT

Measuring and marking tools

A woodworker has to plan and prepare for any project he/she has to construct, for an example a chair, table, cabinet etcetera. The planning will also include the size of the project and that is where the measuring and marking tools come in handy. Measuring will ensure that the sizes on the plan are transferred correctly to the real project and that is one of the reasons why it is important to know how to use measuring and marking tools.

Steel rule



A steel rule is used to take measurements. It is made out of steel as the name indicates. The sizes range from 300mm; 600mm and 1000mm. Steel rulers are also especially useful when measuring and setting out on flat surfaces where a tape hook could present difficulties in terms of accuracy. It is also a handy measuring tool for small projects as well as measuring for joint construction. To keep the steel rule in perfect working condition it is important to take good care of it by not allowing it to drop. Also do not knock it against objects or bend it as this will affect its straightness and accuracy.

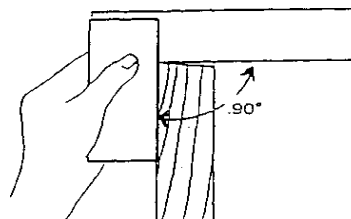
Tape measure:



The tape measure is used for taking and transferring measurements where steel rules are too short to take full measurements. It is flexible, which allows it to go around bends or corners.

It has a locking key to keep the blade in place while in use and the blade is able roll back into the case for storage after use. The sizes of the blade vary from 3 meters, 5metres, 7 meters right up to 10 meters. To keep it working properly you must be careful when the blade returns to its housing. Also do not push or force the blade back into its case. If the tape does not have a stopper or hook in the end, do not use it. Dropping the tape can damage its housing and its hook.

Try square



Source: Toolnut.com

Testing for a right angle on a work piece

The try square is used to test whether materials are square. It used with a marking tool to draw right angle lines on a given surface. Do not drop it onto hard surfaces because the right angle could be affected. Always apply a small amount of oil to the blade before storage to prevent it from rusting.

Marking gauge



Source: Cktools.com

A marking gauge is used to mark sharp parallel lines into the surface of timber to mark for wood joints. It is also used for setting out for dowelling. For safe handling do not allow the spur or pin to come into contact with your fingers. Always push the gauge forward and not pull towards you.

5. Bradawl



Source: Wonkee Donkee tools

A bradawl is used for making pilot holes/ marking centers on hard wood before drilling a hole. It also makes indentations in timber to ease the insertion of nails and screws.

For effective use the pin should always be kept sharp. For safety do not touch the point or use without a handle or if the handle is cracked. Do not drop it- re-sharpening may damage the tempering.

Cutting tools:

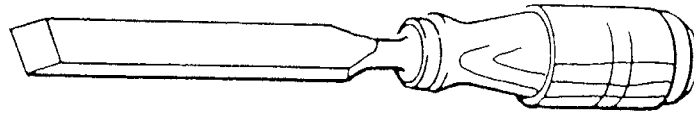
Firmer chisel

(a) Bevel edge Firmer chisel



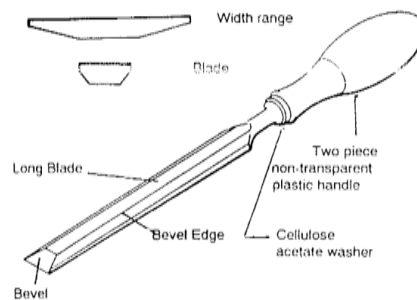
A bevel edge firmer chisel is used for paring and lighter work such as cleaning up corners of joints. Because of its bevel edge blade, it is safe to pare through grooves without damaging the edges/ sides of the work piece.

(b) Square edge/ butt Firmer chisel



Square edge/ butt firmer chisels are used to make recesses for hinges or locks. They require extreme care while using them to clean the trenches so that the square edges may not damage the sides of the trenches. Never use a chisel as a screw driver. Never drop a chisel since it will result in a blunt cutting edge or broken handle. The plastic protective cap should always be replaced after use. For personal safety always work with cutting edge away from your body. It must not be used without a handle or if the handle is cracked. If the chisel is blunt do not use it.

c) The Paring chisel



The paring chisel has a long thin bevelled edge blade and because of its light construction, is not for use with a mallet. For paring work such as finishing off joints and light shaping

Tenon Saw



Source: Shutterstock.com

The Tenon saw is used for cutting small pieces of timber along or across the grain. It achieves a finer cut than the rip saw or cross-cut saw. It is especially handy for cutting out Tenon joints. It is important to ensure that the stiffening rib is intact and is not bent and that the handle is not cracked. Ensure that the handle is secured firmly to the blade. Only cut timber with the Tenon saw and do not use a saw with blunt teeth.

Panel saw



Source: Stanley tools.com

The panel saw has the finest set of teeth compared to the rip and cross cut saw. It is used for cutting small sections of timber. It also is useful for cutting of panels, profiles, solid-wood, plywood, MDF, laminates, plastic sheets and melamine sheets into sizes or cabinet components. Ensure the blade is firmly attached to the handle. Do not use a saw with blunt teeth.

Knocking tools

Claw Hammer



Source: Wikipedia

The claw hammer is the most popularly used hammer in carpentry and is mainly used for heavy carpentry work. It is used to drive in and extracting nails with the claw part. For safety always ensure that the hammer head is firmly attached to the handle. Keep the handle free of oil. Do not knock the head of two hammers against each other.

Warrington hammer



Source: Pinterest

The Warrington pattern hammer is a light furniture making hammer with a pin. Because of its small size it is mainly used for driving oval brads and panel pins (smaller nails). It is also used drive smaller nails into corners where a claw hammer cannot reach. It is mostly used in cabinet making. The pin is used to drive in small panel pins. For personal safety replace cracked or splintered handles. Make sure the head is securely attached to the handle. Keep the handle free of oil.

Wooden mallet

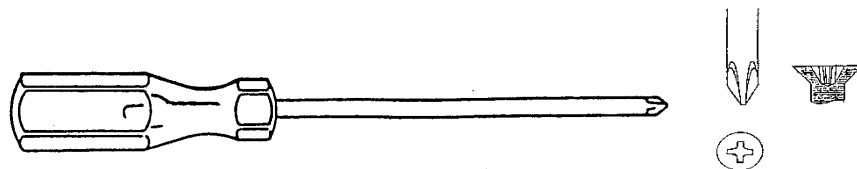


The wooden mallet is used to knock chisels into wood. It is made out of wood, usually beech. It is also used to knock wood joints together when assembling. To preserve the tool do not knock the heads together. It must not be immersed into water since it is wooden. Do not drop the tool.

Screw Driving tools:

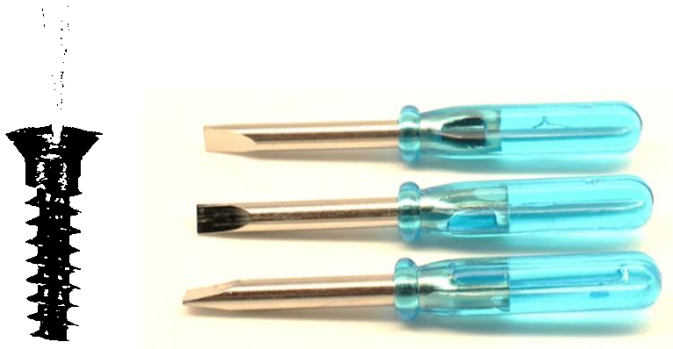
A screwdriver is used to drive in screws and/or loosening them. A screwdriver consists of an alloy steel shaft that is shaped at one end to fit the slot of the screw head. The other end of the shaft is fitted with a handle.

Phillips Screwdriver



These screwdrivers have tips that are shaped to fit the crossed slots of Phillips head screws. For safe handling always select the correct size screwdriver with a properly shaped tip. Do not use the screwdriver as a chisel. Ensure that the tip of the screwdriver is inserted properly into the screw slot when using the screwdriver. Do not attempt to use a screwdriver that has no handle or a cracked or broken handle.

Flat screwdriver

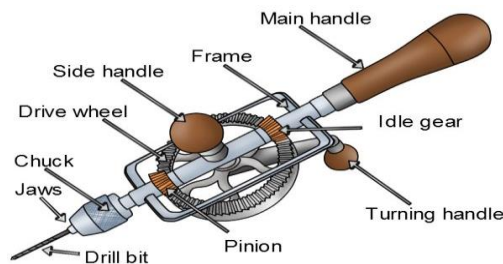


Source: dfsreloading

The flat screwdriver has a tip that is shaped to fit slotted screw heads and is called a standard, common blade, flat-blade, slot-head, straight, flat head screwdriver. For safe handling always select the correct size of the screwdriver with the appropriate tip. Do not use the screwdriver as a chisel. Ensure that the tip of the screwdriver is inserted properly into the screw slot when using the screwdriver. Do not attempt to use a screwdriver that has no handle or a cracked or broken handle. The tip should fit snugly in the slot of the screw. Do not use a hammer on the handle of the screwdriver.

Boring tool:

Hand drill (wheel brace)



Source: Visualdictionaryonline

A hand drill or wheel brace is used to hold and drive drill bits of different sizes while drilling holes into materials. For safe use take care not to trap your fingers between the drive wheel and side. Ensure handles are attached firmly to the body of the tool. Use both hands when using this tool and ensure that the drill bit is secured properly into the chuck of the tool.

Finishing tools:

Smoothing plane



Source: StrandHardware

A smoothing plane is a bench plane that is used to produce a smooth finish and flatten the surface of the wood, to create a classy, finish-ready surface. For safe and correct handling always keep the blade/ cutting iron of the plane sharp at all times. Never drop the plane as the body is brittle. Always store the plane on its side or with its blade lifted above the sole of the plane so that the cutting iron will be protected against damage.

Try plane (jointer plane)



The trying plane is used to achieve true flat surfaces and perfectly straight edges, e.g. planing the edges of boards which are to be joined to make a wide table top. For safe and correct handling always keep the blade of the plane sharp. Never drop the plane as the body is brittle. Always store the plane on its side or with its blade above the sole of the plane so that the cutting iron will be protected.

Jack plane



The jack plane is used to smoothen timber surfaces. As its name suggest it is a 'jack of all trades'. It is slightly bigger than the smoothing plane and will achieve perfect straight edges. Always keep the blade of the plane sharp and never drop the plane as the body is brittle. Store the plane on its side or with its blade above the sole of the plane so that the cutting iron will be protected.

Wood rasp

Rasps are classified according to their coarseness. From smoothest to coarsest, these are: dead smooth, smooth, second cut, bastard and coarse.



Use: A rasp is used to remove parts of timber quickly. It is used to shape concave and convex surfaces. Wood rasps have coarse teeth that are raised on the blade of the rasp. They have a very rough cutting action and tend to splinter the timber. Do not use a rasp without a handle or with a cracked or broken handle. Keep fingers away from the timber surface when the rasp is being used. Flat side for quick levelling and rounding of wooden materials.

Sanding block

Sanding blocks can be made from rubber, foam, cork, wood. etc.



Source: game.co.za

Source: axminister.co.uk

Use:

A sanding block hold/ keep the sand paper in place whilst sanding a material. For safe handling do no use a damaged sanding block. Keep fingers a safe distance away from the timber that is being sanded and ensure that the sandpaper is firmly attached.

Assessment 2



Activity 1

2.1 Identify and state the uses of the following measuring and marking tools:

2.1.1



2.1.2



2.2 Identify and state the uses of the following cutting tools:

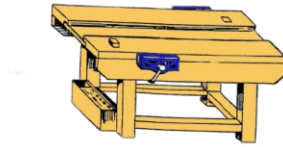
2.2.1



2.2.2



2.3 Identify and state the use of the following item.



2.4. Work in groups and collect two pictures of each of the following different types of tools.

2.4.1 Measuring and marking tools

2.4.2 Cutting tools

2.4.3 Cutting tools

2.4.4 Knocking tools

2.4.5 Driving tools

2.4.6 Finishing tools 🌀

CHAPTER 3

POWER TOOLS

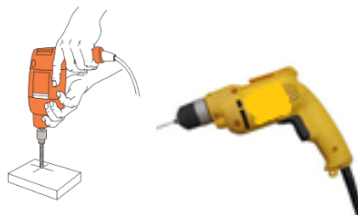
Definition

Power tool is a tool that is activated by an additional power source and mechanism other than the solely manual labour used with hand tool.

Electric power drill

Power drill is an electric motor that rotates a replaceable drill bit to make a hole in different types of material such as metal, masonry, metal or plastic.

The power drill is available in various sizes and different capacities. The most common size is the 13 mm chuck. The housing which is made of non-conducting material can accommodate a two or three speed small gear-box. Some machines are fitted with reversible mechanism to screw or unscrew.



Uses

It is used for drilling round holes using different accessories. It is fitted with a bit, either a drill or driver, depending on application, secured by a chuck. Some powered drills also include a hammer function to make holes in the wall.

Safe handling/ care

- Make sure the equipment is tightly secured in the chuck.
- Remove the chuck key from the chuck before switching the machine on.
- Make sure the machine has come to a standstill before it is put down.
- Secure small pieces of the material to a vice before commencing with the drilling.
- To avoid damaging the armature make sure the machine is switched to a full speed before it is used.
- Safety personal equipment must be worn when using the power drill.

Orbital sander



Orbit/random orbit sander

The random orbit sander is hand-held power tool at which the angle of rotation of the head and disk is variable. It combines the speed and aggressiveness of a belt sander with the ability to produce a finer finish. The machine is light and is fitted with a bag to catch most of the dust. The size of the machine is determined by measurement of the sanding pad.

Uses

- It is used for final sanding of surfaces before polishing.
- It is used for final sanding board edges before polishing.
- It is used for sanding between layers of varnish.

Safe handling/ care

- Keep the power cord out of the way of the sanding pad.
- Keep the machine steady with both hands.
- Wear personal protective equipment such as mouth musk.

Jig saw

It is a power tool made up of an electric motor and a reciprocating saw blade which moves up and down when it is in use. It has a sole plate that have a beveling function that allow to cut straight of angles.



Uses:

- Is used for cutting straight on a material up to 40 mm thick.
- It is used to across the grain of the material up to 40 mm thick.
- It is used to cut curves in material up to 40 mm thick.

Safe handling /care

- Always put the machine in the saw position before switching on the power.
- Always keep the power chord away from the cutting blade.
- Choose the correct type of blade for a specific job.
- Disconnect the power supply when replacing the blade or adjusting the sole plate.
- Secure the work piece on the bench before commencing with the cutting.

MACHINES

Drill press

It is an upright drilling machine in which the drill is pressed to the work piece by a hand lever or by power. The work piece must be secured or clamped in a vice resting on a table.



Drill press



Drill press



Industrial drill press



Vice

Uses:

- The drill press is use for drilling hole of various depth and diameter.
- Drum sanders of various sizes and shapes of can used to sand curves and edges with cylindrical sanding belt grids.
- Can be used for mortising if the correct attachment for mortises are used.

Safe handling/ care

- The drill press must be well fixed to the ground or work-bench
- The chuck must be well secured to the spindle.
- The feed lever must always be used to move the spindle upwards and downwards.
- Table clamp must be well clamped to avoid movement of the table.

Belt and disc sander

It is a sander used to shape and finish wood and other material. It consists of an electric motor that turns a pair of drums on which a continuous loop of sandpaper mounted.



Uses:

- Used for end grain sanding.
- Used for surface sanding along with the grain.
- Used for surface sanding diagonal with the grain.
- Used for sanding concave edge.
- Used for sanding convex edges.

Safe handling/ care

- Always check if the sanding belt runs correctly with the drums.
- Check that the correct tension is applied to the sanding belt.
- Check that the sanding disk is properly attached.
- Keep hand away from the moving disk and belt.
- Avoid sanding small pieces of material.

ASSESSMENT 3



Activity 1

Question

Identify and state the uses of the following portable power tools:

1.



2.



3.



Machines

Activity 2

Identify and state the uses of the following machine:

1.



2.



CHAPTER 4

MATERIALS

Introduction:

The woodworking industry uses a variety of material such as South African pine, Meranti etc. and a number of manufactured boards such as hardboard and plywood. These materials are used for different purposes. It is very important that these materials are of good quality and that one understands where each material is supposed to be used (e.g. some materials are easy to work with and others are not).

Types of materials:

Wood

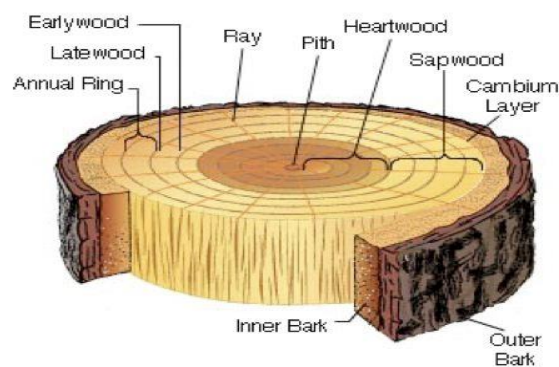
Wooden material is classified into two botanical/scientific categories, namely hard woods and soft woods.

Most hard woods are not hard when you work on and the same applies to soft woods.

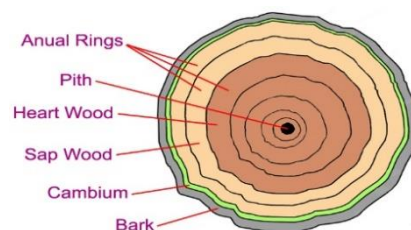
An example of hard wood is meranti, it is used for furniture, window frames, panelling etc.

An example of a soft wood is South African Pine (SA Pine), usually used for roofing and carpentry structures.

The structure of a tree trunk:



The cross section of a tree trunk



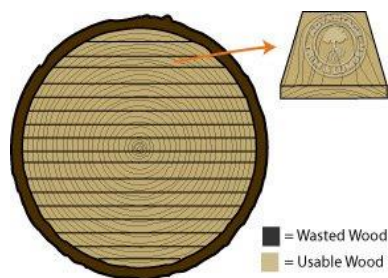
Conversion of timber

Conversion of timber means cutting of logs into slab sizes of timber suitable for use in the market place. The method of cutting depends on the following:

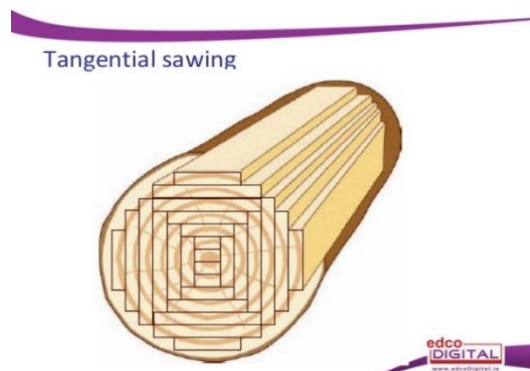
- Size required
- Quality of the logs.
- The kind of timber,
- Purpose for which the wood is to be used.

Methods of conversion.

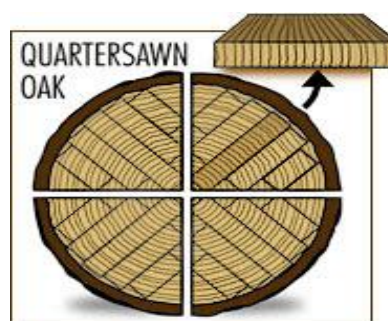
- Through and through/Economical or plain method



Square method



Quarter sawing method



Timber defects:

Drying off is a natural process exposing it to various defects that may cause it to be less productive. These defects include the following:

- a) Heart shake: In heart shake the pith of the tree rot as a result of insufficient food.
- b) Cup shake: In cup shake the wood around the annual rings separate as the medullary rays do not bind the annual rings together.

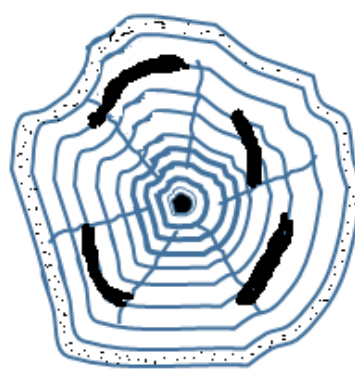
These defects are diagrammatical presented below:

c) Heart shake

d) Cup shake







HEART SHSKE



CUP SHAKE

Solid wood (Soft and Hardwood) is available in the following standard sizes:

SIZE	Pictures	LENGTHS
38x38 (mm)		From 0.9 m - 6.6 m
76x50 (mm)		From 0.9 m - 6.6 m
114x38 (mm)		From 0.9 m - 6.6 m
228x38 (mm)		From 0.9 m - 6.6 m

Manufactured boards

Manufactured boards are manmade. They are manufactured by processing wood, usually from wood that could not be used as higher grade, during conversion on timber.

Hardboard



Hardboard is a manufactured board. It is used as backing in cabinets and furniture etc. Hardboard is commonly known as Masonite.

Hardboard is available in the following panel sizes:

Length	Width	Thickness
2400 mm	1200 mm	3,2 mm , 4.8 mm and 6.4 mm

Plywood





Plywood is also a manufactured board. It is used for formwork, boats, sports equipment; music instruments etc. It is made of thin alternating layers of veneers glued together. Each layer is glued with the grains at right angle to the next layer.

Plywood is available in the following standard sheets:



Length	Width	Thickness
2440 mm	1220 mm	3 mm to 32 mm

Characteristics of Wood.

Soft wood






Wood	characteristic
South African pine 	<ul style="list-style-type: none"> • Light to dark yellow in colour • Straight grain • Easy to work, using hand and power tools • Easy to finish using varnish and paint
Cedar 	<ul style="list-style-type: none"> • Light brown to dark brown • Not easily attacked by insects • Has straight grains • Easily workable.

Hard wood

wood	characteristic
	<ul style="list-style-type: none"> • It is yellowish to reddish brown in colour. • Medium coarse but even. • Easy to work, using both power tools and hand tools. • Easy to finish using varnish
Kiaat 	<ul style="list-style-type: none"> • White to dark brown in colour. • Has good finishing

Characteristics of boards.

Manufactured boards

<p>Plywood</p> 	<ul style="list-style-type: none">• It consists of odd number of layers, starting from 3 to seven and more. (3 to 7 is a ply and more is called a multy - ply)• It can be used internally and externally.• The layers alternate at an angle of 90 degrees• Very strong
<p>Hardboard</p> 	<ul style="list-style-type: none">• It is made from wood fibre, fine chips or pulped wood waste.• It cannot be used outside because it absorbs water.• The fibres are rearranged and compressed together to form a hard panel.• It is stronger than wood.
<p>Chip board</p> 	<ul style="list-style-type: none">• A rigid board with a relatively smooth surface• It is difficult to burn• It is resistant to warping and will not splinter
<p>Supawood</p> 	<ul style="list-style-type: none">• Made by bonding fine wood fibres• Easy to work with when using machine• It can be shaped without chipping.
<p>Soft board</p> 	<ul style="list-style-type: none">• For insulation in the ceiling, and under floor boards• Good insulator for sound and heat• Used for notice boards and pin boards.

Cutting list

This is a list taken from a drawing of a project to be manufactured, where different parts are tabled so as to know exactly how much material will be needed to complete the project.

Title: Bench

Item /Part	Number	Length	Width	Thickness	Material

The title: Is the name or description of the project e.g. Bench hook

Item or Part: Means the member you want to list, for instance if the project is a bench hooks. (Base, stop, hook)

The number: Number of bases is usually one and you will write that in the same row but in the second column.

Length: How long is the base

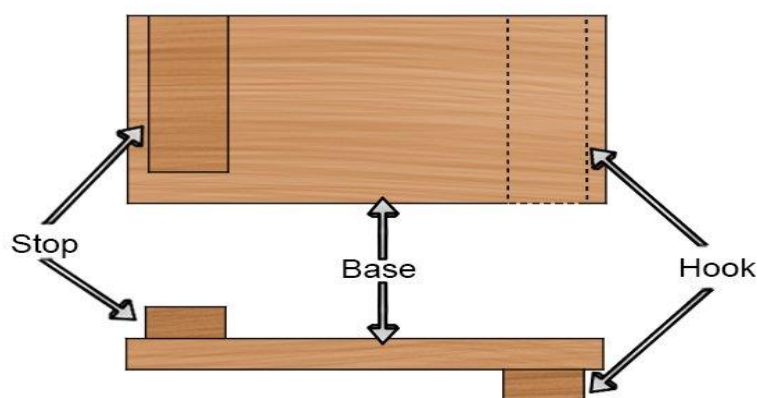
Width: How wide the base

Thickness: How thick the legs will be

Material: Which material is to be used

After you've completed the first row then you move on to the second row and list the next part until all the parts are completed.

Cutting list of a Bench hook



Assessment 4



Activity 1

1. Describe any TWO characteristics of the following boards.
 - 1.1 Soft board
 - 1.2 Chip board
2. Make a neat drawing showing a section through a tree trunk and label the parts.
3. Write down any one type of timber conversion and draw it.

Activity 2

1. Make a freehand sketch of a sectional view of a tree trunk and indicate the following parts:
 - Annual rings
 - Sapwood
 - Heart wood
 - Cambium layer and
 - Bark
2. List three methods of converting timber into usable solid boards
3. Make a rough BUT clear drawing of a quarter sawn method, showing the end grains.

CHAPTER 5

GRAPHICS AS MEANS OF COMMUNICATION

Introduction

Graphics are visual images or designs on some surface. In modern-day usage, it includes a pictorial representation of data, as in manufacturing, in graphic arts, and in educational softwares.

Communication is the act of assigning meanings from one entity or group to another through the use of mutually understood signs, symbols, and semiotic (the study of signs and symbols and their use or interpretation) rules.

Graphic communication is any form of communication that depends on visual signals to transmit a message to people. Is the exercise or field of creating drawings using different line types that communicate ideas visually on how something functions or is constructed.

The language of graphics includes:


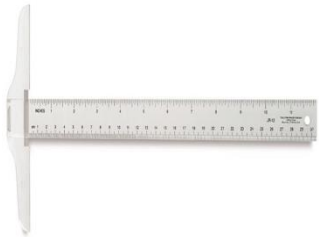
Being able to visualise a drawing,

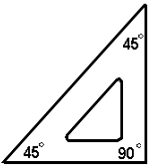
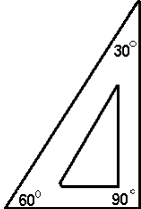


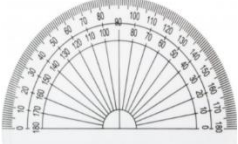


Knowledge and understanding of drawing principles and practices




The design processes

General drawing principles

Drawing Instruments

Name	Use	Care
 Drawing Board	It is used for any kind of drawing , writing or sketching on a piece of paper	Clean your board use a house hold degreaser or low odour white spirit
 T- Square	It used to draw horizontal lines and as guide when drawing vertical lines	Wipe with clean cloth preferable yellow duster

 <p>45° Set square</p>	<p>It is used to draw parallel lines, perpendicular , standard measure angle (45°and 90°)</p>	<p>Wipe with clean cloth preferable yellow duster</p>
 <p>30°/60° Set square</p>	<p>It is used to draw parallel lines, perpendicular , standard measure angle (30°60°and 90°)</p>	<p>Wipe with clean cloth preferable yellow duster</p>
  <p>Scale Rule</p>	<p>It used to measure the length, width and height.</p>	<p>Wipe with clean cloth preferable yellow duster</p>
  <p>Protractor</p>	<p>It is used to measure the angles.</p>	<p>Wipe with clean cloth preferable yellow duster</p>
 <p>Compass set</p>	<p>It is used to draw the draw the circles and arcs</p>	<p>The lead on the compass must be kept sharp.</p>

 <p>Pencil</p>	<p>It is used for lettering, drawing straight and curved lines.</p> <p>Pencils comes in different grades (H,B, F and HB)</p>	<p>Keep it sharpened at all times</p>
 <p>Pair of dividers</p>	<p>It is used to transfer the measured distances on maps and drawing</p>	<p>Always insure that the points remains sharp for accuracy</p>
	<p>It is used to clean the dirt off the drawing. It is also used for making changes for correcting errors in drawing.</p>	<p>Use cotton cloth or soapy water to clean it. It must be totally dry before use.</p>

Dimensioning

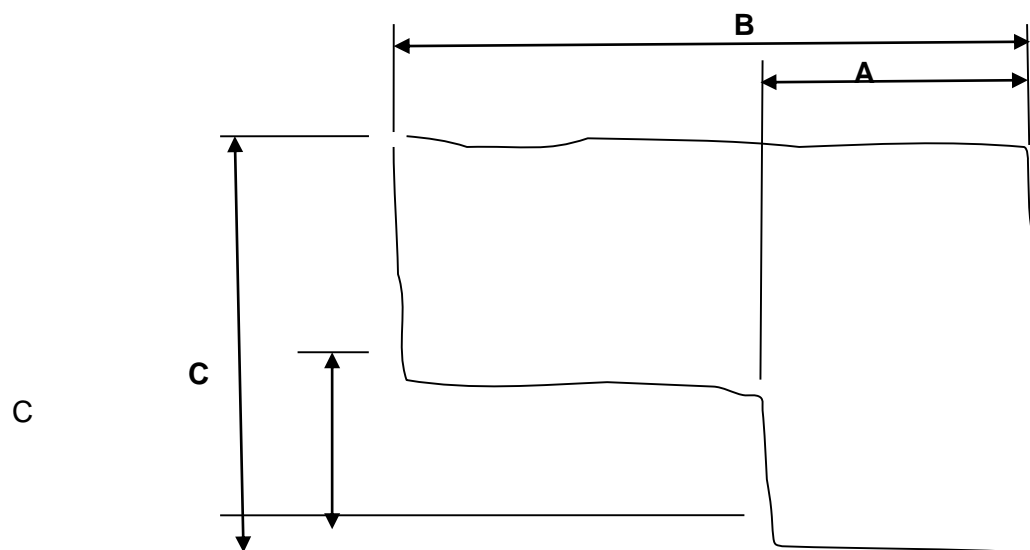
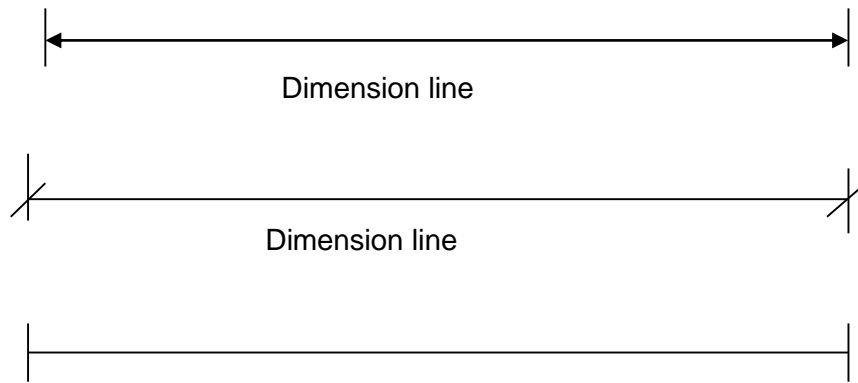
Dimensioning is a process of measuring the length, width or thickness.

The purpose of dimensioning is to provide a clear and complete description of an object.

Dimensions should follow the following guidelines:

- All measurement must be strictly done in millimetres (mm)
- The given values should be accurate
- Dimensions must be placed in correct positions
- Correct dimension lines must be used
- Dimension lines must not touch the object (or the drawing)

Examples of dimension lines






Line types

Lines are patterns of dashes, dots, text, and symbols, or unbroken and continuous. Line types are visual properties assigned to orderly objects.

Types of lines used in woodworking

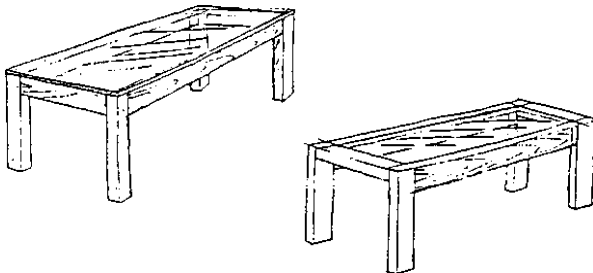
- Outline
- Construction lines
- Hidden detail lines

	Line type	Application	Description
A		Visible line	Continuous thick (0.5 mm)
B		Construction line	Continuous thin (0.3 mm)
C		Hidden detail line	Dashed line (0.3 mm)

Differences between freehand drawings, sketches and scale drawings.

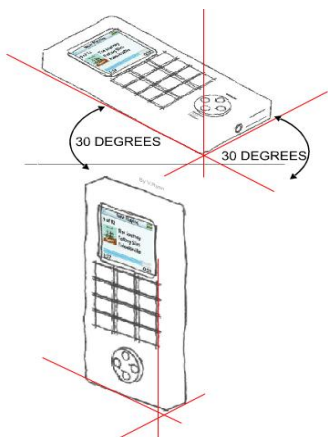
Freehand drawings:

A drawings drawn without the use of drawing instruments. These may be rough freehand pencil sketches - usually in perspective (3-D). The aim is to determine the general form of a design, to communicate ideas between client, manufacturer, manager and employer. See figure below.

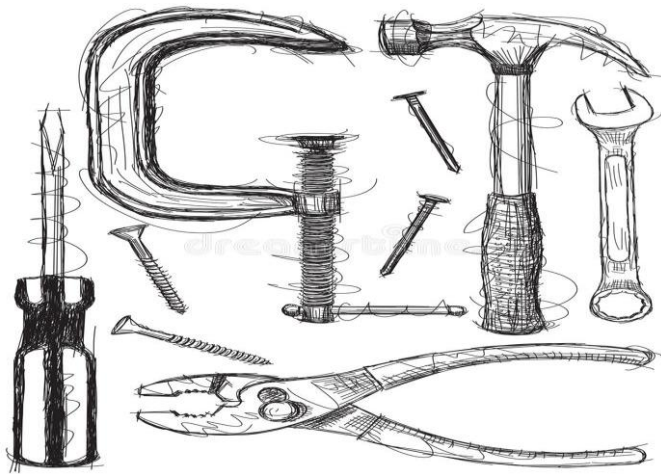


Sketches: Are drawing that are usually rapidly drawn by hand on paper, planned to show the approximate shape or appearance of a part, machine or structure. It allows the designer to draw in 3D quickly and with a reasonable degree of accuracy.

See figures below.



Source: www.technologystudent.com



Source: <https://www.bing.com/images/search?q=Tool+Sketches&FORM=IRIBEP>

Scale drawing: A drawing that shows a real object with exact sizes reduced or enlarged by a definite amount. When object/ component is either small or large to be drawn or represented on paper, scales are used.

Reasons for Scaling

In most instances, the object to be drawn is larger than the paper size. The drawing must therefore be scaled down using a scale rule.

The same scale is not always used for all drawings on the one sheet. For clarity, details (ie. joints) may be drawn to a larger scale, and this scale is generally indicated on the drawing.

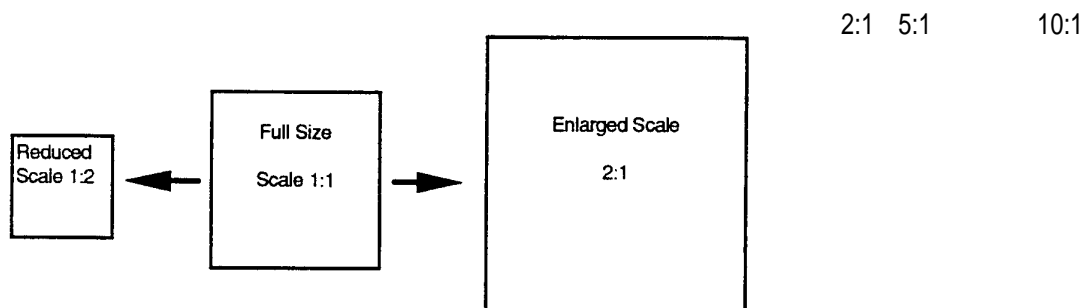
Recommended Scale Ratios

Full Size 1:1

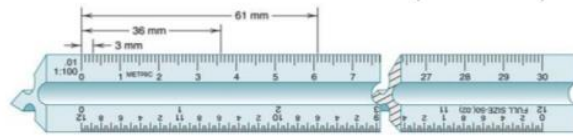
Reduction ratios (for drawings smaller than full size)

1:2	1:20	1:200	1:2000
1:5	1:50	1:500	1:5000
1:10	1:100	1:1000	1:10000

Enlargement ratios (for drawings larger than full size)



Metric Scale



- Metric Mechanical Drawings are drawn in inches.
- Metric Civil Drawings are drawn in meters.
- Scale
 - 1:1 Full Size
 - 1:2 Half Size
 - 1:5 Fifth Size
 - 1:10 Tenth Size

Assessment 5



Activity 1

4.1 Identify the following line types

- a) _____
- b) _____
- c) - - - - -

4.2 Explain the difference between freehand drawings, sketches and scale drawings.

4.3 Draw freehand sketches in good proportion of the following tools.

- 5.3.1 Claw hammer
- 5.1.2 Screwdriver (straight slotted/ flat)

CHAPTER 6

FASTENERS AND FITTINGS

Fasteners:

These are materials used when two materials are to be joined and the connection must be strong. These materials include:

- Panel pins
- Round wire nails
- Countersink woodscrews (Slotted and Phillips)
- Cut screws

Panel pins

These are round nails used by woodworkers for making cabinets, picture frames, fixing small mouldings etc.



Round wire nails

These are round nails used by woodworkers for general carpentry work where strength is needed. These nails have a round head.



Countersunk woodscrew (Slotted and Phillips)

These screws have a head that flushes with the timber surface and in some cases the head is pushed below the surface and hidden by means of filler or screwcaps. Their lengths vary from 12mm to 100mm.



Cut screws

These screws are ideal for joining wood and metal together. These screws are capable of cutting into wood and metal without making pilot holes hence the name cut screw.



Fittings

These are items used to assemble a project or for beautifying purposes e.g. hinges, locks etc.

- Butt hinge
- Piano hinge
- Door lock
- Cupboard lock

Butt Hinge



Use: For hanging doors

Piano hinge



Use: For tall light wardrobe doors and piano lids

Door lock



Use: They provide safety and security in households. They act as the barrier to keep your facility and workspace safe for privacy.

Cupboard lock



Use:




They offer a **locking** facility to a **cupboard** door, often **used** in office furniture **cabinets**.




Assessment 6



Activity 1

Name and identify fasteners and fittings in the table below.

Fasteners	Identify and name
6.1 	
6.2 	
6.3 	

Fittings	Identify and name
6.4 	
6.5 	
6.6 	

CHAPTER 7

7. JOINING

INTRODUCTION

It is part of woodworking that involves joining together pieces of wood or timber, to produce more complex items. Some wood joints are employs as fasteners, bindings, or adhesives while others wood elements. Wood can be joined by means of nails, screws and adhesives. However, making the suitable wood work joint will produce a neater, strong and solidly built joint.

Learner should be able to sketch with free-hand drawing the following joint

- Corner halving lap joint.
- Straight half lap joint
- Butt joint

Main purpose of joining

It is to join wooden parts together, their construction should be done carefully, so it would not weaken parts that are joining.

Characteristics of wooden joints

- Strength
- Flexibility
- Toughness
- Appearance etc.

Types of basic joints in woodworking

Lap joint

What is a lap joint?

- Lap joint simply refers to the process of joining two pieces of a project by overlapping them.

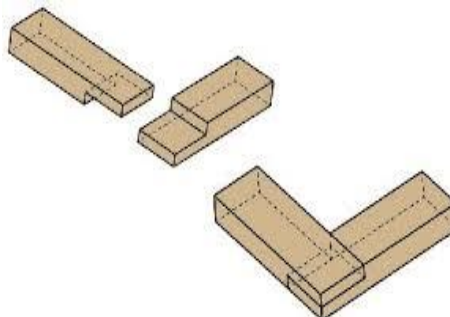
Advantage of lap joints

- They are quick and easy to make.
- They provide high strength through good long grain gluing surface.
- The shoulders provide some resistance to diagonally distortion.
- They may be reinforced with dowels or mechanical fasteners to resist twisting of the wood.

Corner half-lap joint

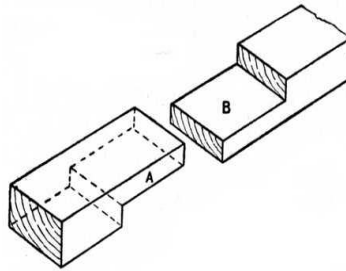
Corner half-lap joint - this type of joint connects corners of frames.

When the joint forms a corner, as in a rectangular frame, the joint is often called a corner half lap.



Straight half - lap joints

Straight half-lap joint – is used to join planks lengthwise.



The properties of straight half-lap joint

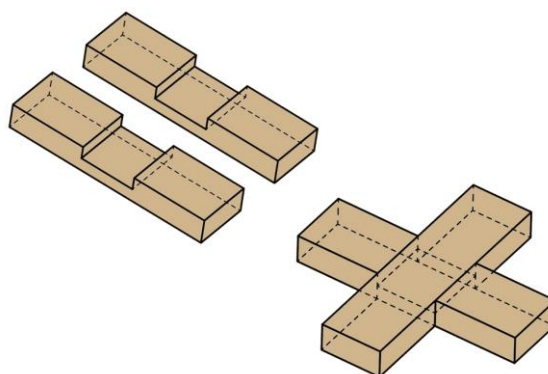
- It is used extensively in transition and cabinetry for framing.
- They are quick and easy to make.
- Provide high strength through long grain to long grain gluing surface.
- The shoulder provides some resistance to racking (diagonally distortion).

Use of half-lap joint

- Making of frames for pictures.
- Make perimeter door frame for panel or glass doors, dust, dust dividers in cabinet.

Cross half-lap joint

- Cross half-lap joint – overlapping joints/or when two rails cross at any angle, this type of joint is used.



Advantage of cross half-lap joint over other lap joints

- When it comes to support for furniture, it offers a big advantage over other joint types in that they tend to be sturdier, less obtrusive, and more aesthetically pleasing than simple lap joint. us

The use of cross half-lap joint

- It is used to create beautiful, continuous lines in wooden structures and furniture.

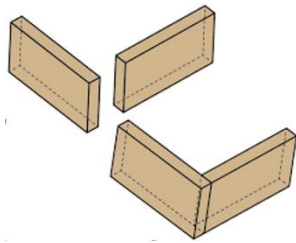
Butt joints

Butt joints is an easy woodworking joint.

It joins two pieces of wood by merely butting them together.

The butt joint is the simplest joint to make.

It is also the weakest wood joint unless, the use some form of reinforcement.



Assessment 6



Activity 1

1.1 Identify and make free hand sketches of the following joints in an exploded view.

- 1.1.1 Corner halving joint
- 1.1.2 Longitudinal half lap joint
- 1.1.3 Butt joint

1.2

1.2.1 Identify and make free hand sketches of the following joints in an exploded view.