Ethiopian TVET-System

Furniture Making L-II

Based on Sept. 2012G.C. Occupational standard

Module Title:- Producing Furniture Components and Fixtures

TTLM Code: IND FMK2 TTLM 0919v1

This module includes the following Learning Guides

LG08: Prepare materials for fabrication of component parts

LG Code: IND FMK2 M03LO1-LG-08

LG09:Lay-out dimension of furniture component parts

LG Code: IND FMK2 M03LO2-LG-09

LG10:Assemble furniture component parts

LG Code: IND FMK2 M03LO3-LG-10

Instruction Sheet -1	LG08: Prepare materials for fabrication of component parts

This learning guide is developed to provide you the necessary information regarding the following **content coverage** and topics –

LO1 **Prepare materials for fabrication of component parts**

1.1. Personal protective equipment (PPE)
1.2. Interpreting working drawing up on job specifications
1.3. Job requirements.
  1.3.1. Select and prepare *Materials*
  1.3.2. Select and prepare *hand and power tools and equipment*
1.4. Requirements for re-checking the materials
1.5. Respond Unexpected situations
  1.5.1. Injury to personnel
  1.5.2. Damage to materials
1.6. Housekeeping

This guide will also assist you to attain the learning outcome stated in the cover page. Specifically, upon completion of this Learning Guide, **you will be able to –**

- Select and use appropriate PPE according to job requirements and OSHC specifications.
- Interpret Working drawings according to job requirements.
- Select and prepare Materials, hand and power tools and equipment related with job requirements.
- Re-check quality of Materials and properly staged according to job requirements
- Reporting defective materials or not in specifications to superior.
- Respond unexpected situations to in line with company rules and regulations.
- Perform Housekeeping according to safety regulations.

1.1. Selecting appropriate PPE

Personal safety:-the following are safeties to be known

- Wear protective closing
- Don't handle the edge of cutting tools with bare hand
- Always remove burrs before handling

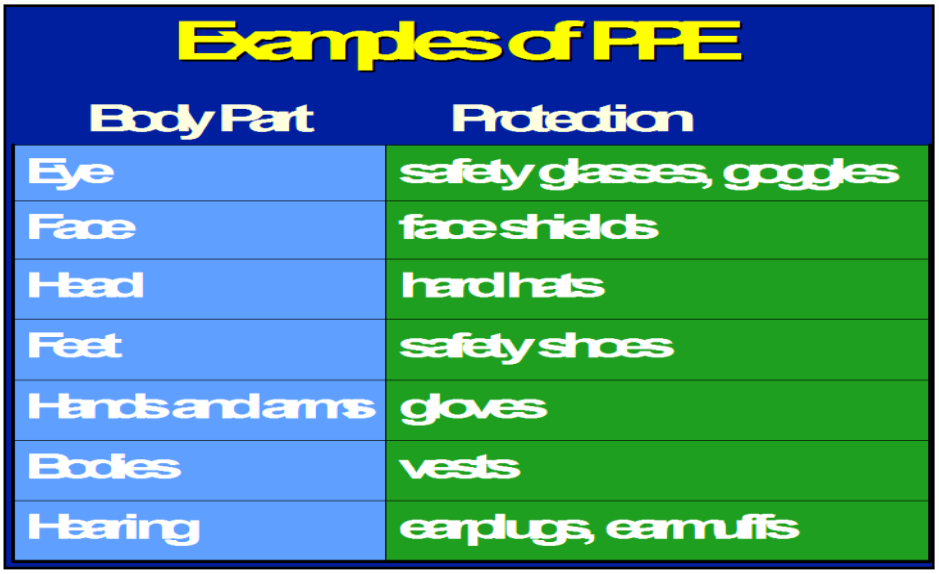
Work shop safety:-the following are safeties to be considered in the shop

- Avoid horse play
- Always clean the shop
- Apply 5S

Tools and equipment safety:-the following are safety to be considered in regard to tools and equipment

- Use tools and equipment properly. You have to use the right tool for the right job
- After completing your work collect tools and equipment and put at proper place.

Safety equipment is for you. It will protect you from injuryand may possibly save your lifeSo me of the more commontypes of safety equipment for your personal protection follow



1. **Goggles**

Proper eye protection is of the highest importance for all personnel. Eye protection is necessary Becauseof hazards Causedby infrared and ultraviolet radiation, or by flying objects suchas sparks, globules of molten metal, or chippd concrete andwood, etc. these hazards arealways present d

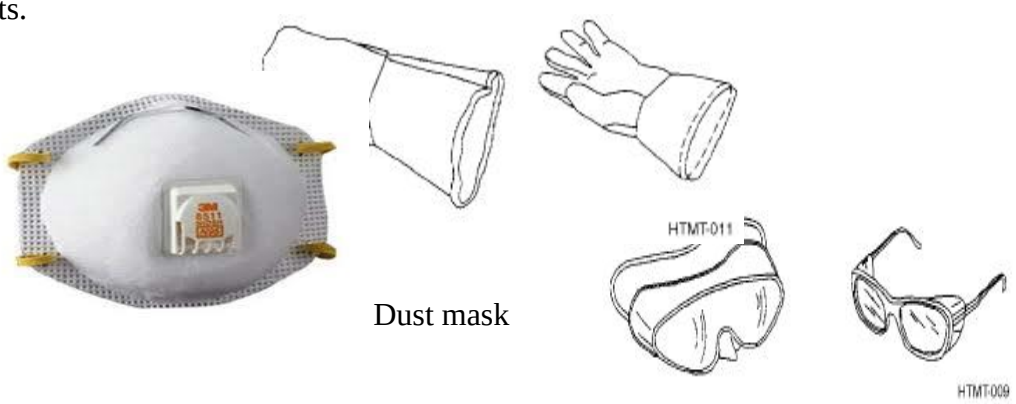
uring welding,cutting, soldering, chipping, grinding, and a variety of otheroperations. It is absolutely necessary for you to use eye protection devices such as helmets, handshields, andgoggles during eyehazard operations. Appropriate use of goggles will limiteye hazards.

Some goggles have plastic windows which resistshattering upon impact. Others are designed to limit harmfulinfrared and ultraviolet radiation from arcs or flames by theuse of appropriate filter lenses.

Remember, eye damage can beextremely painful. Protect your eyes

2. Dust mask

Face shields should be worn during drilling, chiseling or grinding operation on metal, store, and concrete. These operations produce dust and flaying chips which could be injurious to our internal parts.



. Dust mask

3. Gloves

Use gloves whenever you are required to handle rough, scaly,or splintery objects. Two types

are shown above.Specialflameproof gloves are designed for gas and electric welding inorder to limit danger and damage from sparks and other hot,flying objects.Personnel working

with electricity are usuallyrequired to wear insulating rubber gloves.Be sure to follow all regulations prescribed for the use ofgloves.Gloves must not be Wornaround rotating machineryunless sharp or rough material is being handled. If such is thecase, extreme care should be used

to prevent the gloves frombeing caught in the machinery.

4. Safety shoes

Safety shoes protect and prevent injury or loss of toes.Some safety shoes are designed to limit damagetoyour toes fromfalling objects. A steel plate is placed in the toe area of suchshoes so thatyour toes are not crushed if an object falls onthem.

Other safety shoes are designed for use where danger fromsparking could cause an explosion. Such danger isminimizedby elimination of all metallic nails and eyelets and the use ofsoles which do not cause static electricity.

5. Ear Protection

Proper hearing protection is a must when working with or around certain types of power tools. Some tools are capable of producing dangerously high noise levels which, if ignored, can result in serious hearing loss or injury. Use the hearing protection regularly.

6. Working clothes

These are important in all wood workshops. Wear the right clothes in the work shop. Take of cuts and sweaters. If you wear a tie, put it inside your shirt. Roll up your sleeves. If possible, wear a work shop apron.

Self-Check -1	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Write at least five PPE equipments

Note: **Satisfactory rating - 3 points** **Unsatisfactory - below 3 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Information Sheet-2	Interpreting working drawing depend on job specifications

Working drawing

A working drawing may consist of various drawings prepared by a designer to illustrate and explain details of the component parts of an artifact or a system he or she has designed. The details may include:

- Types of materials and fittings;
- Shapes and sizes of materials;
- Estimates for quantity and cost materials and fittings;
- Instructions for construction or manufacture.

The drawings must conform to universally accepted Standards and codes that canbe understood and interpreted by all the people who will use them. Generally, a working drawing consists of two parts:

- A detailed working drawing;
- Assembly working drawing.

The detailed working drawing as thename implies, is a drawing that shows thedetails of every Single component part ofthe artifact / system. The primarypurposes of the detailed drawing are:

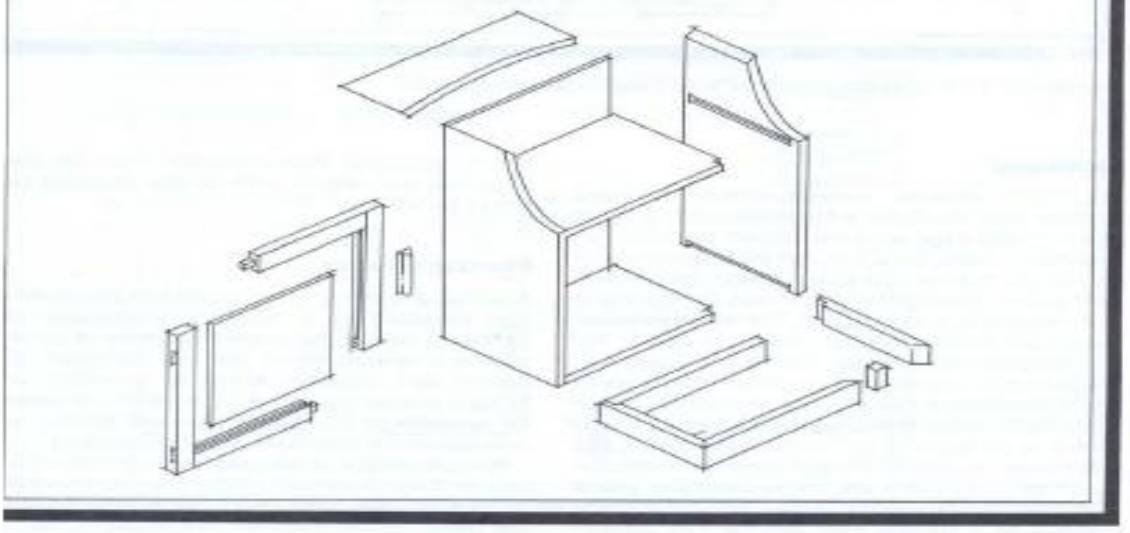
- To outline the shape of the object;
- To provide a size description (itindicates the dimensions of theobject);
- To describe the types of material(s)to be used for its manufacture;
- To provide any additionalinformation required forconstruction or manufacture.

An assembly drawing illustrates how theindividual components fit together to makea complete unit. It is drawn orthographically and pictorially (including an 'exploded isometric' orperspective view).

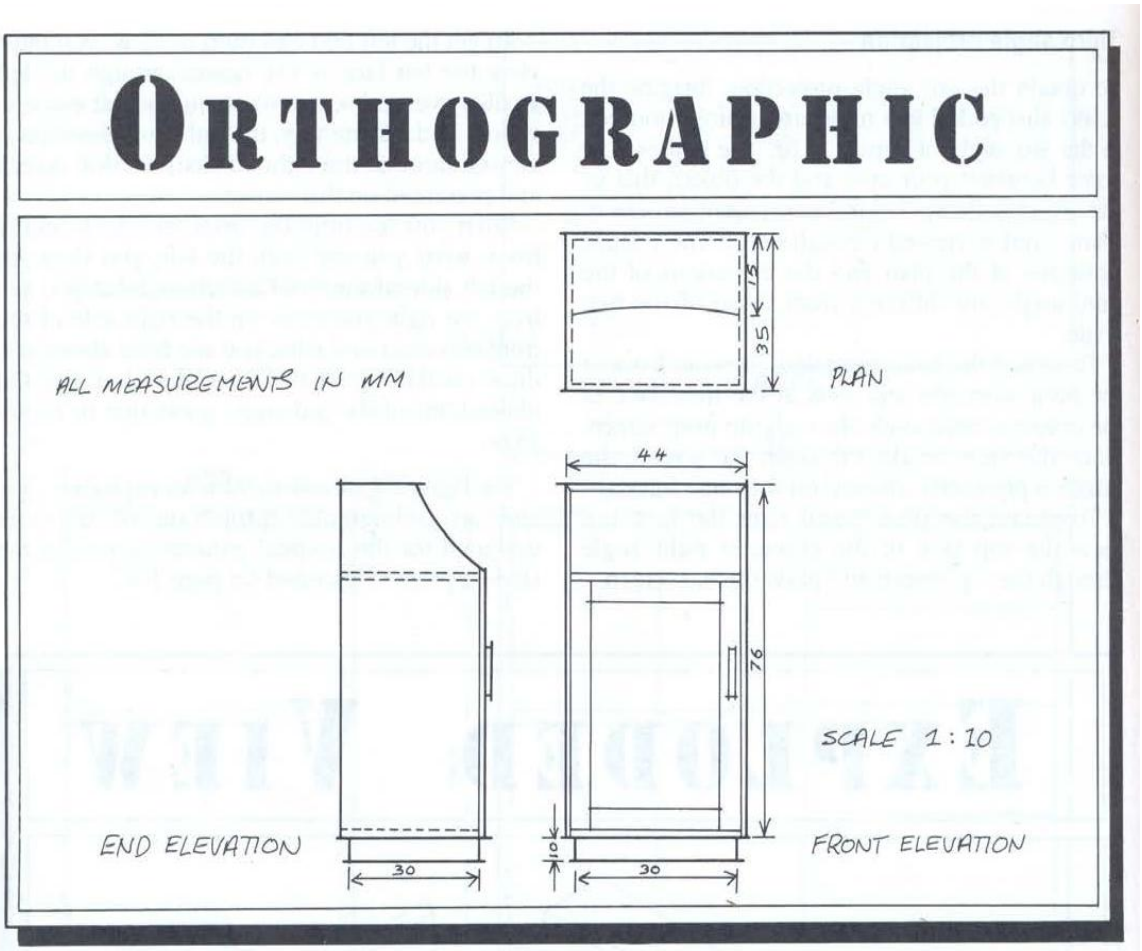
The main functions are:

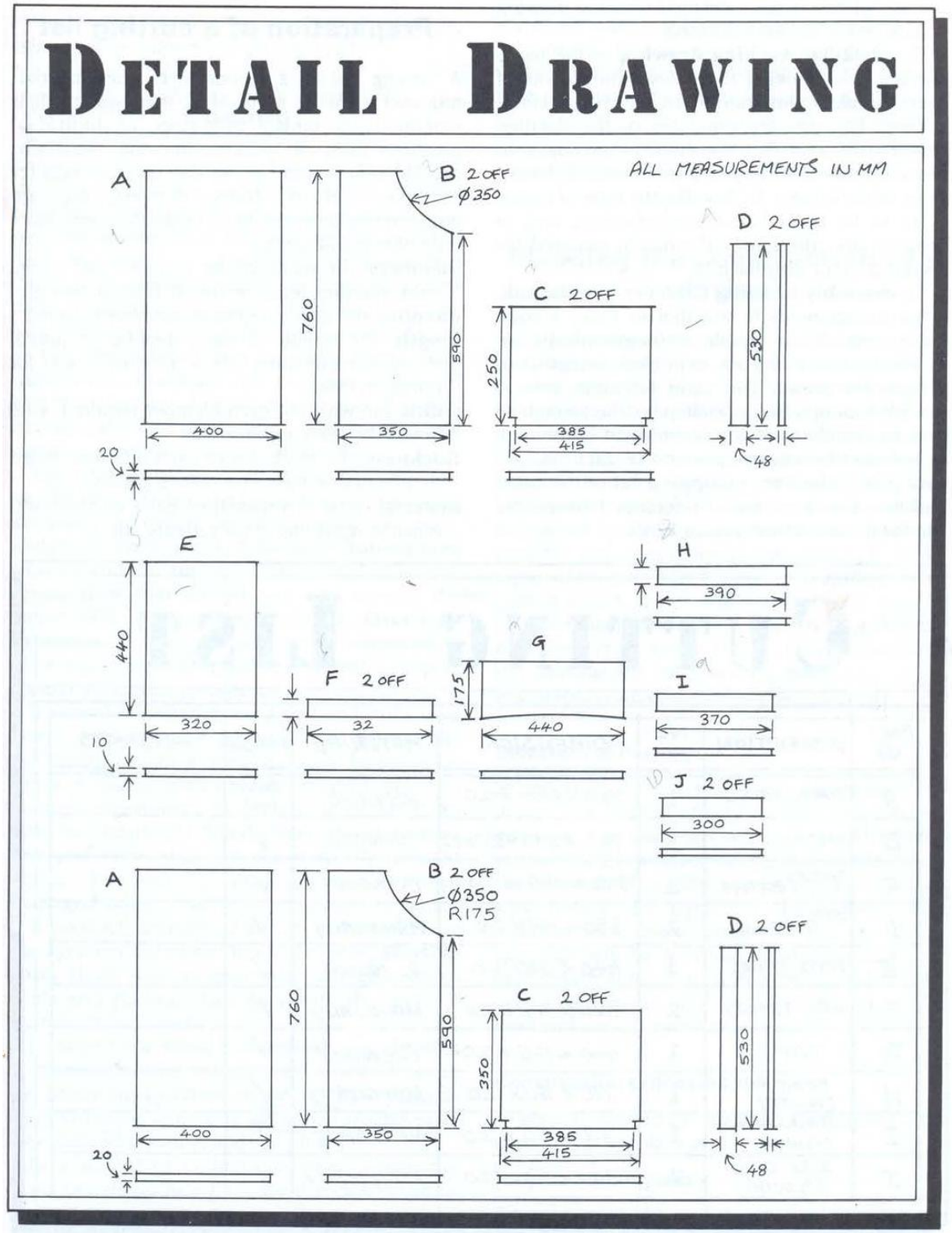
- To provide description of the shapeof the assembled unit;
- To identify each component part ofthe unit;
- To indicate the relative position ofeach component part of the unit;
- To supply a list of the parts;"
- To act as a source of referenceInformation.

EXPLODED VIEW



ORTHOGRAPHIC




DETAIL DRAWING
ALL MEASUREMENTS IN MM
A
B 2 OFF
Ø350
760
590
400
350
20
C 2 OFF
250
385
415
D 2 OFF
530
48
E
440
320
10
F 2 OFF
32
G
175
440
H
390
I
370
J 2 OFF
300
A
B 2 OFF
Ø350
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C 2 OFF
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D 2 OFF
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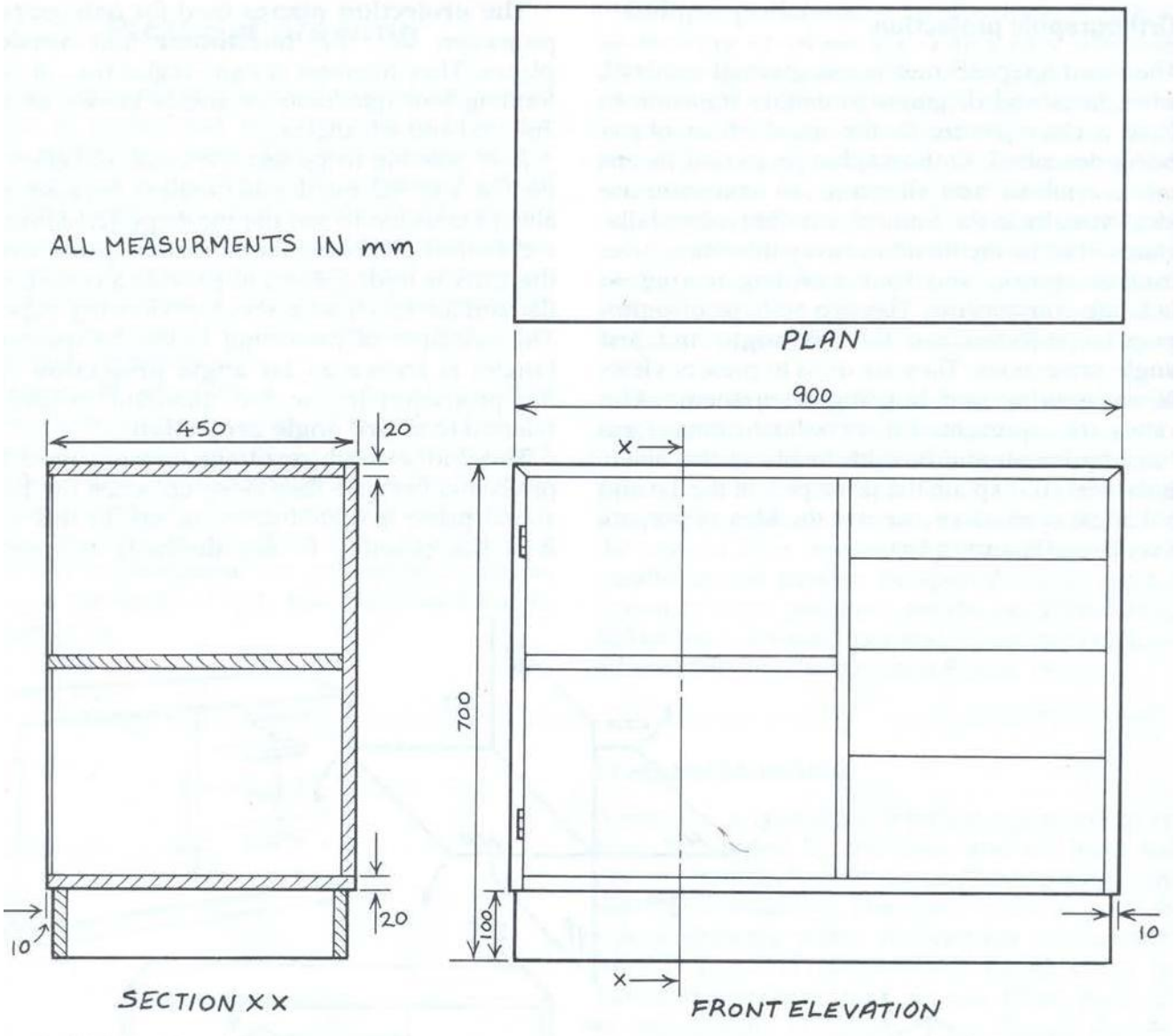


ii. Read and understand working procedure.

Working procedures are steps which show how to do the job given in the drawing. It may be written in word or explained using drawing. It describes clearly the stapes, operations included and what tool and equipment to use.

Once you read and understand working drawing and instructions, you have to follow it until you complete your work. Sometimes I see those trainees who does not follow the given working drawing and instructions. This lead in to in correct dimension of the object produced.

Self-Check -2	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. A working drawing may consist

   A. Types of materials and fittings; B. Estimates for quantity and cost materials and fittings;

   C. Shapes and sizes of materials; D. Instructions for construction or manufacture

   E. All

2.One is not the primary purposes of the detailed drawing are:

   A. To outline the shape of the object;

   B. To provide a size description (it indicates the dimensions of the object);

   C. To provide description of the shape of the assembled unit;

   D. To describe the types of material(s) to be used for its manufacture;

3. _____are steps which show how to do the job given in the drawing

   A. working drawing C. Section view

   B. Working proceduresD. Detail drawing

Note: **Satisfactory rating - 3 points** **Unsatisfactory - below 1.5 points**

Answer Sheet

Score = _____
Rating: _____

Name: _____ Date: _____

Information Sheet-3	Select and prepare Materials depend on Job requirement

1.3.1. Select and prepare Materials depend on Job requirement

Selection of materials

Selection of materials for realization of the design can greatly affect its Utility,appearance and cost. The material selected should suit the purpose of the artifact, taking into consideration size, strength, durability, acceptable in every other way to meet the aspiration of customers. It is therefore advisable to make sure that the cost of materials will be acceptable before making the final choice of Solution. It may be helpful to draw up a chart so that the cost of each part can be seen and a total cost worked out.

Materials used for furniture production.

- plywood
- timber, chip wood, manufacturing materials (MDF)
- nails and screws
- dowels
- adhesives
- hardware and fixture
- finishing materials

Wooden products selected must be,-

A. Only material furnished or approved by the instructor is to be used.

B. All material is to be inspected for knots and nails before using. These may fly off during cutting and cause bodily injury or damage the machine.

C. Do not use green lumber in any milling process. Green lumber is wood that has not been thoroughly dried. It is wet on the inside and contains tree sap. This type of wood will change over time (warp, bow, twist, etc.) as well as grow mold.

D. check the percentage of moisture content for indoor or outdoor furniture

1.3.1. Select and prepare hand and power tools and equipment

Hand tools and Power tools

Introduction:

Hand tools are non-powered instruments used for construction. Unlike power tools, they are not driven by electrical, fuel, or pneumatic (air) power. They are driven by muscle and controlled by the hand. Proper use of these tools will help prevent accidents.

Hand Tools

A. Hand tool preparation

1. Make sure tool handles are not split and are tightly fastened. Many injuries occur when the handles of tools come off (hammer head flies off, file tang punctures, saw handle separates).
2. To prevent slipping, make sure your hands are dry and not oily when using tools.
3. Put tools back in their proper place. Do not leave hand tools in the work area or sticking out from workbenches. Otherwise, students may be injured by brushing against the teeth or sharp edges.

B. Hand tool selection

1. Use the proper size screwdriver to fit the screw. Improperly sized tools slip out of the screw and may puncture you or your material.
2. Only use a tool for what it is made for. Wrenches are not for hammering, chisels are not for prying, screwdrivers are not for chiseling, files are not for hitting or prying, and so on.

C. Hand tool use

1. Most accidents with hand tools will be to the non-dominant hand (the hand not holding the tool), so be aware of hand positioning.

a. Screwdrivers: Never hold work in the palm of your hand while using a screwdriver. As a result of doing so you may slip off and inflict a puncture wound. If the work is unstable, secure it in a vise, clamp, or workbench.

b. Chisels: Keep your hands clear of the blade. The wood should be secure enough for you to not have to hold it. Use a clamp or vice if necessary. Chisels require two hands to use safely (even if one hand is striking with a mallet).

c. Chisels: Chisel strokes should always go away from the body. Place your dominant hand on the handle. With the other hand guide/stabilize the blade. Hold the tool firmly to prevent slipping.

d. Hand saws: Start a hand saw cut with the dominant hand on the saw handle and position the saw blade against the thumb onto the mark. Steadily draw the blade backwards. When the teeth bite, push the saw downward (or upstroke depending on the blade) to complete the first cut. Then, release pressure, pull backward, and push downward again for the next cut. Continue this process until the wood is completely cut.

E. **Hand planers:** Work is to be securely fastened in a clamp or vice before planning. Always plane away from you and never put your non-dominant hand on the work being planned.

2. When pounding or cutting, be sure that the chips fly away from you and others.

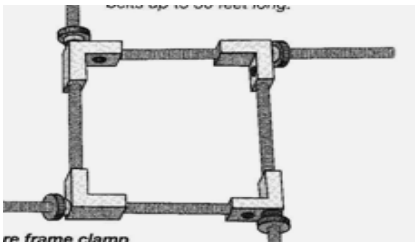
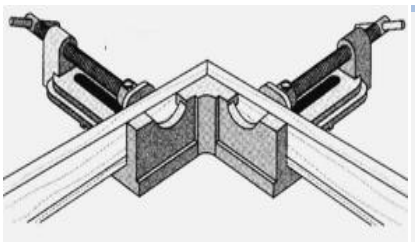
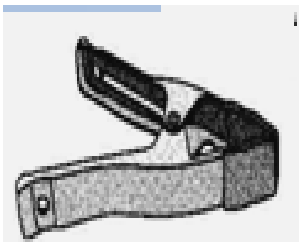
3. Never throw tools to or at other students.
4. Never hammer on a vise or vise jaws.
5. When handling sharp tools, always point the sharp end down. Do not carry sharp tools in your pocket, do not let sharp tools hang of the workbench, and when handing a sharp tool to someone else always give them the handle first.
6. When cutting with a sharp tool, cut away from your body.
7. When using clamps or vises make sure they are tight before starting work on a project

Holding and supporting tools

These tools and devices are those you will require to hold or fasten the work piece securely so that you can work and it safety. They include: work beach, bench vice, bench stop bench hook, bench holding fast, 'G' cramp, sash cramp, saw cramp or vice, miter cramp, shooting boards, miter board.

1. **The work bench**: - is an essential piece of apparatus in the workshop. You need it to support the work piece from the time of setting out the job through to the end of the necessary bench-work operations. It is in the form of a heavy table with a well (a little lower) at the center of the top surface to accommodate some of the tools required.
2. **Bench vice:-** is made of cast iron, often with a quiche release device that permits quiche movement of the job and provides instantaneous grip. The vice is fitted to the side of the work bench so that the top of the jaw is level with the top of the work bench.
3. **Bar clamp: -** is used clamp face to face& edge to edge
4. **Sash clamp;** the largest of all even it has extension apices to increase its length used for edge to edge clamp.
5, **web clamp**; to clamp table frame piece chair frame circular & curve piece.
6. **"C" cramp:-**is a metal cramp is from of the letter 'G' used for holding a piece of wood(job) to the work-bench to enable such operations as sawing or chiseling to performed and also use it to hold small parts of a job together when gluing a job. The size is determined according to the opening of the jaws (50-300mm).
6. **Sash cramp**: is a long metal cramp with opening ranging frame 45cm 195cm. it is used while gluing to hold and draw the parts being assembled together while the glue is setting. For example you might use this cramp when giving sashes, door frames, carcasses etc.

7. **Frame clamp:-** used to frame such as picture frame (photo frame)

8. **Miter clamp** – used to clamp pieces at 90^0.

9. **Spring clamp; clamp** pieces together, light duty clamp.

10. **Miter box:-** is advice made of either metal or wood used for holding a work piece when cutting a miter (at an angle of 45^0). A ten on saw or a panel saw may be used for the cutting.

2. Power Tools

As stated in the last UC (set up and operate wood machine) , "whether a tool is safe or not will depend upon you." If you will learn the general safety guidelines to using power equipment, you will be well on your way to a safe and enjoyable woodworking experience.

Here are some keys to remember:

A. Always wear eye protection

B. You must be certified on a tool before operating it.

C. Never operate equipment while the teacher is out of the shop area.

D. Make sure equipment safety guards are on and working correctly before using any machine.

E. Avoid wearing loose clothing and tie back long hair while using equipment.

F. Keep rags away from equipment.

G. Use a brush to clean ships or shavings off of equipment. Never use your hand.

H. Never adjust equipment while it is running.

I. Turn the machine off when you are done and never walk away from it while it is running. Always wait for a blade, bit, cutter, or sander to come to a complete stop before leaving. Never leave it running or unattended. Machines are quieter than you think, and others may not know it is running. Blades are often felt before they are heard.

J. Do not force wood through the machines as this could result in kick back.

K. Hold wood firmly when running it through equipment.

L. Check all wood for knots, splits, nails, etc. to make it safe to cut. Inspect for and remove all nails from lumber before cutting. Try to do layout cuts between knots.

M. Position yourself properly when using equipment. Maintain a well-balanced solid stance. Know the flow zone and stand away from it. Never walk in the fly zone of another user.

N. Keep area clear to prevent injury.

O. Don't talk to anyone and keep your mind on your work while using equipment.

P. Always make certain the power switch is in the off position before plugging in a machine. Often times you will have to lean over the machine to plug it in. If it suddenly comes on, you risk being injured. Other times material may be touching the blade and it will be sent flying when you plug it in.

Q. Always unplug a machine when you are changing a blade or cutter.

R. Make certain all adjustments and changes to blades, bits, and cutters are tightened properly before turning on a machine. After new cutters are installed, turn on the machine briefly, turn it off, and check the cutter again.

S. Always allow a tool to reach full operating speed before starting your cut. Feed the wood or cutter carefully and only as fast as the machine can cut easily. Learn to listen for "bog down" (the sound of a slowing blade), and smell for "wood burn" (the smell produced when you are moving too slow or the cutter is dull).

T. If a tool is not performing properly (or even sounds odd), it may be out of adjustment. Shut it off, unplug it, and tell the teacher immediately.

U. BE IN CONTROL, REMAIN IN CONTROL: Turn on and turn off your own machine. You, as the user, must remain in control and aware at all times.

Self-Check -3	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Write at least 5 Holding and supporting tools
2. What is the purpose of miter box

Note: **Satisfactory rating - 3 points** **Unsatisfactory - below 1.5 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Information Sheet-4	Requirements for re-checking the materials

1.4. Requirements for re-checking the materials

Checking defective materials

A FEW WORDS ABOUT WOOD AND WOODEN FURNITURE

Wooden objects and furniture have become part of our lives. Whatever their nature or purpose, if they are important to us they deserve the best care we can provide for them. While all living things age and degrade, the process can be slowed through the application of principles of care and maintenance based on understanding the nature of wood

Wood is a living material. It breathes, it gives off aromas, it moves, it changes color, it sweats and gets thirsty, and it needs nutrients……

We have different expectations of wood used **indoors % MC is 6-8 and that destined for outdoor**% MC 8-14 applications. However today's lifestyles, with the use of living areas segueing from indoor to outdoor living spaces mean that these boundaries are not as clear as they once were.

Our HOMEWOOD designs are done with this in mind, but not all of our pieces suit all spaces. We have derived a usage Matrix for our woods and furniture ranges. Ask your consultant to confirm that the piece you have chosen is suitable for the use you have in mind. As a general guide, the closer your space gets to outdoor conditions the higher the expectation you should have that the effects of age seasoning will manifest sooner rather than later.

ACCEPTABLE DEFECTS

Whilst we acknowledge that open cracks and fissures in your furniture are not acceptable, there are certain characteristics of wood that whilst strictly categorized as defects, are deemed in the furniture industry as acceptable (and to some degree even desirable).

These are checks, shakes and knots….

Checks - are hairline to small cracks that appear in surfaces, often as a result of seasoning and age drying, and are prevalent in certain timbers (particularly cross grained varieties). Checks do not usually go right through the thickness of a plank to reveal visible light.

They will tend to disappear during the warmer and wetter moths and reappear during the drier cooler seasons. Because maintenance products will often fill these when open, as they close the compression of the solidified product will frequently form minute ridges on the surface evident to the touch. Should these worry you they may be removed with a light rubbing of grade 0000 steel wool, soaked with your regular maintenance product?

Shakes - manifest as natural splits or separations of fiber (vertical and horizontal or both) in the structure of the wood. They are caused by growth defects, shrinkage, stress or compression often caused during wind storms and sometimes with felling. Shakes can also manifest during age seasoning. There are different types (heart shake, cup shake etc) and they are most frequently internal, but may be exposed on one surface in sawn timber. Wood with shakes often has the most interesting grain patterns, and for this reason we do not reject such pieces outright. Aging can however cause shakes to develop into cracks, and should this occur, we will service your piece under guarantee.

Knots – probably the most well know of the acceptable defects, they are the remains of a branch in timber. A branch sawn off close to the trunk naturally forms a sound or live knot (acceptable). A broken branch stub that becomes surrounded by new growth produces a loose or dead knot (not acceptable). As with shakes knots can produce the most attractive graining in wood surfaces, and many collectors seek knotted pieces for their.

Self-Check -4	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Write the natural defect of lumber
2. What are the artificial defects of lumber
3. Advisable % MC for furniture is _____and for outdoor is _____

Note: **Satisfactory rating - 3 points** **Unsatisfactory - below 3 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Information Sheet-5	RespondUnexpected situations

Unexpected situation are injuries to person and damage of materials during production of furniture production.

1.1.1. Injury to personnel

Some Causes of injuries in wood shop and controlling methods

NOISE

In the wood product manufacturing industry, numerous items of plant and various activities such as nail gunning, hammering frames, sawing sections of timber and even disposing of timber objects in bins can produce excessive noise that can be damaging.

If employees in your workplace are exposed to noise that exceeds the exposure standard of 85 dB(A) averaged over an eight hour period or a peak noise level of 140 dB(c) then your workplace is too noisy.

Furthermore, there may be a noise issue if any of the following occurs:

- Employees have to raise their voice to communicate at a distance of one meter
- Employees have a temporary reduction in hearing or ringing in the ears after leaving work for the day, or
- Employees use hearing protectors during the work day.

Then the noise regulations set out a hierarchy or order of controls that must be applied when fixing noise problems. These are:

a. Elimination of noise sources
b. Substitution of quieter plant or processes or use of engineering measures
c. Isolation of noise sources
d. Administrative measures
e. Hearing protectors

2. WOOD DUST

Timber dust poses a risk to the health and safety of employees within the wood products manufacturing industry. These dusts can be generated through cutting, thicknessing or machining of the timber materials during manufacturing of the product.

These dusts can be inhaled and, in some instances, **air embolisms** can be generated when air is injected into the skin of the operator through the use of compressed air to blow down or clean the operator or clean machinery.

Controls for this risk include:

1. Engineering the machinery to include dust extraction systems
2. Using localized extraction systems on the plant to a remote extraction system
3. Using hand tools that include a collection bag, e.g. sanders and cutting equipment
4. Outsourcing tasks where cutting or machining as required to specialistworkplaces, or
5. Using personal protective equipment such as class P1 dust respirators(disposable or silicone half face respirators).

Housekeeping needs to be considered when eliminating the risk of dust exposure.Regular cleaning and maintenance needs to be undertaken. This cleaning shouldbe completed with the use of wet wiping or vacuuming (vacuum fitted with highefficiency particulate air HEPA filter). This reduces the risk of the dust becomingairborne and being inhaled by the operators.

3. DANGEROUS GOODS AND HAZARDOUS SUBSTANCES

Many different forms of hazardous substances and dangerous goods are used in the wood products manufacturing industry, ranging from paints, resins and lacquers to solvents and thinners. During handling, storing and use of these materials, care should be taken to reduce exposure risks. The correct storage of these materials needs to be considered and appropriate cabinets installed in the workplace. During the mixing and use of these products, fume and vapors can be released and expose the operator to inhalation risks. Other risks to the operators are from skin contact, ingestion and contact with the eyes.

Controls for these risks include:

1. Engineering the machinery to include extraction systems including the spray booths where these tasks are being undertaken. These extraction systems should be designed and installed by suitably qualified people and regular maintained
2. Using localized extraction systems on the plant to a remote extraction system
3. outsourcing spraying tasks to specialist workplaces, or
4. using personal protective equipment such as respirators (silicone half face or full face respirators fitted with vapor filters)
5. Installing a spray painting booth with extraction systems vented outsidethe building
6. Using localized extraction systems on the plant to a remote fumes and vapors
7. Outsourcing spraying tasks to specialist workplaces
8. Using water-based paint alternatives

Though the greatest cause of accidents in the woodshop can be summed up as happening because someone was "not paying attention," or "didn't have their mind on their work," there are many factors that lead to injury. Here are a few[1]:

1. Ignorance 7. Carelessness 13. Lack of judgment
2. Rushing a job8. Overconfidence 14. Making too heavy a cut
3. Talking while working 9. Using a dull tool 15. Using an improperly set or adjusted tool
4. Fatigue 10. Using wrong material 16. Improper body positioning
5. Absent-mindedness 11. Improper clothing 17. A disorderly or messy woodshop
6. Using unsafe material 12. Eyestrain 18. Inadequately guarded machinery

3.1.1. Damage to materials

Damage of material is those damages occurred during production, transportation and packing.

Cause of damages are unskilled man power produce the product and also improper handling of raw materials and products. To minimize such damages using of proper work shop lay out and material management practices are must be performed.

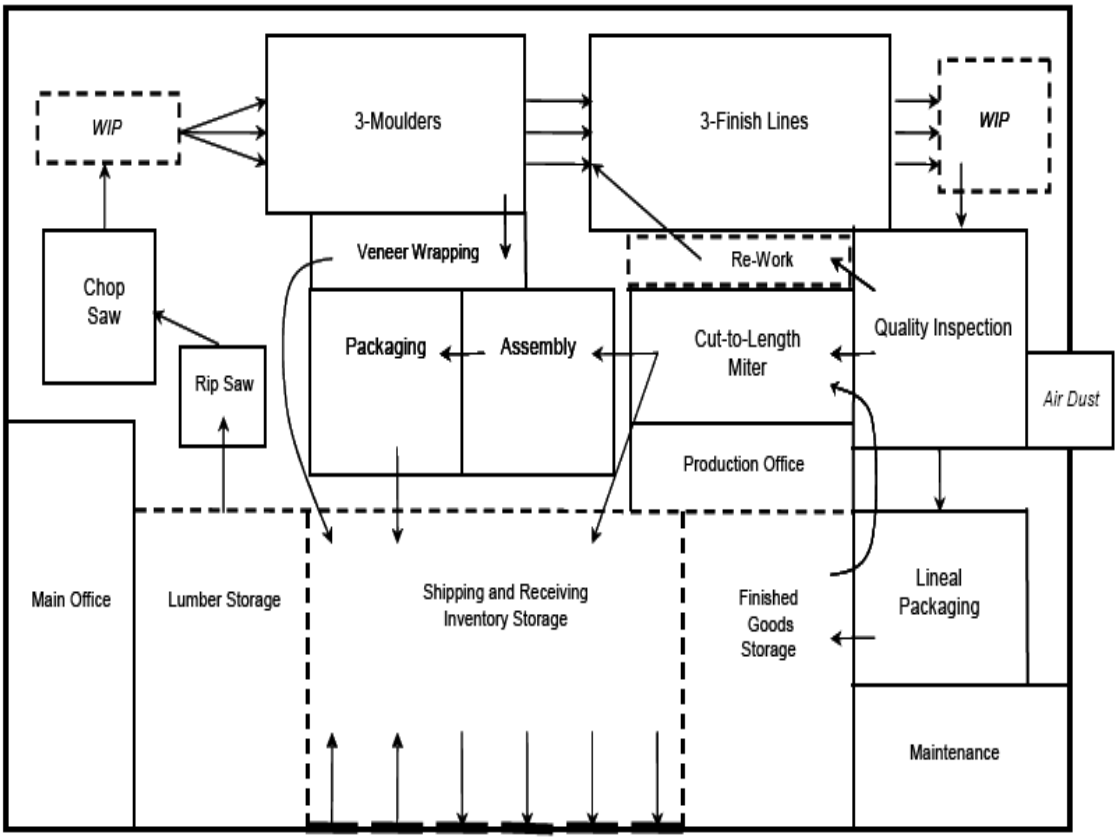


Fig. Proposed shop lay out for furniture production work shop

Legend

WIP- work in process

Self-Check -5	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. What are unexpected situation
2. Range of noise in the work shop is should not be greater than _____db is preferable
3. Discuss the ways of noise controlling methods
4. Write at least 5 causes of injuries.

Note: **Satisfactory rating - 8 points** **Unsatisfactory - below 5 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Information Sheet-6	Housekeeping

Proper work environment

1. Cleanliness

a. It is every student's responsibility to clean the shop at the end of class.

b. Keep the floor clean and free of scrap material, sawdust, oil, wax, and grease. Such messes cause slips, trips, and falls. If you see it, it is up to you to clean it! No "step-over's."

c. Keep work areas clean. Messy work areas are unsafe areas. Always use a hand brush to clean up scrap material, shavings, and sawdust. Never use your hand.

d. Always wait for moving parts (blades, drill bits, sanding discs, etc.) to come to a complete stop before removing scrap material or saw dust. Moving parts, no matter how slow, are still a danger.

e. Put away leftover wood immediately. Do not leave scrap material behind for someone else to move out of their way. Put away your own material.

f. Place electrical cords and vacuums out of the path of travel. To avoid tripping accidents, make certain electrical cords are flat on the floor and not suspended in the air.

g. Clean paint brushes immediately after using. Put used rags in the proper container.

h. Keep your behavior clean: Absolutely no vulgar, crude, or rude behavior will be tolerated. That means no cussing (including the misuse of religious names of God, prophets, or priests), no coarse joking, and no inappropriate touching or show of affection. It means to respect one another, and for guys to HONOR THE GIRLS with admirable actions.

i. Report all breakage or damage to tools or machinery to the instructor immediately. Moreover, if a machine is running poorly, making an unusual sound, or is out of adjustment, the student shall turn it off immediately, unplug it so that others don't use it, and inform the instructor directly. If conditions of the shop are such that a hazard is beyond the control of the teacher then it will be reported to the principal.

2. Eliminating distractions

a. The use of cell phones, i-pods, i-pads, or any such devices is prohibited while in the woodshop.

b. Music will not be played while the shop is in use.

c. Yellow lines are painted on the floor around machinery. Only one person may be inside the yellow lines at a time. Talking with someone while they are in the yellow lines is not allowed.

3. Carrying, moving, storing

a. When lifting, keep your back straight and lift with your legs. Do not strain yourself.

b. If something is too heavy, ask for help or use a hand-truck, a lever, dolly, jack, wheels, or rollers. If you must strain to lift or carry something then it is too heavy for you.

c. Always carry long objects with the front end high enough to avoid hitting someone. If the front end is low, it may not only hit someone, but also strike the ground and put a sudden stop to your movement causing injury to someone following you.

d. Any left-over wood should be returned to the proper area immediately, do not leave it behind for someone else. Small specialty wood (oak, maple, walnut, etc.) goes in marked bins. Long specialty wood should be returned to their marked shelves. Other "common woods" shall be placed in the upright bins. Plywood is stored in plywood racks.

Fire prevention

1. When using power tools it is the responsibility of the student to be aware of a tool getting hot. If this happens immediately turn it off, unplug it, and report it to the teacher.

2. If a tool emits a "burning smell" inform the instructor immediately.

3. Any finishing materials should not be used near an open flame. This would also include thinners and paints.

4. Rags that have absorbed any amount of linseed oil, solvents, stains, paints, or any other finishing products must be disposed in an approved covered metal container as a precaution against spontaneous combustion.

5. Report to the instructor any odor of gas. Gas can not only cause a fire or an explosion, it can also make people ill.

6. When unplugging an electrical cord, always do so by the plug itself and not by the cord. This causes damage to the wires and can eventually be the cause of a fire.

D. Fire extinguishing

1. Leave firefighting to the professionals. Call **for college trainers and authorized** immediately. In the event of a small fire (nothing larger than your hand), put it out quickly before it has time to grow, but know the following:

a. Know the location of all fire extinguishers - including hoses - and how to use them.

b. Do not hang anything on fire extinguishers. The area around fire extinguishers should be kept clear so that they may be reached without delay.

c. Flammable liquid fires should be put out by smothering with non-flammable material. Spraying such fires spreads the fire.

d. CO2 extinguishers should be used on gasoline fires and most chemical and electrical fires. Use water, not CO2 extinguishers, on wood or wood product fires.

e. Extinguish fires quickly, while they are small. Do not attempt to put out large fires. Nothing we own is worth injuring yourself or losing your life.

f. In the event of a fire, do not panic. If it is small (i.e. the size of your hand), put it out immediately. Don't give it time to get large and out of control. If it is a large fire, inform the instructor immediately and calmly follow his/her instructions. Walk calmly to the nearest exit.

g. Smoke inhalation and heat can kill you as easily as fire. Stay away.

Self-Check -6	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. What is housekeeping

Note: **Satisfactory rating - 8 points** **Unsatisfactory - below 5 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Instruction Sheet -2	LG09: Lay-out dimension of furniture component parts

This learning guide is developed to provide you the necessary information regarding the following **content coverage** and topics –

- Marking and measuring furniture component parts
- Laying out and cutting furniture components
- Responding unexpected situations
- Following company rules and regulations
- Housekeeping and safety regulations

This guide will also assist you to attain the learning outcome stated in the cover page. Specifically, upon completion of this Learning Guide, **you will be able to –**

- Measure and markFurniture component parts according to job specifications.
- Layout and cut Furniture component parts with given dimension.
- Respond unexpected situations to in line with company rules and regulations.
- Perform Housekeepingaccording to safety regulations.

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described in number 3 to 21
3. Read the information written in the "Information Sheets 7". Try to understand what are being discussed. Ask you teacher for assistance if you have hard time understanding them.
4. Accomplish the "Self-check 7" in page _37_.
5. Ask from your teacher the key to correction (key answers) or you can request your teacher to correct your work. (You are to get the key answer only after you finished answering the Self-check 7).
6. If you earned a satisfactory evaluation proceed to "Information Sheet 7". However, if your rating is unsatisfactory, see your teacher for further instructions or go back to Learning Activity #7.
7. Submit your accomplished Self-check. This will form part of your training portfolio.
8. Read the information written in the "Information Sheet 8". Try to understand what are being discussed. Ask you teacher for assistance if you have hard time understanding them.
9. Accomplish the "Self-check 8" in page _40_.
10. Ask from your teacher the key to correction (key answers) or you can request your teacher to correct your work. (You are to get the key answer only after you finished answering the Self-check 8).

11. Read the information written in the “Information Sheets 9”. Try to understand what are being discussed. Ask you teacher for assistance if you have hard time understanding them.
12. Accomplish the “Self-check 9” in page 42.
13. Ask from your teacher the key to correction (key answers) or you can request your teacher to correct your work. (You are to get the key answer only after you finished answering the Self-check 8).
14. If you earned a satisfactory evaluation proceed to “Operation Sheet 1” in page 39_. However, if your rating is unsatisfactory, see your teacher for further instructions or go back to Learning Activity #2.
15. Read the “Operation Sheet 1” and try to understand the procedures discussed.
16. Do the “LAP test” in page __ (if you are ready).

    Request your teacher to evaluate your performance and outputs. Your teacher will give you feedback and the evaluation will be either satisfactory or unsatisfactory. If unsatisfactory, your teacher shall advice you on additional work. But if satisfactory you can proceed to Learning Guide #3

Information Sheet-7	Marking and measuring furniture component parts

2.1. Marking and measuring furniture component parts

2.1.1.. Geometrical tools used for marking and laying furniture component parts

Geometrical tools are those that are used for measuring marking out, setting out and testing of a job at various stages.

Measuring and laying out tools (Geometrical tools)

These types of tools are those that are used for

- Measuring
- Setting out and
- Marking out
- Testing of a job at various stages .

Among the common tools are:-

- The rule
- Marking gauge
- Cutting gauge
- Straight edge
- Sliding bevel
- Panel gauges
- Marking knife
- Combination square
- Mortise gauge
- Using compasses
- Miter square
- Try square

Setting out/laying out procedures

1. Place Identification marks on members and joints, for example, letters or numbers.
2. Set out positions and shapes of joints. Mark waste with crosses.
3. Check size from scale drawings or mark directly from the cutting rod if one was prepared.
4. Mark the positions of grooves, rabbets, screw holes, etc.
5. Set out any shaped pieces and decorative features.
6. Mark all squaring and gauging from the face side and face edges.
7. Place similar members, such as rails, Stiles, legs and drawer sides, together to mark lengths and positions of joints.
8. Make sure of the grain directions for shaped pieces, keeping short grain to a minimum. Trace curved shapes from a template.
9. Arrange for wide boards that are liable to cup, to be set out so that tops and shelves are always heart side up.
10. Doors and drawers are prepared and set out to fit the carcass, therefore finish the carcass assembling before doors and drawers are made.

Self-Check -7	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

I. Choose the correct answer

1. All of the following are marking out tools, **except**

A. Pen B. mortise gauge C. scriber D. try-square

II. Match part B to A

A	B
____1. Measuring tool	A. try square
____2. Marking out tool	B. back saw
____3. Cutting tool	C. clamp
____4. Forming tool	D. Jig
____5. Joining tool	E. Tape meter

Note: **Satisfactory rating - 8 points** **Unsatisfactory - below 5 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Information Sheet-8	Laying out and cutting furniture components

Introduction

What is Furniture?

- Furniture is the mass noun for the **movable objects** intended **to support** various human activities such as seating and sleeping, to hold objects at a convenient height for work using horizontal surfaces above the ground, or to store things.
- Furniture is essential to our every-day lives.
  - We use it at home,
  - while we're working and
  - when we're out shopping,
  - at the cinema or travelling.

2.2. Laying out and cutting furniture components

The Layout:

Layoutis the term used to describe the process of marking your wood for cutting. During this process, use a pencil, not a pen. Pencils marks alone are not easily dealt with, **pen** marks are even **worse**. Make a simple little straight mark or at the point where the blade first touches the wood. DO NOT DRAW LINES. The machines will cut straight for you. You do not need to follow lines when using machines. Lines are only necessary when making freehand cuts with hand tools.

Cutting out and shapingprocedures.

1. Always cut on the waste side of the lines.
2. Cut waste from joints. Cut along the grain first and cut the Shoulders last.
3. Plane grooves and rabbets and bore holes for screws.
4. Cut shapes and decorative features, such as chamfers and moldings.
5. Curved shapes, tapered legs and turned members are often difficult to hold; hence it is usual to cut joints, bore holes or dowels, etc., before shaping.
6. Make sure Identification marks are not cut off.

OPERATION SHEET-1

OPERATION TITLE; ripping with portable circular saw

PURPOSE; ripping cutting with portable circular saw for construction purpose.

CONDITIONS OR SITUATIONS FOR THE OPERATIONS: The trainee should perform this activity with complete protective equipments

EQUIPMENT TOOLS AND MATERIALS: (Tape rule, Try square, Pencil, work piece, clamp, portable circular saw.

Procedure for ripping **cutting**

- Make alien showing the location of the cut.
- Place the work over the saw horses so that the cut can be made.
- Whenever possible, use the rip guide & adjust for the correct width of cut.
- Start the cut & the slowly walk along the saw.
-

PRECAUTIONS: Disconnect the plug from the electric power out let when the tool is not in use.

- Keep the blade is sharp.
- Always hold the electric saw firmly.
- Allow the blade to come full speed before starting.
- Adjusting only 3-6mm below the thickness of the board to be cut.
- Do not use it without the saw guard of the blade

QUALITY CRITERIA: 1. Select the wood with good quality.

2. Cut the wood to the correct degree.

Self-Check -8	Written Test

Directions:1. Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Define layout

Direction II:-write True if the statement is correct if not correct write False

2. Pen marking is advisable when lay marking on cut out lumber

Note: **Satisfactory rating - 5 points** **Unsatisfactory - below 3 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Information Sheet-9	Responding unexpected situations in line company rules and regulations

What is an expected situation?

- Is risk occurred by miss use and improper handling of tools and equipment?
- An expected situation is injury in people and damage of material during production of product and service.

These injuries are managed by following the company rules and regulation and by apply OHS requirement.

Company rules and regulation

1. DISCIPLINE: Perform with full discipline by practicing true values as well as taking actions in accordance with existing rules and regulations.

2. CREDIBILITY: Demonstrate excellent credibility in performing duties and responsibilities.

3. SPIRIT OF COOPERATION: Work in the spirit of cooperation by assisting one another.

4. SKILL AND COMPETENCY: Strive to acquire knowledge in order to enhance skill and competency, and to achieve excellence in performing duties and responsibilities.

5. OFFICE HARMONY: Maintain work environment that is orderly, clean and harmonious.

6. DRESS: Dress in smart and polite attire in accordance with the approved dress code.

7. BALANCE LIFE: Practice a healthy and balance life by allocating sufficient time for work, rest, recreation and spiritual obligation.

8. BEHAVIOUR: Have an attitude that demonstrates politeness, respect and forgiveness among one another.

9. OPENNESS: Receptive to views, suggestions, criticisms and ideas from other members of the Department or the public with an open and positive mind.

10. **VALUING TIME**: Skillful in planning and utilizing limited time in performing tasks, making decisions and achieving the desired outputs.

2.4. Housekeeping and safety regulations

Performing housekeeping according to safety regulations

Keeping of work shop clean & store the tools in proper place is to ensure our body & tools from the accidents of machine while working & breakage of tools respectively. The workshop is kept in different ways .Some of themes are:

- Work benches should be free &clean of clutter.
- Tools &equipments should be safely stored.
- Keep the floor clean &clear.
- Immediately wipe of spilled liquids which can create a slippery surface.

Self-Check -9	Written Test

Directions:1. Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. How we reduce unexpected situation? 3pts
2. What are the methods we use to make our work shop conducive for work?2pts

Note: **Satisfactory rating - 5 points** **Unsatisfactory - below 3 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Instruction Sheet -10	LG10: Assemble furniture component parts

This learning guide is developed to provide you the necessary information regarding the following **content coverage** and topics –

- Furniture component parts
- Temporary fixing and/or permanent assembly techniques
- Assembly furniture component parts
- Check assembly furniture component parts
- Clean up work area
- Daily work report

This guide will also assist you to attain the learning outcome stated in the cover page. Specifically, upon completion of this Learning Guide, **you will be able to –**

- Position Materials and/or fabricated furniture component parts for assembly.
- Check Assembled furniture component parts for squareness, levelness and specified tolerance based on specification.
- Apply Temporary fixing and/or permanent assembly techniques as per job requirements.
- Perform Cleanup work area according to safety regulations and OSHC specifications.
- Accomplish Daily work report in accordance with enterprise rules and regulations.

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described in number 3 to 21
3. Read the information written in the "Information Sheets 10". Try to understand what are being discussed. Ask you teacher for assistance if you have hard time understanding them.
4. Accomplish the "Self-check 7" in page __.
5. Ask from your teacher the key to correction (key answers) or you can request your teacher to correct your work. (You are to get the key answer only after you finished answering the Self-check 1).
6. If you earned a satisfactory evaluation proceed to "Information Sheet 2". However, if your rating is unsatisfactory, see your teacher for further instructions or go back to Learning Activity #2.
7. Submit your accomplished Self-check. This will form part of your training portfolio.
8. Read the information written in the "Information Sheet 2". Try to understand what are being discussed. Ask you teacher for assistance if you have hard time understanding them.
9. Accomplish the "Self-check 2" in page _14_.

10. Ask from your teacher the key to correction (key answers) or you can request your teacher to correct your work. (You are to get the key answer only after you finished answering the Self-check 2).
11. Read the information written in the "Information Sheets 3 ". Try to understand what are being discussed. Ask you teacher for assistance if you have hard time understanding them.
12. Accomplish the "Self-check 3" in page 20.
13. Read the information written in the "Information Sheet 4". Try to understand what are being discussed. Ask you teacher for assistance if you have hard time understanding them.
14. Accomplish the "Self-check 4" in page _23_.
15. Ask from your teacher the key to correction (key answers) or you can request your teacher to correct your work. (You are to get the key answer only after you finished answering the Self-check 4).
16. Read the information written in the "Information Sheet 5and 6". Try to understand what are being discussed. Ask you teacher for assistance if you have hard time understanding them.
17. Accomplish the "Self-check 5 and 6" in page _27 and 31_.
18. Ask from your teacher the key to correction (key answers) or you can request your teacher to correct your work. (You are to get the key answer only after you finished answering the Self-check 5 & 6).
19. If you earned a satisfactory evaluation proceed to "Operation Sheet 1" in page _. However, if your rating is unsatisfactory, see your teacher for further instructions or go back to Learning Activity #6.
20. Read the "Operation Sheet 1" and try to understand the procedures discussed.
21. Do the "LAP test" in page __ (if you are ready).

    Request your teacher to evaluate your performance and outputs. Your teacher will give you feedback and the evaluation will be either satisfactory or unsatisfactory. If unsatisfactory, your teacher shall advice you on additional work. But if satisfactory you can proceed to Learning Guide 10

- Plate
- Panel
- Skeleton parts
- Top
- Bottom

Fabrication procedures

Plan of Procedure

The *what to do* steps in a *plan of procedure* usually remain the same for different products. However, you will alter them according to available equipment and your skills. Generally, the plan will follow these steps in production:

1. Identify appropriate tools.
2. Obtain materials and supplies.
3. Lay out and rough cut standard stock.
4. Square workpieces and components accurately to size.
5. Prepare joints.
6. Create holes and other openings.
7. Shape components.
8. Smooth components.
9. Assemble components.
10. Apply finish.
11. Install hardware.

When you're ready to assemble your furniture, you usually have only one shot to get it right.

Once the glue is spread, there's no turning back. Glue up a cabinet out of square, and you'll pay dearly later in the construction process because your error will accumulate so that fitting subsequent parts becomes a nightmare. To get it right the first time, it's vital to have the right assembly tools on hand and to use the proper clamps and clamping technique. After all, who hasn't glued together what was a perfectly fitted miter, only to find the joint slipping out of alignment as you placed pressure on the joint? Learning and practicing the correct approach to assembly will save you untold hours of frustration.

The Dry Run

One of the best techniques.This means assembling all the parts without glue. Make sure you use all the necessary clampsyou'll need and check to see that you canconfidently close all the joints. In effect, you're practicing the entire assemblysequence.And 9 times out of 10, you'll discoverduring a dry run that something is missing

Assembling Cases

That makes things a little easier and more precise. Set the rod to the length of one ofthe diagonals; then check the opposite diagonal inside the case. Push the sticks into thecase to read the entire depth. Keep adjusting the rod (and the case) until the rod fits equally between both diagonals and you need more clamps in a specific are to bring an assembly together. Or perhaps you'll need to rethink the glue-up processand break the assembly sequence down intosmaller, more manageable parts. It may takemore time, but investing in a dry run is wellworth avoiding the horror of applying glue, only to find that you can't quite put the partstogether as planned.

Assembly Tools and Jigs

There are innumerable jigs and tricks usedin assembly. All are aimed at making theProcess of putting together multiple partseasier, more accurate, and ultimately less Frustrating. There's nothing worse thanspreading glue only to find you don't havethe right tools or setup ready to go. Hereare some essential assembly aids that makeGlue-ups go a lot smoother.

Reading Square with a Pinch Rod

It's vital to square up a case or opening immediately after assembly—before the glue dries. One way to check for square is to read the diagonal measurements from outside corner to outside corner with a tape measure. When the two measurements are equal, the opening is square. But clamps often get in the way, it's practically impossible to get a reading on the back of the case, and reading the outside corners won't tell you whether the inside of a deep case is square. A more accurate method is to use a pinch rod. A traditional pinch rod is simply two sticks, sharpened at one end that you pinch or hold together, in the center. The modified version shown at right adds clamping heads

Squaring a Case with a Board

As an aid to assembling a case square, cut apiece of plywood to the exact width of thecase opening, making sure adjacent edges aresquare. Before you clamp the case joints,clamp the board inside the case, lining upone edge of the board with the case sides.No more twisted or out-of-squareopenings.

Shims and Blocks Align Parts

It's a good idea to keep on hand a variety ofshims and blocks in varying thicknesses, from playing cards, squares of plastic laminate,and strips of leather to 1/4-in.-, 1/2-in.-,and 3/4-in.-thick blocks of wood. Thesespacers help align or position parts duringglue-up, and they're great for protectingthe surface of your work. Shown at middleleft, small squares of MDF align the clampheads over the center of the joint, whileplastic shims prevent the pipes from dingingthe surface.

Riser Blocks Raise the Work

Gluing up assemblies often means having toget underneath the work to attach clamps or other parts. The simplest answer is to raisethe entire assembly on blocks of wood. Butfinding stock

thick enough can be a pain.Just as strong, and easier to make, are sets ofriser blocks made from 3/4-in. plywood gluedand nailed together. Blocks about 5 in. highby 2 ft. long are sufficient for almost allyour glue-ups.

Using a hammer

To pound parts together is admittedly part of woodworking. Your joints may be too tight, or theupright may Bethe glue that has swelled parts at the critical moment of assembly. Either way, you should be ready with some form of heavy-duty "persuader" to coax parts together when hand pressure or clamps alone fail. Better than a hammer is a dead-blow mallet. These weighted hammers pack a powerful punch without the jarring effect that metal produces. Backing up the surface with a block of hardwood can help distribute the force of the blow. The mallet shown here has differentweights in each of the two heads, allowing gentle taps on oneside and heavier, more powerful hits on the opposite.

Clamping Cauls

Like blocks, Cauls made from scrap materialcan prevent dings in your work. More important, cauls distribute more clamping pressure across a joint, allowing you to usefar fewer clamps when gluing up. For broadgluing surfaces, use bowed clamping cauls. For narrow joints, scrap plywood or leftoversticks of wood work fine. The trick to getting the cauls to stay where you wantthem until you add the clamps is to tapethem temporarily in place.

Dovetail Tapping Wedge

In many cases, you don't need to botherclamping dovetail joints, especially on smallbox constructions, such as a drawer. Toassemble and fully seat the joints without damaging the pins, tap over the joint witha wedged-shaped block of dense wood. The shape of the block allows you to positionit over the joint regardless of the size ofthe tail.

Assembling a Case

For most cabinets, there's a basic assemblysequence that will guarantee success—or atleast a more comfortable heart rate. The trick isalways to begin assembly from the insides out.In most instances, this means assembling anyinterior dividers or partitions to the top and bottomof the case. If the case is wide, clamp oneside of the work while it sits face down on thebench (**A**). Then flip the assembly over andclamp the opposite side (**B**).Tackle the outside of the case, often the sides orends of a cabinet, after you've clamped all theinterior assemblies. Depending on the type ofclamps you use and the design of the cabinet,you might have to wait for the glue to dry on the interior parts before clamping the outside of thecase. When possible, use long-reach clamps,because they can reach over existing clamps andlet you clamp the entire case in one assemblysession (**C**).

Clamping Corners

Corner joints constitute most of the casework infurniture—including small boxes and drawers—and it'snecessary to find an effective way toclamp across what is typically a wide surface.Like edge work, the answer is to use cauls tohelp distribute clamping pressure.When joints protrude at the corners, such as inthrough dovetails or box joints, use notched cauls to bring the corner together (**A**). Make the notchcuts on the band saw or table saw.

The blocksGain purchase and don't interfere with closing thejoint and they center over the joint to avoid bowingthe sides. Miter joints have a way of not closing at the mostinappropriate times. To get good purchase onwhat is often a very slippery joint, there are severalclamping strategies. The tried-and-truemethod is to clamp all four corners of a miteredframe at once with bar clamps. The deep throats of Bessey K-body clamps make it easy to getover and under the joint (**B**). Tighten each clamp alittle at a time, like tightening the lug nuts on acar wheel. Make sure to check the frame for square before letting the glue dry. The block-and-rod frame system shown here(from Lee Valley Tools) gives you very precisecontrol when closing four miters at a time, and itdoesn't require lots of clamping force (**C**). Likethe bar clamp approach, tighten each corner a little at a time to align the miters.One of the simplest ways to close the joint is to clampshop made blocks to the frame beforeassembly. Cut out the blocks on the band sawso that the clamping surfaces are parallel to eachother when the frame is assembled (**D**).A picture framer's vise is handy for closing onemiter at a time (**E**). This is useful when you're

Nailing or screwing the joint, since you canassemble the frame one piece at a time.Web clamps allow you to glue up all four cornersat once, and they work well on both flat framesand boxes (**F**). You can use heavy-duty webclamps for large cases, but plan on having severalon hand to close the joints.

Clamping Difficult Parts

If your pipe clamps are too short, you canextend them with metal pipe joiners, availableat plumbing-

Supply tores. Make sure at least one of your pipes is threaded on both ends soit can accept both the threaded joiner and the clamp head (**A**).Another effective way to grip long work is to jointwo clamp heads together. Shims center theclamping pressure over the joints, and rubberpads slipped over the clamp heads prevent thework from being marred (**B**).Get a grip on difficult pieces, such as a panel, bysecuring it with a wooden hand screw (**C**). A barclamp holds the hand screw to the bench, leavingyour hands free for more important tasks.

Frame Construction

Legs and Aprons

Tables, desks, beds, chairs—most of these frame-type constructions

Require legs that connect to apron or rails. Although chair construction, withits angles and curves, is worthy of a sectionall its own, learning how to put together abasic leg and apron allows you to build anynumber of furniture projects that require aframework for support.Using the appropriate joinery is important, because many legs are subject to a lotof sideways stress and narrow aprons

won’toffer sufficient support to prevent racking.The styling of a leg and apron can affect thepiece’s structure and will certainly have aneffect on the overall feel and look. You’llhave many options for leg and apron styles, from simple rectilinear forms to turnings, tapers, and curves

Assembling a Frame

Gluing up a complicated frame can be a real headache if you don’t have time to get all theparts clamped before the glue starts to set.And even if you’ve milled your stock and cutyour joints accurately, with flat, straight surfacesand square shoulders, the clampingpressure can twist an assembly out of square.The first step is to divide a major assembly into subassemblies. Glue up one side of aframe, which will require fewer clamps, andcheck that the clamps align over the centerof the joints. Then use a reliable square toread intersecting parts. If a joint is out ofsquare, shift the clamps and recheck with your square until you’re satisfied. Make asecond check using a straightedge to readthe surface for flat, placing the straightedgeat various points across the frame. Any light between the straightedge and the workmeans you’ve introduced twist, and you’llneed to reclamp.Once the subassemblies have dried, joint them together to create the final assembly. Here, it’scritical to glue up on a dead-flat surface,such as the top of your table saw or a flatbench top, to ensure the assembly goestogether flat day-

Self-Check -10	**Written Test**

Directions:1. Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. List the component parts of shelf furniture

Direction II:-write True if the statement is correct if not correct write False

2. Write the procedure of to produce furniture.

Note: **Satisfactory rating - 10 points** **Unsatisfactory - below 5 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Information Sheet-11	Temporary fixing and/or permanent assembly techniques

Introduction

Many everyday products, such as furniture, appliances, and toys, require assembly at home. Included witheach product is a set of instructions showing how to put it together For modular product lines, such as customizable office furniture, many different versions of the instructions are necessary. As the number of customizable products and demand for task specific instructionsincrease, technology will be needed to produce instructions more cost effectively.

The two primary tasks in designing assembly instructions are:

• **Planning**: Most objects can be assembled in a variety of ways. The challenge is to choose a sequence of assembly operations that will be easy for users to understand and follow.

• **Presentation**: There are many ways to depict assembly operations. The challenge is to convey the assembly operations clearly in a series of diagrams.

Joinery is a part of woodworking that involves joining together pieces of wood.

Methods of joining wood together can be classified under four broad headings:

1. Butted joints, either edge to edge, side to side and with or without additional reinforcement
2. Interlocking joints where one piece of wood is cut or shaped to fit a corresponding socket in the other piece
3. Mechanical joints which permit controlled movement
4. Knock-down metal or plastic fittings which secure the various wood sections together to form rigid structures.

Different types of joints involve:

Fasteners

- Screws (open, plugged, capped)
- Pocket screws
- Nails (hammer and pneumatic)

Bindings

- Metal straps, metal corners, corners
- Material straps: fabric, leather

Adhesive

- Wood glue: Glue produces a stronger than wood connection
- Water swelling

Wood elements

- Dowel: A wooden rod set into both pieces of adjoining wood
- Biscuit: A small wooden biscuit shaped piece is set into both pieces of adjoining wood
- Spline: Similar to the biscuit, but the “spline” runs the whole length of the joint
- Corner blocks: Square or triangular blocks placed at a joint to attach both pieces to.

Assembling techniques

1. **Trial assembly**: Are the members & joints without glue to see that they fit together properly & that the whole job is square. Any adjustment necessary is made at this stage.
2. **Clean up all internal surfaces & edges**: which cannot be planned after assembling &replace locating marks to that they can be removed later.
3. **Sub assembly**: is required for such items as chairs, tables, framed, carcase, where it is necessary to glue up one or two units of the job at a time.
    - For example, glue together the front legs & back legs of a chair separately allowing them to dry then complete the assembly by gluing in the side of rails.
    - Clean up the external faces & edges of the glued up sub units.
4. **Final assembly**: consists of assembly the various units to complete the job.
    - ♣ When assembling makes sure all materials & tools are ready so that, the assembly can be processed without delay.

Sequence Determination

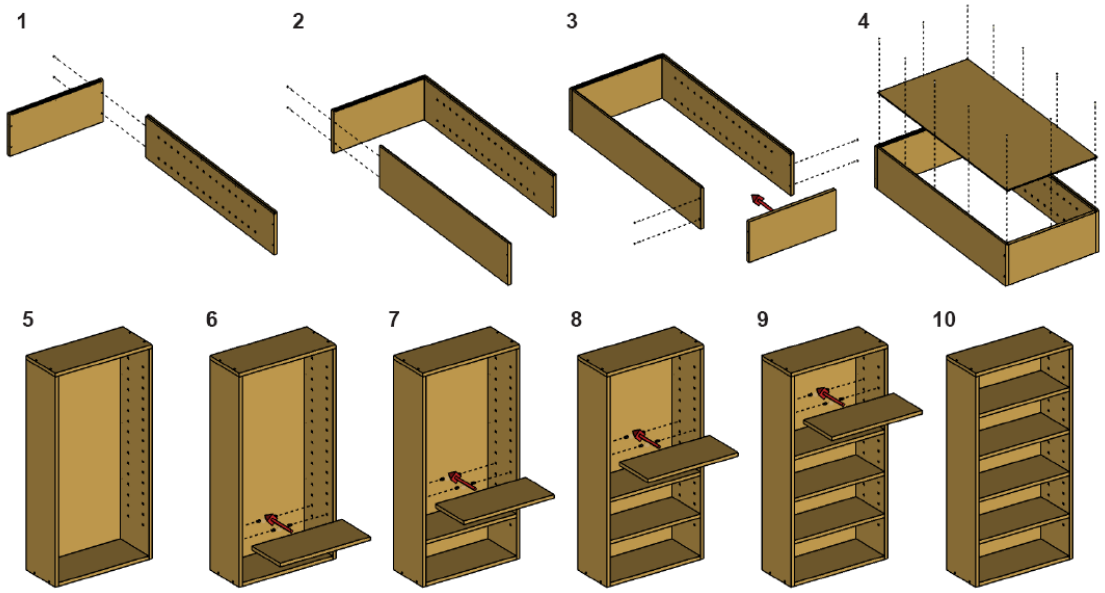


Figure 7: Instructions for assembling a bookcase

Self-Check -11	Written Test

Directions:1. Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Define layout

Direction II:-write True if the statement is correct if not correct write False

2. Pen marking is advisable when lay marking on cut out lumber

Note: **Satisfactory rating - 5 points** **Unsatisfactory - below 3 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Information Sheet-12	Check assembly furniture component parts

1. **Visual inspection**against scratches and approved samples for aesthetic compliance and checks for defects related to dimensions, discoloration ,in adequate finishing ,scratches ,warping and other visual imperfection .
2. **Onsite tests and checks for** structuralsafety through load test ,impact test, arm and leg strength test, drop test and other relevant stability tests.
3. Compliance to **legal standard** related to illegal sorting , grade of filling materials and textile fibers for upholstered products and other relevant standards
4. **Packing inspection** to check for appropriate packing of all furniture parts to protect against abrasion and proper climate controls to prevent damage during transporting.
5. **Relevant lab test coordination**

Self-Check -12	Written Test

Directions:1. Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Define layout

Direction II:-write True if the statement is correct if not correct write False

2. Pen marking is advisable when lay marking on cut out lumber

Note: **Satisfactory rating - 5 points** **Unsatisfactory - below 3 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Information Sheet-13	Clean up work area

Good housekeeping involves every phase of industrial operations and should apply throughout the entire premises, indoors and out. It is more than mere cleanliness. It requires orderly conditions, the avoidance of congestion, and attention to such details as an orderly layout of the whole workplace, the marking of aisles, adequate storage arrangements, and suitable provision for cleaning and maintenance.

Efficient production and a good working environment are complementary. The elimination of inefficiencies and accident hazards caused by unfavorable conditions in and about the workplace is essential in getting the job done properly and safely. The attention to these important details—which may be overlooked when management's attention is concentrated upon such amenities as good cloakrooms, canteens, rest rooms, recreational facilities, etc.—is widely referred to as "good housekeeping". Good housekeeping involves every phase of industrial operations and should apply throughout the entire premises, indoors and out. It is more than mere cleanliness. It requires orderly conditions, the avoidance of congestion, and attention to such details as an orderly layout of the whole workplace, the marking of aisles, adequate storage arrangements, and suitable provision for cleaning and maintenance.

Good housekeeping is a vital factor in preventing accidents. The great majority of all work accidents are caused during the handling of goods or materials, and by people falling, being hit by falling objects, or striking against objects in the workplace. All these causes can be reduced by good housekeeping practices—in fact, good housekeeping is the only cure for hundreds of accidents that occur. Here are some kinds of accidents commonly caused by *bad* housekeeping:

- Tripping over loose objects on floors, stairs and platforms
- Articles dropping from above
- Slipping on greasy, wet or dirty surfaces
- Striking against projecting, poorly stacked, or misplaced material
- Tearing the hands or other parts of the body on projecting nails, wire, steel strapping on bales or crates, etc.

Typical examples of poor housekeeping that lead to these accidents are:

- Excessive material, waste or chips in the working area
- Congested aisles
- Tools left on machines
- Waste containers overflowing
- Lockers and workrooms in disorder
- Acids in open containers
- Broken glass

- Electric leads or air lines across aisles
- Dirty light fittings, windows and skylights

Where housekeeping is bad, fire is a constant hazard. It can be caused by many housekeeping problems—such as oil-soaked rags and clothing igniting from spontaneous combustion; dust collectors not being properly or frequently cleaned; or piles of paper and other packing materials being allowed to accumulate. Poor housekeeping can also lead to infestation by pests such as rodents and cockroaches and create serious health risks.

Self-Check -13	Written Test

Directions:1. Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Define layout

Direction II:-write True if the statement is correct if not correct write False

2. Pen marking is advisable when lay marking on cut out lumber

Note: **Satisfactory rating - 5 points** **Unsatisfactory - below 3 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Information Sheet-14	Daily work report

Minimum requirement that the report shall satisfy are:

a. Should provide timely, complete and accurate status information.
b. Should warn of pending problems in time to take action.
c. Should be easily understandable and explanatory by itself (in the absence of the writer)

The above minimum requirements can explicitly be stated as:

1. Reports must and only be submitted on planed day . Reports submitted latter than the specified reporting date is considered invalid and the production manager who couldn't submit his weekly/monthly report on time as inefficient.
2. All sections must get due attention and must not be left blank without sufficient justification. No section of the report shall be left untreated and no column of each table shall be left blank.
3. All values and information's in the report must always be accurate and consistent with previous reports. Inconsistent & inaccurate information primarily indicate either the supervisor's/or production managers inefficiency and ineffectiveness or his negligence.
4. There should no confusion of terms. A problem has to be stated clearly and sufficiently in the sections and column of a table allocated for them. There should be no confusion of problems and causes.
5. The report should clearly show unsolved problems.
6. Reports must be self explanatory with minimum oral explanation demand. Any person who looks in to them in the absence of the writer must be able to comprehend them.

The daily report shall have the following minimum contents and sections:

General

Date report submitted _____

Reporting area: _____

Report period _____

Production manager Name_____

Total work amount (birr) _____ No of product /WIP _____

Work executed to date _____No of product finished _____

Number of crews involved to accomplish the product_, designer, machinist, joiner, finisher, etc._____

Challenges _____

Injuries_____

Self-Check -14	Written Test

Directions:1. Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. One is not reported on Daily report:?
   A. Material off site
   B. Work executed
   C. Work in process
   D. All of the above
2. Write the basic requirements of reports?(3pts)

Direction II: -write True if the statement is correct if not correct write False (2pts)

1. **Report not show the performance of the organization**
2. **Report shows what we plan and what we executed**

Note: **Satisfactory rating - 8 points** **Unsatisfactory - below 3 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Operation Sheet 2	Produce bed side cabinet

Methodof—

Finalizing project components

Purpose: This activity covers the trainee how to

Situation: trainee how to identify required materials

Equipment, tools and materials: are listed below:

Procedure:The following procedure are under taken

Step 1- Layout all necessary dimensions (in every stock if necessary)using standard allowance in order to minimize wastage

Step 2- Go to machines for cutting & other things. Please follow the correct procedure of machines.

Step 3-Go to the lamination if there are materials which needed to be laminated. Again please don`t use access glue

Step 4-Go back to the other machines. Example jointer machine.

Step 5-Cut the final dimension of the laminated components.

Step 6-Cut out the detail parts.

Step 7-Check measurements of the detail parts.

Step 8- Fill each part to finish pre-assembling activities

Precaution: keep yourself from danger and use the necessary safety material & please the materials safely.

LAP Test	Practical Demonstration

Name: _____ Date: _____

Time started: _____ Time finished: _____

Instructions: Given necessary templates, tools and materials you are required to perform the following tasks within -8hrs-- hour.

Task1. Read a drawing

Task2. Prepare cutting list

Task3. Laminate timber /board material

Task4. Measure, mark out, cut and shape according to specification.

Task5. Prepare the components for assembling

N.B .candidate may under appropriate supervision prepare their own timber/laminate board-all dimension to be + 2mm all saw cuts +1mm and all joint to be level and evenly finished

List of Reference Materials

1- BOOKS

Reference Books	1. *General wood working* by CHRIS H. GRONEMAN/ Third Edition 2. *General wood working* by CHRIS H. GRONEMAN/ Six Edition 3. *Working with Wood* by SACKEY 4. *Modern cabinet making* by William D. Umstatted, Charles W.david 5. *Arts & Crafts Furniture Projects* BY GREGORY PAOLINI 6. Motivate series:-*wood work technology*, by J.K.N. Sackey