CHAPTER 1

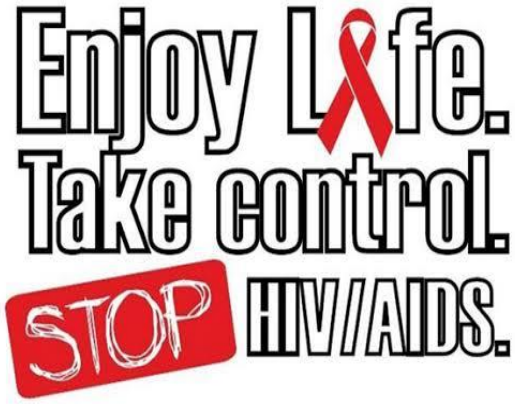
GENERIC

INTRODUCTION

HEALTH AND SAFETY

Occupational safety and health, is a regulations and procedures intended to prevent accident or injuries with the safety, health, and welfare of people in workplace or public environment.

Figure 1.1



HIV/AIDS AWARENESS

HIV and Aids is a complex illness with a wide range of complications and symptoms

THE FOLLOWING ARE VERY IMPORTANT SAFETY MEASURES TO PREVENT HIV/ AIDS IN THE WORKSHOP

- Tools with sharp edges should be handled with care.
- Any blood should be washed off from the surface of tool and must be sterilized.
- Protective clothing must be worn when handling contaminated body fluids
- In an emergency of mouth to mouth recitation, mouth places must be worn
- If faced with the possibility of contact with blood, precaution should be taken to prevent contact with skin,eyes or mucous membrane
- The wound should be covered to stop further bleeding

Figure 1.2

Substance abuse

Figure 1.3

WORKSHOP SAFETY - DRUG AND ALCOHOL ABUSE

WHAT IS SUBSTANCE ABUSE?

- Is when people inhale, inject, smoke, consume, and absorb drugs or any substance that, when via a patch on the skin or dissolved under the tongue causes a physiological change in the body.
- The abuse of alcohol and drugs continues to be major health problems globally.
- It also affects our schools and compromising the quality of teaching and learning. Alcohol and drug abuse has been linked to academic difficulties and absenteeism.
- It means therefore that no drugs or alcohol is allowed in the workshop

WORKSHOP RULES

Figure 1.4

ALL LEARNERS MUST ADHERE TO THE FOLLOWING RULES IN THE WORKSHOP:

- Do not run in a workshop.
- Ask first to use any tools in a workshop
- Report any spillage or breakage immediately to the teacher.
- Always use the right tool for the right job
- Show the necessary respect to your teacher/ instructor and other learners at all times.
- Always wear personal protective clothing in the workshop
- Never enter and leave the workshop without permission
- Playing in the workshop is prohibited
- Work only in the area allocated to you
- Always cut the bricks in such a way that the pieces do not injure yourself and other learners
- Never leave objects, like pieces of bricks, trestles, scaffold boards and other equipment or tools lying around

- Clean the workshop and tools before you leave

Requirements of the OHS act associated with bricklaying and plastering:

The aim of the **OHS Act is** to provide for the safety and health of learners in the workshop and in connection with the use of tools and machinery.

HOUSEKEEPING

Introduction

Good housekeeping refers to the practice of keeping your workshop clean and tidy. Bricklaying and plastering work is messy after all, and if you clean up now there will only be more mess later, you should practice good housekeeping! A tidy work area reduces the risk of accidents and injuries.

Figure 1.5

Definition

Plant housekeeping means a place for everything and everything in its place at all times.

Why is good housekeeping important?

- It saves time
- Saves space
- Injuries are avoided
- Fire hazards are reduced

GOOD HOUSE KEEPING

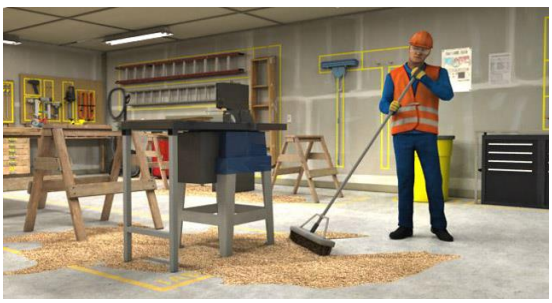


Figure 1.6

BAD HOUSE KEEPING

Figure 1.7

PERSONAL SAFETY

- Personal safety refers to safety with regards to one's personal wellbeing and one is not exposed to danger

CLOTHING (PPC) PERSONAL PROTECTIVE CLOTHING

It refer to correct safety clothing,

- Overalls
- Head protection (hardhat/helmet)
- Eye protection (safety goggles)
- Ear protection (ear plugs/ earmuffs}
- Foot wear (Safety shoes/ boots)
- Mouth and nose (dust musk)
- Hand protection (hand gloves)

Safety equipment	Purpose
Overalls 	• It refers to correct safety clothing, like safety overalls, It protect your clothing from being spoil and damage.

Gloves 	• It refers to the safety gloves which must be worn when working in the workshop to avoid hand injuries
Boots 	• It refers to the safety shoes/boots which must be worn when working in the workshop to avoid foot injuries from falling objects
Safety glasses 	• It refers to the safety goggles which must be worn in the workshop or on site to avoid eye injuries
Gas masks/dust masks	• It is for the protection against dust and vapors in the workshop.

	
Safety helmets (Hard hat) 	• Refers to safety hats, like hard hats/helmet when working in the workshop or on site ,to avoid head injuries
Ear muffs 	• Refers to safety ear plugs/muffs, to protect your ears when grinding, cutting metal or masonry,loud noises

Figure 1.8

Fire prevention and protection:

Fire prevention means to educate the public to take precautions to prevent potentially harmful fires

Types of fires
Class A

- Ordinary, wood, paper and other substances

Class B

- Flammable liquids and gases. Vapors from petrol fumes, oil based paints, lacquers and some solvents

Class C

- Electrical equipment, wiring and other apparatus

Class D

- Combustible metals, dust and metal chips. Examples magnesium, aluminum and lithium

Class F

- High temperature cooking oil such as used in the restaurants

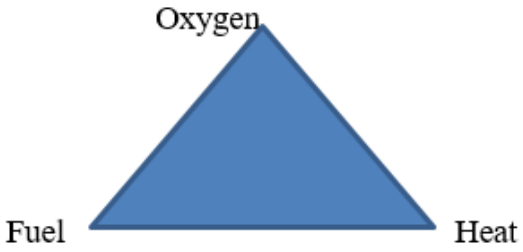
SYMBOLS	TYPES OF FIRE
	The picture represent or denotes : • Wiring, Electric equipment, Electrical appliances and Circuit breakers
	The picture represent or denotes : • Trash, Paper, Fabric and Plastic
	The picture represent or denotes : • Trash, Paper, Fabric, and Plastic
	The picture represent or denotes : • Combustible metals and metal alloys
	The picture represent or denotes : • Cooking media (vegetable or animal oils and fats

Figure 1.9

MAIN COMMNON COUSRES OF FIRE

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

FIRE TRIANGLE



For any fire to take place, the following should be present, oxygen, heat and fuel.

FIRE EXTINGUISHERS FOR SPECIFIC TYPES OF FIRES

fire extinguisher

- Is a portable container, usually filled with special chemicals for putting out a fire

Extinguishers	Type of Fire
Water	Solids –Papers, Wood, Fabric
Foam	Flammable liquids and gases. Vapors from petrol fumes ,oil based paints ,lacquers and some solvent
Dry powder	Electrical equipment, gases, flammable liquids, Solid
Carbon dioxide	Flammable liquids, cooking oils

SCAFFOLDING

Scaffolding is a temporary structure on the outside of a building, made of wooden planks and metal poles, used by workers while building, repairing, or cleaning the building. A scaffold is one of the equipment that helps a worker to work at higher level. As OHSA stipulates the safety of every workmen working on scaffold should be maintained.

TYPES OF SCAFFOLD

Dependent scaffold

A **dependent scaffold** has all the putlogs (board supports) resting on the brickwork, these are then built over as the building goes up, then removed and the "holes" filled in once the building is complete and the scaffold dismantled

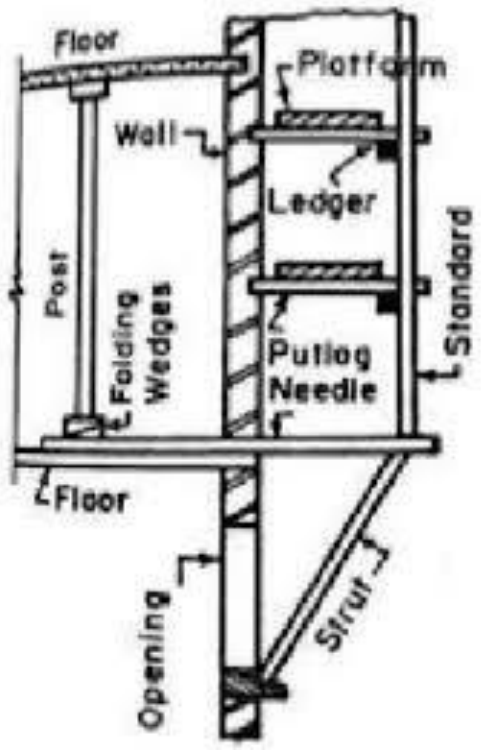


Figure 1.11

Independent scaffold

This scaffold does not rely on the wall for support; it stands on its own. It consists of a double row of standards, with each row parallel to the building. The inner row is set as close to the building as is practicable.

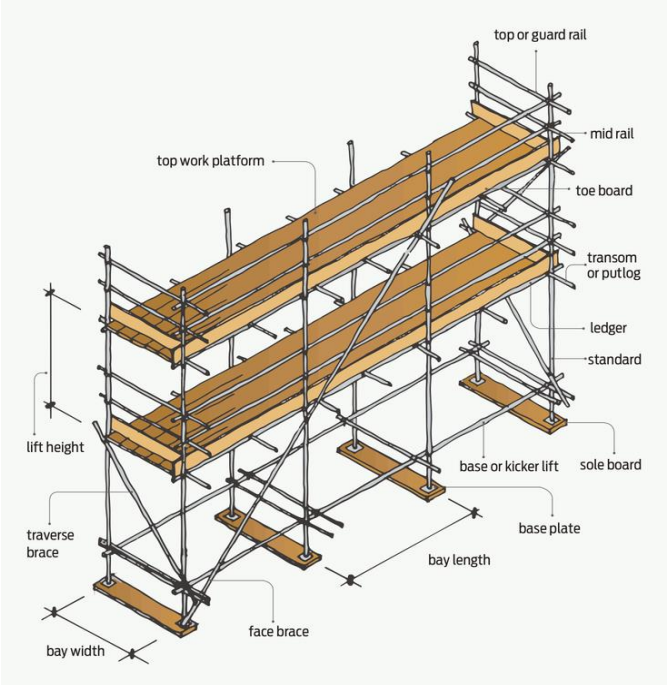


Figure 1.12

BUILDERS TRESTLES

This is generally used for work inside the room, such as paintings, repairs etc., up to a height of 5m.

Builders Folding Trestle -

Figure 1.13

Safety precautions to be followed when working on a scaffold:

- Do not overload the scaffold.
- Never tamper with or attempt to repair a scaffold unless you have received training in scaffold erection.
- Scaffold must be erected by a qualified person.
- Always wear personal protective equipment.
- Do not through any tools or material to the ground.
- Ensure qualified person has inspected the scaffold before the work shift and that it is safe to use and in proper working order
- Safety net must be installed around scaffold to protect ground workers from falling objects.
- Report any defects or loose members of the scaffold to the safety officer
- Do not move the scaffold while other worker still on top.
- Do not climb the scaffold while feeling dizzy or numb
- Do not climb the scaffold on bad weather condition
- Scaffolds can only be erected, dismantled, altered or moved under the direct supervision of a qualified person.
- Parts should securely fix to avoid tipping
- Base plates and sole plates should be on the firm ground.
- Boards must be level and overlap
- Clear passage at least 400mm on the working platform to avoid obstruction
- Braces must be used to prevent the scaffold from collapsing due to sideways sway
- Guard rails and toe boards must be provided and securely fixed
- Safety harneses should be used when using scaffold
- Check if the type of scaffold is right for the loads, materials, workers and weather conditions.
- Inspect footings to see if they are level, sound, firm, and can support the loaded scaffold.
- Ensure that the legs, posts, frames and uprights are on baseplates and mudsills.
- Ensure there are no bends, holes, cracks, rust, pits, welding splatter, broken or, and non-compatible parts in the metal components of scaffold.

- Check for safe access. The cross braces should not be used as ladder for access or exit.
- Guard rail and the toe board must be provided and securely fixed
- Keep scaffold away from electrical lines

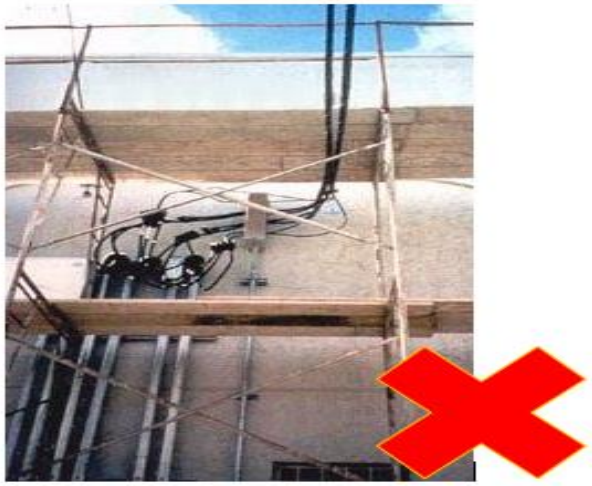


Figure 1.14

ACTIVITY 1

1. What do we call person who lay bricks to construct brickwork?
2. Name TWO types of substance that have a negative effect on learners capability
3. Name TWO safety measures to prevent HIV/AIDS from spreading from one person to another.
4. Name TWO workshop rules that learners must obey
5. Name TWO reasons why good housekeeping is important
6. Name the following safety equipment

Safety equipment	Name
	
	

7. Name three courses of fire

CHAPTER 2

FIRST AID

FIRST AID

BASIC FIRST AID PRINCIPLES

Definition of First Aid:

Refers to help given to a sick or injured person until full medical treatment is available

Basic principles of First Aid:

Principles of **first aid** include:

- Safe response to emergencies for the benefit of casualties, bystanders and rescuers. Securing the emergency site to reduce further harm to the casualty.

Types of injuries:

- Cuts
- Burns
- Fractures
- Slips, trips and falls
- Inhaling toxic fumes
- Exposure to loud noise
- Walking into objects
- Fights in the workshop

Care of injuries:

- **Cuts**

- Wash your hands well before attending to any wound.
- Treat with antiseptic to protect against possible infections
- Cover the wound with dressing or plaster.

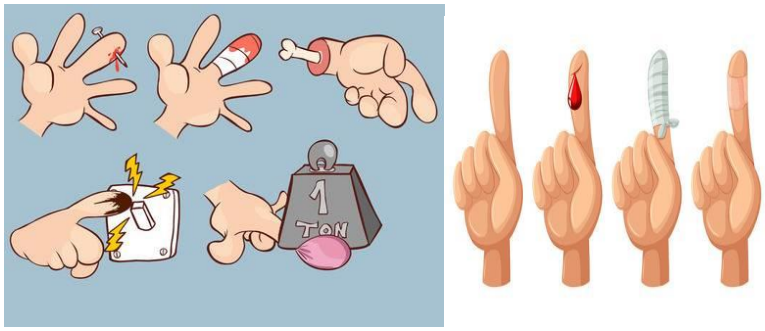


FIGURE 2.1

- **Burns**
  - If necessary remove clothes carefully from the burnt part
  - Blisters should not be punctured
  - Cover the burn area with a clean cloth to avoid infection
  - Do not tighten to prevent the skin removed
  - If the skin is removed take the injured person to hospital

FIGURE 2.2

- **Fractures**
  - Do not try to straighten out a fracture.
  - Put the person in the most comfortable position and get professional help

FIGURE 2.3

- **Slips, trips and falls**
  - Check the degree of the injury that the ankle, legs, or even knees are not affected.
  - If the visible signs of injuries that cannot be treated in the workshop, the learner must be taken into the doctor or call the ambulance

FIGURE 2.4

- **Inhaling toxic fumes**
  - Since it is difficult to determine the extent of inhalation of the fumes or vapours, the person must be taken straight to the doctor for medical examination.

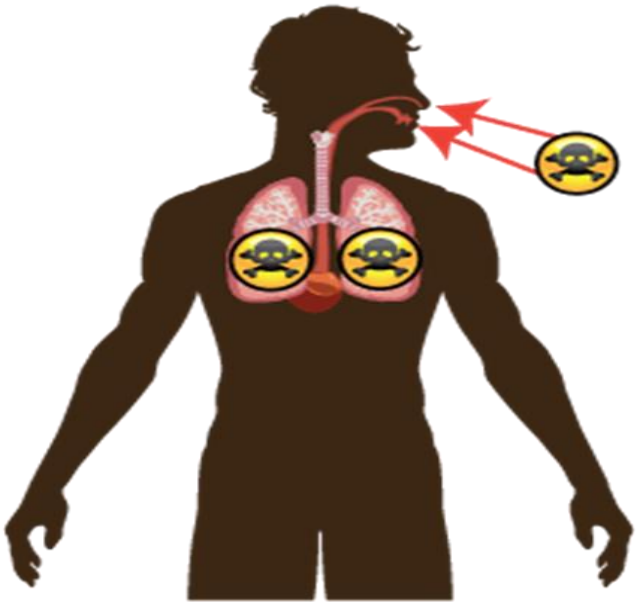


FIGURE 2.5

- **Exposure to loud noise**

- If working in a noisy area where there are loud bangs, the learners must wear earmuffs or earplugs.
- In the event of someone being, expose to loud noise they must stop working immediately and be made to sit in a noise free area.

FIGURE 2.6

- **Walking into objects**

- Check the degree of the injury that there are no cuts or the parts of the body are pierced and treat according to the injury

FIGURE 2.7

- **Fights in the workshop**

- Check the degree of the injuries of the learners involved and treats according to the injury.
- If deemed serious, the injured person must be taken to the doctor or hospital for further medical examination.

FIGURE 2.8

ACTIVITY 1

1. Define first aid.
2. Name two types of injuries.
3. What would you do if you see someone has a cut? Name two
4. What would you do if you see someone has burn? Name two
5. What precautions must be taken to prevent fracture from continuing? Name two
6. What must you check if someone has slipped, tripped and fallen?
7. If it is difficult to determine the extent of inhaling toxic fumes, what must be done?
8. What must a teacher do if there was a fight between learners?

CHAPTER 3

GRAPHICS COMMUNUCATION SKILLS

GRAPHICS AND COMMUNICATION SKILLS

INTRODUCTION

Graphics and communications skills is a combination of lines, symbols and signs used to create technical drawings that are needed to clearly communicate a message to a builder, engineer or producer. It is a communication tool.

Purpose of Graphics and communications skills

Designers use drawings when developing ideas.

Clear, complete and accurate drawings helps to prevent expensive and/ dangerous mistakes e.g. when a builder discovers that a mistake was made in a building and has to demolish the building. This has financial implications and time is wasted

.The language of graphics includes:

Being able to visualise a drawing,

Knowledge and understanding of drawing principles and practices

The design process

Graphics and communications skills prepares a person for the following career opportunities/ choices or paths

Civil Engineering

Mechanical Engineering

Electrical Engineering

Maritime studies

Mining engineering

Medical Technician

Industrial designer

Interior Designer

City Planner

Teacher

Jewellery designer

Architecture etc.

General drawing principles

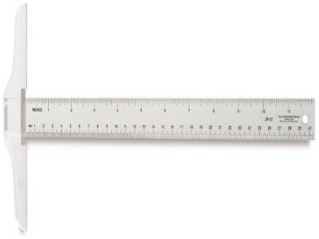
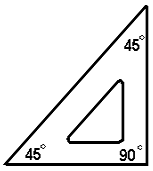
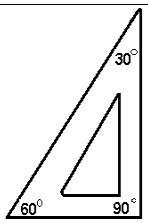
Drawing Instruments

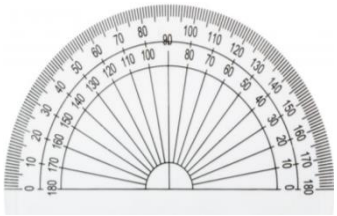
Name Use Care

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 cloth45 preferable yellow duster
 **45°Set square**	It is used to draw parallel lines, perpendicular , standard measure angle (45°and 90°)	Wipe with clean cloth preferable yellow duster
 **30°/60° Set square**	It is used to draw parallel lines, perpendicular , standard measure angle (30°60°and 90°)	Wipe with clean cloth preferable yellow duster

  **Scale Rule**	It used to measure the length, width and height.	Wipe with clean cloth preferable yellow duster
  **Protractor**	It is used to measure the angles.	Wipe with clean cloth preferable yellow duster
 **Compass set**	It is used to draw the draw the circles and arcs	The lead on the compass must be kept sharp.

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

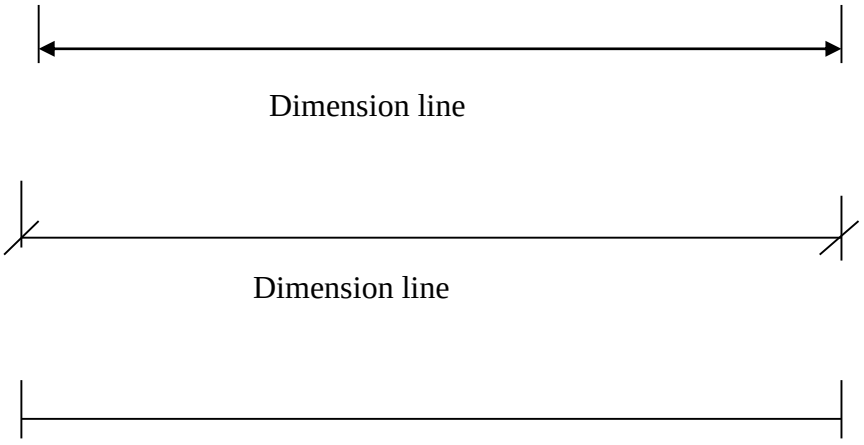
Dimensioning

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)

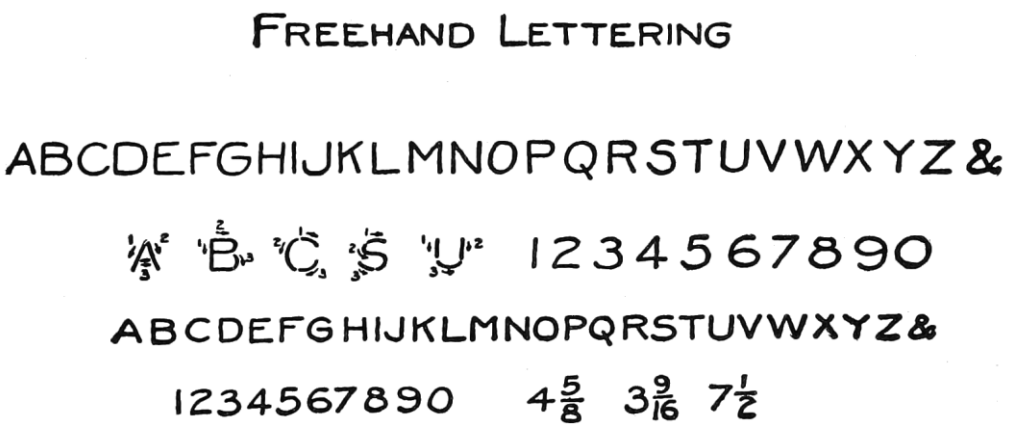
Examples of dimension lines



Line work

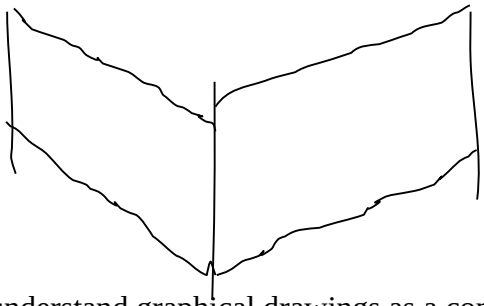
Line type	Description	General application
A	Continuous line dark.	Visible outlines and edges.
B	Continuous line light.	Dimension lines. Extension lines. Hatching lines. Leader lines.
C	Continuous line very light.	Construction lines. Projection lines. Guidelines for printing.
D	Dashed line light.	Hidden lines.
E	Chain line light.	Centre lines. Pitch lines and circles. Lines indicating symmetry.
F 	Chain line light – dark ends.	Cutting planes.
G	Short break line light.	Irregular boundaries.
H 	Long break line light.	Limits of views and sections, if the line is not an axis.

Lettering



Freehand drawing

Freehand drawings or sketches refer to drawings that are done without mechanical help, such as guiding or measuring instruments. These sketches are drawn using a pencil and an eraser only.



- To enable the learner to understand graphical drawings as a communication method.
- To enable the leaner to read and interpret building plans
- To enable the learner to draw free hand drawings in order to communicate graphically on site
- Purpose, scope and career opportunities

SCALE

All d Drawings are drawn to scale. The scale refers to the proportion or ratio between the dimensions adopted for the

drawings and the corresponding dimensions of the object.

- The following scales will be used in this regard:

The application of scales

- Full size scale 1:1
- Reducing 1:2

1:5

1:10

1:50

1:100

Enlarging scale 2:1

GENERAL DRAWING PRINCIPLES TO ALL TYPES OF DRAWINGS

- Use and care of drawing instruments

The GRAPHICS AND COMMUNICATIONS SKILLS drawing instruments consists of the following basic requirements:

- Drawing board
- A 4 drawing paper
- Clutch pencil or H (least hard) or 2H (medium hard)
- Set squares- 45
- 60/30
- T- Square

FREE HAND DRAWING TECHNIQUE

- This is a simply done by hand without the aid of tools such as templates, stencils or tracing copies.
- Only pencils and eraser are used for free hand drawing.
- The technique can be mastered by practicing and drawing regularly

CHAPTER 4

MATERIALS

Introduction

Building material is any **material** which is used for **construction** purposes. Many naturally occurring substances, such as clay, rocks, sand, and wood, even twigs and leaves, have been used to construct **buildings**.

Many types of building materials are used in the construction industry to create buildings and structures.

Sand - is a natural resource dug from the ground and mixed with cement to produce mortar

TYPES OF SAND

- Crushers sand
- River sand
- Pit /Building sand
- Drift sand
- Sea sand
- Mine dump sand

Crusher sand

It is obtained by crushing, washing and grading natural stone. It is used for building purposes

River sand

It is coarse and contains small amount of fine pieces in it.

It is obtained from the riverbanks.

It is used in conjunction with cement and stone for concrete purposes.

It is also use for screed purposes with cement.

Pit sand (building sand)

Pit sand contains too much clay. It is mixed with cement and water and mainly used for laying bricks or blocks.

Plastering sand

Plastering sand is a very fine grade of **sand.** It is used for **plastering** and creating renders both internally and externally.

Drift sand

It is sand blown from the desertand normally clean.It is of the same size of particles and is therefore poorly graded forany building purposes.

Sea sand

It is salty type of sand obtained on the sea shores. It is rarely used and not recommended for any building purposes

Mine dump sand

It is derived from the mine deposits after blasting and is full of mine chemicals. Mine dump sand is good for levelling off an area before brick paving is done.

PROPERTIES OF SAND

- It should be clean, free from earth, clay or other vegetable matters like weeds, grass.
- It should be run through a sieve before being used and be evenly graded from fine to course.
- Sand is used together with cement for building and plastering purposes.
- It is also being used with cement and crushed stone for concrete purposes.

WATER

Water used for concrete or mortar should be clean, and free from impurities.

Ingredients for concrete or mortar should be mixed raw before water is being added.

Only enough water should be added to make the mix a "plastic mixture.

CEMENT

Is a powdery substance made from limestone and shale,

it is used as binding agent in the production of mortar and concrete during the **construction** process

FIGURE 4.1

BUILDING LIME

Fine powder formed from cement clinker which are fired at high temperature to form a fine powder

Lime is added when the bricklayer wants to add a bit of bulk to cement and is not so strong for bricklaying purposes.

Lime is used instead of a cement when the strength of the mortar required is not that strong

FIGURE 4.2

FINE AGGREGATE

Fine aggregate consists of natural sand or crushed stone with small particles less than 9.55 mm in diameter.
It assist in producing workability and uniformly in mixture.
It assist the cement paste to harden the coarse aggregate particles

FIGURE 4.3

COARSE AGGREGATE

Coarse aggregate : is the portion of the aggregate used in concrete that is larger than 4.75 mm in diameter
Forms part of concrete to provide additional strength

FIGURE 4.4

Activity 1

1. Work in groups and collect different types of building material used for building

- Sand
- Cement
- Water
- Coarse aggregate
- Fine aggregate
- Bricks

2. Name **THREE** types of sand used in building construction

CHAPTER 5

TOOLS AND EQUIPMENT

Introduction

In general, **brickwork tools** and **equipment** can be divided into four categories: Hand **tools**, such as **trowels**, hammers and bolsters. Power **tools**, such as heavy-duty drills and mixers for mortar and plaster. Measuring devices, including laser levels and tape measure

It is important that the correct tools are available to carry out the specific work

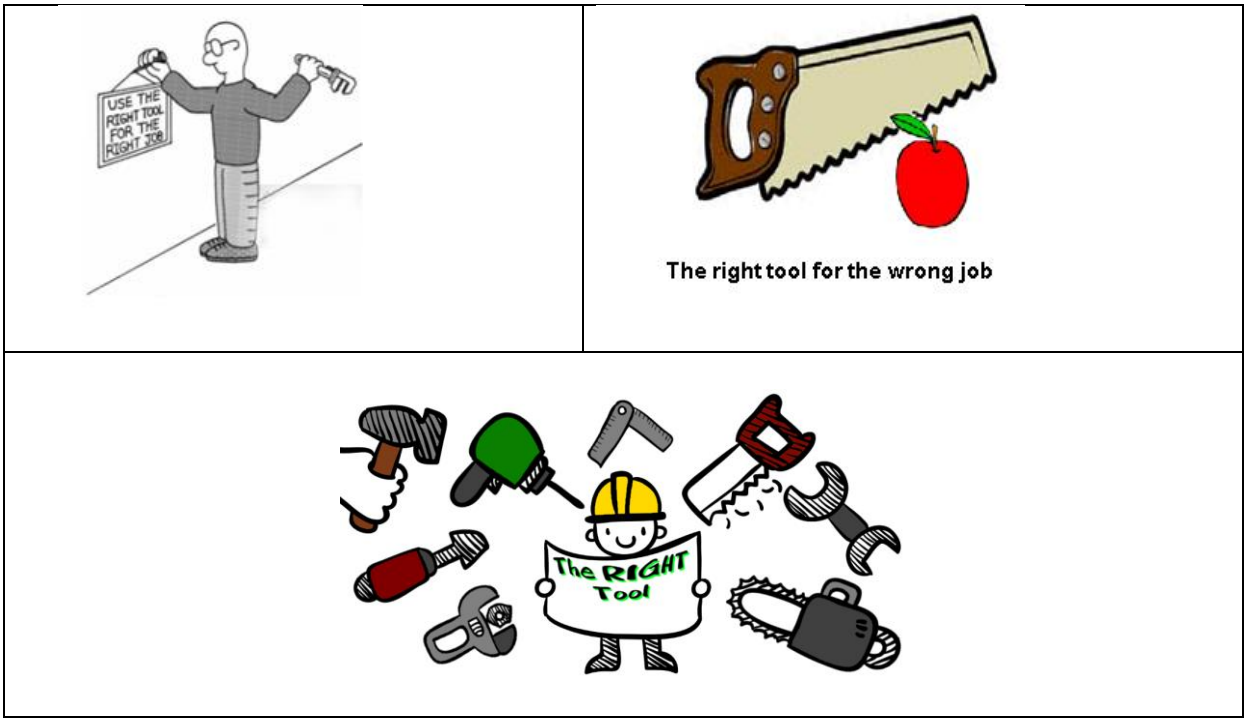


FIGURE 5.1

TOOLS

Classification of tools:

In bricklaying and plastering, learners must understand how tools are classified.

Bricklaying and plastering tools are classified according to their use.

Five classifications of tools in bricklaying are the following:

- Setting-out tools
- Bricklaying tools
- Brick-cutting tools
- Jointing/Finishing tools
- Plastering tools

Handling of hand tools

- Use tools for the specific purpose and not for anything else
- Tools must not be put on the edge of the tables
- The tools and equipment must be properly maintained to extend the tool life

- Sharp tools must be kept sharp, as blunt tools can course injuries when working with them
- Never throw tools to your fellow learner, rather give them by hand
- Always concentrate on the point of action
- Allow adequate time at the end of each work day to clean the tools, properly pack and secure for storage.

SETTING OUT TOOLS

Name of tool	Uses	Storage, maintenance and handling of equipment
Steel square 	• Used to check the squareness of buildings • Setting out of brickwork	• Wash off the excess mortar with clean water and cloth. • Keep in a store room
Folding rule 	• Accurate measuring for less than 1m	• Wash off the excess mortar with clean water and cloth. • Keep in a store room
Measuring tape 	• Used for fine and accurate measuring	• Wipe the excess mortar with a cloth • Keep in a store room
30m Steel tape 	• It is used for setting out of large buildings	• Wipe the excess mortar with a cloth • Keep in a store place
Metal pegs/Wooden pegs 	• Used to indicate the foundation trenches and also to what level should be poured	• Wash or rinse with water • Keep it in a store room

	• Lay-out of area or foundations for building of straight courses	• Wipe the excess mortar with a cloth • Keep in a store place •
Spirit level 	• Used for checking levels of brickwork horizontal and vertically	• Wash off the excess mortar with clean water and cloth. • Keep in a store room
Straight edge 	• Is used to guide a plasterer for levelling of foundation, floors and plastering.	• Wash off the excess mortar with clean water and cloth. • Keep in a store room

FIGURE 5.2

BRICKLAYING TOOLS

Name of tool	**Uses**	**Storage, maintenance and handling of equipment**
Brick trowel 	• **Is used for picking and spreading mortar**	• **Wash off the excess mortar with clean water and cloth.** • **Keep in a store room**
Line and Pins 	• **Line pins are inserted into a brick course or staked into the ground** • **Line and pins are used as a reference or guide line.**	• **Wash off the excess mortar with clean water and cloth.** • **Keep in a store room**

Corner blocks 	• **Used with the building which indicates a straight line to build against**	• **Remove excess mortar with wet cloth.** • **The line should be rolled back on the block to avoid it to be tangled.** • **Keep all in the storeroom**
Spirit level 	• **Used for checking levels of brickwork horizontal and vertically**	• **Wash off the excess mortar with clean water and cloth.** • **Keep in a store room** •
Tingle 	• **Is used to keep the line straight between two corners which are far apart**	• **Remove excess mortar with wet cloth.** • **Store in the store room** •
Gauge rod/brick gauge 	• **Is used for checking the accurate height of the courses of the brickwork**	• **Remove excess mortar with wet cloth.** • **The line should be rolled back on the block to avoid it to be tangled.** • **Keep all in the storeroom**
Steel square	• **Used to check the squareness of buildings** • **Setting out of brickwork and buildings**	• **Wash off the excess mortar with clean water and cloth.** • **Keep in a store room**

FIGURE 5.3

BRICK CUTTING TOOLS

Name of tool	Uses	Storage, maintenance and handling of equipment
Brick hammer 	• Is used to cut bricks	• Wash off the excess mortar with clean water and cloth. • Keep in a store room
Bolster 	• Is used with a club hammer to cut bricks accurately	• Wash off the excess mortar with clean water and cloth. • Keep in a store room
Club Hammer 	• Is used with a bolster and cold chisel to cut brick and brick work	• Wash off the excess mortar with clean water and cloth. • Keep in a store room

Cold Chisel 	• **Is used for cutting concrete and brickwork**	• **Wash off the excess mortar with clean water and cloth.** • **Keep in a store room**
Comb hammer 	• **Is used to trim and cut bricks more accurately**	• **Wash off the excess mortar with clean water and cloth.** • **Keep in a store room**

FIGURE 5.4

JOINTING TOOLS

Name of tool	**Uses**	**Storage, maintenance and handling of equipment**
Long Jointer 	• **Used to smoothen the joints between courses of the brickwork** • **To ensure a good and consistent finish**	• **Wash off the excess mortar with clean water and cloth.** • **Keep in a store room**
Short Jointer 	• **Used for upright joints between bricks**	• **Wash off the excess mortar with clean water and cloth.** • **Keep in a store room**

Pointing Trowel 	• **Used to finish the mortar between bricks** • **Used to apply tuck pointing**	• **Wash off the excess mortar with clean water and cloth.** • **Keep in a store room**
Mastic Trowel 	• **Is used to form tuck pointing** • **Used to fill up joints between windows and door frames**	• **Wash off the excess mortar with clean water and cloth.** • **Keep in a store room**

FIGURE 5.5

BASIC SITE EQUIPMENT

Name of tool	**Uses**	**Storage, maintenance and handling of equipment**
Round shovel 	• Used for mixing concrete and mortar	• Kept sharp • Stored in a dry location
Square shovel 	• Used for clearing loose material and rubble at building sites	• Kept sharp • Stored in a dry location
Steel Shaft Digging Spade 	• Used for digging trenches	• Kept sharp • Stored in a dry location

Pick Axe 	• Used to break up hard ground	• Clean with water after every use. • Keep in the store room
Wheel barrow 	• Used to transport mortar, concrete, filling and bricks	• Clean with water after every use. • Turn it up right to dry • Keep in the store room

FIGURE 5.6

PLASTERING TOOLS

Name of tool	**Uses**	
Wooden/plastic float 	• Is used to finish off plaster or concrete surfaces to achieve a finely textured surface	• Wash off the excess mortar with clean water and cloth. • Keep in a store room
Plastering trowel 	• Is used to apply plaster to the wall • Is used for smoothing concrete and plaster	• Wash off the excess mortar with clean water and cloth. • Keep in a store room
Hand hawk 	• Is used to carry the plaster	• Wash off the excess mortar with clean water and cloth. • Keep in a store room
Straight edge 	• Is used to guide a plasterer for levelling of foundation, floors and plastering	• Wash off the excess mortar with clean water and cloth. • Keep in a store room

Block brush 	• Is used for wetting down walls before plastering and during the floating process	• Wash off the excess mortar with clean water and cloth. • Keep in a store room • in the storeroom
Corner trowels (internal and external) Internal corner tool  External corner tool 	• Is used to finish off the corners of the plastering internally and externally	• Wash off the excess mortar with clean water and cloth. • Keep in a store room
Gauging Nose trowel 	Is used for mixing small quantities of mortar for patching and laying on mouldings	• Wash off the excess mortar with clean water and cloth. • Keep in a store room

FIGURE 5.7

Activity 1

Work on your own. This activity is formal assessment.
Answer the questions in your workbook.

1. The drawings below shows pictures of hand tools that are used on sites and in the workshops. Write down the correct name of each tool

A.

B.

C.

D.

E.

2. Name Five classifications of tools used in bricklaying and plastering:

MATERIALS:

PIPES USED IN PLUMBING.

PVC PIPES.

PVC is a common, **strong but lightweight plastic used in construction**. It is **made softer and more flexible by the addition of plasticizers**. **If no plasticizers** are added, it is known as uPVC (unplasticized **polyvinyl chloride**) or rigid **PVC**. Pvc pipes come in different sizes from 50mm-550 mm

The uses of PVC:

Economical, versatile **polyvinyl chloride** (**PVC**, or vinyl) is **used** in a variety of applications in the building and construction, health care, electronics, automobile and other sectors, in products ranging from piping and siding, blood bags and tubing, to wire and cable insulation, windshield system components and more.

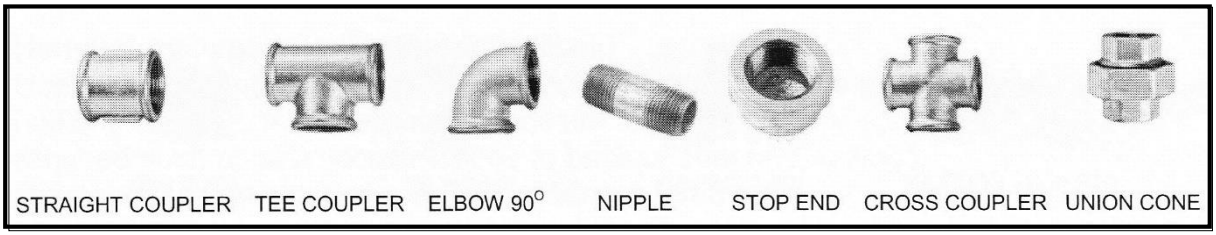
COPPER PIPES:

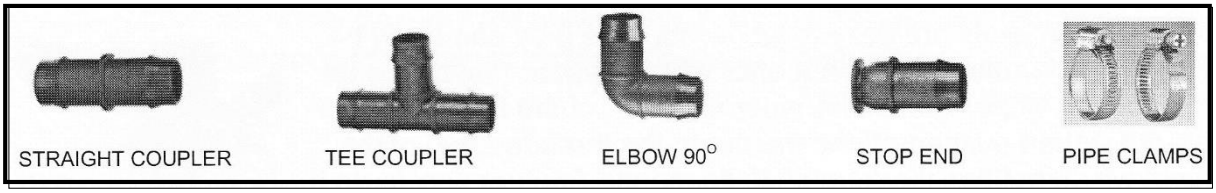
There are two basic **types** of **copper tubing**, soft **copper** and rigid **copper**. **Copper tubing** is joined using flare connection, compression connection, pressed connection, or solder. **Copper** offers a high level of corrosion resistance but is becoming very costly.

Copper pipes are commonly **used** in the construction industry for water supply lines and refrigerant lines in HVAC (heating, cooling, and air-conditioning) systems. **Copper pipes** can be manufactured as soft or rigid **copper** and offer excellent corrosion-resistance and reliable connections.

GALVANIZED PIPES:

A **galvanized pipe consists** of a common steel **pipe** which is coated by a thin layer of another **metal** such as zinc to prevent rusting. Thus, for nearly all outdoor uses a **galvanized pipe** is usually preferred to other plastic **pipes** such as PVC or ABS **pipes**.





Galvanized pipe is **used** in outdoor and indoor **applications** due to its anti rusting components. The zinc coating slows the process of corrosion and can make the **pipe** last for decades (in the right environment). This makes it ideal for marine **applications** and for transporting hot and cold water alike.

Assessment

ACTIVITY:

2.1 Identify the following.

Part	Name
	2.1.1

	2.1.2
	22.3
	2.1.4
	2.1.5

PLASTIC FITTINGS:

PVC fittings includes solvent weld tees, elbows (both 45° and 90°), sockets, stubs, reducers, crosses and flanges.

Plastic pipework is **used for** the conveyance of drinking water, waste water, chemicals, heating fluid and cooling fluids, foodstuffs, ultra-pure liquids, slurries, gases, compressed air, irrigation, **plastic** pressure **pipe** systems, and vacuum system applications.

Brass fittings(Compression joints)

Brass itself is an alloy of copper that incorporates zinc as an alloying element; the ratio of **brass** to copper varies between types of **brass**. Of the **pipe** attachments available, common varieties include union tees, crosses, couplings, elbows (male or female).

Brass caps fit on the end of a pipe and, as their name suggests, are **used** to prevent flow in a certain a ɔ **used** in automotive **applications**, where they are **used** in air brakes, fuel line valves, and hose ends.

Assessment

ACTIVITY:

1) Name the types water pipes used for cold water.
2) Give the uses of brass fittings.
3) Describe the FOUR different types of fitting used to connect pipes.
4) Name the fitting used for PVC connections.

Enrichment

PVC Solvents and glues

To briefly explain, a solvent **cement** is a **glue** which **consists** of a small amount of **plastic** resin which is dissolved in a solvent. When a solvent **cement** is applied to the surface of the **PVC** pipe, the solvent contained within the **cement**, temporarily melts the surface of the **PVC**.

1 Contact glue:

The ultimate general-purpose Contact Adhesive that is a toolbox essential. Offers fast, flexible and permanent bonding - one of the best bonding agents for durability. It can be used for bonding almost anything but is especially useful for non-porous materials (e.g. glass, metal, hard plastics) that other adhesives can't glue together. Genkem Contact Adhesive offers good brushability for easy application in hard to reach places. In its wet form, it will stick to a variety of surfaces, and in its tacky to dry form, it will only stick to itself. Once adhered, it is nearly impossible to rip apart.

SUITABLE FOR USE ON:

- Wood, processed boards, masonite, plywood, veneer, floor coverings, foam, canvas, leather, felt, cloth, linoleum, glass, metal, rubber, cork and some plastics.

- Ideal for hobby crafts, shoe repair, leather work, decorative work and general DIY projects

1.2 PVC adhesive:

Working with PVC conduit and its fittings is easy and with the right technique, you can have a strong holding bond between the conduit and the fitting by using this great tip on how to glue with PVC glue.

Unlike rigid metal conduit that has threaded fittings or EMT conduit that has setscrew fittings, PVC conduit has glued fittings that require some special twists and turns to make them secure and stay holding strong.

There are three plastic plumbing pipes that are put together with glue. They are ABS, PVC, and CPVC pipes. We don't really call it glue, but solvent-cement. None of the plumbing cements are interchangeable, each one is specific for its pipe.

Each pipe is joined with its own cement. One exception is transition cement, used to weld ABS pipe and PVC pipe together. This transition cement is green in colour so it's easy to recognize. The other exception is all-purpose cement which can be used to join any of the three pipes to each other.

APPLICATIONS & USES:

Excellent adhesion to rigid PVC plastics and ABS. Suitable for all close fitting PVC pipes:

- Low-pressure pipes: like swimming pool pipes, outlet pipes, cable conduits, PVC gutters, PVC and ABS connections, etc.

- High-pressure pipes:like irrigation pipes, drink-water pipes, gas pipes, sewage pipes, industrial pipes, etc.

Assessment

ACTIVITY:

1) Name the types glues uses for PVC pipes.
2) Contact adhesive can be used on which type of material
3) Describe FOUR high pressure PVC pipes.
4) Name the fitting used for PVC connections.

PLUMMING TOOLS:

USE OF THE FOLLOWING TOOLS:

MONKEY WRENCH	SHIFTING SPANNER	PIPE STOCK AND DIE	WATER PUMP PLIERS	PLIERS
				
USES: - Tightening and loosening of pipes - Holding of pipes when valves, etc. are tightened	USES: - Tightening and loosening of taps, pipe fittings.	USES: - Cutting exterior thread on water pipes.	USES: - For gripping and holding pipes, etc.	USES: To perform many functions like: - Gripping - Cutting wire. - Bending - Pulling.
VICE GRIP	**TIN SNIPS**	**HACK SAW**	**SOLDERING IRON**	**PIPE CUTTER**

				
USES: - All purpose gripping tool	USES: - Cutting straight cuts and curves in sheet metal	USES: - To cut metal - To cut plastics	USES: - Soldering work for joining of copper and brass pipes and fittings	USES: - Cutting of pipes.
PLUMP BOB	**BLOW TORCH**	**REAMER**		
			Enrichment 	
USES: - To determine perpendicular level.	USES: - To heat copper pipes when soldering	USES: - To ream copper pipes		

Assessment

ACTIVITY:

1. Identify FIVE (5) plumbing tools.
2. Name the uses of all plumbing tools listed above.

CHAPTER 2 (WOODWORKING)

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.

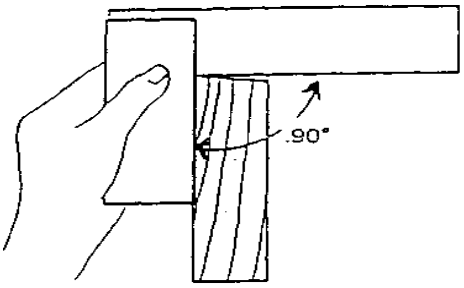
Tape measure:

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 metres, 5metres, 7 metres right up to 10 metres. 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

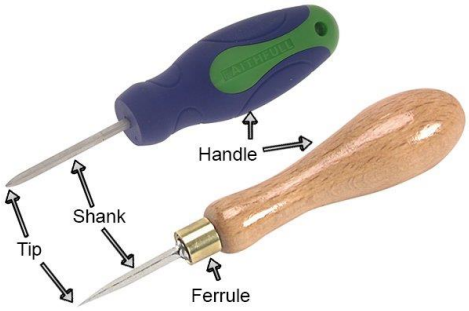
The try square is used to test whether materials are square. It used with a marking tool to draw right angle lines on a given surface. Do not drop it onto hard surfaces because the right angle could be affected. Always apply a small amount of oil to the blade before storage to prevent it from rusting.

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 centres 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

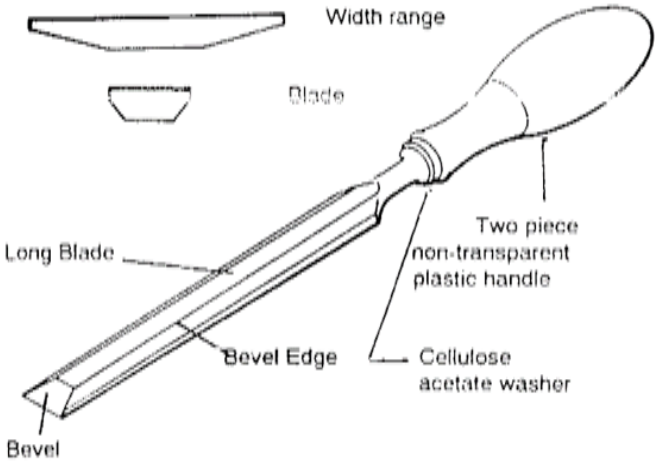
(a) Bevel edge Firmer chisel

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: Wikipidia

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 pein. 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 pein 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

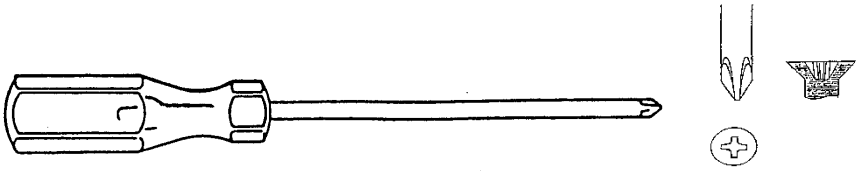
The wooden mallet is used to knock chisels into wood. It is made out of wood, usually beech. It is also used to knock wood joints together when assembling. To preserve the

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:

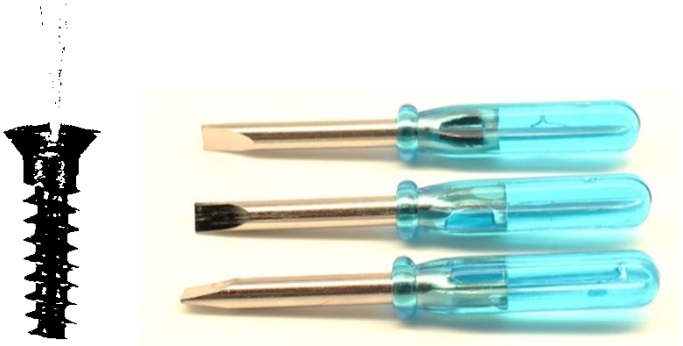
A screwdriver is used to drive in screws and/or loosening them. A screwdriver consists of an alloy steel shaft that is shaped at one end to fit the slot of the screw head. The other end of the shaft is fitted with a handle.

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

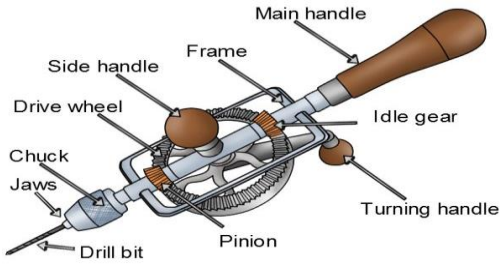


Source: dfsreloading

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

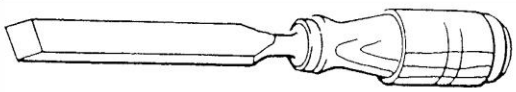
2.1 **Identify and state the uses of the following measuring and marking tool**

2.1.1

2.1.2

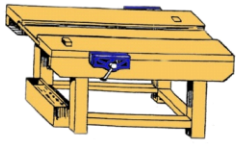
2.2 **Identify and state the uses of the following cutting tools:**

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

Woodworking

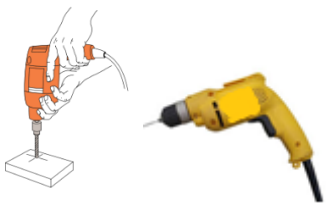
Definition

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 vanish.

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.

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.