

## **BRICKLAYING AND PLASTERING GRADE 8**

### **TERM 1**

### **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

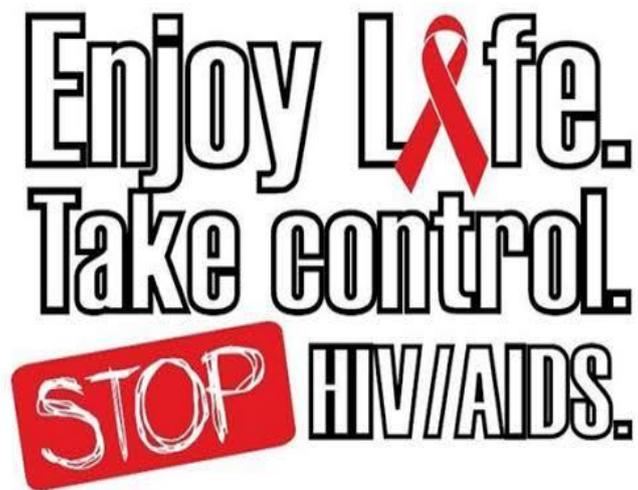


Figure 1.2

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 resuscitation, mouth pieces 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

### **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 refers 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
<p>Overalls</p> 	<ul style="list-style-type: none"> <li>• It refers to correct safety clothing, like safety overalls, It protect your clothing from being spoil and damage.</li> </ul>
<p>Gloves</p> 	<ul style="list-style-type: none"> <li>• It refers to the safety gloves which must be worn when working in the workshop to avoid hand injuries</li> </ul>
<p>Boots</p> 	<ul style="list-style-type: none"> <li>• It refers to the safety shoes/boots which must be worn when working in the workshop to avoid foot injuries from falling objects</li> </ul>
<p>Safety glasses</p>	<ul style="list-style-type: none"> <li>• It refers to the safety goggles which must be worn in the workshop or on site to avoid eye injuries</li> </ul>

Figure 1.8



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

### 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
	<p>The picture represent or denotes :</p> <ul style="list-style-type: none"> <li>• Wiring, Electric equipment, Electrical appliances and Circuit breakers</li> </ul>
	<p>The picture represent or denotes :</p> <ul style="list-style-type: none"> <li>• Trash, Paper, Fabric and Plastic</li> </ul>
	<p>The picture represent or denotes :</p> <ul style="list-style-type: none"> <li>• Trash, Paper, Fabric, and Plastic</li> </ul>

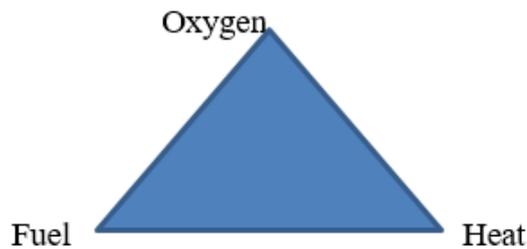
	<p>The picture represent or denotes :</p> <ul style="list-style-type: none"> <li>• Combustible metals and metal alloys</li> </ul>
	<p>The picture represent or denotes :</p> <ul style="list-style-type: none"> <li>• Cooking media (vegetable or animal oils and fats)</li> </ul>

Figure 1.9

**MAIN COMMON 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 OSHA 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

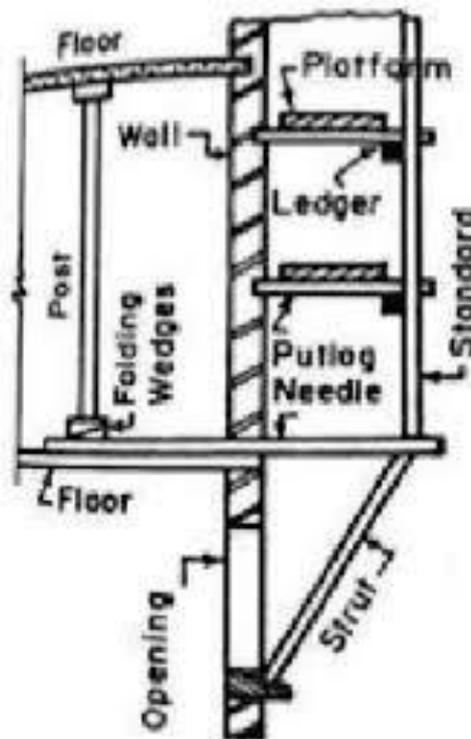
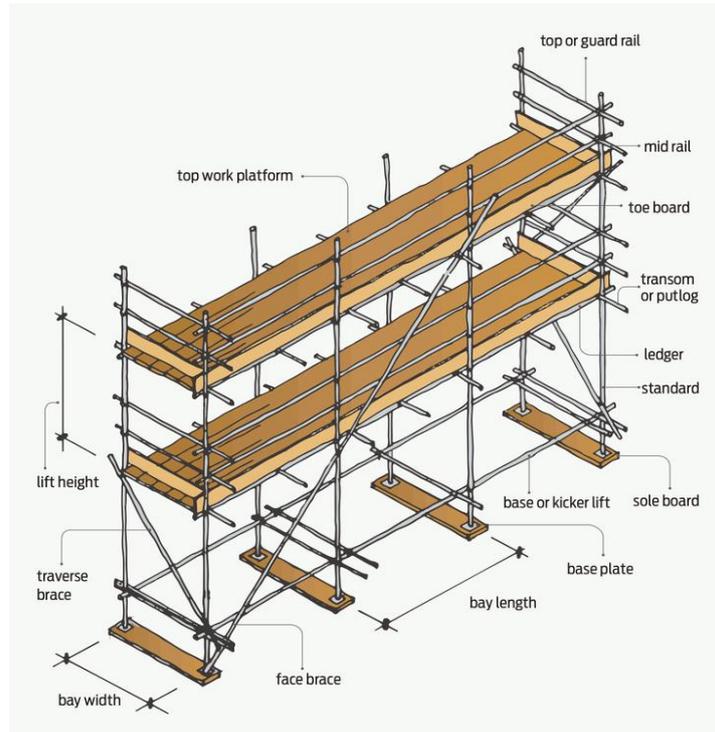


Figure 1.11

### 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 throw any tools or material to the ground.
- Ensure a 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 workers are on top.
- Do not climb the scaffold while feeling dizzy or numb
- Do not climb the scaffold in bad weather conditions
- Scaffolds can only be erected, dismantled, altered or moved under the direct supervision of a qualified person.
- Parts should be securely fixed to avoid tipping
- Base plates and sole plates should be on the firm ground.
- Boards must be level and overlap
- Clear passage of 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 harnesses 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

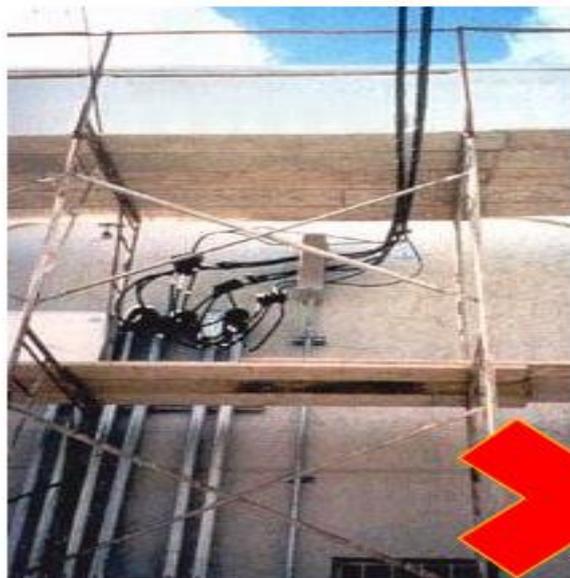


Figure 1.14



**ACTIVITY 1**

1. What do we call a person who lays 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.

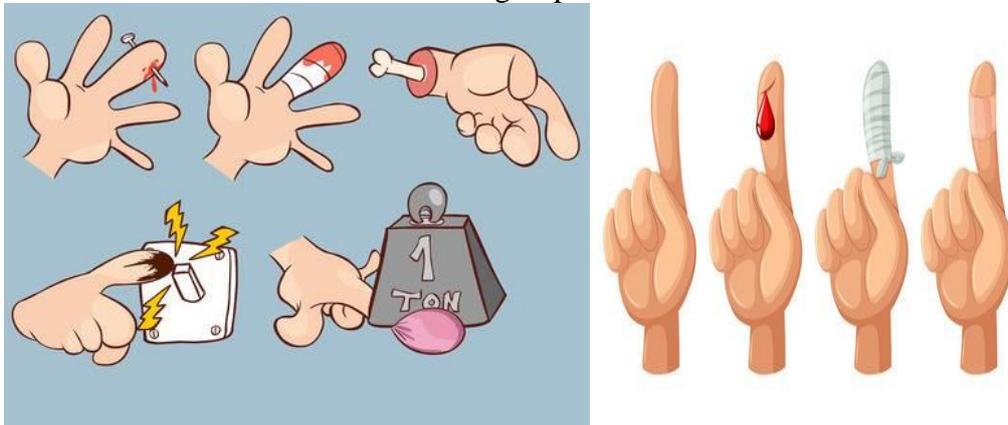


FIGURE 2.1

#### ➤ 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**

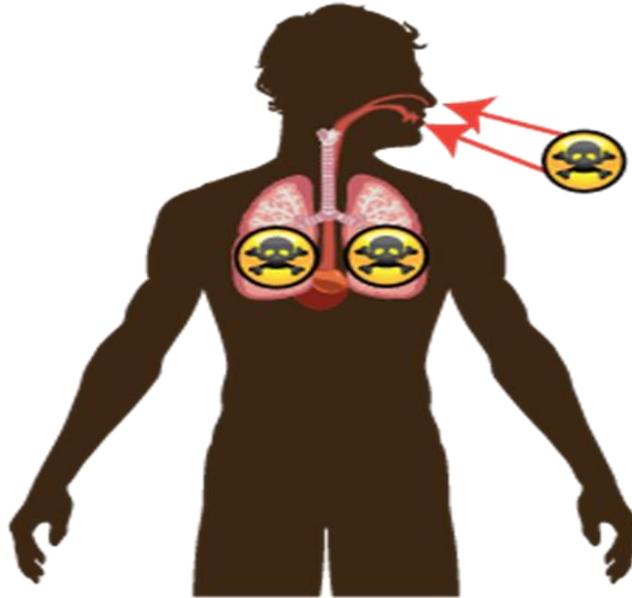
- Check the degree of the injury that the ankle, legs, or even knees are not affected.
- If the visible signs of injuries that cannot be treated in the workshop, the learner must be taken into the doctor or call the ambulance



**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 exposed 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 to ensure 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 treat  according to the injury.
- If deemed serious, the injured person must be taken to the doctor or hospital for further medical examination.

**DON'T FIGHT**



**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 a burn? Name two
5. What precautions must be taken to prevent an accident 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 COMMUNICATION 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.

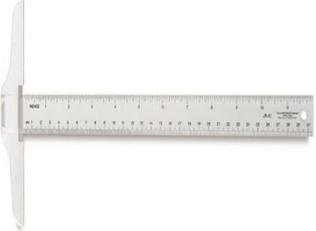
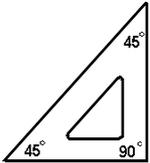
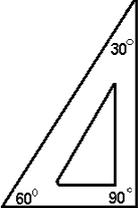
General drawing principles

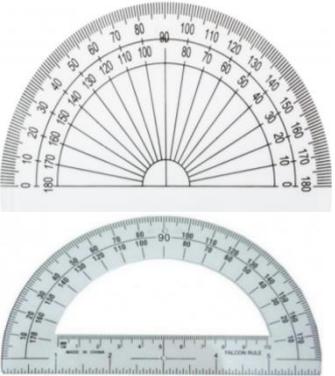
### Drawing Instruments

Name	Use	Care
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## General drawing principles

### Drawing Instruments

Name	Use	Care
 <p><b>Drawing Board</b></p>	<p>It is used for any kind of drawing , writing or sketching on a piece of paper</p>	<p>Clean your board with a house hold degreaser or low odour white spirit</p>
 <p><b>T- Square</b></p>	<p>Used to draw horizontal lines and as guide when drawing vertical lines</p>	<p>Wipe with clean cloth preferable yellow duster</p>
 <p><b>45° Set square</b></p>	<p>It is used to draw parallel lines, perpendicular, standard measure angle (45° and 90°)</p>	<p>Wipe with clean cloth preferable yellow duster</p>
 <p><b>30°/60° Set square</b></p>	<p>It is used to draw parallel lines, perpendicular, standard measure angle (30°, 60° and 90°)</p>	<p>Wipe with clean cloth preferable yellow duster</p>

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

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

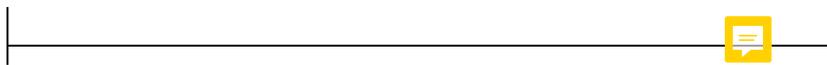
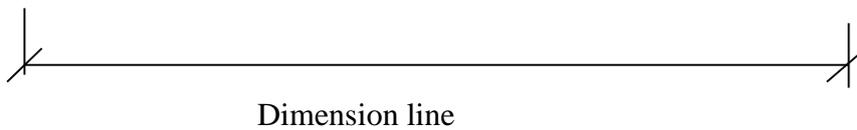
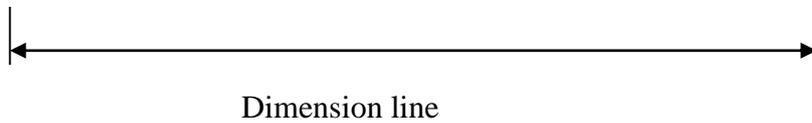
## Dimensioning

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

The purpose of dimensioning is to provide a clear and complete description of an object. Dimensions should follow the following guidelines:

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

Examples of dimension lines



## Line 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 LETTERING

ABCDEFGHIJKLMNOPQRSTUVWXYZ &

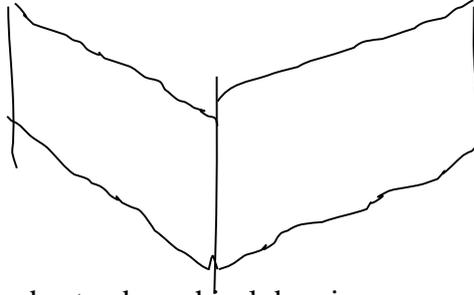
À<sup>2</sup> B<sup>2</sup> C<sup>2</sup> S<sup>2</sup> U<sup>2</sup> 1 2 3 4 5 6 7 8 9 0

ABCDEFGHIJKLMNOPQRSTUVWXYZ &

1 2 3 4 5 6 7 8 9 0  $4\frac{5}{8}$   $3\frac{9}{16}$   $7\frac{1}{2}$

## 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 learner 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 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



Bricks



Cement



Concrete



Sand



Reinforcement



Glass



Plastic



Wood



Tiles

## **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 desert and normally clean. It is of the same size of particles and is therefore poorly graded **for any** building purposes.

### **Sea sand**

It is a 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 coarse.
- 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 a 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 uniform 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**

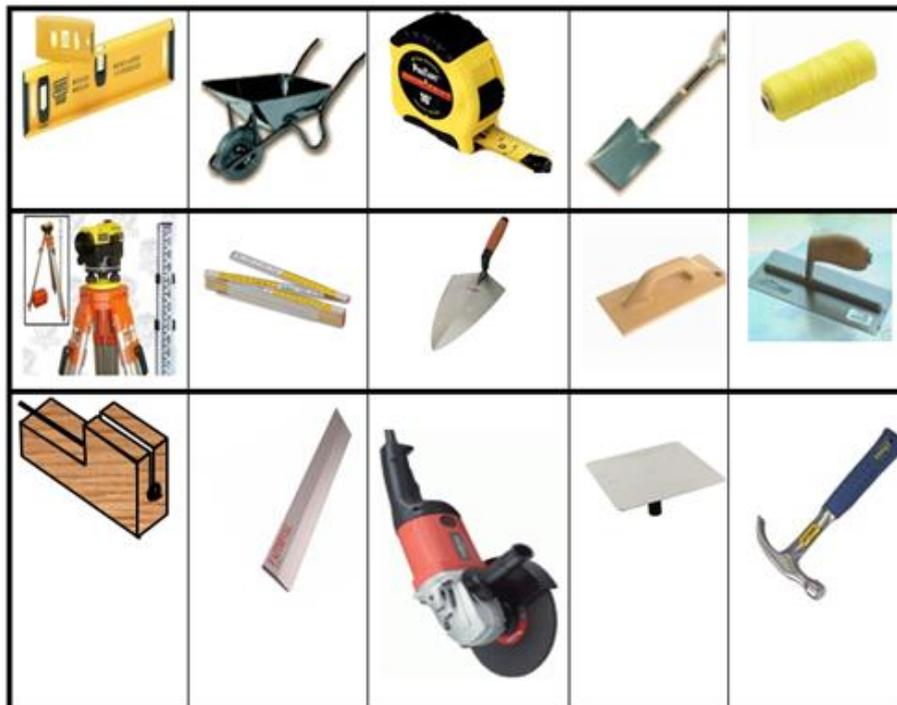


## Activity 1



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

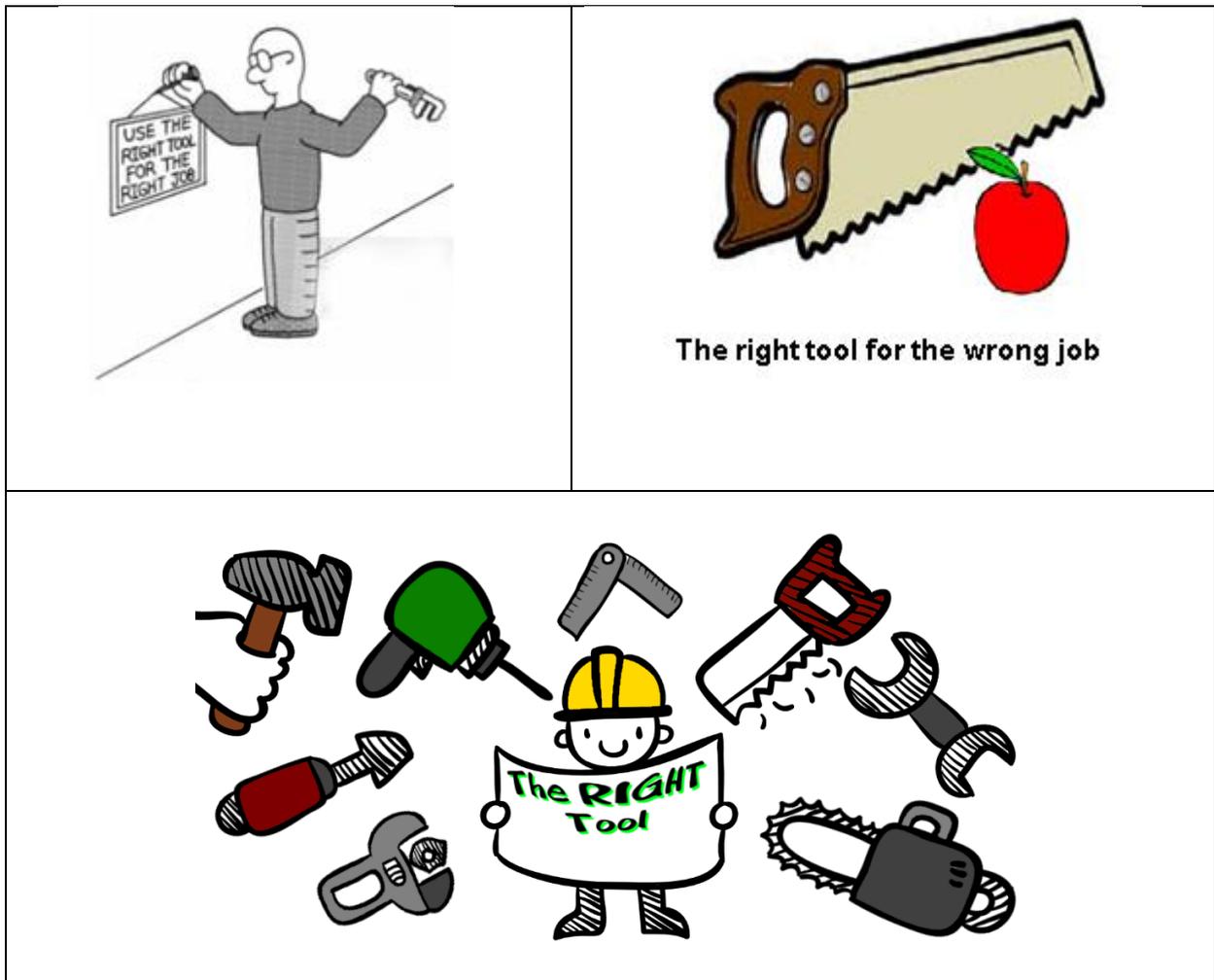


FIGURE 5.1

## 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 cause 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

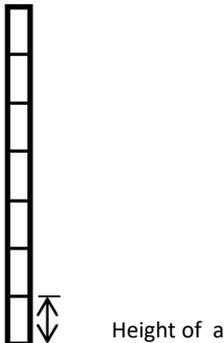
Name of tool	Uses	Storage, maintenance and handling of equipment
<b>Steel square</b> 	<ul style="list-style-type: none"> <li>• Used to check the squareness of buildings</li> <li>• Setting out of brickwork</li> </ul>	<ul style="list-style-type: none"> <li>• Wash off the excess mortar with clean water and cloth.</li> <li>• Keep in a store room</li> </ul>
<b>Folding rule</b> 	<ul style="list-style-type: none"> <li>• Accurate measuring for less than 1m</li> </ul>	<ul style="list-style-type: none"> <li>• Wash off the excess mortar with clean water and cloth.</li> <li>• Keep in a store room</li> </ul>
<b>Measuring tape</b> 	<ul style="list-style-type: none"> <li>• Used for fine and accurate measuring</li> </ul>	<ul style="list-style-type: none"> <li>• Wipe the excess mortar with a cloth</li> <li>• Keep in a store room</li> </ul>
<b>30m Steel tape</b> 	<ul style="list-style-type: none"> <li>• It is used for setting out of large buildings</li> </ul>	<ul style="list-style-type: none"> <li>• Wipe the excess mortar with a cloth</li> <li>• Keep in a store place</li> </ul>
<b>Metal pegs/Wooden pegs</b> 	<ul style="list-style-type: none"> <li>• Used to indicate the foundation trenches and also to what level should be poured</li> </ul>	<ul style="list-style-type: none"> <li>• Wash or rinse with water</li> <li>• Keep it in a store room</li> </ul>

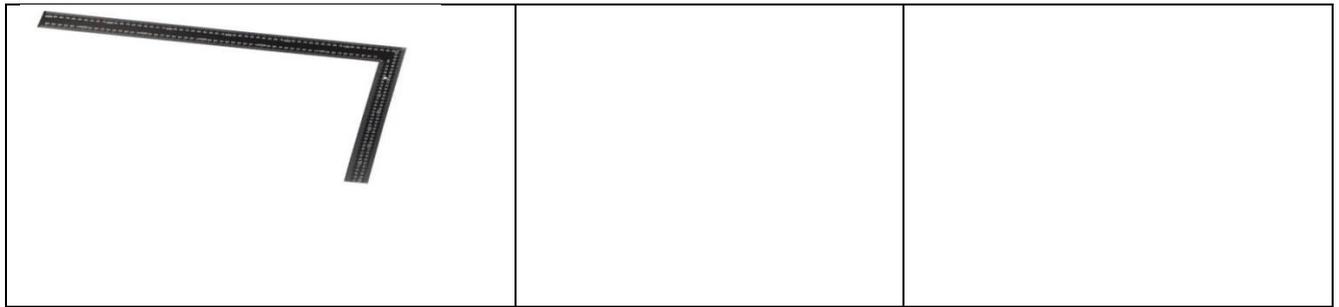
	<ul style="list-style-type: none"> <li>• Lay-out of area or foundations for building of straight courses</li> </ul>	<ul style="list-style-type: none"> <li>• Wipe the excess mortar with a cloth</li> <li>• Keep in a store place</li> </ul>
<p>Spirit level</p> 	<ul style="list-style-type: none"> <li>• Used for checking levels of brickwork <b>horizontal</b> and vertically</li> </ul>	<ul style="list-style-type: none"> <li>• Wash off the excess mortar with clean water and cloth.</li> <li>• Keep in a store room</li> </ul>
<p>Straight edge</p> 	<ul style="list-style-type: none"> <li>• Is used to guide a plasterer for levelling of foundation, floors and plastering.</li> </ul>	<ul style="list-style-type: none"> <li>• Wash off the excess mortar with clean water and cloth.</li> <li>• Keep in a store room</li> </ul>

**FIGURE 5.2**

**BRICKLAYING TOOLS**

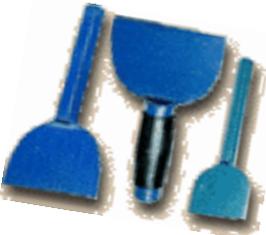
Name of tool	Uses	Storage, maintenance and handling of equipment
<p><b>Brick trowel</b></p> 	<ul style="list-style-type: none"> <li>• Is used for picking and spreading mortar</li> </ul>	<ul style="list-style-type: none"> <li>• Wash off the excess mortar with clean water and cloth.</li> <li>• Keep in a store room</li> </ul>
<p><b>Line and Pins</b></p> 	<ul style="list-style-type: none"> <li>• Line pins are inserted into a brick course or staked into the ground</li> <li>• Line and pins are used as a reference or guide line.</li> </ul>	<ul style="list-style-type: none"> <li>• Wash off the excess mortar with clean water and cloth.</li> <li>• Keep in a store room</li> </ul>

<p><b>Corner blocks</b></p> 	<ul style="list-style-type: none"> <li>• Used with the building which indicates a straight line to build against</li> </ul>	<ul style="list-style-type: none"> <li>• Remove excess mortar with wet cloth.</li> <li>• The line should be rolled back on the block to avoid it to be tangled.</li> <li>• Keep all in the storeroom</li> </ul>
<p><b>Spirit level</b></p> 	<ul style="list-style-type: none"> <li>• Used for checking levels of brickwork horizontal and vertically</li> </ul>	<ul style="list-style-type: none"> <li>• Wash off the excess mortar with clean water and cloth.</li> <li>• Keep in a store room</li> </ul>
<p><b>Tingle</b></p> 	<ul style="list-style-type: none"> <li>• Is used to keep the line straight between two corners which are far apart</li> </ul>	<ul style="list-style-type: none"> <li>• Remove excess mortar with wet cloth.</li> <li>• Store in the store room</li> </ul>
<p><b>Gauge rod/brick gauge</b></p> 	<ul style="list-style-type: none"> <li>• Is used for checking the accurate height of the courses of the brickwork</li> </ul>	<ul style="list-style-type: none"> <li>• Remove excess mortar with wet cloth.</li> <li>• The line should be rolled back on the block to avoid it to be tangled.</li> <li>• Keep all in the storeroom</li> </ul>
<p><b>Steel square</b> </p>	<ul style="list-style-type: none"> <li>• Used to check the squareness of buildings</li> <li>• Setting out of brickwork and buildings</li> </ul>	<ul style="list-style-type: none"> <li>• Wash off the excess mortar with clean water and cloth.</li> <li>• Keep in a store room</li> </ul>



**FIGURE 5.3**

**BRICK CUTTING TOOLS**

Name of tool	Uses	Storage, maintenance and handling of equipment
<p><b>Brick hammer</b></p> 	<ul style="list-style-type: none"> <li>• Is used to cut bricks</li> </ul>	<ul style="list-style-type: none"> <li>• Wash off the excess mortar with clean water and cloth.</li> <li>• Keep in a store room</li> </ul>
<p><b>Bolster</b></p> 	<ul style="list-style-type: none"> <li>• Is used with a club hammer to cut bricks accurately</li> </ul>	<ul style="list-style-type: none"> <li>• Wash off the excess mortar with clean water and cloth.</li> <li>• Keep in a store room</li> </ul>
<p><b>Club Hammer</b></p> 	<ul style="list-style-type: none"> <li>• Is used with a bolster and cold chisel to cut brick and brick work</li> </ul>	<ul style="list-style-type: none"> <li>• Wash off the excess mortar with clean water and cloth.</li> <li>• Keep in a store room</li> </ul>

<p><b>Cold Chisel</b></p> 	<ul style="list-style-type: none"> <li>• Is used for cutting concrete and brickwork</li> </ul>	<ul style="list-style-type: none"> <li>• Wash off the excess mortar with clean water and cloth.</li> <li>• Keep in a store room</li> </ul>
<p><b>Comb hammer</b></p> 	<ul style="list-style-type: none"> <li>• Is used to trim and cut bricks more accurately</li> </ul>	<ul style="list-style-type: none"> <li>• Wash off the excess mortar with clean water and cloth.</li> <li>• Keep in a store room</li> </ul>

**FIGURE 5.4**

**JOINTING TOOLS**

Name of tool	Uses	Storage, maintenance and handling of equipment
<p><b>Long Jointer</b></p> 	<ul style="list-style-type: none"> <li>• Used to smoothen the joints between courses of the brickwork</li> <li>• To ensure a good and consistent finish</li> </ul>	<ul style="list-style-type: none"> <li>• Wash off the excess mortar with clean water and cloth.</li> <li>• Keep in a store room</li> </ul>
<p><b>Short Jointer</b></p> 	<ul style="list-style-type: none"> <li>• Used for upright joints between bricks</li> </ul>	<ul style="list-style-type: none"> <li>• Wash off the excess mortar with clean water and cloth.</li> <li>• Keep in a store room</li> </ul>

<p><b>Pointing Trowel</b></p> 	<ul style="list-style-type: none"> <li>• Used to finish the mortar between bricks</li> <li>• Used to apply tuck pointing</li> </ul>	<ul style="list-style-type: none"> <li>• Wash off the excess mortar with clean water and cloth.</li> <li>• Keep in a store room</li> </ul>
<p><b>Mastic Trowel</b></p> 	<ul style="list-style-type: none"> <li>• Is used to form tuck pointing</li> <li>• Used to fill up joints between windows and door frames</li> </ul>	<ul style="list-style-type: none"> <li>• Wash off the excess mortar with clean water and cloth.</li> <li>• Keep in a store room</li> </ul>

**FIGURE 5.5**

**BASIC SITE EQUIPMENT**

Name of tool	Uses	Storage, maintenance and handling of equipment
<p>Round shovel</p> 	<ul style="list-style-type: none"> <li>• Used for mixing concrete and mortar</li> </ul>	<ul style="list-style-type: none"> <li>• Kept sharp </li> <li>• Stored in a dry location</li> </ul>
<p>Square shovel</p> 	<ul style="list-style-type: none"> <li>• Used for clearing loose material and rubble at building sites</li> </ul>	<ul style="list-style-type: none"> <li>• Kept sharp</li> <li>• Stored in a dry location</li> </ul>
<p>Steel Shaft Digging Spade</p> 	<ul style="list-style-type: none"> <li>• Used for digging trenches</li> </ul>	<ul style="list-style-type: none"> <li>• Kept sharp</li> <li>• Stored in a dry location</li> </ul>

<p>Pick Axe</p> 	<ul style="list-style-type: none"> <li>• Used to break up hard ground</li> </ul>	<ul style="list-style-type: none"> <li>• Clean with water after every use.</li> <li>• Keep in the store room</li> </ul>
<p>Wheel barrow</p> 	<ul style="list-style-type: none"> <li>• Used to transport mortar, concrete, filling and bricks</li> </ul>	<ul style="list-style-type: none"> <li>• Clean with water after every use.</li> <li>• Turn it up right to dry</li> <li>• Keep in the store room</li> </ul>

**FIGURE 5.6**

### PLASTERING TOOLS

Name of tool	Uses	
<p>Wooden/plastic float</p> 	<ul style="list-style-type: none"> <li>• Is used to finish off plaster or concrete surfaces to achieve a finely textured surface</li> </ul>	<ul style="list-style-type: none"> <li>• Wash off the excess mortar with clean water and cloth.</li> <li>• Keep in a store room</li> </ul>
<p>Plastering trowel</p> 	<ul style="list-style-type: none"> <li>• Is used to apply plaster to the wall</li> <li>• Is used for smoothing concrete and plaster</li> </ul>	<ul style="list-style-type: none"> <li>• Wash off the excess mortar with clean water and cloth.</li> <li>• Keep in a store room</li> </ul>
<p>Hand hawk</p> 	<ul style="list-style-type: none"> <li>• Is used to carry the plaster</li> </ul>	<ul style="list-style-type: none"> <li>• Wash off the excess mortar with clean water and cloth.</li> <li>• Keep in a store room</li> </ul>
<p>Straight edge</p> 	<ul style="list-style-type: none"> <li>• Is used to guide a plasterer for levelling of foundation, floors and plastering</li> </ul>	<ul style="list-style-type: none"> <li>• Wash off the excess mortar with clean water and cloth.</li> <li>• Keep in a store room</li> </ul>

<p>Block brush</p> 	<ul style="list-style-type: none"> <li>• Is used for wetting down walls before plastering and during the floating process</li> </ul>	<ul style="list-style-type: none"> <li>• Wash off the excess mortar with clean water and cloth.</li> <li>• Keep in a store room</li> <li>• in the storeroom</li> </ul>
<p>Corner trowels (internal and external)</p> <p>Internal corner tool</p>  <p>External corner tool</p> 	<ul style="list-style-type: none"> <li>• Is used to finish off the corners of the plastering internally and externally</li> </ul>	<ul style="list-style-type: none"> <li>• Wash off the excess mortar with clean water and cloth.</li> <li>• Keep in a store room</li> </ul>
<p>Gauging Nose trowel</p> 	<p>Is used for mixing small quantities of mortar for patching and laying on mouldings</p>	<ul style="list-style-type: none"> <li>• Wash off the excess mortar with clean water and cloth.</li> <li>• Keep in a store room</li> </ul>

**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:

## **CHAPTER 6**

### **MORTAR AND CONCRETE**



## MORTAR AND CONCRETE

### Definition of Mortar / Dagha

Mortar (Dagha) is a mixture of cement, sand and water in a proportion. Lime can be added to make it more workable. It can be used for brickwork and plastering.



**FIGURE 6.1**

**Mix proportion for brickwork**

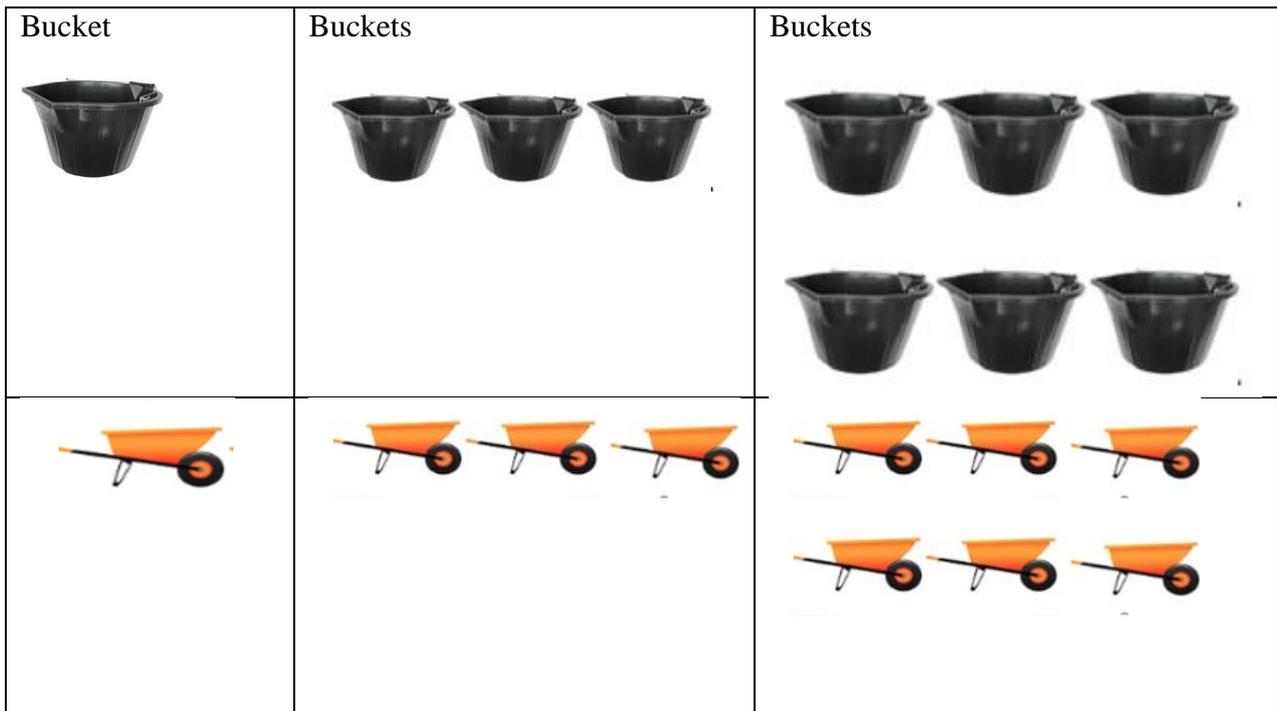
<b>Cement</b>	<b>Building Sand</b>	<b>Water</b>
<b>1 Part</b>	<b>3 Parts</b>	<b>As required for workability</b>
CUP 	Cups 	
Bucket 	Buckets 	
Wheel Barrow 	Wheel Barrows 	

**FIGURE 6.2**

**Definition of concrete**

- Concrete is a mixture of cement, sand (fine aggregates), stones (coarse aggregates) and water
- **MIXING PROPORTIONS OF CONCRETE:**

<b>Cement</b>	<b>River sand</b>	<b>Stones</b>
<b>1</b>	<b>3</b>	<b>6</b>
Cup 	Cups 	Cups 



**FIGURE 6.3**

- Different ways of mixing concrete:
  - Hand mixing
  - Machine mixing (concrete mixer)
  - Ready-mix
- The strength of concrete is measured in mega Pascal (Mpa), which describes the pressure the concrete can withstand.
- The strength of concrete is determined by the quantity of the sand and stone (aggregates) added to the cement.

### MIXING OF CONCRETE

#### HAND MIXING:

- Choose a suitable spot to mix (Hard, clean surface like a concrete floor or a steel plate)
- Measure the stone and spread it approximately 100mm thick.
- Measure the sand and spread it on top of the stone.
- Measure the cement and spread it evenly on top the sand.
- Mix properly until it shows an even colour.
- Make a heap and make a depression on top in the centre.
- Add water while mixing continuously with a **shovel**.
- Mix until the mixture appears like a thick paste.

#### **MACHINEMIX WITH A CONCRETE MIXER:**

- Throw the measured stone and some water in the mixing drum.
- Throw the measured cement into the drum.
- Throw the measured sand into the drum.
- Throw the remainder of the water into the drum.

## Hand mixing of concrete



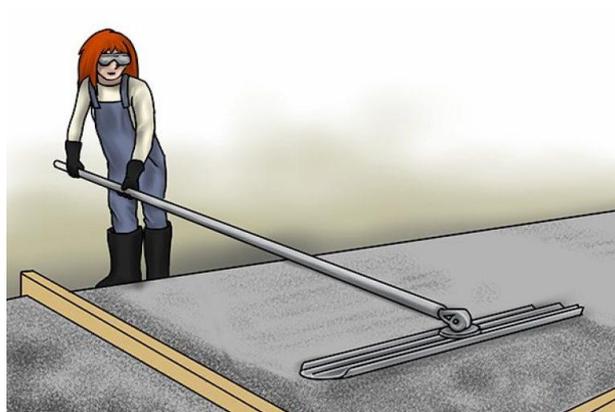
**FIGURE 6.4**

### Activity 1



1. In groups, write the difference between mortar and concrete. Redraw the table below to answer

Mortar	Concrete



**FIGURE 6.6**

2. In groups, make use of materials that will assist(help) you in mixing a medium strength concrete to be used for paving around your school. Use the table below to

indicate the correct mixing ratio to achieve the medium strength. After completion, cover with plastic and leave it to set for 21 days.

### Instructions

The teacher should supply the learners with the following:

- Formwork to all the groups
- Tools and equipment
- Materials needed

	Cement	River Sand	Stone
Low-strength concrete 15 Mpa	 1	 $3\frac{1}{2}$	 $3\frac{1}{2}$
Medium-strength concrete 25 Mpa	 1	 $2\frac{1}{2}$	 $2\frac{1}{2}$
High-strength concrete 30 Mpa	 1	 $1\frac{3}{4}$	 $1\frac{3}{4}$

FIGURE 6.7

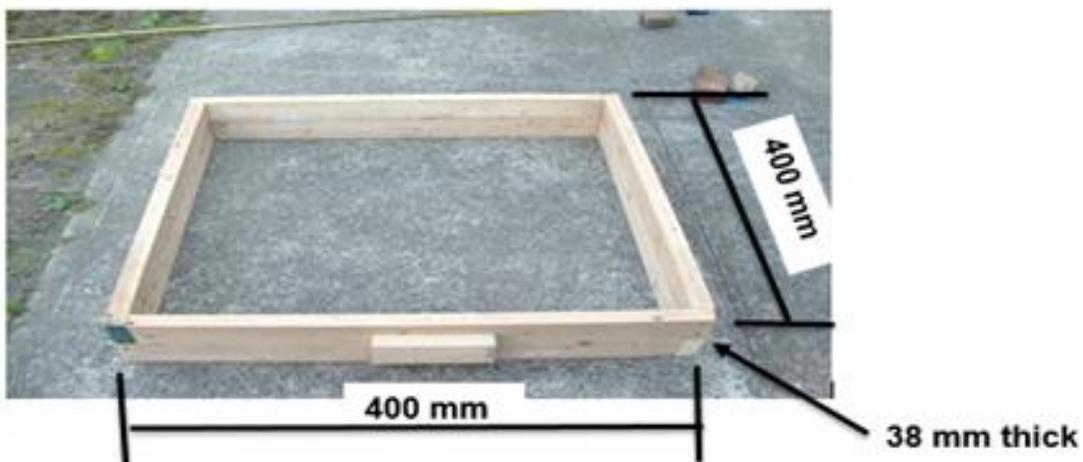
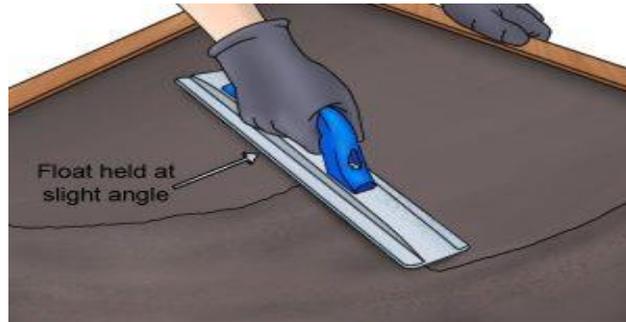


FIGURE 6.8



**FIGURE 6.9**



**FIGURE 6.10**



**FIGURE 6.11**

## **GLOSSARY OF TERMS**

### **Safety:**

**regulations** – rules enforced by law

**statutory**– as enforced by law

**factory act** – industrial regulations  
**ordinance** – prescribed rules to be followed  
**SANS (SABS)** – South African National Standards  
**first aid** – emergency aid to those in need or those who are hurt  
**workplace** – area where you do your daily work  
**overall** – clothes to work in  
**safety shoes** – shoes with built in metal protection  
**rubber boots** – when working in wet places  
**mask** – for protection against dust and vapors  
**hard hat** – to protect your head against bumping and falling items  
**gloves** – to protect your hands against cuts and wear  
**harness** – protection against falling

### **Graphics/Communication:**

**free-hand drawing** – a method of generating a drawing using only a pencil and an eraser  
**free-hand printing** – printing dimensions and other information between guidelines using only a pencil and eraser

**instrument drawing** – a method of drawing that uses conventional drawing tools to generate drawings

**isometric drawing** – a pictorial drawing where the height, width and depth axes are set at 120° angles to each other

**joints** – a place at which two components are joined, two parts of an artificial structure are connected

**SANS(SABS) code of practice** – approved codes of practice for presentation and delivery of services

**scale drawing** – a drawing made with a proper, systematic code-system, so that cross-referencing is established to generate drawings that fit on standard-size paper to simplify copying and storing

**Bat:** Its portion of a brick larger than one quarter. Half brick is known as half bat.

**Stretcher:** A brick laid with a long side showing on the face of the a wall.

**Arris:** Is an edge of a brick.

**Header:** A brick laid with an end showing on the face of a wall.

**Closer:** A brick cut lengthways in the middle.

**Bed Joint:** A horizontal joint of mortar which is about 10mm to 15mm in thickness

**Perpend:** The vertical mortar joint on the face of the wall.

**Lap:** The distance that the brick of a following layer cover the joints of the previous layer.

**Course:** A layer of bricks covering the length and thickness of the wall.

**Corner or Quoin Brick:** It's a place where the wall changes directions.

**Buttering:** To apply mortar to the end or side of a brick with a brick trowel before laying.

**Levelling:** The process of setting bricks or courses straight horizontally

**Plumb:** The process of setting bricks straight vertically.

**Alternate plan courses** - A layer of bricks laid forming a line above one another to form a complete wall.

**Admixtures** - Materials that are added to concrete or mortar before or during the mixing process to improve the workability of concrete.

**Foundation** - Natural or prepared base or ground on which a structure rests.

**Foundation wall** - The brickwork or masonry wall below ground level that serves the purpose of supporting the structure.

**cement** – binding the stone and sand

**mortar** – cement and sand mixture

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

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

**Good Housekeeping** - Means a place for everything and everything in its place all the time

**Frog** - is an indentation in the top about (10mm-20mm) deep at its fullest point and has sloping sides.

**Rough Arch** – Constructed of ordinary uncut bricks and being rectangular in shape they give rise to wedged shaped joints.

**Fine Axed Arch** – This type of arch is set out carefully: the shape of bricks is determined, a template is made and all the bricks are cut and trimmed to the template shape and size

**Gauged Arch** – Constructed of bricks cut to the required wedged shape

**Semicircular Arch** - Also known as the Roman **arch**, the **Semicircular Arch** forms a half circle and is a major feature of all Roman architecture.

**Flat arch.** – is a spanning member constructed of mutually supporting voussoirs and having a straight or almost straight horizontal intrados and extrados.

**Segmental arch** - is a type of **arch** with a circular **arc** of less than 180 degrees.

**Foundation** – is the lowest load-bearing part of a building, typically below ground level.

**Paving** - Paving can be described as a material (such as stone, tar, or concrete) that is used to form the hard surface of a road, driveway.

**DAMP PROOF COURSE** - Is a layer of material usually placed in a building to prevent dampness from rising up the main walls

**Excavation** - An excavation is any man-made cut, cavity or trench in the earth`s surface formed by earth removal

**Plaster** - is a mixture of cement, sand and water in proportion. Lime can be added to make it more workable.

## REFERENCES / ACKNOWLEDGEMENTS

1. Nischinth.com- Construction Quality Management Services
2. www.claybrickassosiation.org- Clay bricks
3. [www.civilology.com-Construction-tools-list-pictures](http://www.civilology.com-Construction-tools-list-pictures)
4. <http://joeicca1.blog.com.setting up profiles>

5. [www.civilconstructiontips.blogspot.com](http://www.civilconstructiontips.blogspot.com). – Damp proof Course
6. civilseek.com – Everything you need to know about civil engineering
7. The constructor.org -mixing – concrete
8. dengarden.com/mixing-concrete-by-hand
9. www.vectorstock.com.
10. [www.aboutcivil.org/construction-materials](http://www.aboutcivil.org/construction-materials)
11. www.safetysigns.com/good-housekeeping
12. ghaperdia.com
13. en.wilki.pedia.org
14. quora.com
15. www.civildigital.com/curing -of-concrete
16. www.wikihow.com/build-a-concrete-foundation
17. www.engineeringbasic.com/steps-in-setting-out-a-building-plan
18. civilblog.org-different-types-of -brick-cuts-used-in-brick-masonry
19. www.https//4.6p.blogspot.com
20. alamy.com/hand-mixing-concrete
21. waysto.digital.com/how-to-make-your-own-concrete-blocks
22. wordpress.com-Basics for site engineer
23. diyhomesolutions.co.za/product-damp-proof-course
24. completedampspecialist.com
25. durbanwaterproofing-co-za
26. constructionduniya.blogspot.com-Variou s types of floor finishes
27. tilespace.co.za
28. Building magazine.org.nz