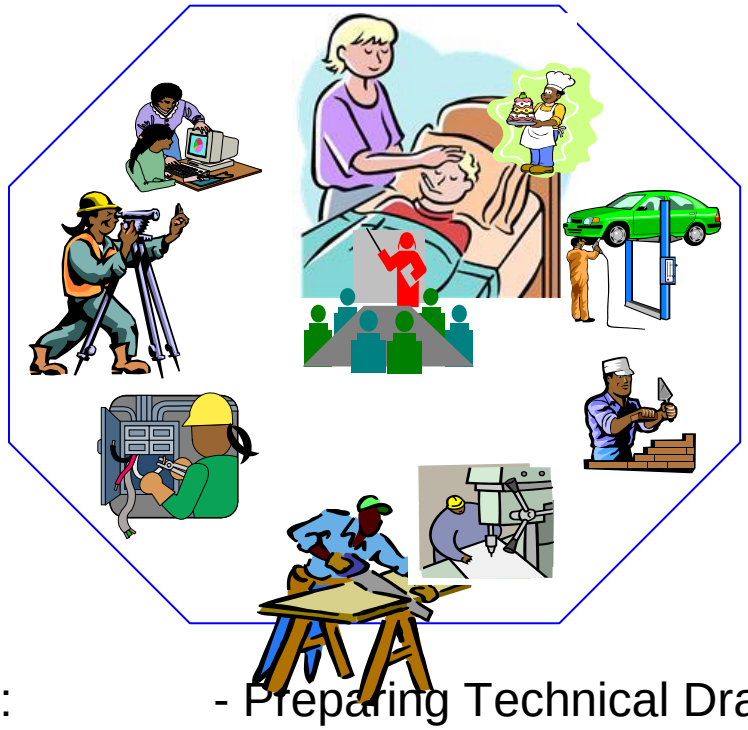
Furniture Making Level - III

Based on Sep, 2012 Version: 1 Occupational Standards and Curriculum



Module Title: - Preparing Technical Drawings

LG Code: I ND-FMK1 M01 LO1- 4 LG-(1 -4)

TTLM Code: IND-FMK1 M01-TTLM 2020v1

December 2020

Bishoftu, Ethiopia

Table of Contents **page**

L G#1	LO #1- Prepare for work

Instruction sheet

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

- Gathering OHS requirements
- Determining quality requirements
- Preparing & selecting tools and equipment for drawings
- Selecting types of drawings
- Identifying key features of drawings

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Gather OHS requirements
- Determine quality requirements
- Prepare & selecting tools and equipment for drawings
- Select types of drawings
- Identifying key features of drawings

Learning Instructions:

Read the specific objectives of this Learning Guide.

1. Follow the instructions described below.
2. Read the information written in the “Information Sheets”. Try to understand what are being discussed. Ask your trainer for assistance if you have hard time understanding them.
3. Accomplish the “Self-checks” which are placed following all information sheets.
4. Ask from your trainer the key to correction (key answers) or you can request your trainer to correct your work. (You are to get the key answer only after you finished answering the Self-checks).
5. If you earned a satisfactory evaluation proceed to “Operation sheets
6. Perform “the Learning activity performance test” which is placed following “Information sheets” ,
7. If your performance is satisfactory proceed to the next learning guide,
8. If your performance is unsatisfactory, see your trainer for further instructions or go back to “information sheets”.

Information Sheet 1**:** **Adhering OHS requirements**

1.1 Occupational Health and Safety

- OHS requirements

OHS, or Occupational Health and Safety, is a multidisciplinary practice dealing with all aspects of health and safety in the workplace, with a strong focus on preventing workplace hazards.

- Personal protective equipment
  - ✓ . Overalls
  - ✓ . Gloves
  - ✓ . Protective eyewear
  - ✓ . Hearing protection
  - ✓ . Safety harness

Safety is the first essential requirement and every personnel must learn the safety measures even before he starts working on a machine or on equipments.

- **General Safety Rule**

General safety rule is very important to reduce the accident while you working in workshop. Some of them are listed below,

- ✓ **Always dress properly**: - Dress properly for your work. While you must wear your aprons are provided so that you can work on the machines. Remove any jeweler, neckties, chains, bracelets, and rings. Roll up your sleeves and tie any hair back in a ponytail before beginning any work
- ✓ **Follow directions:-**understanding the procedures of using by hand tools & machines.
- ✓ **Keep the shop clean: -** Keep the floor clear of debris and sawdust the floor should be clear of scrap blocks, excessive material, and sawdust. Keep projects, sawhorses, and other equipment and materials you are using out of travel lanes.
- ✓ **Learn to use the tools correctly**-Understanding using of hand tools in proper ways.

- **Personal Safety**

✓ **Stay alert.**. Do not use a power tool while tired or under the influence of drugs, alcohol, or medication. A moment of inattention while operating power tools may result in serious personal injury.

✓ **Dress properly.** Do not wear loose clothing or jewelry. Contain long hair. Keep your hair, clothing, and gloves away from moving parts. Loose clothes

✓ **Use safety equipment.** Always wear eye protection. Dust mask, non-skid safety shoes, hard hat, or hearing protection must be used for appropriate conditions

Self-Check1	Written Test

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

1. List Personal protective equipment? (5 points)

A. _____
B. _____
C. _____
D. _____

2. Define The term OHS ? (2 points)

_____
_____
_____

3. List General safety rule:

_____
_____
_____
_____
_____

Note: Satisfactory rating - 4 points Unsatisfactory - below 4 points

Answer Sheet

Name: _____ Date: _____ Score = _____

Information Sheet 2: Determining quality requirements

2.1 Quality requirements:

- **Quality**

Quality is critical to satisfying your customers and retaining their loyalty so they continue to buy from you in the future. Quality products make an important contribution to long-term revenue and profitability. They also enable you to charge and maintain higher prices

- ✓ Quality requirement

Quality requirement refers to a condition or a capability that must be present in a requirement. They represent that which is needed to validate the successful completion of a project deliverable

The easiest of quality requirements to capture are the express ones. Examples include ones written in the contract or charter and ones set forth by code or statute.

Implied quality requirements can be more elusive Consider a custom web development project where the system is so slow that it's rendered ineffective.

There may be no express quality requirements concerning the size or compression of images; however, proper sizing and compression are required for efficient page loads. The implied quality requirement is that the page should function as expected. Break this down further and the quality requirement might dictate that all pages load in X amount of time. This implied quality requirement, now being verifiable, should be captured.

- **Quality Control Tools**

Check-lists

Questionnaires

Inspection procedures. These can be internal or through outsourced companies such as.

The inspection may be based on:

chemical Composition;

physical attributes; and

Standard operating procedures adopted.

Formulation of a QC Process

Who Creates the Quality Requirements List?

The quality requirements list is created by the project manager with considerable input from stakeholders and members of the project team.

- What Are the Inputs?
- There are numerous inputs to creating a quality requirements log. Sometimes, quality requirements concern only the stakeholder expectations. In that case, the stakeholders themselves provide the input.

At other times, quality requirements arise from the need to conform to the law. For example, on a construction project, the building code will set forth the requirements a certified electrician must meet when terminating a circuit.

Inputs may also include the WBS dictionary and the risk register. Any source that might trigger express or implied notice of the level of quality required for a project deliverable or for project acceptance will be an input to developing the quality requirements log.

- How Is It Used?

Before we can determine how to meet the quality requirements, we must know what they are. It's here that the quality requirements log begins being useful. At the most

Self-Check 2	Written Test

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

1. List Quality Control Tools

I. _____

II. _____

III. _____.

2. Inspection procedures

I. _____

II. _____

III. _____

Note: Satisfactory rating -100% points

Answer Sheet

Name: _____ Date: _____

Score = _____

Information Sheet 3. Preparing & selecting tools and equipment for drawings

- **Types, Uses and Specifications of Tools and Equipment**

Technical drawing is concerned mainly with using lines, circles, arcs etc., to illustrate general configuration of an object.

Technical drawing is a language of communication between architects and Engineers, usually to convey information about the object.

However, it is very important that the drawing produced to be accurate and clear.

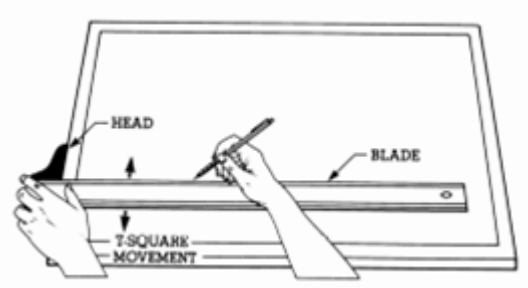
The ability to read and understand drawings is a skill interpreting different level of engineering drawings

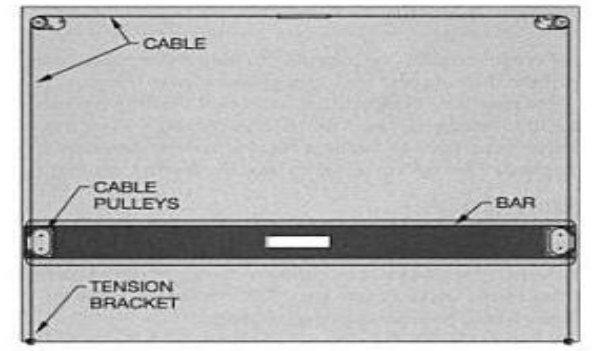
- **Basic Drawing Tools**

  - ✓ **<u>Drawing Table</u>**

    Drawing table is a large top to suit various projects, such as sketching, crafting and writing.

✓ **Drawing Board**



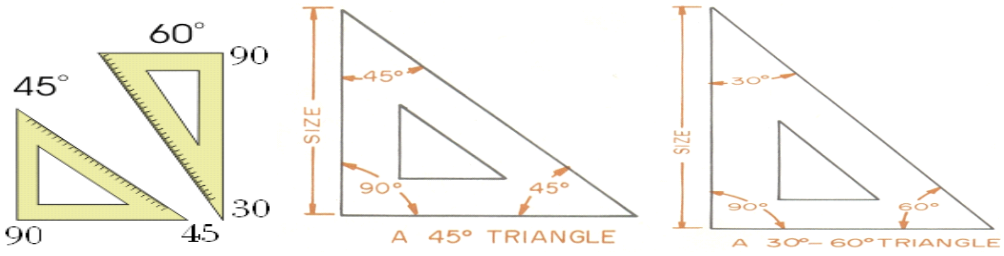


Parallel Bar

✓ **Tee -Squares** are use to draw horizontal lines. They are especially useful when constructing accurate orthographic drawings or architectural drawings. A T-Square is normally used with a drawing board, set squares and clips.

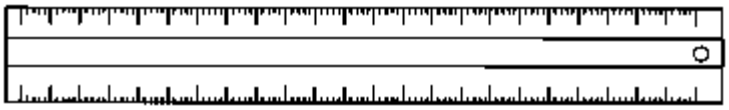
✓ **Set Squares**

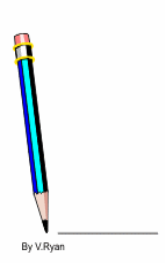
Set Squares are used to draw accurate angles. The most common are 45 and 60/30 degrees. When using set squares they should always used along with a T-Square.



✓ **Ruler**

A ruler should only to use to measure distances with lines being drawn with T-Squares and Set Squares.





✓ **Drawing Pencil**

✓ **Refillable pencil**

- ✓  **Ink fountain pen**

- ✓  **Fine pen**

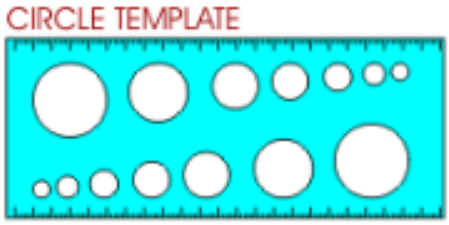
- ✓ **Pencil sharpener**

- ✓ **Eraser shield**

Eraser shield - A metal plate with various slots and openings used to protect line work when a portion of a drawing is to be erased

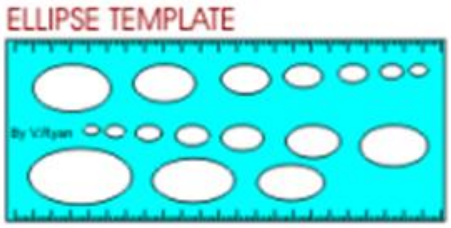
- ✓ **Template**

A template is a thin & flat piece of plastic containing various cutout shapes. It is designed to increase the speed & accuracy of the drafter. Templates are available for drawing geometric shapes, electrical drafting, architectural drafting, screw head & so on. A template should be used whenever possible to increase the accuracy & the speed.



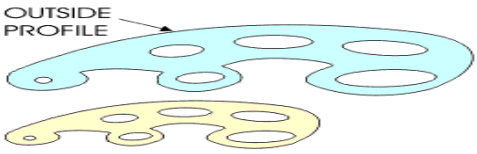
Circle template

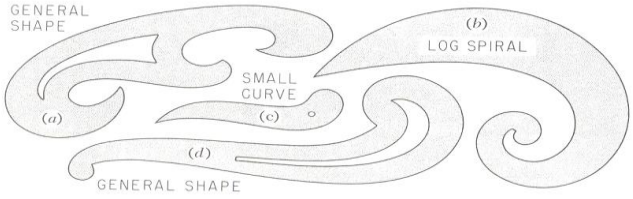
Ellipse template



- ✓ **French Curve**

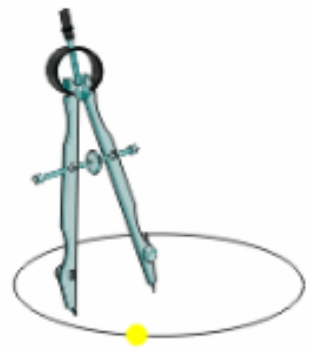
French curve Used to lay out any noncircular curve and ellipse





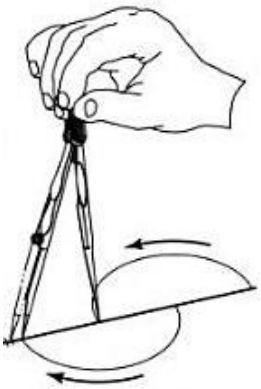
- ✓ **Compass**

A compass is an absolute essential piece of equipment. It includes at least two compasses allowing the drawing of small circles arcs and large circles arcs



- ✓ **Dividers**

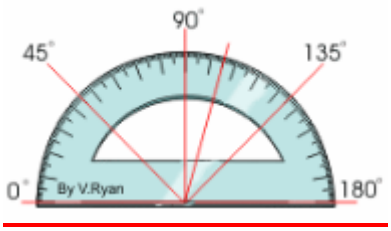
Dividers are similar to the compass. The dividers, as the name implies, are used for dividing distances into a number of equal parts. They are also used for transferring distance or for setting off a series of equal distance



USING THE DIVIDER

- ✓ **protractor**

A protractor is used to measure angles. A typical protractor is a semi-circular piece of plastic With 180 degrees printed around its curve. This piece of equipment is not only used in graphics for constructing accurate drawings but is also used in subjects like Mathematics.



- ✓ **Drawing Paper**

Drawing paper is the paper, on which drawing is to be made. The U.S.S.R standard establishes five preferred sizes for drawings as tabulated below.

in mm

- A4=297x210
- A3=297x420

- A2=594x420
- A1=594x841

A0=11,189x841

- ✓ **Paper sizes**

SIZE (MILLIMETERS)			LETTER SIZE
WIDTH		LENGTH	
210	x	297	A4
297	x	420	A3
420	x	594	A2
594	x	841	A1
841	x	1189	A0

- ✓ **Masking Tape** - A specially-prepared tape used to adhere drawing media to the working surface

Self-Check3	Written Test

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

Choose correct answer on the following providing question

1. _____ is use to draw horizontal lines

A:- Tee square

B : Set square

C Patellar bar

D Drawing board

2, The most common Set square degree are

A 45 and 60/30 degrees

B 40 and 60/30 degrees

C 90 and 60/30 degrees

D are 45 and 60/60degrees

3. _____ use to draw horizontal lines

A Drawing Board

B Tee -Squares

C Template

D Eraser shield

4 . What is the main function **Dividers**

A used for transferring distance or for setting off a series of equal distance

B used for measuring distance or for setting off a series of equal distance

C used for Check distance equal distance

D Used to lay out any noncircular curve and ellipse

Note: **Satisfactory rating - 100% points**

Answer Sheet

Name: _____ Date: _____

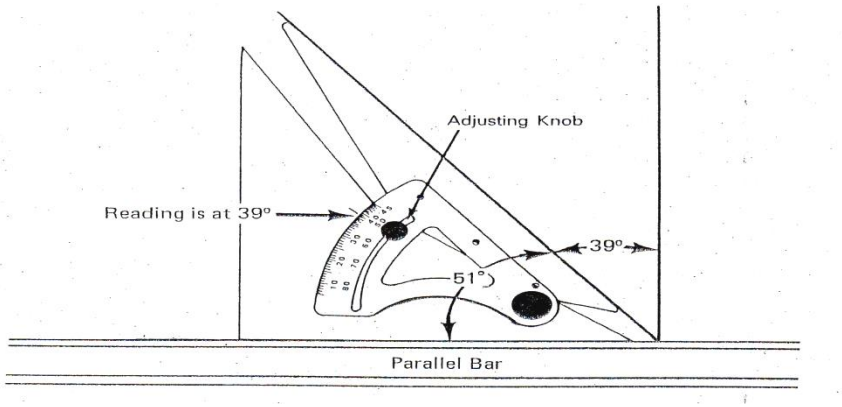
Score = _____

Operation sheet 1 Operate an adjustable triangle

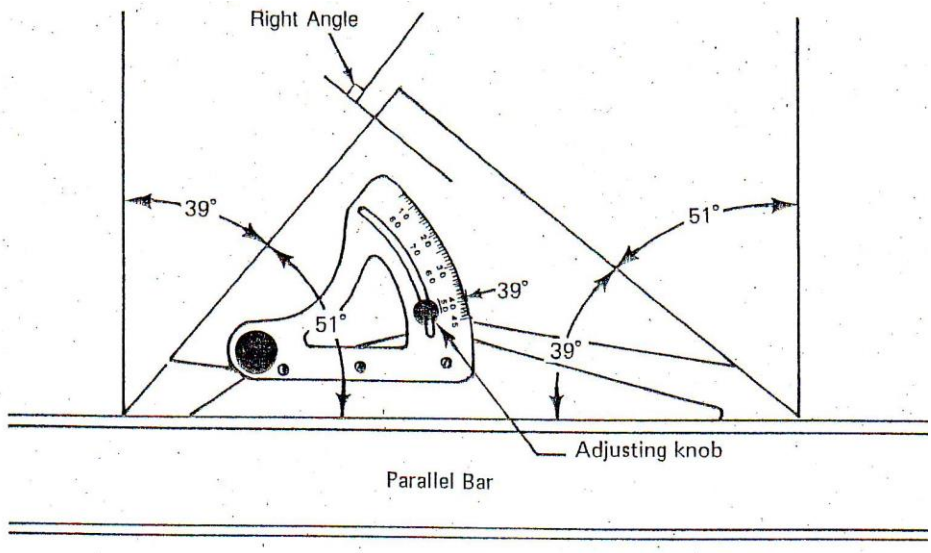
1.1. Operate an adjustable triangle

A. Tools and Equipment
   - Adjustable triangle
   - Parallel bar/Drawing Board
   - Activity Paper
   - Pencil
   - Eraser

B. Procedure
   - Set required angle on triangle by loosening adjusting knob and setting the scale. (see figure below)
   - Read numbers on lower half of scale if required angle is greater than 45°. The angle will be the actual angle made by the triangle.
   - Read numbers on upper half of scale if required angle is less than 45°.
   - The angle will be complementary to the angle

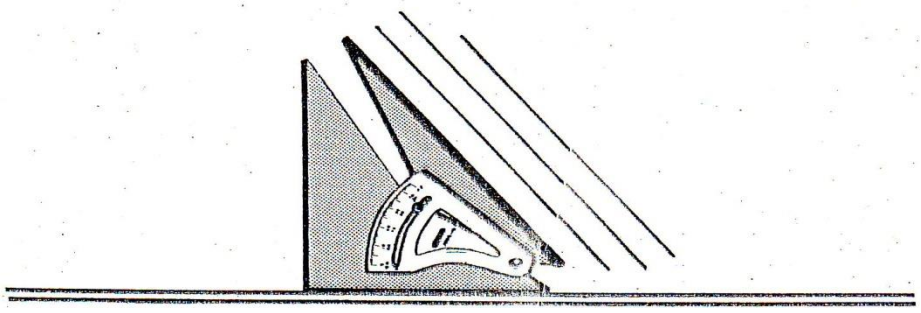


Adjustable triangle can also be adjusted so that the long side can serve as the base line. This changes the direction the individual lines will run. See figure below.)



4. Practice setting various angles and rotating triangle to get various line angle.

5. Construct parallel lines by drawing along one edge of the triangle. Slide the triangle along working edge to knew position and construct the new line. (Figure 3)



Operation -Sheet 2 Draw horizontal and vertical lines with triangle and drafting machine

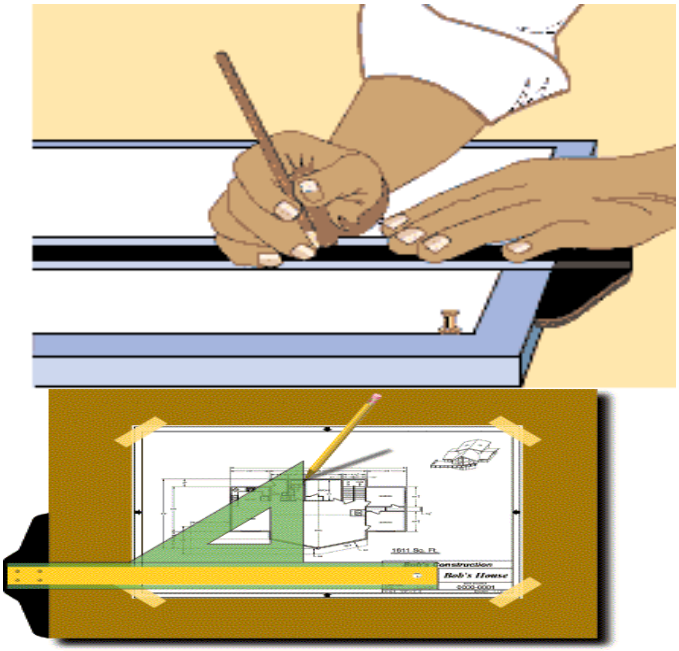
2.1 Draw horizontal and vertical lines with triangle and drafting machine

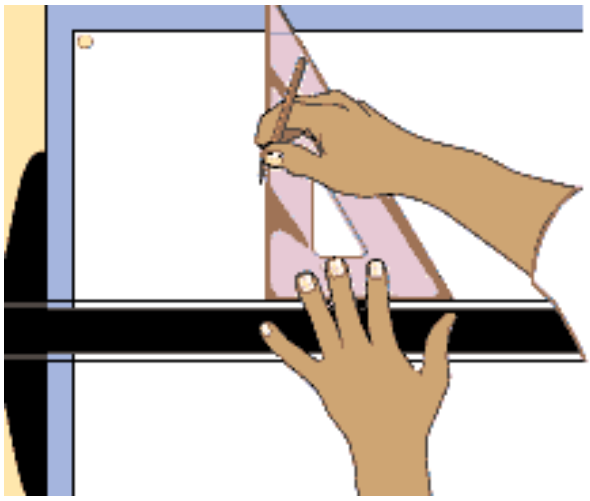
- Tools and equipment

1. Drafting machine/Drawing Table
2. Standard triangles
3. Two sheets of drafting media
4. Pencil
5. Eraser

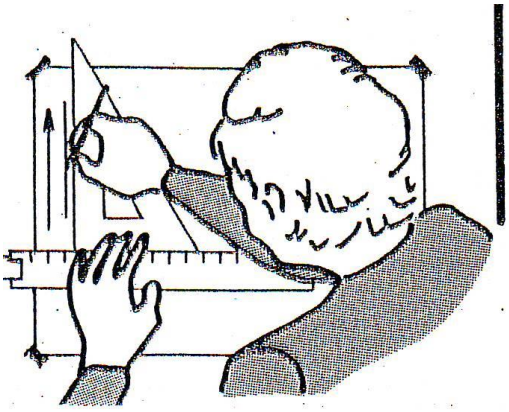
- **Procedure**

1. Place the drawing media on the drafting surface.
2. Set the drafting machine at the “0” mark with parallel scale approximately horizontal to the drawing surface.
3. Align the bottom edge of the drawing media with the parallel scale.
4. Tape the drawing in place.
5. Draw horizontal lines using the parallel scale as a guide





6. Draw vertical lines by placing a triangle against the parallel scale and using the vertical 90° angle side of the triangle to trace along.



Operating Sheet No. 3

Divided a circle into 24 parts of 15° by using 30°/60° and 45° triangles

A. Tools and equipment

1. Triangles- 30°/60° and 45°
2. Drafting machine or parallel bar
3. Drafting media
4. Drafting pencil
5. Eraser

B. Procedure

1. Use the established center point and lines as a reference point from which two standard triangles can be used to find the first 15° angle. (Figure 1)
2. Use one triangle to find the 30° angle next to the 15° angle.
3. Use one triangle to find the 45° angle next to the 30° angle.
4. Use one triangle to find the 60° angle next to the 45° angle.
5. Use two triangles to find the75° angle next to the 60° angle.
6. Use one triangle to find the 90° angle next to the 75° angle.

Continue with triangles and drafting machine or parallel bar until the circle has been divided into 24 parts and each angle has been correctly labeled

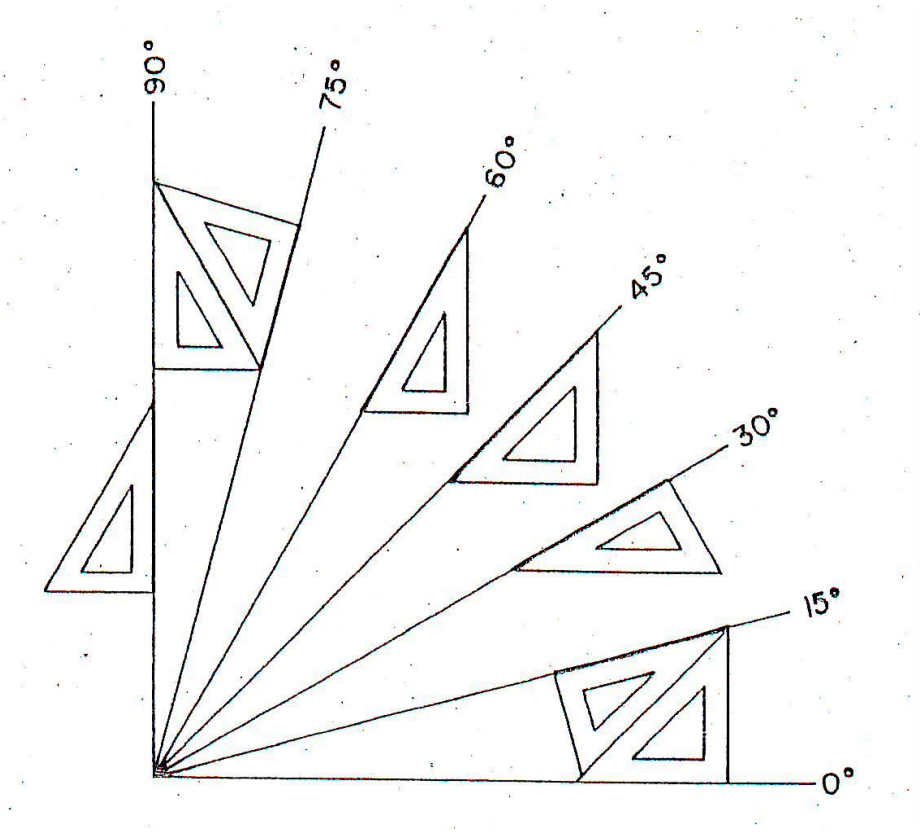


Fig 1

Operation Sheet No. 4

Use a divider to divide a line into equal parts.

A. Tools and Equipment

1. Divider
2. Eraser
3. Drafting media (“A” size vellum)
4. Drafting pencil

B. Procedure

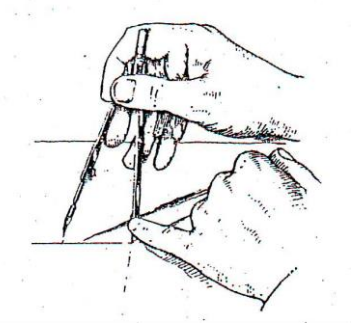
A divider is used to transfer a dimension from one point to another or to subdivide a line into a given number of equal parts.)

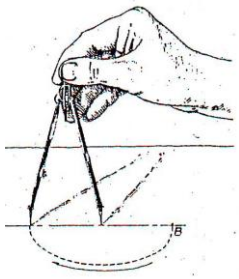
1. To divide a line into a given number of equal parts, set one point of the divider at one end of the line.
2. Use one hand to adjust the divider to approximately 1/3 the distance of the line.

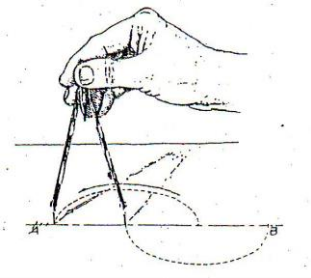
Distance will change defending upon number of divisions.

3. Swing the divider clockwise to the second point on the line.
4. Swing the divider counterclockwise to the third point on the line.

If spacing is too short or too long, lengthen or shorten the divider spacing slightly and try again. This is a trial and error method, but a useful method to practice.)







Task 1	Draw horizontal and vertical lines with triangle and drafting machine

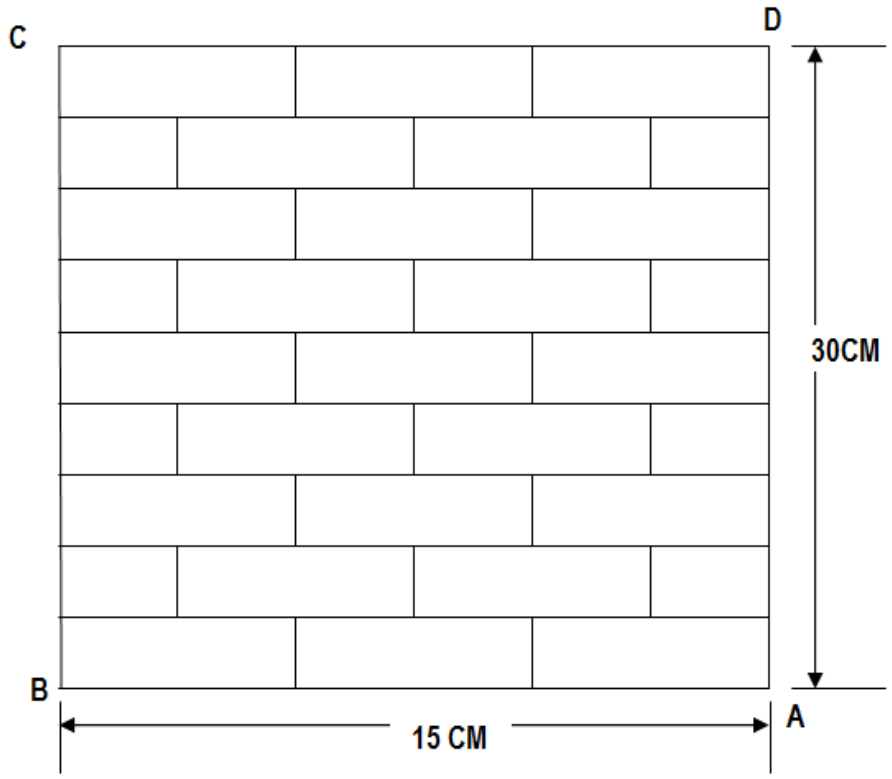
- **Problems**:

Using a new sheet of drawing paper, draw the following figures using the specifications noted. Construct problem 1 in the left half of the sheet and Problem 2 in the right half of the sheet.

Problem 1:

Line A-B is divided into 6 equal parts.

Line A-D is divided into 9 equal parts



Gig 1

Task 2	Problem- Construct a 4” square in the center of the working space

Problem- Construct a 4” square in the center of the working space. Using the figure below as an example, divide lines A-D and B-C into seven equal parts locating the corners of the squares. Construct the squares and complete the figure by adding center lines.

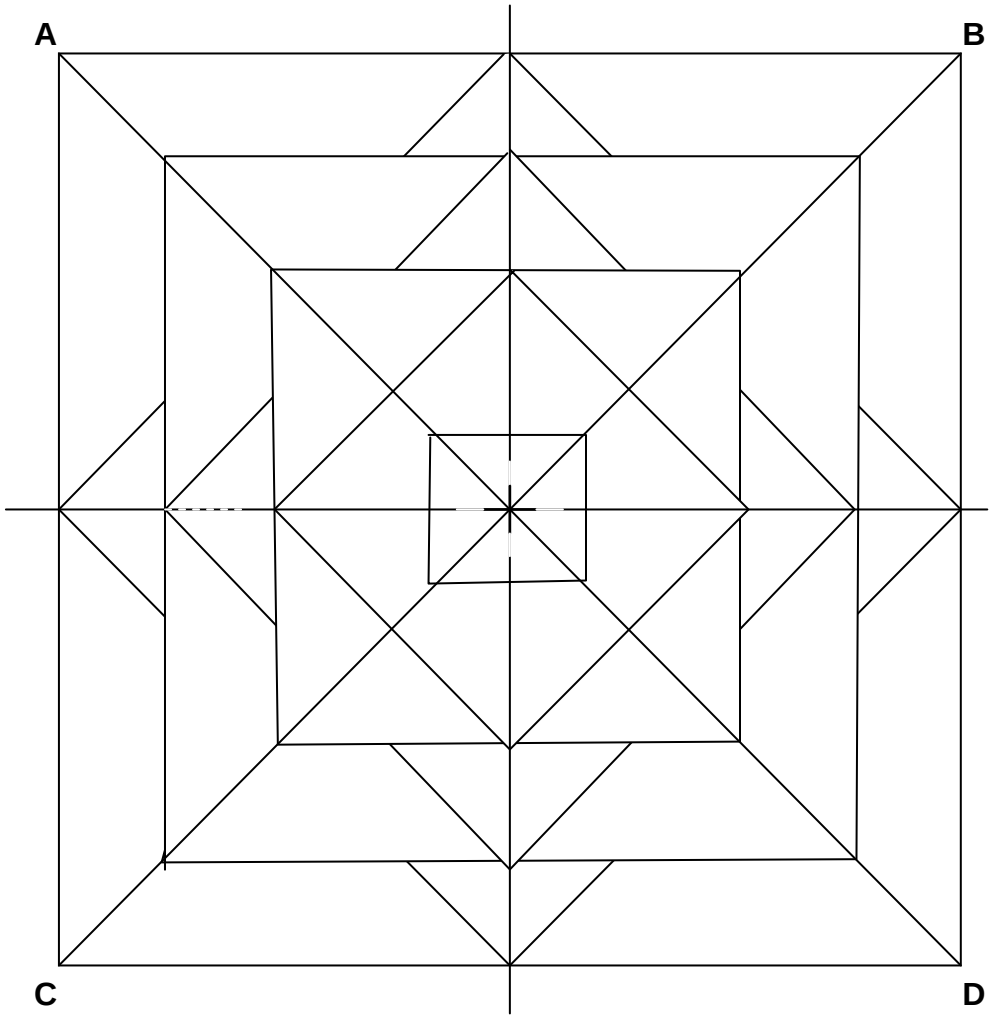


Fig 2

Task 3

4 Problem- Divided the circle below into 24 parts of 15°

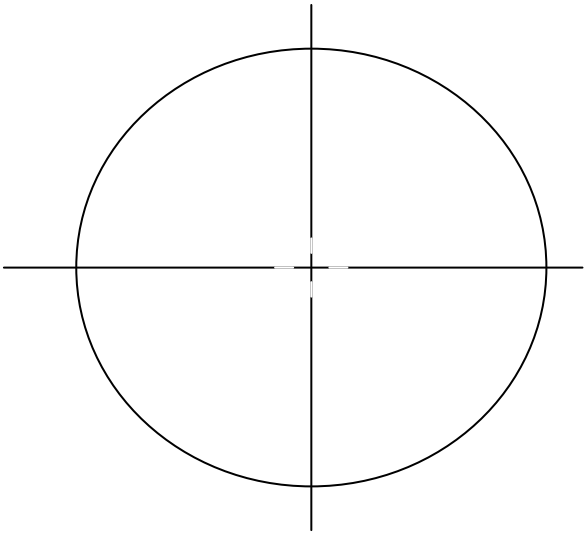


Fig 3

Information Sheet 4. Selecting types of drawings

4.1 Selecting types of drawings

- What is Drawing

Drawing is a form of communication that preceded writing and that continues to serve as another form of communication. "

Drawing is essentially a technique in which images are depicted on a surface by making lines, though drawings can also contain tonal areas, washes and other non-linear marks.

✓ **Sketching**

Sketching is a rough design of drawing that representing the main features of an object or scene and often made a preliminary study and also the way of communication to yourself or you can say reflecting idea to other for conversation and collaboration. It is a set of instruction to illustrate an idea.

✓ **Importance of sketching: -** the old saying of a picture is worth thousand words is particularly true for cabinet making. Sketch is asset of instruction to illustrate an idea.

Cabinet maker on the job who thinks of time saving device or a new method of construction uses sketch to explain the idea to other.

Sketches are used in many cases in preference to an instrument drawing because they can b e made so quickly

✓ **Steps in sketching**

1. Formulating the shapes and size of the cabinet.
2. Showing the rough out line of the view which are necessary
3. Showing the lines which are used to complete the sketch of the cabinet
4. Showing the completion of the sketch.

   The unnecessary any lines have been erased .then change into formal working drawing.

✓ **Types of Drawing**

The technique of representing an object in a drawn form is referred to as projection.

Projection can be divided into

1. Orthographic (2- dimensional) projection.
2. Pictorial (3- dimensional) projection

- Orthographic or multi view dewing

Orthographic projection is a method of producing a number of separate 2d inter-related views, which are mutually at right angles to each other.

This method, however, does not create an immediate three dimensional visual picture of the object, as does pictorial projection.

Important point to remember in making orthographic drawing

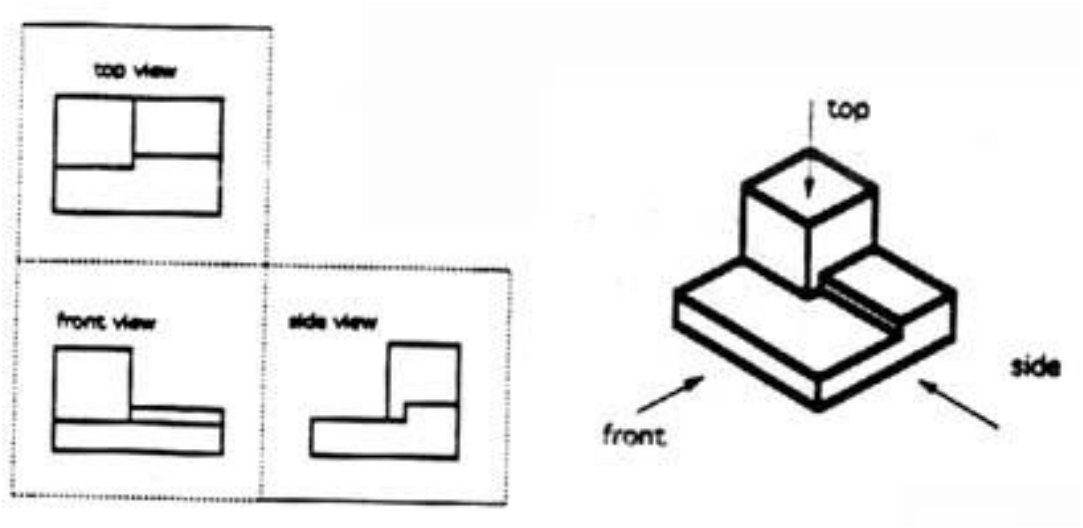
- ✓ Space the view an even distance apart
- ✓ Make accurate measurement
- ✓ Make clear line
- ✓ Make sure that the outline are darker than the dimension lines
- ✓ The scale (mm, cm) should be mentioned in the block of the drawing
- ✓ Lettering must be uniformed and clear

- **Orthographic projection is based on two principal planes**

1. One horizontal (hp) and

2 One vertical (v p) intersecting each other and forming right angles and quadrants.

Then draw the object on each of three faces as seen from that direction Views. We call this an "orthographic" or "multi view" drawing.

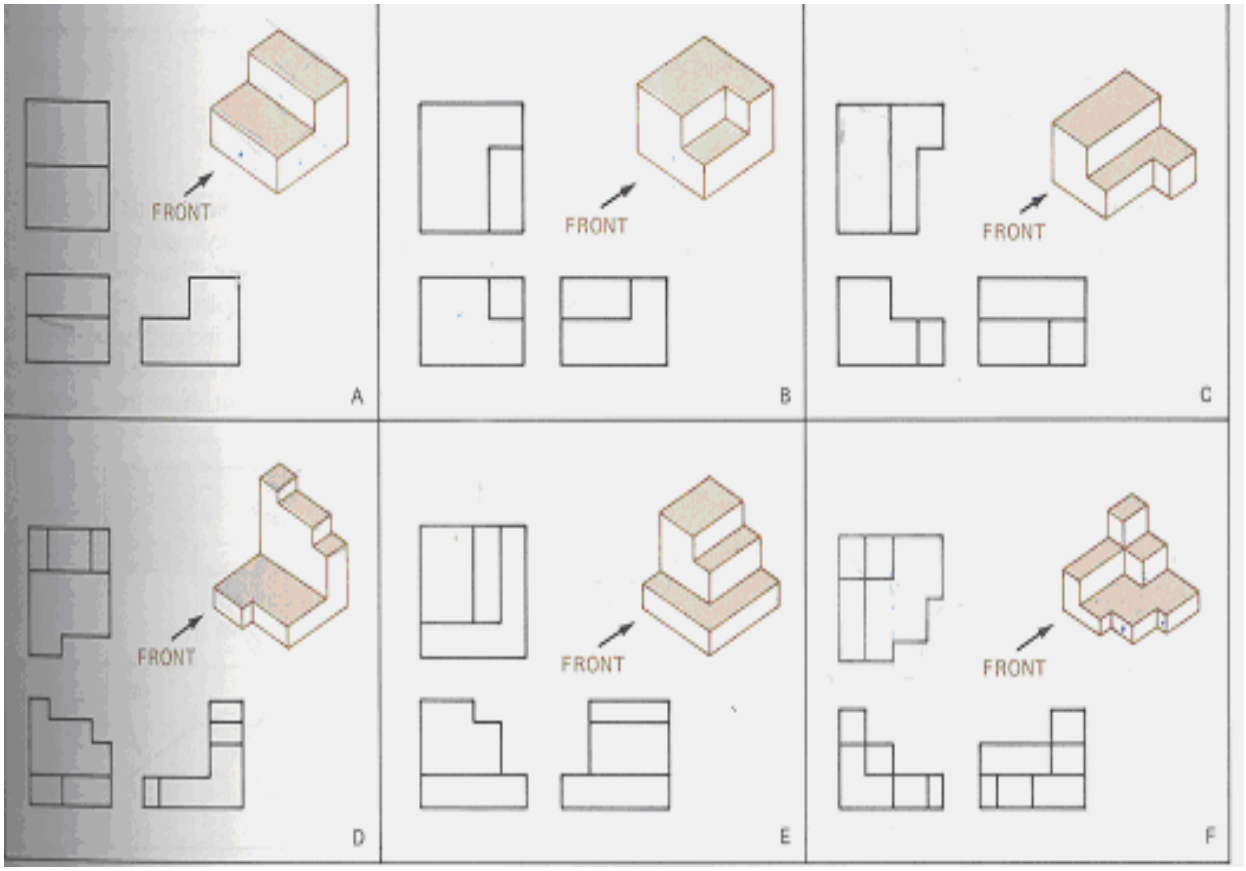


The views that reveal every detail about the object.

Three views are not always necessary; we need only as many views as are required to describe the object fully.

Top view is projected onto the horizontal plane

Side view is projected onto the profile plan



Examples of multi view Fig 1

- **Pictorial drawings**

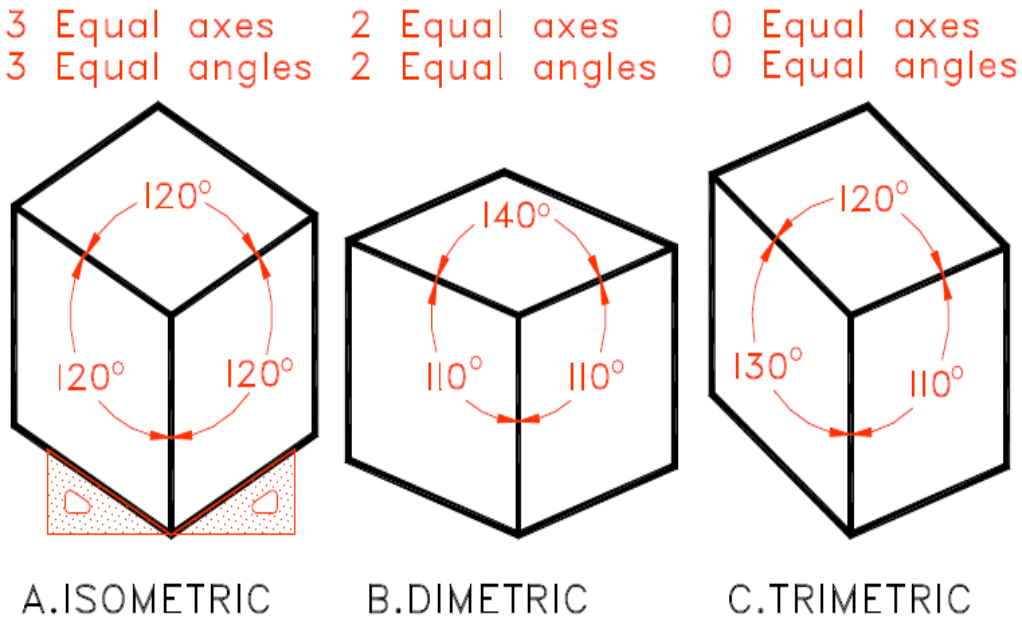
pictorial drawings- shows an object like you would see in a photograph give a three dimensional view of a room or Structure

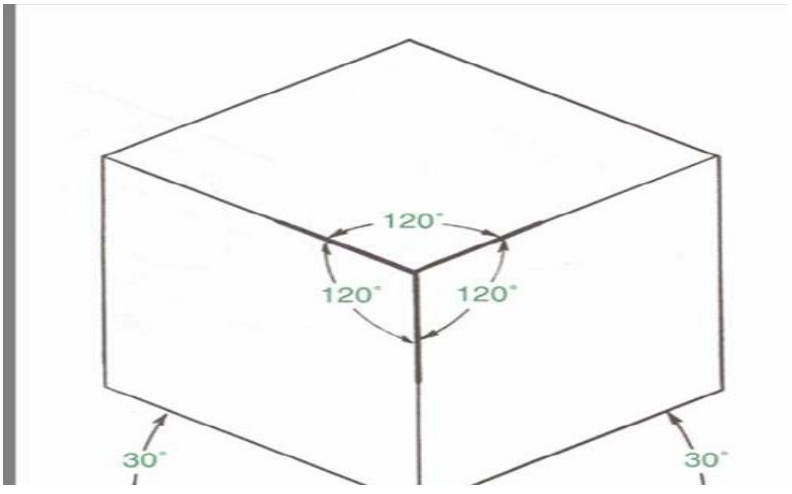
three common types pictorial drawings

1. Isometric
2. Oblique
3. Perspective

1) Isometric drawing

In an isometric drawing, the object's vertical lines are drawn vertically, and the horizontal lines in the width and depth planes are shown at 30 degrees to the horizontal. When drawn under these guidelines, the lines parallel to these three axes are at their true (scale) lengths. Lines that are not parallel to these axes will not be of their true length.





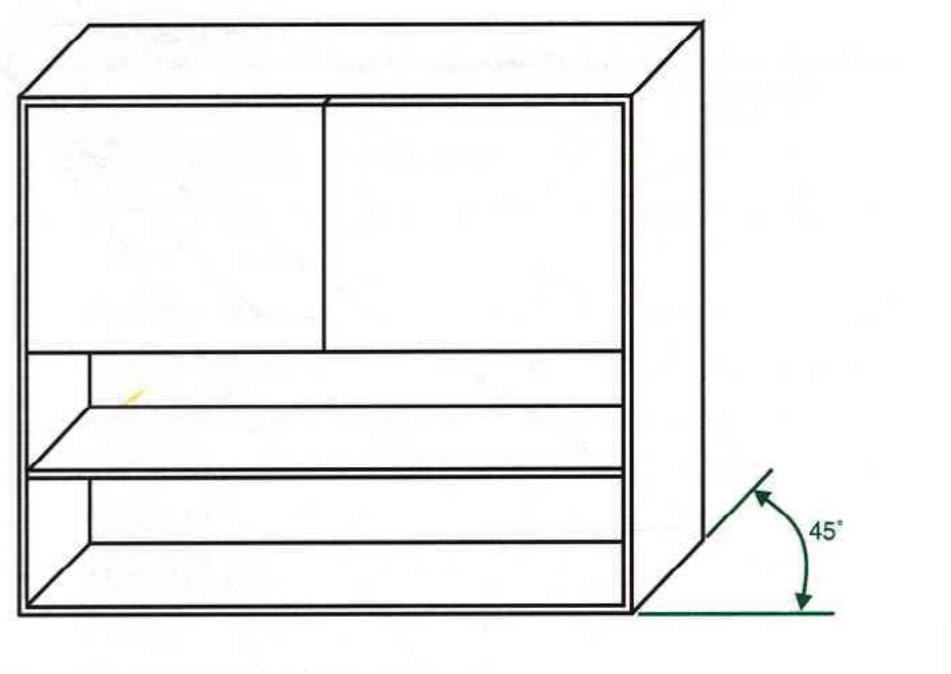
- **Oblique drawings**

Oblique drawings The selection of the direction of an object is very important for making the oblique drawing explanatory. For this purpose, the longer side of the object is kept along the horizontal axis., the more detailed and the side having more curves is taken along the horizontal axis.

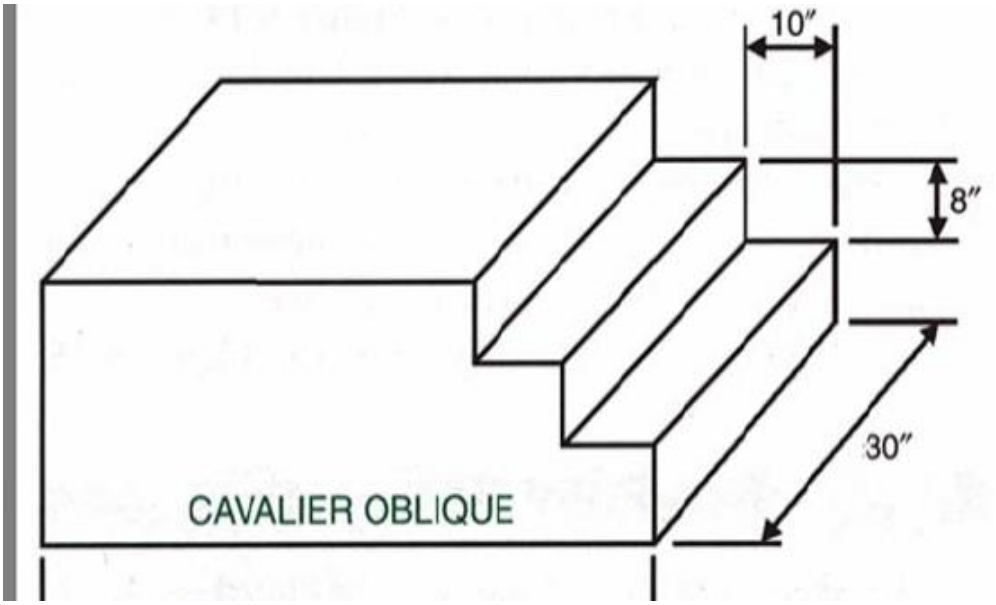
- ✓ The front view is drawn like it would be using orthographic projection
- ✓ The front view shows all features with true shape and size
- ✓ The top and side view are then projected back from the front view
- ✓ Views can be at any angle15, 30 or 45 degrees are common

Two types of oblique drawings

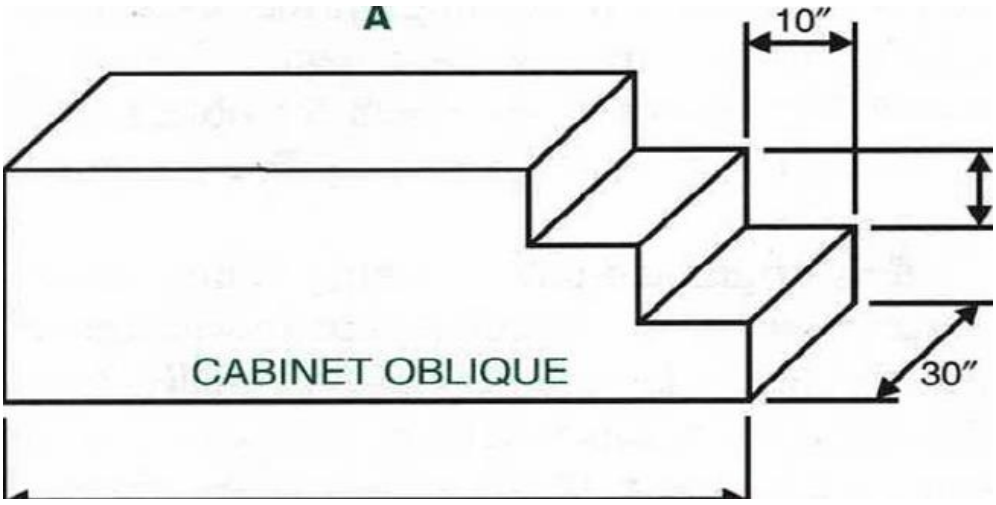
- ✓ cavalier
- ✓ cabinet



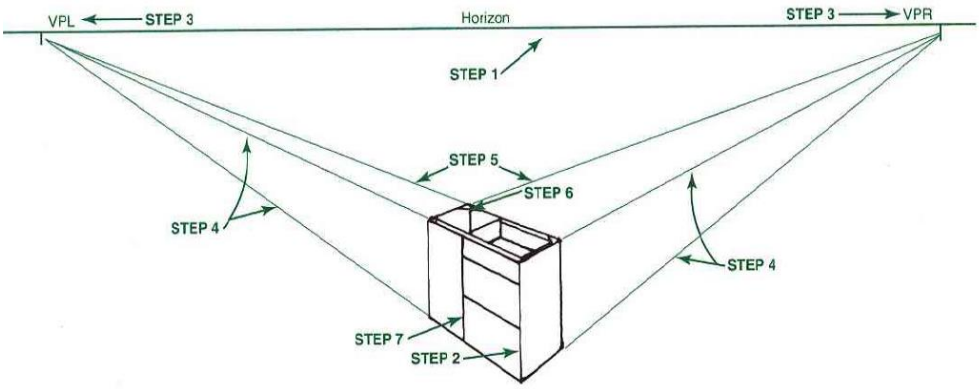
- ✓ cavalier



2) Cabinet oblique Measurements on the receding axes are reduced by half more visually realistic representation often used for drawing cabinets



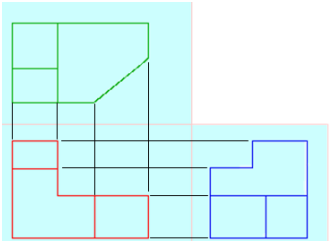
3. **Perspective** the two faces that meet at this edge recede to different vanishing points all lines parallel to each face go to the different vanishing points



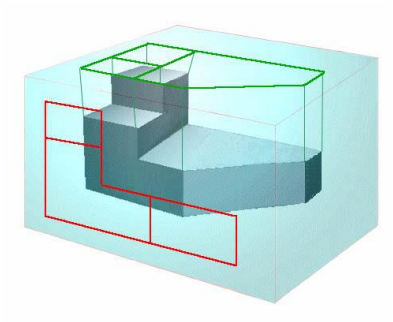
- Structure/configuration plans,

plane is a flat surface on which a straight edge will lie in any surface.

Representation of planes can be performed in four ways as by two intersecting lines, by two parallel lines, by three points not in a straight line or by a point and a line (point not on the line)



Orthographic projection (Multi view)

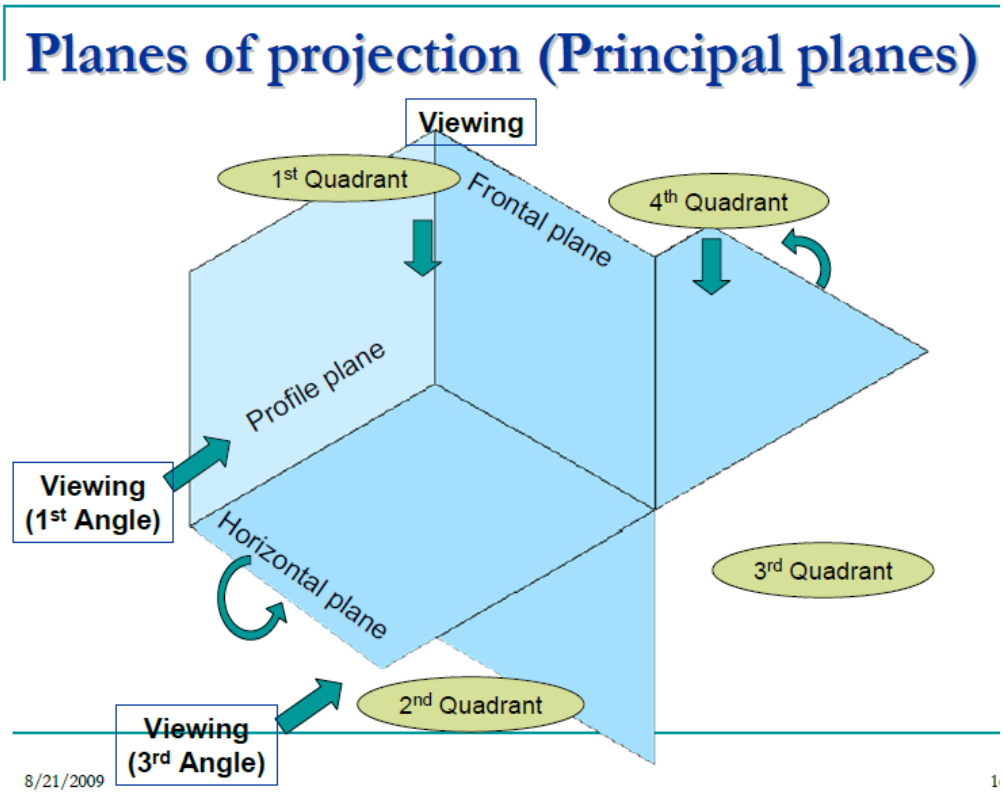


Pictorial projection (Single view)

✓ **Project plans, drawings, specifications, illustrations,**

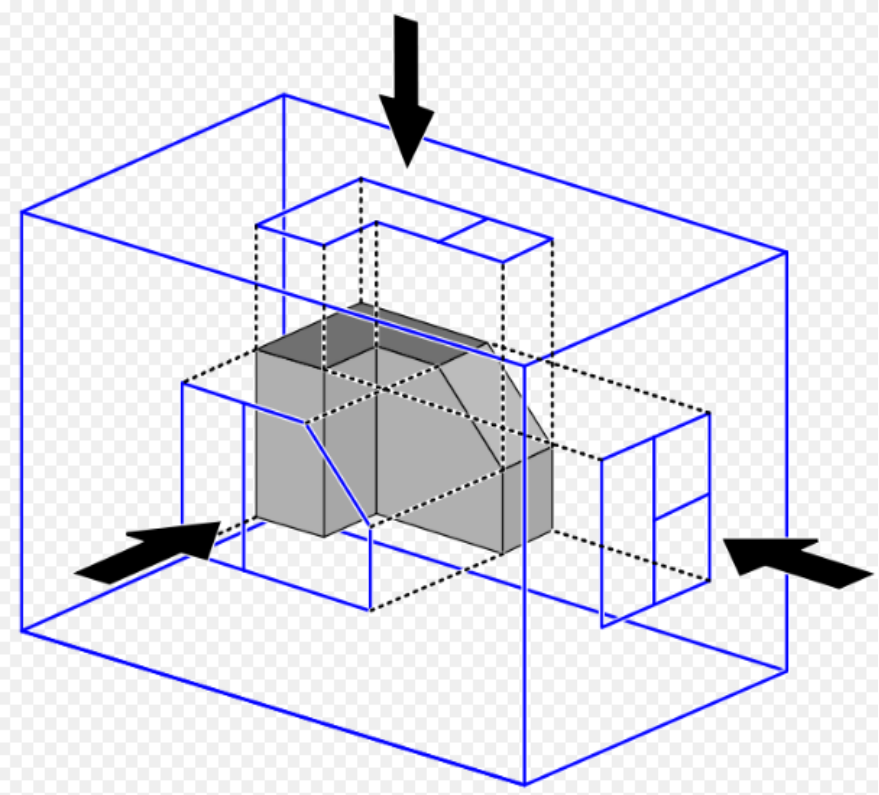
Projection is the representation of this physical object (figure or solid) on the viewing plane as it would look from a particular direction

Graphical projection contains two broad categories based on the number of views:



✓ Cross sectional plans, longitudinal plans

object is conceptually located in quadrant III, i.e. it is positioned below and behind the viewing planes,



Cross sectional plans of drawing

Self-Check4	Written Test

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

Answer the following equations provide below

1. What is Isometric Drawing?_____

---

2. What is Pictorial Drawing?_____

---

3 List the oblique Drawings _____

---

4. List the types of drawing with their identification _____

Note: **Satisfactory rating -100% points**

Answer Sheet

Name: _____

Score = _____

Information Sheet 5: Identifying key features of drawings

5.1 Identifying key features of drawings

Features of drawings is those features of redaction the do rely additional expenditures after insulation to achieve their intended propos

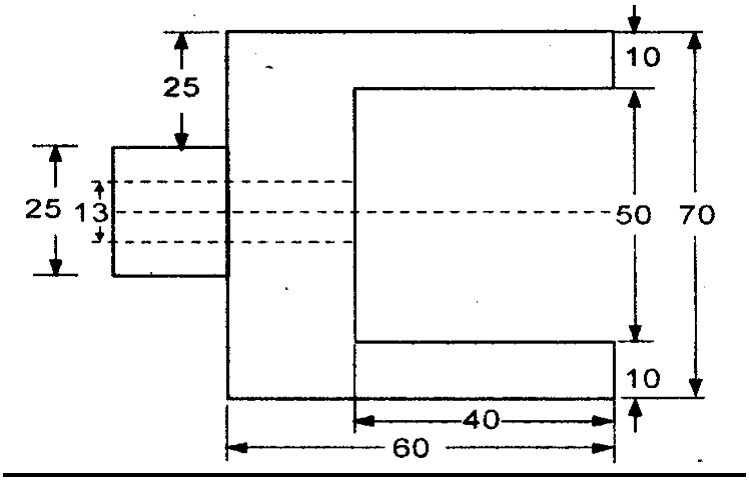
their ar 8 qualities of good drawing

1. Function
2. Wall made
3 Emotionally resonant
4 Enduring
5. Social beneficial
6. Beautiful
7 Ergonomic
8 Affordable

- Dimensions,

Dimensioning: - it includes in working drawing to show its size and shapes. And divided in to three depending up on the location.

1. Position dimension it shows where the hole or other details is located.
2. Detail dimension itgive correct length, width, height or depth of the same specific detail parts.
3. Over all dimension it shows total length, width and height of an object.



Basic rules of dimension

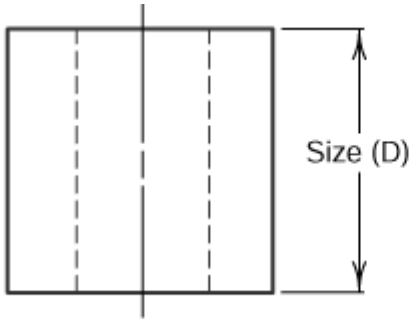
- ✓ Dimension should be outside, to the right, and bottom of the view where possible.
- ✓ The first line of dimension around view should begin about 6-10mm away from the nearest object line. Overall dimension is farthest from the object.
- ✓ ` the right and bottom of the sheet. Those are called aligned dimension.
- ✓ The dimension of particular parts are usually given only on the view were the part is most clearly shown.
  - Basic Concepts

Dimensions are used to describe the size and location of features on parts for manufacture. The basic criterion is, "What information is necessary to make the object?" Dimensions should not be excessive, either through duplication or dimensioning a feature more than one way.

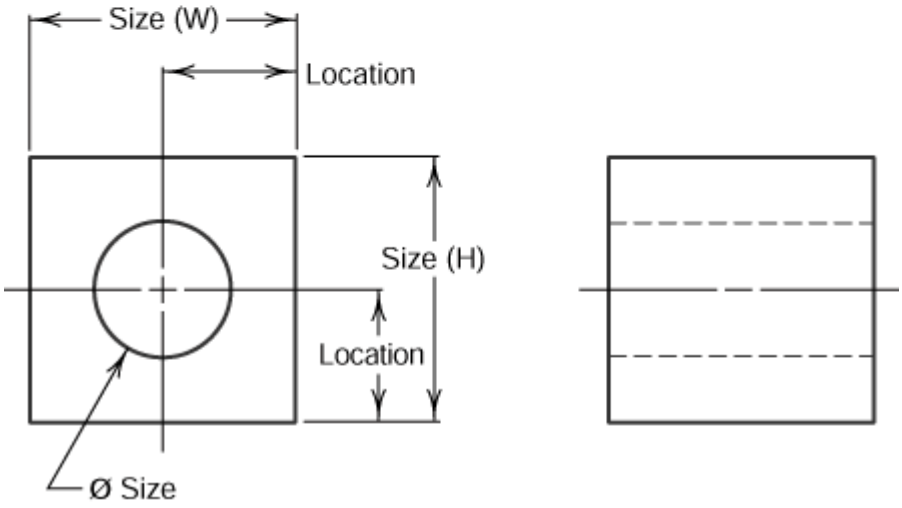
1. Size dimension

2. Location dimension

- ✓ Size dimension might be the overall width of the part or the diameter of a drilled hole.

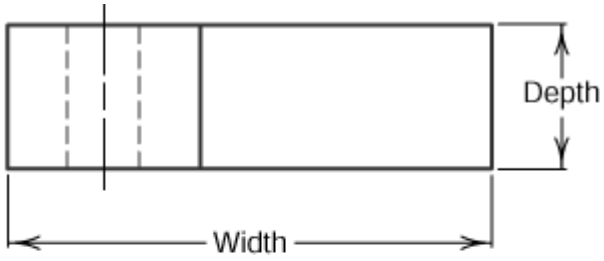


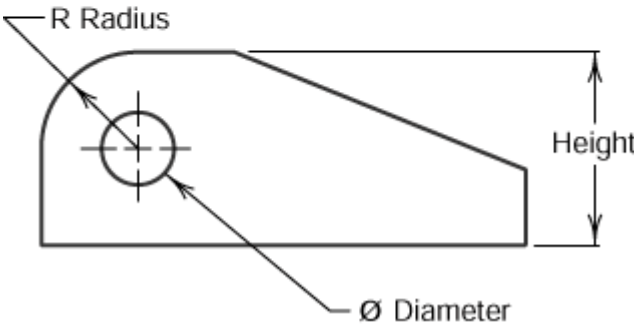
- ✓ Location dimension might be length from the edge of the object to the center of the drilled hole.



1.1 **Size dimensions**

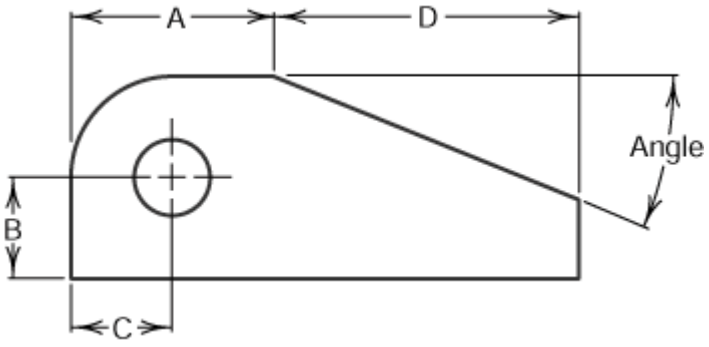
- ✓ Horizontal
- ✓ Vertical
- ✓ Diameter
- ✓ Radius



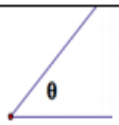
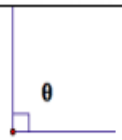
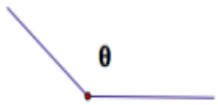
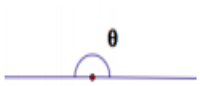
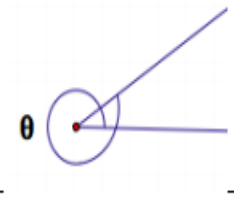


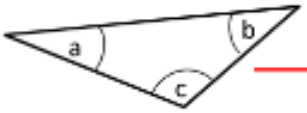
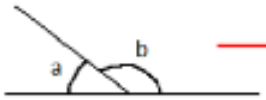
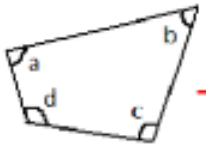
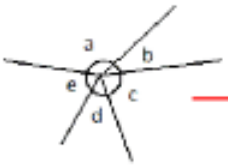
2.1 **Location and Orientation**

- ✓ Horizontal
- ✓ Vertical
- ✓ Angle



Types of Angel

NAME	MEASURE	DIAGRAM
acute	$0^\circ < \theta < 90^\circ$	
right	$\theta = 90^\circ$	
obtuse	$90^\circ < \theta < 180^\circ$	
straight	$\theta = 180^\circ$	
reflex	$180^\circ < \theta < 360^\circ$	
whole	$\theta = 360^\circ$	
angle greater than 360°	$\theta > 360^\circ$	

Angle Types	Angle Rules
 Acute angle < 90°	 Angles in a triangle add up to 180° So a + b + c = 180°
 Right angle = 90°	 Angles on a straight line add up to 180° So a + b = 180°
 Obtuse angle > 90° and < 180°	 Angles in a quadrilateral add up to 360°. So a + b + c + d = 360°
 Straight line = 180°	 Angles around a point add up to 360°. So a + b + c + d + e = 360°
 Reflex angle > 180°	**Angles in regular shapes**

Name of shape	Sides	Interior angles
equilateral triangle	3	60°
square	4	90°
regular pentagon	5	108°
regular hexagon	6	120°
regular heptagon	7	128.6°
regular octagon	8	135°
regular nonagon	9	140°
regular decagon	10	144°

Interior angles of regular n-sided polygons add up to 180(n-2) °

Self-Check5	Written Test

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

1. What is features of drawing ----------

---

2. Wham is positional dimension ----------

---

3 List the types of dimension ----------

---

4 List Size dimensions ----------

Note: **Satisfactory rating 100% points**

Answer Sheet

Score = _____

1 Name: _____

L G# 2	LO #2- Creating simple sketches, drawings and sectional views

Instruction sheet

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

- Selecting medium drawings to suit job requirements
- Using drawing instruments, equipment and materials to produce:
- Applying different types of lines with industry drawings
- Forming hand letter texts in a variety of formats
- Preparing simple two dimensional drawings & sketches
- Preparing simple three dimensional drawings & sketches
- Preparing sectional details of simple design elements and angles
- Adding notations and dimensions to complete drawings

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Select medium drawings to suit job requirements
- Use drawing instruments, equipment and materials to produce:
- Apply different types of lines with industry drawings
- Form hand letter texts in a variety of formats
- Prepare simple two dimensional drawings & sketches
- Prepare simple three dimensional drawings & sketches
- Prepare sectional details of simple design elements and angles
- Add notations and dimensions to complete drawings

Learning Instructions:

Read the specific objectives of this Learning Guide.

1. Follow the instructions described below.
2. Read the information written in the “Information Sheets”. Try to understand what are being discussed. Ask your trainer for assistance if you have hard time understanding them.
3. Accomplish the “Self-checks” which are placed following all information sheets.
4. Ask from your trainer the key to correction (key answers) or you can request your trainer to correct your work. (You are to get the key answer only after you finished answering the Self-checks).
5. If you earned a satisfactory evaluation proceed to “Operation sheets
6. Perform “the Learning activity performance test” which is placed following “Information sheets” ,
7. If your performance is satisfactory proceed to the next learning guide,
8. If your performance is unsatisfactory, see your trainer for further instructions or go back to “information sheets”.

Information Sheet 1. Selecting medium drawings to suit job requirement

1.1 Selecting medium drawings to suit job requirements

Basic requirement of drawing

Engineering drawings should be unambiguous and clear for any part of a component there must be only one interpretation.

Sizes and layout of drawing sheets

- ✓ Title block.
- ✓ Frame for limiting the drawing space.
- ✓ Centering marks.
- ✓ Orientation marks.
- ✓ Metric reference graduation.
- ✓ Grid reference system

- Formula in designing cabinet

The designer has a five/5 point formulas to which he/ she applies to every design problems. These are:

- ✓ Utility and safety: the design in every item must be easy to handle, comfortable, easy to find the peace and quickly legible.
- ✓ Maintenance: the design should be designed accessible and easy to maintain after service.
- ✓ Cost: there are two phases to be considered in cost.
- ✓ Sales appeal: is the silent selling that the product does. Over and above our eye appeals, the product must express quality through unity of design, texture, simplicity and forthrightness. It proclaims the excellence of its concealed mechanism and the integrity of its manufacturer.
- ✓ Appearance: is the finish of the product, and what does the product looks like.

- Setting up paper on a drawing board

- ✓ Drawing paper must be set up on a drawing board using a T-square. Once in position, the paper is clipped to the board with board clips or even *masking tape*.

The T-square must be placed up against the edge of the drawing board. There must be

no gaps otherwise the paper will not be set up correctly and drawing accurate horizontal and vertical lines will be impossible.

- ✓ The paper is then allowed to rest on the T-square. Check that the paper rests properly on the T-square and that there are no gaps between the T-square and the paper OR the T-square and the side of the drawing board.

  The masking tape can then be positioned holding the paper securely to the board.

- ✓ A 2H pencil can then be used to draw faint horizontal lines across the page. Try to keep the lines to the same size by measuring them with a ruler.
  Each time you draw a line check that the T-square is pressed completely against the edge of the board. There should be no gaps.

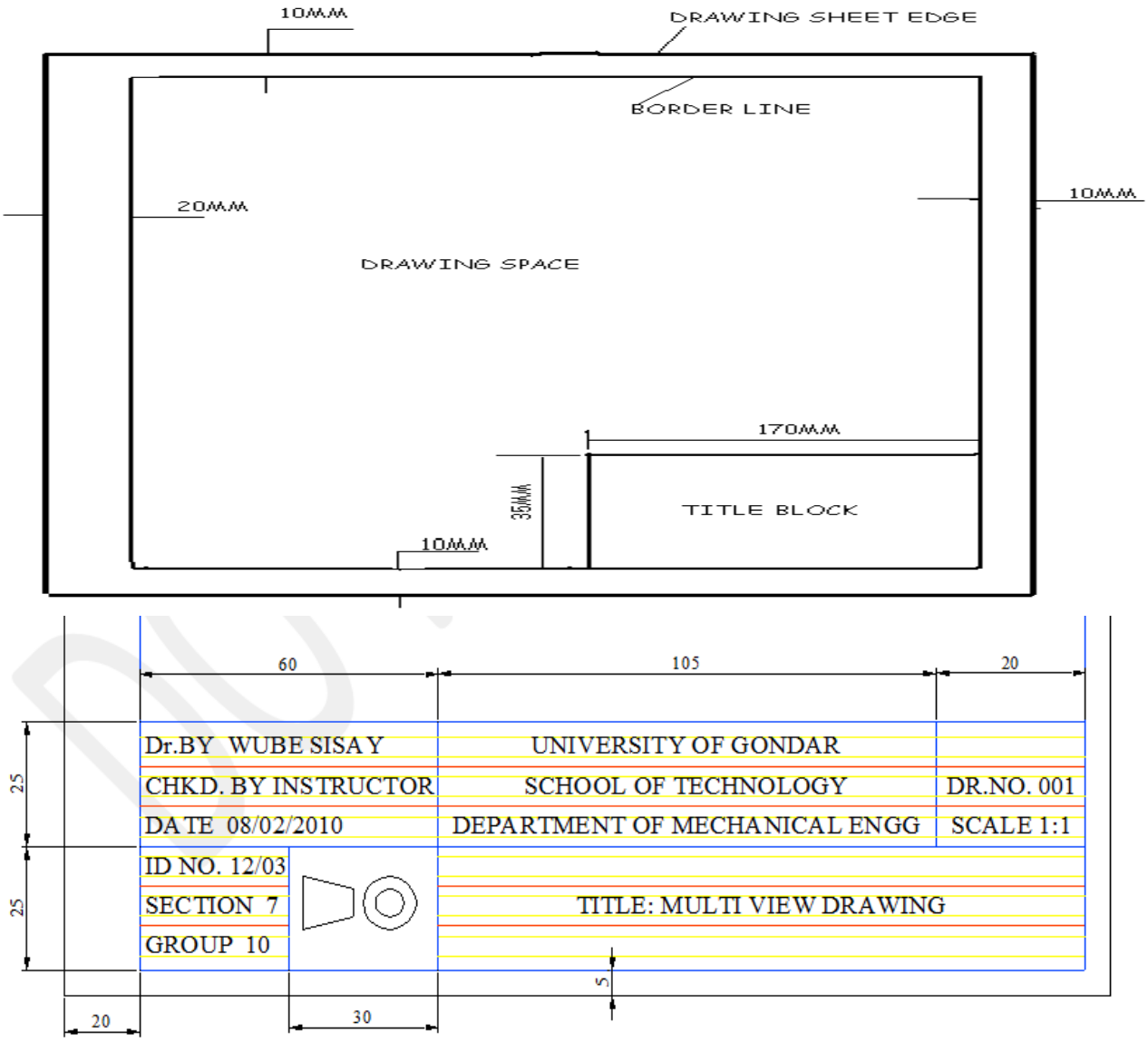
- ✓ To draw vertical lines a T-square and set square are used together.
  Be careful to check that there no gaps between the T-square and the board AND the set square and the T-square. Do not draw vertical lines with a set square only as they will not be accurate.

- ✓ Great care should also be taken to ensure that the paper does not move. This can happen if a hand or arm rubs too strongly against the paper.

- ✓ Check that the paper has not moved by placing the T-square at the bottom edge of the paper.

- ✓ Then check that the paper rests level against the T-square and that the paper is not at an angle.

- ✓ Ensure that the T-square is also firmly against the edge of the board



The essential drawing materials and tools for artists that are just starting to get serious about their drawing.

- Quality Drawing Pencils

We' start off with the most obvious essential – quality drawing pencils. When it comes to drawing pencils, each artist will find a brand that they connect with. There's no way to know which brand will become your favorite until you try a few.

- A Sketchbook

A sketchbook is one of the most important things an artist can have. I should point out that I am referring to an “active sketchbook” – one that receives attention on a daily basis. Anyone can “own” a book with blank pages of drawing paper

A drawing can be made on any surface, but the quality of that surface is sometimes just as important as the medium that it is used upon it.

Variety of Erasers

Erasers are for mistakes – right? Think again. Erasers can be a great mark-making tool as well. Each eraser creates a different mark and should be used as necessary according to the specific drawing medium.

A Good Pencil Sharpener

Pencils need to be sharpened with a quality pencil sharpener. Use a poor quality sharpener and you could be out of a pencil in a matter of moments.

Pencil sharpeners generally fall into two categories – Manual and electric

Drawing Pens / Ink

When we draw with ink, we’re forced to master the use of line. Line is used to develop the illusion of form, texture, and light. Technical drawing pens are affordable, easy to find, and portable

Self-Check1	Written Test

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

1. what is Basic requirement of drawing ? _____

2. List the five/5 point formulas to which he/ she applies to every design problems.

   1._____

   2._____

   3._____

   4._____

   5, _____

Note: **Satisfactory rating -100% points**

Answer Sheet

Score =

2 Name: _____

Information Sheet 2: Using drawing instruments, equipment and materials to produce

2..1 Using drawing instruments, equipment and materials to produce

- ✓ Scaled line work,

, **Drawing Scales**

Generally, it is easier to produce and understand a drawing if it represents the true size of the object drawn. This is of course not always possible due to the size of the object to be drawn, that is why it is often necessary to draw enlargements of very small objects and reduce the drawing of very large ones, this is called “SCALE”.

However, it is important when enlarging or reducing a drawing that all parts of the object are enlarged or reduced in the same ratio, so that the general configuration of the object is saved. Thus, scales are multiplying or dividing of dimensions of the object.

The scale is the ratio between the size represented on the drawing and the true size of the object.

Scale= Dimension to carry on the drawing ÷ True Dimension of the object.

Examples:

Dimension carried on the drawing = 4mm. True dimension= 40mm

Scale = 4 ÷ 40 = 1:10

Calculating drawing dimension of a line having a true dimension of 543 mm to a scale of 1/10.

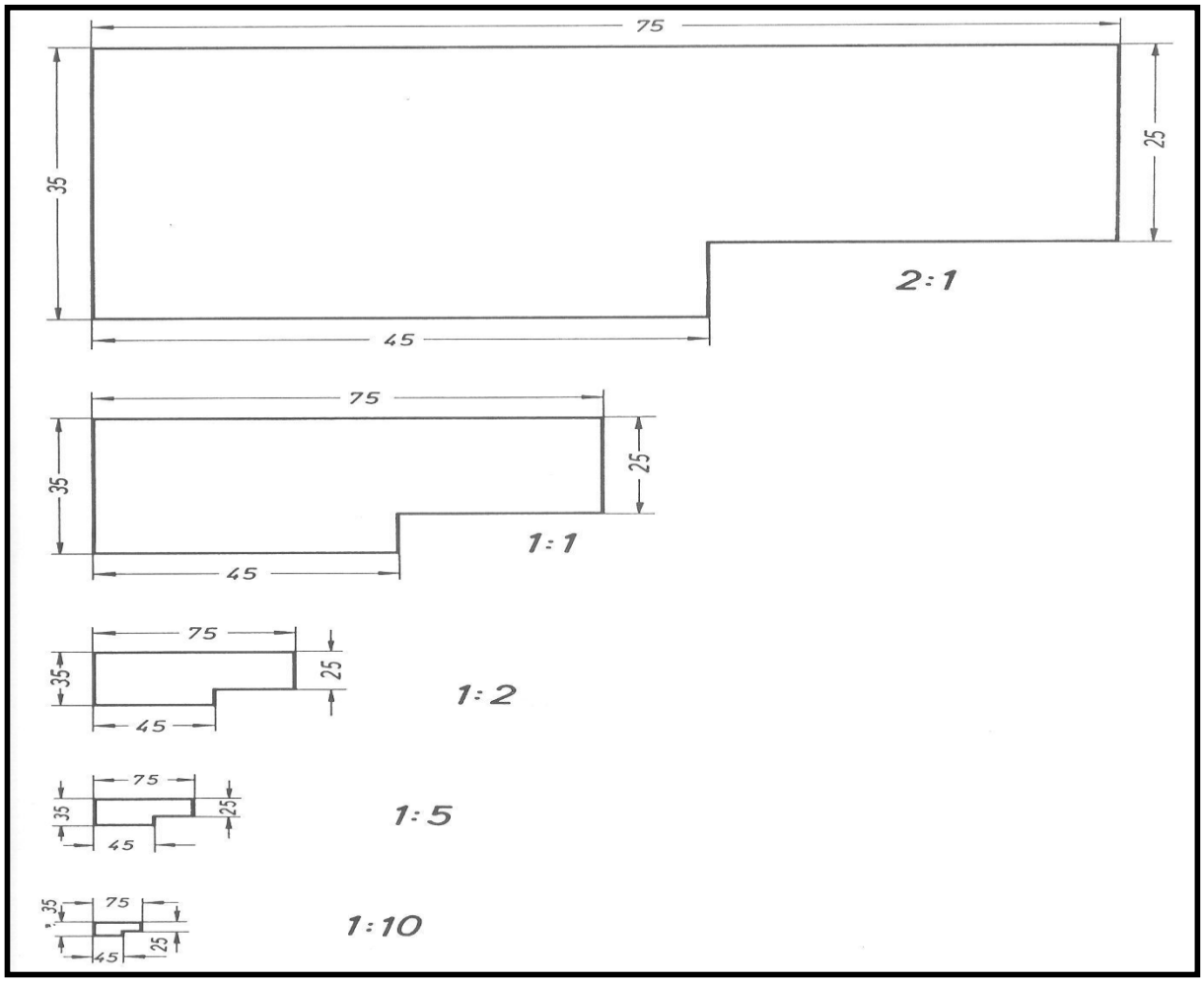
If a true dimension of 10mm is represented as 1mm, a true dimension of 543mm is represented as X

Then 10 mm ∈ 1 mm

543 mm----------∈ X mm

We have 1/10= x ÷ 543 or X= 54.3mm.

Therefore, a true dimension of 543mm is represented to a scale of 1/10 by a length of 54.3mm.



- **Lettering and numbering**

There are two fundamental methods of writing the graphic languages

1. Freehand

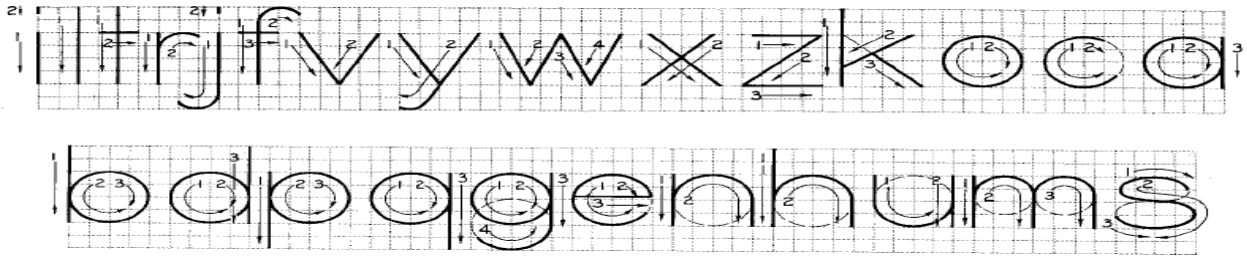
2instruments.

The direction of pencil movements are shown in Figure. (2.2) and (2.3).

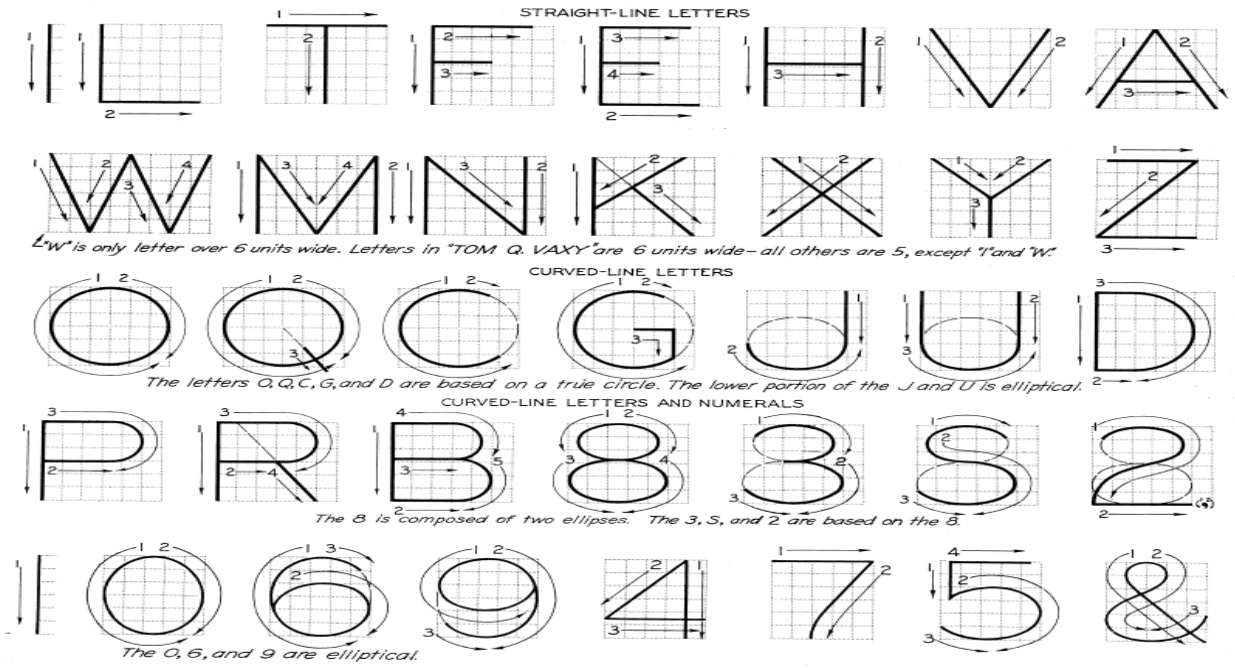
- ✓ •Knowledge of proposition and form of letters and the orders of the stroke.
- ✓ •Knowledge of the composition the spacing of letters and words.Persistent practices.

Capital letters are preferred to lower case letters since they are easier to read on reduced size

drawing prints although lower case letters are used where they from of a symbol or an abbreviation.



(Fig.2.2) Vertical lower case letter



(Fig.2.3) Vertical Capital Letters

Self-Check -2	Written Test

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

1. List fundamental methods of writing the graphic languages

1. _____

2,_____

Score = _____

Rating: _____

Note :**Satisfactory –100%**

You can ask you teacher for the copy of the correct answers.

Name: _____ Date: _____

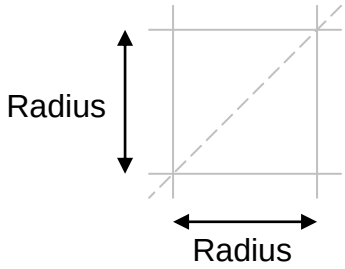
Short Answer Questions

Operation Sheet 1 Using drawing instruments, equipment and materials to produce arcs

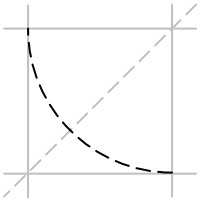
- Guidelines for sketching arcs

1. Sketch a box corner.

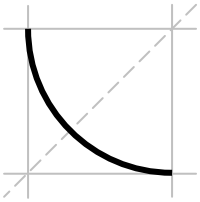
2. Mark off radius distance from corner point.



3. Swing a rough arc from center point.



4. Darken arc.



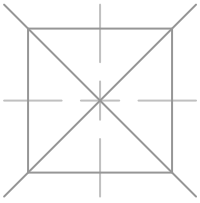
Operation sheet 2 Using drawing instruments, equipment and materials to produce CIRCLES

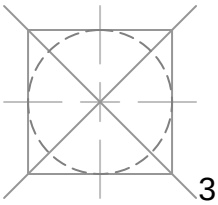
SKETCH CIRCLES

A. Guidelines for sketching circles.

1. Sketch in center lines.

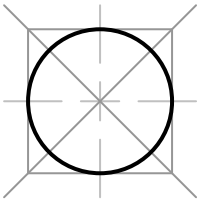
2. Box in circle at a diameter required.



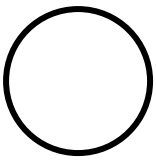


3. Put in diagonal lines and marks radius points from center.

4. Rotate wrist in a circular motion and connect arcs.



5. Erase construction lines and darken outline.



Task 1 Draw Hexagonal drawing by using by using drawing instrument

A. show the stapes of using line types with their description

Task 2 Draw Ellipse by using by using drawing instrument

Information Sheet 3. Applying different types of lines with industry drawings

Applying different types of lines with industry drawings

- Line:

Generally, drawing is the expression of bodies (or matters) by lines.

- ✓ Pieces are composed of variable geometric component. Sides and surfaces of these components are visible but some of them cannot be seen because they are behind the back sides.
- ✓ To obtain full and precise info about the piece, drawing should be done by using variable lines (instead of using same lines). Moreover, these lines should be drawn at same thickness and shape by everyone. The shapes and thicknesses of lines are given below.

Type of lines

- ✓ Solid line

The solid line is of continuous, even strength. This line can be used as a light line in the process of developing or constructing the drawing that may be required to be erased at a later stage. It could also be a heavier line that is used to line in the completed drawing.

Solid ——————————————————————

- ✓ Hidden line

Hidden details are shown by a series of dashes making up a broken line. It is normal practice that you place a dash at the beginning of the hidden line and another at the end where it meets an intersecting line. In a scaled drawing, the hidden line can be measured from the start of the first dash, to the end of the last dash.

Hidden — — — — — — — — — — — — — —

- ✓ Centre line

Centre lines are drawn to indicate the exact centre of a component being drawn. They are made from a series of lighter long and short dashes.

- ✓ Section line

Section lines are special lines placed on a drawing which indicate the area of the drawing through which an imaginary cut has been made to reveal internal details. These lines are drawn at full density and should be drawn at certain dimensions.

- ✓ Dimension lines

Dimension lines are thinner than the lines used to outline a drawing. They are used to indicate the sizes of articles or objects instantly. Two types of dimension lines that can be used are shown below.

- ✓ Broken lines

Broken lines indicate that a break has been made in the drawing of an object which is too large to be drawn on the paper and had to be cut in order to fit on it. It is common practice when you are drawing a full size set-out to use broken lines rather than draw the full view.

Self-Check -3	Written Test

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

Matching

Match the following equation

A			B	
	1	thinner than the lines used to outline a drawing	A	Solid line
	2	are drawn to indicate the exact centre of a component being drawn	B	Centre lines
	3	indicate that a break has been made in the drawing of an object which is too large to be drawn on the paper and had to be cut in order to fit on it	C	Section line
	4	It could also be a heavier line that is used to line in the completed drawing	D	Center line
	5	shown by a series of dashes making up a broken line	E	Dimension lines
			F	Broken lines

You can ask you teacher for the copy of the correct answers.

Name: _____ Date: _____

Short Answer Question

Information Sheet 4 Forming hand letter texts in a variety of formats

4.1 Forming hand letter texts in a variety of formats

- Hand writing

written in a flowing manner, sometimes making a word look like a single pen stroke. In Roman cursive and Hebrew cursive, the letters are not joined.

The cursive writing style is further divided into three subclasses; looped, italic and connected.

Types of hand writing

Looped Cursive Handwriting

In looped cursive handwriting, some letters that ascend and descend are written with loops to provide for joins. An example of looped handwriting is Renaissance, which is one of the oldest handwriting styles in history.

Italic Cursive Handwriting

Italic cursive penmanship is derived from chancery cursive and uses non-looped joins. Joins from g, j, q, or y and other few letters are discouraged. Italic handwriting style became popular during the medieval times.

During the 15th century, the popular handwriting consisted of black indecipherable letter script. Due to its illegibility, Renaissance scribes and writers decided to return to the Carolingian writing style, which was invented by monks in the 8th century with bold and easy-to-read letters. However, they gave it an ornate look by slanting it conjoining some of the letters with lines.

The cursive italic handwriting originated in Italy; hence it was dubbed the name “italic.” This term (italic) relates to penmanship where letters slant backward and should not be confused with the “italic typed” where letters slant forward.

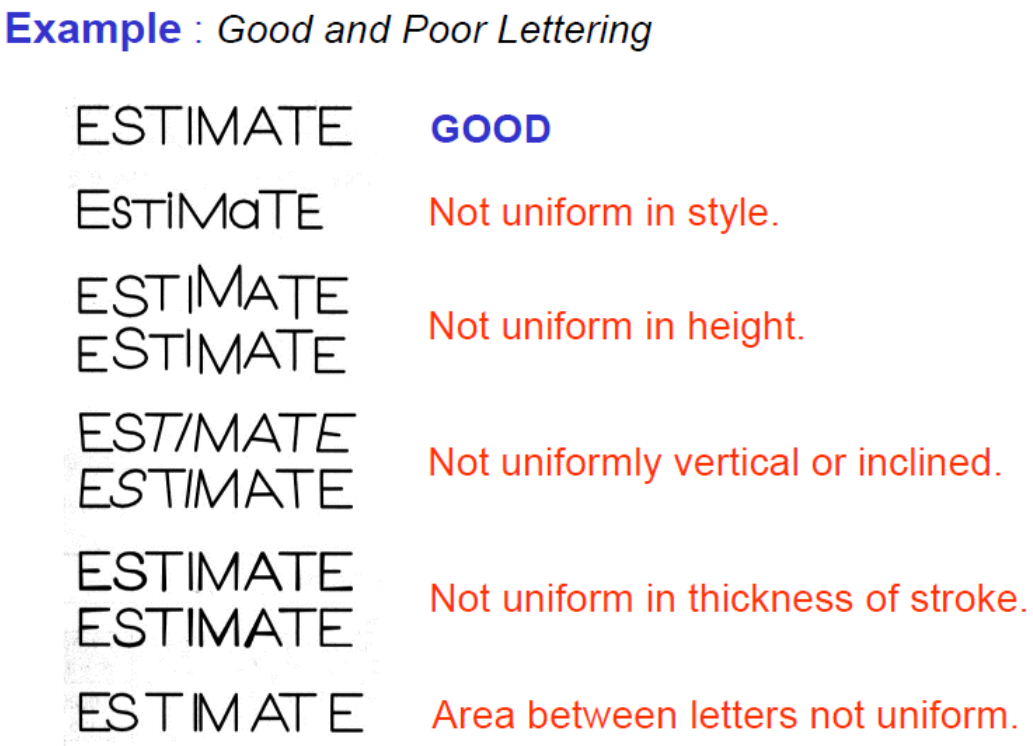
Connected Cursive Writing

The connected cursive handwriting is associated with the origin of the cursive writing method. It was used not only for its practical advantages of writing speed, but also the infrequent pen lifting that was required to accommodate the limitations of writing with the quill. The quill is fragile hence breaks easily and will spatter unless it is used correctly.

The steel dip pen followed the quill. Although they were sturdier than the quill, steel dip pens came with some limitations like spattering if you did not write fast enough.

Print Handwriting Style

Print handwriting style, also known as block letters, print script, ball and stick, or manuscript, is a gothic or sans-serif writing style where letters are individual glyphs and not conjoined.



Self-Check -4	Written Test

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

1 List the types of hand writing

A. _____

B. _____

C. _____

Score = _____

Rating: _____

Note :**Satisfactory 100%**

You can ask you teacher for the copy of the correct answers.

Name: _____ Date: _____

Short Answer Questions

Information Sheet 5 Preparing simple two dimensional drawings &sketches

5.1 Preparing simple two dimensional drawings & sketches'

- **Two dimensional drawings**

Two dimensional drawings is It supports only two dimensions in Drawing like height and width. It does not support thickness of the object.

A method of producing a number of separate 2D inter-related views, which are mutually at right angles to each other.

Even the most complex shape can be fully described.

This method, however, does not create an immediate three –dimensional visual picture of the object, as does pictorial projection

Example two dimensional drawings are

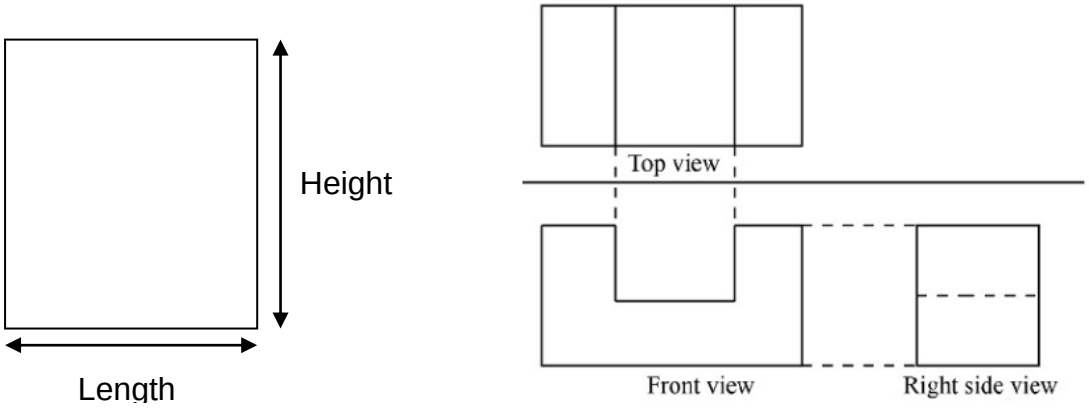


Fig 1

- ✓ Stapes two dimensional drawings &sketches

Step 1: Identify and illustrate the front view of the object from the base line and project all the lines of the drawn figure.

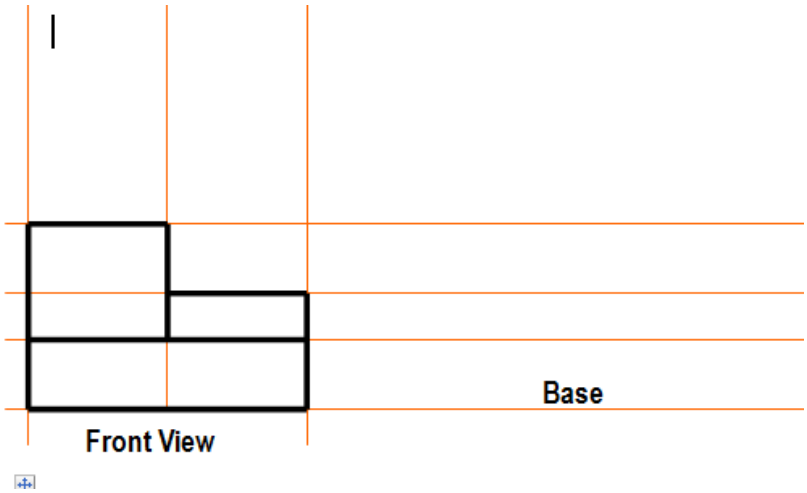


Fig 1.1

Step 2: Identify and illustrate the top view of the object leaving a space of at least five centimeters from the front view and project all the lines of the drawn figure .

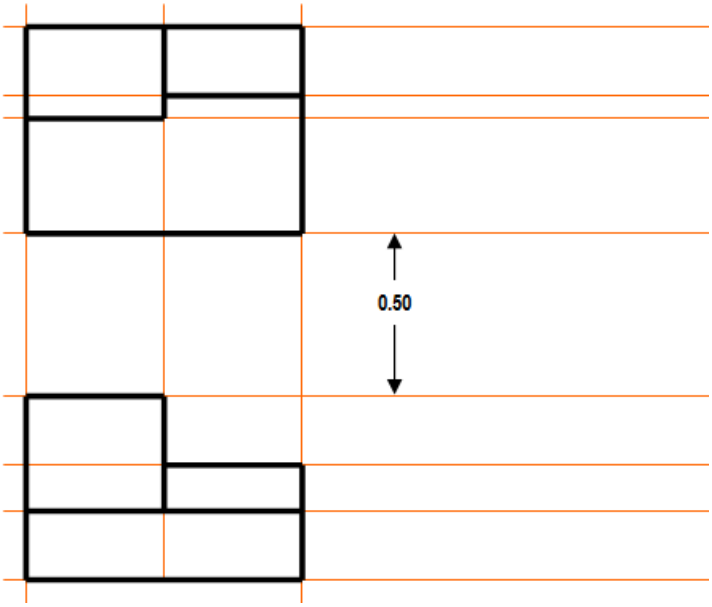


Fig 1.2

Step 3: Make a 45º angle line from the corner of the front view. Then project the lines downward to the base line starting from the corners of the intersected lines of the 45º angle. Draw the figure of the side view.

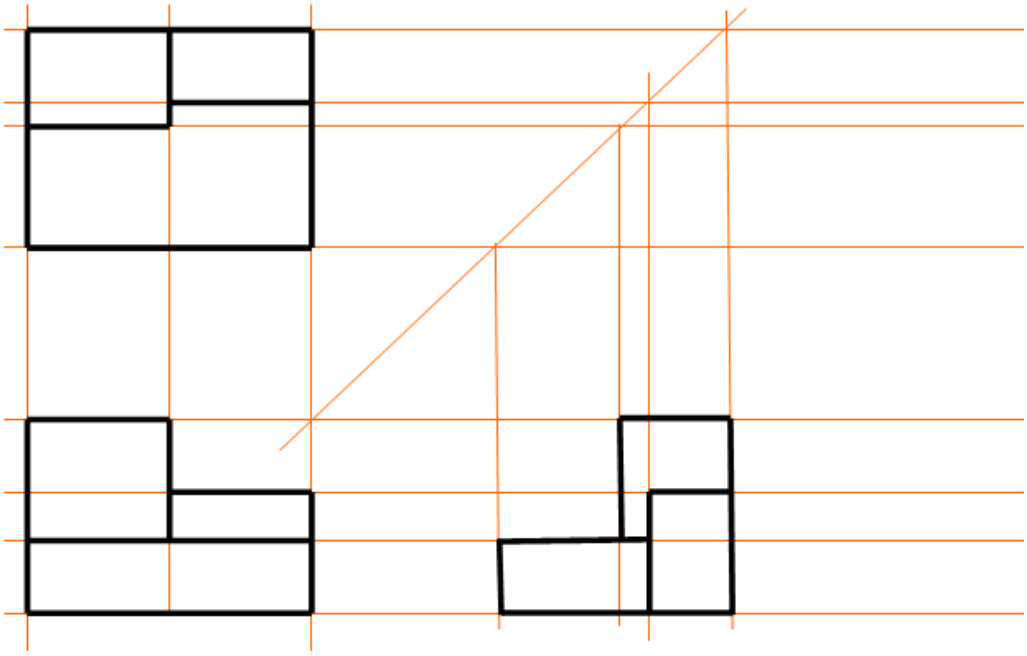


Fig 1.3

Step 4: Write all the details needed (measurements and names of the figures), write all the details outside, do not put it in the projection area then erase all the projected lines

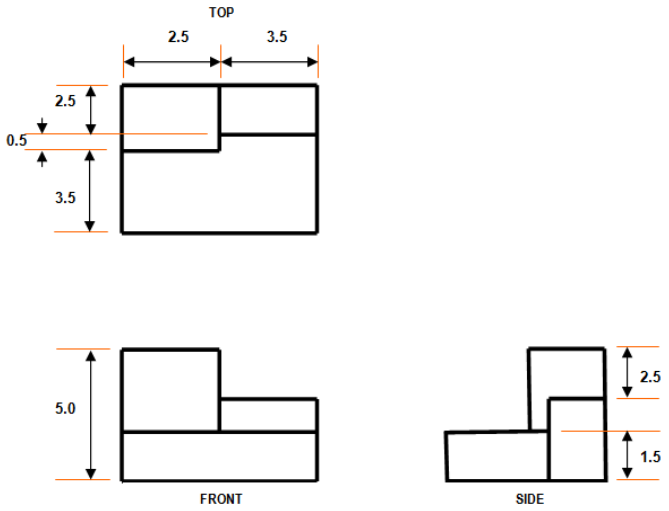


Fig 1.4

Self-Check -5	Written Test

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

1 What is two dimensions drawing : _____

2. _____ is not sport on two dimensions drawing

Score = _____

Rating: _____

Note :**Satisfactory –** **-**

You can ask you teacher for the copy of the correct answers.

Name: _____ Date: _____

Short Answer Questions

Information Sheet 6 Preparing simple three dimensional drawings &sketches

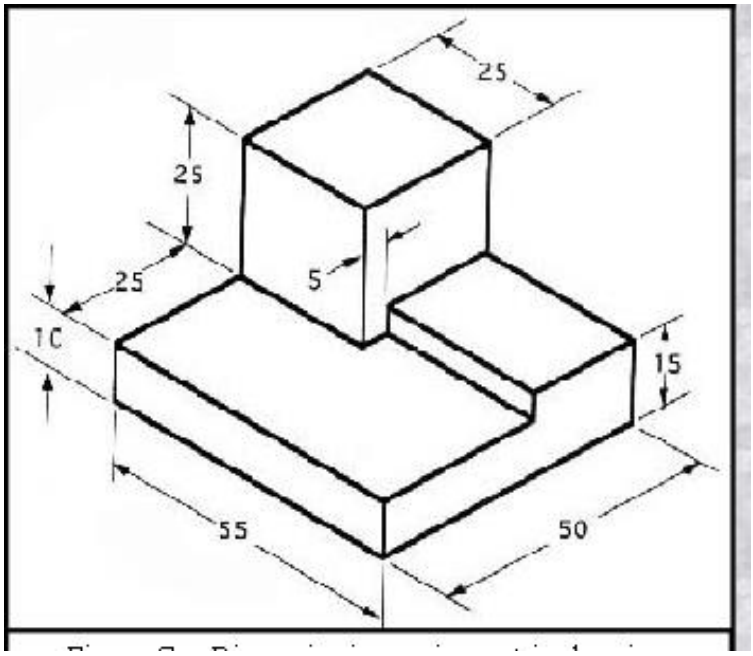
6.1 three dimensional drawings &sketches

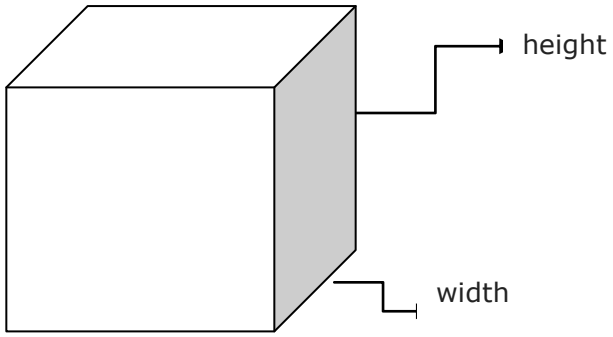
- Three dimensional drawings

Three dimensions drawing incorporates three dimensions that are length, width and height

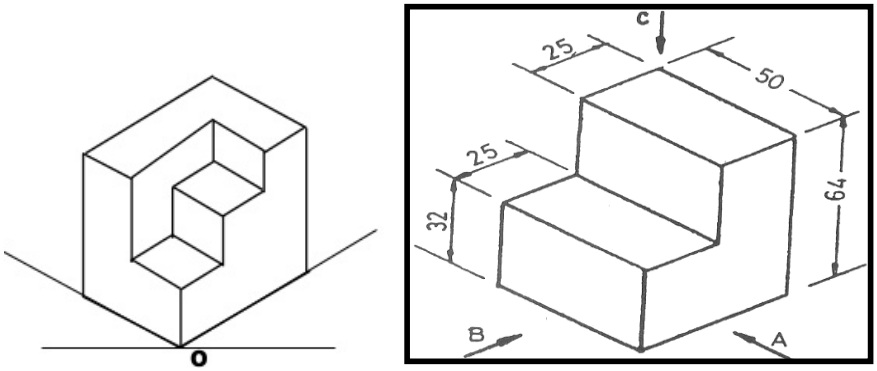
3-D projections are useful in that they provide an image that is similar to the image in the designer's mind's eye.

Example of three dimensions drawing



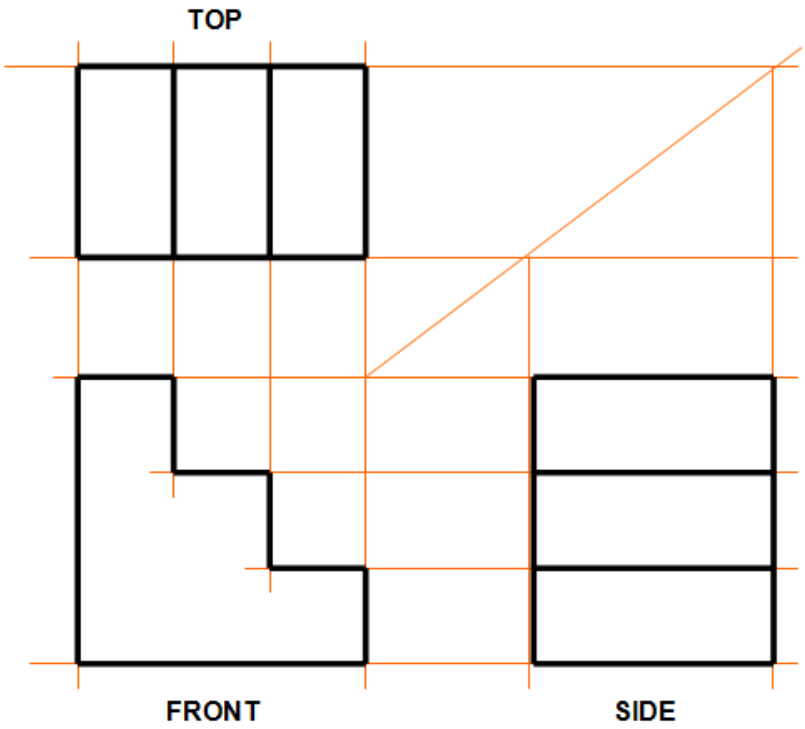


Length



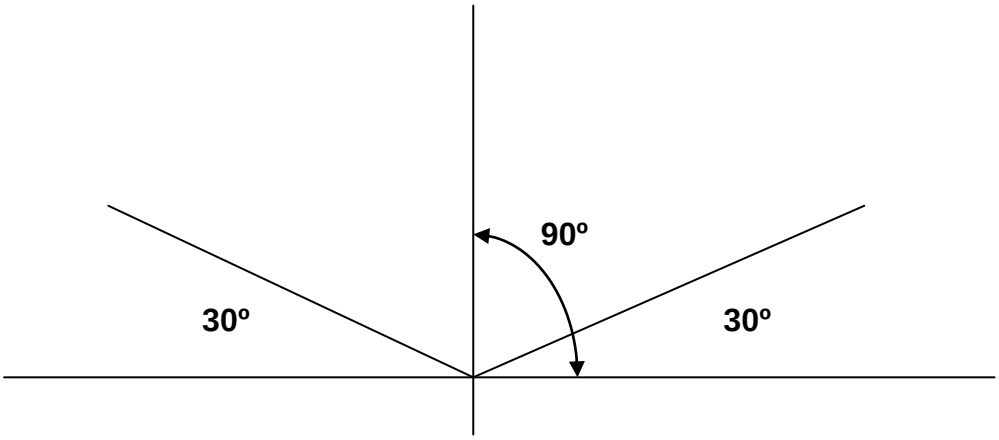
- ✓ ASSEMBLING THE PARTS

Sometimes there are given parts of an object using the orthographic illustration, your concern will be identifying the perspective figure to complete a task. An example figure below is given to find the perspective.

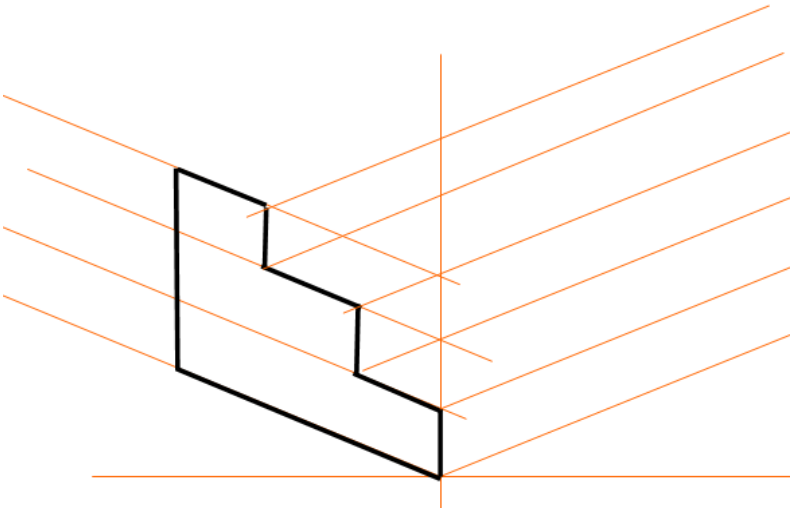


Steps in assembling the parts:

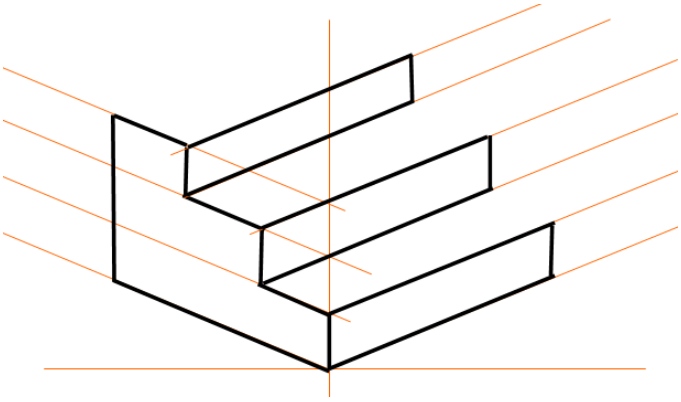
Step 1: Follow the procedures of Isometric drawing. Create first the 30º angles used in creating isometric figures.



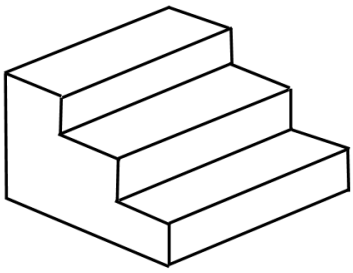
Step 2: Illustrate or draw the FRONT view first, following the given measurements. Project the side view after completing the front view



Step 3: Illustrate or draw the SIDE view according to the details or measurements given.



Step 4: Project the remaining lines that will complete the top view. After completing the figure, erase all unnecessary lines or the projection lines



Self-Check -6	Written Test

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

1 What is Three dimensions drawing : _____

2. What is the different two dimensions drawing three dimensions drawing

_____

_____

_____:

Score = _____

Rating: _____

Note :**Satisfactory –** **Unsatisfactory -**

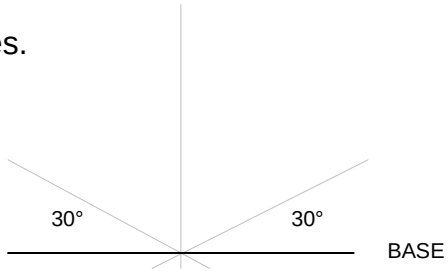
You can ask you teacher for the copy of the correct answers

Operation Sheet #1

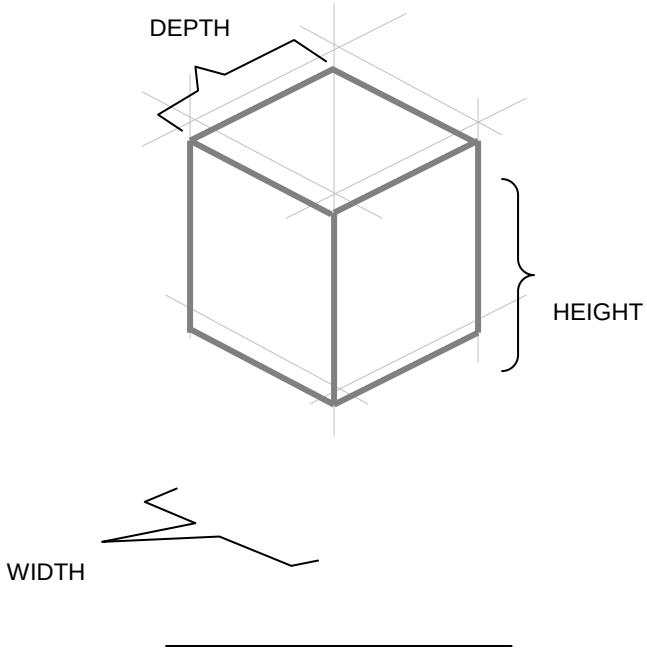
SKETCH AN ISOMETRIC CUBE

A. Guidelines for sketching an isometric cube

1. Lay out the isometric axes.

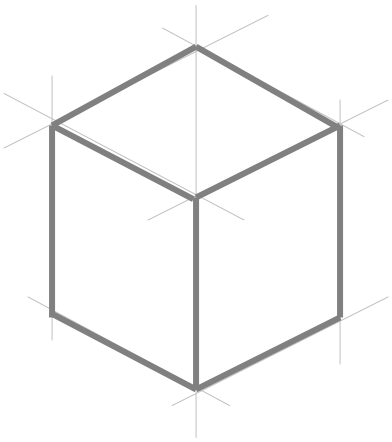


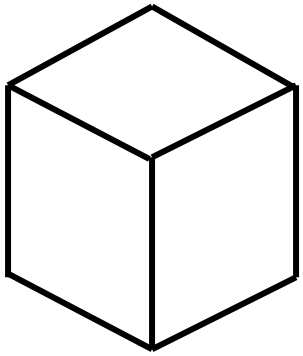
1. Sketch an isometric box so the height, width, and depth of the box, are the same as the object (cube).



3. Darken all final lines.

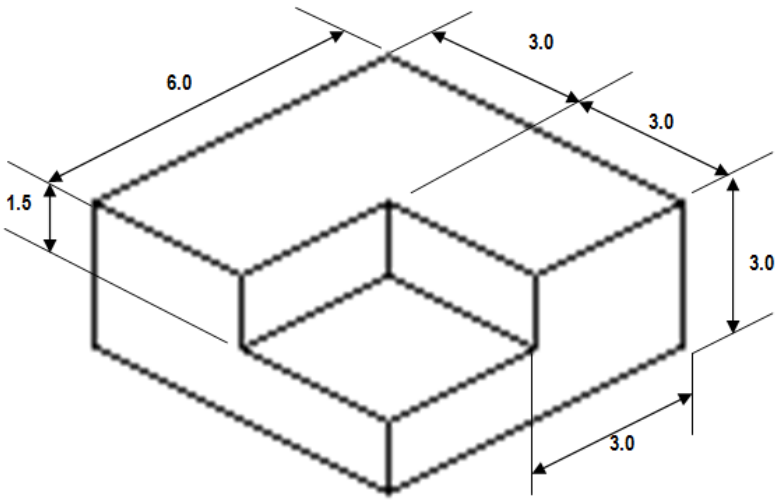
4. Erase construction lines.



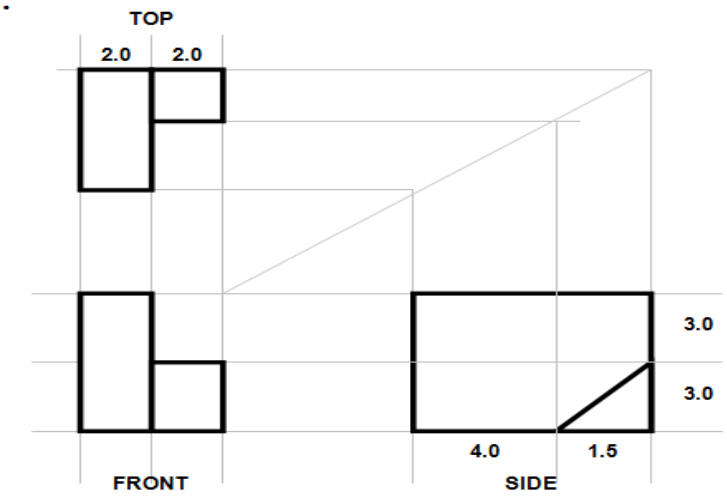


LAP Test 1	**Preparing simple three dimensional drawings &sketches**

Task 1 . Identify the 3 principal views of the object below. (TOP, FRONT and right SIDE view). All measurements are in centimeters



Task 2. Assemble the 3 principal views of the object below. (TOP,FRONT and right SIDE view). All measurements are in centimeters


TOP
2.0
2.0
3.0
3.0
4.0
1.5
FRONT
SIDE

Information Sheet 7. Preparing sectional details of simple design elements and angles

- **section drawing**

Sectional drawing' shows a view of a structure as though it had been sliced in half or cut along another imaginary plane. ...

Plan drawings are in fact a type of section, but they cut through the building on a horizontal rather than vertical plane.

Sections are used to clarify the interior construction of a part that can not be clearly described by hidden lines in exterior views.

By taking an imaginary cut through the object and removing a portion, the inside features may be seen more clearly

Section Lines: Section lines are used to indicate where the cutting plane cuts the material.

Section lines are thin lines. Section line symbols are chosen according to the material of the object Section lines are generally drawn at a 45°angle

The type of section used depends on the situation and what information needs to be conveyed.

✓ Types of sections

1. Full Section
2. Half Section
3. Offset Section

Full section, the cutting plane passes fully through the object.

Used in many cases to avoid having to dimension hidden lines.

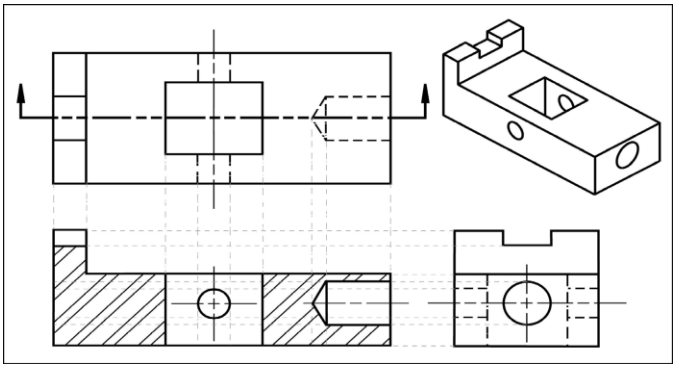


Fig 1

- ✓ **half section** exposes the interior of one half of an object while retaining the exterior of the other half.

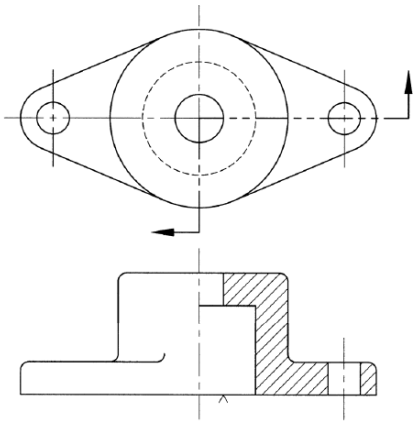


Fig 2

- **Offset section**

offset sections produced by bending the cutting plane to show features that don't lie in the same plane.

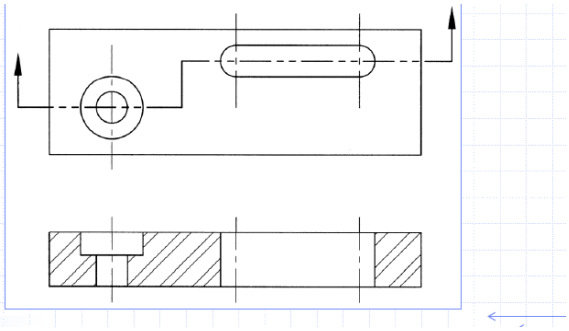


Fig 3

Self-Check -7	Written Test

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

1, What is Section ? _____

2, List the types of section -_____

_____

_____

_____

3

Score = _____

Rating: _____

***Note :*Satisfactory –**

You can ask you teacher for the copy of the correct answers.

Name: _____ Date: _____

Information Sheet 8: Adding notations and dimensions to complete drawings

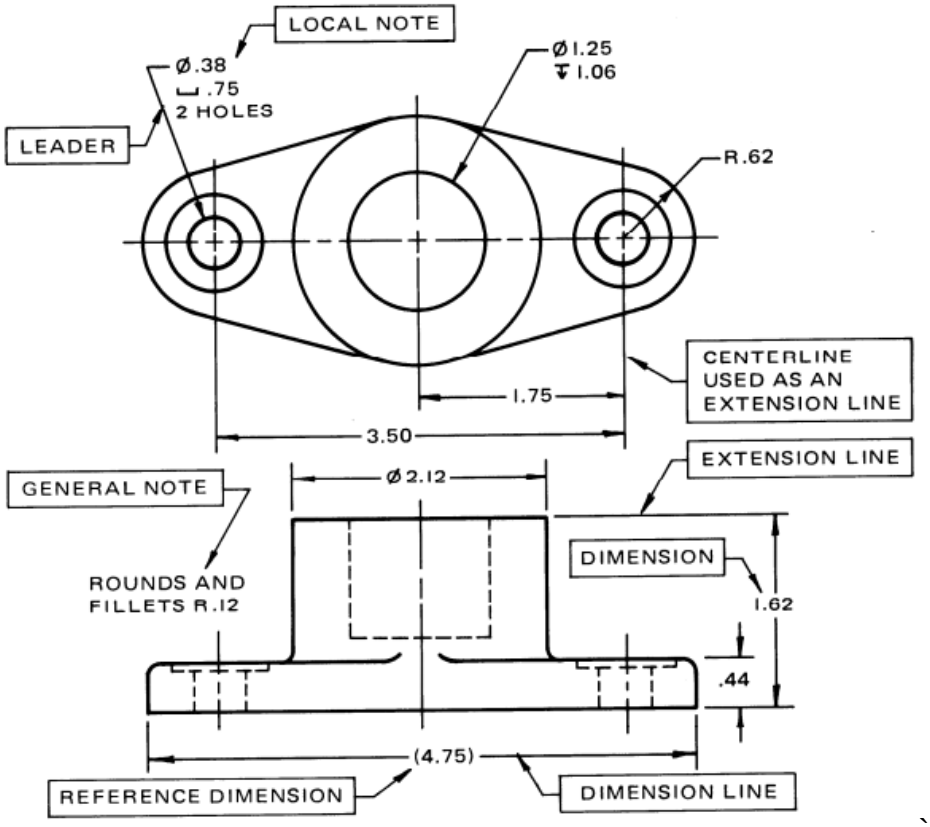
.8.1 Adding notations and dimensions to complete drawings

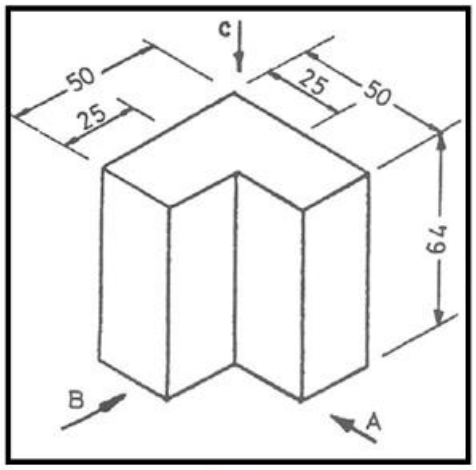
Dimensions provide the information needed to specify the *size* and *location* of every feature on the object.

A properly dimensioned drawing ensures that the part produced in the manufacturing phase matches the part asked for by designer.

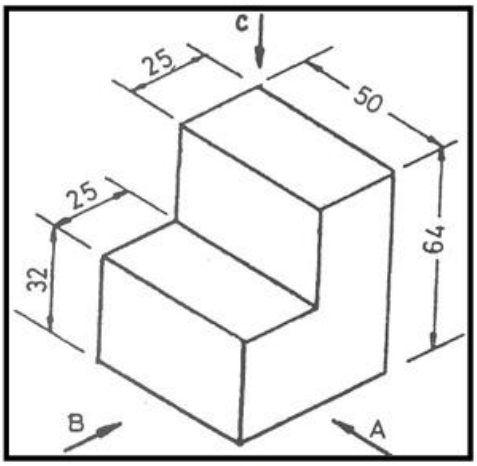
There are a few simple guidelines to be followed when dimensioning a drawing and these guidelines covers the majority of cases you will encounter.

Example

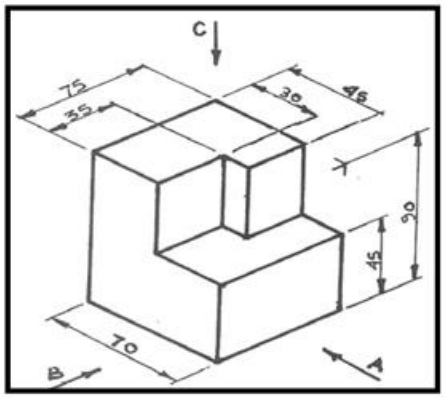


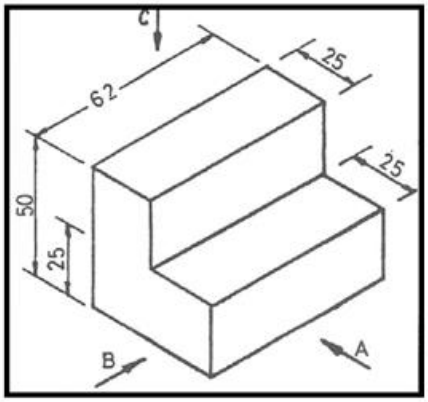

C
50
25
25
50
64
B
A

(Fig 6.7)


C
25
50
25
32
64
B
A

(Fig. 6.8)


C
75
35
30
45
90
45
70
B
A


C
62
25
25
50
25
B
A

Self-Check 8	Written Test

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

1 Dimensions provide the information needed to specify

A , _____

B,_____

Score = _____

Rating: _____

Note :**Satisfactory –** **Unsatisfactory -**

You can ask you teacher for the copy of the correct answers.

Name: _____ Date: _____

Short Answer Questions

LG # 3	LO #3- Develop specifications

Instruction sheet

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

- Identifying purpose of specifications
- Identifying suitable elements for use in specifications
- Using correct format and conventions for a furniture project
- Identifying and using different drawing scales and symbols
- Preparing title panels to enable verification that drawings
- Using common symbols and abbreviations for drawings

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Identify purpose of specifications
- Identify suitable elements for use in specifications
- Using correct format and conventions for a furniture project
- Identify and using different drawing scales and symbols
- Prepare title panels to enable verification that drawings
- Use common symbols and abbreviations for drawings

Learning Instructions:

Read the specific objectives of this Learning Guide.

1. Follow the instructions described below.
2. Read the information written in the “Information Sheets”. Try to understand what are being discussed. Ask your trainer for assistance if you have hard time understanding them.
3. Accomplish the “Self-checks” which are placed following all information sheets.
4. Ask from your trainer the key to correction (key answers) or you can request your trainer to correct your work. (You are to get the key answer only after you finished answering the Self-checks).
5. If you earned a satisfactory evaluation proceed to “Operation sheets

Information Sheet .1 Identifying purpose of specifications

1.1Identifying purpose of specifications

✓ *Specification.*

. specifications is a written document describing in detail the scope of work, materials to be used, method of installation and quality of workmanship for a parcel of work to be placed under contract.

Specifications describe the materials and workmanship required for a development. They do not include cost, quantity or draw information, and so need to be read alongside other information such as quantities, schedules and drawings.

These technical drawing and specifications vary depending upon for whom they are intended.

Designer use technical drawing and specifications prepared by draughts persons to convey their ideas and intentions to such people as manufacturing engineer, maintenance or service engineer, sales engineer, and customers.

A specification often refers to a set of documented requirements to be satisfied by a material, design, product, or service

✓ Purpose of Specifications

The purpose of a specification is to provide a description and statement of the requirements of a product, components of a product, the capability or performance of a product, and/or the service or work to be performed to create a product.

The specifications should also include descriptions and procedures for alternate materials, products or services if necessary

- Types of specifications there are there are three types of specifications

1. Functional specifications

Functional specifications define the task or desired result by focusing on what is to be achieved rather than how it is to be done. They do not describe the method of achieving the intended result.

This enables suppliers to provide solutions to defined problems.

For example, a specification for “an accessible device capable of conveying children from their school to their homes” does not limit responses to bus operators alone.

2. Performance specifications

Performance specifications define the task or desired result by focusing on what is to be achieved. For example, a specification could be written: “An accessible device is required to convey at least 30 children every afternoon of the school week from their school in a safe manner to their homes within a radius of the school of 15 kilometers.

The device shall be capable of achieving this within 1 hour. The device shall be capable of maintaining a comfortable environment for the children at an average temperature of 22 degrees Celsius in all types of weather. The device should allow equitable access by all children”. Such a specification does not limit offers to one type of transportation or one type of user.

3. Technical specifications

These are specifications that define the technical and physical characteristics and/or measurements of a product, such as physical aspects (for example, dimensions, color, surface finish), design details, material properties, energy requirements, processes, maintenance requirements and operational requirements. They are used when functional and performance characteristics are insufficient to define the requirement

Specifications mist be

- ✓ Specifications should describe the type and quality of every product required for the project.
- ✓ The specifications should describe the requirements for fabrication, erection, application, installation and finishing.
- ✓ Specifications should describe the quality of workmanship necessary for the project. This includes all phases of creation and installation starting with manufacturing, fabrication, and application, through installation, finishing and adjustment.
- ✓ Specifications should include any necessary codes and standards applicable to the project.

The specifications should also include descriptions and procedures for alternate materials, products or services if necessary

- ✓ Bonds and Certificates

Self-Check1	Written Test

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

1. What is Specification

_____

_____

_____

2. Write the types of specification

_____

_____

_____

_____

Score = _____

Rating: _____

***Note :*Satisfactory –** **Unsatisfactory -**

You can ask you teacher for the copy of the correct answers.

Name: _____ Date: _____

Short Answer Questions

Information Sheet 2 Identifying suitable elements for use in specifications

2.1 Identifying suitable elements for use in specifications

Elements of specification

The main element represents the main content of the body of a document or application. The main content area consists of content that is directly related to or expands upon the central topic of a document or central functionality of an application. Authors must not include more than one main element in a document.

Contents of specification

- ✓ Title Page
- ✓ Certifications Page
- ✓ Table of Contents
- ✓ Guide to Use of the Project Manual (used by many specifies)
- ✓ Bidding Requirements
- ✓ Bid Solicitation: Advertisement/Invitation to Bid
- ✓ Instructions to Bidders
- ✓ Information Available to Bidders
- ✓ Bid Forms and Supplements
- ✓ Contracting Requirements
- ✓ Agreement
- ✓ General Conditions of the Contract
- ✓ Supplementary Conditions of the Contract

Self-Check2	Written Test

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

1. What is element of specification

_____

_____

_____

2, write the content of specification

_____

_____

_____

Score = _____

Rating: _____

***Note :*Satisfactory –** **Unsatisfactory -**

You can ask you teacher for the copy of the correct answers.

Name: _____ Date: _____

Short Answer Questions

Information Sheet 3 Using correct format and conventions for a furniture project

3.1 Using correct format and conventions for a furniture project

- Furniture Project

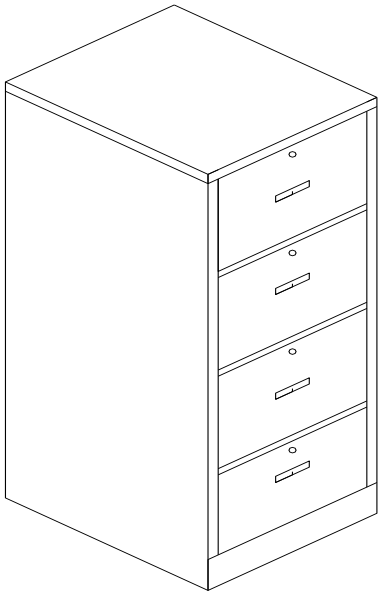
  project is a series of tasks that need to be completed in order to reach a specific outcome.

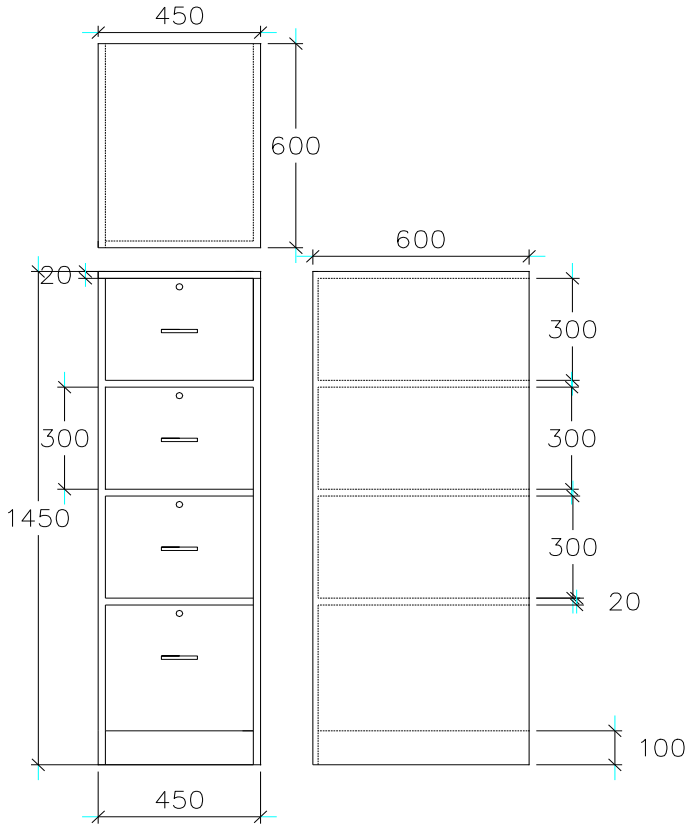
  A project can also be defined as a set of inputs and outputs required to achieve a particular goal.

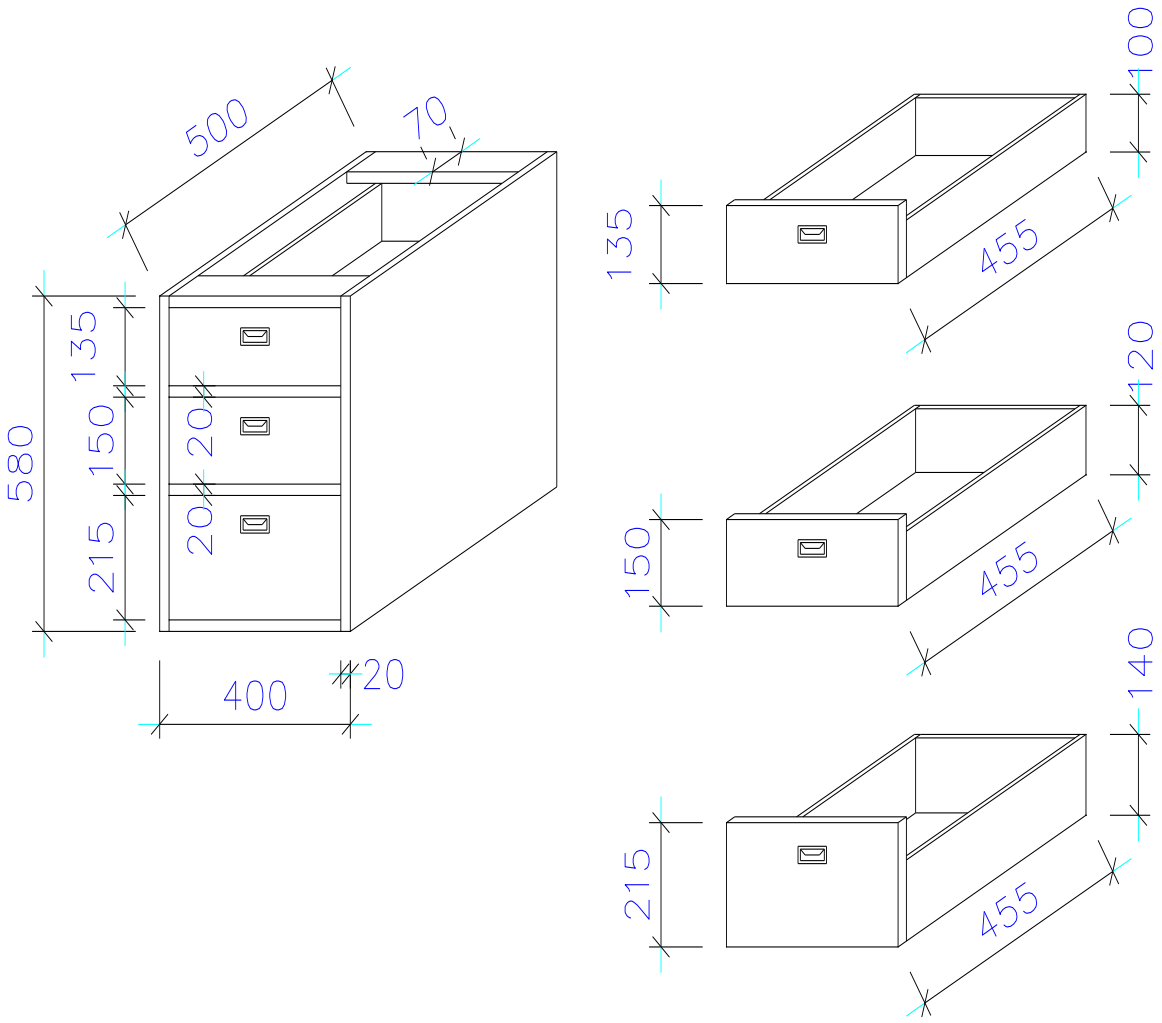
  Projects can range from simple to complex and can be managed by one person or a hundred.

- **Types of Projects:**

1. Manufacturing Projects:
2. Construction Projects:
3. Management Projects:
4. Research Projects:




450
600
600
20
300
300
300
1450
300
20
100
450


500
70
580
135
150
20
20
215
400
20
100
135
455
120
150
455
140
215
455

Self-Check3	Written Test

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

Short answer

1. Write the types of project

_____

_____

_____

_____

Score = _____

Rating: _____

***Note :*Satisfactory –** **Unsatisfactory -**

You can ask you teacher for the copy of the correct answers.

Name: _____ Date: _____

Short Answer Questions

Information Sheet 4 Identifying and using different drawing scales and symbols

4.1 Identifying and using different drawing scales and symbols

- What scale

The scale is the ratio between the size represented on the drawing and the true size of the object

The scale is shown as the length in the drawing, then a colon (":"), then the matching length on the real thing.

drawing that shows a real object with accurate sizes reduced or enlarged by a certain amount (called the scale).

Scaling is used to either:

- reduce the drawing in size so that it will fit onto the page, or
- enlarge the drawing in size so that all required details are clearly visible.

Drawings can be scaled up or down using either a calculator or a scale rule.

Example 1: Scaling down

- A 50mm line is to be drawn at a scale of 1:5 (ie 5 times less than its original size). The measurement 50mm is divided by 5 to give 10mm. A 10mm line is drawn.
- A 50mm line is to be drawn at a scale of 1:2. The measurement 50mm is divided by 2 to give 25mm. A 25mm line is drawn.

Example 2: Scaling up

- A 50mm line is to be drawn at a scale of 5:1 (ie 5 times more than its original size). The measurement 50mm is multiplied by 5 to give 250mm. A 250mm line is drawn.

- A 50mm line is to be drawn at a scale of 2:1. The measurement 50mm is multiplied by 2 to give 100mm. A 100mm line is drawn.

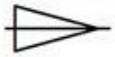
Scales

Drawing Scale	Measuring Scale
1:20	1cm = 0.2m
1:25	1cm = 0.25m
1:50	1cm = 0.5m
1:100	1cm = 1m
1:200	1cm = 2m
1:500	1cm = 5m
1:1000	1cm = 10m
1:1250	1cm = 12.5m
1:2500	1cm =25m
1:5000	1cm = 50m
1:10000	1cm = 100m

- Symbol

Symbols are used on electrical drawings to simplify the drafting work for both the drafters and the workers interpreting the drawings. It should be noted that electrical symbols are not standardized throughout the industry, which is one reason why electrical drawings typically have a symbol legend or list.

Symbol	Meaning
Ⓛ	LMC – Least Material Condition
Ⓜ	MMC – Maximum Material Condition
Ⓣ	Tangent Plane
Ⓟ	Projected Tolerance Zone
Ⓕ	Free State
Ø	Diameter
R	Radius
SR	Spherical Radius
SØ	Spherical Diameter
CR	Controlled Radius
ST	Statistical Tolerance
77	Basic Dimension
(77)	Reference Dimension
5X	Places

Symbol	Meaning
	Dimension Origin
	Counterbore
	Countersink
	Depth
	All Around
	Between
	Target Point
	Conical Taper
	Slope
	Square

Type of Tolerance	Geometric Characteristics	Symbol
Form	STRAIGHTNESS	
	FLATNESS	
	CIRCULARITY	
	CYLINDRICITY	
Profile	PROFILE OF A LINE	
	PROFILE OF A SURFACE	
Orientation	ANGULARITY	
	PERPENDICULARITY	
	PARALLELISM	
Location	POSITION	
	CONCENTRICITY	
	SYMMETRY	
Runout	CIRCULAR RUNOUT	
	TOTAL RUNOUT	

Self-Check4	Written Test

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

1. What is Scale :

_____

_____

Score = _____

Rating: _____

Note :**Satisfactory –** **Unsatisfactory -**

You can ask you teacher for the copy of the correct answers.

Name: _____ Date: _____

Short Answer Questions

Information Sheet 5 : Preparing title panels to enable verification that drawings

. Preparing title panels to enable verification that drawings

- What is title Panel

Title Panel is a compactly-arranged area of the drawing sheet that contains information that is more or less common to all of the sheets for a specific project, such as the project name, designer name, client name, site address, issue date, author, checker, sheet number, scale, etc.

A title block is a template for a sheet and generally includes a border for the page and information about the design firm, such as its name, address, and logo. The title block can also display information about the project, client, and individual sheets, including issue dates and revision information

PAPER LAY OUT

The layout of the paper for drawing purpose is very necessary

- The layout shows the areas to be covered through our paper
- It shows the drawing area, border line, page border and the title block

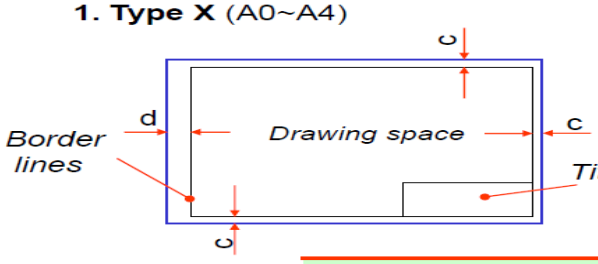
- TITLE BLOCK

- ✓ Information center for our drawing
- ✓ It is composed of
- ✓ Drawers name
- ✓ Checkers name
- ✓ Date that the drawing prepared
- ✓ Scale of the drawing
- ✓ Type of projection
- ✓ Company
- ✓ Title of the drawing

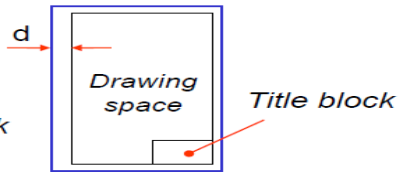
- ✓ Drawing number
- ✓ And other needed information required by the company

Orientation of drawing sheet

1. Type X (A0~A4)



2. Type Y (A4 only)



Sheet size	c (min)	d (min)
A4	10	25
A3	10	25
A2	10	25
A1	20	25
A0	20	25

Self-Check5	Written Test

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

1. What is title Panel?

_____

_____

2 Elements of tille block include

_____

_____

_____

_____

_____

Answer Sheet

Score = _____

Name: _____ Date: _____

Information Sheet 6: Using common symbols and abbreviations for drawings

6.1 Using common symbols and abbreviations for drawings

- Symbols drawing

Symbols are the shorthand of drawing. They graphically portray the characteristics of a component with a minimal amount of drawing

drawing abbreviations and symbols are used to communicate and detail the characteristics of an engineering drawing. This list includes abbreviations common to the vocabulary of people who work with engineering drawings in the manufacture and inspection of parts and assemblies.

Technical standards exist to provide glossaries of abbreviations, acronyms, and symbols that may be found on engineering drawings

Geometric Symbols:

Type of Tolerance	Geometric Characteristics	Symbol
Form	STRAIGHTNESS	
	FLATNESS	
	CIRCULARITY	
	CYLINDRICITY	
Profile	PROFILE OF A LINE	
	PROFILE OF A SURFACE	
Orientation	ANGULARITY	
	PERPENDICULARITY	
	PARALLELISM	
Location	POSITION	
	CONCENTRICITY	
	SYMMETRY	
Runout	CIRCULAR RUNOUT	
	TOTAL RUNOUT	

The symbols that are used to specify the type of geometric control

SYMBOL	CHARACTERISTICS	CATEGORY
	Straightness	Form
	Flatness	
	Circulatity	
	Cylindricity	
	Profile of a Line	Profile
	Profile of Surface	
	Angularity	Orientation
	Perpendicularity	
	Parallelism	
	Position	Location
	Concentricity	
	Symmetry	
	Circular Runout	Runout
	Total Runout	

Self-Check 6	Written Test

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

Score = _____

Rating: _____

Note :**Satisfactory –** **Unsatisfactory -**

You can ask you teacher for the copy of the correct answers.

Name: _____ Date: _____

Short Answer Questions

L #4	LO #4- Complete drawing

Instruction sheet

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

- Checking angles, shapes and dimensions against specifications and samples
- Adjusting drawings within scope of authority
- Checking drawing with workplace documentation requirements

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Check angles, shapes and dimensions against specifications and samples
- Adjust drawings within scope of authority
- Check drawing with workplace documentation requirements

Learning Instructions:

Read the specific objectives of this Learning Guide.

1. Follow the instructions described below.
2. Read the information written in the “Information Sheets”. Try to understand what are being discussed. Ask your trainer for assistance if you have hard time understanding them.
3. Accomplish the “Self-checks” which are placed following all information sheets.
4. Ask from your trainer the key to correction (key answers) or you can request your trainer to correct your work. (You are to get the key answer only after you finished answering the Self-checks).
5. If you earned a satisfactory evaluation proceed to “Operation sheets

Information Sheet 1 :Checking angles, shapes and dimensions against specifications and samples

Checking angles, shapes and dimensions against specifications and samples

- Checking angles,

Protractor Protractors is a tool for measuring the size of an angle.

As we know, we can observe angles all around us of various degrees ranging from 0 to 360. The measurement of angles is necessary also to measure the heights and lengths of certain locations. Here are the three basic devices used to measure angles.

- Devices for Measuring Angles

✓ Protractor

The most common device to measure angles is the protractor. It is used to measure small angles and sometimes big ones too. It is a very useful device in construction engineering and architecture. The protractor that is commonly found in almost all stationery stores is a half circle with marked degrees from 0 to 180. There are many types of protractors that are found, and according to their needs, they are altered with assets. The simple ones measure small angles till 180 and 90 degrees, and these are used by students in schools and colleges. The full circle and round protractors have 360 degrees, which are more useful to professionals. Others are the Bevel protractors, which have swinging arms and are faster in measurement. Therefore, these protractors are known as mechanical protractors and are very efficient in professions, which need quick calculations.

✓ Hand Squares

Hand squares and set squares are also some of the devices used to measure angles in geometry. These are used in measurements of larger angles, as they have degrees from 0 to 360. In cases where there is construction of stairs, frames, and rafters, framing

squares are used to measure right angles as they are usually L-shaped devices. They are also used if you want to know how to measure square feet. There are other types of hand squares which have metal blades to them and are used to measure both 45 and 90 degree angles very efficiently. Another device known as the “carpenter’s square” is also very well-known and is actually a metal triangle. Other than these, the set squares which are used by students to study their academic geometry in mathematics are also great devices.

- ✓ Compass

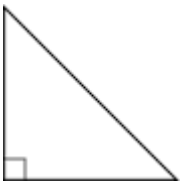
A compass in geometry is a hinged set of arms, wherein one arm has a pointed end and the other holds a pencil. It is used to measure and construct angles in a very easy way because it can rotate into a complete 360 degrees of a circle. When you have a circle in which you want to create angles, a compass helps measure them as you can simply keep one end in any particular point and with the pencil end, measure the distance. When you have the distance, all you have to do is, place the compass on a square or protractor and measure the angles. This is very important to measure the area of the circle too on the paper. A protractor is also a type of compass but, it has only 180 degrees whereas a compass has 360 degrees rotation.

There are some more devices used for measuring angles, and they are:

- Navigational Plotter
- The Sextant
- Miter Saw
- Goniometry
- Inclinometer

A right triangle is a triangle in which one of the angles is a 90◦ angle. The "square" at the vertex of the angle indicates that it is 90 degrees. A triangle can be determined to be a right triangle if the side lengths are known. If the lengths satisfy the Pythagorean Theorem (a2+b2=c2) then it is a right triangle

A right triangle is a triangle in which one of the angles is a 90◦ angle.



The "square" at the vertex of the angle indicates that it is 90 degrees.

A triangle can be determined to be a right triangle if the side lengths are known. If the lengths satisfy the Pythagorean Theorem (a2+b2=c2) then it is a right triangle.

For example, if it is known that a triangle has side lengths of 11, 60, and 61, we can show that the sides satisfy the Pythagorean Theorem:112+602?=612121+3600?=37213721=3721

The side lengths 3, 8, and 10 WOULD NOT be side lengths of a right triangle:32+102?=2029+100?=400109≠400

Self-Check1	Written Test

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

1. List Devices for Measuring Angles
   1._____
   2,_____
   3,_____

Score = _____

Rating: _____

Note :**Satisfactory –** **Unsatisfactory -**

You can ask you teacher for the copy of the correct answers.

Name: _____ Date: _____

Short Answer Questions

Information Sheet 2 Adjusting drawings within scope of authority

Adjusting drawings within scope of authority

authority: for project managers this typically refers to the authority earned by displaying integrity, fairness and respect to others. This power enables project managers to gain the confidence of their teams even in the absence of formal/reward or penalty power.

Authority in project management is the power that gives a project manager the ability to act in the name of the project sponsor executive or on behalf of the organization.[1]

There are several different types of authority that project managers

- the project manager's authority enforced through the project charter or some other organizational means (organizational level, reporting relationship, etc).
- Coercive authority (also referred to as penalty authority): refers to motivating staff by threat of punishment such as fear of losing a bonus, assigning unappealing work, losing status, issuing a formal reprimand or possibly even losing their job.
- Expert authority: achieved through formal mechanisms such as certifications or education. Project Managers have several formal certifications available from global certification bodies such as the Project Management Professional (PMP)[3] or Prince2 Foundation. In addition, degrees or diplomas from universities or educational institutes can further confer expertise on a project manager. Finally, validated experience in a relative field and industry can associate a project manager as an expert in their field.
- Referent authority: for project managers this typically refers to the authority earned by displaying integrity, fairness and respect to others. This power enables project managers to gain the confidence of their teams even in the absence of formal/reward or penalty power. Referent authority is also associated with being accessible or approachable and possessing the necessary charisma to enable team members to share their ideas, feelings and concerns. Another perspective on

referent authority is provided by French and Raven[4] based on the groups or affiliations that the project manager belongs to, this can either be positive or negative.

- Reward authority: refers to positive reinforcement and the ability to award something of value.

Due to the temporary nature of projects, most project managers will rely primarily on expert and referent authority.

Self-Check1	Written Test

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

1.- What is Authority in project management?

_____

_____

2, different types of authority that project managers

1,_____

2,_____

3,_____

Answer Sheet

Score = _____

Name: _____ Date: _____

Information Sheet 3. Checking drawing with workplace documentation requirements

Checking drawing with workplace documentation requirements

Effective checklist

- ✓ Pulling random samples for inspection. ...
- ✓ Checking the product against specifications. ...
- ✓ Verifying packaging requirements. ...
- ✓ Classifying and reporting quality defects. ...
- ✓ Conducting on-site testing

First off to produce production drawings manually you will need access to specific work area where drawing can be done. Sometimes this can be a work area which has been set up especially foe drawing.

Where appropriate, the materials, the materials from which the object should be made and can be identified from sketch.

This will allow the engineer to:-

- make accurate decisions
- follow instruction carefully
- complete the task in reasonable time

Check drawing with workplace documentation requirements

The primary role or function of working drawings is to convert design data into construction information and to clearly communicate that information to building industry, code officials, product manufacturers, suppliers and fabricators.

- ✓ Read and Interpret Working Drawings
- ✓ Read and Interpret Working Drawings (sketches)
- ✓ Prepare cutting list according to the given dimension
- ✓ Identify tools and equipment needed to the project
- ✓

Select Materials for Furniture Production

- ✓ Lay out & measure component parts
- ✓ Prepare parts by using proper machines & hand tools
- ✓ Cut the parts with its final length & width
- ✓ Assembling all part of object or project

Self-Check1	Written Test

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

1. List Effective checklist

1

2

3

4

5

Answer Sheet

Score = _____

Name: _____ Date: _____

	Participant Name			
1	Mebratu W/Yuhannis	BSC Wood Work Technology	Oromia	mebrtuw4@gmail.com Tel. 0913162766
2	Kedir Nejat	BSC in Wood Science and Technology	Oromia	kedirmohammedn@gmail.com Tel. 0921125276
3	Tsegayee Biruu	BSC in Wood Science and Technology	Oromia	Tel. 0921822866

Acknowledgement

The group wishes to extend thanks and appreciation to the TVET experts and government agencies who donated their time and expertise to the develop of this (TTLM) for the TVET Program

This (TTLM) was developed on December. 2020 at the Bishoftu in Bin International Hotel Oromia