

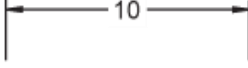



Drawing

Mechanical Drawing Interpretation

A.  Diameter	B.  Countersink	C.  Dimension	D.  Centre lines
--	---	--	--

When marking out a series of holes on a piece of metal, for increased accuracy, measurements are made from the datum.

Three basic pieces of information that are required on a title block are:

Drawing title, Version number, Scale used in the drawing

Drilling, Tapping, Threading, and Joining

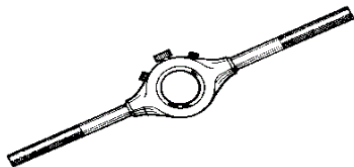
Pilot holes are normally drilled before drilling large holes

The standard type of thread used with nuts and bolts is the right hand thread

Hand taps are usually provided in sets of three to allow progressive tapping of blind holes








Die



Stock

Tap set is the appropriate tool for cutting internal threads in a drilled hole in metallic or non-metallic components.

Stock and Die is the appropriate tool for cutting external threads on a metallic or non-metallic shaft?

	Pan Head
	Metric Hex Bolt & Nut
	Countersunk Rib Head
	Wafer Head Self-Drilling Screw
	Hexagon Head (with or without seals)

"Manual metal arc", "MIG" and "TIG" are examples of welding methods

When using self-tapping screws to fix a switchboard to sheet metal, the pre-drilled hole in the sheet frame should be smaller than the shank of the screw

<p>The process which involves the union of two pieces of metal by melting them together.</p>	<p style="text-align: center; color: red;">Welding</p>
<p>The process which involves heating a lower melting point material between two metal components to form a bond between them, without damaging the components.</p>	<p style="text-align: center; color: red;">Soldering</p>

Low Tolerance Measurement

- 1. Tolerance in electrotechnology work is the allowable deviation from the nominal or specified value

If it is required to make 50 mm long pieces of threaded rod with +/- 0.1 mm tolerance, what would be the maximum and minimum length of acceptable parts?



Maximum length: 50.1mm

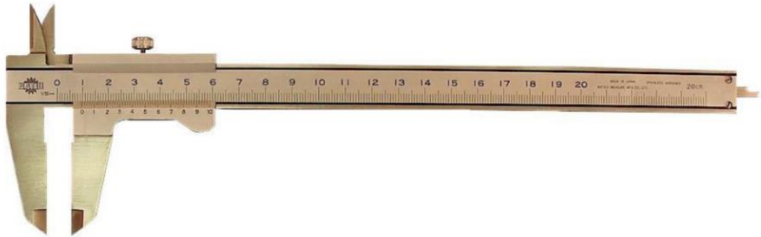
Minimum length: 49.9mm

Write the measurement indicated in the following micrometer scales.

Table 1 Short answer

Micrometer scale	Measurement
	<p>9.05mm</p>
	<p>5.78 mm</p>

Vernier callipers, as shown below, can measure: (There are 3 correct answers. Mark **all** that apply)



- a) the outside diameter of a work piece
- b) the inside diameter of a hole
- c) the depth of a hole

Write the measurements indicated by the Vernier scales given below.

Table 3 Short answer

Vernier scale	Measurement
	<p>15.00 mm</p>
	<p>18.40 mm</p>

Dismantling and Assembly Techniques

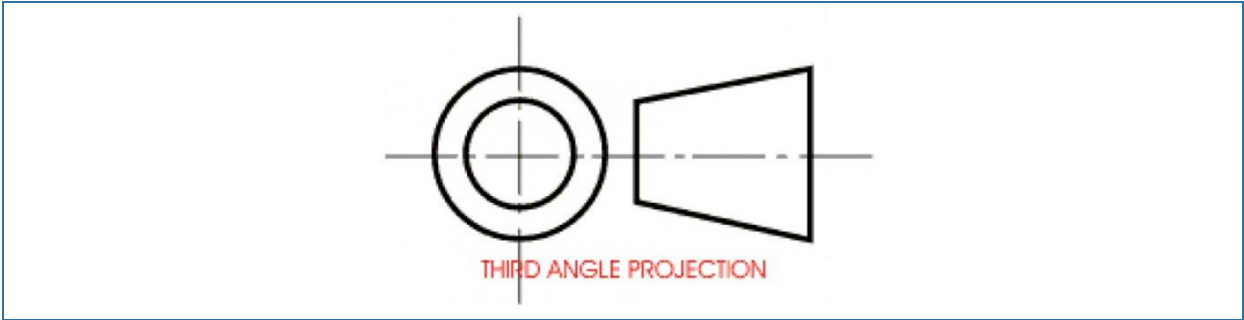
Pullers provide a mechanical advantage for the extraction, without damage, of seated ball and roller bearings and gears.

Mark **all** the tasks that are required before undertaking any disassembly work:

- a) carry out a full risk assessment of the required tasks.
- b) clean and clear the workspace
- c) make sure that all power connections are fully disconnected from the appliance
- d) safely discharge any capacitors

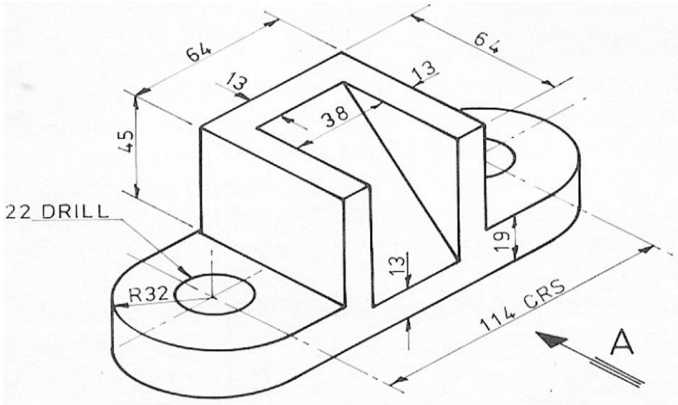
Drawing and Short Answers

1. Draw the projection symbol for third angle projection.

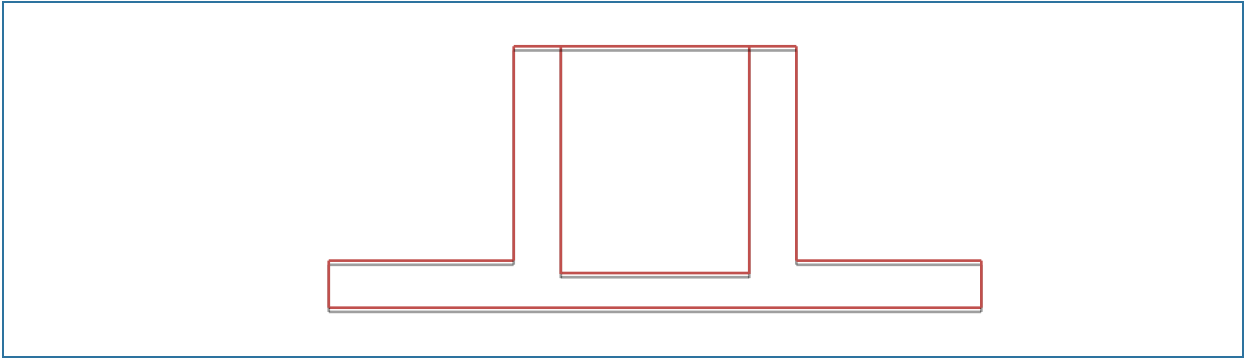


Use the isometric view shown below of the “bracket” to produce a freehand third angle projection; orthogonal sketch for following two views.

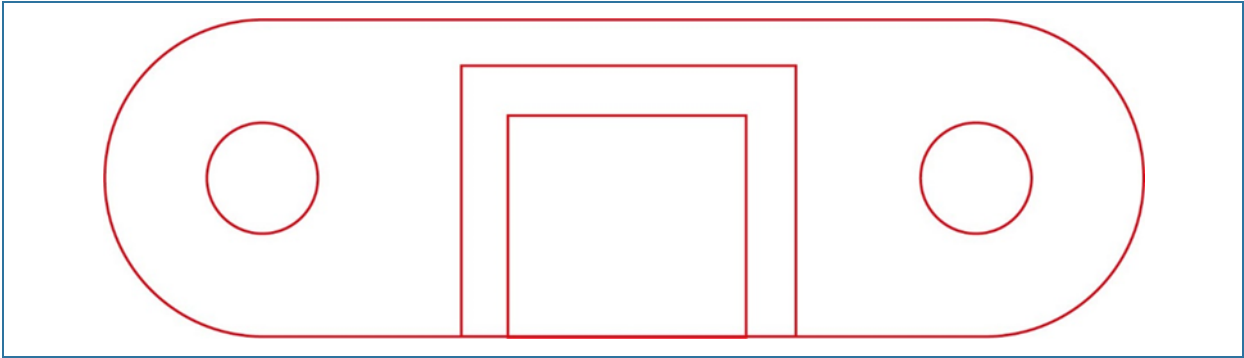
- a) Draw a front view from “A”.
- b) Draw a top view.



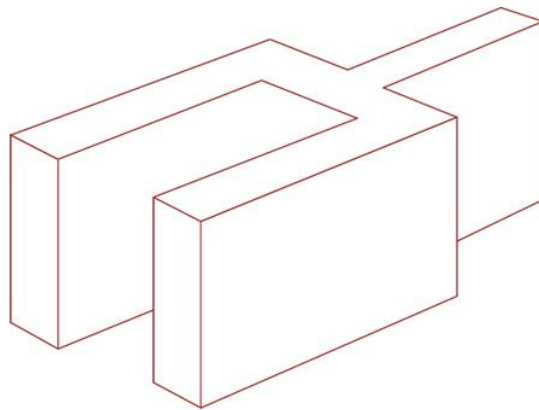
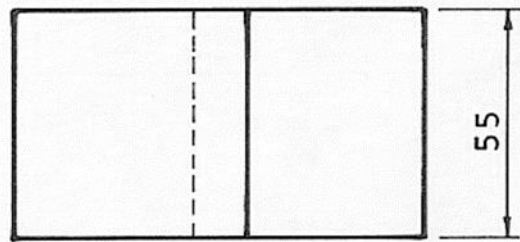
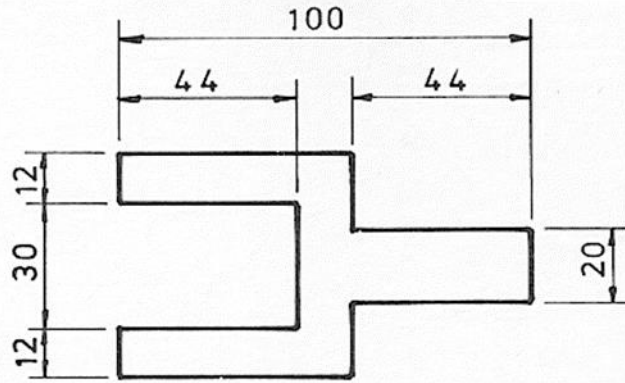
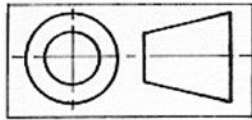
a) Front View from "A"



b) Top View



2. Use the orthogonal drawing shown below, to produce a freehand isometric projection sketch of the "connecting piece". The receding lines in your isometric sketch should be the correct angle to the horizontal.



Before starting an activity at work, it is important to take time for planning. State three benefits of planning prior to commencement of an activity.

- To ensure required resources and personnel are available to complete the task/s.
- To ensure the task can be completed ensuring safety of workers and equipment involved.
- To ensure the task can be completed within the available time.
- To ensure the task can be completed within the estimated budget.

Two common **metallic** materials (including sheet metal) used in the electrotechnology industry.

- Sheet metal – Zincalume, Stainless steel, galvanised steel, black steel, aluminium, copper
- Copper tube or pipe, copper wire
- Steel tube or pipe
- Steel bar or square stock
- Plastic/PVC tube or conduit or ducting
- Polystyrene sheet/panel
- Thermoplastic sheathing

Why is it necessary to take overall measurements of materials received for a job prior to starting the marking out process?

To ensure that the material received is the correct size for the job and that the quantity received is sufficient to complete the job

One of the key factors to reduce waste in sheet metal fabrication is improving the usage of the material. Give three examples of ways you can minimise the amount of materials wasted.

- Planning fabrication so as to cut in an efficient pattern to avoid wastage
- Checking measurements before cutting
- Using the trimmed sections to produce additional parts
- Batching parts together that have similar straight edges or radii
- Using the 'hole' of a part to create additional items

the power tool shown below. Give two risks associated with its use and their control measures is
bench mounted drill press

Two risks associated with its use	Control measures:
<p>Accept any two reasonable responses eg. Gloves caught in rotating tools</p>	<p>No gloves worn while using the press</p>
<p>Sharp hot swarf flying off</p>	<p>Wear goggles and appropriate protective clothing.</p>

Name two types of drill bits typically used in the electrotechnology industry, and a typical use for each.

Twist bit/twist drill; speed bore/spade bit; holesaw; tungsten tip/masonry bit; auger

Three taps that make up the basic thread cutting "tap set"

- Taper
- Intermediate
- Plug

Insulated handles on pliers, screwdrivers, side cutters and other tools used for electrical work

To provide additional protection from a possible electric shock, if the user accidentally or unintentionally uses them on live components.

Three WHS precautions that must be taken when soft soldering two or more components together.

- Make sure a solder fume extractor is correctly placed near the work area.
- Ensure there is sufficient ventilation around the work area.
- Wear eye protection.
- Check the soldering iron and the station, including leads for damage.
- Make sure the soldering iron is set to the recommended temperature.

The difference between soft soldering and hard (silver or Tobin bronze) brazing.

Soldering is the process of joining two types of metals by melting a filler that bonds the two pieces together at lower temperatures (below 450 °C).

Brazing is the process of joining two types of metals by melting a filler (alloy) that bonds two pieces together at temperatures above 450 °C.

A typical electrotechnology application for each of the following tools.

Tool No 1: Cordless Drill

- Using a screwdriver bit, it can be used as a screwdriver.
- Using a drill bit it can be used as a standard drill to drill pilot holes, or large holes.

Tool No 2: Chasing machine

- Chasing machine is used for cutting narrow grooves in brick walls.

Tool No 3: Angle Grinder

- Used for grinding or cutting metal, tiles, stucco, pavers, mortar
- Used for sanding or polishing.

Tool No 4: Jigsaw

- Used for cutting curves and holes in timber, plastics or metal.

Tool No 5: Hammer Drill

- Used for drilling in masonry or concrete.

Name the tool shown in the diagram and, list a typical use for it.



Micrometer - Used for low tolerance measurement of precision items.

Accept other appropriate uses.

Only soft faced hammers should be used during the disassembly and assembly procedure. Why?

Soft faced hammers are good for disassembling objects with a greater force than a mallet without damaging the object the way a solid metal hammer would. If steel hammers are used, it can damage the cast iron material used in common electrical housings.

Witness marks is the correct name given to the markings used to identify a component's original position prior to being dismantled.

Tools

Tool

Name



Hacksaw



Panel saw



Chisel



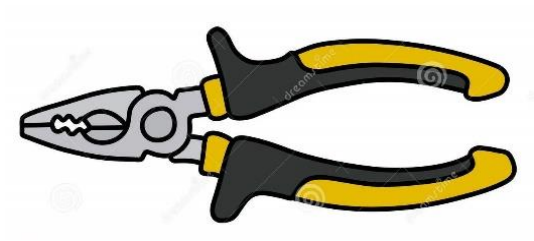
Long nose pliers



Adjustable
pipecutter/tubecutter

Tool

Name



Combination pliers



Claw hammer



Lump hammer



Soft face hammer



Bench vice

Tool

Name



Holding clamp (G clamp)



Multigrips



Adjustable spanner (shifter)



Open Ended Spanner



Ring Spanner



Allen Key

Tool

Name



Socket Set



Insulated screw driver
Red Handle / Connector
Flat Blade / Electrically
rated flat connector blade
(or similar answer),



Insulated Phillips Head



Stubby / Stumpy Flat Blade



Square Shaft Flat Blade



Side Cutters

Tool

Name



Welder



Chasing Machine



Cordless Drill



Angle Grinder



Jig Saw

Tool

Name



Electric Drill



Hammer Drill



Rotary Hammer Drill