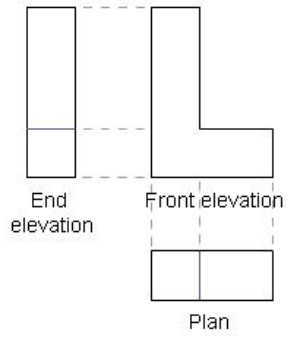
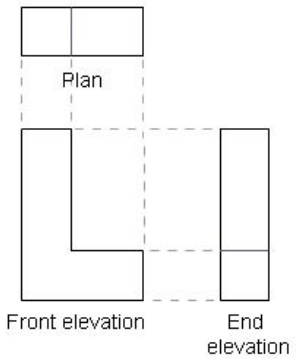
Engineering Drawing

2D drawings:





First Angle Projection

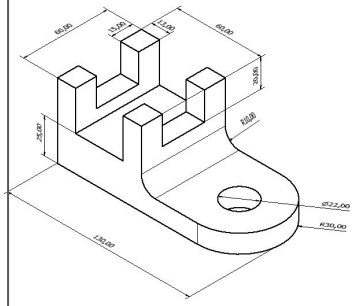
Projection	Symbol
First angle	

Third Angle Projection

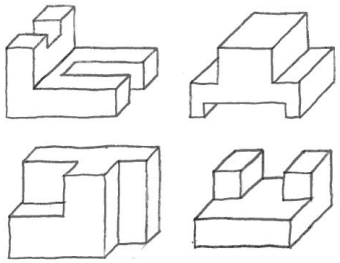
Projection	Symbol
Third angle	

When drawing at school you have always used 3rd Angle Projection

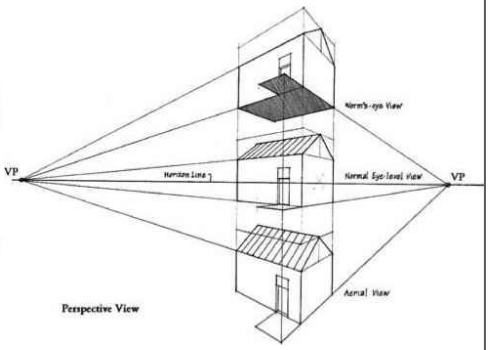
3D drawings:



Isometric



Oblique

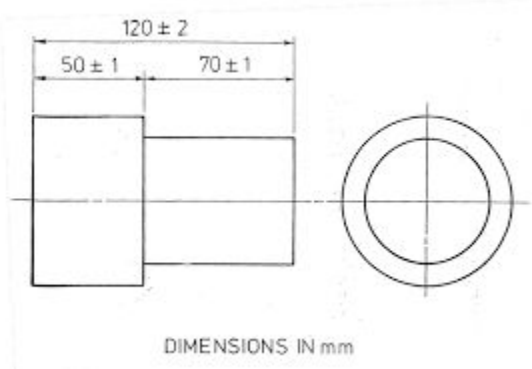


Perspective

Linetypes

- Visible - outlines and edges that exist
- Hidden - outlines and edges that exist but can't be seen (are hidden)
- Centre - line of symmetry
- Construction - used to help build a drawing and line up views
- Dimensions - used to show measurements between two points

Tolerances



For the dimensions shown on this drawing		
Dimension	Min	Max
120mm	118mm	122mm
50mm	49mm	51mm
70mm	69mm	71mm

Tolerances show the maximum and minimum permissible sizes of the finished part.

Title Blocks on Engineering Drawings - may contain the following information

Date of Production:	**Author:**	
System of Measurement:	**Title:**	
Scale:		
Projection:	**Drawing Number:**	**Sheet Number:**
	Material:	**Surface Finish:**

Engineering Drawing

Systems of measurement

Metric

Units include:
mm, cm, m, km
Grams (g), mg,
Litres (l), millilitres (ml)

Used in most of the world for measuring (except USA).

Used in the UK since around 1970

Sizes are all based on the decimal system - e.g. 3.25mm, 150.75 etc.
Easy to calculate as all in base 10

Thread forms are M3, M4, M5 etc.
M stands for metric, the number is the thread diameter.

Remember - Metric = mm

Imperial

Units include:
Miles, feet, inches.
Pounds and Ounces
Pints, fl oz

Only really used in the USA

System still used when dealing with 'legacy' (old) equipment.

Sizes are often given as fractions - e.g. 3¼, 6⅞ etc.

Lots of different thread forms e.g. UNF, Whitworth, UNC, BSF

Remember - Imperial = inches

Scale

An Engineering drawing is nearly always drawn to **scale.**

A drawing that shows a real object with accurate sizes reduced or enlarged by a certain amount is called a scale drawing.

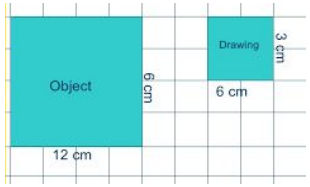
If a drawing is drawn **ACTUAL** size, the scale is 1:1. This means that one unit on the page represents one unit in 'real life'.

If a drawing is drawn **HALF** the actual size of the object, the scale is 1:2. This means that one unit on the page is equal to two units in real life.

If a drawing is drawn **DOUBLE** the actual size of the object, the scale is 2:1. This means that two units are used on the drawing to represent one unit in real life.

Scale is important because of the following reasons:

1. If an object is very small, the drawing may need to be enlarged (scaled up) so we can see all of the detail - E.g. electronics components
2. If an object is very big, it will need to be reduced (scaled down) so it fits on the drawing paper - E.g. Cars, buildings etc.
3. We can take measurements off drawings so it is important to know they are accurate and what scale they are drawn at.



Scale 1:1 Scale 1:2

British Standards and International Standards

British Standards are set by the BSI Group. They were the world's first national standards body, and still remain global leaders in this field.
A standard is an agreed way of doing something, in this case a technical drawing. They provide a framework for all businesses to follow, so there is a standard way of working recognised by all.
The current British Standard for technical drawings is BS8888.
This standard is related to the layout of technical drawings.

- the various ways to indicate dimension
- the way tolerance is identified
- the way surface finish is identified
- systems for adding
  - annotation
  - symbols
  - abbreviations.

The basic principles allow technical drawings to be easily interpreted by people with limited engineering knowledge.
Benefits include:

- Efficiency and Effectiveness
- Fewer Errors