A cosmic background featuring a large, detailed view of Earth's horizon on the right side, showing swirling cloud patterns. In the upper center, the Moon is visible as a dark sphere with a thin, bright ring of light. The rest of the image is a deep blue space filled with numerous stars and a faint, glowing nebula or galaxy structure. The title text is centered in the middle of the image.

Engineering Drawing and Graphics

Pre Requisites

- Drawing Instruments
- Basic Knowledge of Geometry
- Basic Knowledge of units & conversion
- Basic Knowledge of computers

Overview of an Engineering Drawing



LECTURE OBJECTIVES

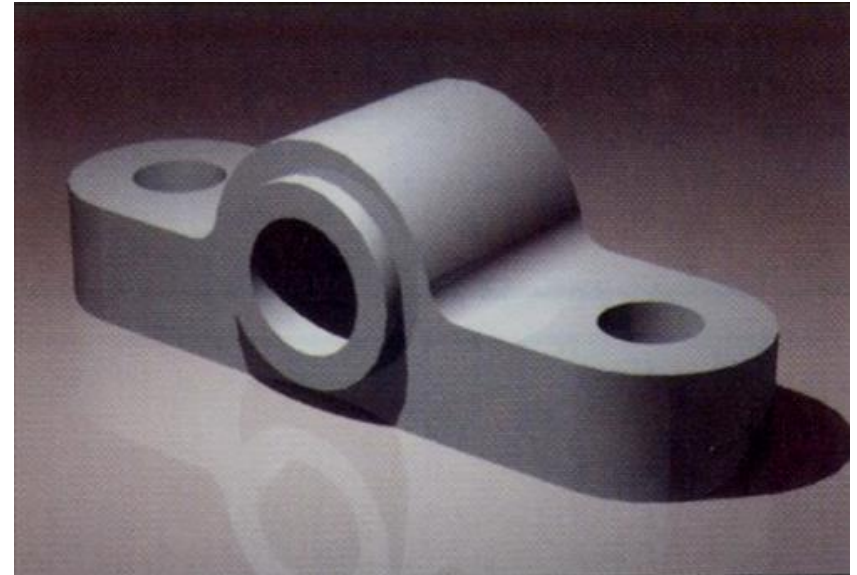
- Graphics language
- Engineering drawing
- Traditional Drawing Tools
- Drawing standards
- Drawing scales
- Drawing Symbols



GRAPHICS LANGUAGE

Effectiveness of Graphics Language

1. Try to write a description of this object.
 2. Test your written description by having someone attempt to make a sketch from your description.
-



You can easily understand that ...

The word languages are inadequate for describing the **size**, **shape** and **features** completely as well as concisely.

Composition of Graphic Language

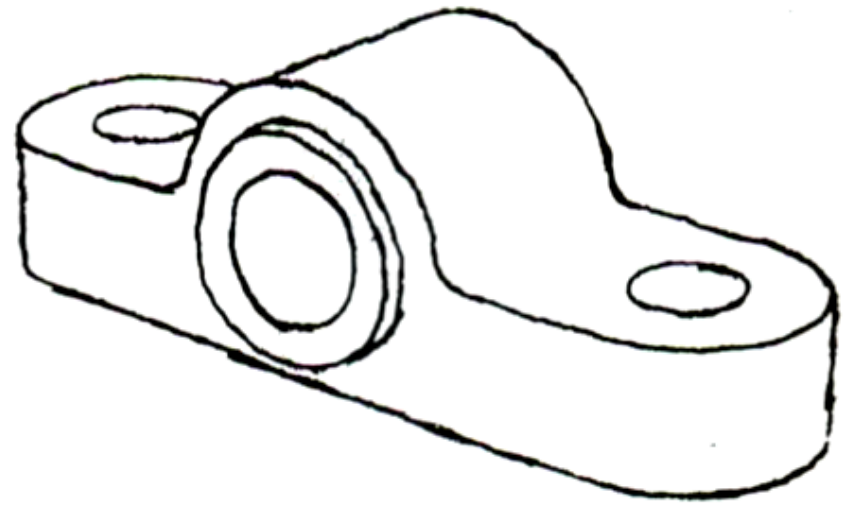
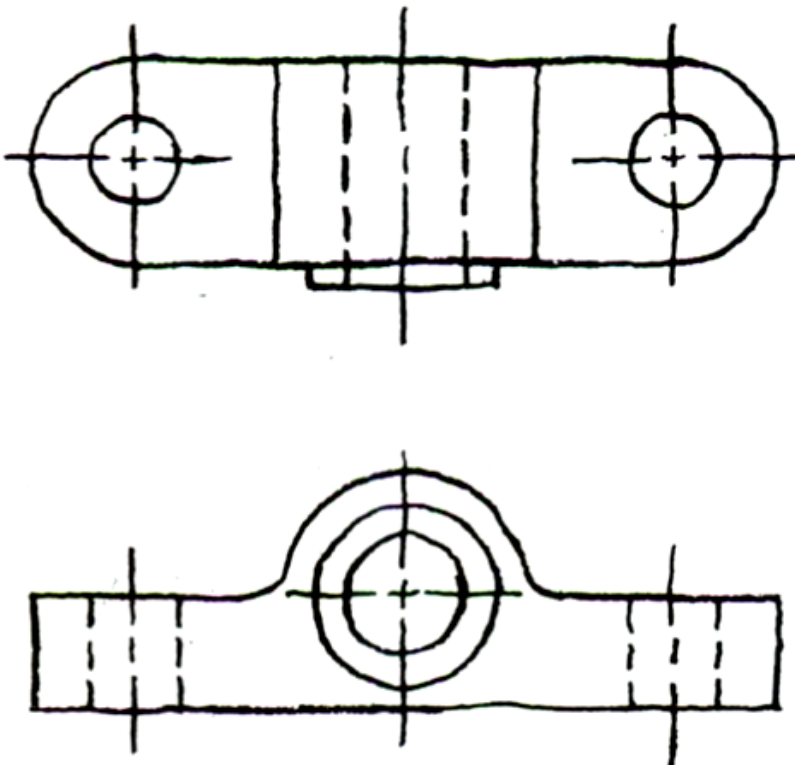
Graphic language in “**engineering application**” use *lines* to represent the *surfaces*, *edges* and *contours* of objects.

- The language is known as “*drawing*” or “*drafting*” .
- A drawing can be done using *freehand*, *instruments* or *computer* methods.

Freehand drawing

The lines are sketched without using instruments other than pencils and erasers.

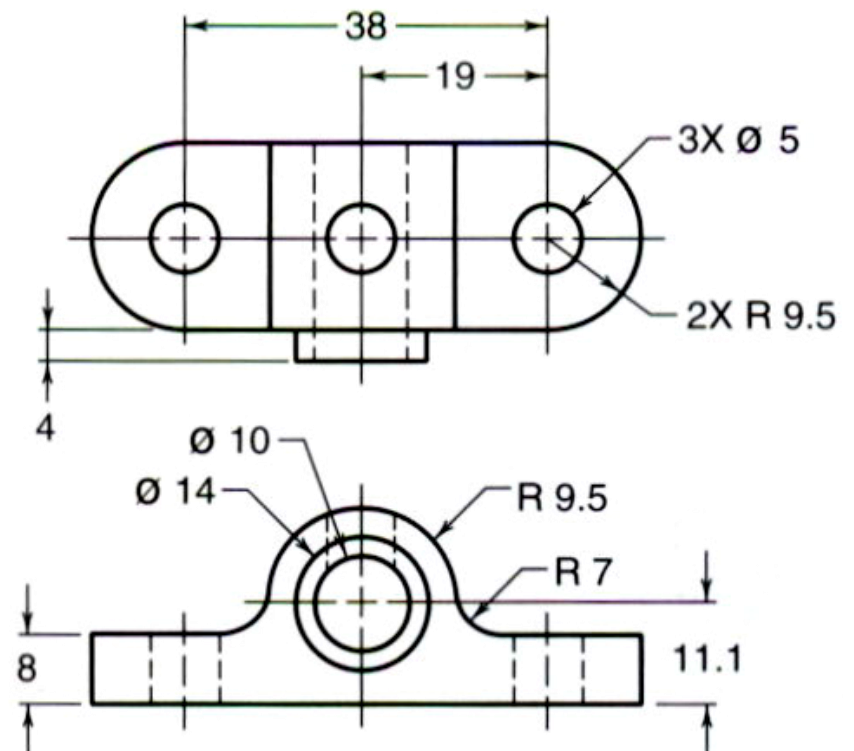
Example



Instrument drawing

Instruments are used to draw straight lines, circles, and curves concisely and accurately. Thus, the drawings are usually made to scale.

Example



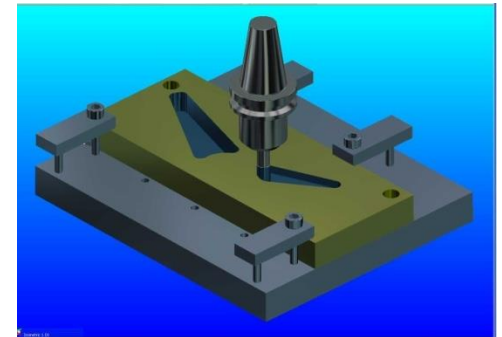
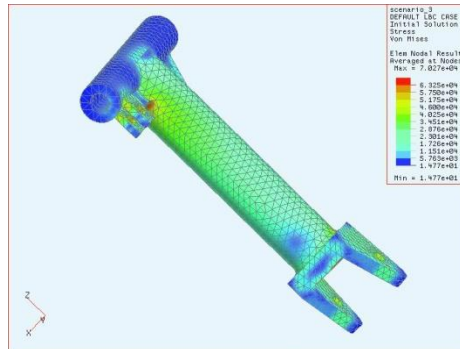
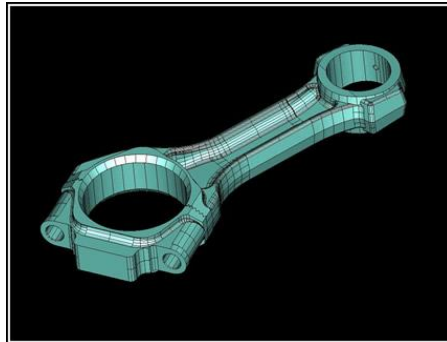
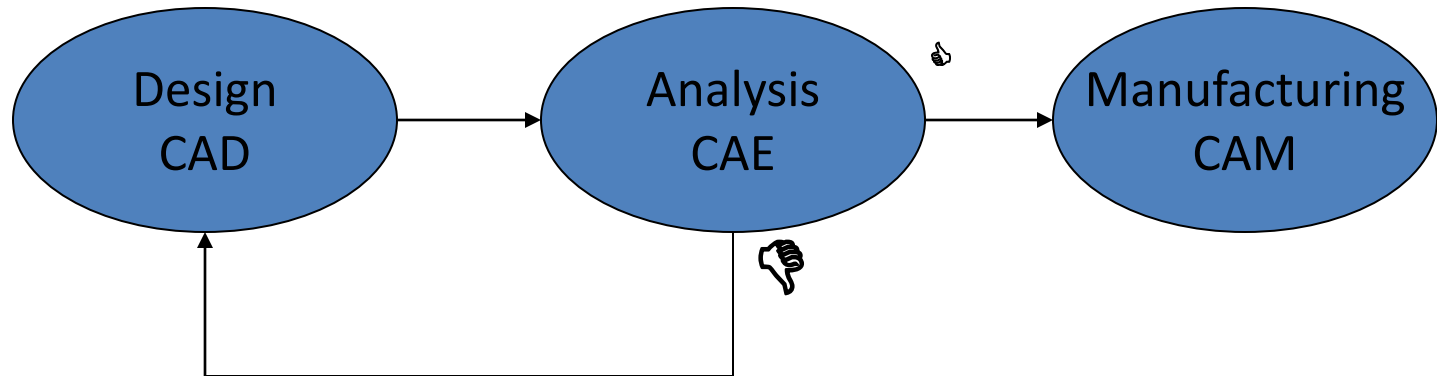
Computer drawing

The drawings are usually made by commercial software such as AutoCAD, solid works , PRO – E, etc.

Examples



Simple CAD/CAE/CAM Product Lifecycle



Engineering Drawing



Elements of Engineering Drawing

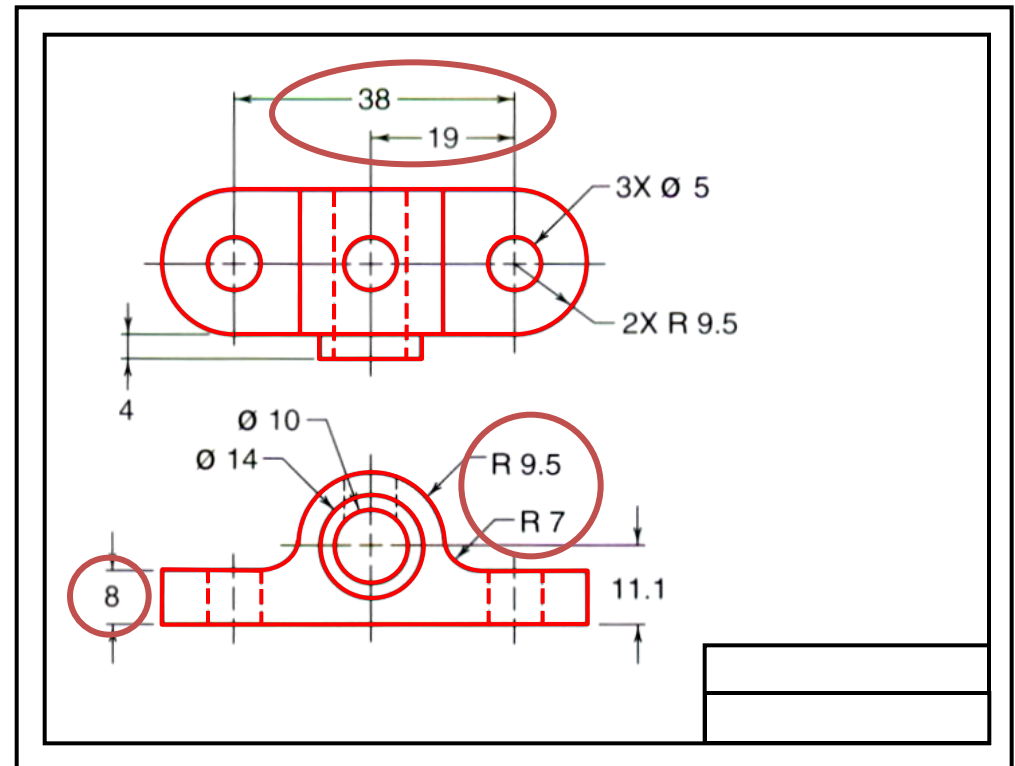
Engineering drawing are made up of *graphics language* and *word language*.

Graphics language

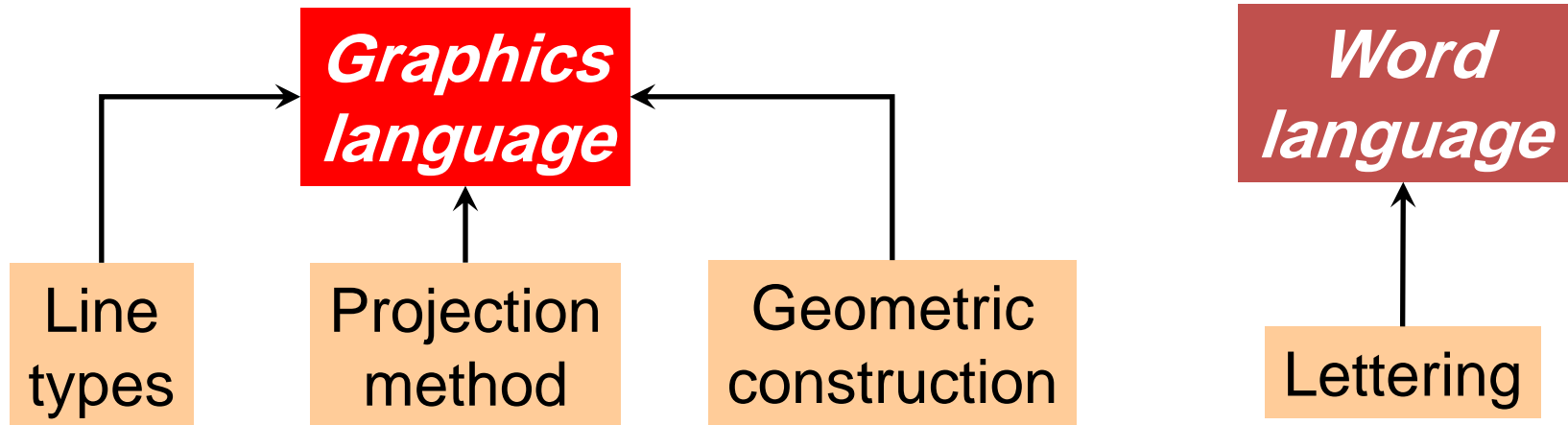
Describe a shape (mainly).

Word language

Describe size, location and specification of the object.



Basic Knowledge for Drafting



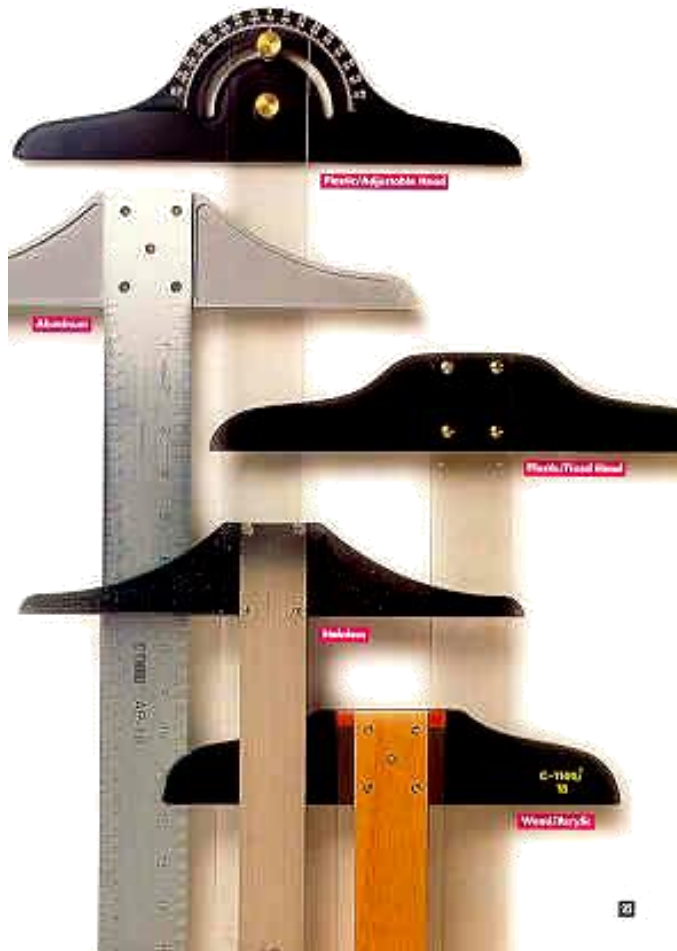
The background of the image is a faded architectural blueprint. It shows various lines, shapes, and text typical of a technical drawing, including labels like 'COUNTY ROAD', 'OFFICE', and 'LOCK'. Overlaid on this background are three 3D-rendered drawing tools: a large set square in the center, a T-square at the top right, and a long straightedge at the bottom left. The tools are rendered in a dark grey color with some highlights and shadows, giving them a three-dimensional appearance.

Traditional Drawing Tools

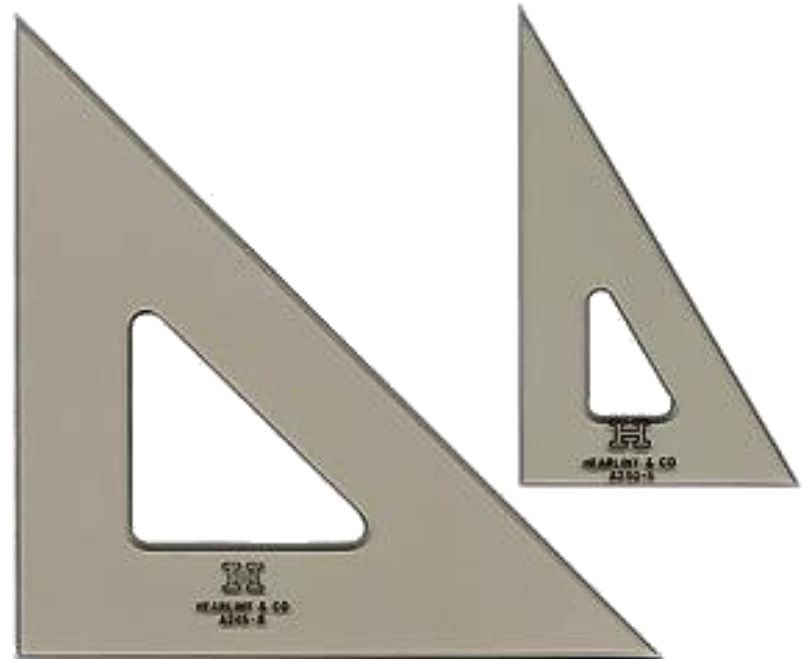
TECHNICAL DRAWING BOARD



DRAWING TOOLS



1. T-Square



2. Triangles

DRAWING TOOLS



3. Adhesive Tape



2H or HB for thick line
4H for thin line



4. Pencils

DRAWING TOOLS



5. Sandpaper

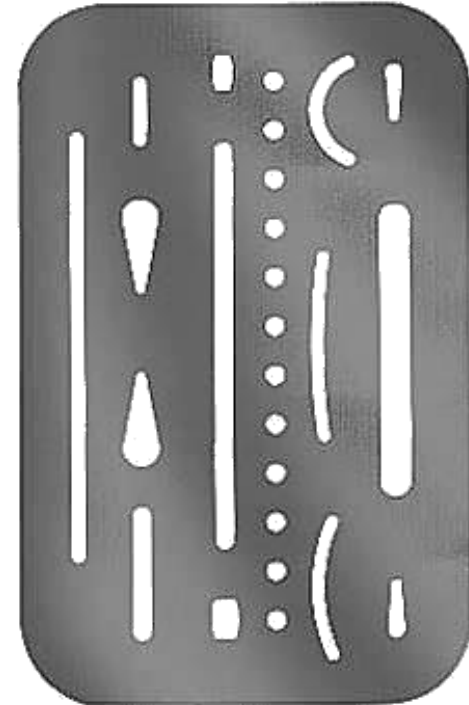


6. Compass

DRAWING TOOLS

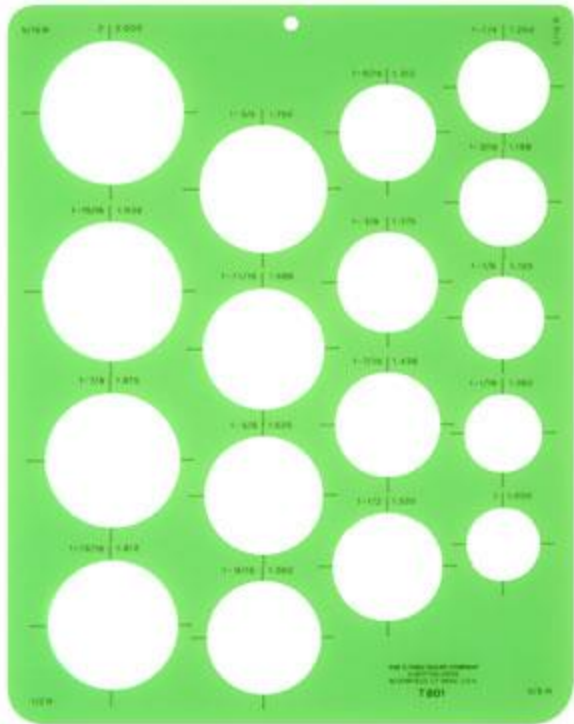


7. Pencil Eraser



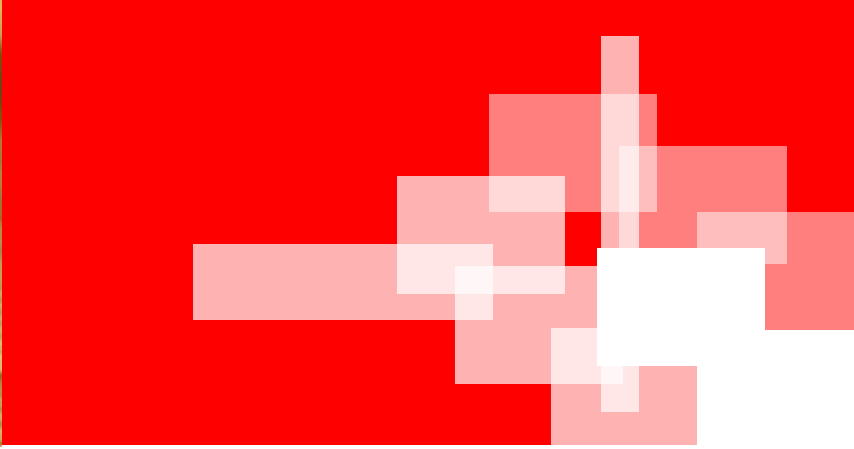
8. Erasing Shield

DRAWING TOOLS



9. Circle Template

10. Sharpener



Drawing Standard



Introduction

Standards are set of rules that govern how technical drawings are represented.

- Drawing standards are used so that drawings **convey the same meaning to everyone** who reads them.

Standard Code

Country	Code	Full name
USA	ANSI	American National Standard Institute
Japan	JIS	Japanese Industrial Standard
UK	BS	British Standard
Australia	AS	Australian Standard
Germany	DIN	Deutsches Institut für Normung
	ISO	International Standards Organization

Drawing Sheet

- Trimmed paper of a size A0 ~ A4.
- Standard sheet size (**JIS**)

A4 210 x 297

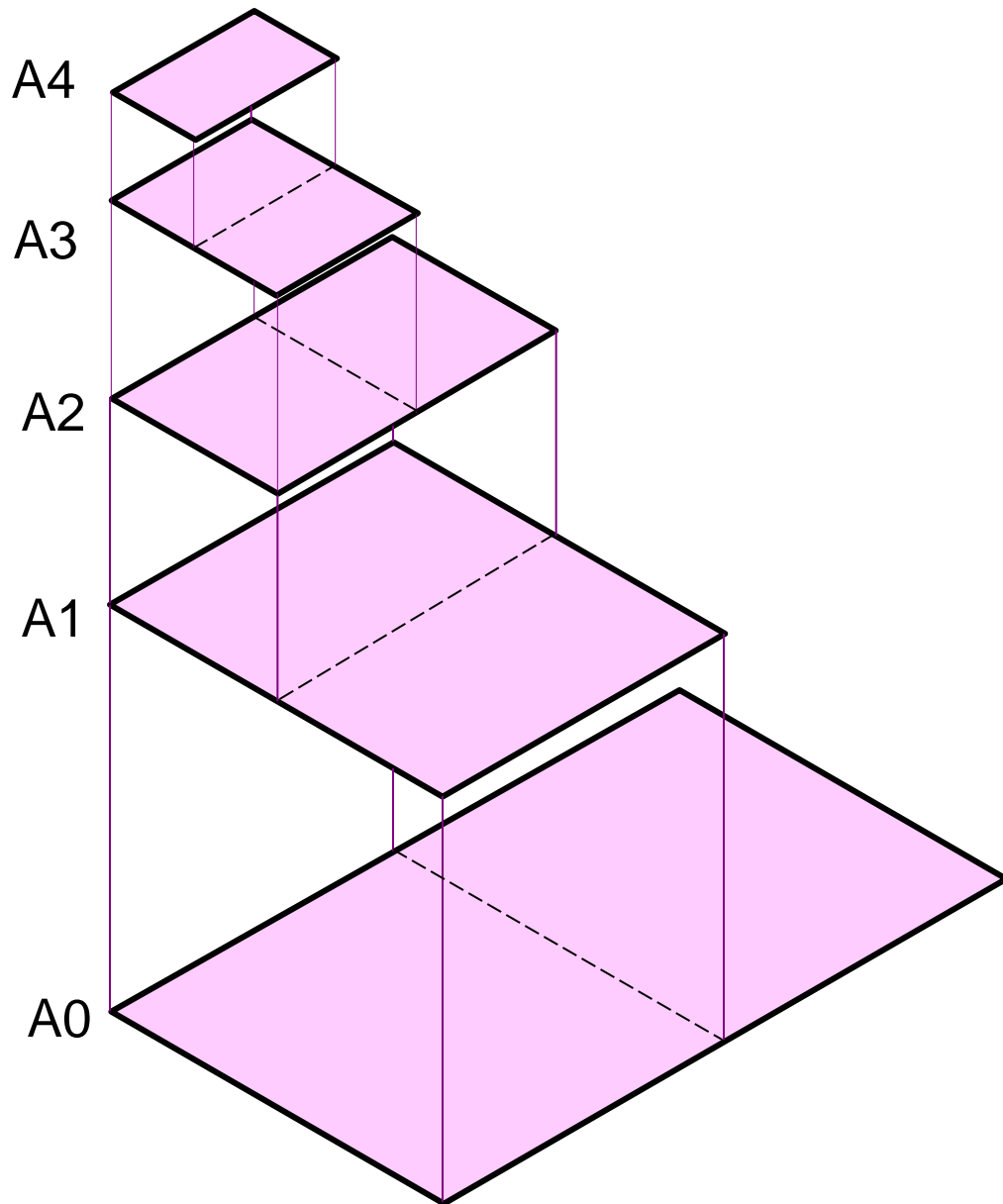
A3 297 x 420

A2 420 x 594

A1 594 x 841

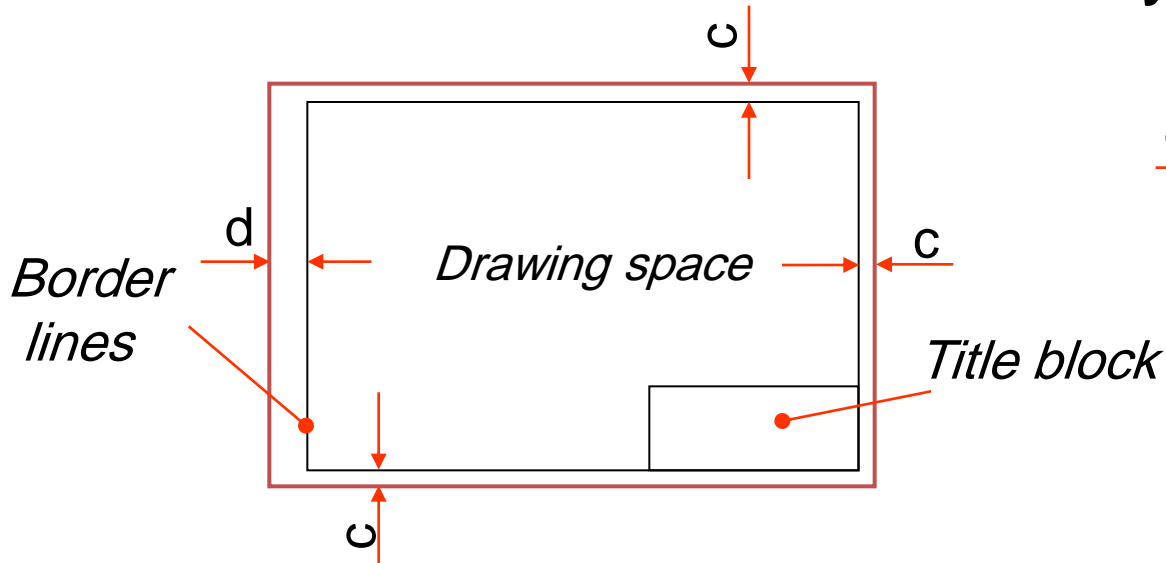
A0 841 x 1189

(Dimensions in millimeters)

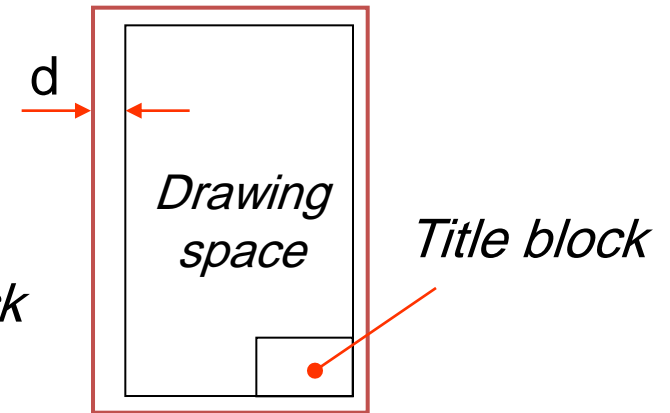


Orientation of drawing sheet

1. Type X (A0~A4)



2. Type Y (A4 only)



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

SAMPLE OF DRAWING SHEET

The drawing sheet is a rectangular template with a grid. The grid is labeled with letters A through F on the left and right sides, and numbers 1 through 8 on the top and bottom. The top and bottom edges have a scale bar with the text "DO NOT SCALE".

Top Right Table: REVISIONS

SYM	DESCRIPTION	DATE	APPD



Bottom Left Table: TOLERANCES

UNLESS OTHERWISE STATED ALL DIMENSIONS IN MILLIMETRES TOLERANCES		DRN	TITLE
LINEAR		CRG	
ANGULAR	MATERIAL	APPD	SIZE A3 SCALE
CRAFTING STANDARD AS 1100	FINISH	SSLED	
			CRG No.
			SHEET

Bottom Left Text: 282 x 400 mm

Drawing layout

All engineering drawings should

TITLE WHEEL BEARING	
NAME John Smith	CHECKED 
VERSION 1.1	DATE 16.10.98
NONEED TO MEASURE -ALL MEASUREMENTS IN MM	SCALE 1:1
ITI ENGINEERING	

The title block should include:

Title:- title of the drawing

Name:- name of the person who produced the drawing

Checked:- before manufacture, drawings are usually checked

Version:- many drawings are amended, each revision must be noted

Date:- the date the drawing was produced or last amended

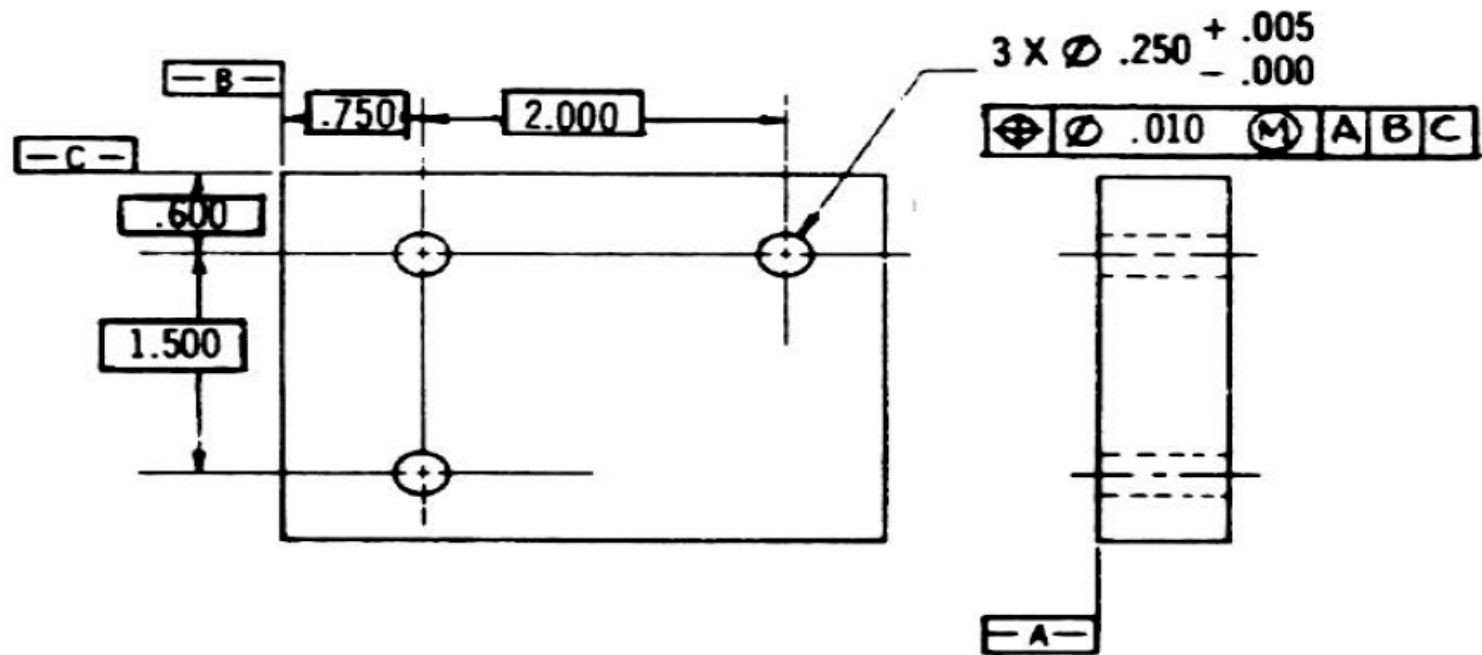
Notes:- any note relevant to the drawing

Scale:- the scale of the drawing

Company name:- name of the company

Projection:- the projection system used to create the drawing

SAMPLE OF ENGINEERING DRAWING



PSD Production System Design Laboratory
Laboratory for Manufacturing and Productivity
Massachusetts Institute of Technology

PART NAME: Left Mtg. Bracket

MATERIAL: AL6601-T6

NOTES: Units in Inches

DRAWN BY: BC

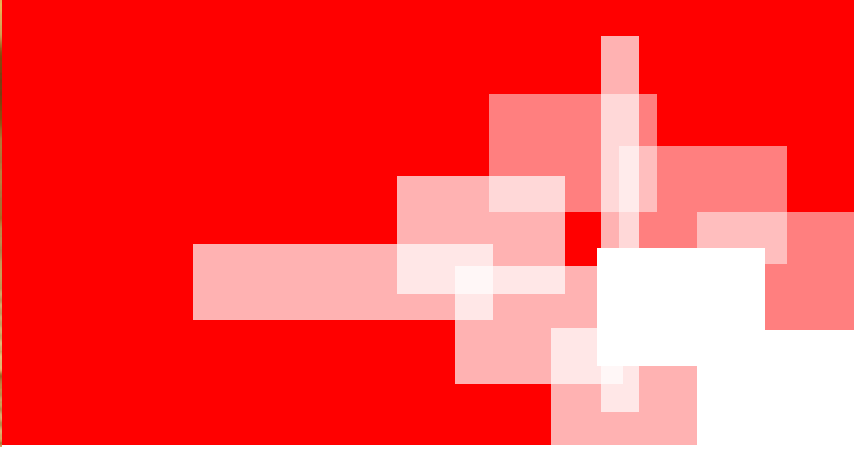
Deburr all edges

TOL:

QTY: 1

REV:

DATE: 6-5-97



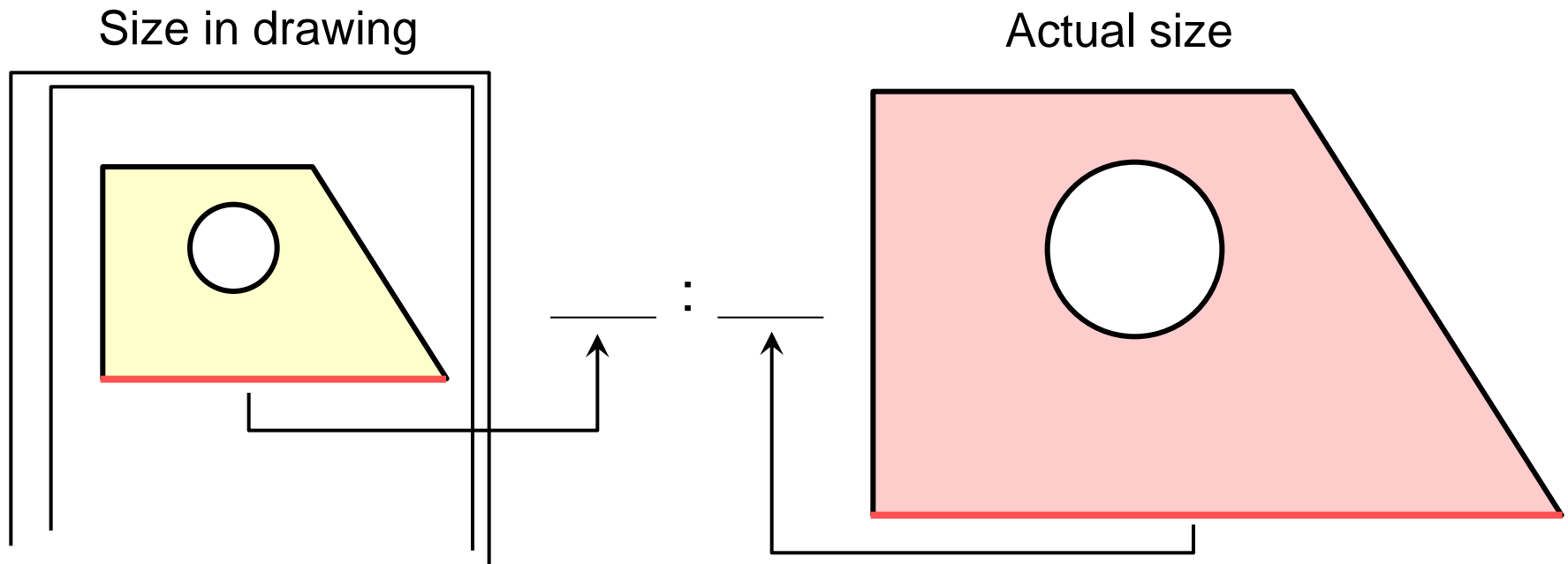
Drawing Scale



Drawing Scales

Length, size

Scale is the ratio of the linear dimension of an element of an object shown in the drawing to the real linear dimension of the same element of the object.



Drawing Scales

- Designation of a scale consists of the word “SCALE” followed by the indication of its **ratio**, as follow

SCALE 1:1 for full size

SCALE **X**:1 for **enlargement** scales ($X > 1$)

SCALE 1:**X** for **reduction** scales ($X > 1$)

- Dimension numbers shown in the drawing are correspond to “**true size**” of the object and they are **independent** of the scale used in creating that drawing.