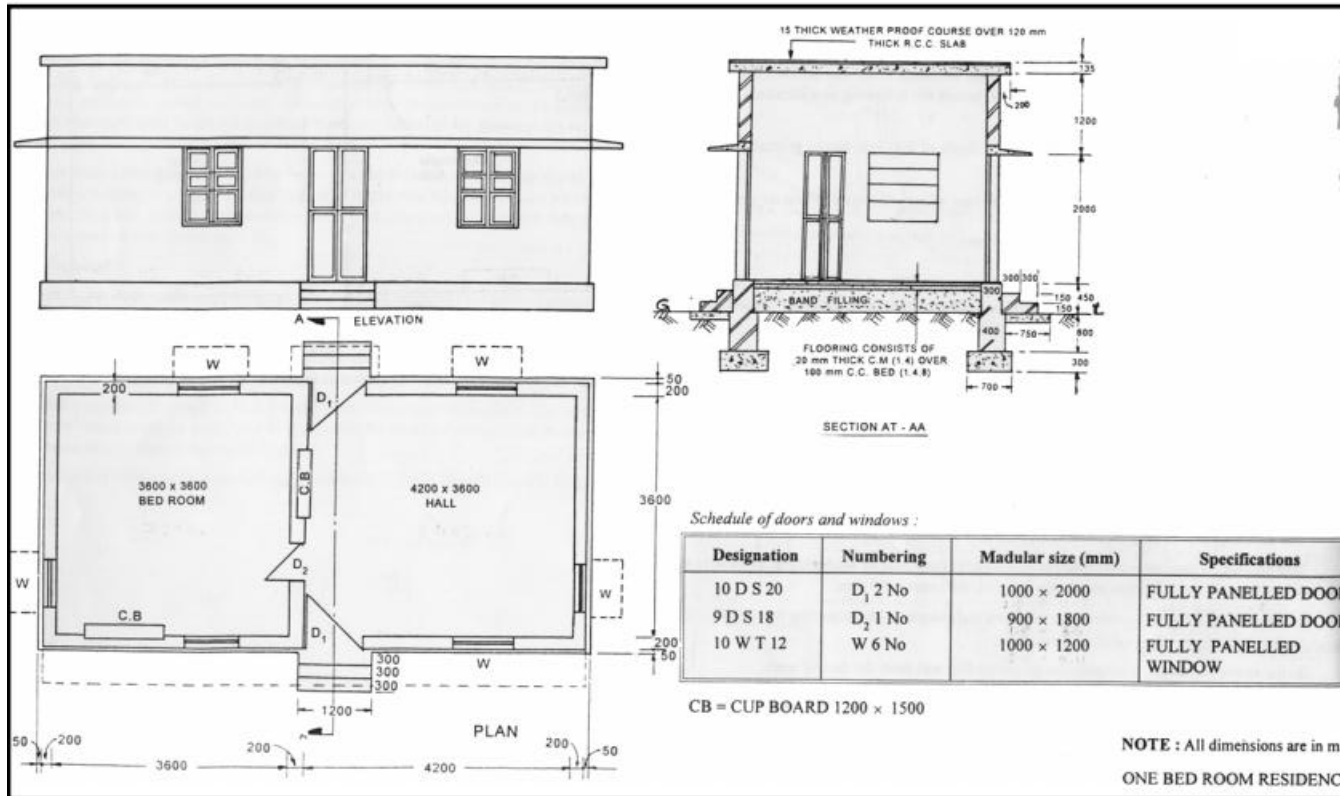


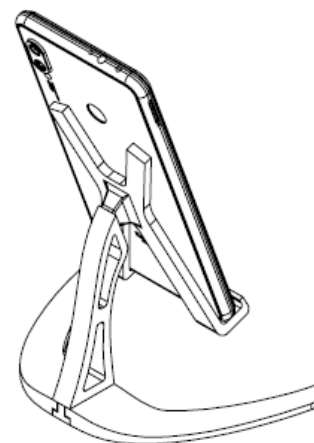
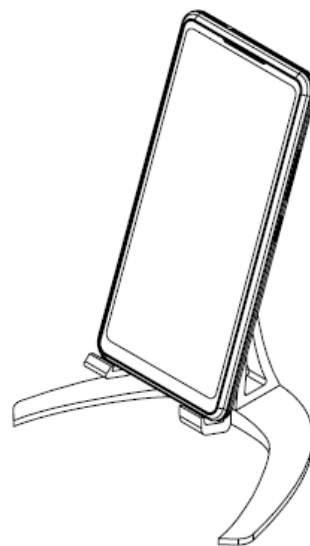
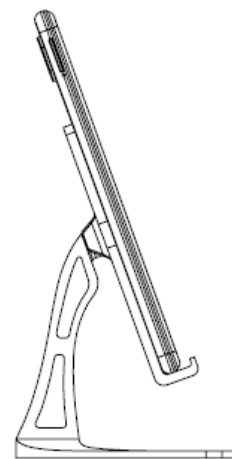
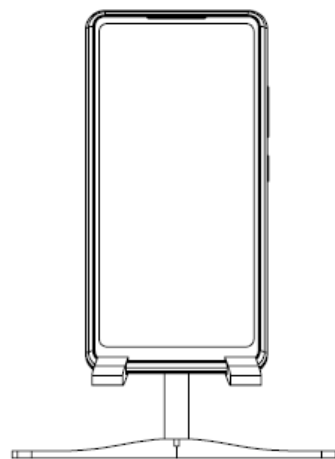
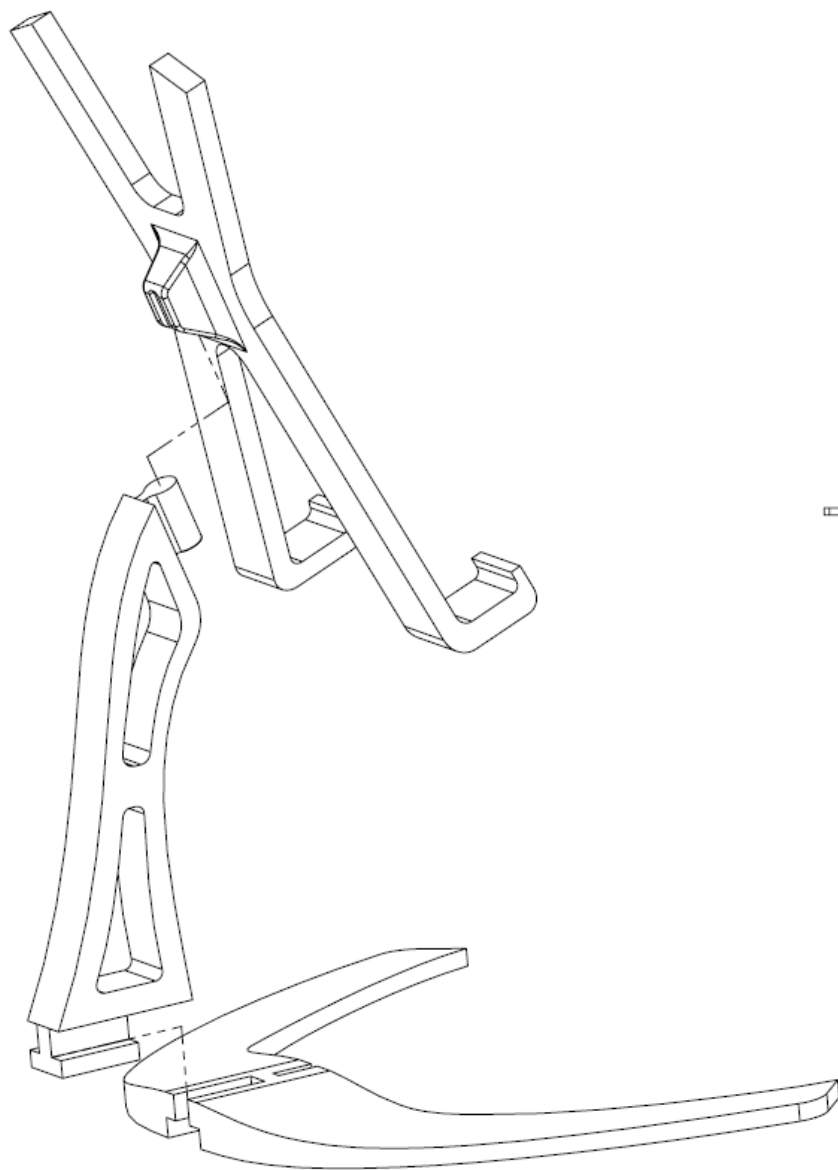
Drawing

- Drawing is an art of representing objects or forms on a flat surface or a canvas chiefly by means of lines using any of a wide variety of tools and techniques.
- A drawing can be prepared either using free hand or using engineering instruments or using computer program.

Types of Drawing

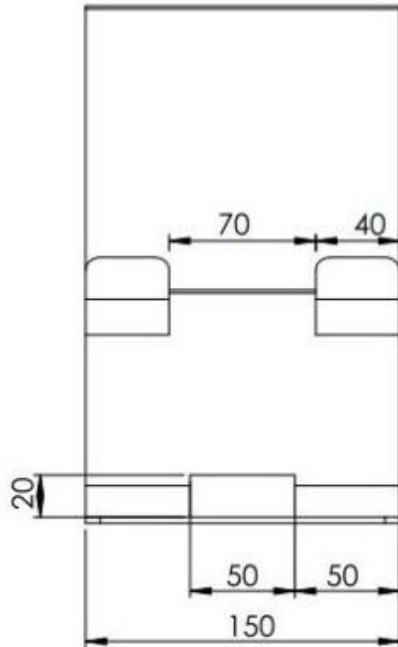
- Artistic Drawing
- Engineering drawing



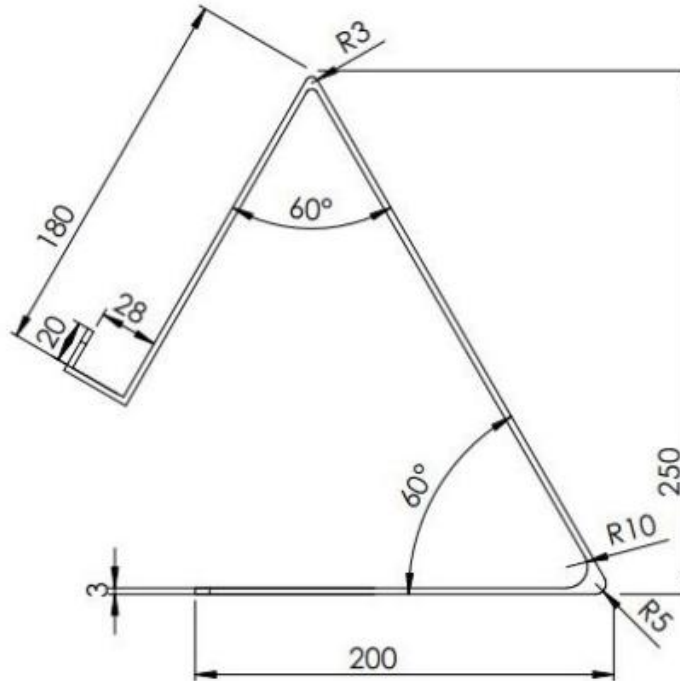




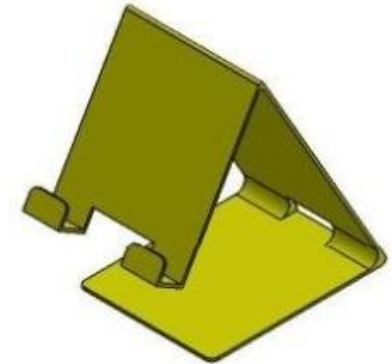
Front View



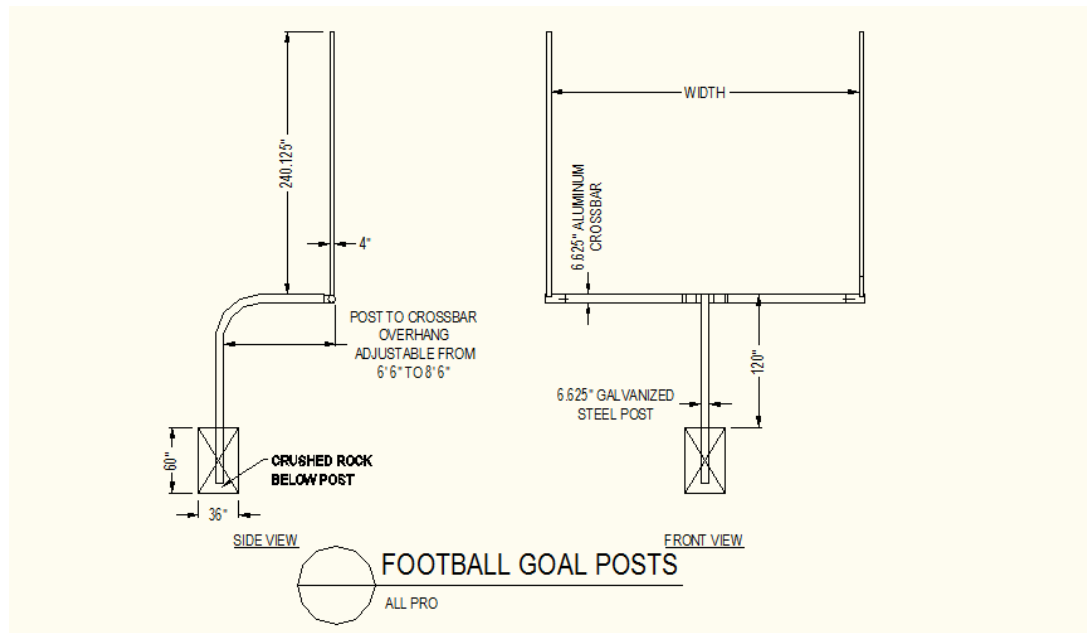
Side View

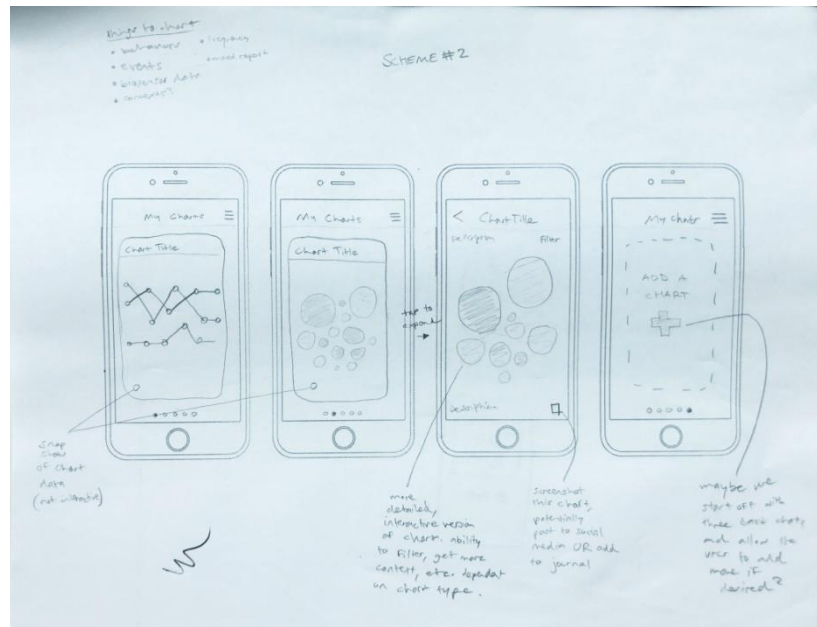


3D representation



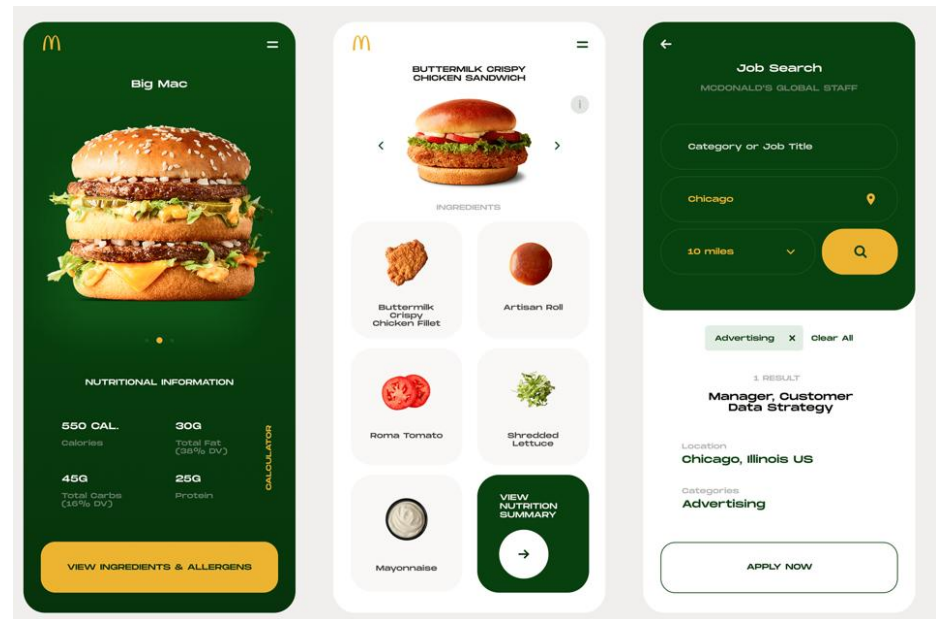
- Shows the width (150 mm) and slots (50 mm apart) that hold the mobile.
- Indicates angles of 60° for both inclined sections, overall height of 250 mm, and base length of 200 mm.
- Provides a 3D representation of the mobile stand for better visualization.





UI AND UX DESIGN

Hand sketch
Figma, Adobe XD,



Artistic Drawing

- The drawing representing any object or idea which is sketched in free hand using imagination of artist and in which proper scaling and dimensioning is not maintained is called an artistic drawing.
- It focuses on aesthetic appeal and creative expression rather than technical accuracy.
- **Example: Painting, Posters, arts etc.**

Engineering drawing

- Graphical method used to clearly and accurately communicate the details and specifications of engineered items.
- The art of representing a real or imaginary object precisely using some graphics, symbols, letters and numbers with the help of engineering drawing instruments.
- It is made in accordance with the standard conventions for layout, nomenclature, interpretation, appearance, size, etc.

Example: Building drawing for civil engineers, Machine drawing for mechanical engineers, Circuit diagrams for electrical and electronics engineers

ARTISTIC DRAWING	ENGINEERING DRAWING
Purpose of artistic drawing is to convey emotion or artistic sensitivity in some way.	Purpose of engineering drawing is to convey information about engineering object or idea.
Can be understood by all.	Need some specific knowledge or training to understand.
Scale maintaining is not necessary	Scale maintaining is necessary
No special requirement of engineering instruments.	Engineering drawing instruments is used to make the drawing precise.
An artistic drawing may not be numerically specific and informative.	An engineering drawing must be numerically specific and informative.
Standard drawing code need not to be followed.	Standard drawing code (like ISO, ANSI, JIS, BS etc,) must be maintained.

Engineering drawing

- Engineering drawing follows certain codes of practice. International Organisation for Standardisation (ISO) recommended international standards for engineering drawing in 1982.
- The standards published by ISO are designated as ISO XXXX:YEAR, where XXXX represents a unique number allocated to the standard and the YEAR represents the year of publication.
- If a standard has been published before and is updated, the number remains the same as the previous number but the YEAR changes to the new year of publication.

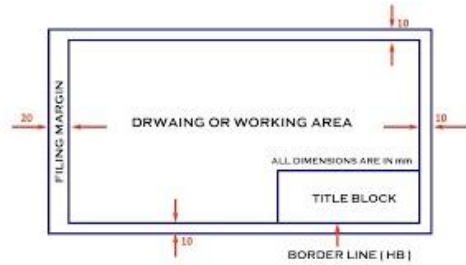
DRAWING INSTRUMENTS

- Drawing board
- Mini drafter
- Drawing sheet
- Drawing Pencil
- Compass
- Divider
- Protractor
- Ruler (scale)
- French curves
- Set squares
- Eraser or rubber
- Sheet fasteners
- Template
- Pencil cutter
- Sand paper pad
- Brush or towel cloth

INSTRUMENTS USED IN ENGINEERING DRAWING



DRAWING BOARD



DRAWING SHEET



MINI DRAFTER



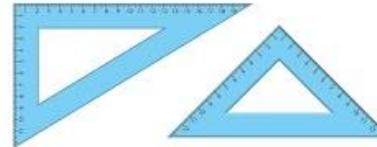
T - SQUARE



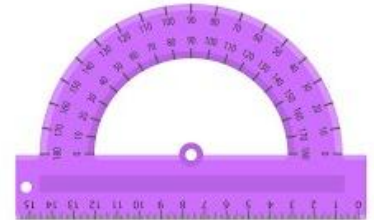
COMPASS



DIVIDER



SET SQUARES



PROTRACTOR



FRENCH CURVES



PENCILS



ERASER

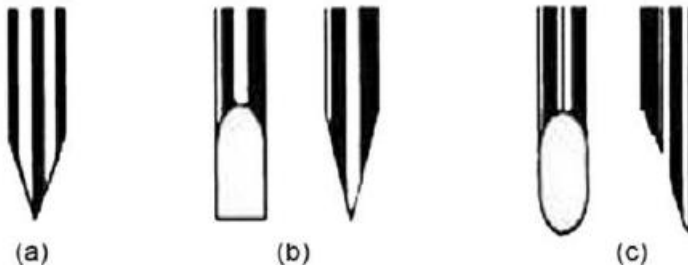
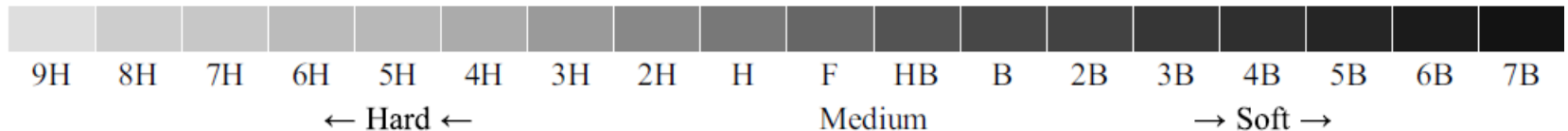
Drawing sheet

- A drawing sheet comprises a thick paper onto which the drawing is made
- A sheet with 150 to 250 gsm (grams per square metre) is suitable for drawing. Size of the sheet depends upon the size of drawing.
- The Bureau of Indian Standards in its bulletin is 10711:2001 recommends “ISO-A series” of paper size for the drawing sheet
- Students generally use A1 size card sheet and A2 size drawing sheet.

<i>Series</i>	<i>Paper size (mm × mm)</i>
A0	841 × 1189
A1	594 × 841
A2	420 × 594
A3	297 × 420
A4	210 × 297
A5	148 × 210
A6	105 × 148
A7	74 × 105
A8	52 × 74

Drawing Pencil

- Pencils are graded according to the proportion of graphite to clay mixture in the pencil lead.
- A pencil that is considered the medium grade is designated by the letter HB.
- A hard pencil produces thin, grey line while a soft pencil produces thick line.
- The working end of a pencil may have a number of different shapes - conical, chiselled or bevelled -carefully prepared by blade-type pencil cutters and sand papers.



(a) Conical (b) Chiselled (c) Bevelled

Conical point - writing, dimensioning and making arrowheads.

Chisel edge - straight lines

Bevelled is preferred for drawing circles and arcs.

BIS standards related to engineering drawing

- **SP 46:2003** Engineering Drawing Practices for School and Colleges
- **IS 9609 (Part 0-4 & Part 6)** Technical Product Documentation — Lettering
- **IS 10711 2001** Technical Product Documentation — Sizes and Layout of Drawing Sheets
- **IS 10713: 1983** Scales for Use on Technical Drawings
- **IS 10714 (Part 1-3 & Part 71)** Technical Product Documentation (TPD) — General Principles of Representation
- **IS 11158: 2023** Technical Product Documentation — Symbols Used in Technical Product Documentation — Proportions and Dimensions
- **IS 11663: 1986** Conventional Presentations of Common Features and Materials on Technical Drawings
- **IS 11664: 1986** Folding of Drawing Prints
- **IS 15021 (Part 1-4) 2001** Technical Drawings — Projection Methods

The mechanics of the drawing task has been largely automated and greatly accelerated through a number of computer softwares.

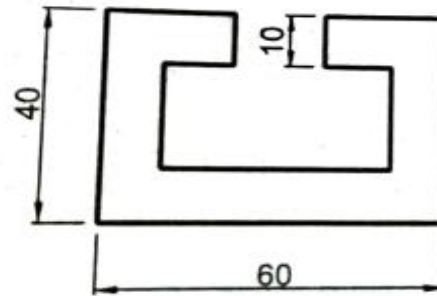
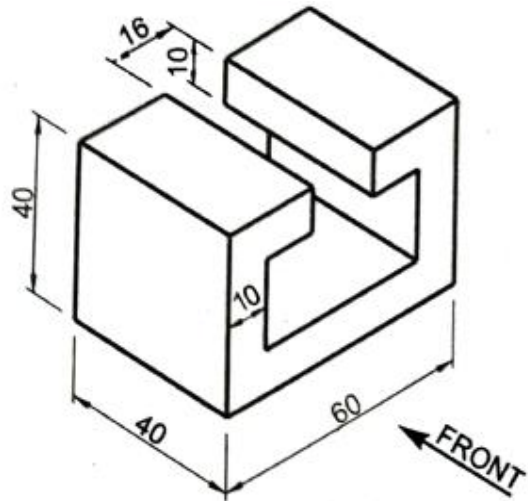
AutoCAD, Solidworks, Altium designer, KiCad, Matlab

- **IEEE 315** – Standard for electrical and electronic symbols
- **ISO 9241** – Ergonomics of human-system interaction (for UI/UX)
- **IPC-7351** – Standard for PCB component footprints

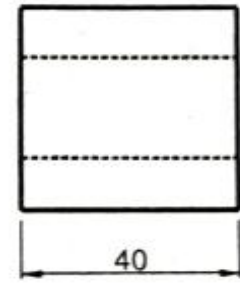
BENEFITS OF CAD OVER MANUAL DRAWING

- **No need for scaling. All drawing is done full size.**
- **Both two and three dimensional drawings can be produced.**
- **All of the tools needed are supplied by the program.**
- **Drawings are stored on disk rather than in a bulky folder.**
- **Dimensioning is almost automatic**
- **Work is copied and stored off the computer for security**
- **Absolute accuracy can be maintained**
- **Production details can be extracted directly from the drawing.**
- **Parts of drawings can be saved and used in other drawings.**
- **Images on the PC screen can be printed on paper with a single click using printers or plotters.**

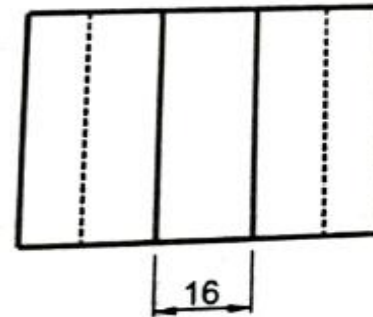
Draw an orthographic projection of a simple object and label its views correctly.



FRONT VIEW



LEFT SIDE VIEW



TOP VIEW