ME1480 Engineering Drawing

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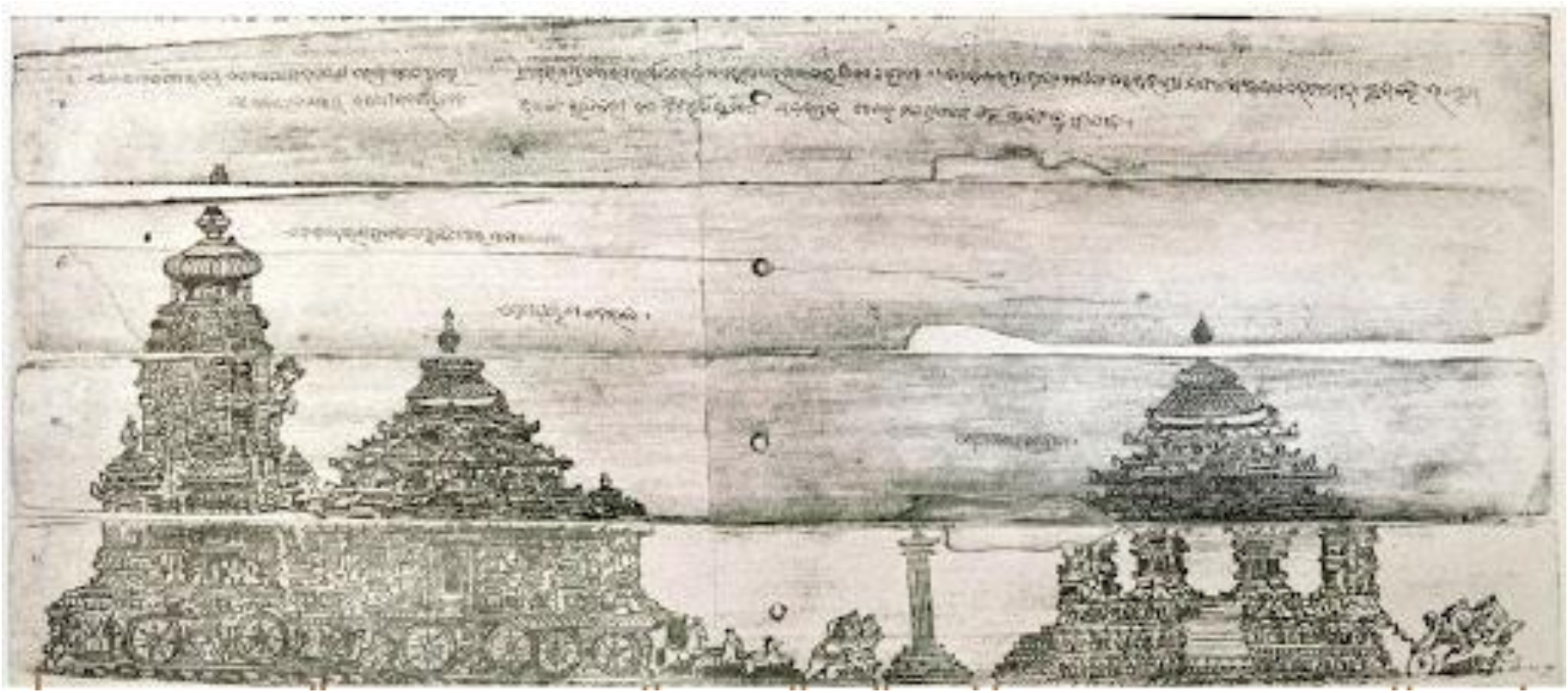
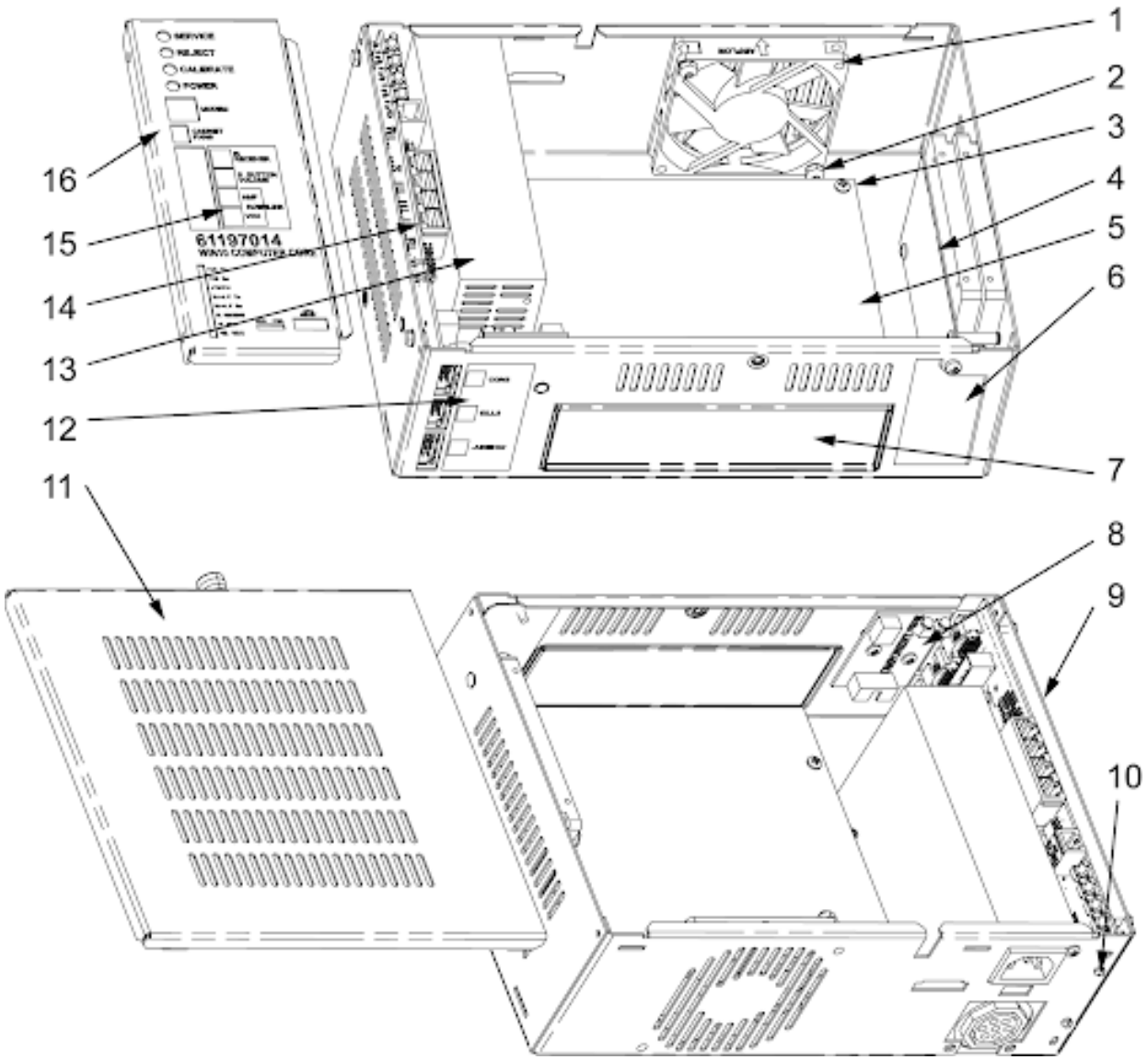
Prehistoric Drawings

Prehistoric Drawings

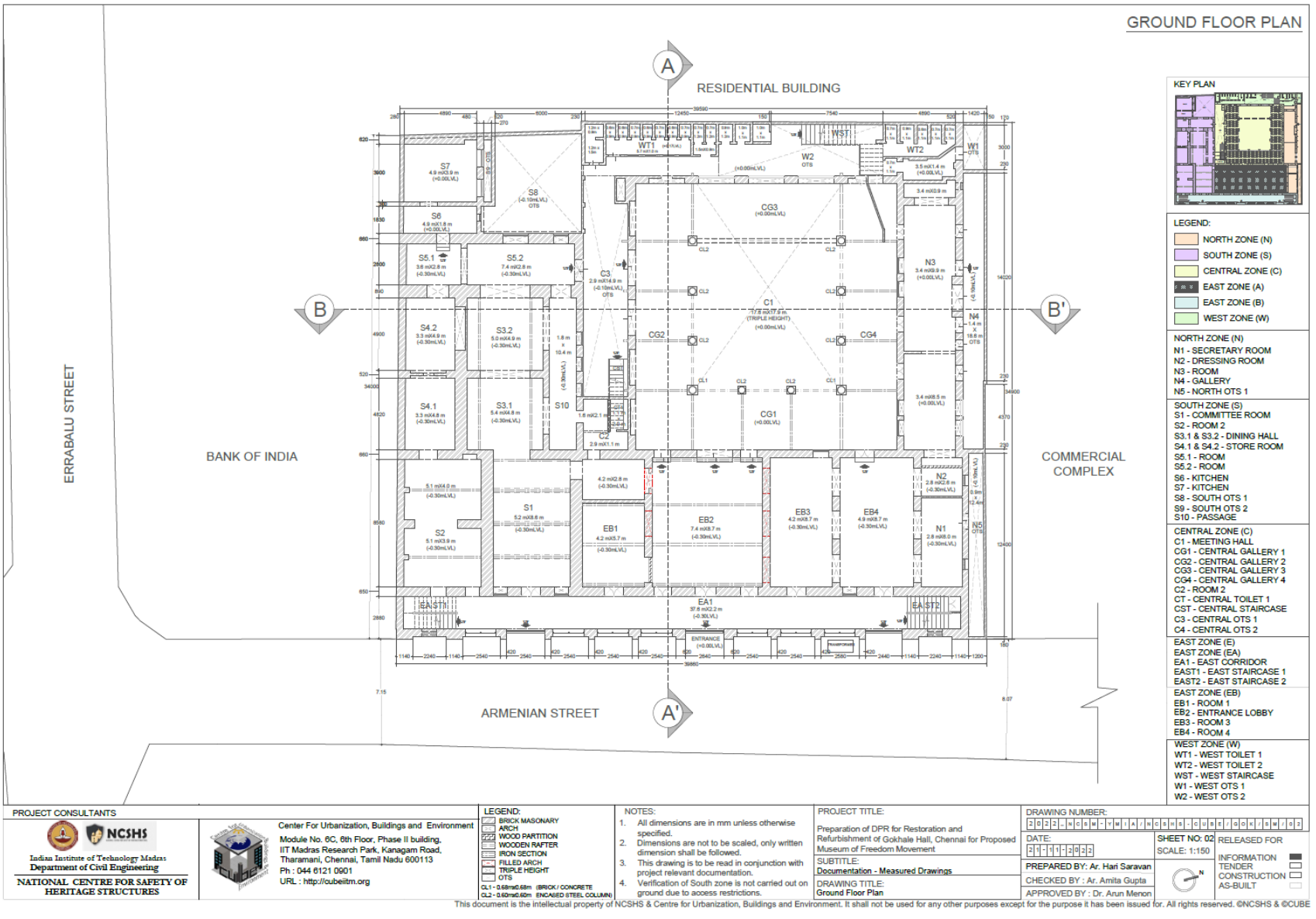
Medieval Times



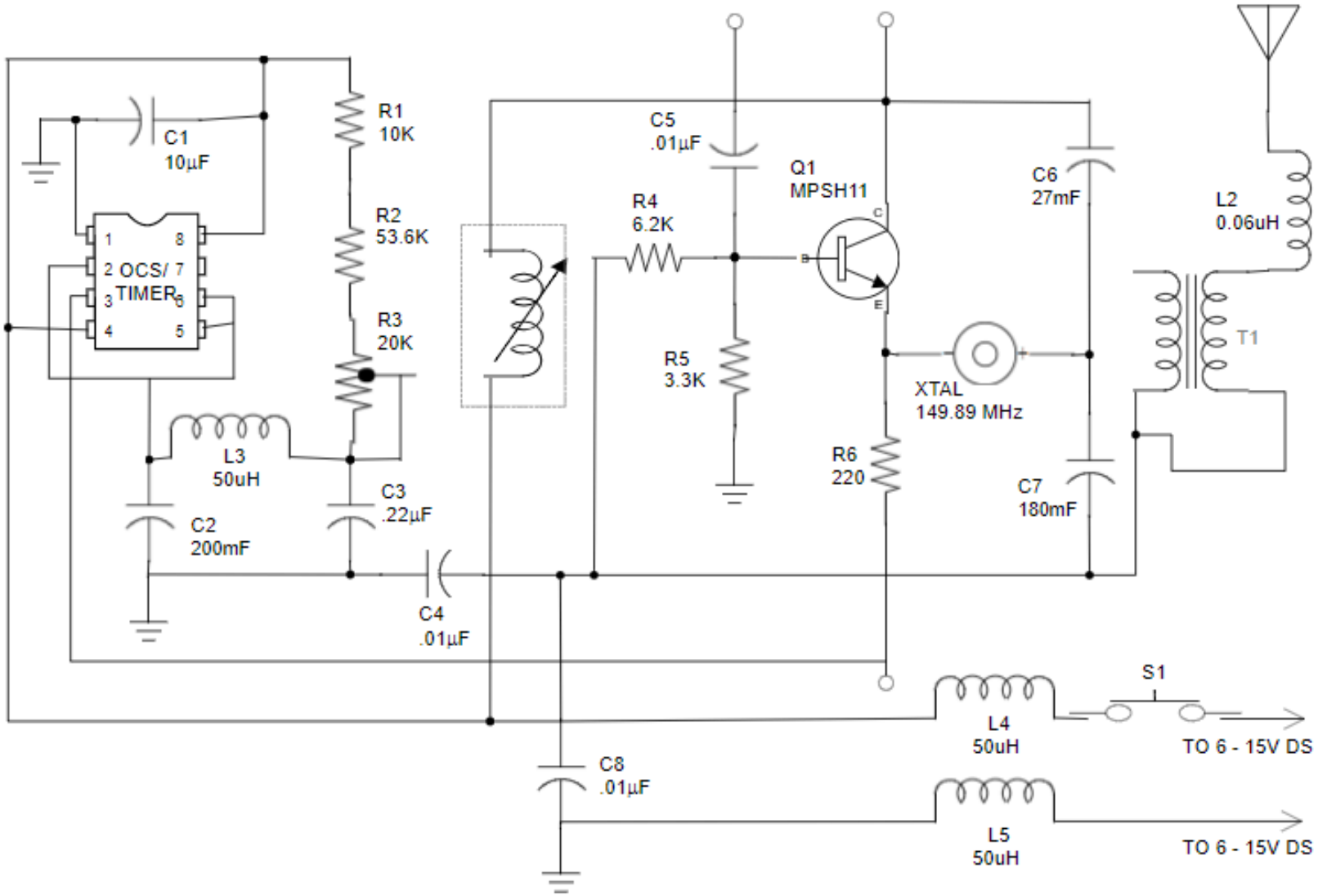
Drawings (Computer Engineering)



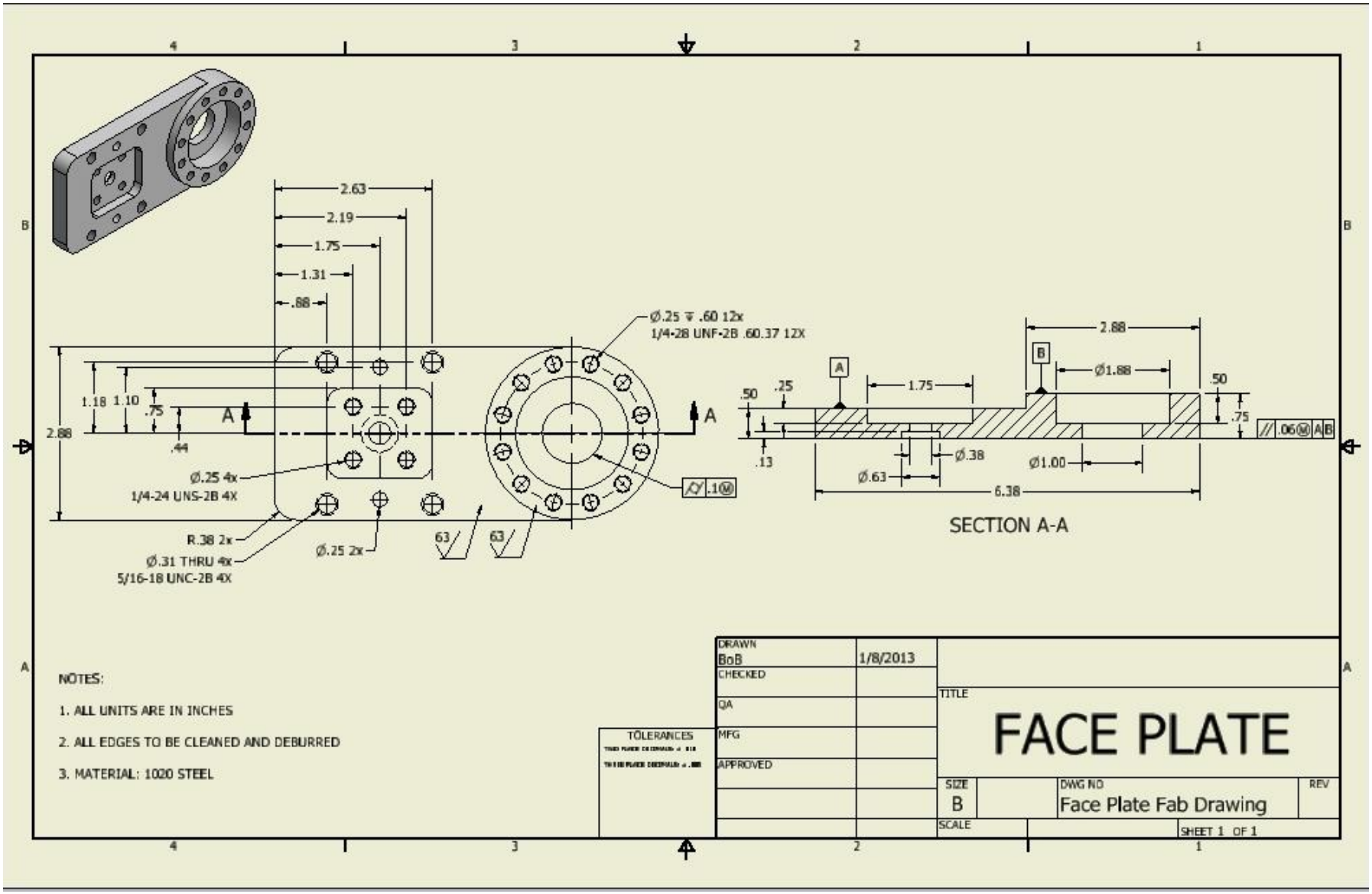
Drawings (Civil Engineering)



Drawings (Electrical Engineering)



Drawings (Mechanical Engineering)



Purpose of Engineering Drawing

1. To communicate geometry related information of any entity
2. Geometric details include lines (visible and hidden) and surfaces, shapes, sectional views, etc.
3. To provide information on dimensions (explicit or implicit)
4. To provide information on manufacturing or construction details
5. To indicate dimensional tolerances
6. To provide machining instructions (e.g., surface roughness)
7. To provide information on materials to be used

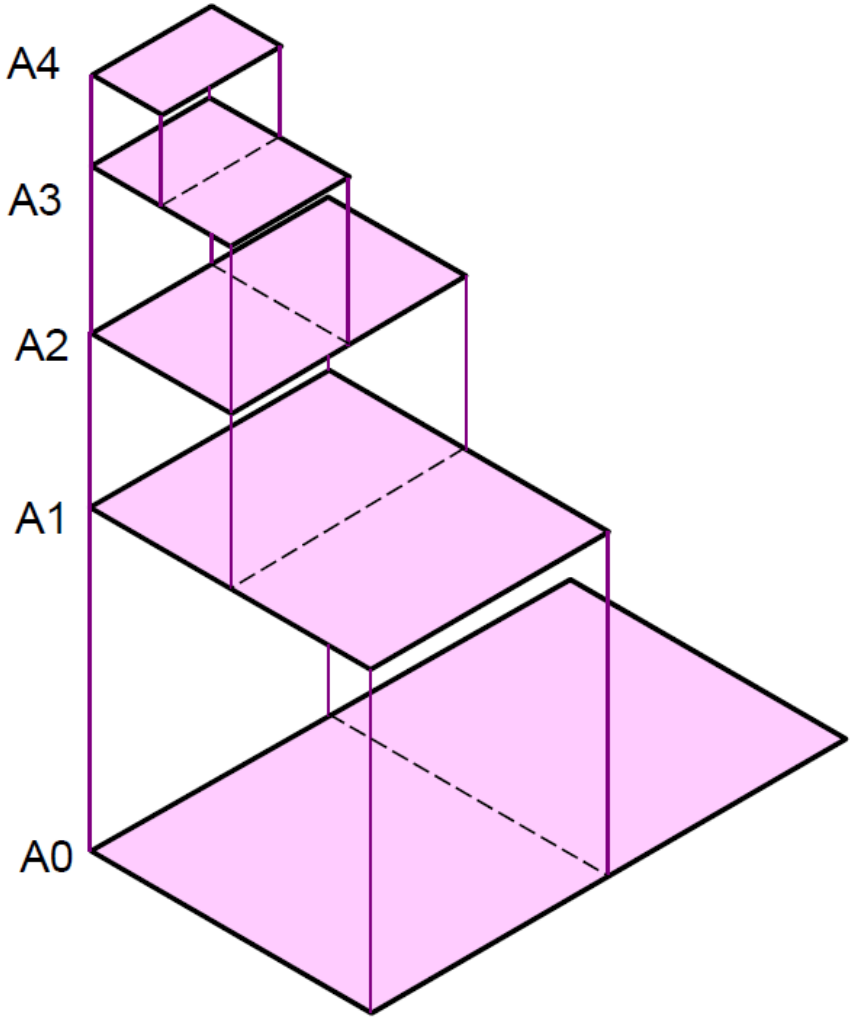
Paper Size (A series)

1. The size of paper in A series varies from A0 to A10.
2. For A0 size, area of the paper is $1.0 m^2$, with ratio of length-to-width being $\sqrt{2}:1$.
3. Therefore, the length and the width of A0 sheets are 1189 mm and 841 mm respectively.
4. For every successive paper size A1, A2, etc., the area becomes half of the previous size, maintaining the same length to width ratio.
5. Therefore, the length of the succeeding size will be same as width of the preceding size (The length of A1 is same as width of A0).
6. ISO 216:2007 is a document issued by International Standards Organization to standardize various sizes of paper.

Paper Size (A series)

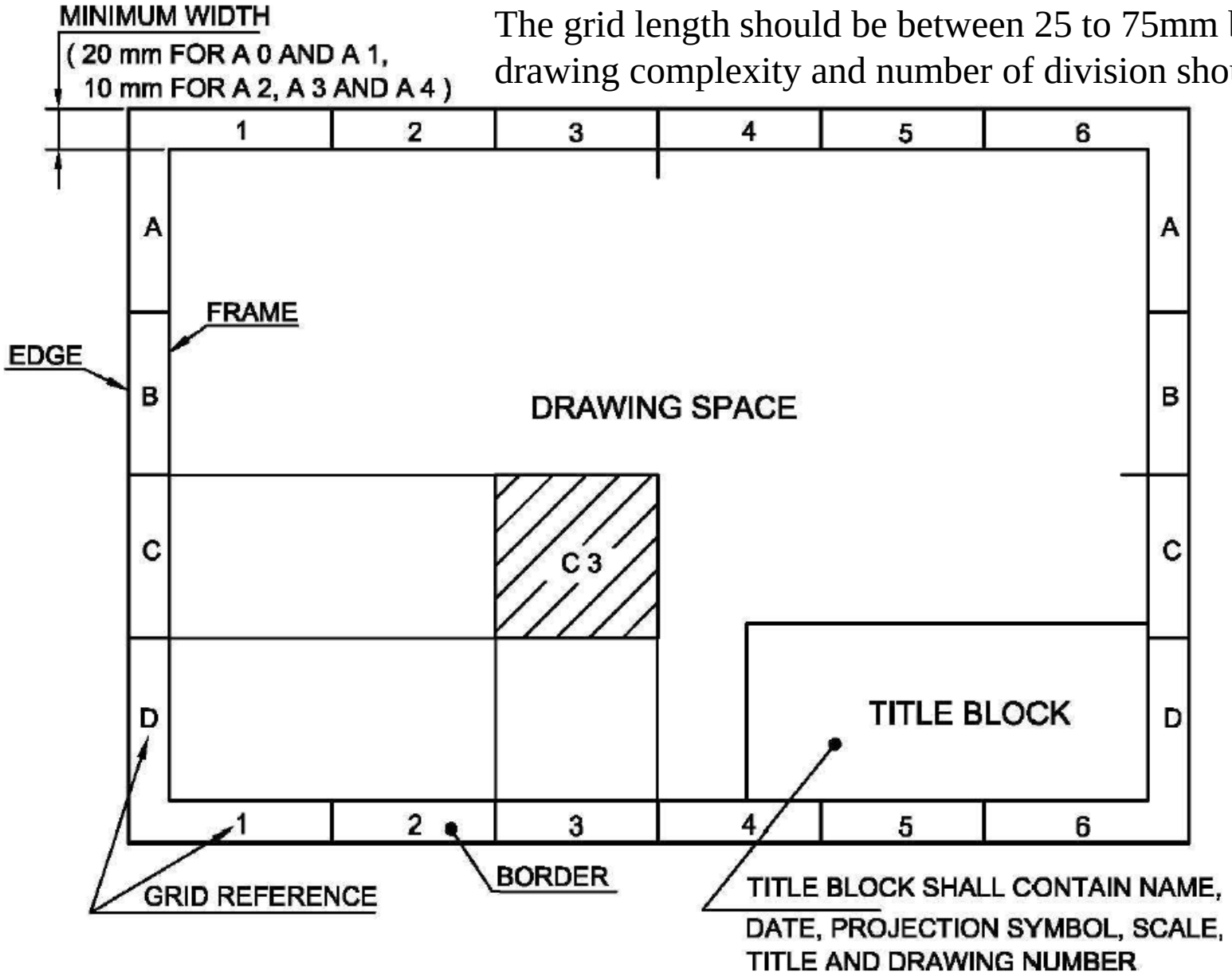
Frequently used sizes:

Paper Size	Width (mm)	Length (mm)	Area (m^2)
A0	841	1189	1
A1	594	841	0.5
A2	420	594	0.25
A3	297	420	0.125
A4	210	297	0.0625



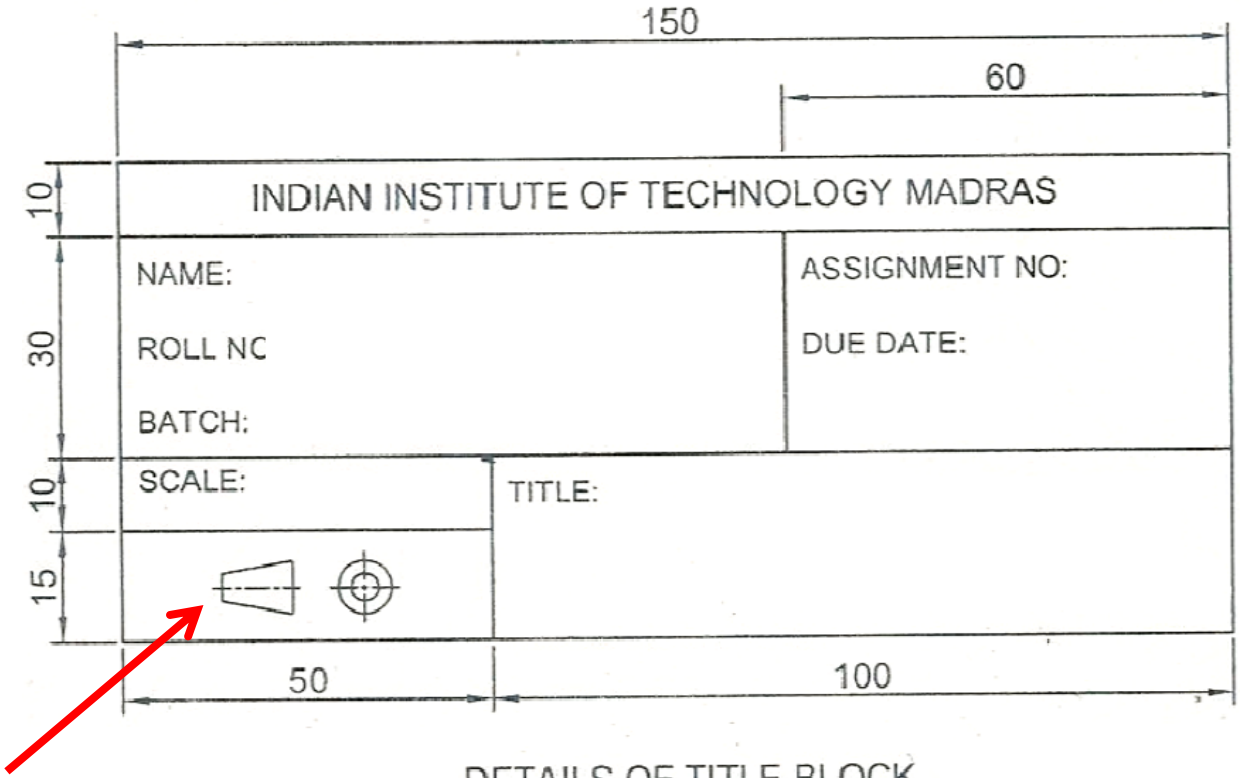
Drawing Sheet Layout

The grid length should be between 25 to 75mm based on the drawing complexity and number of division should be even.



Title Block Layout

Title block shall contain the student's name, date of exercise, projection symbol, scale title, and drawing number.



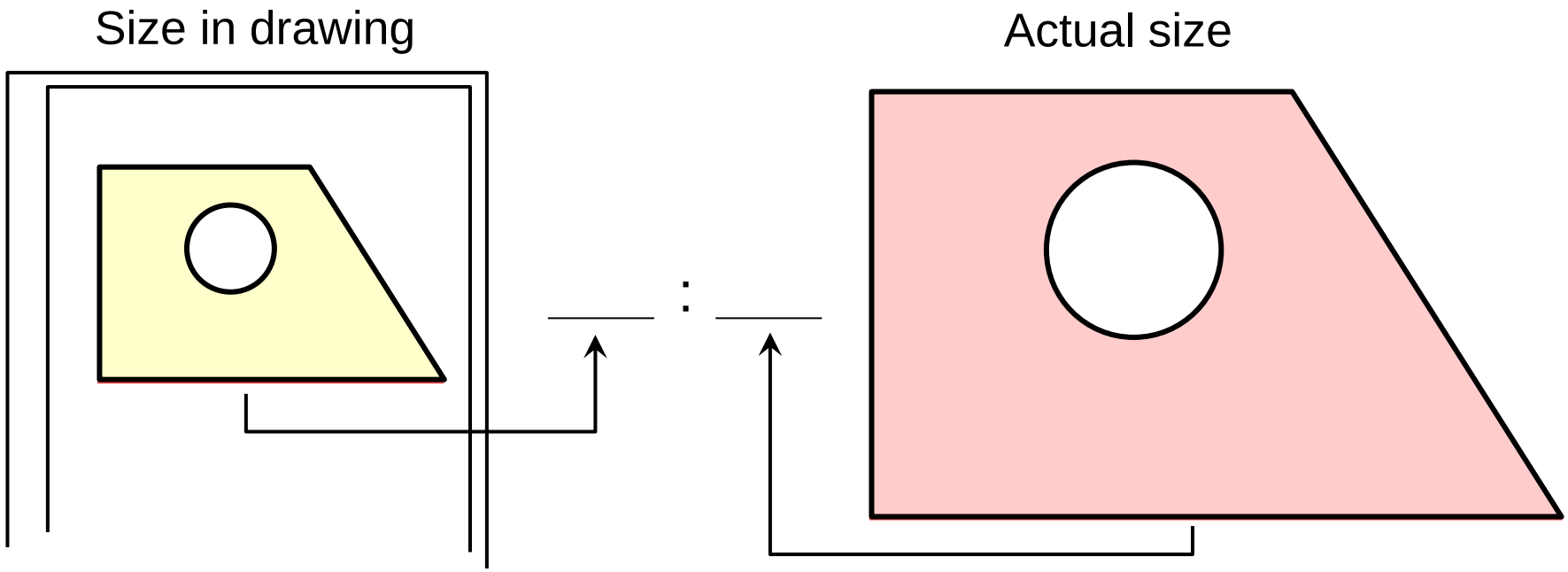
DETAILS OF TITLE BLOCK
(Suggested for students)

ALL DIMENSIONS IN mm

Symbol of Projection Method

Drawing Scales

Scale is defined as the ratio of the linear dimensions of the object as represented in a drawing to the actual dimensions of the object.



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.

Drawing Scales

Actual

SCALE 1:1 for full size

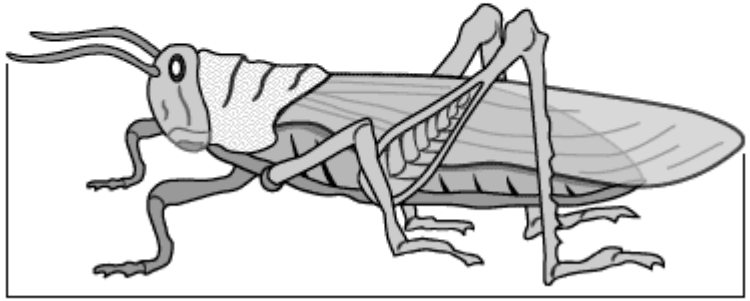
SCALE **X**:1 for ***enlargement*** scales (X > 1)

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

Scale of 1:1

Scale of 1:2

Drawing



Scale of 2:1

Exercise: A mural of a dog was painted on a wall. The height in the mural was 45 ft. If the average height for this breed of dog is 3 ft., what is the scale factor?

Solution: 15:1

Lettering and Dimensioning

Text styles on the drawing must have the following two properties:

Legibility

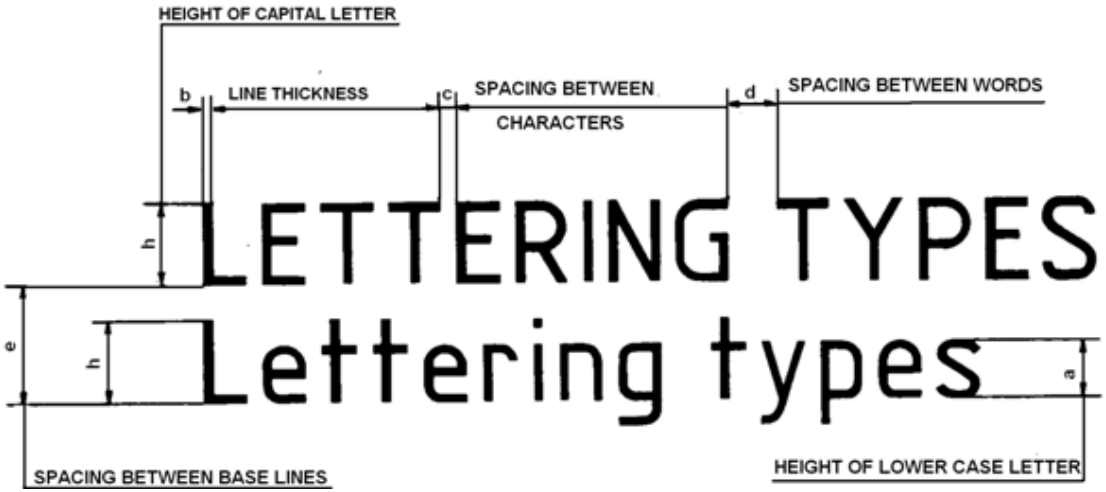
- Shape
- Space between letters
- Space between words

Uniformity

- Size (or text height)
- line thickness

Examples

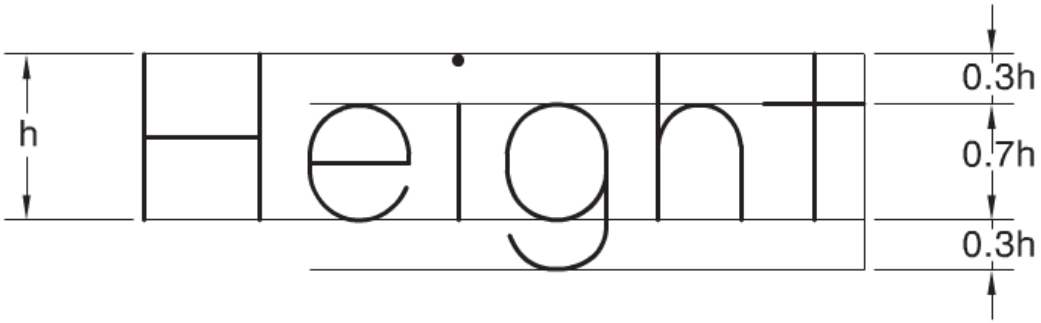
Lettering Height



Specifications	Value	Size (mm)					
Capital letter height	h	3.5	5	7	10	14	20
Lowercase letter height	a = (7/10)h	2.5	3.5	5	7	10	14
Thickness of lines	b = (1/10)h	0.35	0.5	0.7	1	1.4	2
Spacing between characters	c = (1/5)h	0.7	1	1.4	2	2.8	4
Min. spacing b/n words	d = (3/5)h	2.1	3	4.2	6	8.4	12
Min. spacing b/n baselines	e = (7/5)h	5	7	10	14	20	28

Lettering Height

1. Lettering type B (Refer to BIS SP46, 2003 for details)
2. Main title: h = 7 mm
3. Subtitles: h = 5 mm
4. Dimensions and notes: h = 3.5 mm



Basic Line Types

Types of Lines	Appearance	Name according to application
Continuous thick line		Visible line
Continuous thin line		Dimension line Extension line Leader line
Dash thick line		Hidden line
Chain thin line		Center line

NOTE : Other types of line will be introduced in the practical sessions.

What do these Lines represent?

Visible lines represent features that can be seen in the current view

Hidden lines represent features that can not be seen in the current view

Center line represents symmetry, path of motion, centers of circles, axis of axi-symmetrical parts

Dimension and Extension lines indicate the sizes and location of features on a drawing

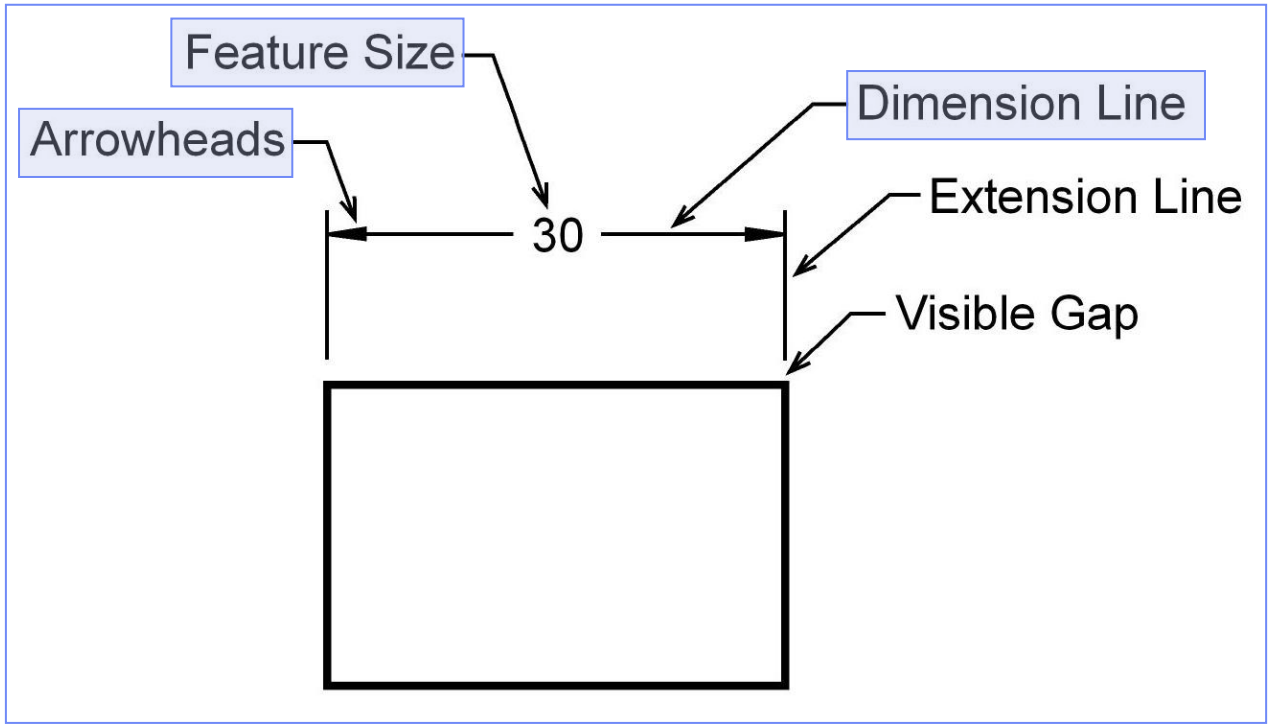
Lines used in Dimensioning

- Dimensioning requires use of the following line types:
  - Dimension lines
  - Extension lines
  - Leader lines

- All these three types of lines are drawn ***thin*** so that they will not be confused with visible lines.

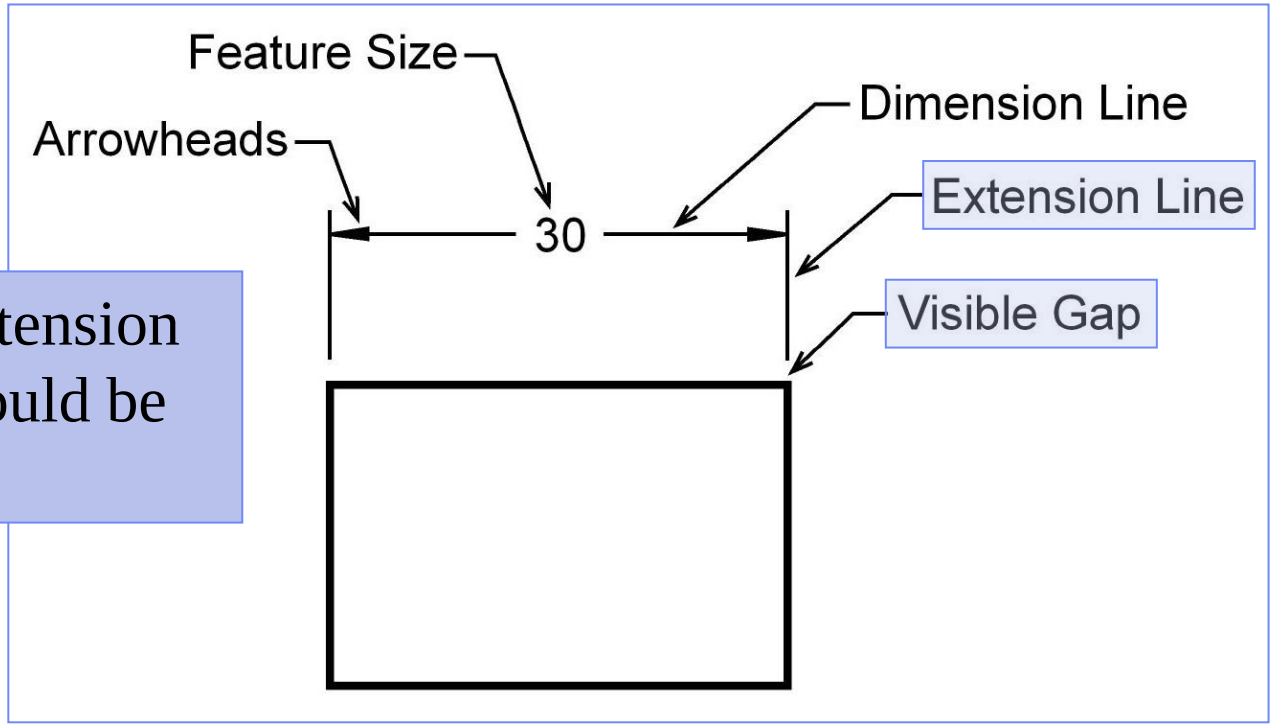
Dimension Line

- **Dimension Line:** A line terminated by arrowheads, which indicates the direction and extent of a dimension.



Extension Line

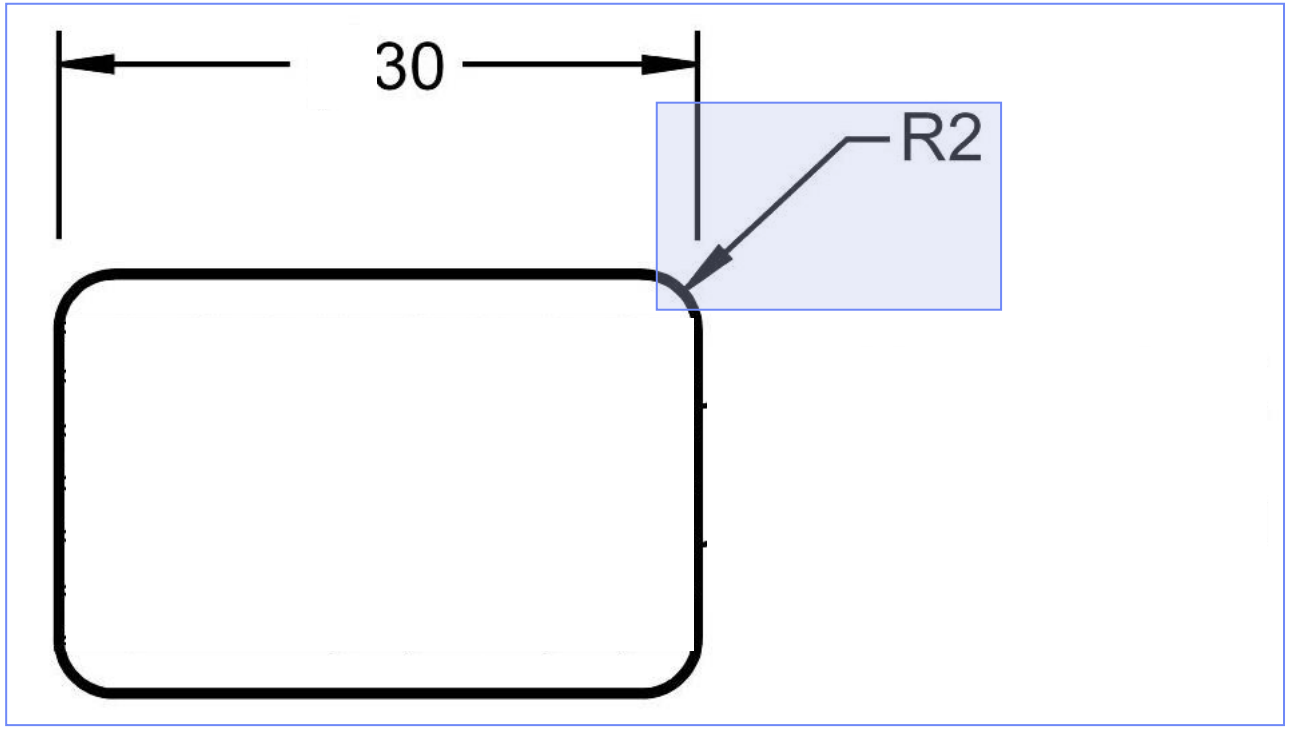
- **Extension line:** A thin solid line that extends from a point on the drawing to which the dimension refers.



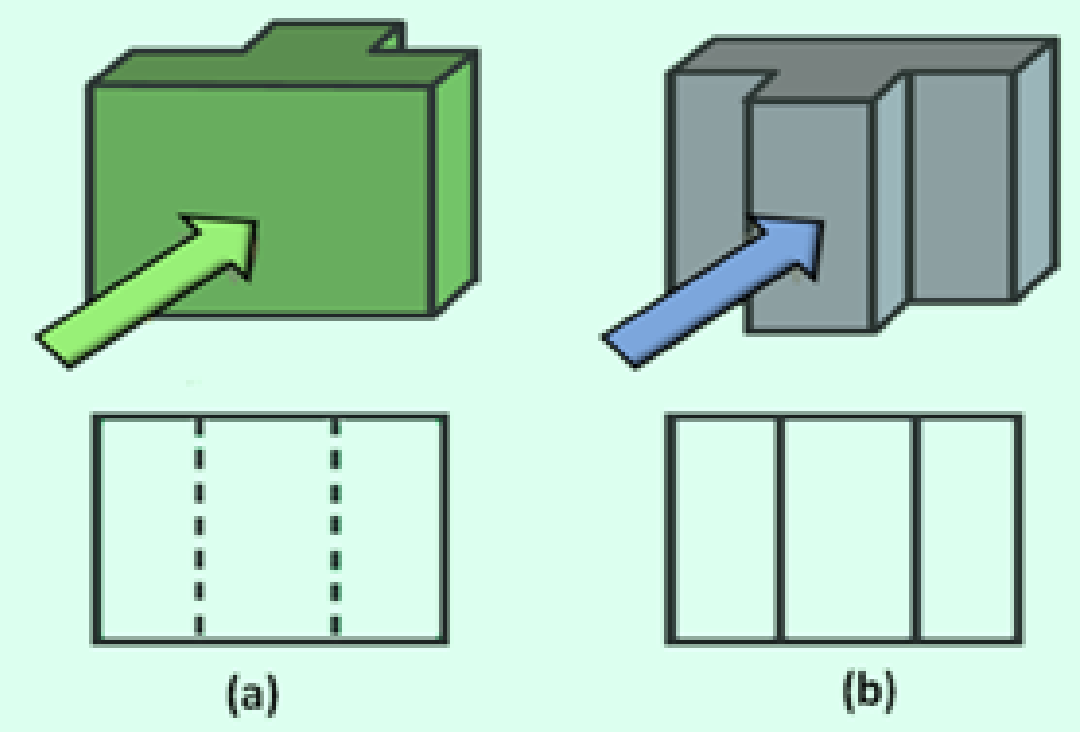
Long extension lines should be avoided.

Leader Line

- **Leader Line:** A straight inclined thin solid line that is usually terminated by an arrowhead.

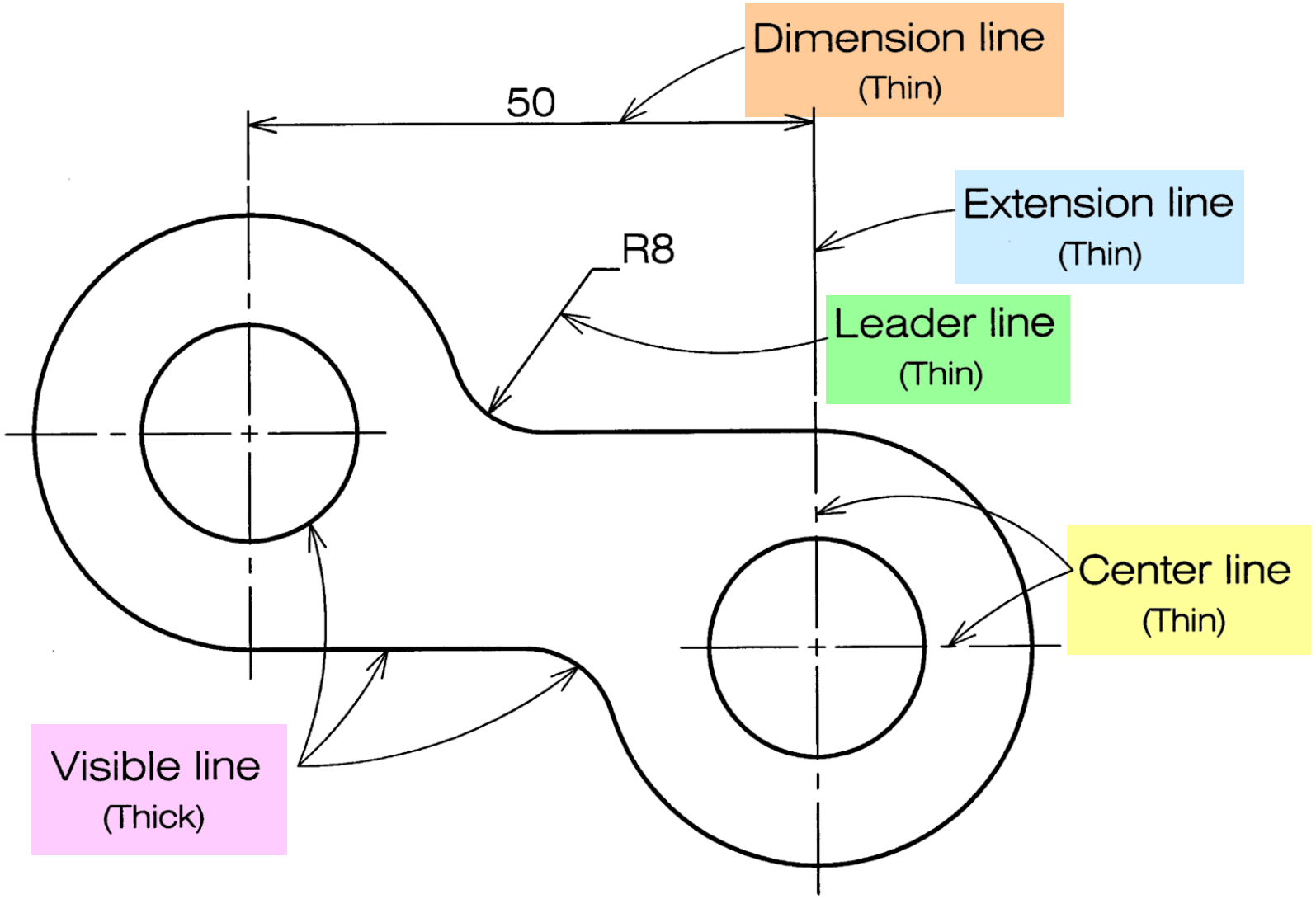


Example



Hidden Line vs. Visible Line

Example


Dimension line
(Thin)
50
Extension line
(Thin)
R8
Leader line
(Thin)
Center line
(Thin)
Visible line
(Thick)

Guidelines

LINES, LETTERING AND DIMENSIONING

LINE TYPES

Sl. No	LINE TYPE	APPLICATION	PENCIL TYPE
1	Continuous thick ———	Visible edges, Visible outlines	H (Medium grade)
2	Continuous thin ———	Construction lines, Guide lines, Projection lines, Dimension lines, Extension lines, Leader lines and Hatching lines	2H (Hard grade)
3	Dashed thick - - - - -	Hidden outlines, Hidden edges	H
4	Chain thin —·—·—	Center lines, Axes, Lines of symmetry, Trajectories and Pitch circles	2H
5	Continuous thin free hand ~~~	Limits of partial or interrupted views	2H
6		Border lines, Lettering and Free hand skecthing	HB (Soft grade)

SCALES

TYPE	RECOMMENDED		
Enlargement scale	50:1	20:1	10:1
	5:1	2:1	-
Full size	1:1		
Reduction scale	1:2	1:5	1:10
	1:20	1:50	1:100
	1:200	1:500	1:1000
	1:2000	1:5000	1:10000

$$\text{Scale of a drawing / Representative fraction} = \frac{\text{Drawing length of an element}}{\text{Actual length of that element}}$$

(PTO)

Guidelines

LETTERING

Recommended letter sizes

2.5 mm & 3.5 mm - For Dimensioning & Marking

5 mm - For Writing notes & Subtitles

10 mm - For Title of the Drawing

Lettering Types:

1) Vertical single stroke letters

2) Inclined single stroke letters

Shape identification symbol for dimensioning

Ø - Diameter

R - Radius

□ - Square

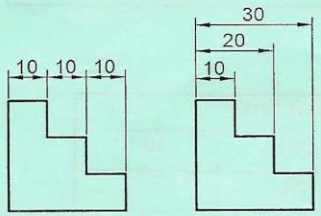
SØ - Spherical diameter

SR - Spherical radius

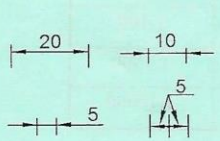
Lettering sizes ratio:

Height of the Upper case letters 'h'	(14/14) h	2.5	3.5	5	7	10	14	20
Height of the Lower case letters 'c'	(10/14) h	-	2.5	3.5	5	7	10	14

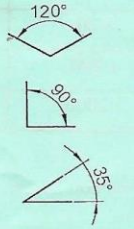
DIMENSIONING METHODS



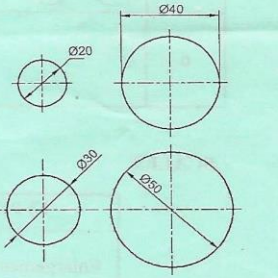
Chain dimensioning Parallel dimensioning



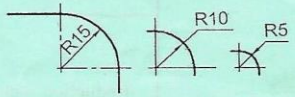
Linear dimensioning



Angular dimensioning



Diameter dimensioning for circles



Radius dimensioning for arcs

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30/01/2018