

ENGINEERING GRAPHICS

INTRODUCTION



Engineering Drawing

- Engineering Drawing is the language of Engineers.
- It is a graphical language used for effective communication among engineers.



ENGINEERING GRAPHICS

- Graphical representation of an object containing details like shape, size etc., is called as Engineering Graphics.

DRAFTING TOOLS



1. Drawing Board
2. Mini drafter or T- square
3. Drawing Instrument box
4. Drawing Pencils
5. Eraser
6. Templates
7. Set squares



8. Protractor
9. Scale Set
10. French curves
11. Drawing clips
12. Duster piece of cloth (or) brush
13. Sand-paper (or) Emery sheet block
14. Drawing sheet

Drawing Board (IS 1444 : 1989)

- **Standard Size : 650mm x 470mm**

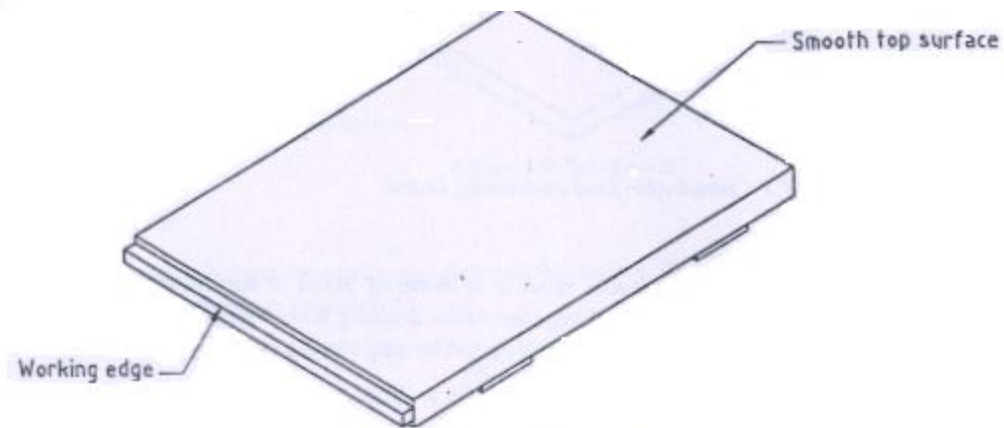


Figure 1.2 Drawing board



Mini Drafter

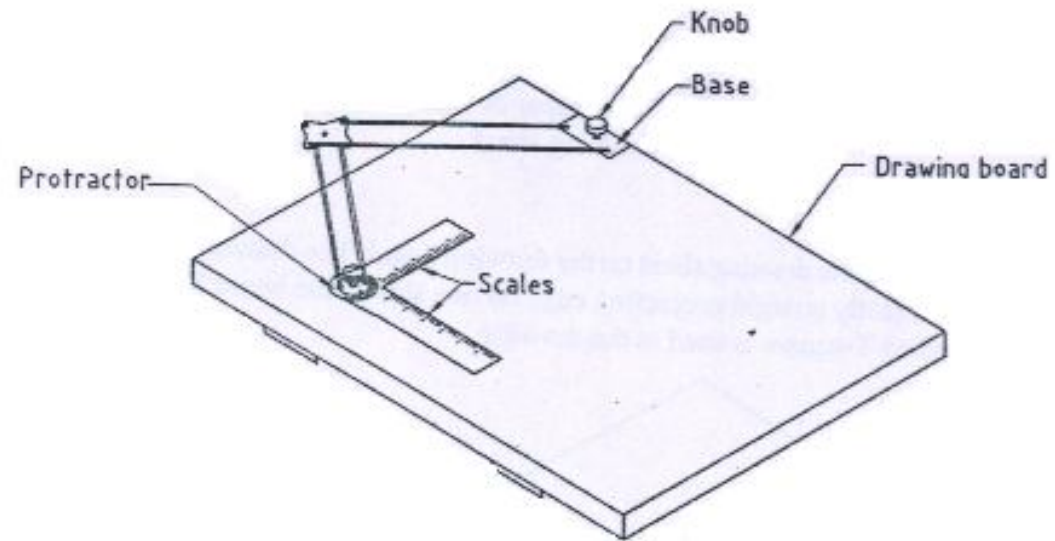


Figure Minidrafter fixed on drawing board

T- Square

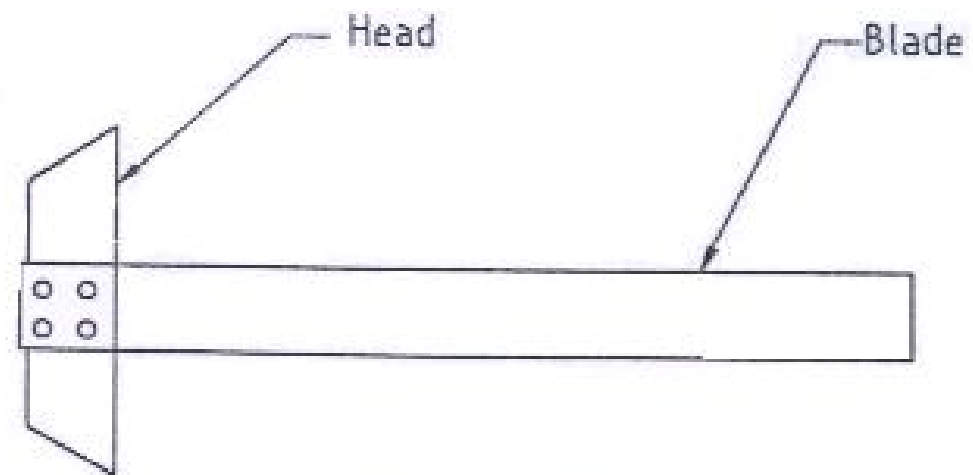


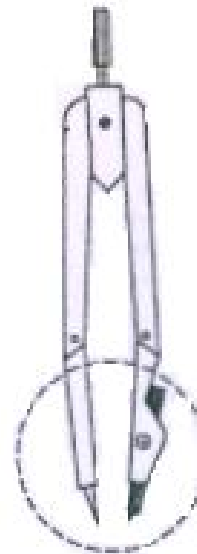
Figure T-square

Drawing Instrument Box

- Compass and Divider



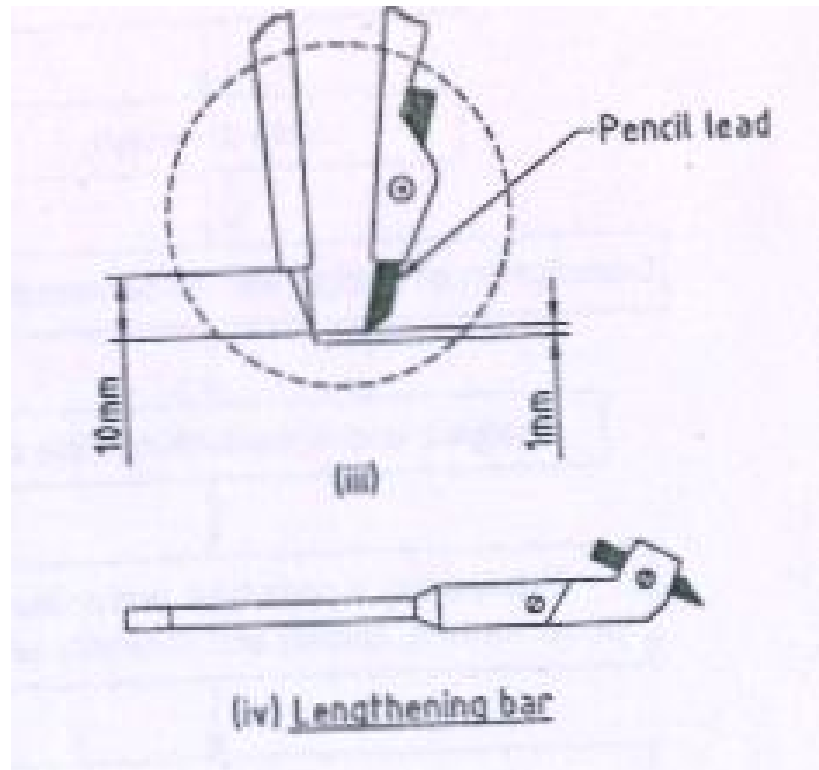
(i) Large size divider



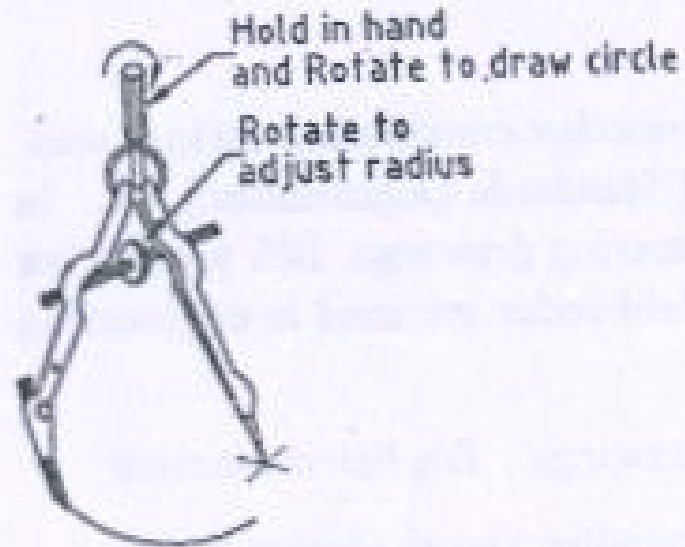
(ii) Large size compass



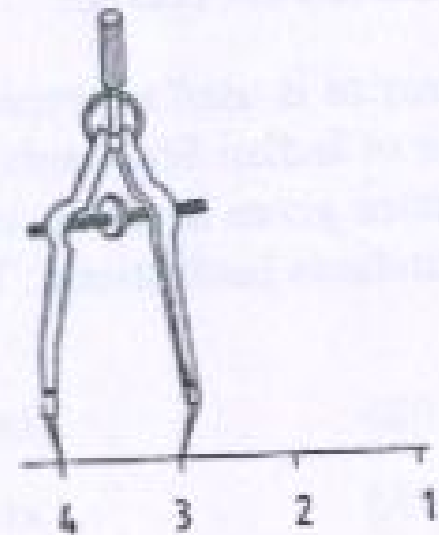
Lengthening bar



Bow Compass & Bow Divider



(i) Small bow compass



(ii) Small bow divider

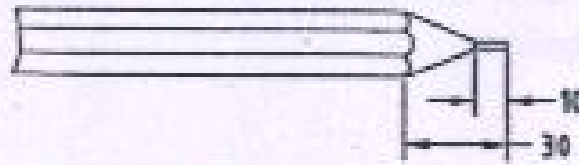
Drawing Pencils

■ TYPES OF PENCILS

- HB - (*Soft grade*) ... Used for drawing Border Lines, Lettering and Freehand sketching
- H - (*Medium grade*) Used for Visible outlines, Visible edges and Boundary lines
- 2H - (*Hard grade*) ... Used for Construction lines, Dimension lines, Leader lines, Extension lines, Center lines, Hatching lines and Hidden lines

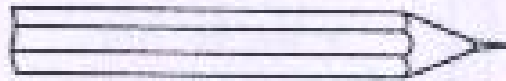


Drawing Pencils



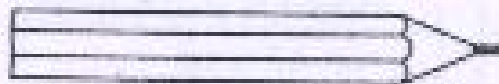
Cut the wood from
unlettered end

(i)



Shape the lead as conical point

(ii)



Shape the lead as wedge or chisel point

(iii)

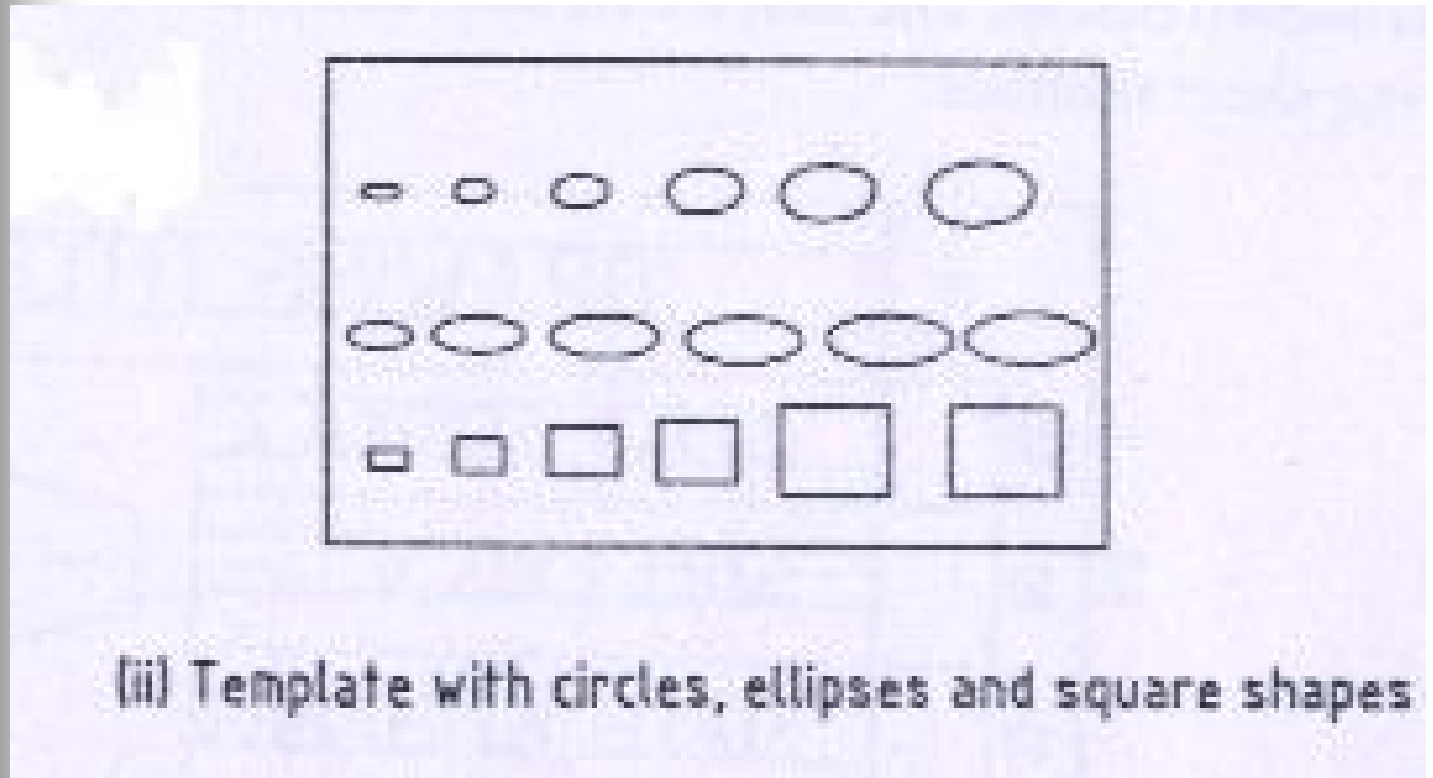


Micro tip Pencil

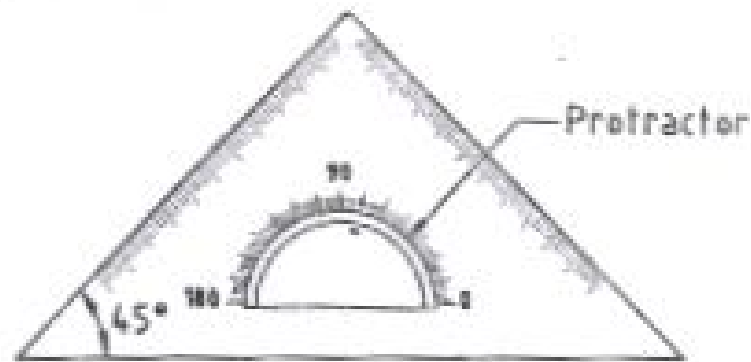


(i) Mechanical or microtip pencil (lead holder)

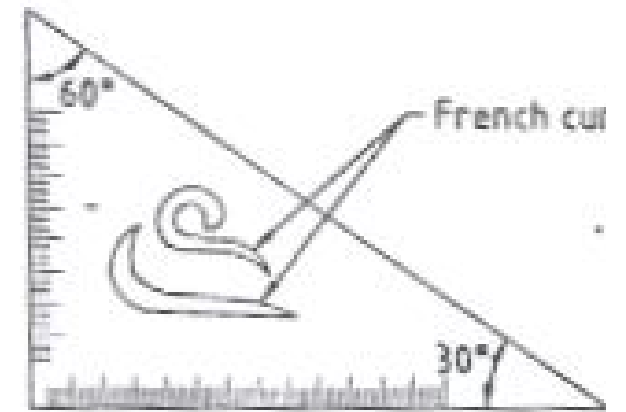
Templates



Set Squares



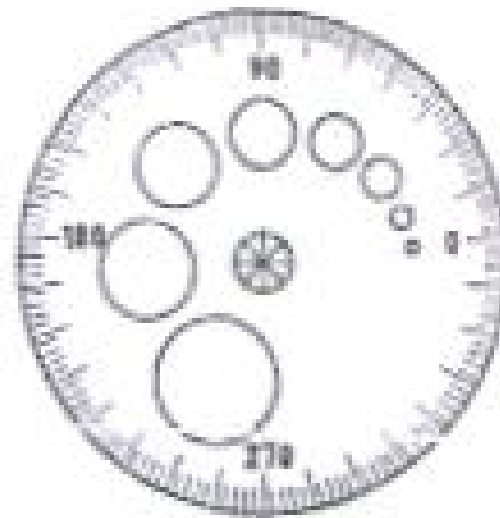
45° triangle with protractor



30°-60° triangle with french curve

Figure Set squares

Protractor with Pro circles



Protractor with procircles

French Curves

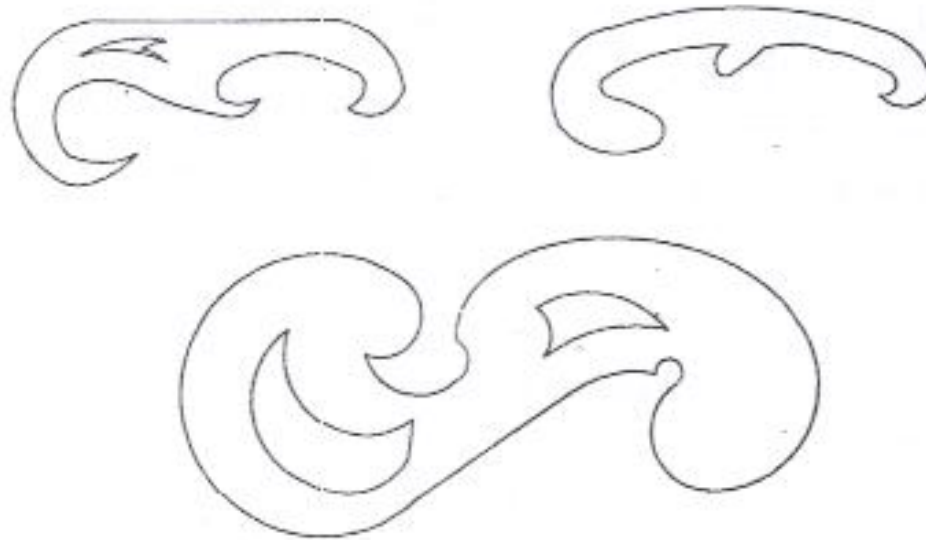


Figure French curves

Drawing Sheets (IS 10711 : 2001)

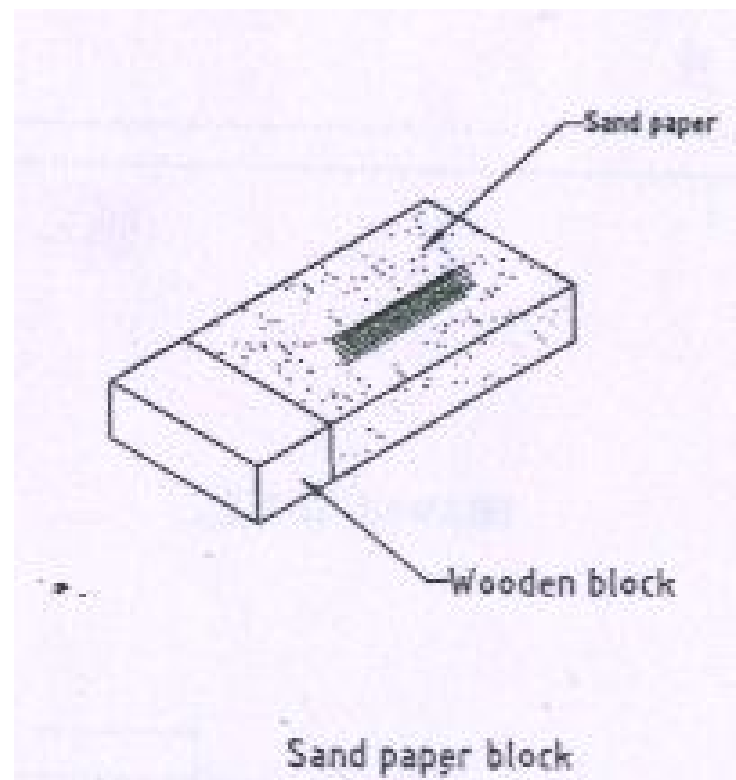
* A2 Size is preferred

** A3 Size is preferred for practice & examination

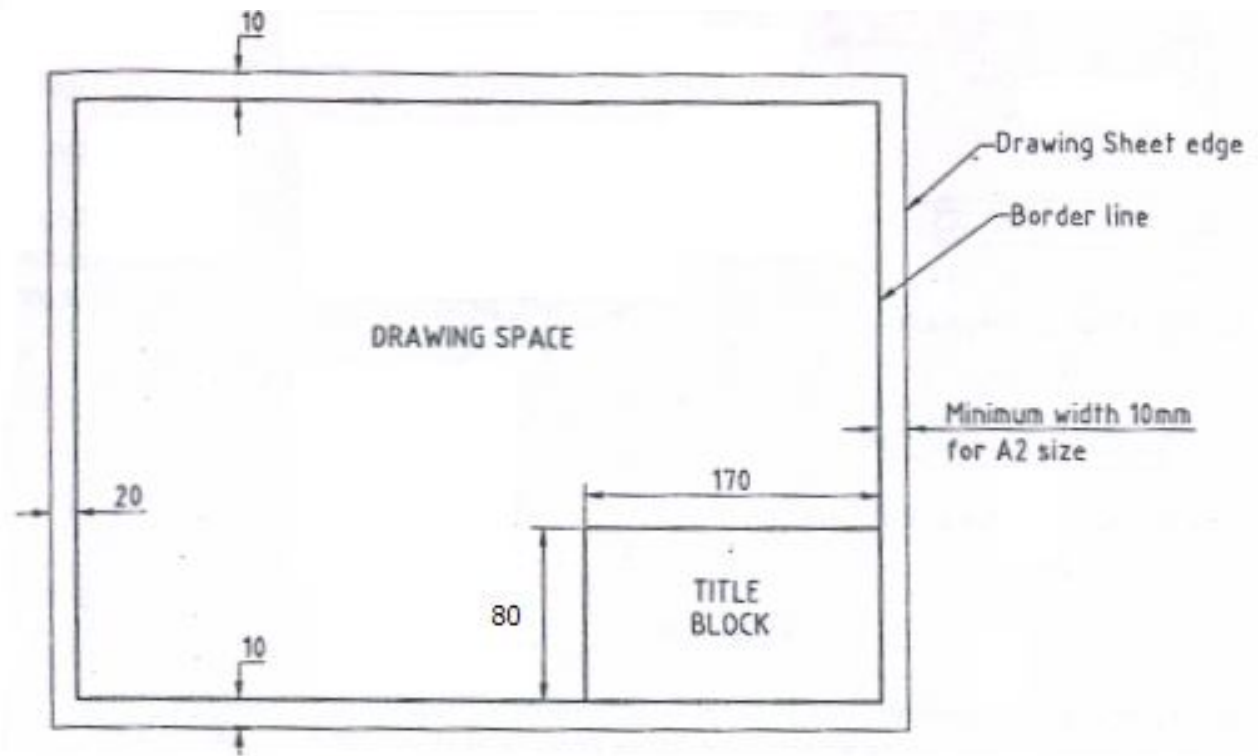
Designation	Dimension, mm Trimmed size
A0	841 x 1189
A1	594 x 841
A2 *	420 x 594
A3 **	297 x 420
A4	210 x 297



Sand Paper (or) Emery sheet Block



Layout of Trimmed Drawing Sheet



Title Block

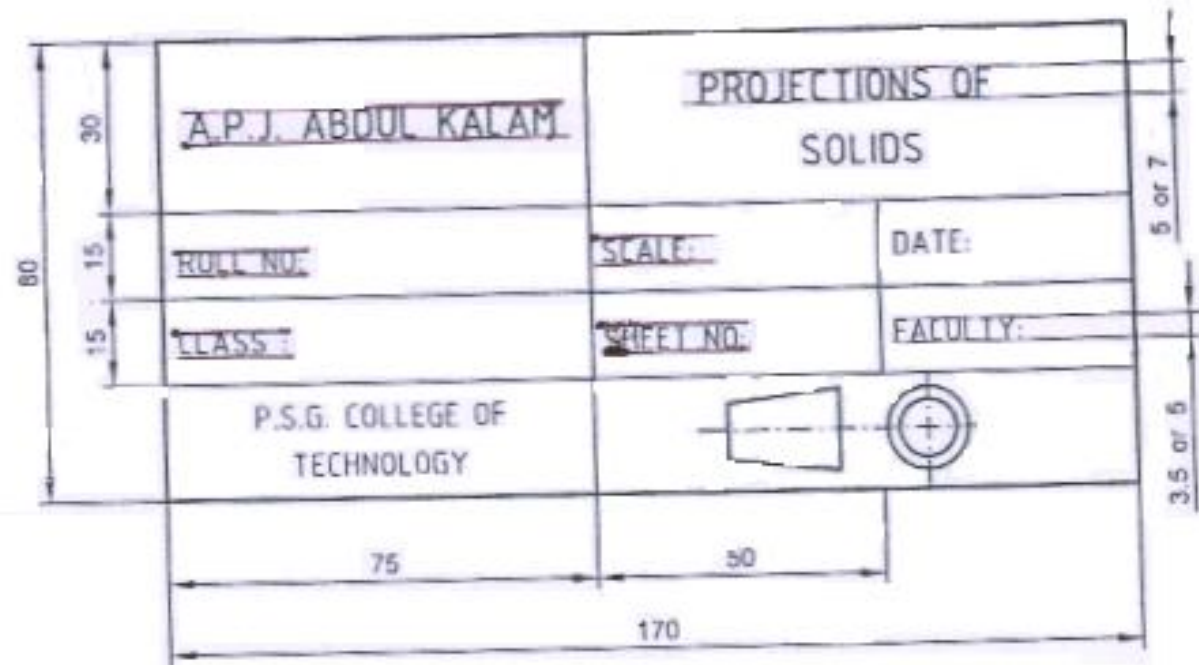






FIG SUGGESTED TITLE BLOCK FOR CLASS WORK

Types of Lines and their Applications [IS 10714 (Part 20) :2001]



LINE DESCRIPTION AND REPRESENTATION	APPLICATIONS
CONTINUOUS NARROW LINE 	Dimension lines, Extension lines
	Leader lines, Reference lines
	Short center lines
	Projection lines
	Hatching
	Construction lines, Guide lines
	Outlines of revolved sections Imaginary lines of intersection
CONTINUOUS WIDE LINE 	Visible edges, Visible outlines Main representations in Diagrams, Maps, Flow charts
DASHED NARROW LINE 	Hidden edges Hidden outlines
LONG-DASHED DOTTED NARROW LINE 	Center lines / Axes, Lines of symmetry Cutting planes (Line 04.2 at ends and changes of direction)

It is recommended to use only one type of line on one drawing.



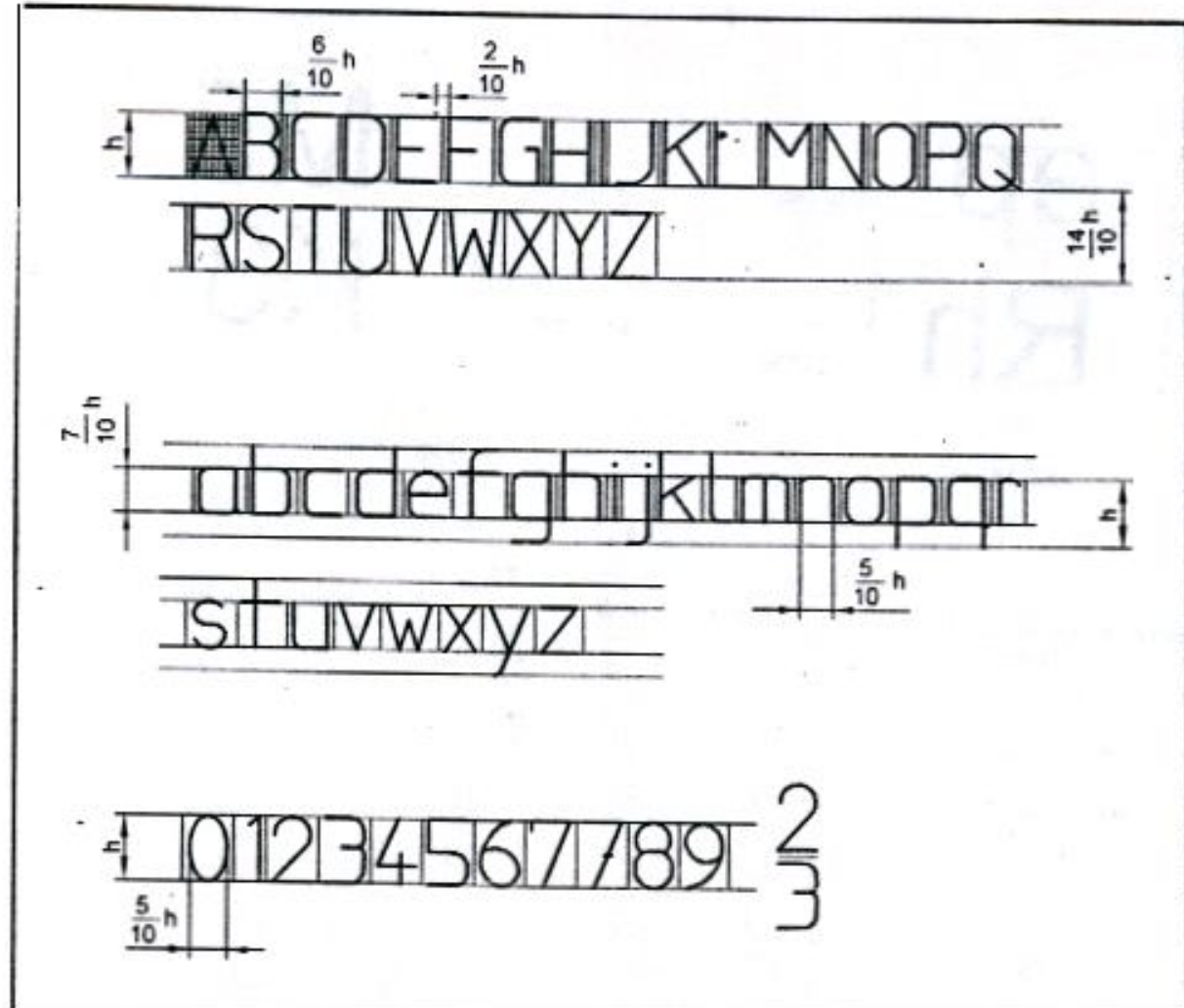
LETTERING [IS 9609 – 2001]

■ SIZE OF LETTERS

Recommended Size (height h) of Letters / Numerals

MAIN TITLE	:	5 mm or 7 mm or 10 mm
SUB-TITLES	:	3.5 mm or 5 mm
Dimensions, Notes, etc.,	:	2.5 mm, 3.5 mm or 5 mm

LETTERING PRACTICE



DIMENSIONING

■ ELEMENTS OF DIMENSIONING

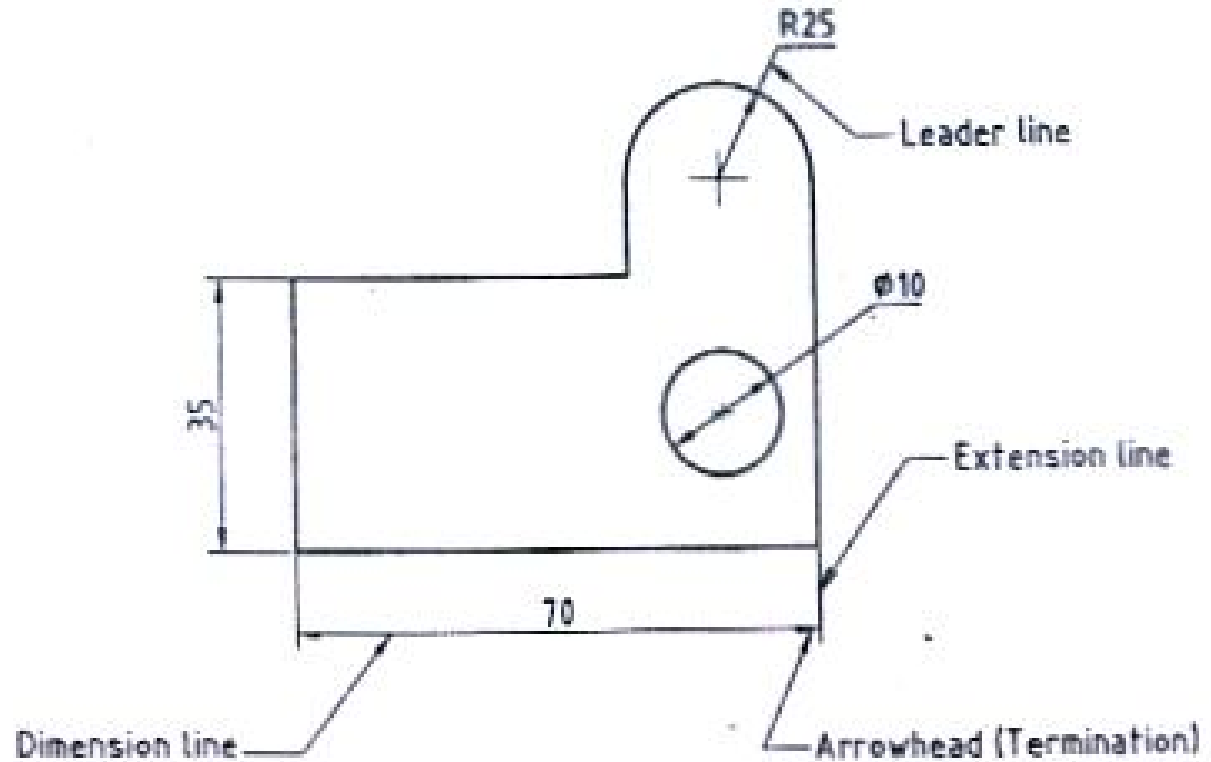
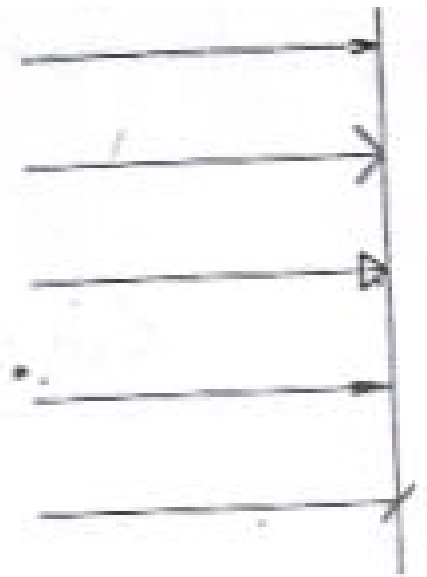


Figure Elements of dimensioning

Arrow heads

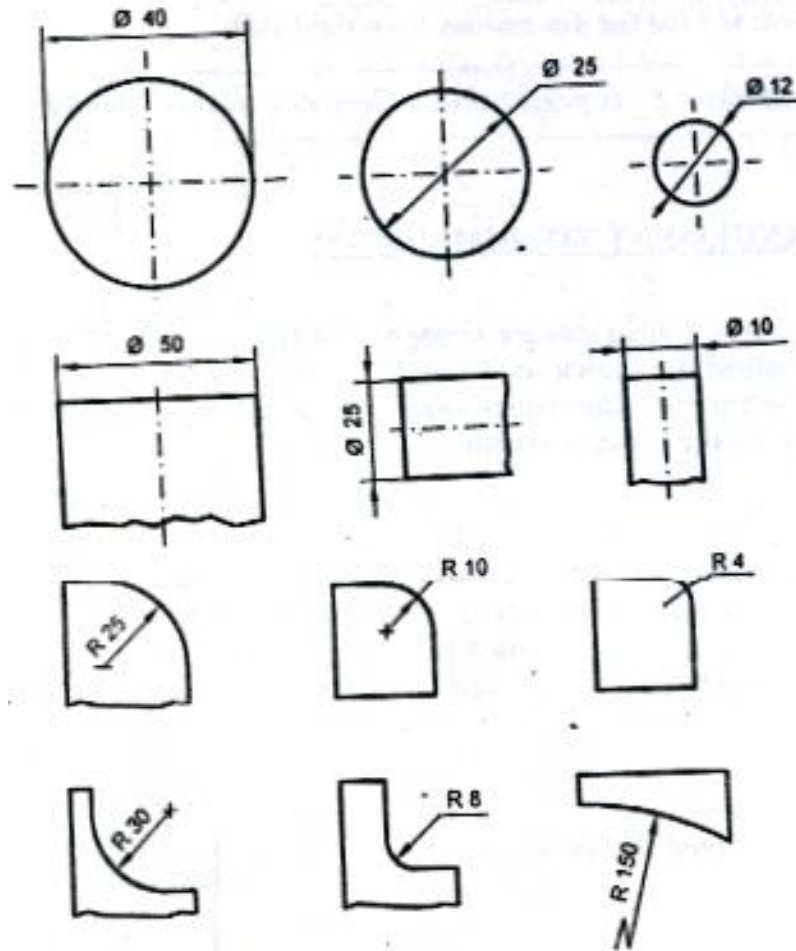
- TYPES
- a) Open type
- b) Closed type
- c) Closed filled
- d) Oblique stroke



(i) Arrow heads

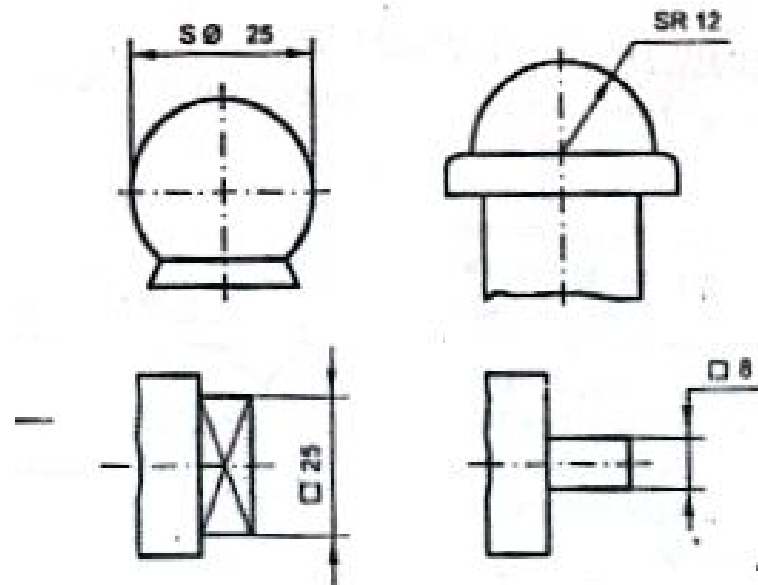


SYMBOLS FOR SHAPE INDICATION





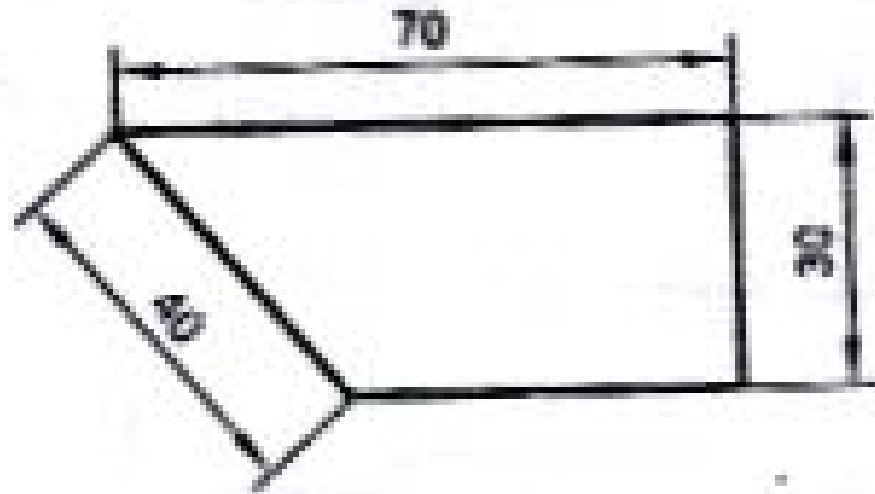
- R : Radius □ Square
- SR: Spherical Radius ϕ = Diameter





METHODS OF DIMENSIONING

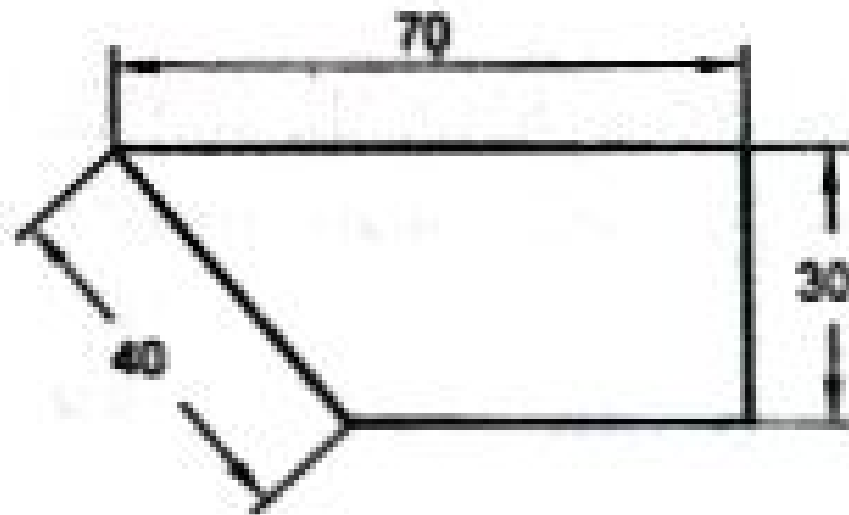
■ METHOD – I



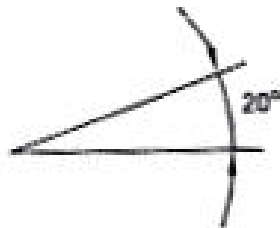
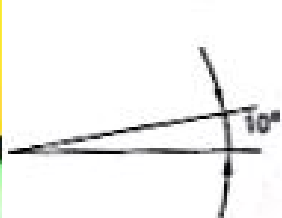


Note: Only one method should be used on a drawing.

■ METHOD – II

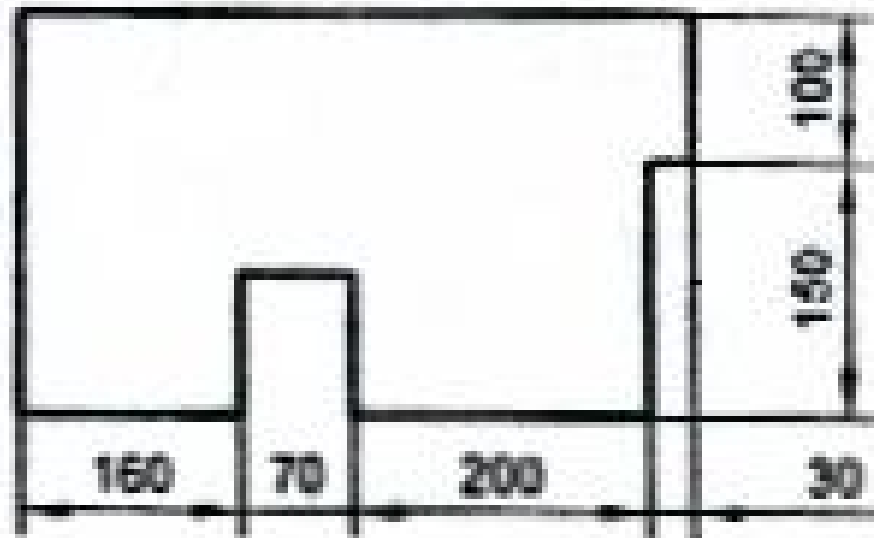


ANGULAR DIMENSIONS



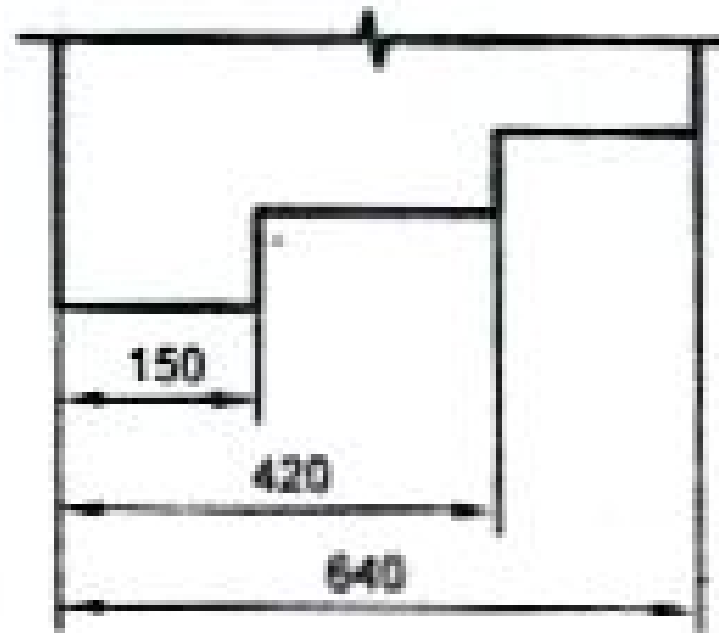
ARRANGEMENT OF DIMENSIONS

■ CHAIN DIMENSIONING





■ PARALLEL DIMENSIONING





■ COMBINED DIMENSIONING

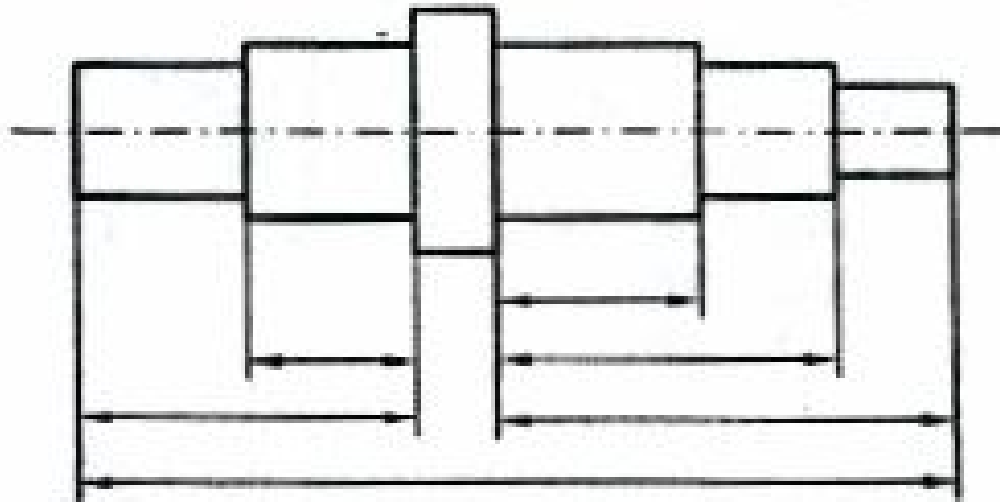
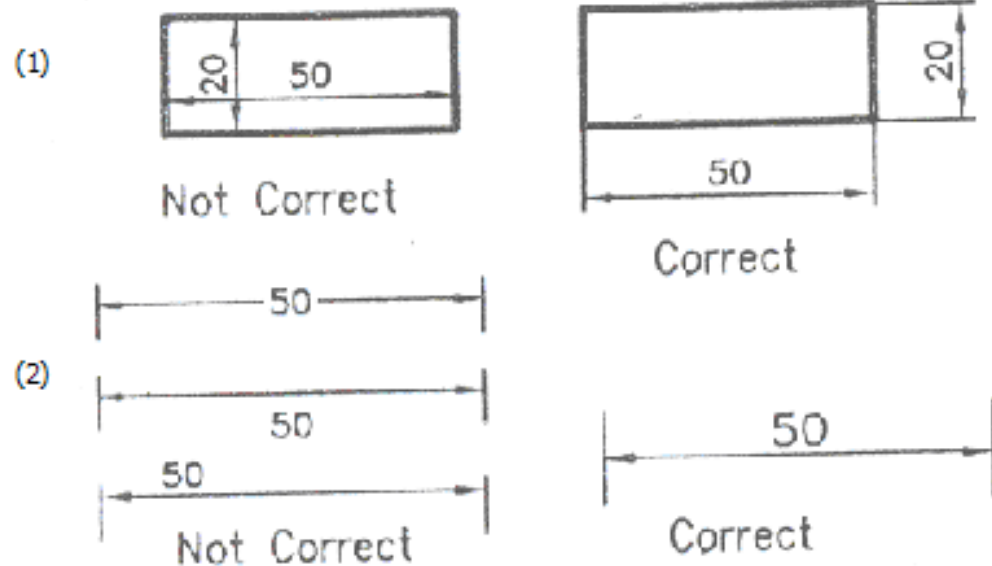


Illustration of Principles of Dimensioning

1. Place the dimensions outside the views.
2. Place the dimension value above the horizontal line near the middle.



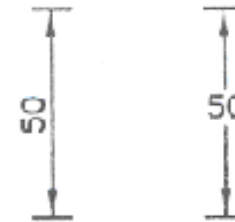


3. Dimensioning a vertical line

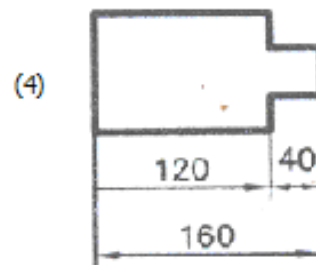
4. When an overall dimension is shown, one of the intermediate dimensions should not be given.



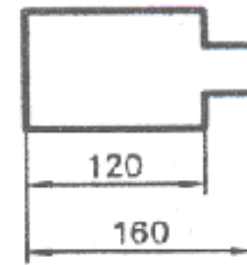
Not Correct



Correct



Not Correct



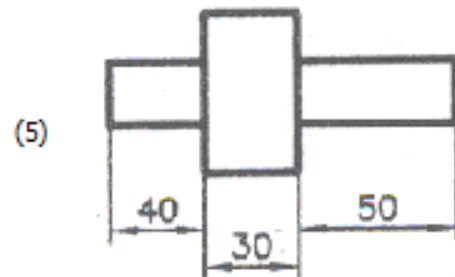
Correct



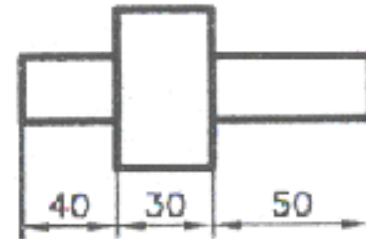
5. Arrange a chain of dimensions in a continuous line.

6. Arrowheads should touch the projection lines.

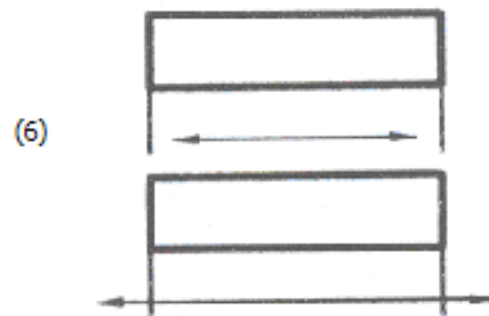
Not Correct



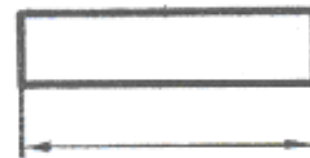
Correct



Not Correct



Correct



Not Correct

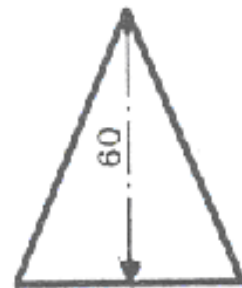
Correct



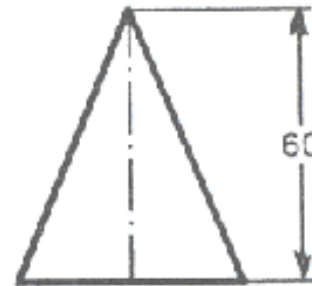
7. Centre line should not be used as a dimension line.

8. Do not repeat the same dimension in different views.

(7)

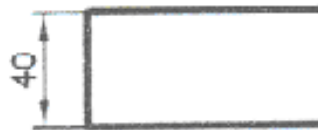


Not Correct



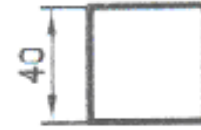
Correct

(8)



FRONT VIEW

Not Correct



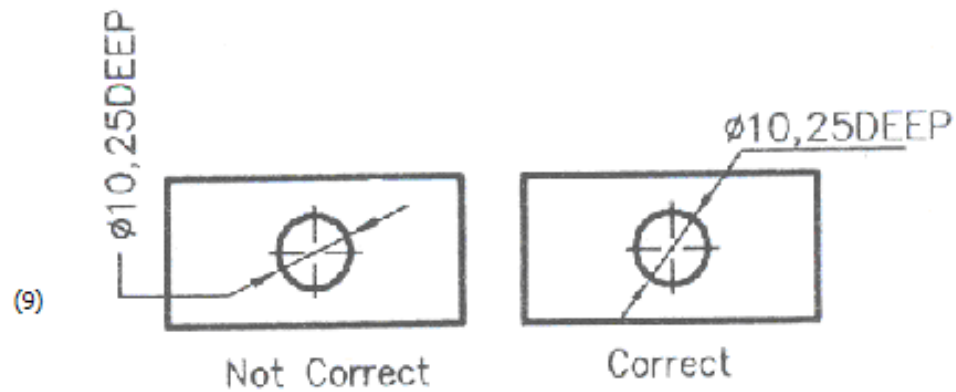
L.S.-VIEW

Correct



9. Indicate the depth of the hole as notes written horizontally.

10. Diameter and radius symbols should be placed before the values.



40ø , 50R

ø40, R50

(10) 20SR

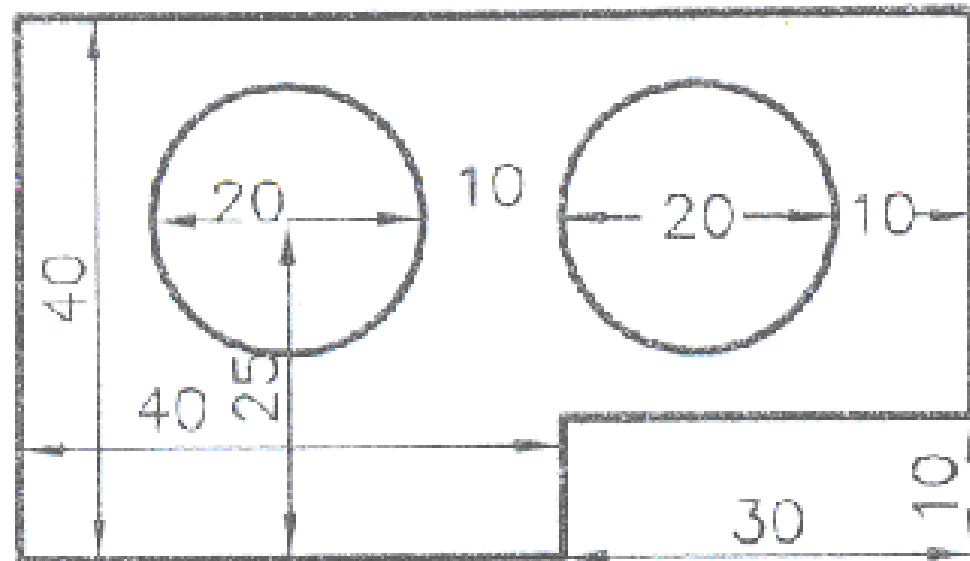
SR20

Not correct

Correct

Dimensioning (Example-1)

- Read the dimensioned drawing shown in fig. Redraw the same to full size and dimension it as per Indian Standards.

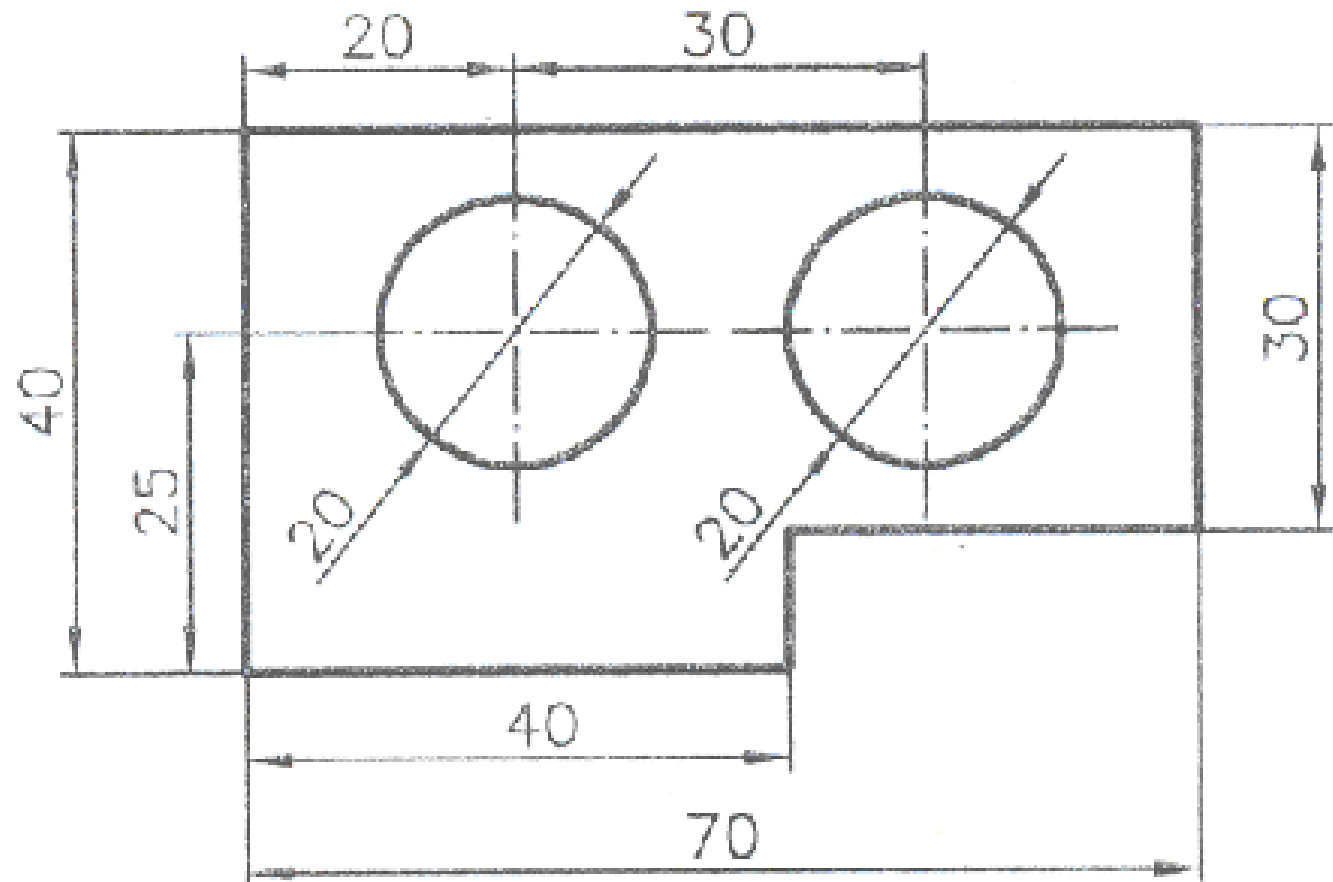


Mistakes in the given drawing



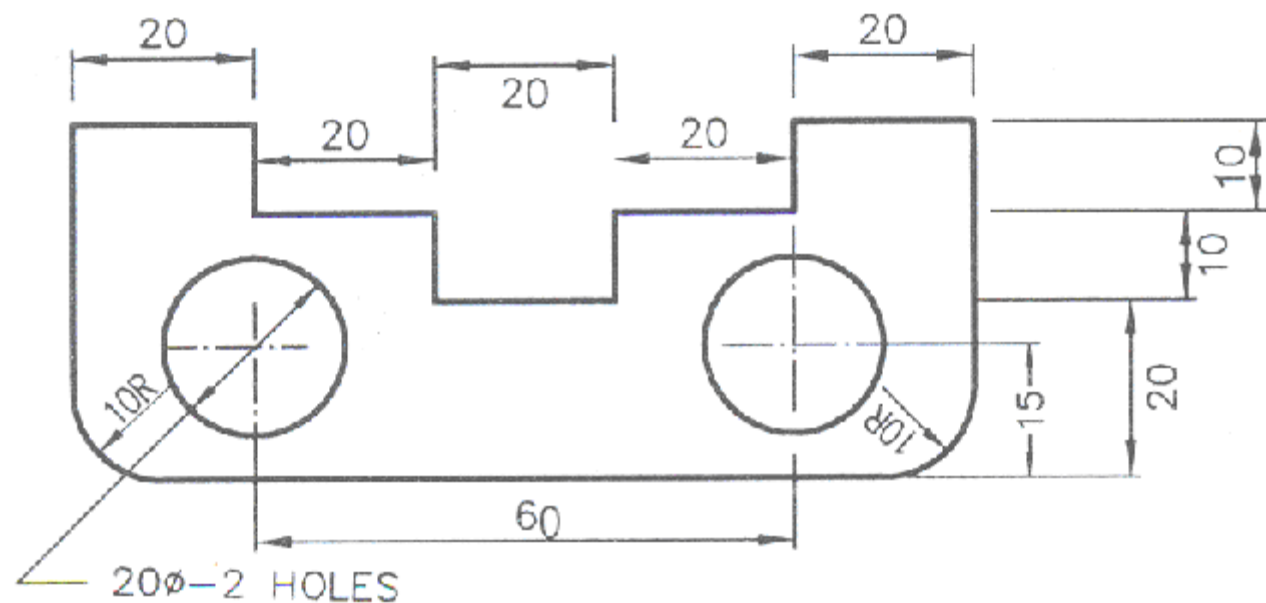
1. A number of dimensions are placed inside the drawing.
2. Some dimension lines cross some other dimension lines.
3. Diameter of the holes is not indicated properly.
4. Centre lines of the holes are not shown properly.
5. Extensions of outlines of the drawing are used as dimension lines which is not permissible.
6. The dimensions inside the drawing are not given from a base line or the centre line of holes.
7. Some horizontal dimension lines are broken for placing dimension values. This is not correct.

Figure with correct dimensions



Dimensioning (Example -2)

Read the dimensioned drawing shown in fig. Redraw it to full size and dimension it as per Indian Standards.

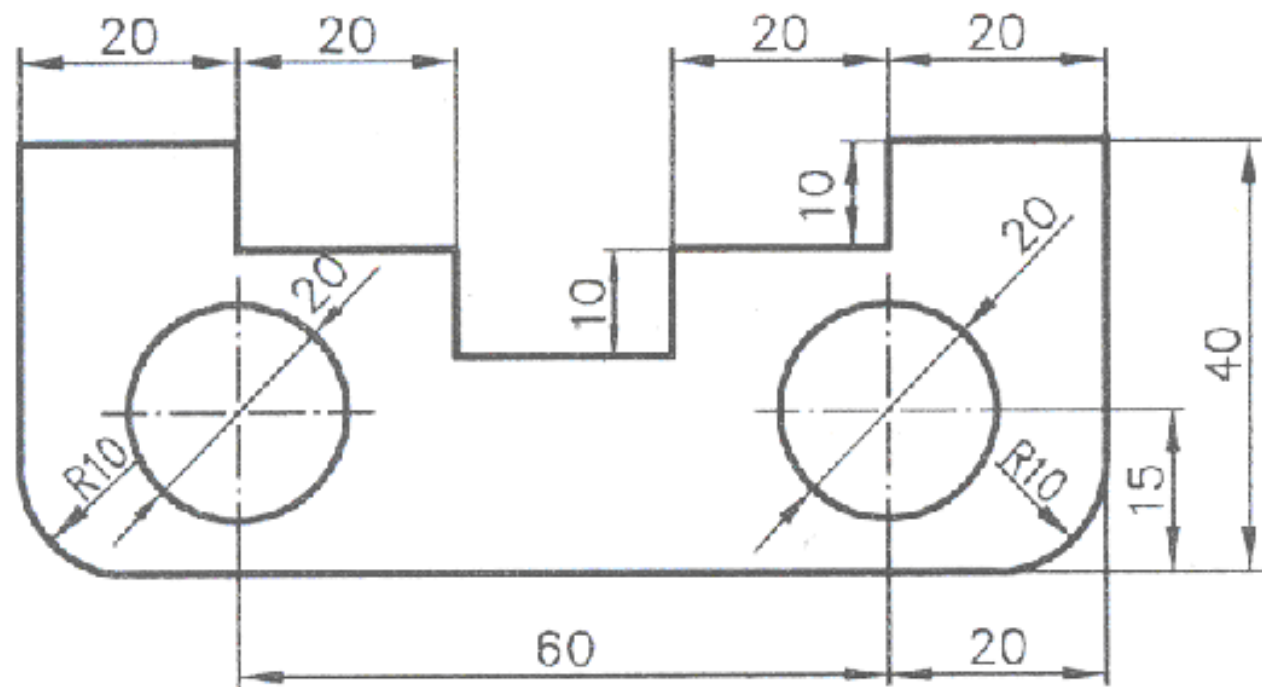


Mistakes in dimensioning

1. Arrangement of dimensions is not proper. They are arranged in a stepped manner.
2. Dimension for the radius is not shown properly.
3. Dimension for the hole is not written in the correct form.
4. Placing of vertical dimensions is not uniform.
5. Some dimension figures are not placed above the dimension lines.
6. Centre lines for the holes are not drawn properly.
7. There is gap between projection lines and outlines of the drawing which is not acceptable.



Figure with correct dimensions





Thank You