Engineering Drawing Principles L-2

IIITM Gwalior

Marks Distribution

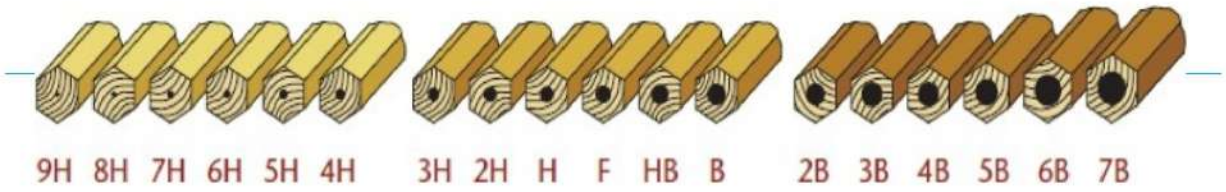
S.No.	Component	Distribution
1	Attendance/Quiz/Assignment	10
2	Minor-Lab	15
3	Minor-Theory	15
4	Major-Lab	30
5	Major-Theory	30
	Total	**100**

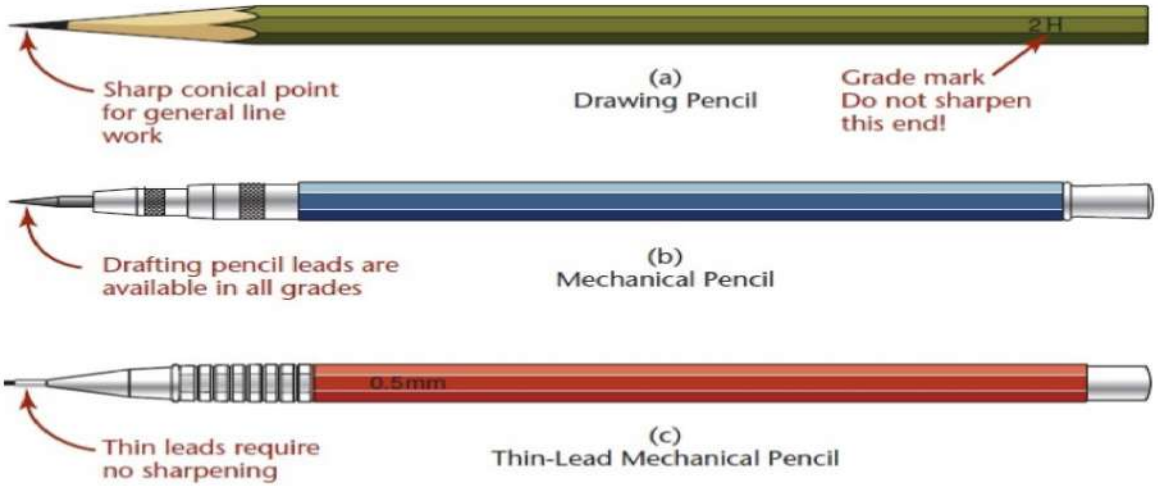
Google Classroom Code: **jru2dnb**

Syllabus

S.No.	Topic
1.	Introduction to Engineering Graphics: Drawing Equipment, AutoCAD, Lettering, Dimensions, Lines, Sheets.
2.	Loci of Points: Path of the points moving on Simple mechanisms, Slider crank mechanism, Four bar mechanism. Engineering Curves: Classification and application of Engineering Curves, Construction of Conics, Cycloidal Curves, Involutes and Spirals along with normal and tangent to each curve.
3.	Projections of Points and Lines: Introduction to principal planes of projections, Projections of the points located in same quadrant and different quadrants, Projections of line with its inclination to one reference plane and with two reference planes. True length and inclination with the reference planes.
4.	Projections of Planes: Projections of planes (polygons, circle and ellipse) with its inclination to one reference plane and with two reference planes, Concept of auxiliary plane method for projections of the plane
5.	Projections of Solids, Section of Solids and Development of Surfaces: Classification of solids. Projections of solids (Cylinder, Cone, Pyramid and Prism) along with frustum with its inclination to one reference plane and with two reference planes, Section of such solids and the true shape of the section, Development of surfaces
6.	Orthographic Projections: Fundamental of projection along with classification, Projections from the pictorial view of the object on the principal planes for view from front, top and sides using first angle projection method and third angle projection method, full sectional view.
7.	Isometric Projections and Isometric View or Drawing: Isometric Scale, Conversion of orthographic views into isometric projection, isometric view or drawing of simple objects.
8.	A Basic Introduction for Designing a Printed Circuit Board (PCB) with AutoCAD

Pencils





Every line of the drawing should indicate its importance.
It depends upon the hardness of pencil. Based on the hardness quality pencils are classified into 18 grades

Grade of Pencil	Used to Draw
3H	Construction lines
2H	Dimension lines, center lines, sectional lines, hidden lines
H	Object lines, lettering
HB	Dimensioning, boundary lines

Pencils

Grade of Pencil	Hardness of Pencil
9H	Hardest
6H, 5H, 4H	Extremely Hard
3H	Very hard
2H	Hard
H	Moderately hard
F	Firm
HB	Medium hard
B	Moderately soft and black
2B	Soft and black
3B	Very soft and black
4B, 5B, 6B	Very soft and very black
7B	Softest

Grade of Pencil	Used to Draw
3H	Construction lines
2H	Dimension lines, center lines, sectional lines, hidden lines
H	Object lines, lettering
HB	Dimensioning, boundary lines

LINES

A variety of line styles graphically represent physical objects. Types of lines include the following:

1. **Visible Line:** Visible line is continuous lines used to depict edges directly visible from a particular angle.
2. **Hidden Line:** Hidden line is short-dashed lines that may be used to represent edges that are not directly visible.
3. **Center Line:** Center line is alternately long- and short-dashed lines that may be used to represent the axes of circular features.
4. **Cutting Plane Line:** Cutting plane line is thin, medium-dashed lines, or thick alternately long- and double short-dashed that may be used to define sections for section views.
5. **Section Line:** Section line is thin lines in a pattern (pattern determined by the material being “cut” or “sectioned”) used to indicate surfaces in section views resulting from “cutting.” Section lines are commonly referred to as “cross-hatching.”

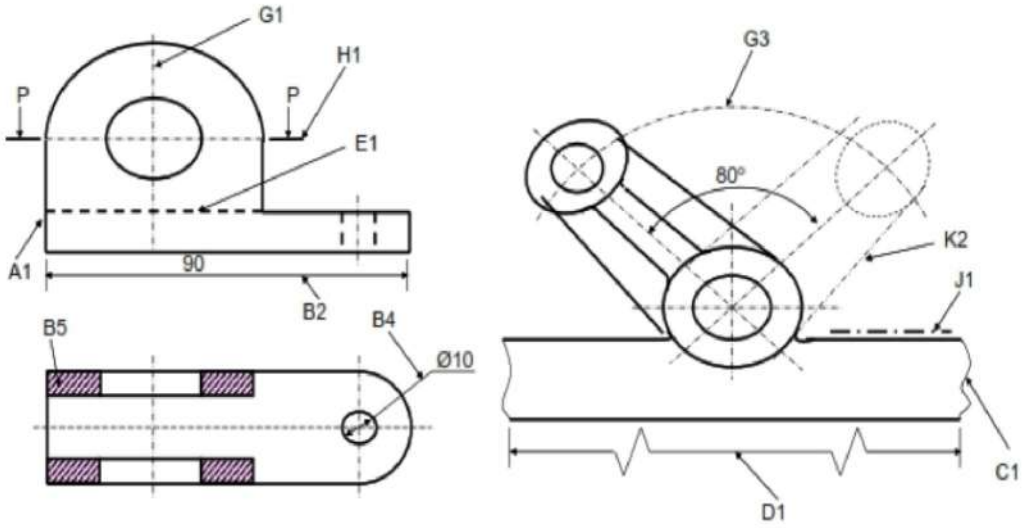
LINES

Lines		Description	General Applications	
A		Continuous thick	A1 A2	Visible outlines Visible edges
B		Continuous thin (straight / curve)	B1 B2 B3 B4 B5 B6 B7	Imaginary lines of intersection Dimension lines Projection lines Leader lines Hatching or section lines Outlines of revolved sections in plane Short centre lines
C		Continuous thin (free-hand)	C1 C2	Limits of partial or interrupted views and sections Short-break lines
D		Continuous thin (straight with zigzags)	D1	Long-break lines

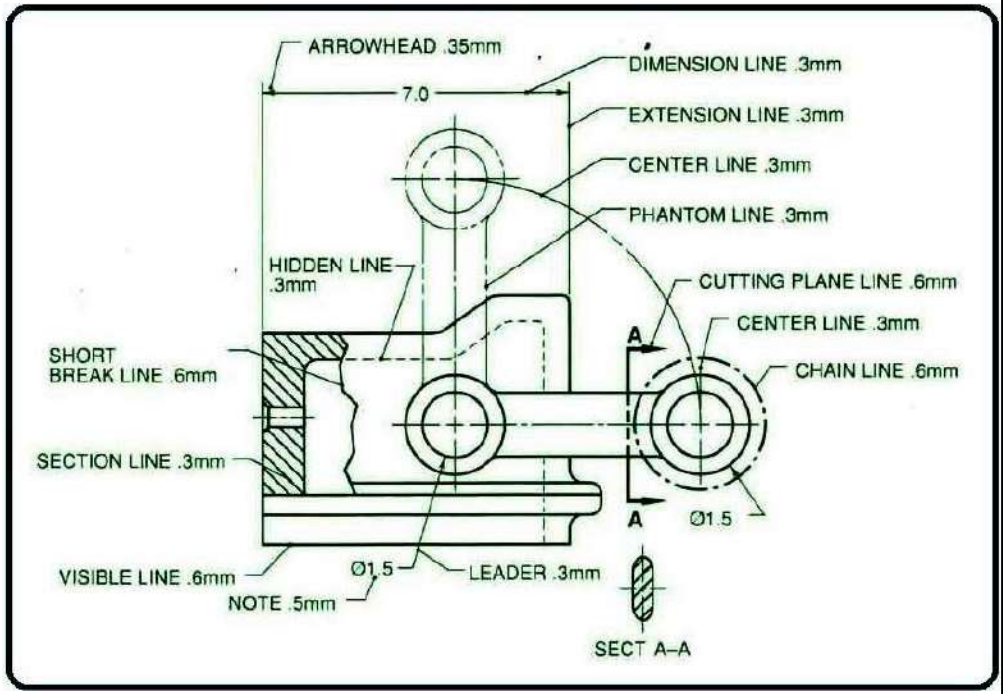
LINES

Lines		Description	General Applications	
E		Dashed thick	E1 E2	Hidden outlines Hidden edges
F		Dashed thin	F1 F2	Hidden outlines Hidden edges
G		Chain thin	G1 G2 G3	Centre lines Lines of symmetry Trajectories
H		Chain thin, thick at ends and changes of direction	H1	Cutting planes
J		Chain thick	J1	Indication of lines or surfaces to which a special treatment applies
K		Chain thin double-dashed	K1 K2 K3 K4	Outlines of adjacent parts Alternative and extreme positions of movable parts Centroidal lines Lettering

LINES



Application of various types of lines according to B.I.S.



DIMENSIONING

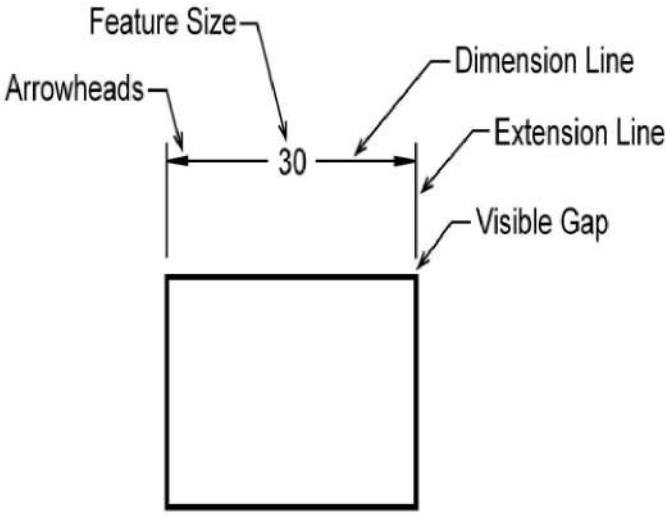
The information of size on the drawing is called “Dimensioning”. It plays an important role as it helps in giving the correct and accurate size of the part to be manufactured.

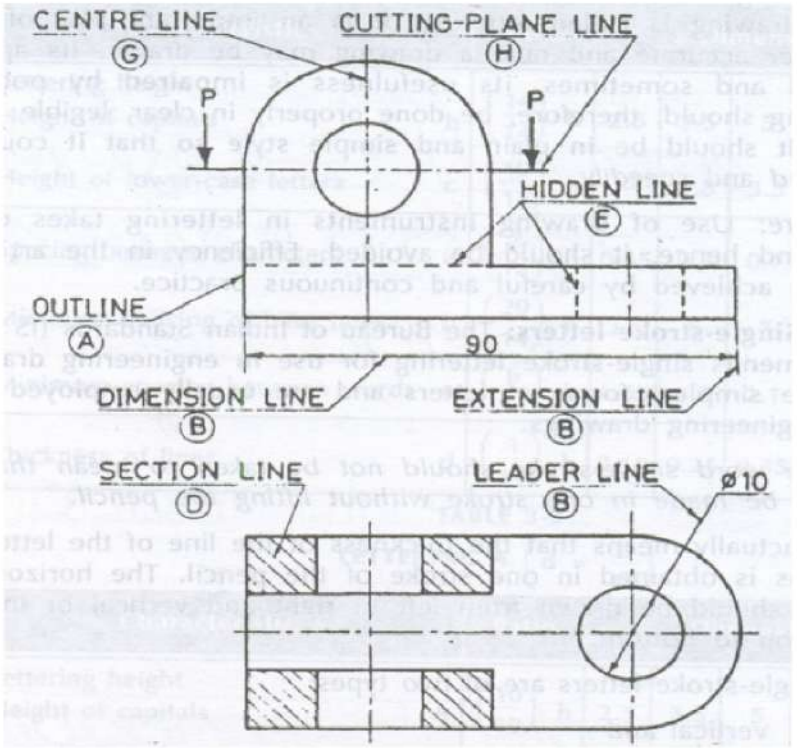
• Drawing without dimensions is meaningless

The elements of dimensioning are:
• Dimension line
• Extension line
• Arrowheads
• Dimension figures
• Leaders
• Notes

▪Dimension lines should always be parallel to the line it dimensions.
▪Extension line should extend slightly beyond the dimension line.

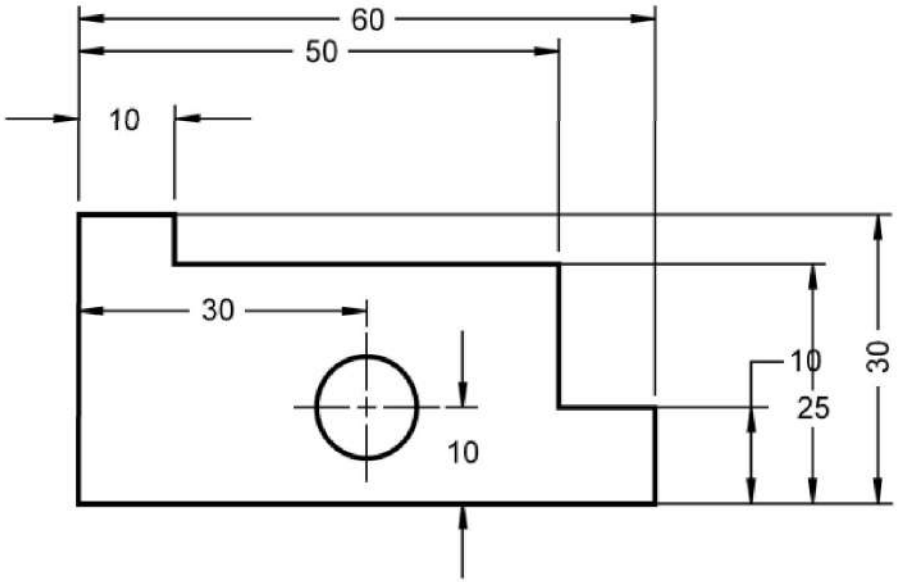
DIMENSIONING

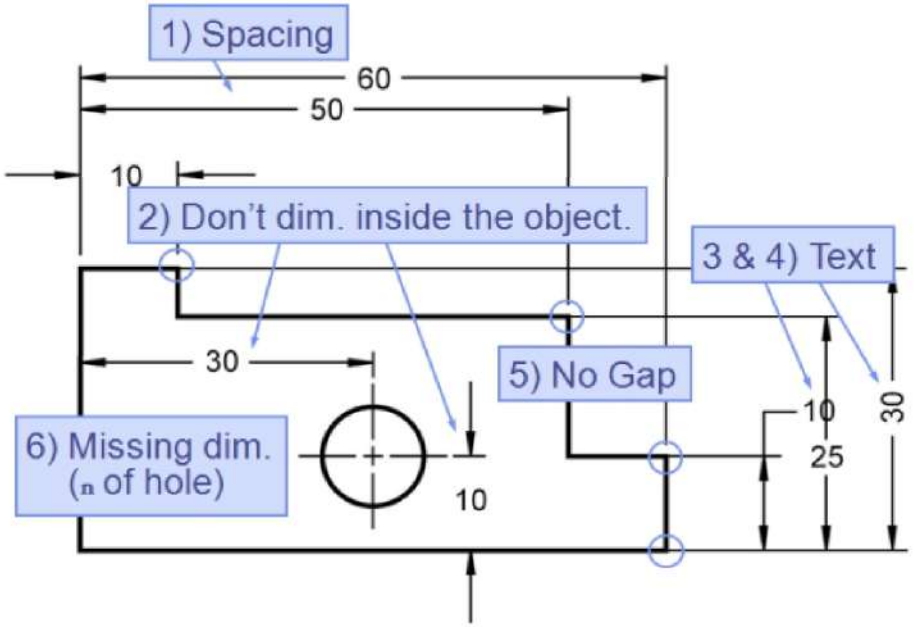




DIMENSIONING

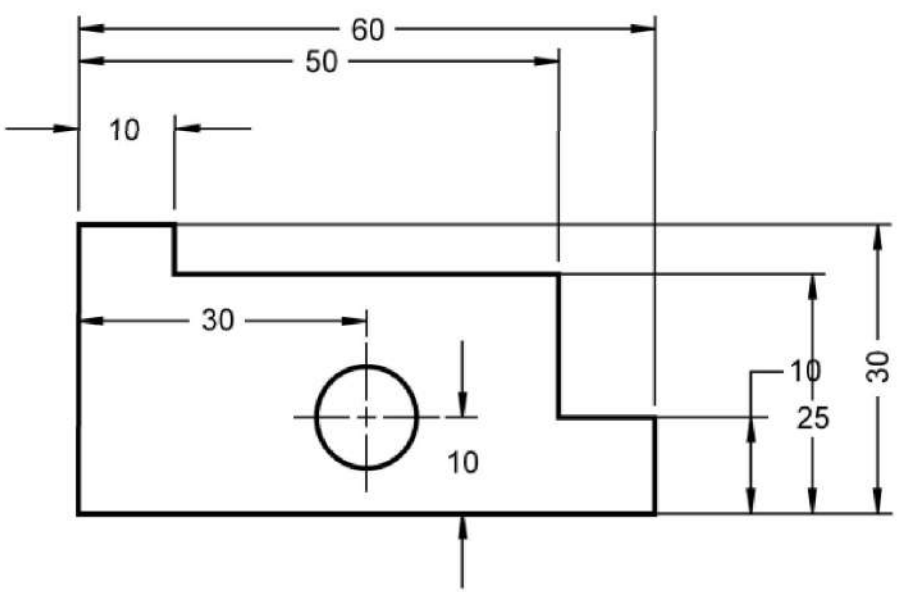
DIMENSIONING MISTAKES

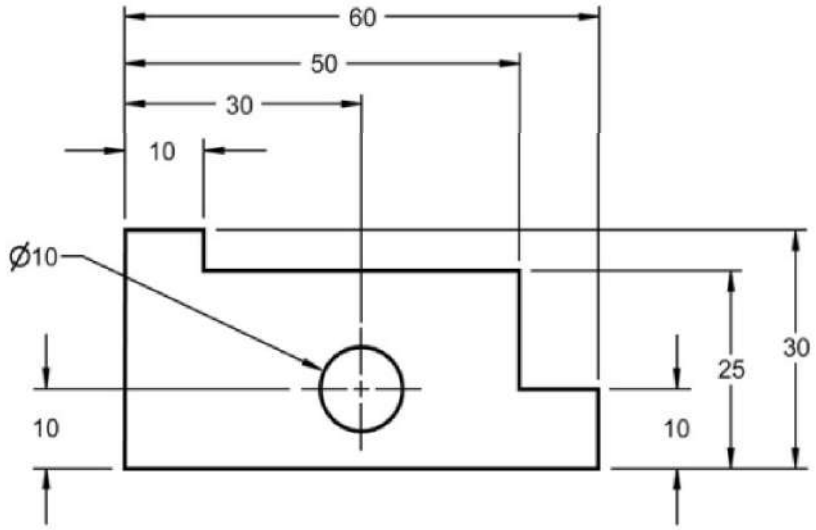




DIMENSIONING

DIMENSIONING MISTAKES



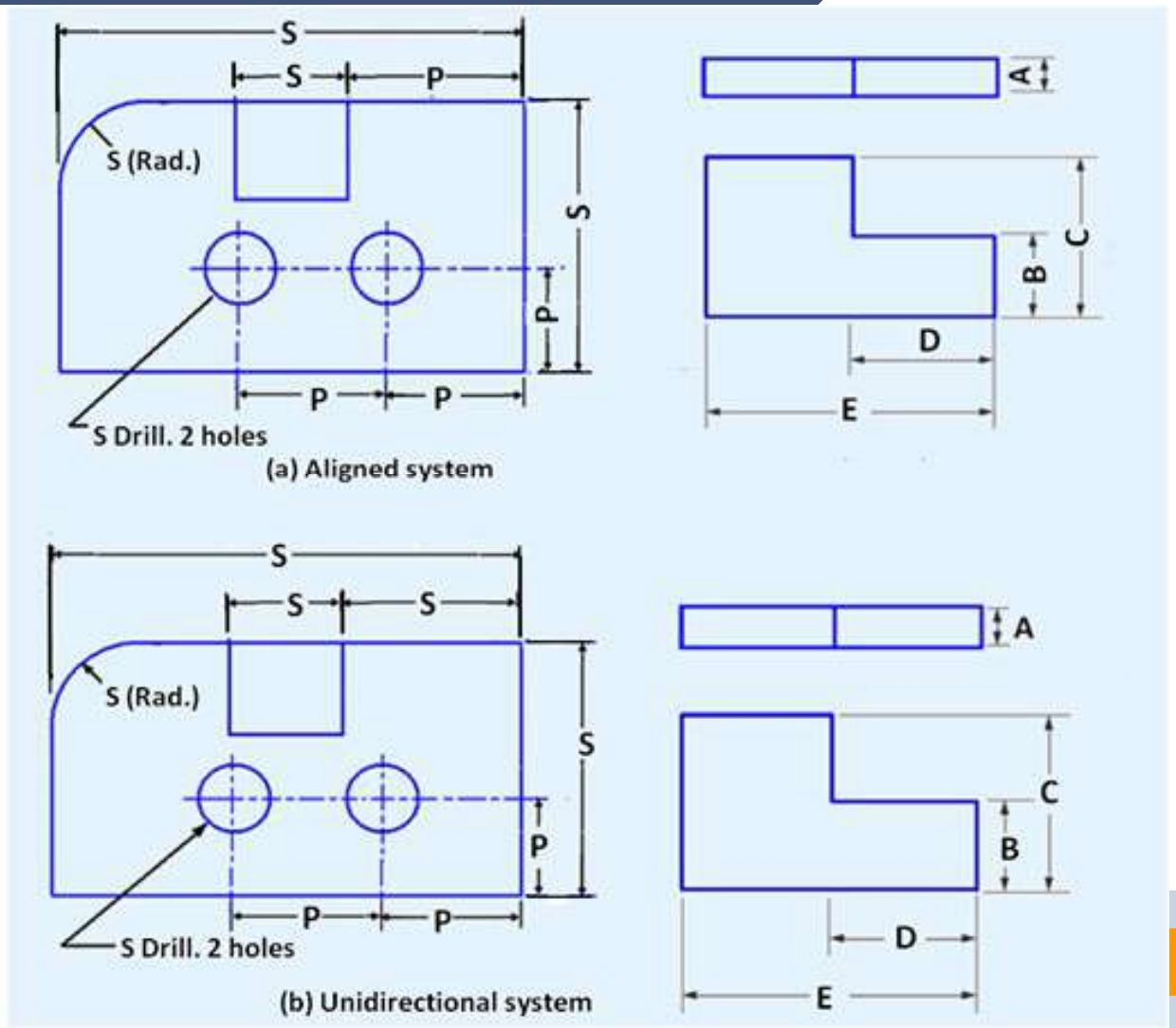


DIMENSIONING

SYSTEM OF DIMENSIONING

1. ALIGNED SYSTEM: This method of dimensioning is written in two directions throughout the drawing. It is written on the top and right side and read from the bottom and right side of a drawing. This has the advantage that the dimensions can be written in the horizontal direction, which is very easy to write.

2. UNI-DIRECTIONAL SYSTEM: This method is mostly used in dimensioning. In this method, the entire dimension is written in one direction throughout the drawing. This direction is usually perpendicular.



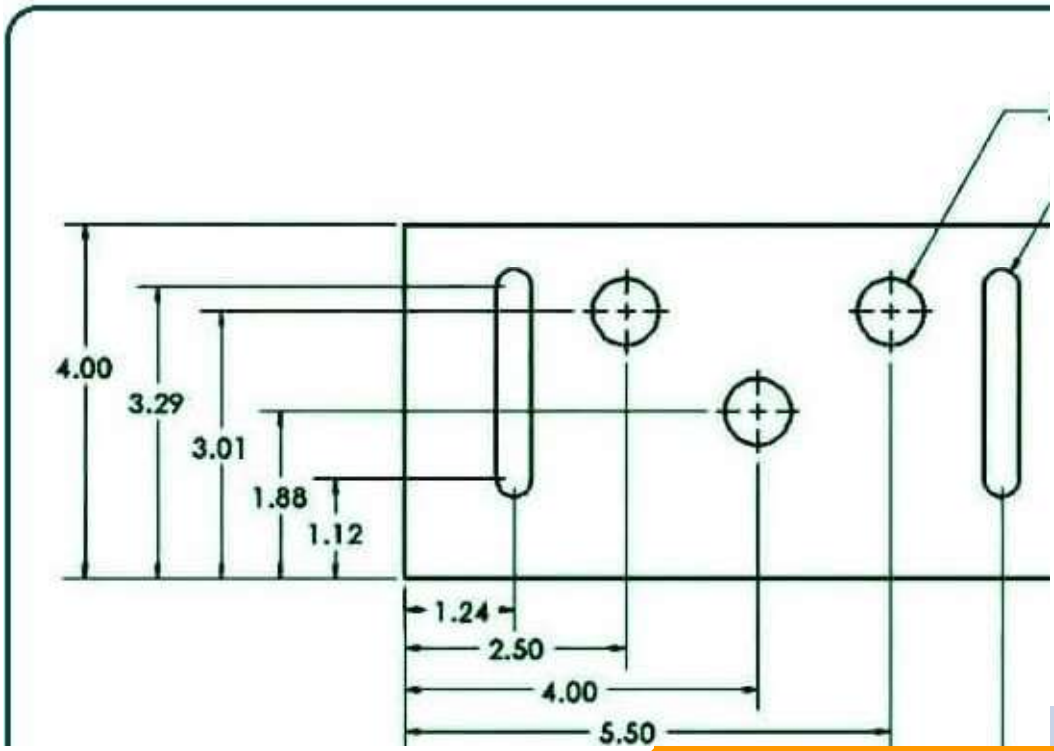
DIMENSIONING

SYSTEM OF DIMENSIONING

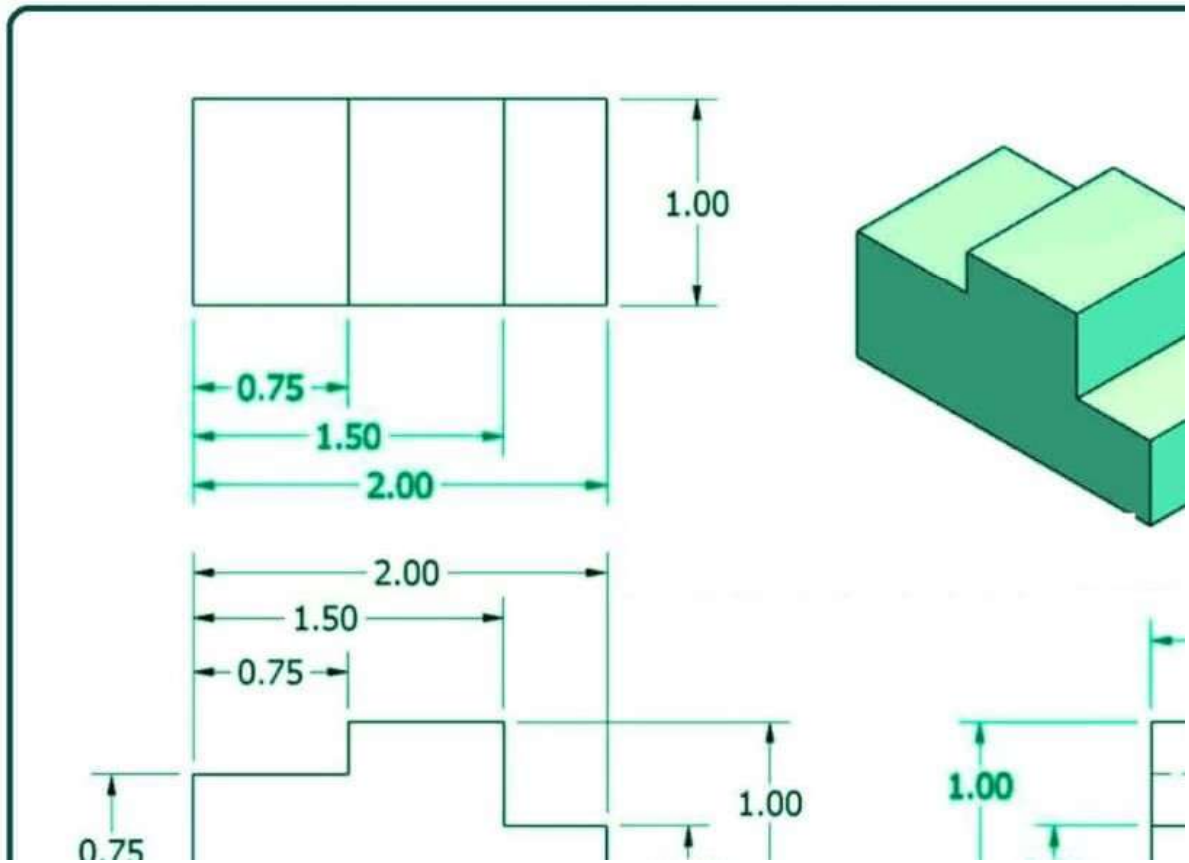
3. Base Line Method:

In this dimensioning method, the baseline is used to write the dimensions of the different parts of the drawing. Then all dimensions are written parallel to the baseline.

In the writing dimension, the smallest one is written on the side of the object, and the largest one is written on the outer side of the object. All other dimensions are written in between them. In this system, the chances of mistakes are very less.



DIMENSIONING



DIMENSIONING