



L OVELY  
P ROFESSIONAL  
U NIVERSITY

# MEC 103

## ENGINEERING GRAPHICS



## Chapter 2

# DIMENSIONING

*Dimensioning* refers to the act of giving dimensions. BIS (SP 46: 2003) defines dimension as *a numerical value expressed in appropriate units of measurement and indicated graphically on technical drawings with lines, symbols and notes.*

**The important aspects of dimensioning are as follows:**

**Units of Measurement** The most convenient unit for length is millimetre. In civil engineering and architectural drawing, inch or foot is often used as a unit of length. Angles are shown in degrees.

Symbols are incorporated to indicate specific geometry wherever necessary.

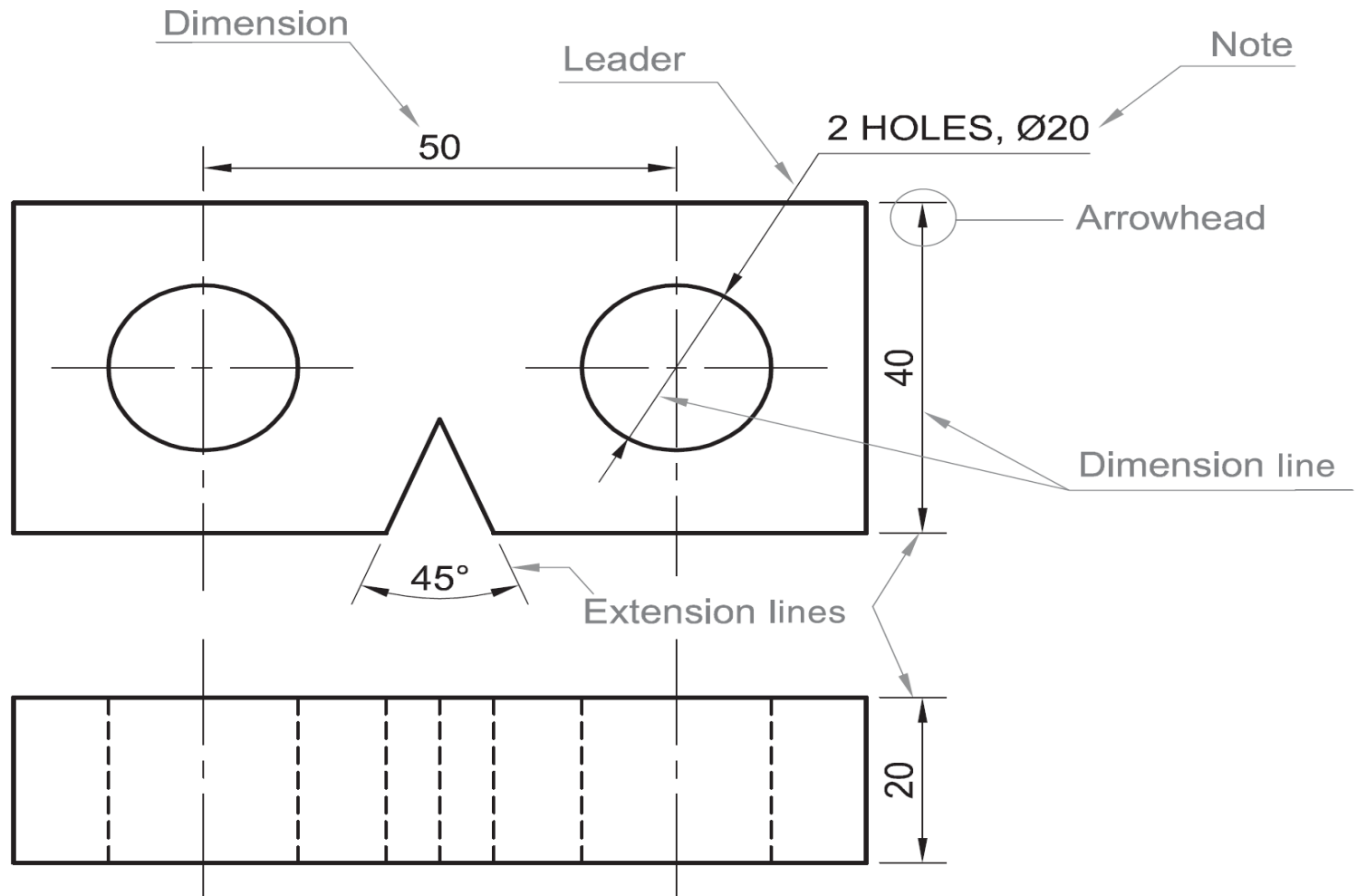
Notes are provided to give specification of a particular feature or to give specific information necessary during the manufacturing of the object.



## **ELEMENTS OF DIMENSIONING :**

A line on the drawing whose length is to be shown is called an *object line*. The object line is essentially an outline representing the feature(s) of the object. While showing an angle, the two lines forming the angle will be the object lines.

Dimensioning is often done by a set of elements, which includes extension lines, dimension lines, leader lines, arrowheads and dimensions. These are shown in Fig. 3.1



**Fig. 3.1**



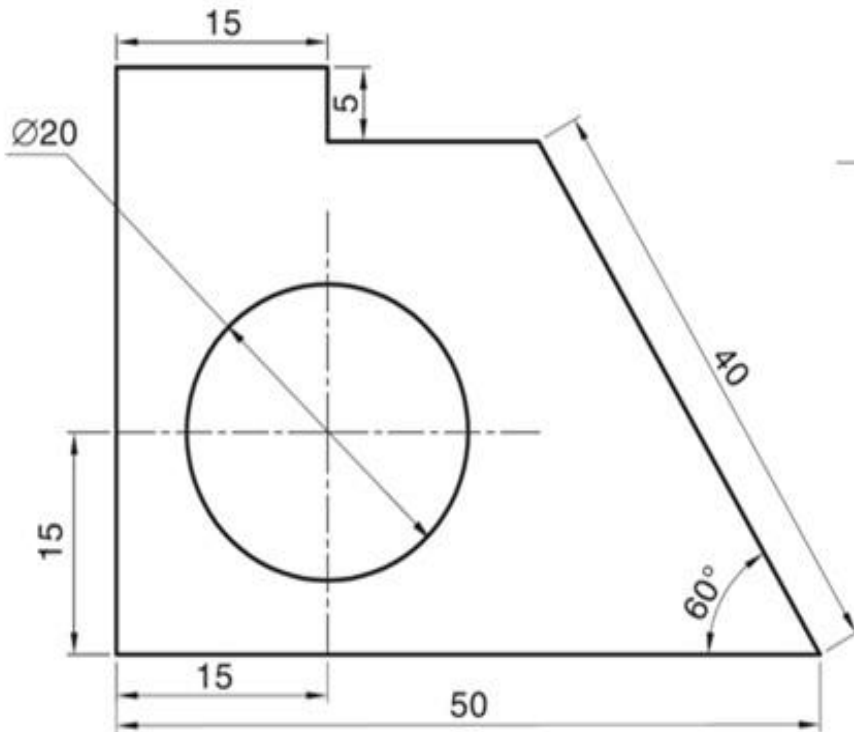
## **SYSTEMS OF DIMENSIONING**

### **1. Aligned System :**

In the aligned system, dimensions are placed perpendicular to the dimension line so that they may be read from the bottom or right-hand side of the drawing sheet. Dimensions are placed at the middle and on top of the dimension lines. Fig 3.4

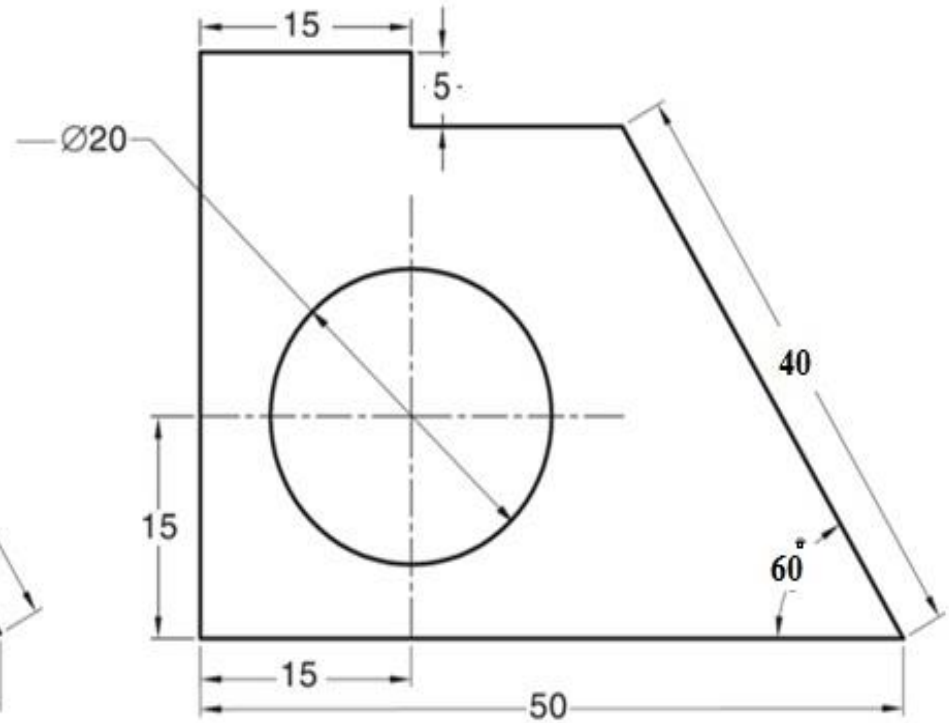
### **2. Unidirectional System :**

In the unidirectional system, dimensions are placed in such a way that they can be read from the bottom edge of the drawing sheet. As shown in Fig. 3.5, all horizontal dimensions are placed at the middle and on top of the dimension lines while vertical and inclined dimensions are inserted by breaking the dimension lines at the middle.



**Fig. 3.4**

**ALIGNED SYSTEM**



**Fig. 3.5**

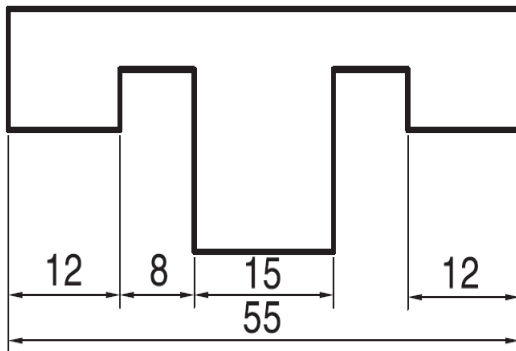
**UNIDIRECTIONAL SYSTEM**



## **TYPES OF DIMENSIONING**

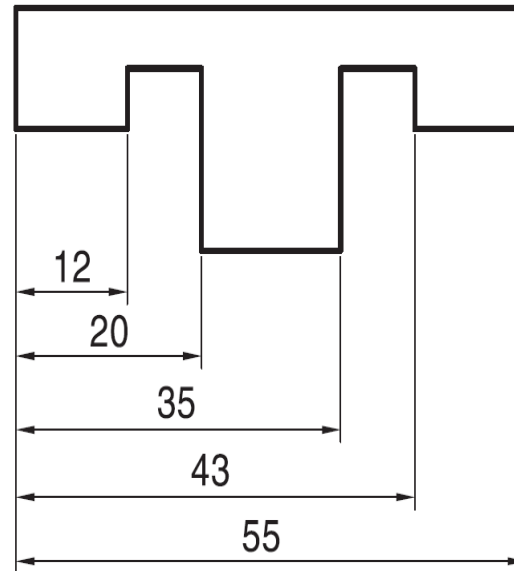
For dimensions in series, adopt any one of the following ways.

- i. Chain dimensioning (Continuous dimensioning):** All the dimensions are aligned in such a way that an arrowhead of one dimension touches tip-to-tip the arrowhead of the adjacent dimension. The overall dimension is placed outside the other smaller dimensions, Fig. 3.13(a).
- ii. Parallel dimensioning (Progressive dimensioning):** All the dimensions are shown from a common reference line. Obviously, all these dimensions share a common extension line. This method is adopted when dimensions have to be established from a particular datum surface, Fig. 3.13(b).
- iii. Combined dimensioning:** When both the methods, i.e., chain dimensioning and parallel dimensioning are used on the same drawing, the method of dimensioning is called combined dimensioning, Fig. 3.13(c).



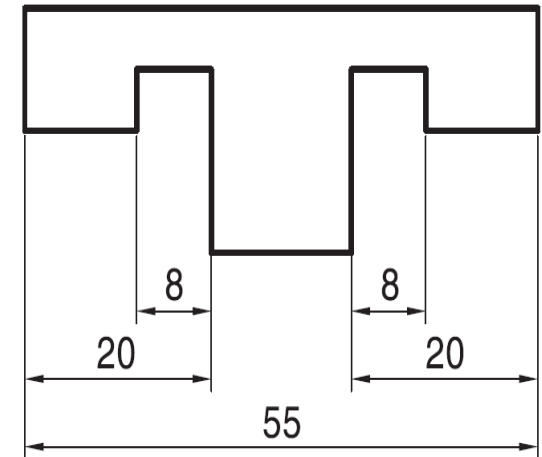
**Fig. 3.13(a)**

**a) Chain  
Dimensioning**



**Fig. 3.13(b)**

**b) Parallel  
Dimensioning**



**Fig. 3.13(c)**

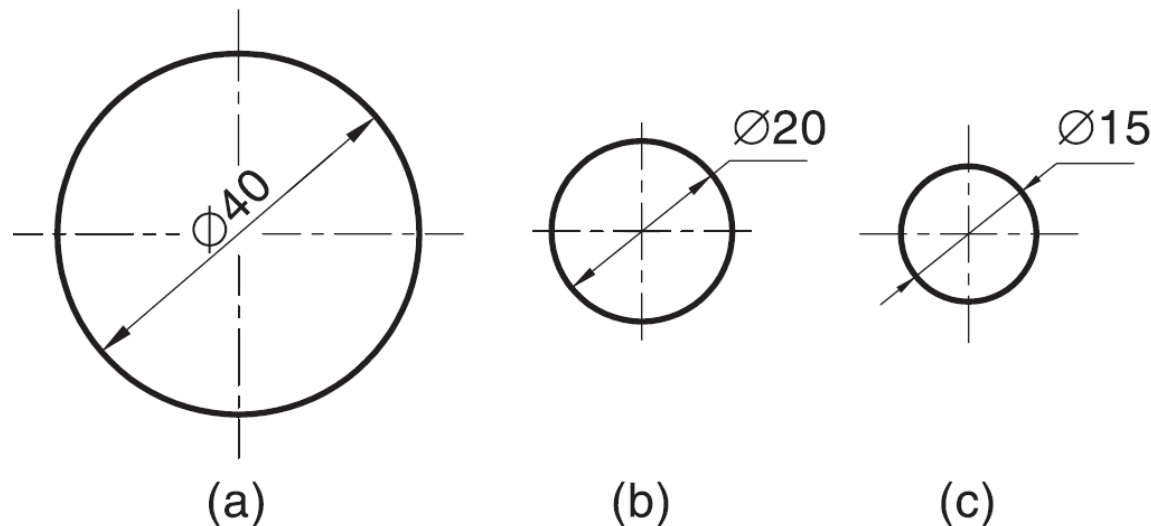
**C) Combined  
Dimensioning**





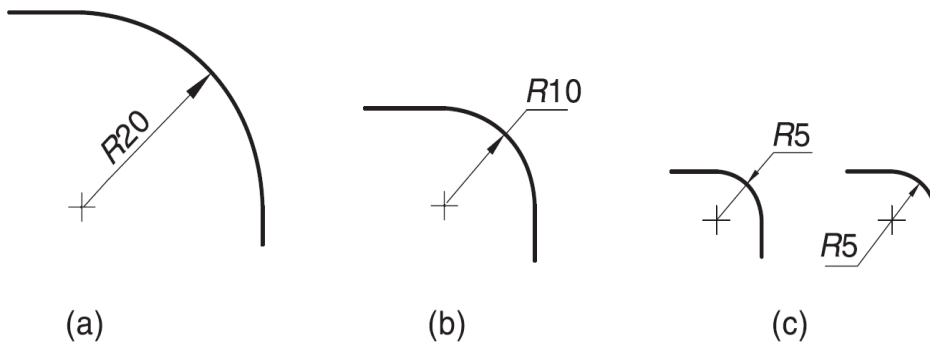
## **DIMENSIONING OF CIRCULAR FEATURES :**

1. A circle should be dimensioned by giving its diameter instead of radius. The dimension indicating a diameter should always be preceded by the symbol  $\varnothing$ , Fig. 3.14.

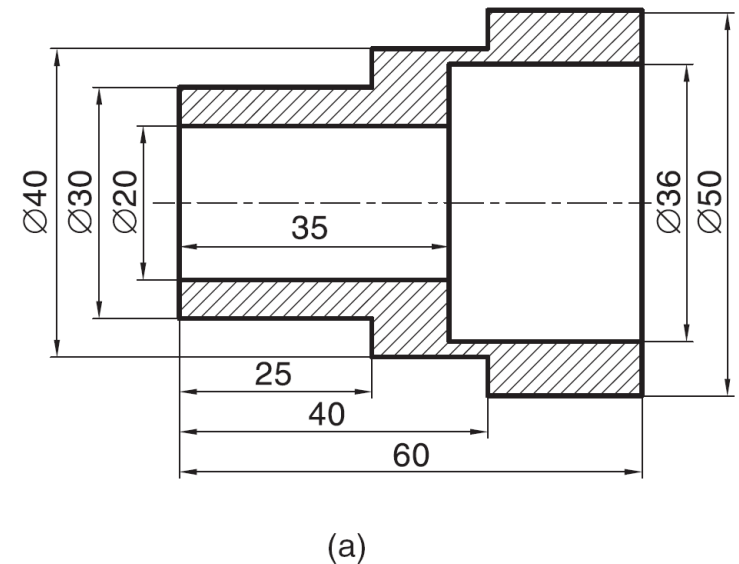


**Fig. 3.14**

2. An arc should be dimensioned by giving its radius. The dimension indicating radius should be preceded by symbol  $R$ , Fig. 3.17.
3. Cylindrical features should be dimensioned by giving their diameters. As far as possible, they should be dimensioned in the views in which they appear as rectangles, Fig. 3.18(a).



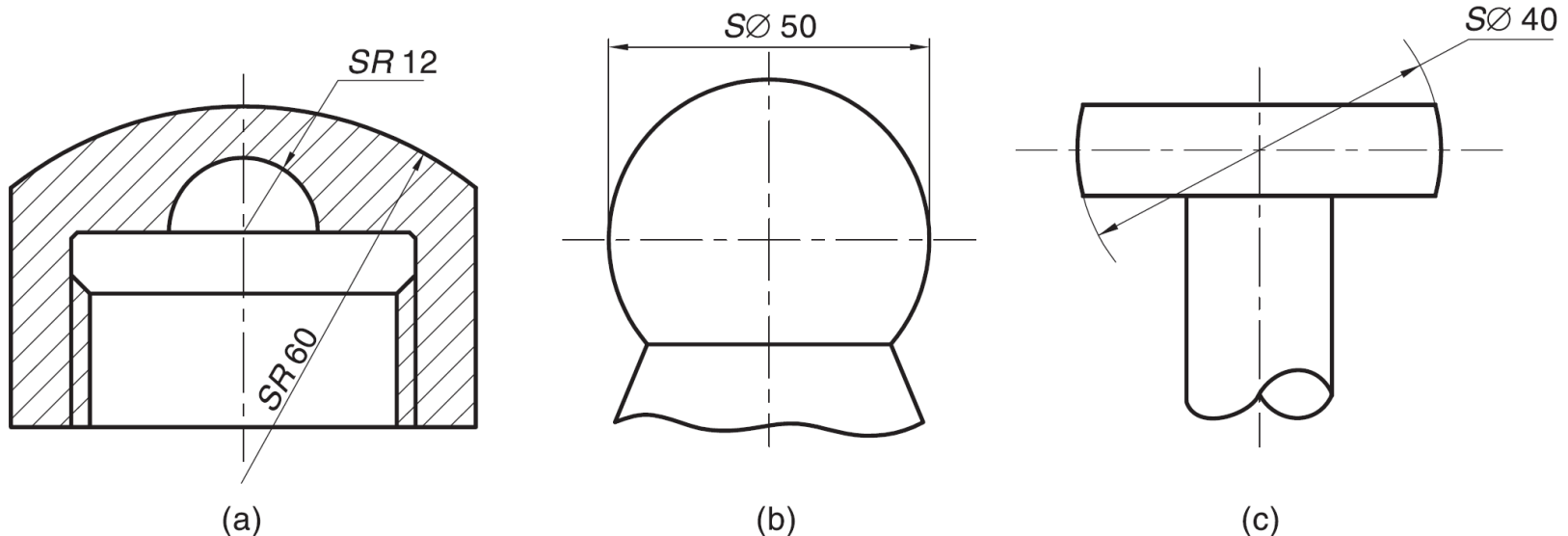
**Fig. 3.17**



**Fig. 3.18**

## **DIMENSIONING OF SPHERICAL FEATURES :**

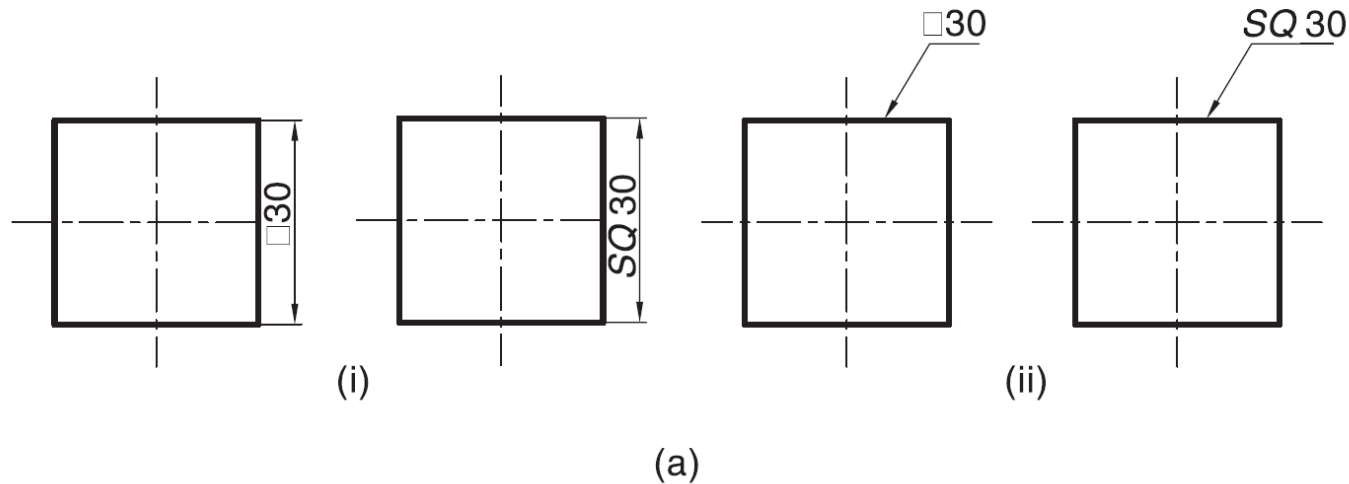
Spherical features may be dimensioned by giving either the radius or diameter of a sphere. The symbols *SR* or *SØ* must precede the dimension for radius or diameter respectively, Fig. 3.19.



**Fig. 3.19**

## **DIMENSIONING OF SQUARE FEATURES :**

Square features (e.g., a rod of square cross-section) are dimensioned using symbol  $\square$  or *SQ* as shown in (i) or (ii), Fig. 3.22(a).



**Fig. 3.22**



## **RULES OF DIMENSIONING**

1. Between any two extension lines, there must be one and only one dimension line bearing one dimension.
2. As far as possible, all the dimensions should be placed outside the views. Inside dimensions are preferred only if they are clearer and more easily readable.
3. All the dimensions on a drawing must be shown using either Aligned System or Unidirectional System. In no case should, the two systems be mixed on the same drawing.
4. The same unit of length should be used for all the dimensions on a drawing. The unit should not be written after each dimension, but a note mentioning the unit should be placed below the drawing.
5. Dimension lines should not cross each other. Dimension lines should also not cross any other lines of the object.
6. All dimensions must be given.
7. Each dimension should be given only once. No dimension should be redundant.



**L** OVELY  
**P** ROFESSIONAL  
**U** NIVERSITY

8. Do not use an outline or a centre line as a dimension line. A centreline may be extended to serve as an extension line.
9. Avoid dimensioning hidden lines.