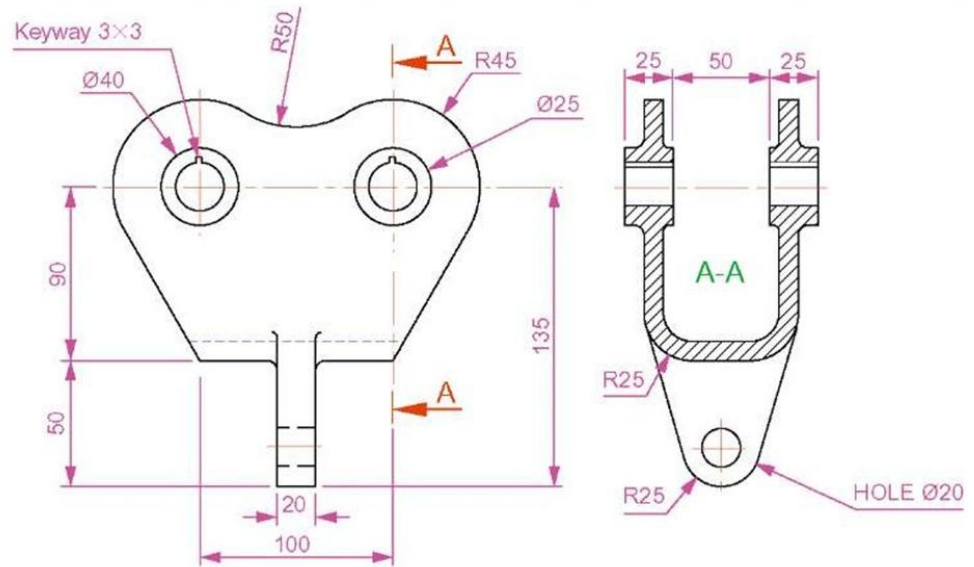


# DIMENSIONING



**Pre-Engineering & Computer-Aided Design  
Mr. Mandl**

# Dimensioning: Why?

- In order to provide accurate *size* description of a part for *manufacturing*
- To describe the *relationships* between features in your drawing
- Drawings with dimensions and notes often serve as *construction documents* and *legal contracts*

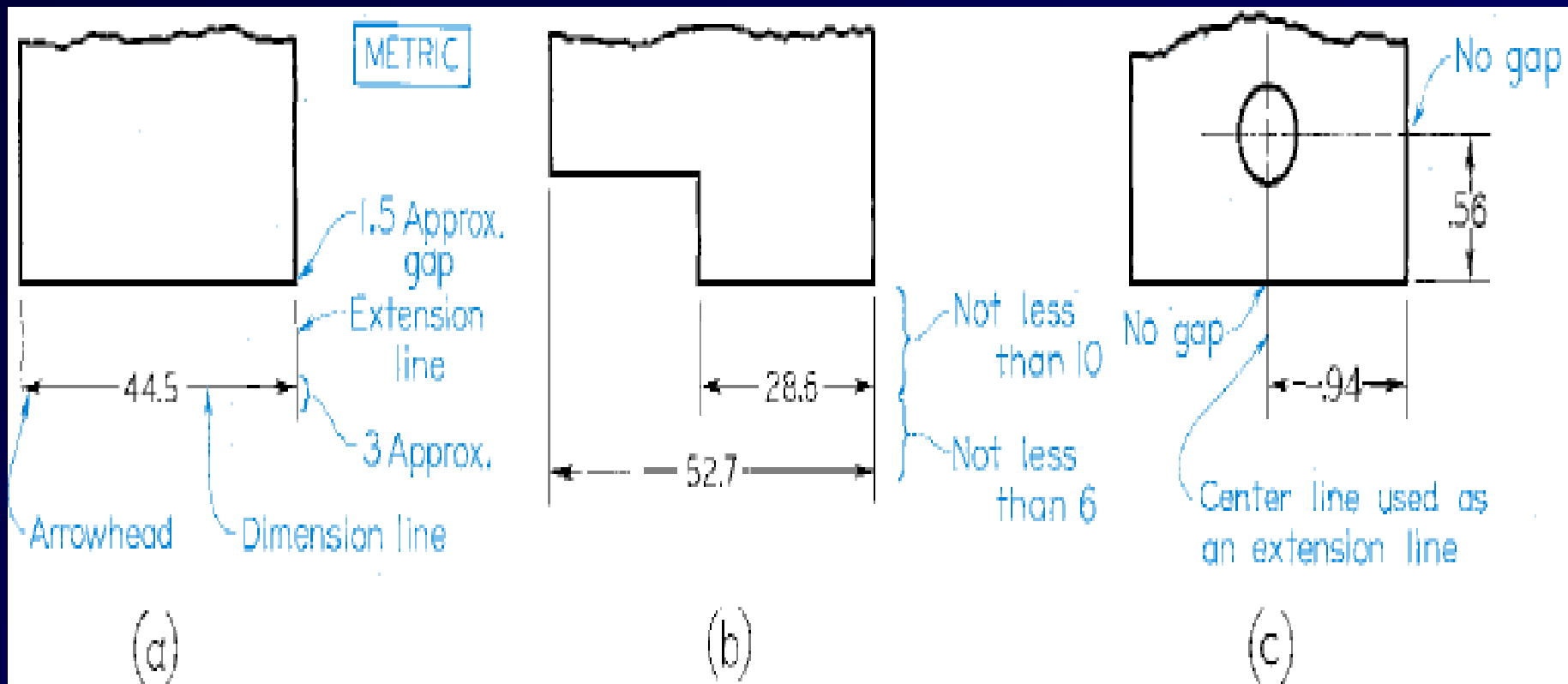
# Dimensioning: Types

## There Are 2 Basic Types of Dimensions

- **Size Dimensions**
  - Describes sizes of features such as holes
  - Does not require the use of a datum
- **Location Dimensions**
  - Provides location of one surface or feature in relation to another
  - Requires the use of a datum

# Dimensioning: Key Terms

- Dimension Line
- Extension Line
- Leader
- Finish mark
- Dimension Value
- Offset



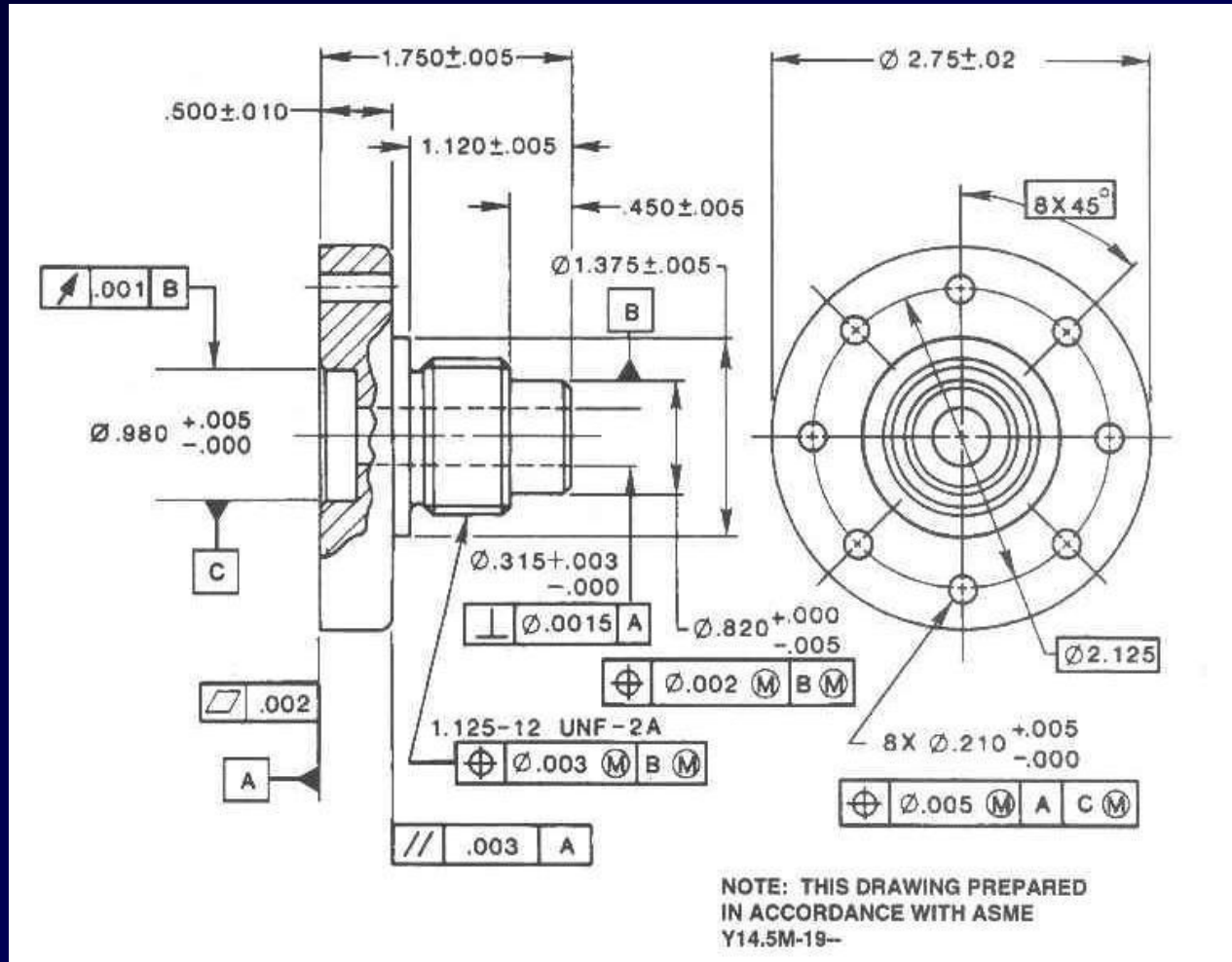
# Dimensioning: Key Terms

- Tolerance
  - The total allowable variation a part can have from the specified dimension
  - The less variation allowed, the more the part will cost to make

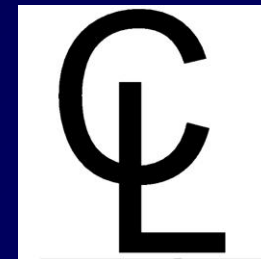
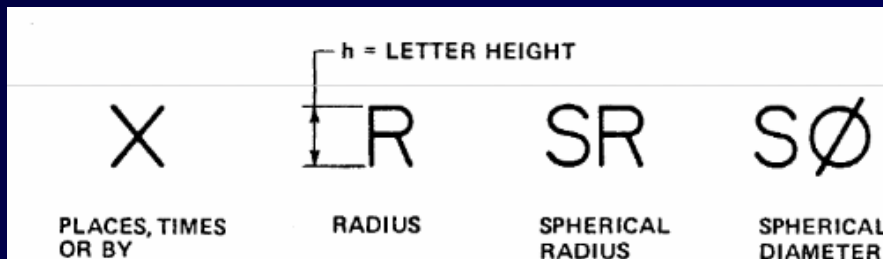
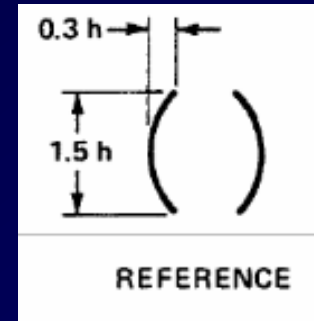
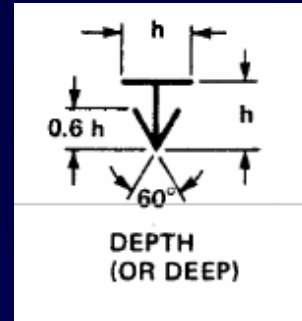
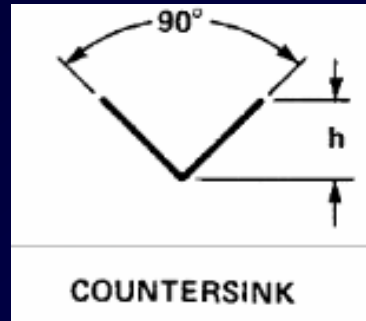
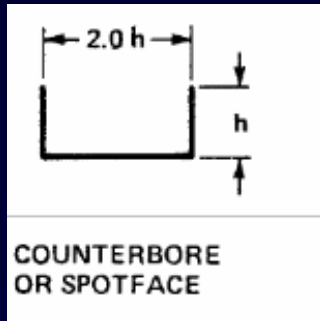
Tolerances: Linear 0.05	Dimensions in mm	Materials:		
Angular: 15° unless otherwise stated		DO NOT SCALE	Finish:	
Name:	Scale: 1:1	Date:	Title:	Dwg No:

# Dimensioning: Key Terms

- Tolerance in action

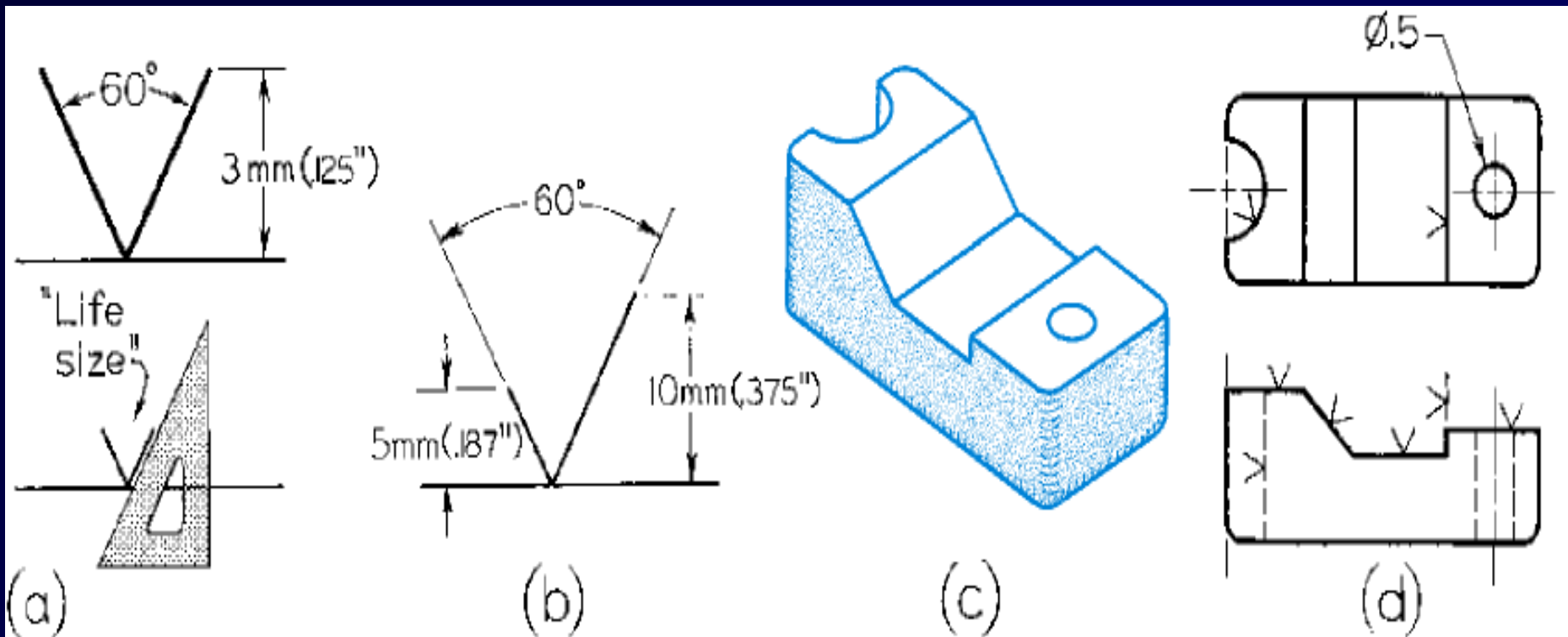


# Dimensioning: Symbols



# Dimensioning: Symbols

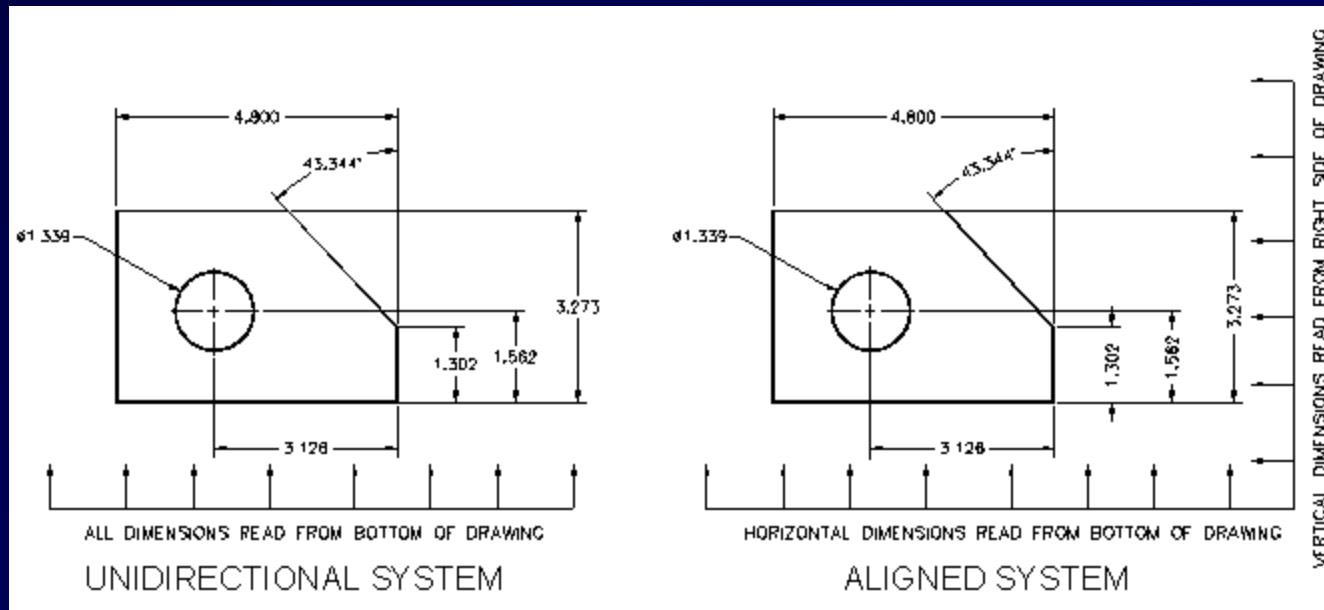
## Finish Marks





# Dimensioning: Orientation of Values

- **Unidirectional:**
  - Read horizontally from bottom of sheet
- **Aligned:**
  - align with dimension line and read from bottom or right side of sheet



# **Dimensioning: Rules**

## **5 Basic Rules to Remember**

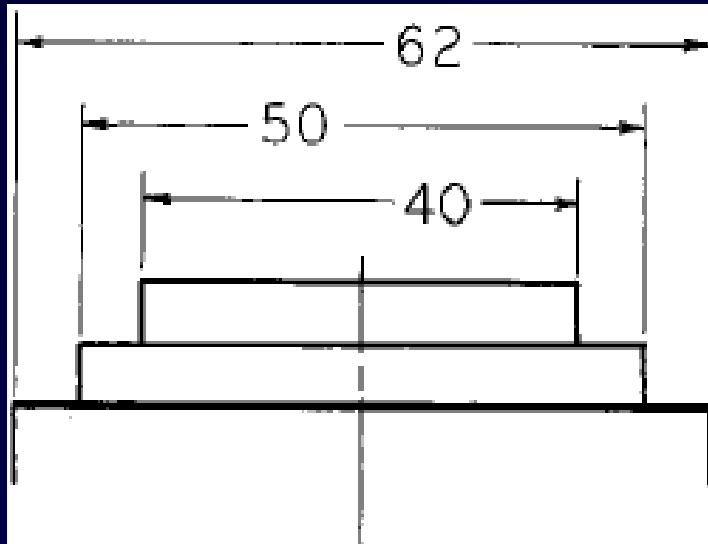
- 1. Start with Small, Get Bigger**
- 2. Do Not Dimension to Hidden Lines or Hidden Features**
- 3. Avoid Placing Dimensions on Part**
- 4. Place Dimensions Between Views**
- 5. Do Not Dimension to Edge of Arcs**

# Dimensioning: Placement

- Avoid dimensioning on object (face of part)
- Avoid dimensioning to hidden lines
- Place dimensions between views when possible
- Group dimensions around a central view when possible
- Place dimensions where feature best shows shape
- Dimension from or between machined surfaces (datum)
- Give overall size of view dimensions where possible

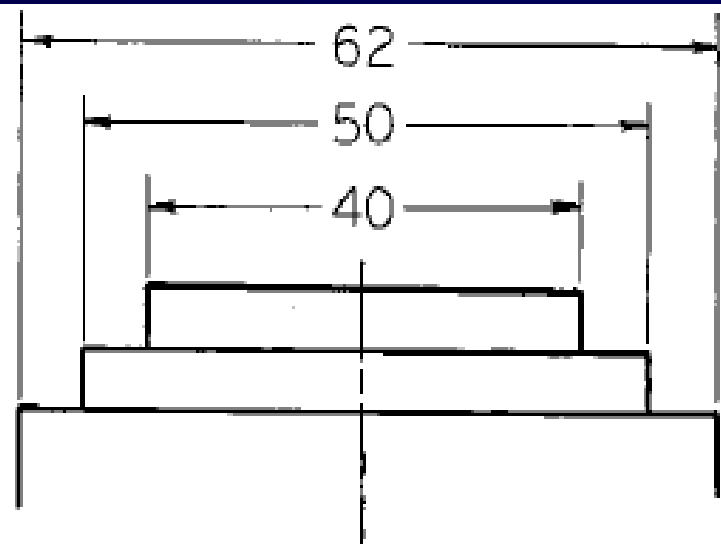
# Dimensioning: Placement

## Stagger Dimension Values



PREFERRED

(a)

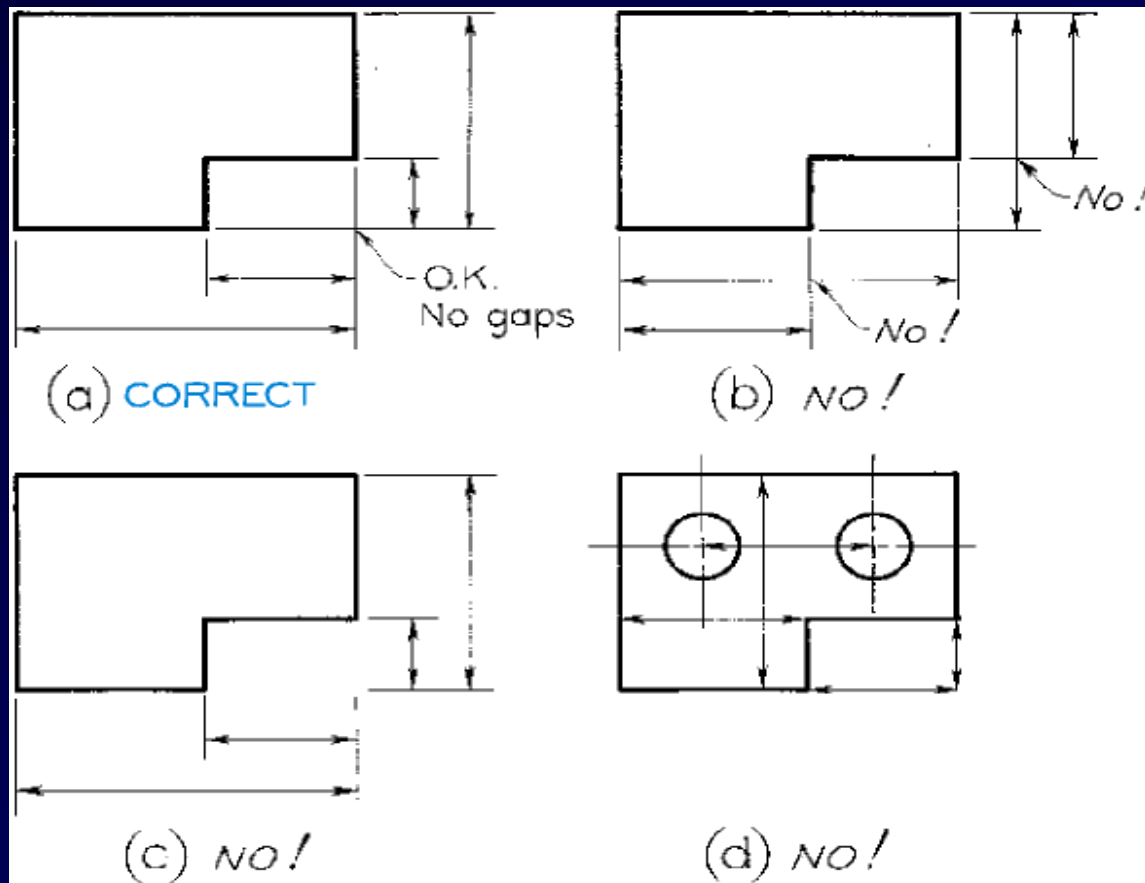


POOR PRACTICE

(b)

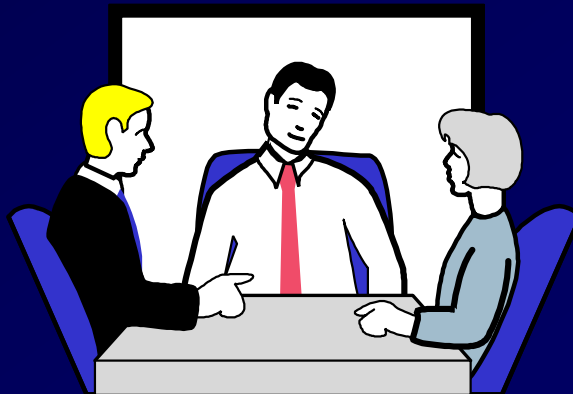
# Dimensioning: Placement

## Dimension & Extension Lines



# Dimensioning: Placement

- The rules for dimension placement help ensure that others will be able to interpret your drawing quickly and easily
- Where placement practices conflict, remember that your goal is to *clearly communicate* the purpose of the drawing. Use the practice you feel will make the drawing easy to understand.



# Dimensioning: Choice

- The dimensions you specify determine the way the part is manufactured and the way the tolerance is applied
- Fully dimension each part
- Do not over dimension
  - Each dimensions should appear only once
- Give the diameter of complete circular shapes
- Give the radius of arcs
- Give size dimensions for features
- Give location dimensions to show how features relate to one another

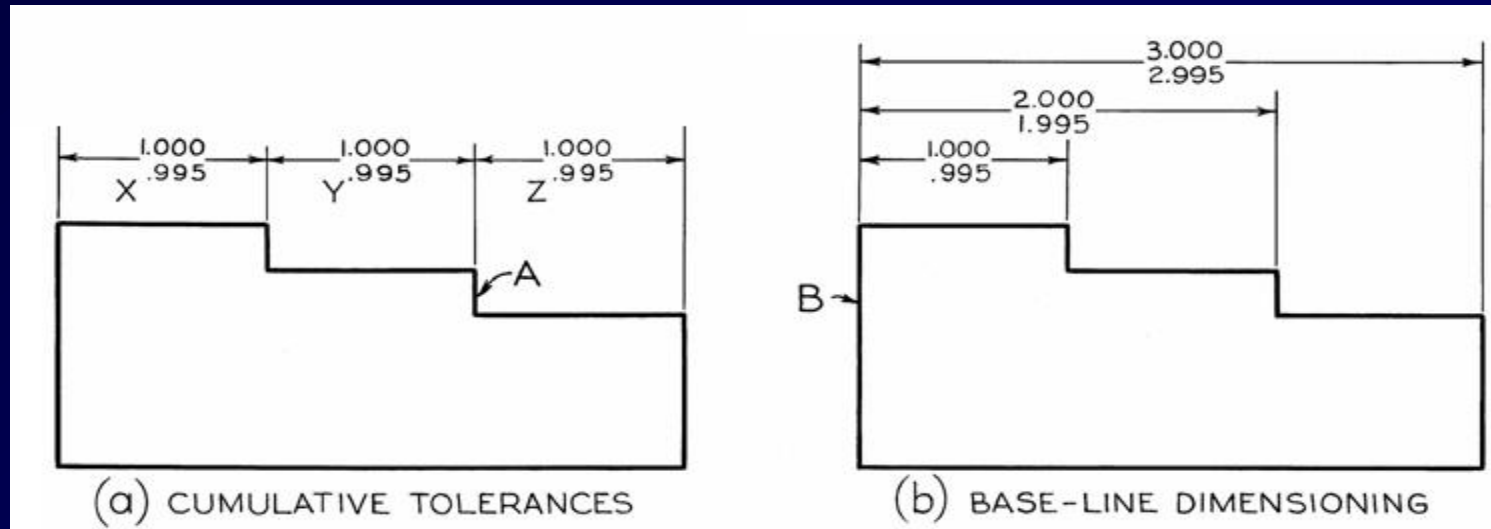
# Dimensioning: Three Systems

- Chained

- Each dimension continues from the previous one
- Tolerances stack

- Baseline

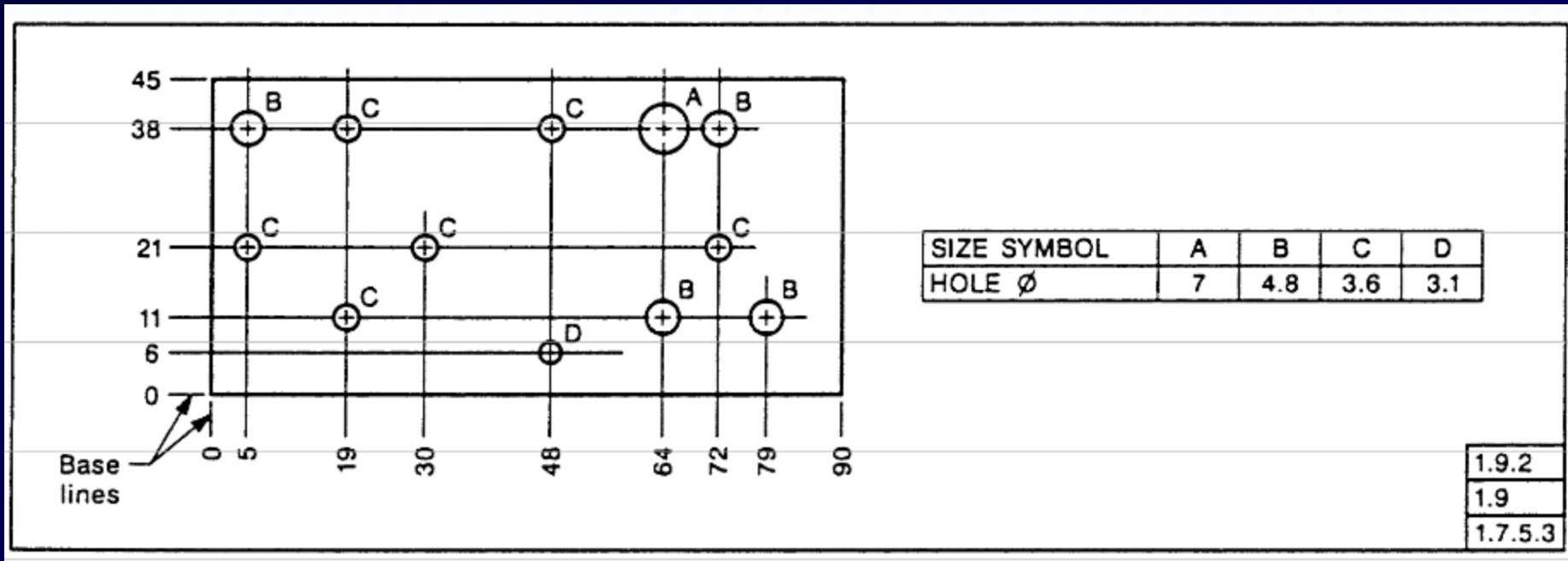
- Each dimension is specified from a common baseline
- Tolerances do not stack





# Dimensioning: Three Systems

- Ordinate (coordinate)
  - Each dimension comes from a datum or base line
  - Each dimension originates from zero
  - Dimension values are aligned

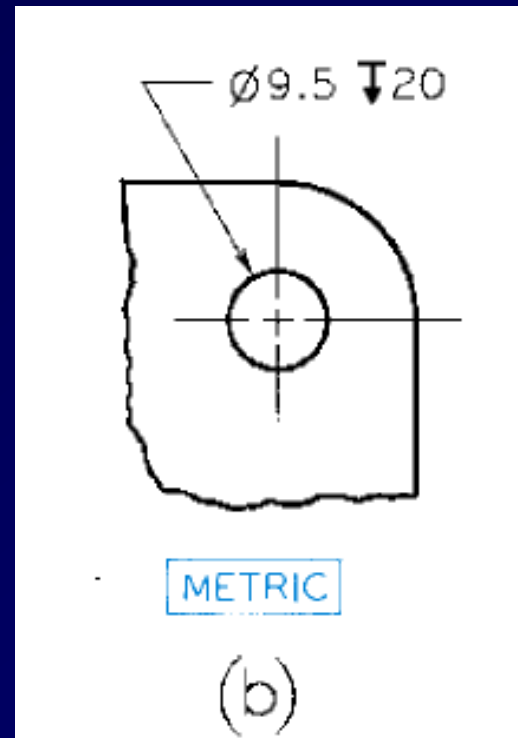
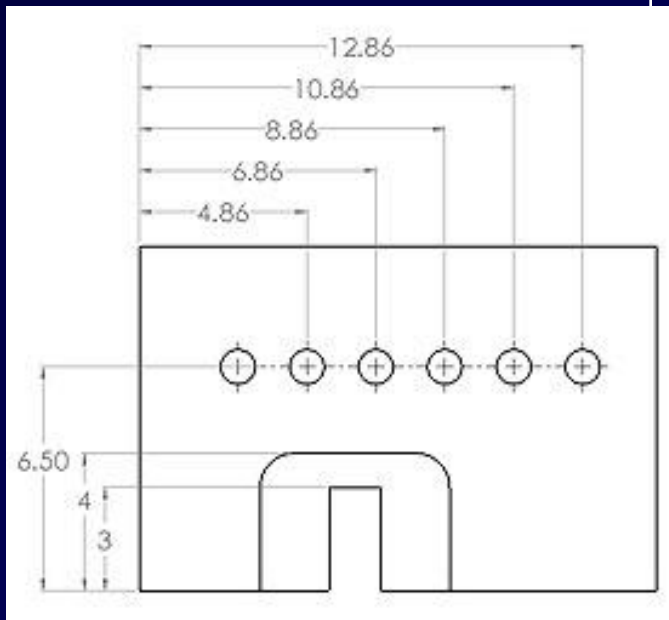


# Dimensioning: Units

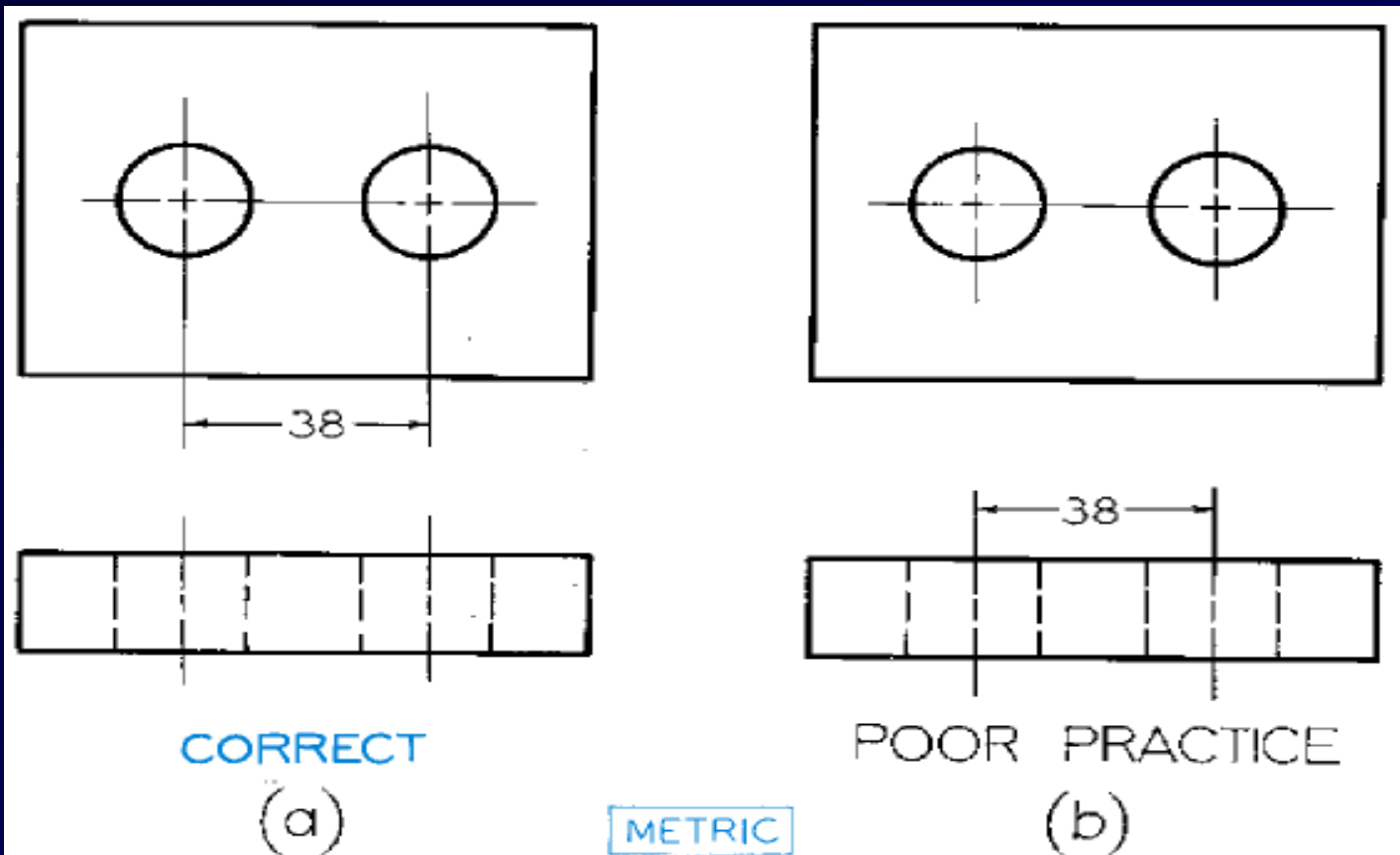
- English:
  - Decimal inch dimensions are typically specified to 2 decimal places
    - 25.78
- Metric
  - Metric values are typically given in whole millimeters or to one decimal place.
    - 3
    - 3.5

# Dimensioning: Holes

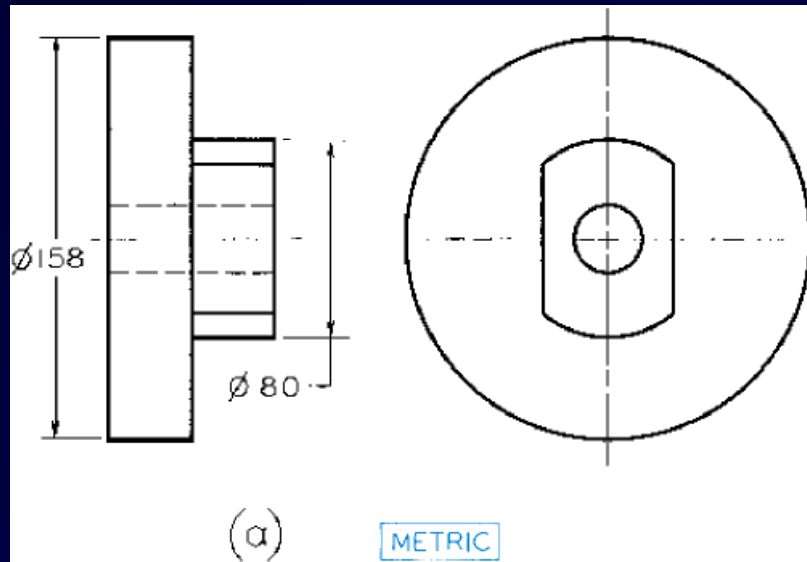
- Described with notes
  - Can be placed anywhere on drawing
  - Always added to drawing last
- Located with two dimensions



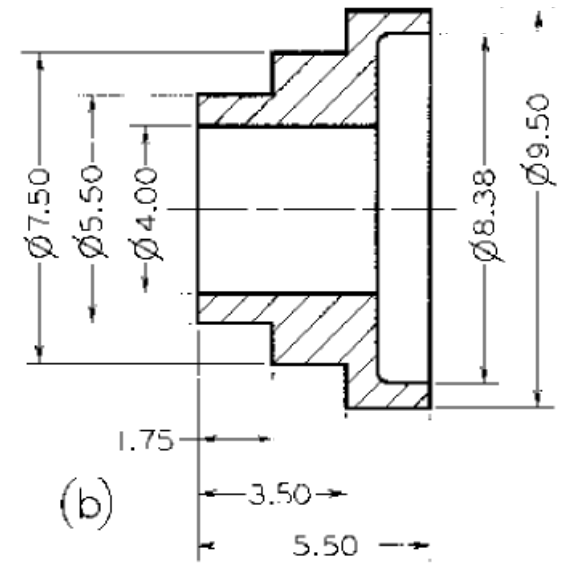
# Dimensioning: Holes



# Dimensioning: Diameter Symbol



USE OF "  $\phi$  " TO INDICATE CIRCULAR SHAPE



USE OF "  $\phi$  " TO OMIT CIRCULAR VIEW

# Dimensioning

## Summary

- Dimensioning drawings correctly can be as important or more important than drawing the shapes correctly.
- Good dimensioning requires practice and thought... lots of both!!!