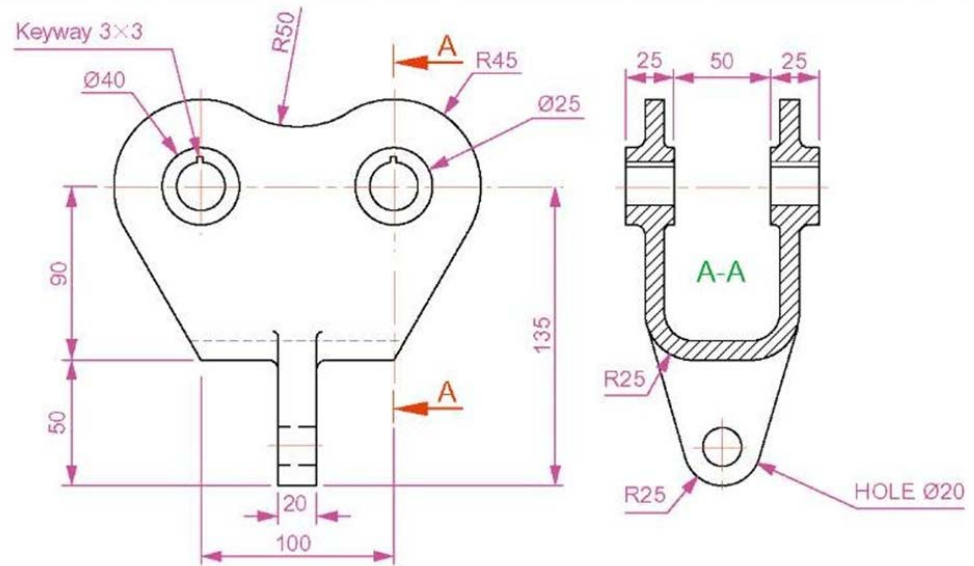


# DIMENSIONING



**Pre-Engineering & Computer-Aided Design**

**Mr. Mandl**

**Drafting/CAD 1**

**Mr. Mandl**

# Dimensioning: Why do it?

- In order to provide accurate *size* description of a part for *manufacturing*
- To describe the *relationships* between features on your part
- Often serve as *construction documents* and *legal contracts*

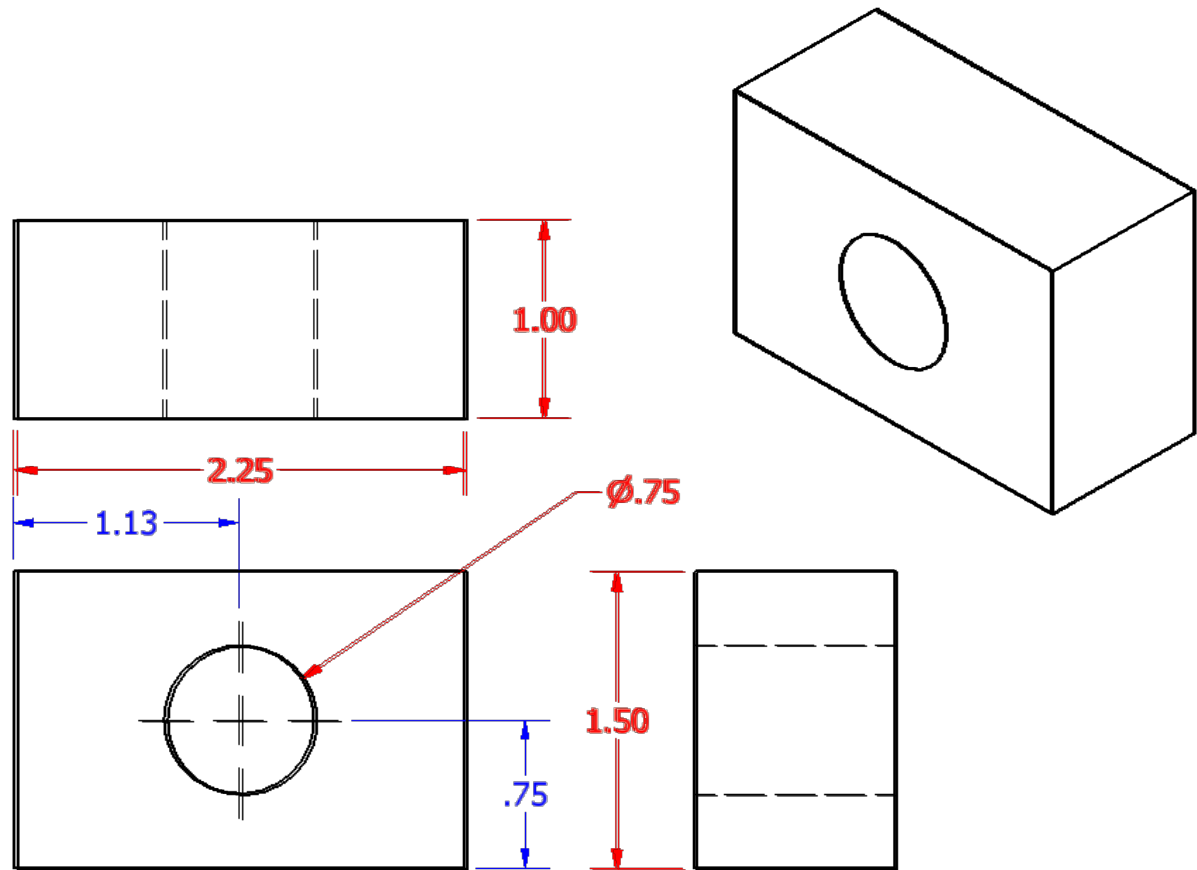
# Dimensions Communicate...

Engineers, designers, and engineering technologists need to know...

➤ Size

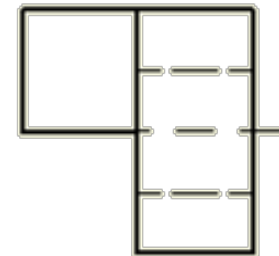
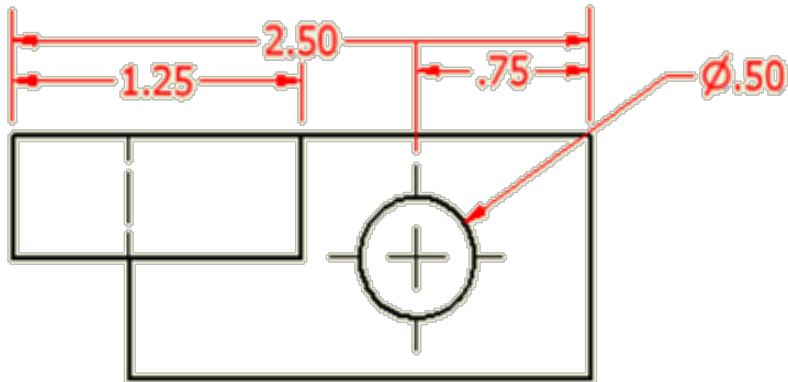
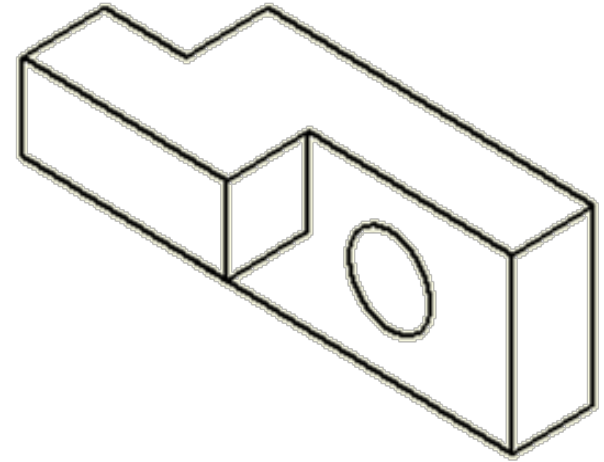
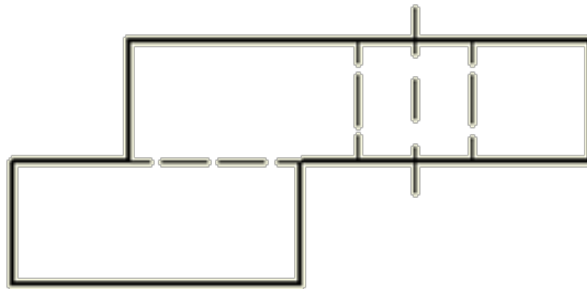
➤ Location

of all  
features



# Dimension Completely

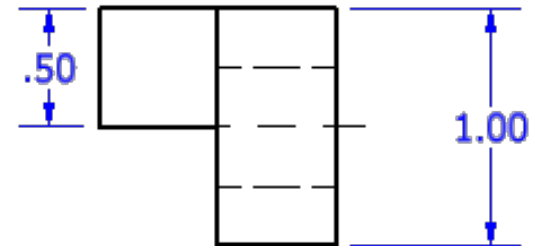
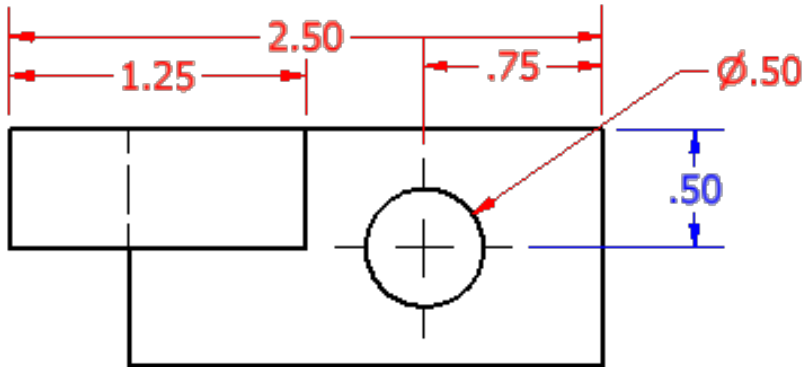
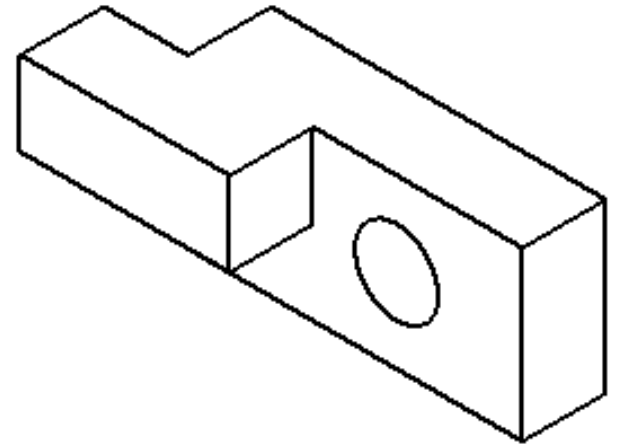
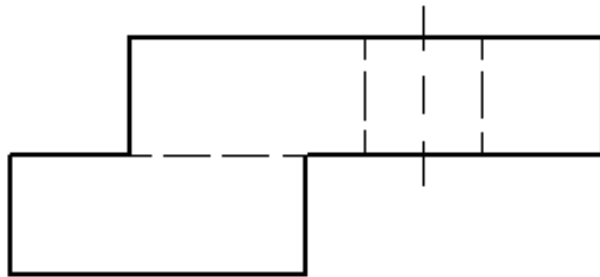
Width



# Dimension Completely

Width

Height

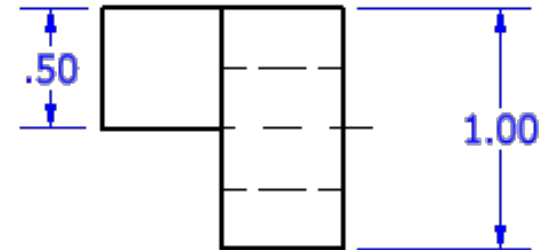
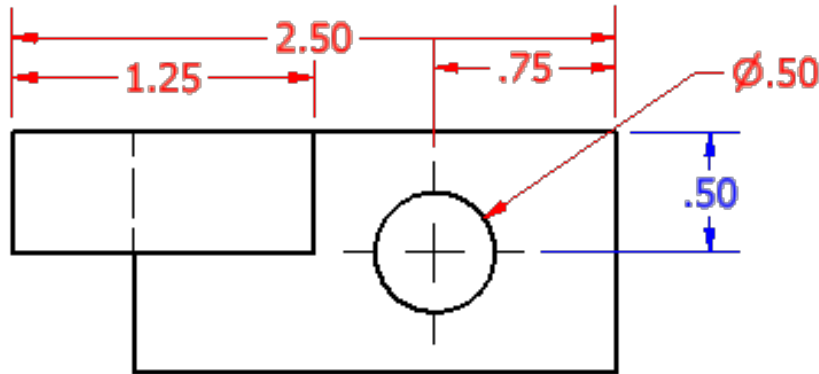
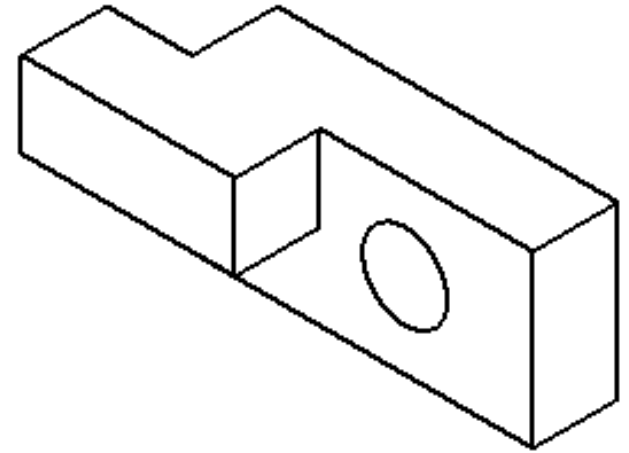
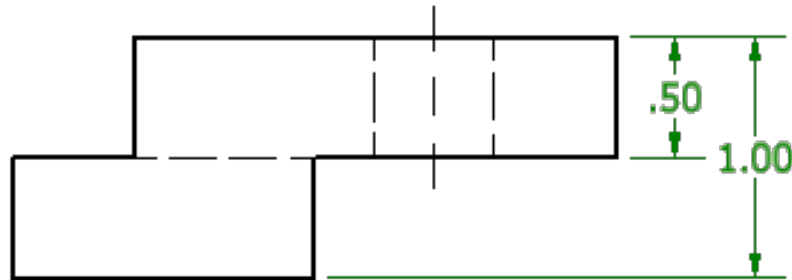


# Dimension Completely

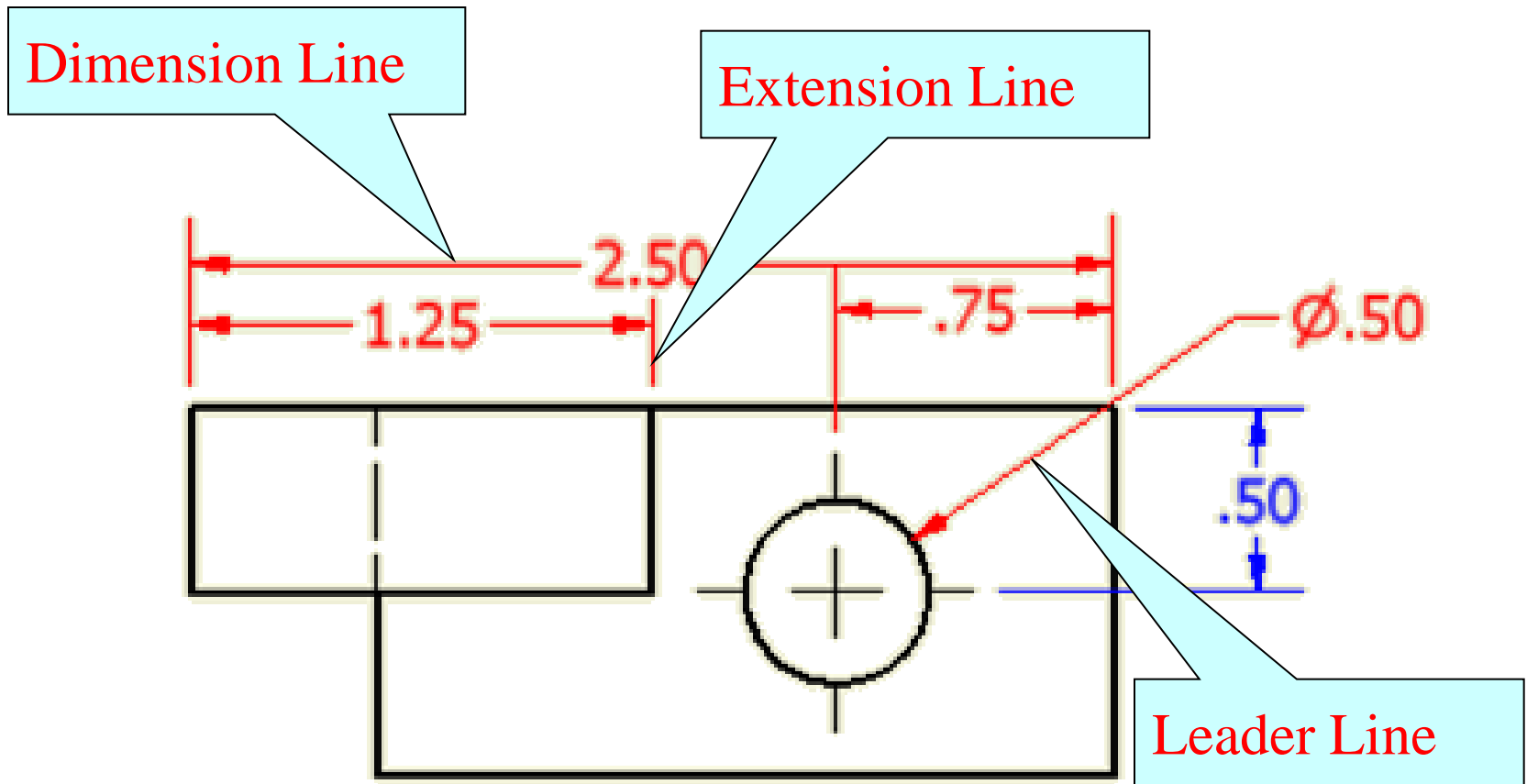
Width

Height

Depth

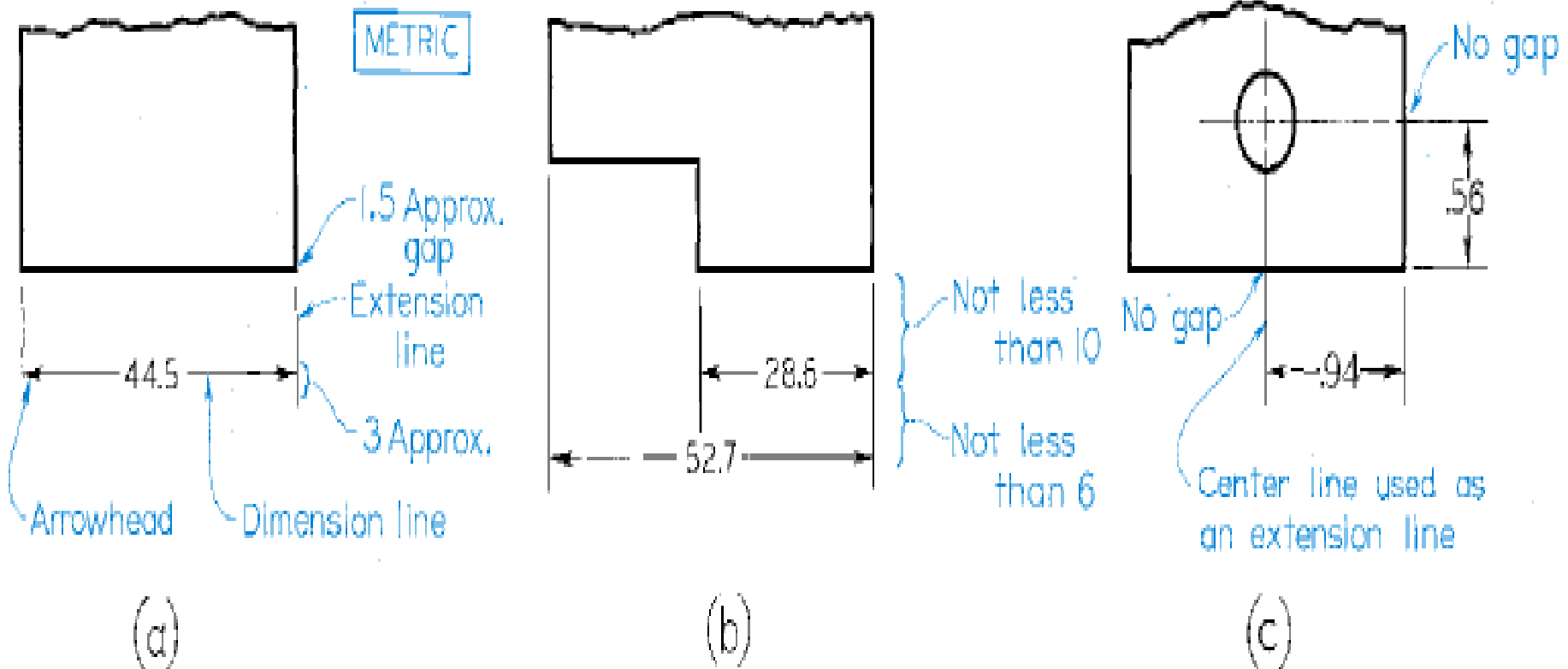


# Dimension Line “Types”



# Dimensioning: Key Terms

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



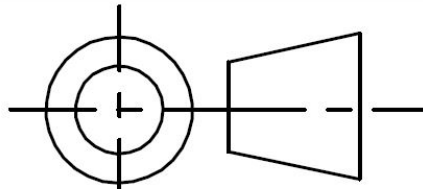


# Dimensioning: Key Terms

- **Tolerance**

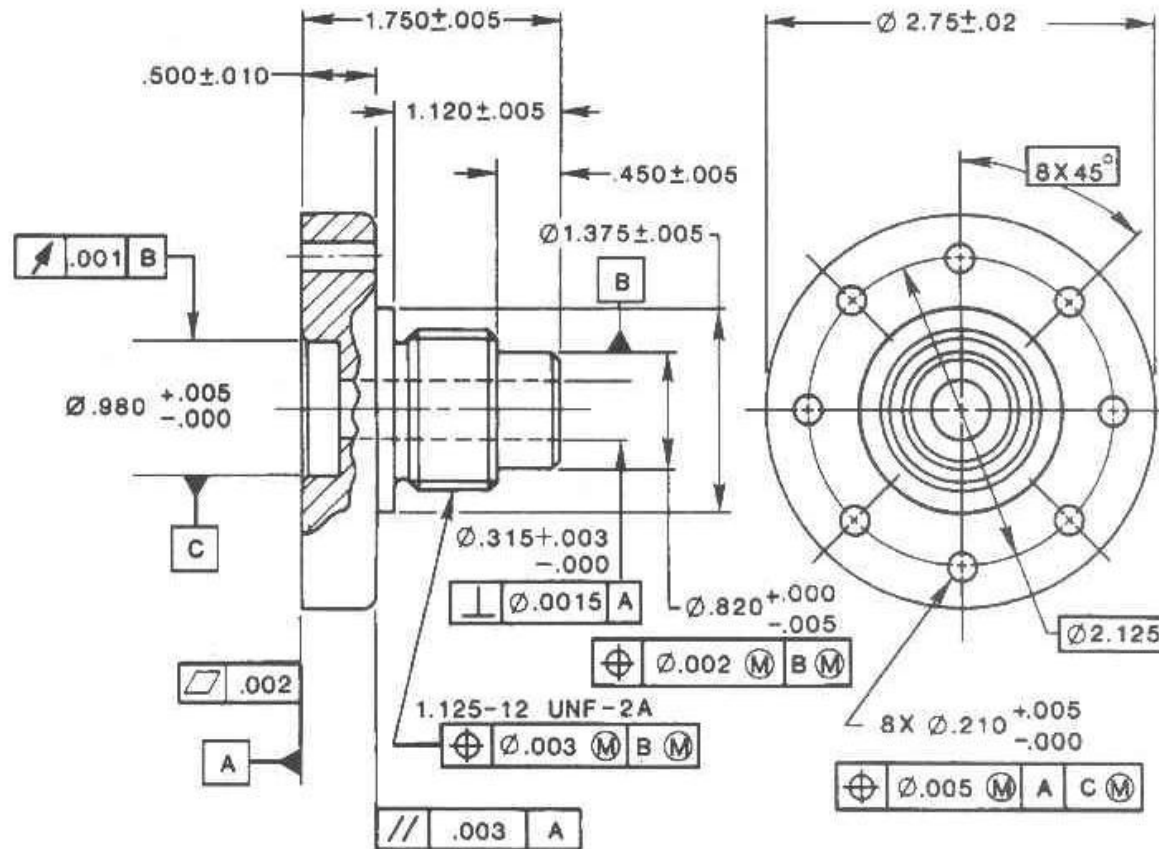
- The total allowable variation a part can have from the specified dimension
- The less variation allowed, the more the part will cost to make

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES			
ANGLES	.X	.XX	.XXX
$\pm .5^\circ$	$\pm .02$	$\pm .01$	$\pm .005$

<b>TOLERANCING</b> 00 = $\pm 0.2$ 00.0 = $\pm 0.1$ 00.00 = $\pm 0.05$ angular = $\pm 0^\circ 30'$	<b>SCALE</b> <b>1:1</b>	<b>SIZE</b> <b>A4</b>
<b>ALL DIMENSIONS IN MM</b>		
 <p>3rd ANGLE PROJECTION</p>		
<b>DO NOT SCALE</b>		

# Dimensioning: Key Terms

- Tolerance in action



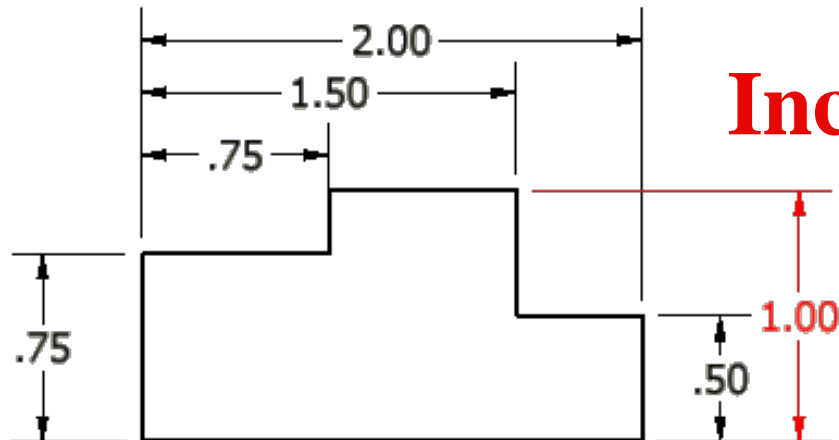
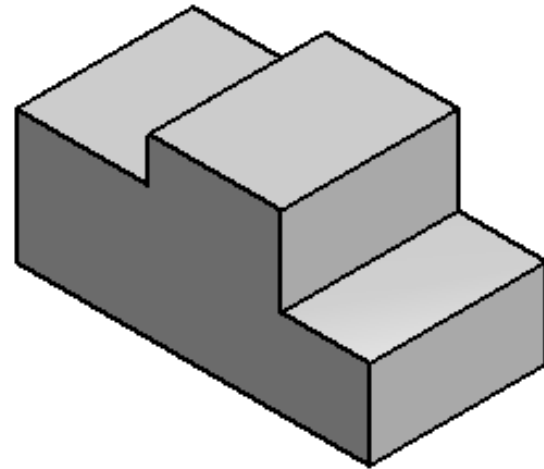
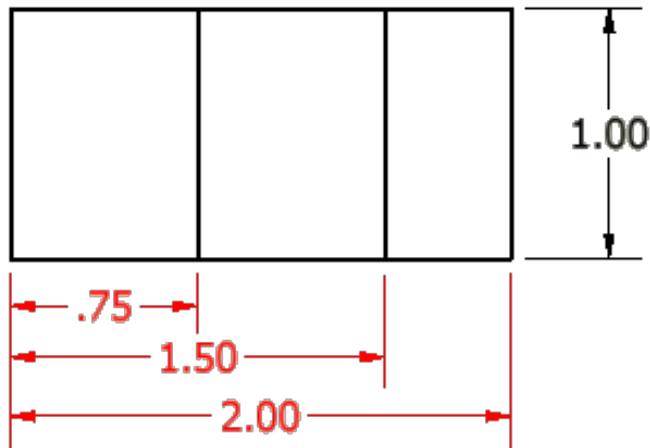
NOTE: THIS DRAWING PREPARED  
IN ACCORDANCE WITH ASME  
Y14.5M-19--

# Dimensioning: Rules

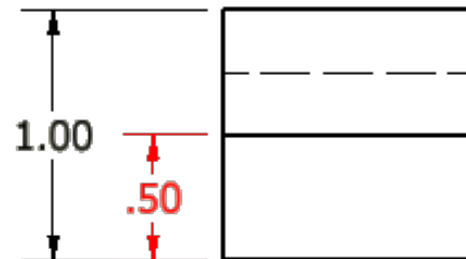
8

**Basic  
Rules to  
Remember**

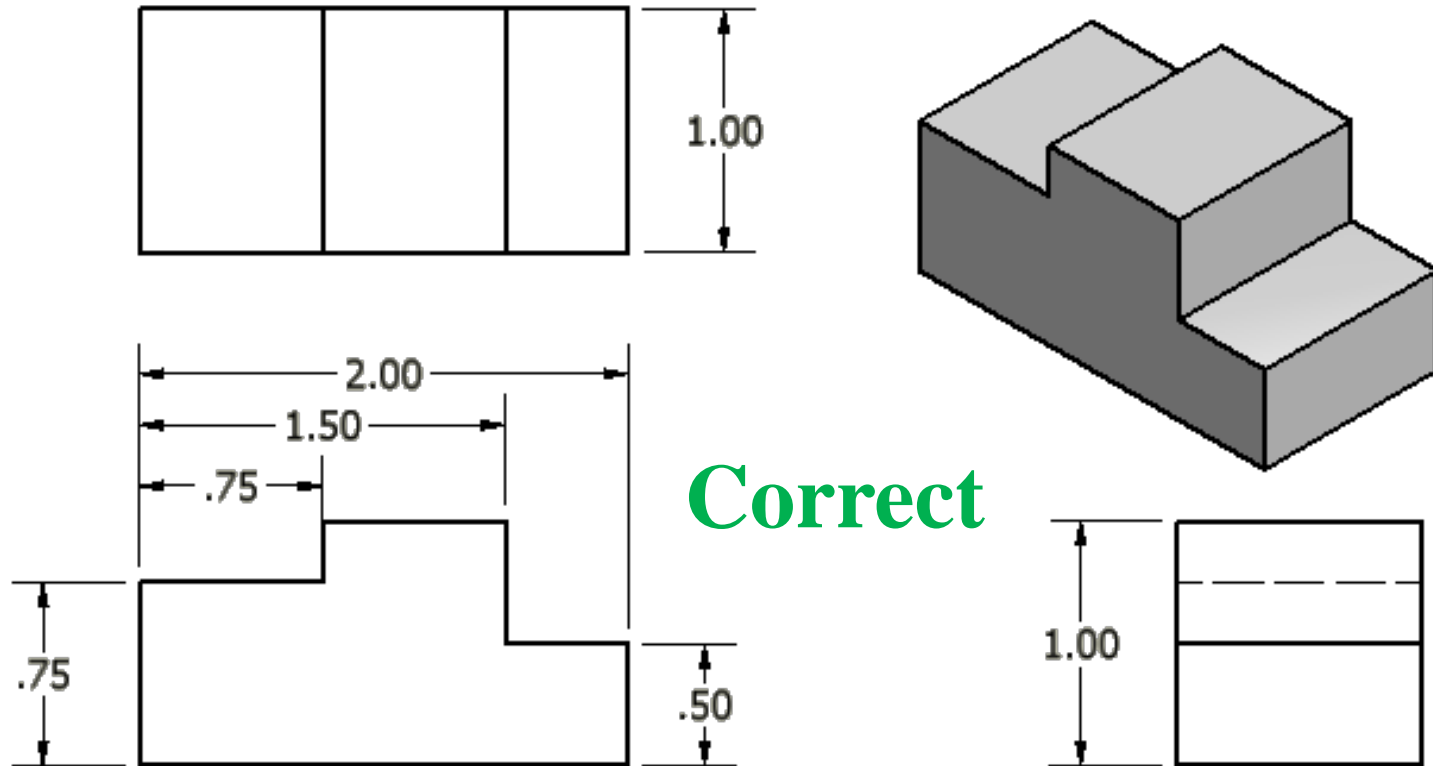
1) Dimensions should ***NOT*** be duplicated, nor should the same information be given in two different ways.



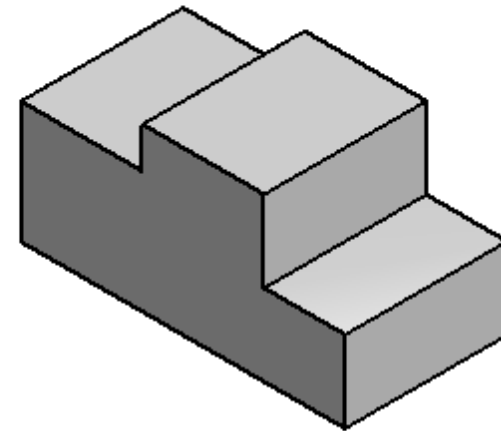
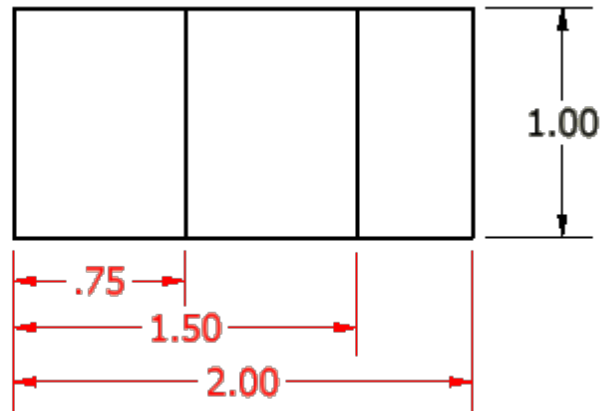
**Incorrect**



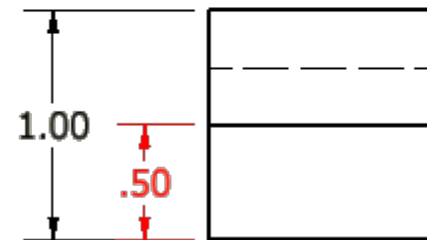
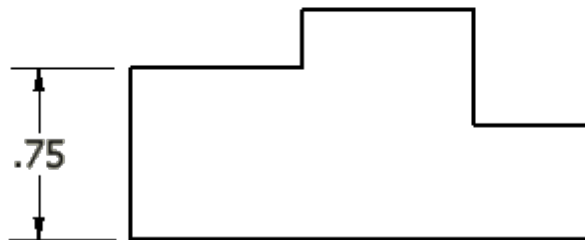
1) Dimensions should ***NOT*** be duplicated, nor should the same information be given in two different ways.



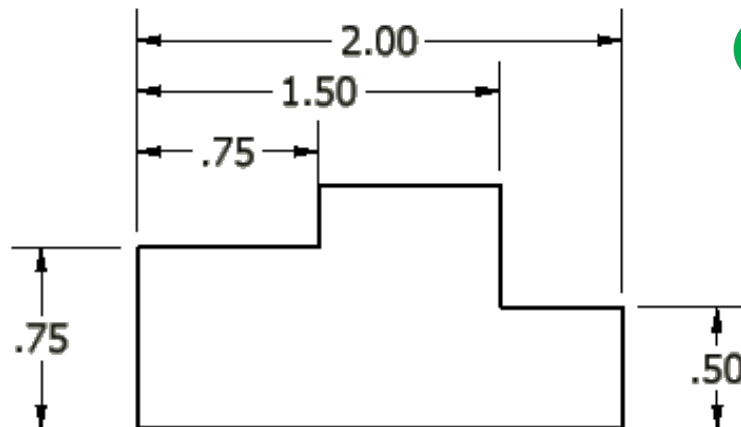
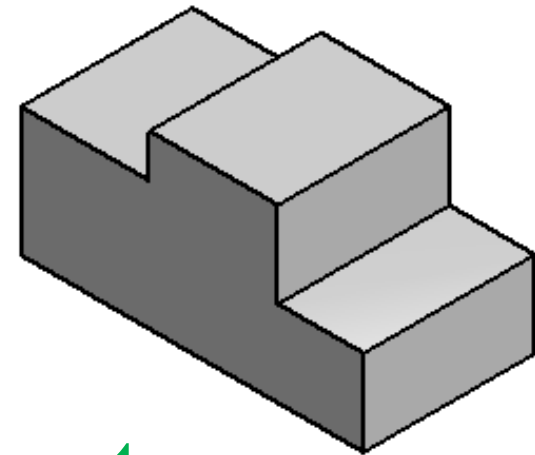
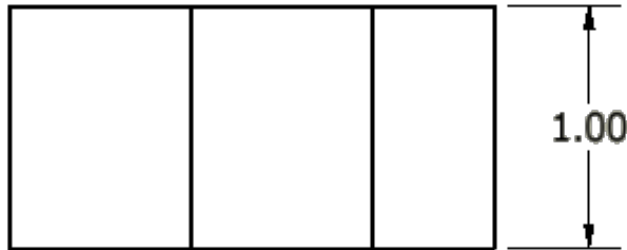
2) Dimensions should be attached to the view that best shows the *contour* (curve, shape) of the feature to be dimensioned.



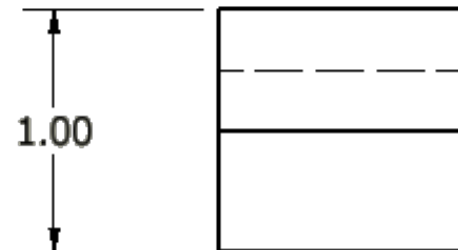
**Incorrect**



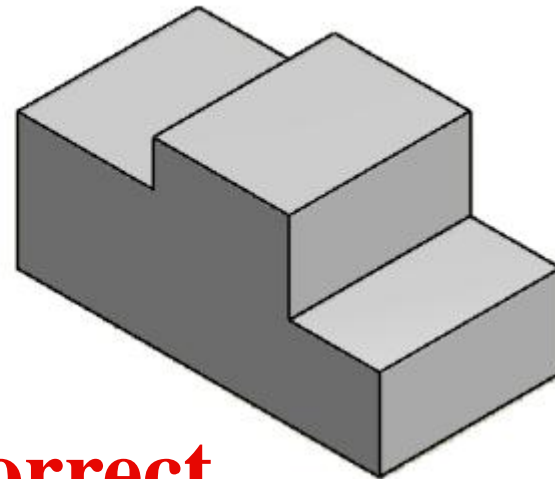
2) Dimensions should be attached to the view that best shows the *contour* of the feature to be dimensioned.



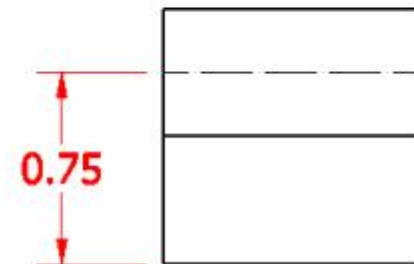
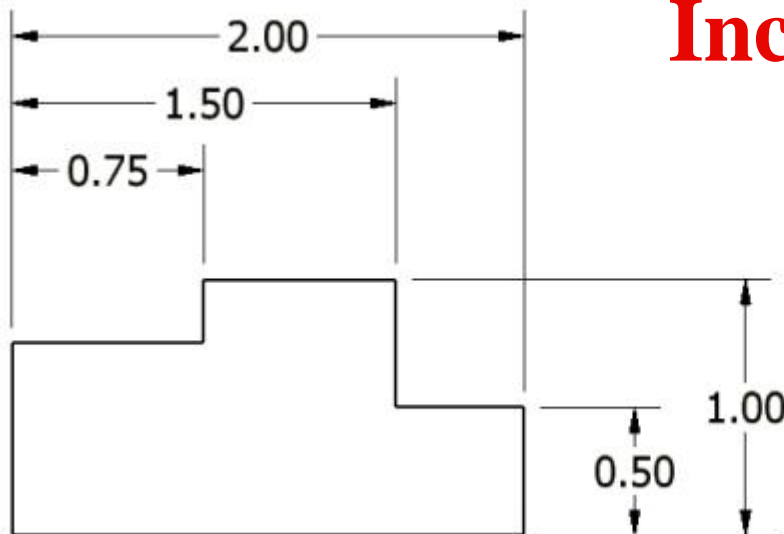
Correct



3) Whenever possible, *avoid* dimensioning to hidden lines.

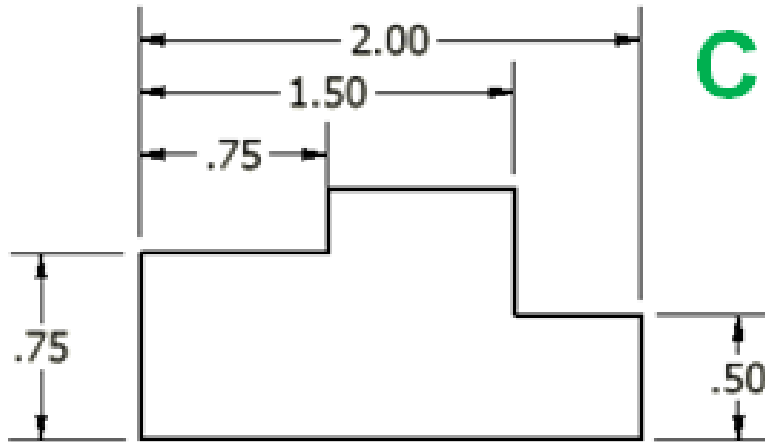
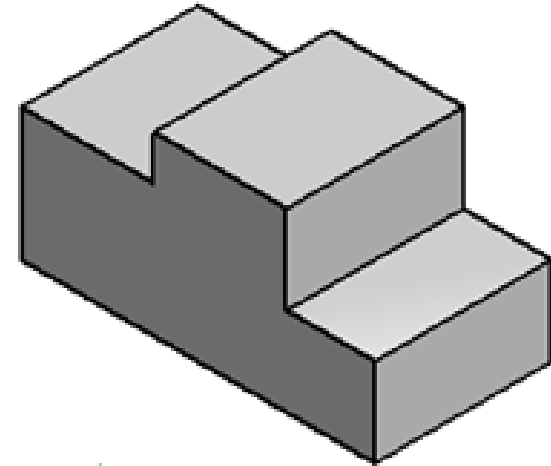
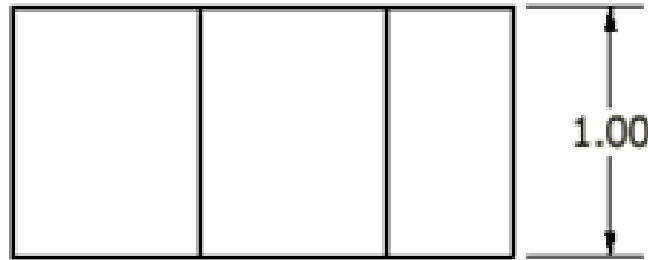


**Incorrect**

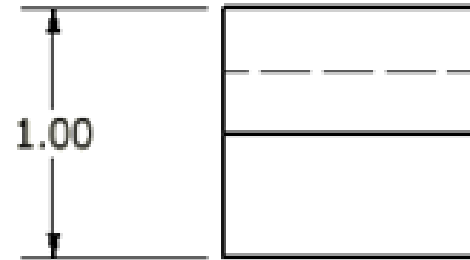




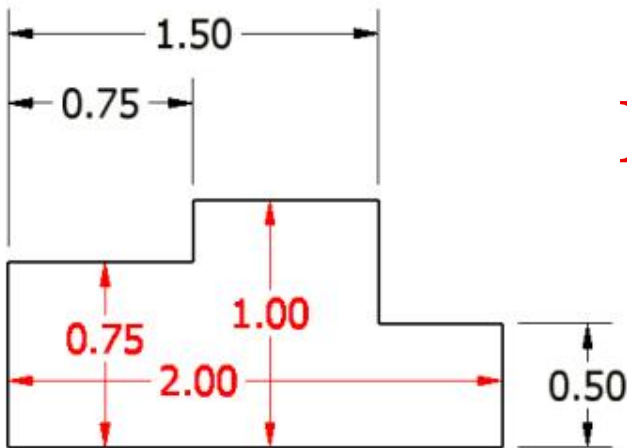
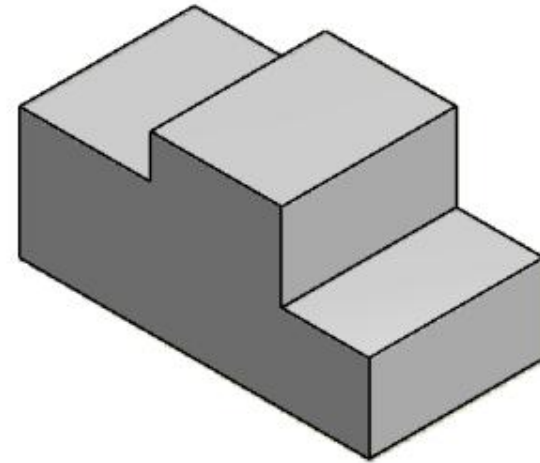
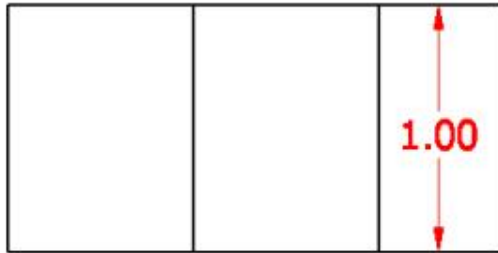
3) Whenever possible, *avoid* dimensioning to hidden lines.



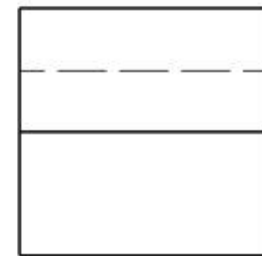
Correct



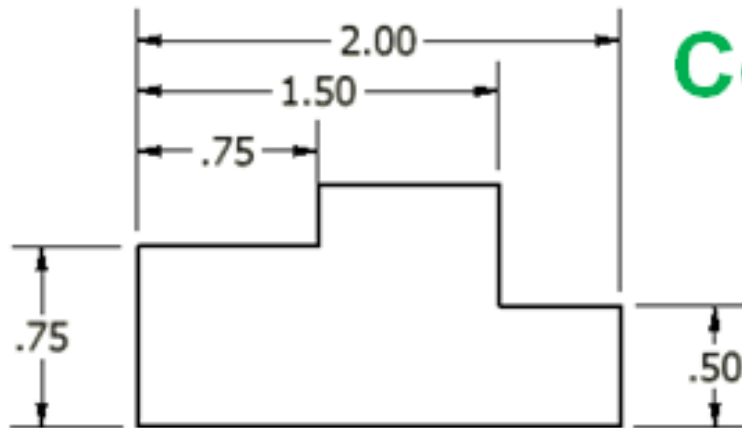
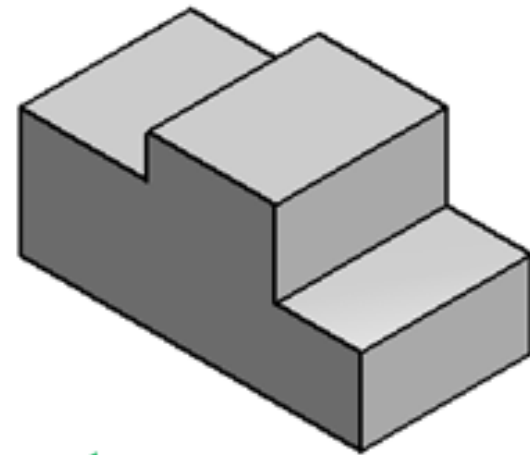
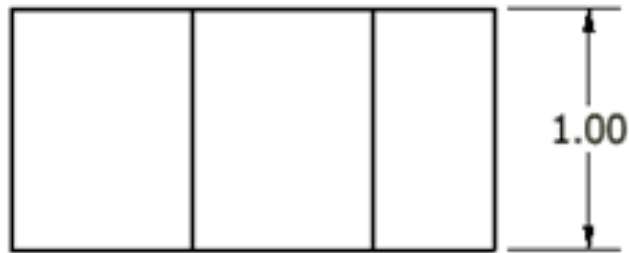
## 4) Avoid dimensioning over or through the object.



**Incorrect**



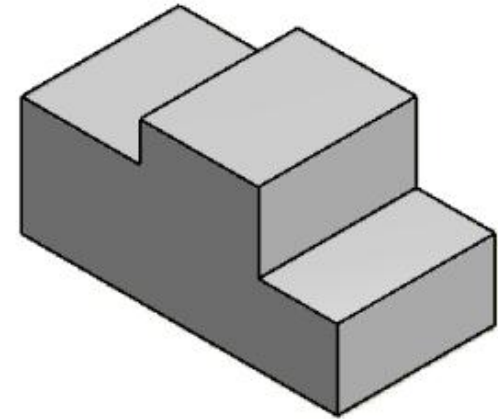
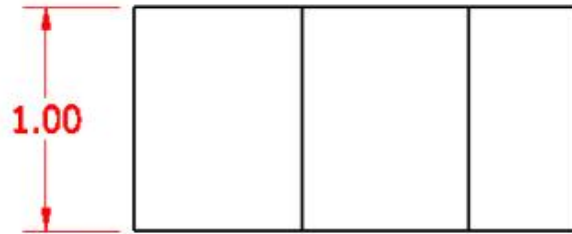
4) Avoid dimensioning over or through the object.



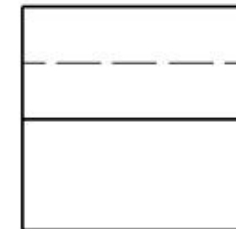
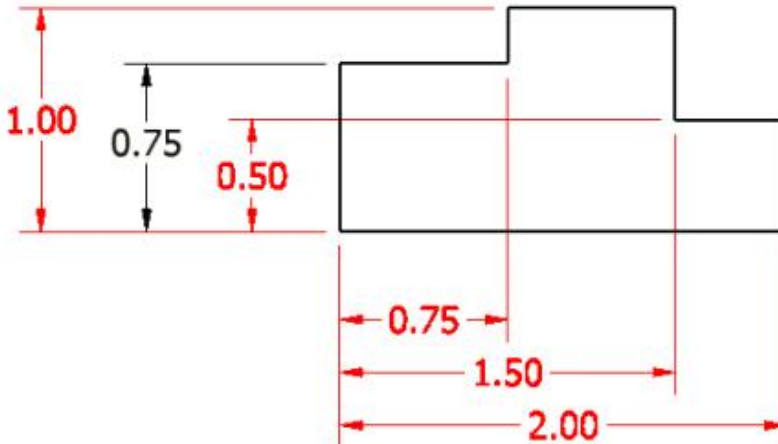
**Correct**



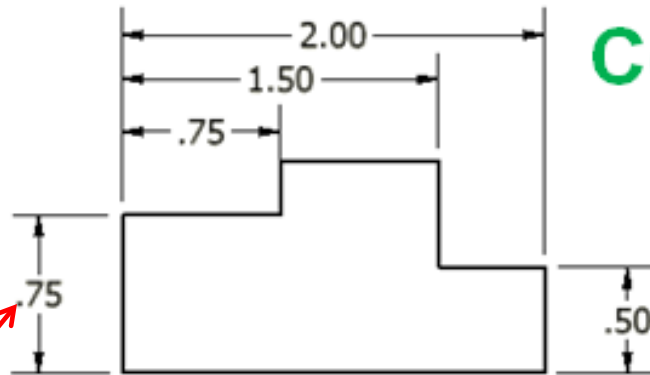
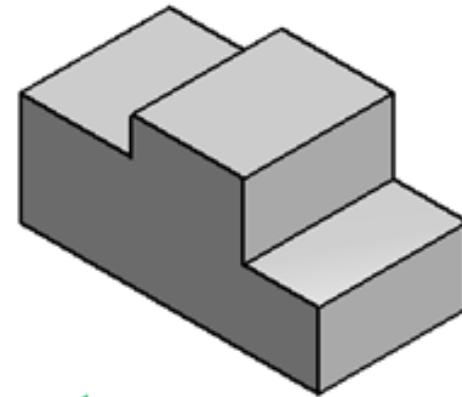
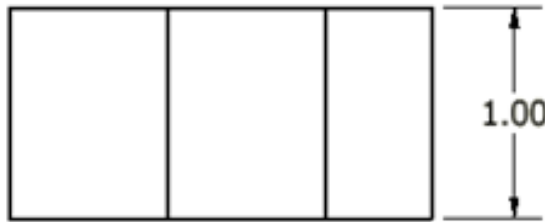
5) Whenever possible, place dimensions *between* adjacent views.



**Incorrect**



5) Whenever possible, place dimensions between adjacent views.

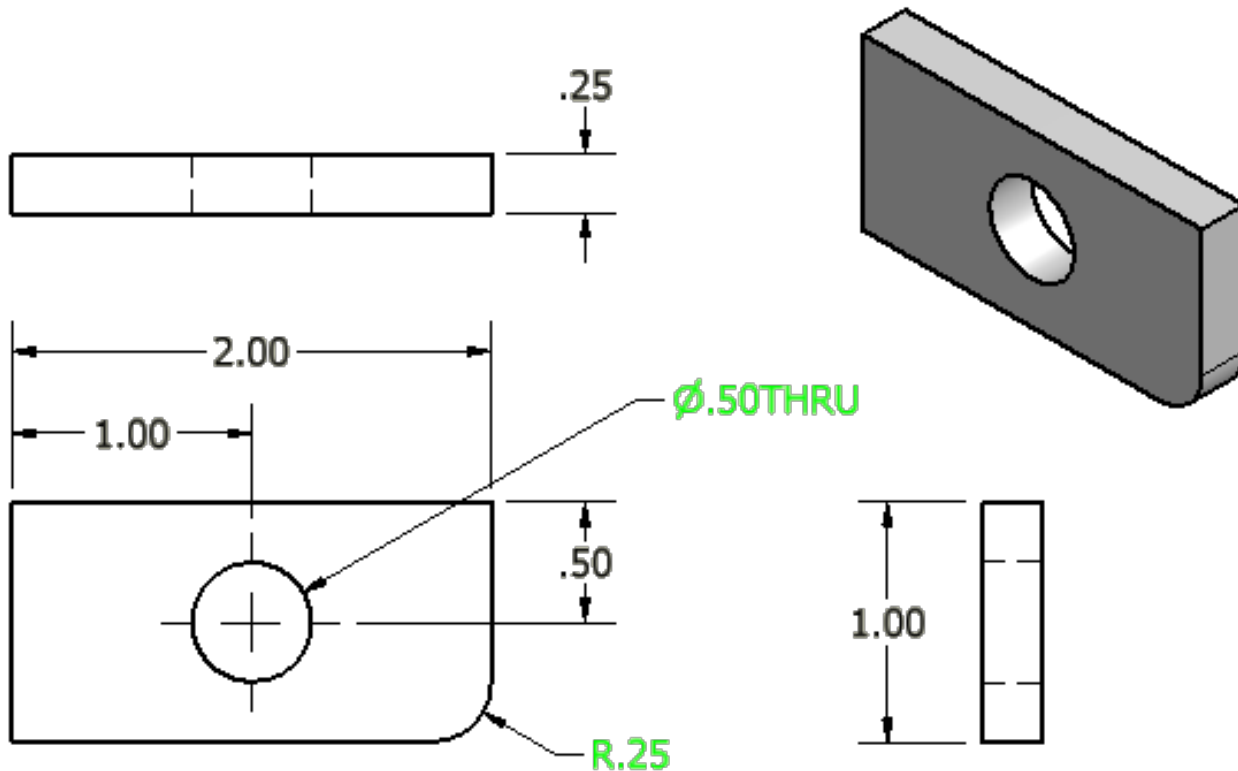


Correct

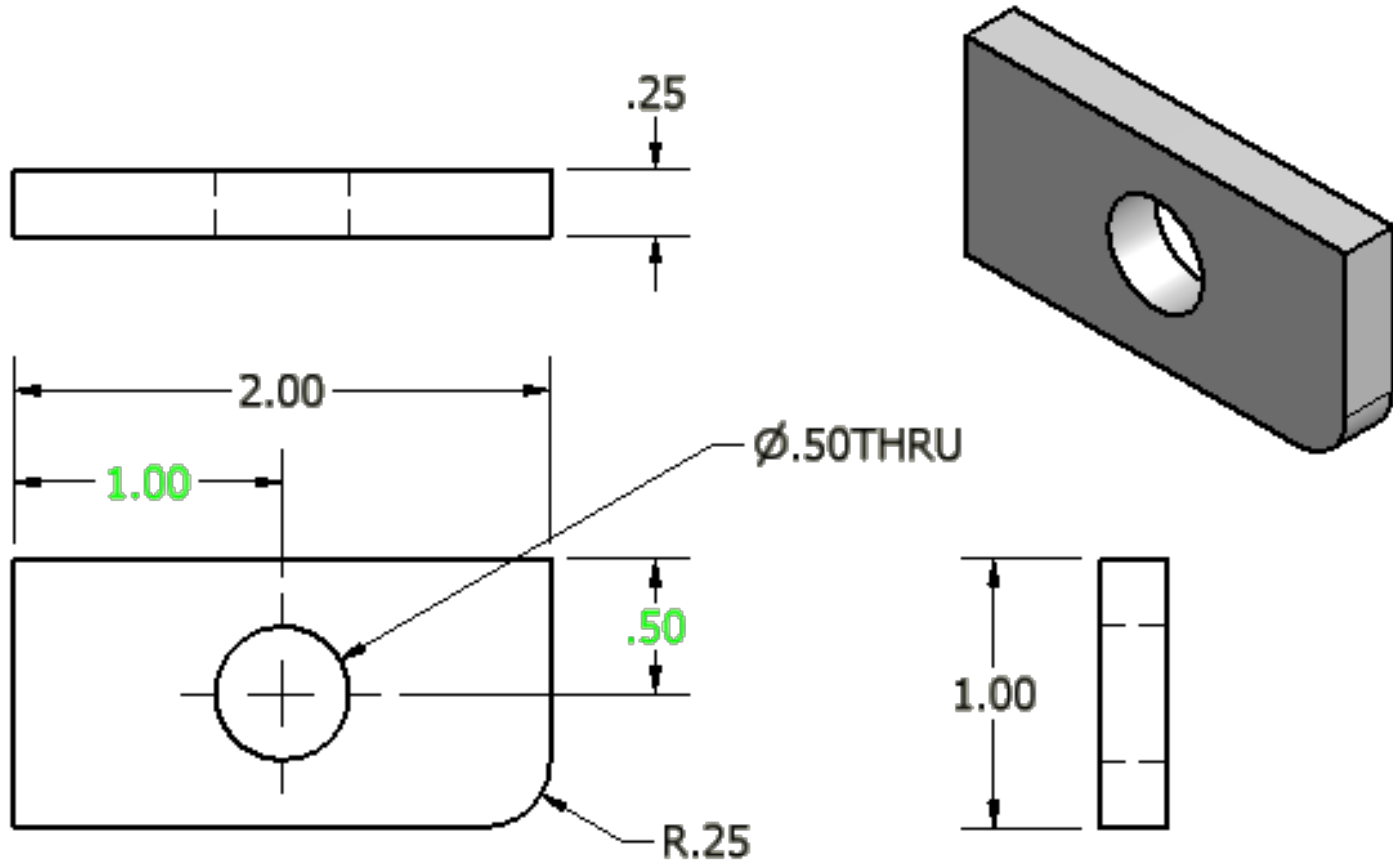


Notice this dimension is not between the views; **HOWEVER**, this is a better placement than dimensioning to the hidden line in the right side view.

6) A *circle* is dimensioned by its *diameter* and an *arc* is dimensioned by its *radius*.

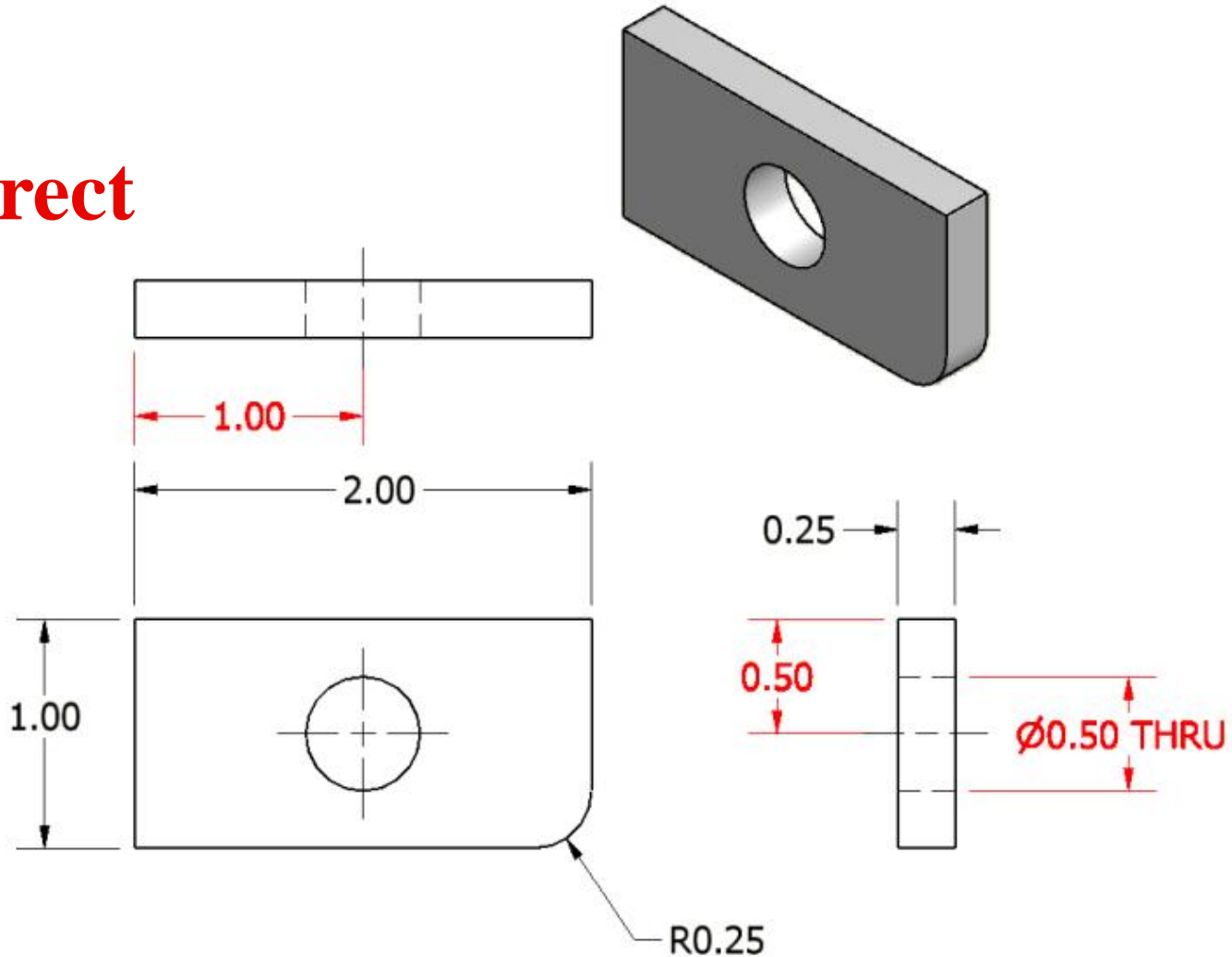


7) Holes are *located* by their *centerlines*, which may be *extended* and used as *extension lines*.



8) Holes should be *located* and *sized* in the view that shows them as a *circle*.

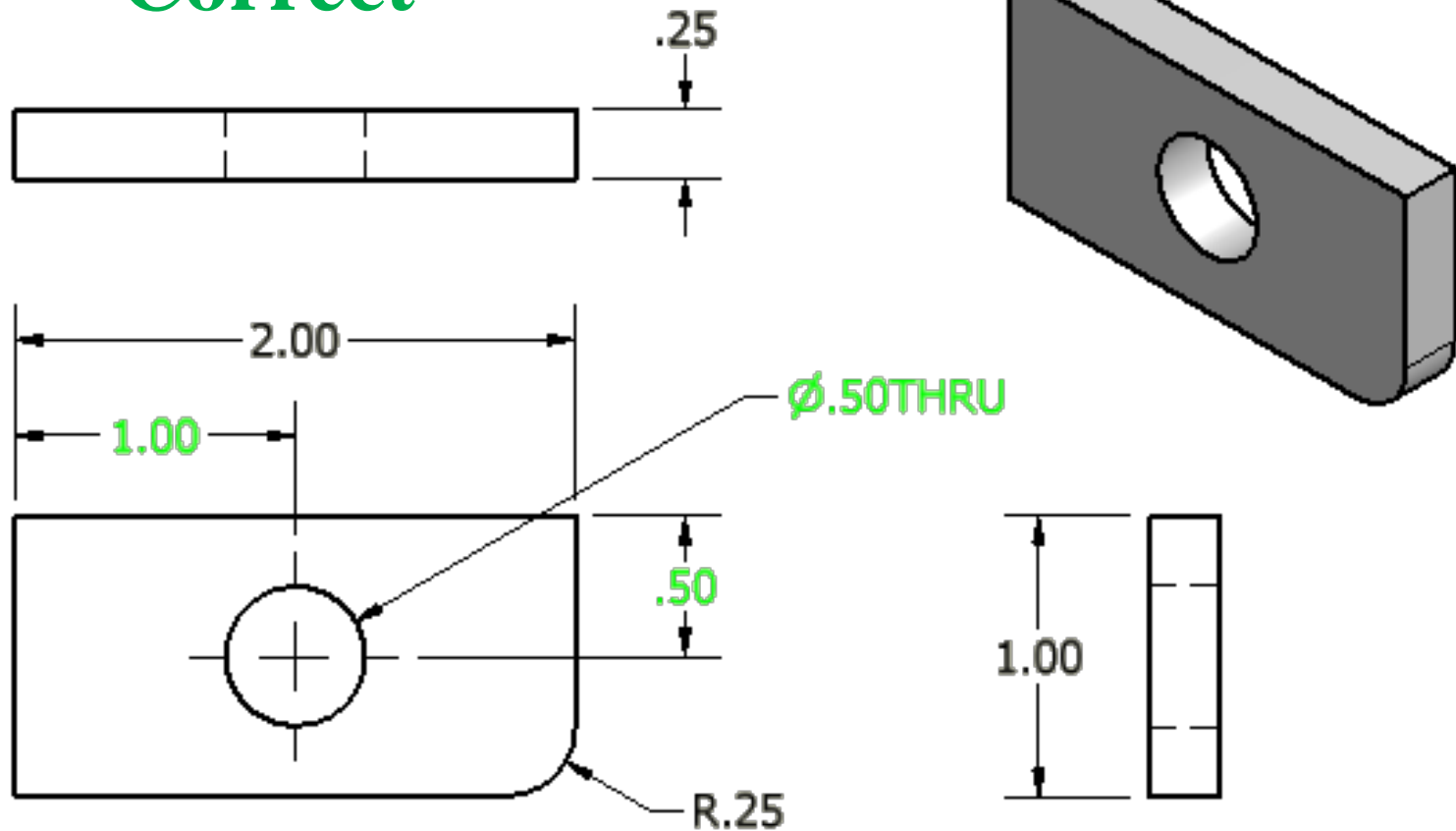
**Incorrect**





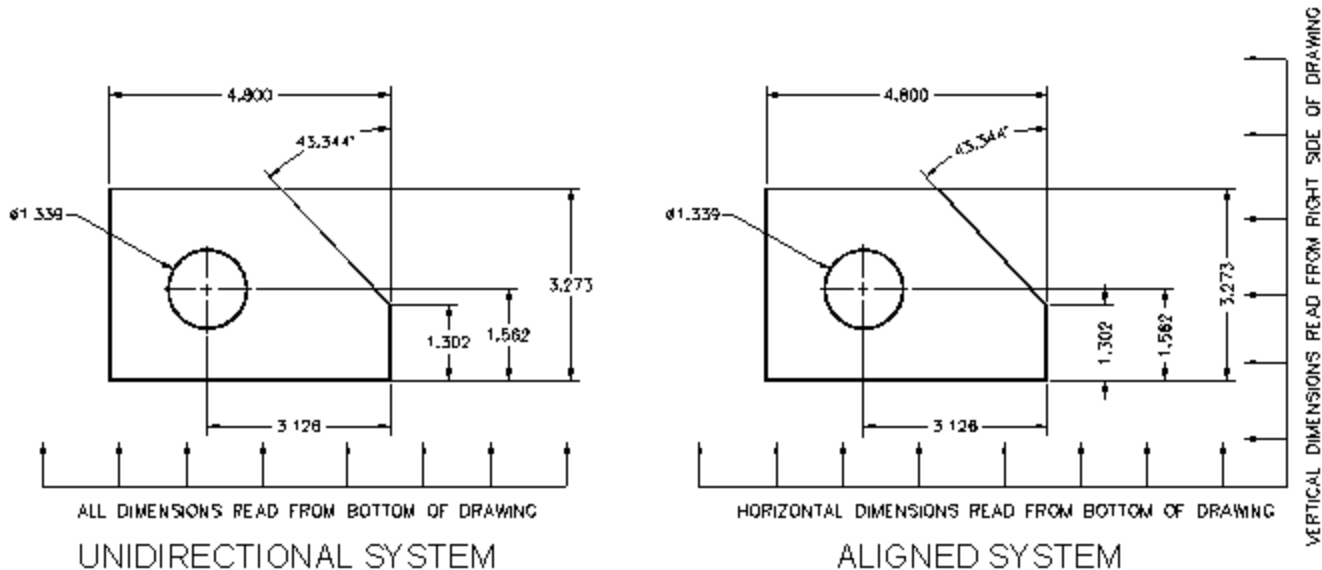
8) Holes should be *located* and *sized* in the view that shows them as a *circle*.

**Correct**



# 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: Placement

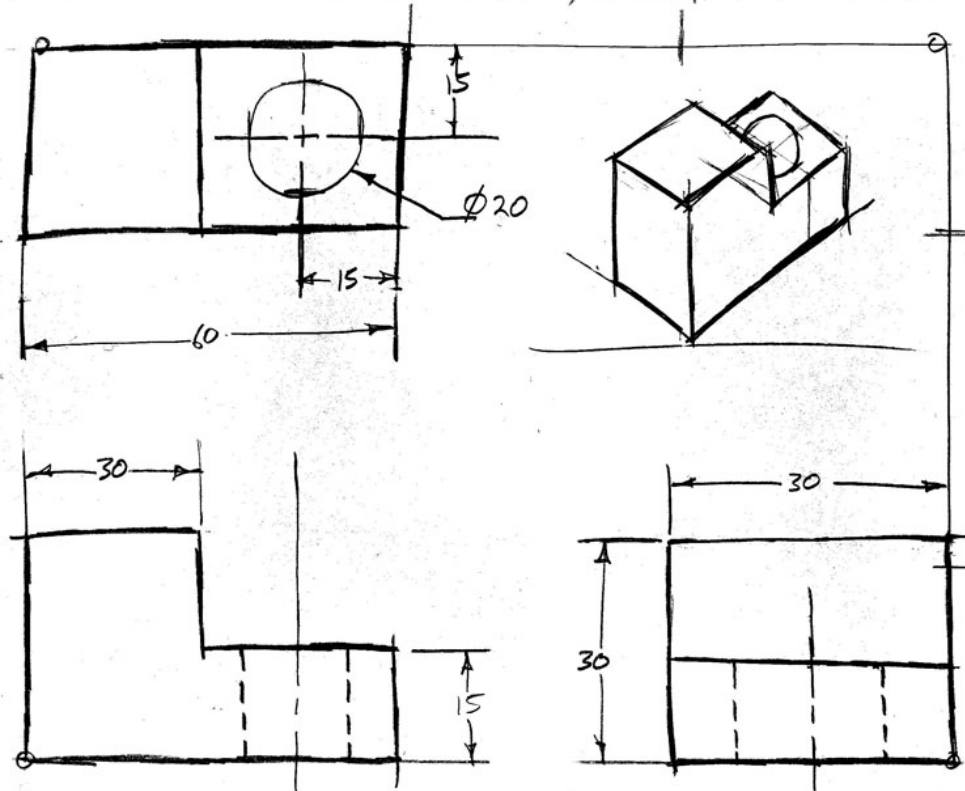
REF: D.F. TEXT P. 29

ORTHO GRAPHIC PROJECTION

DATE \_\_\_\_\_ NAME \_\_\_\_\_

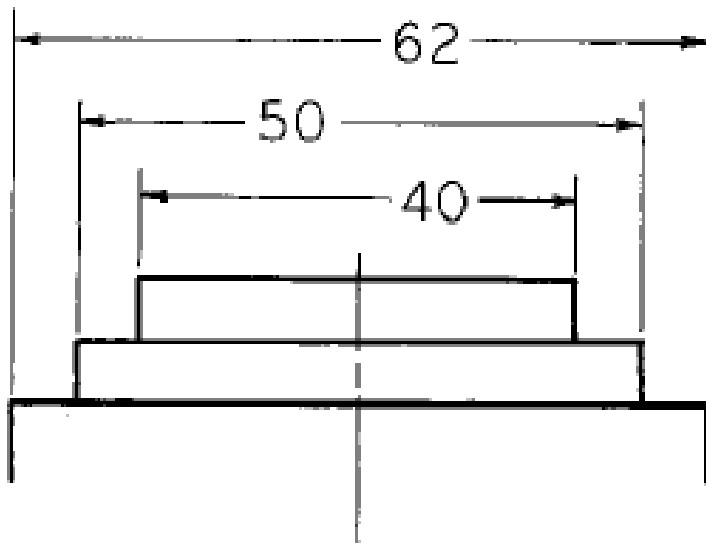
SECTION \_\_\_\_\_

SHOWS AN OBJECT FROM DIFFERENT 2D VIEWS, USUALLY 3 TO SHOW ALL FEATURES.



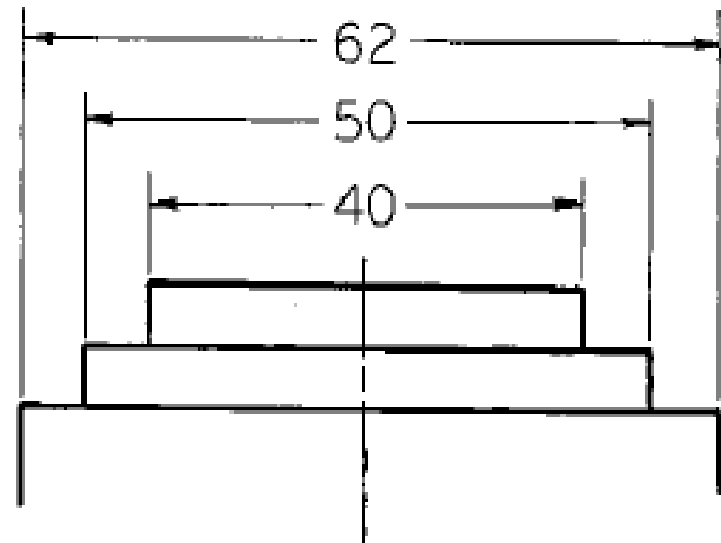
# Dimensioning: Placement

## Stagger Dimension Values



PREFERRED

(a)

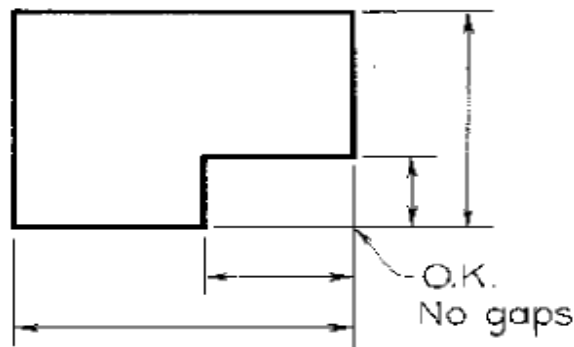


POOR PRACTICE

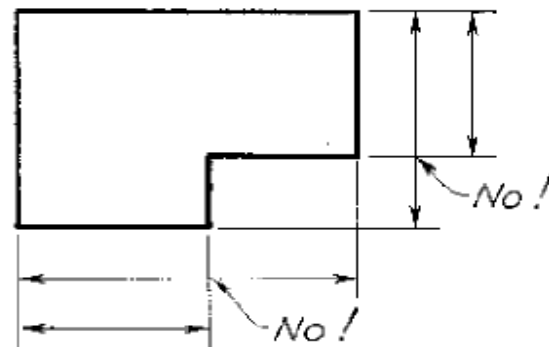
(b)

# Dimensioning: Placement

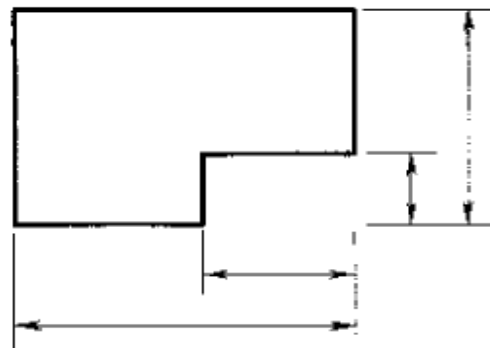
## Dimension & Extension Lines



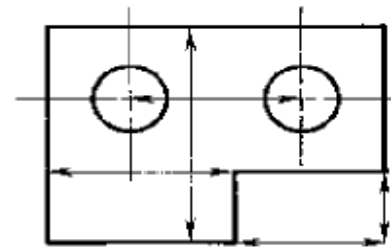
(a) CORRECT



(b) NO!



(c) NO!

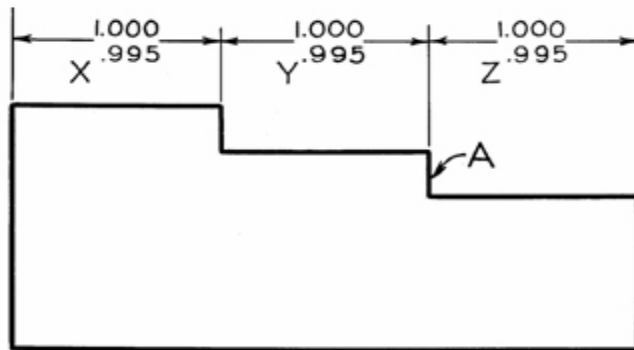


(d) NO!

# Dimensioning: Three Systems

- **Chained**

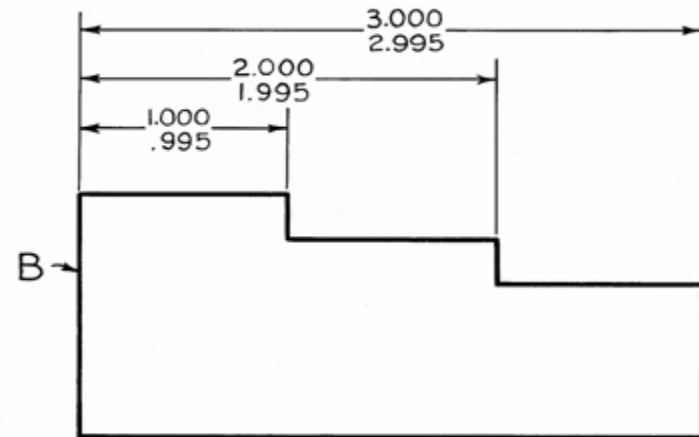
- Each dimension continues from the previous one
- Tolerances stack



(a) CUMULATIVE TOLERANCES

- **Baseline**

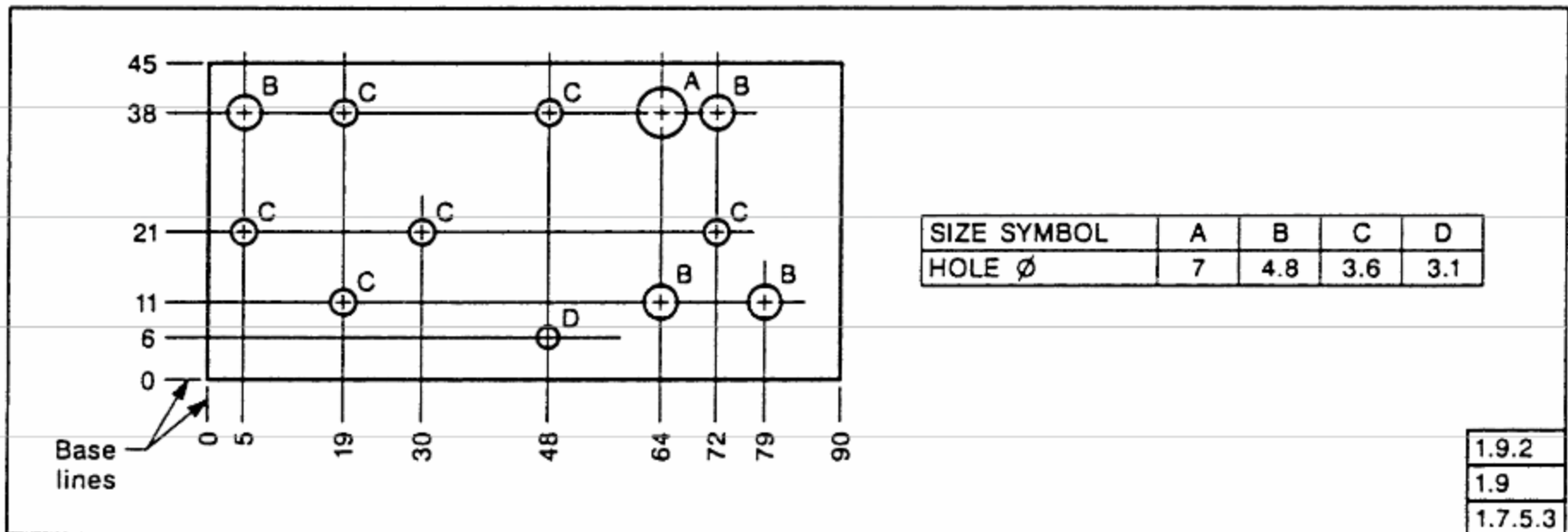
- Each dimension is specified from a common baseline
- Tolerances do not stack



(b) BASE-LINE DIMENSIONING

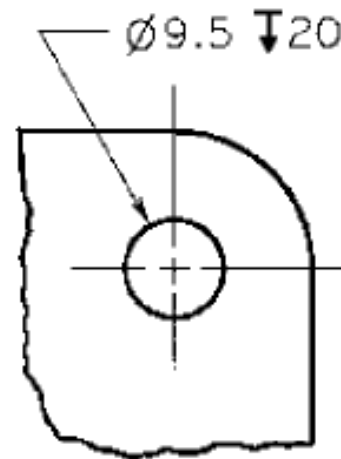
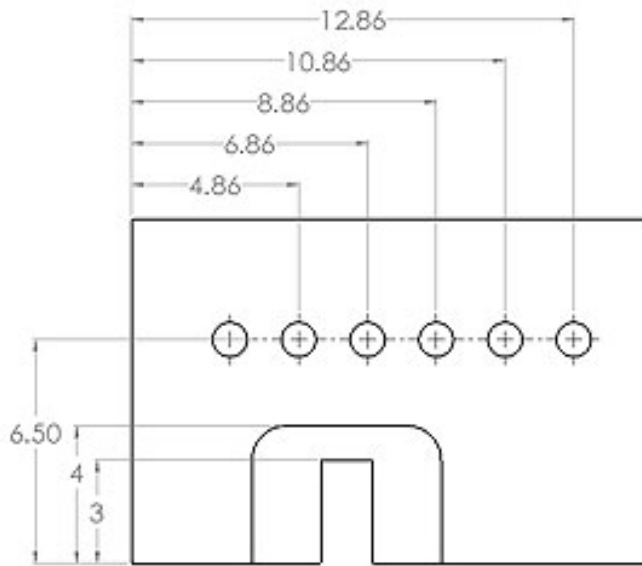
# Dimensioning: Three Systems

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



# Dimensioning: Holes

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

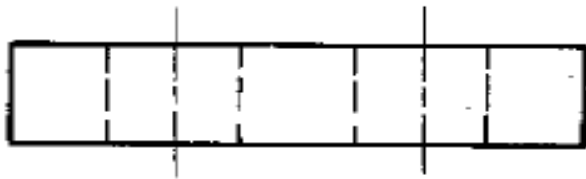
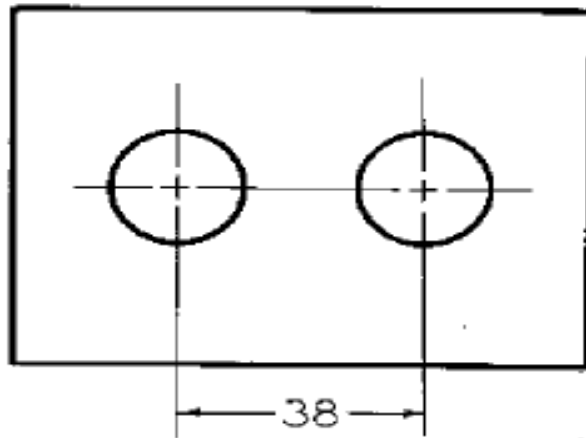


METRIC

(b)



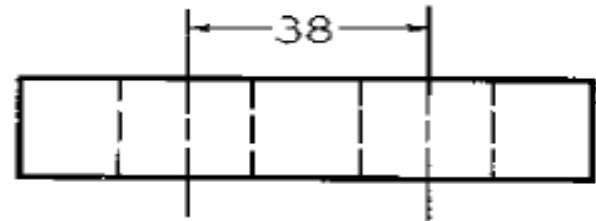
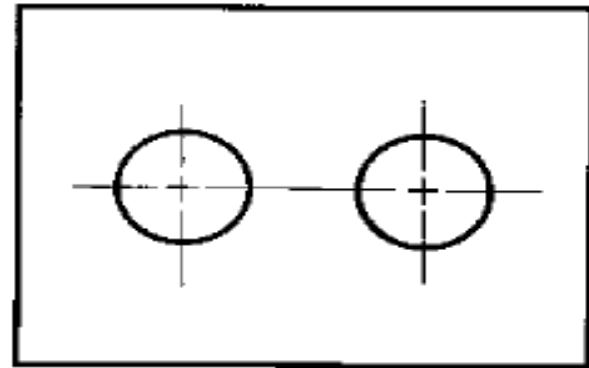
# Dimensioning: Holes



CORRECT

(a)

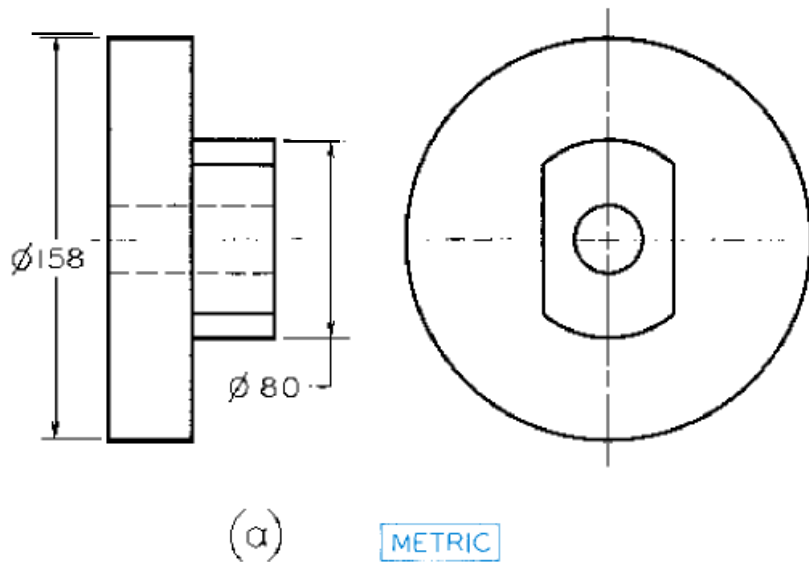
METRIC



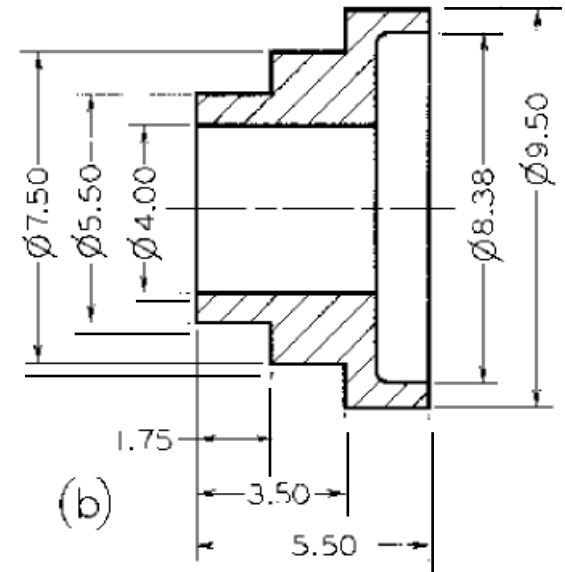
POOR PRACTICE

(b)

# Dimensioning: Diameter Symbol



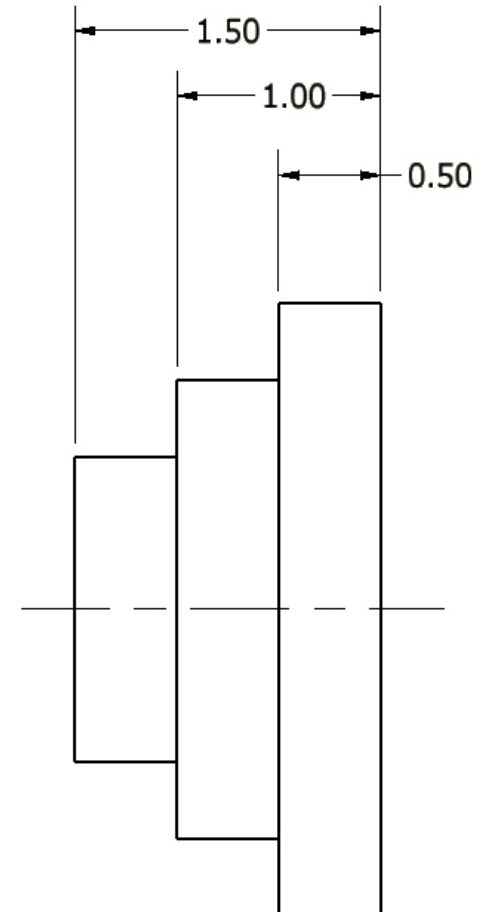
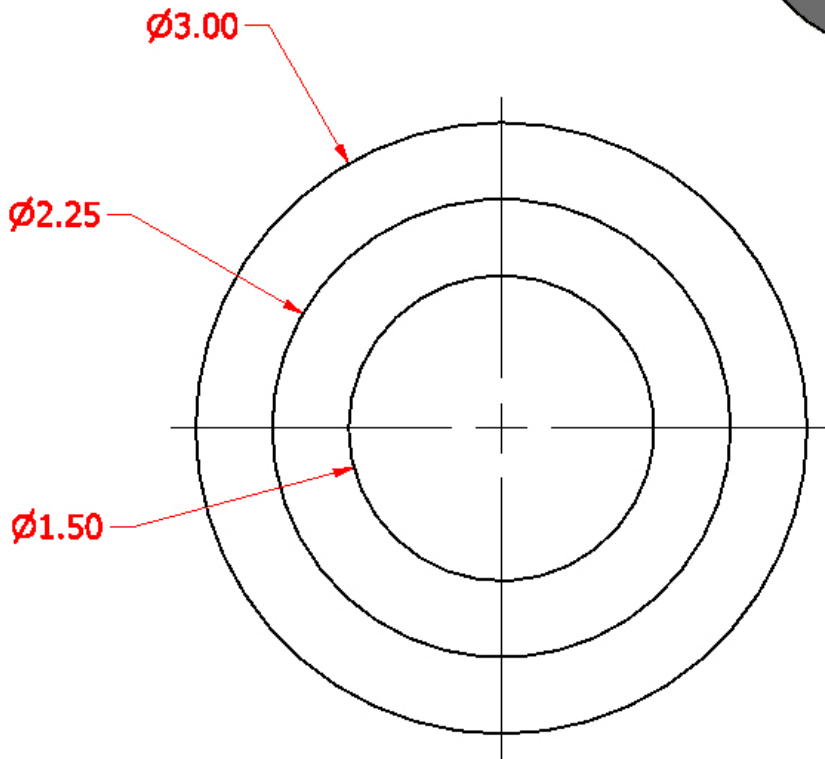
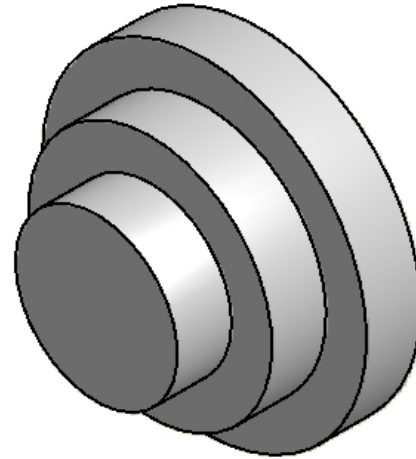
USE OF "  $\varnothing$  " TO INDICATE CIRCULAR SHAPE



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

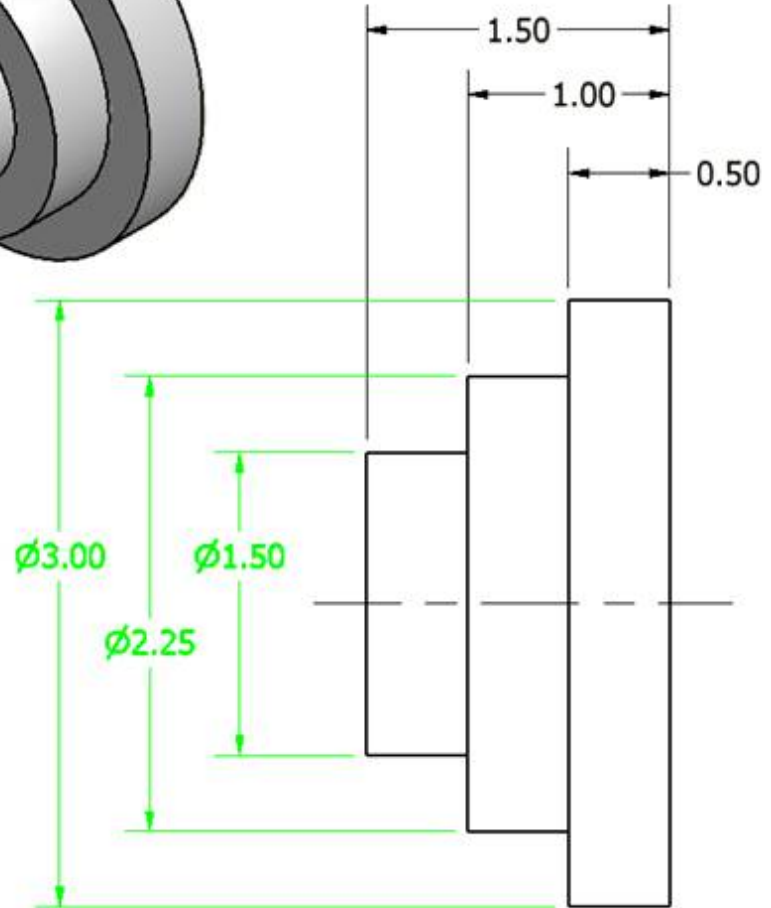
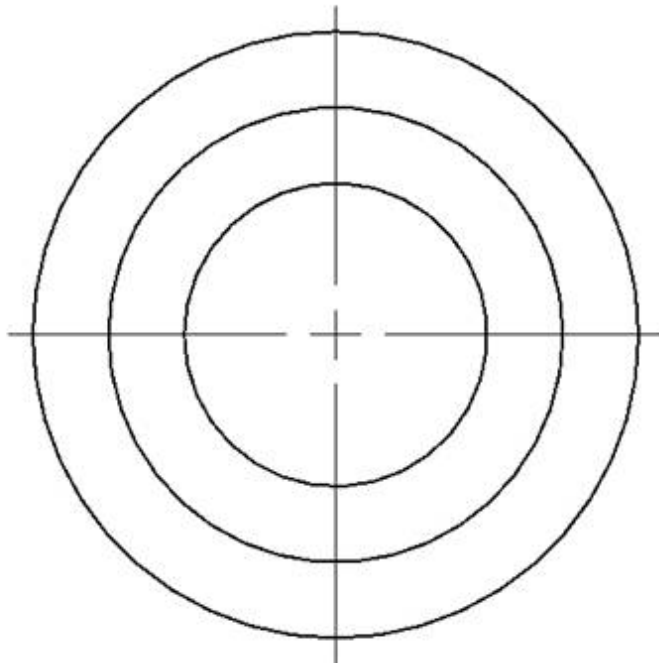
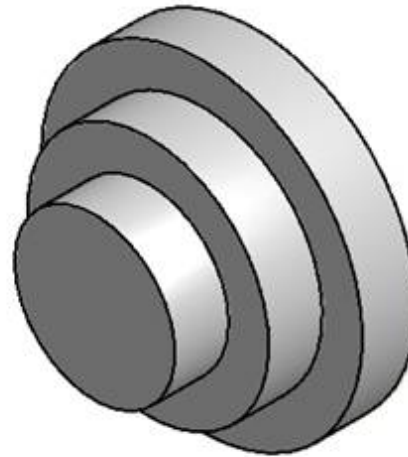
# Dimensioning: Diameter Symbol

**Incorrect**



# Dimensioning: Diameter Symbol

Correct



# 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!!!