

# MACHINIST'S DRAWINGS

- As a designer, your main job is to make sure the machinist/manufacturer doesn't have to guess or assume *anything*.
- Don't tell the machinist "add a thing here" without showing the details.
- But, consult your machinist for advice at the start of your design process!

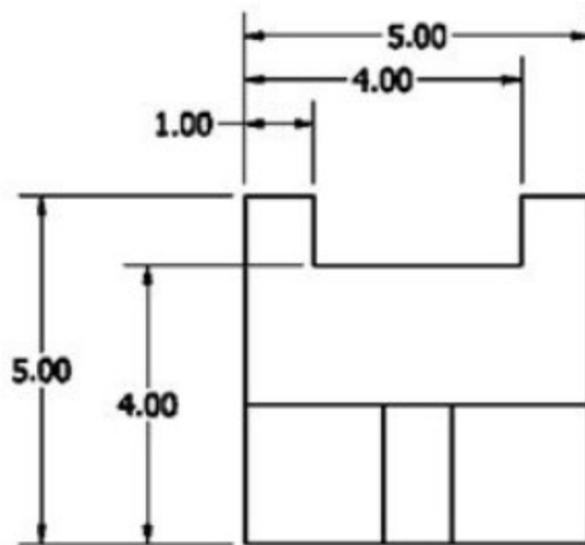
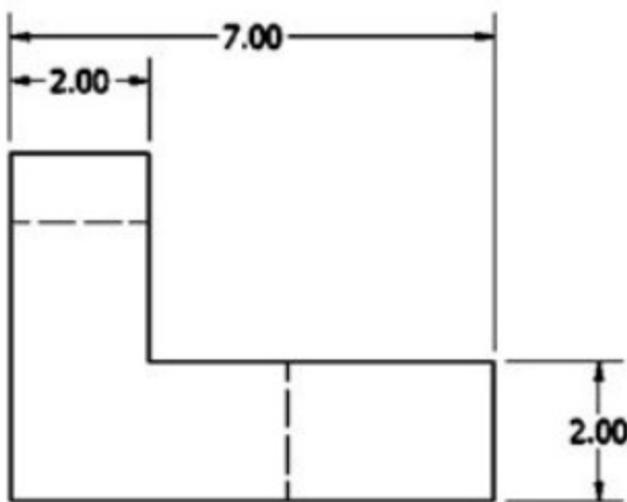
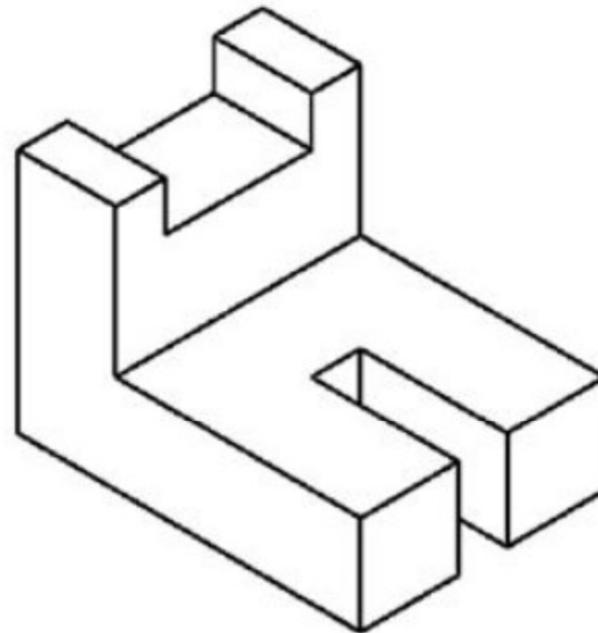
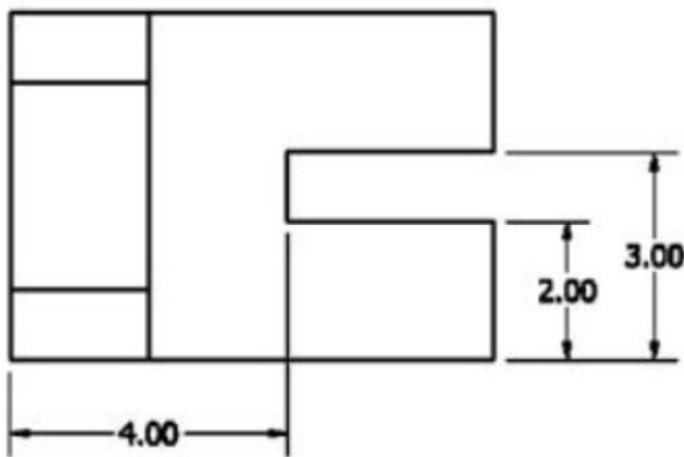
# SCALE

- All drawings are “to scale”. Period.
- This does NOT mean “full size”.
- This DOES mean “in the correct proportions”.
- The drawing must show *everything* (sizes, materials, etc.) describing the end goal.
- Generally, drawings never tell the machinist *how* to arrive at the goal... just what the goal *is*.

# SOFTWARE VS. PENCIL

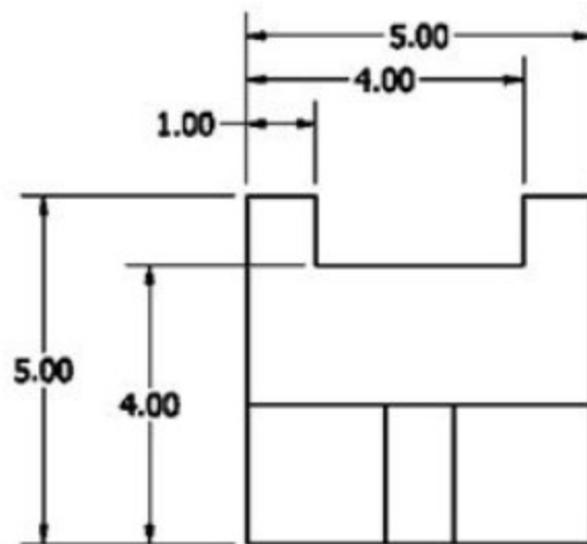
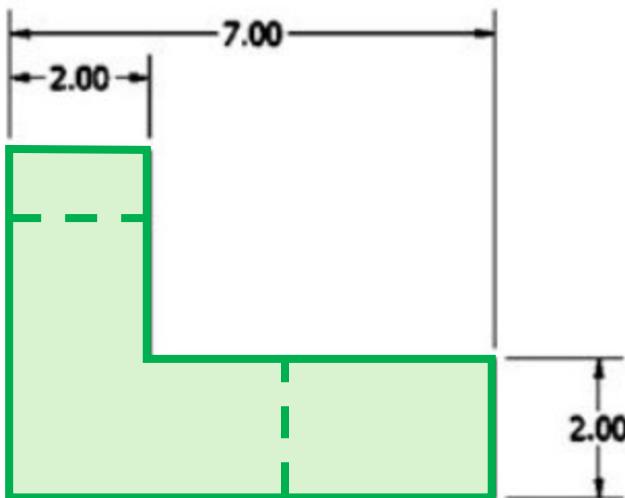
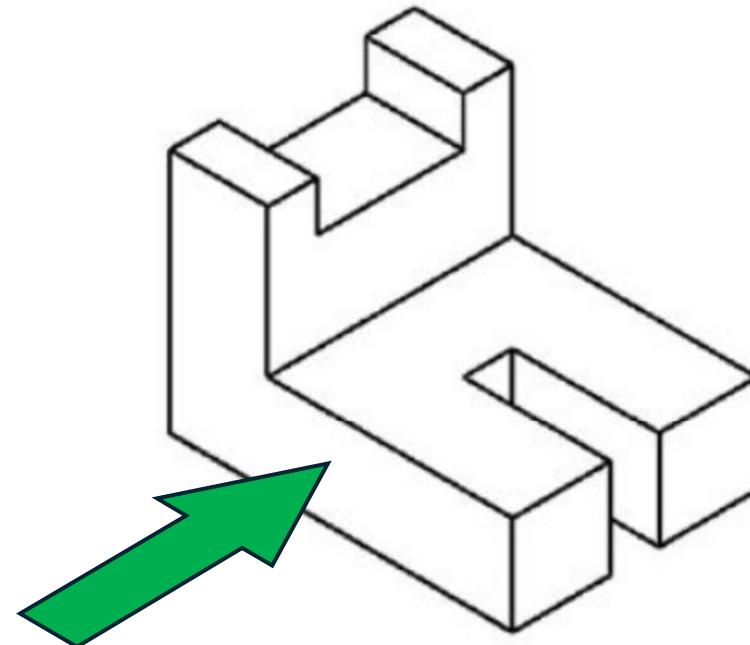
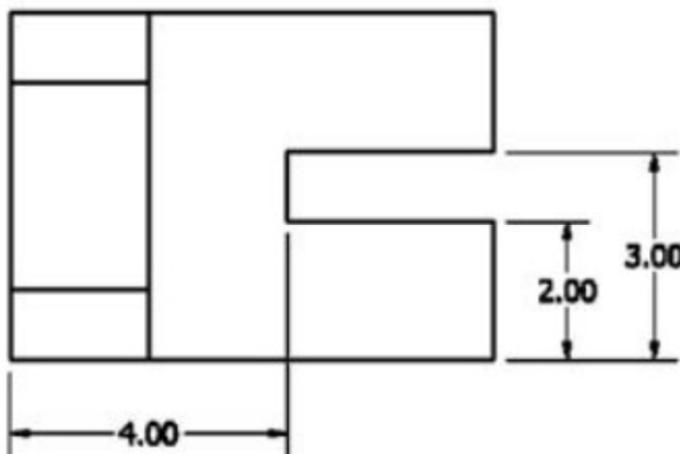
- Software will usually slow you down unless you are already an expert.
- If you are making one drawing to make *one object*, just use a pencil with a ruler.
- Dr. McLean does not care if your lines have a small wobble, or if your corners aren't perfectly at 90°.

# 3 VIEW Drawings (the default)

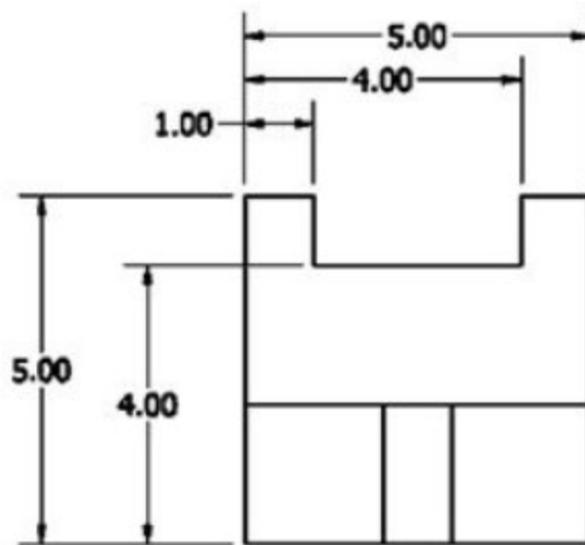
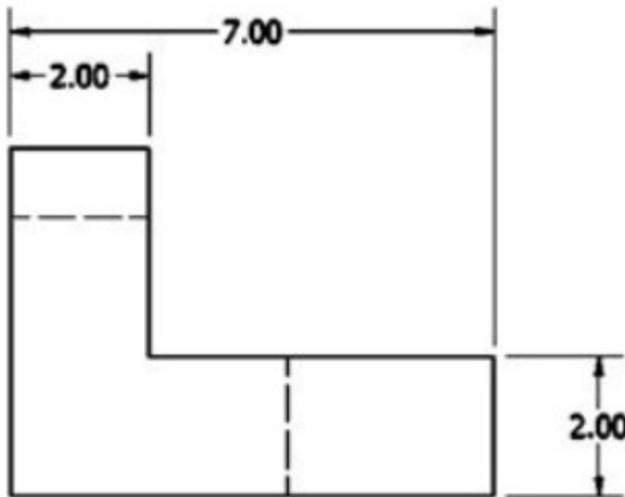
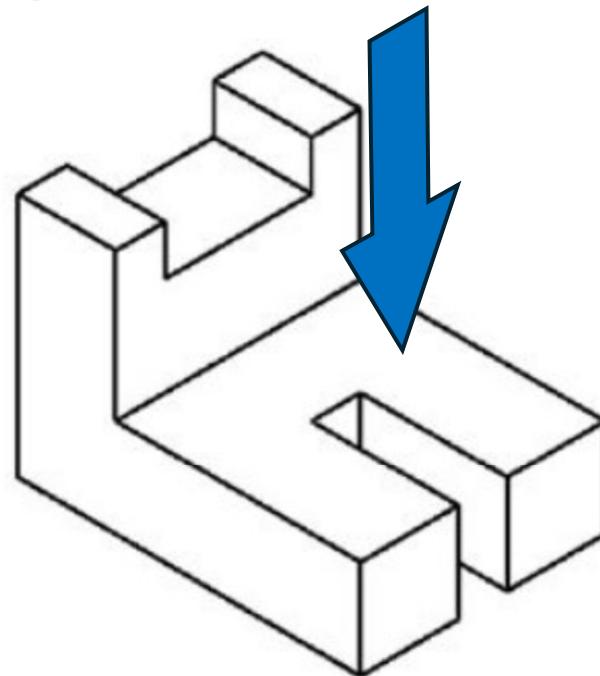
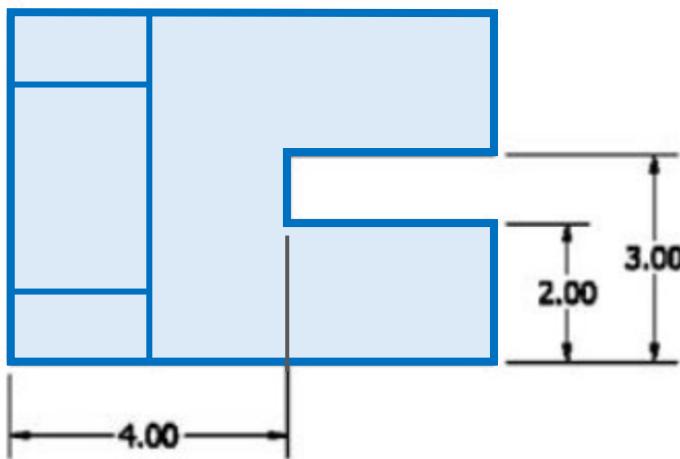


# Front View

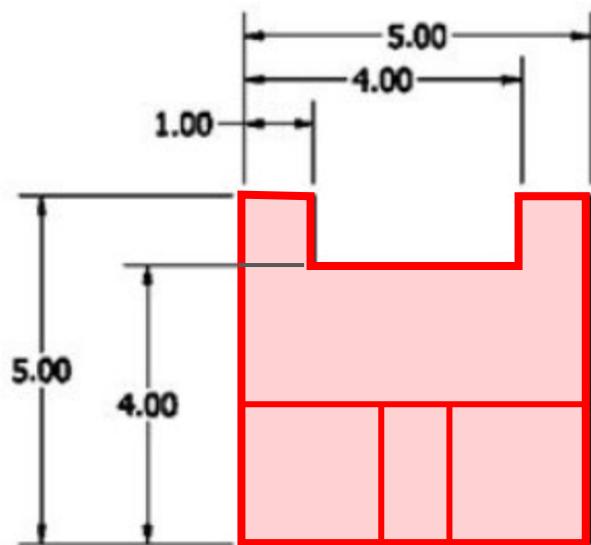
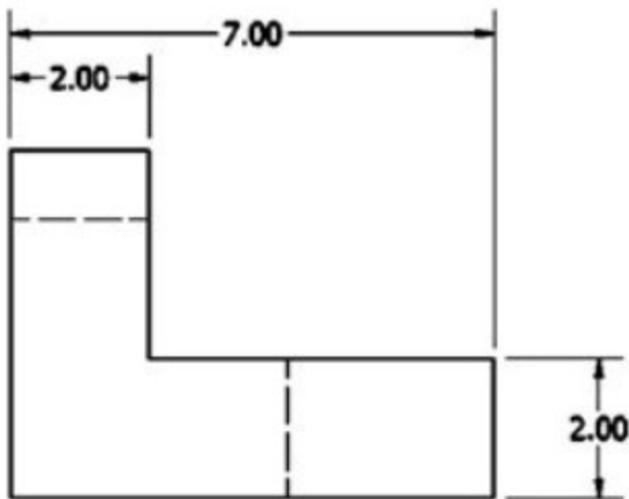
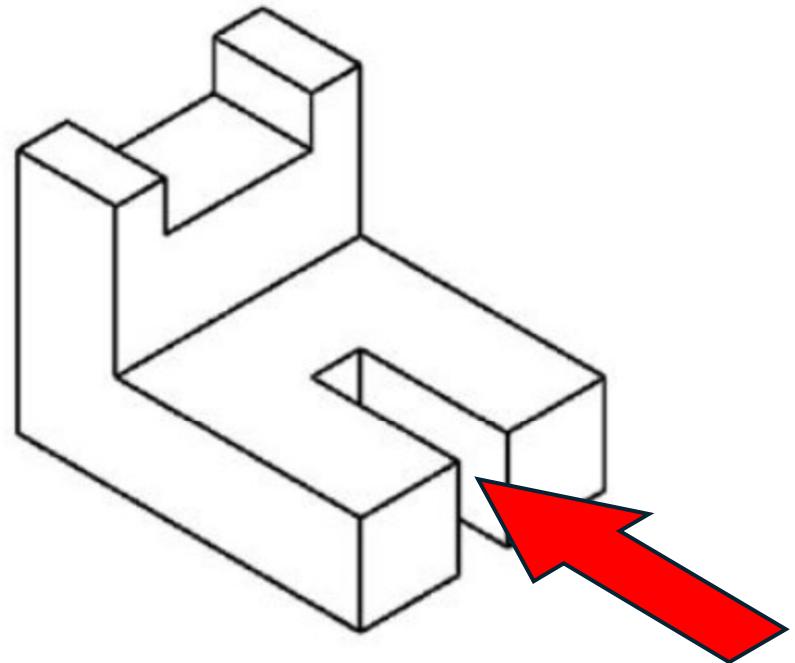
Most Important...



# Top View

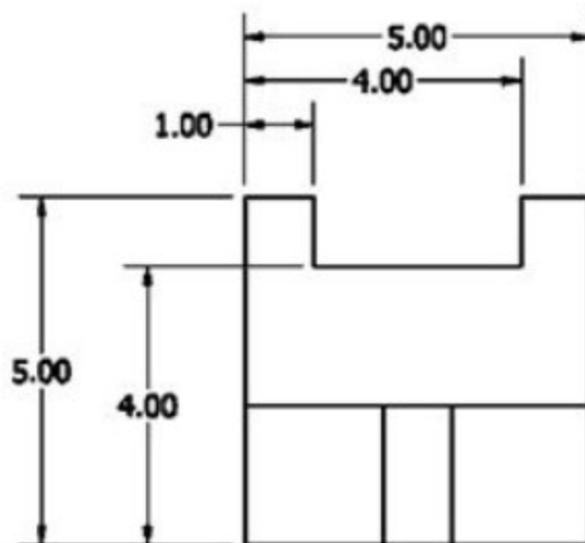
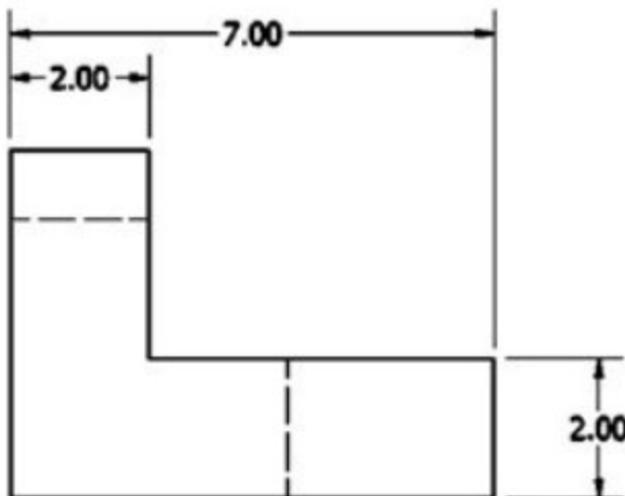
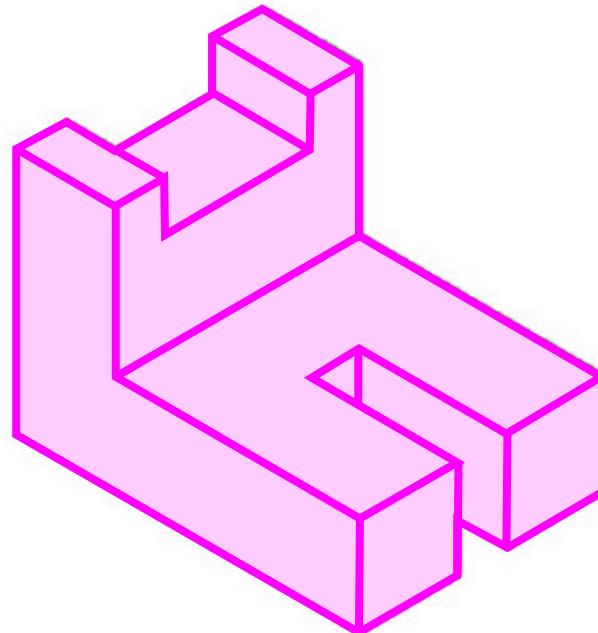
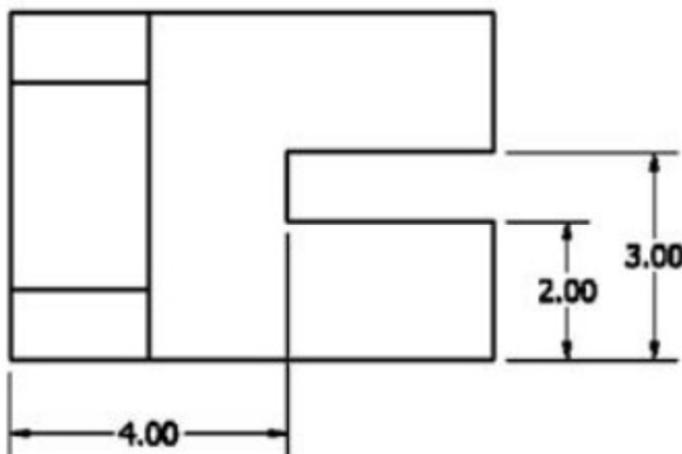


# Side View

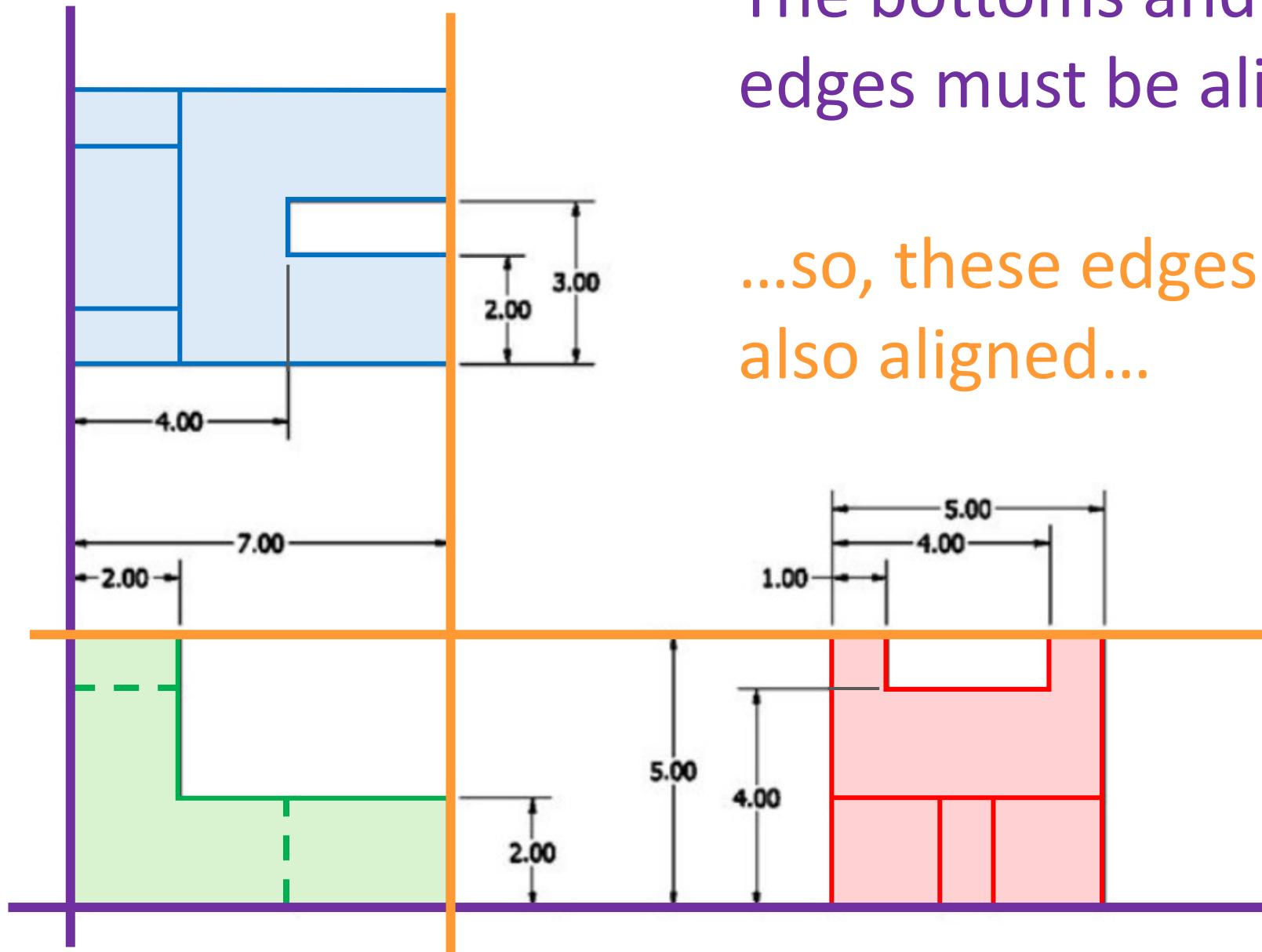


# Isometric View

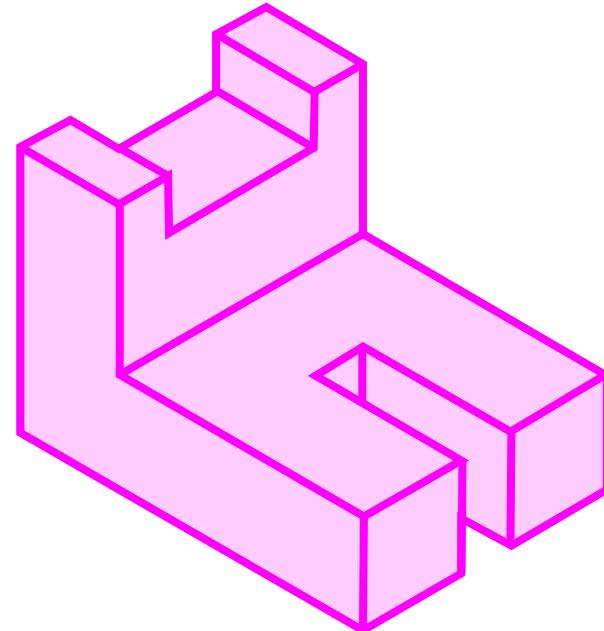
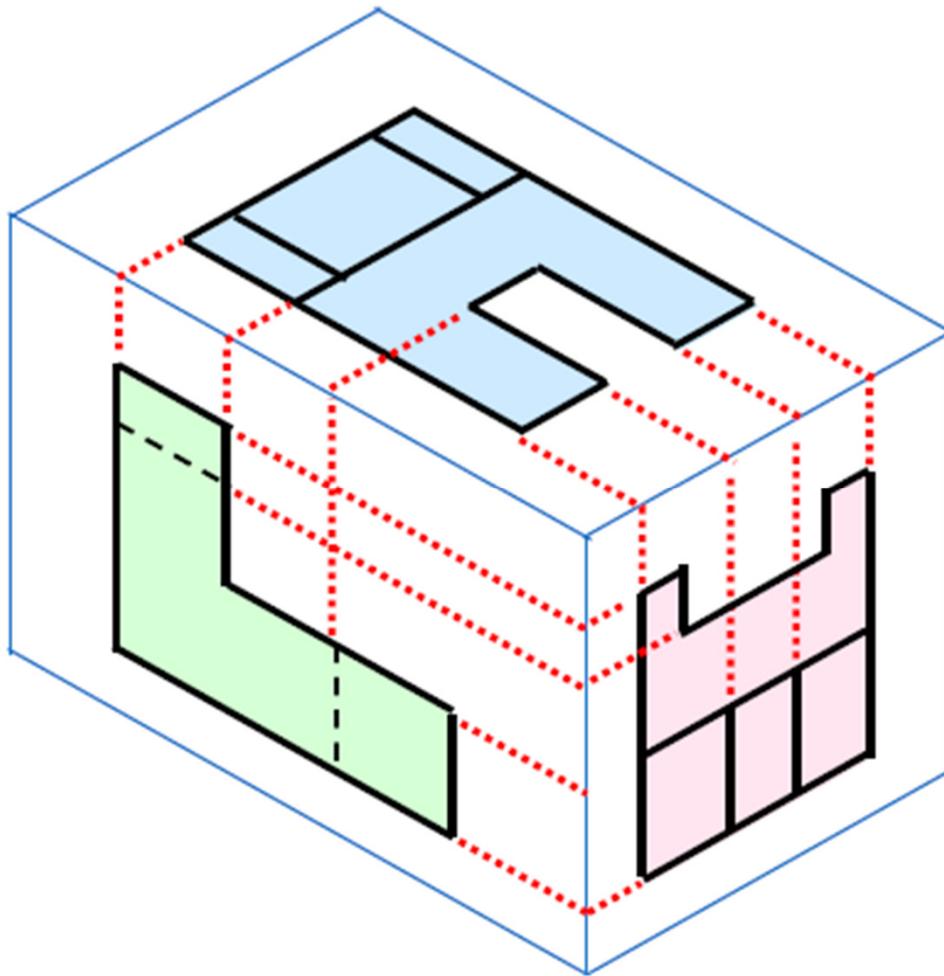
Not very important for  
the machinist...



# 3 View Alignment



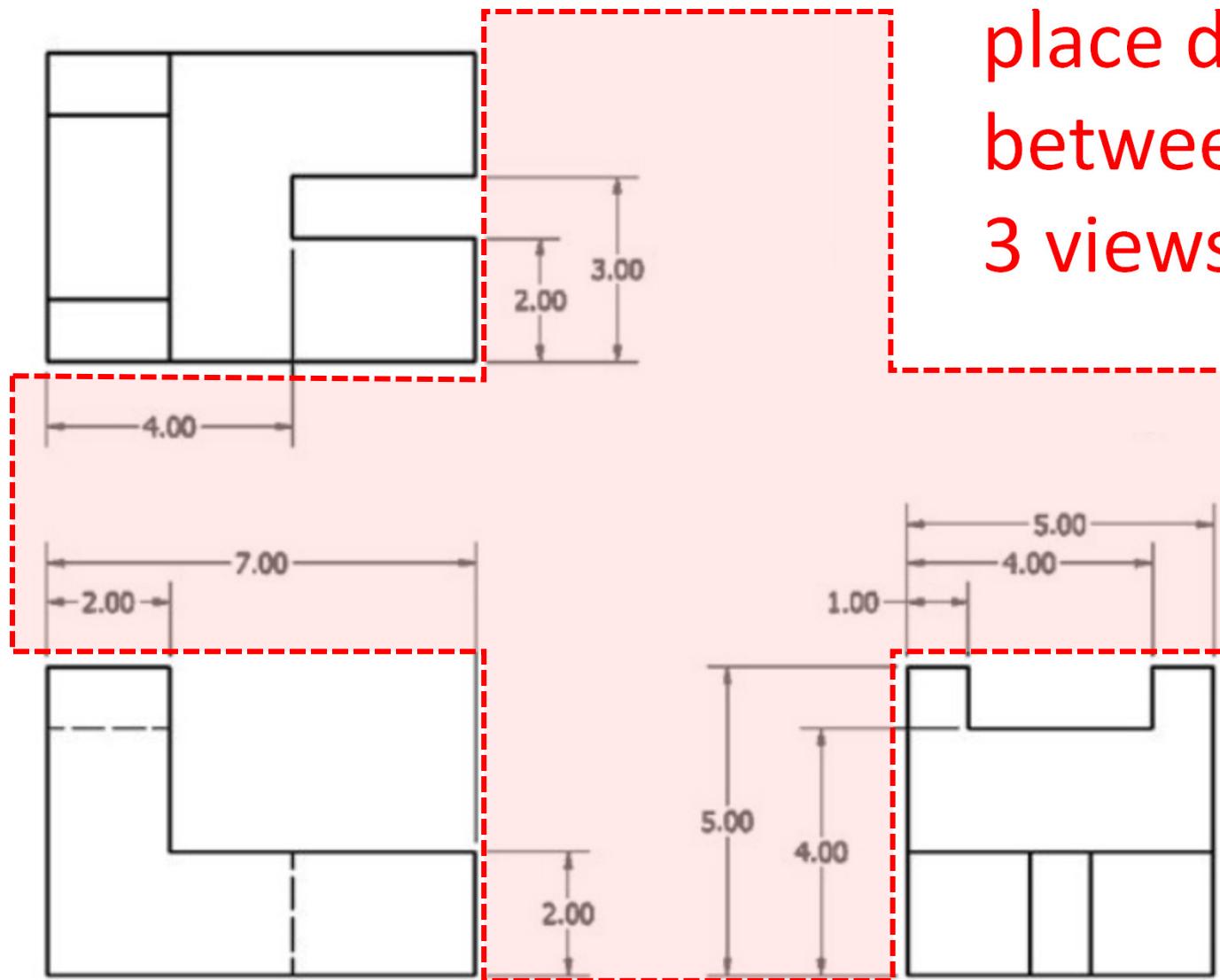
# 3 View Orientation



When folded, they align  
as they would be seen...

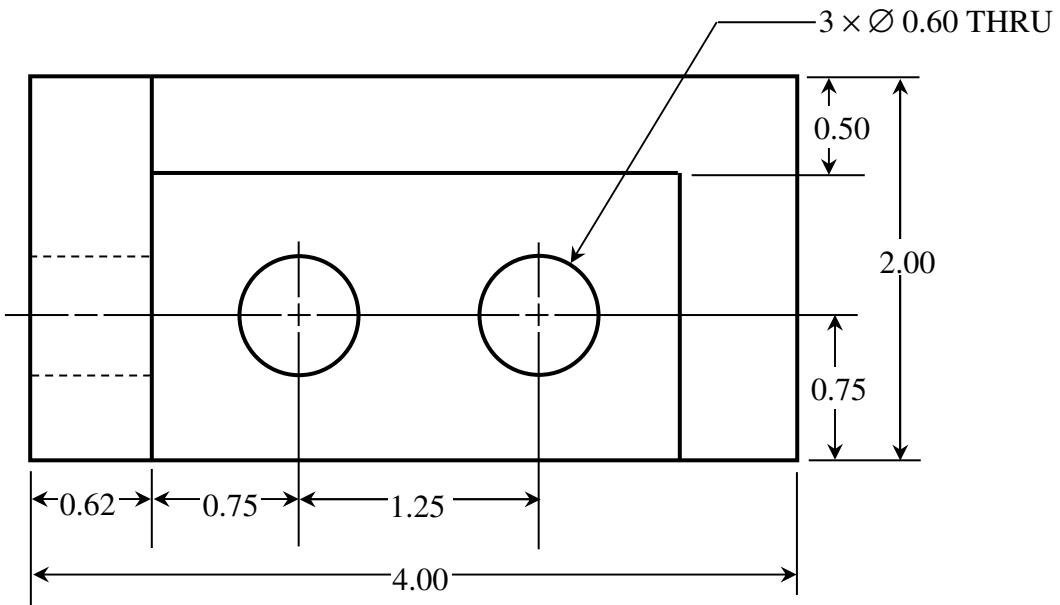
# Dimensions

When possible,  
place dimensions  
between the  
3 views.

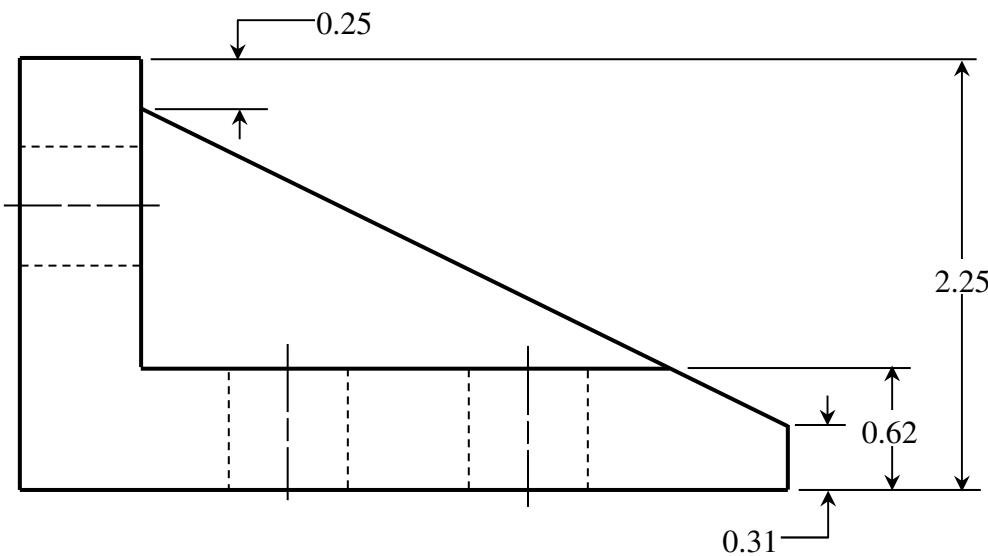


# Dimension to which view?

- Every feature that can be dimensioned appears on at least two views.
- Pick the view that's clearest.
- For holes and curves, that's ALWAYS the view that LOOKS curved!
- The position of a hole is always shown using the **center** of the hole, not an edge.
- Try to choose the view that avoids extension lines that penetrate the object.

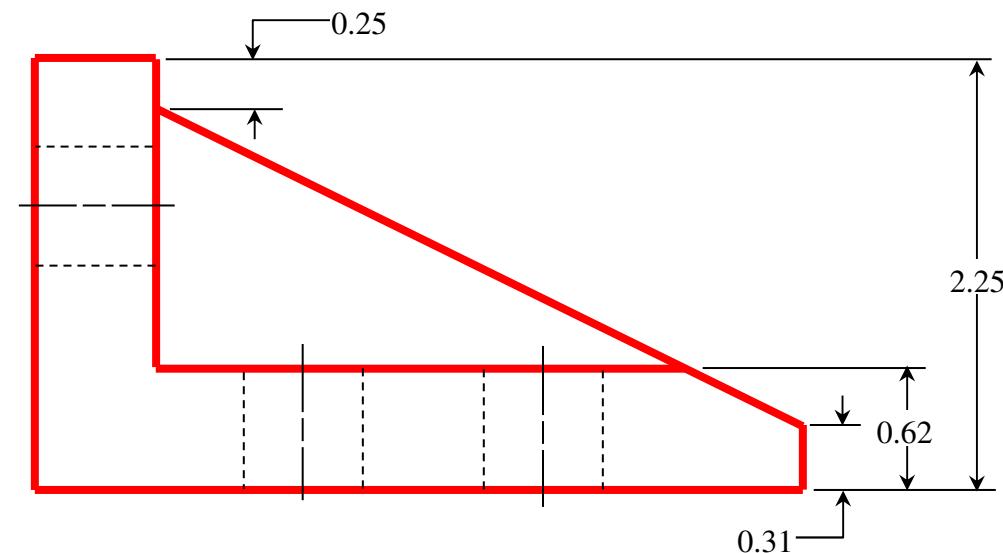
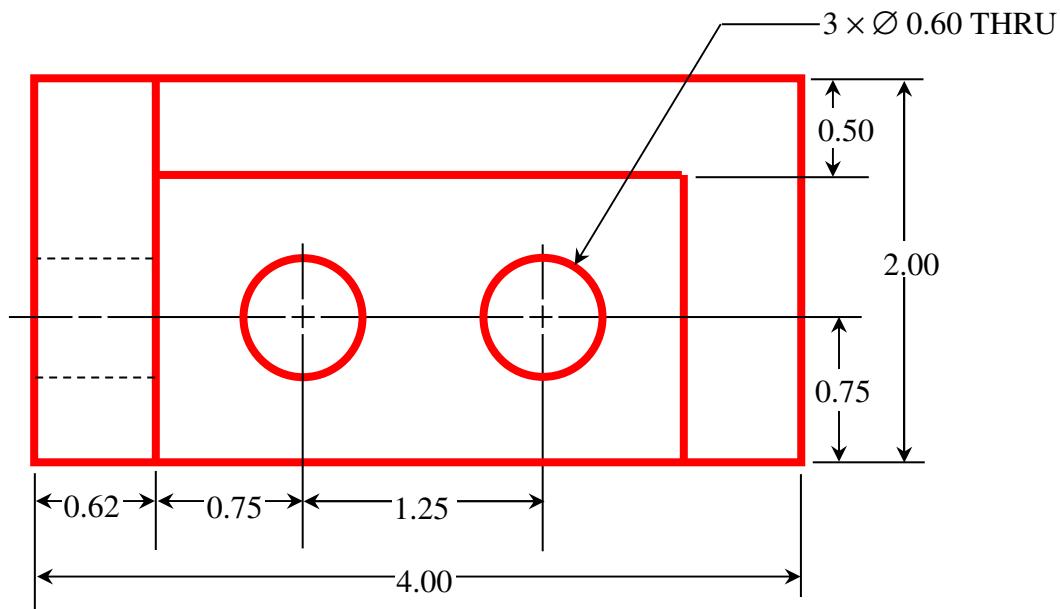


# Line Types...



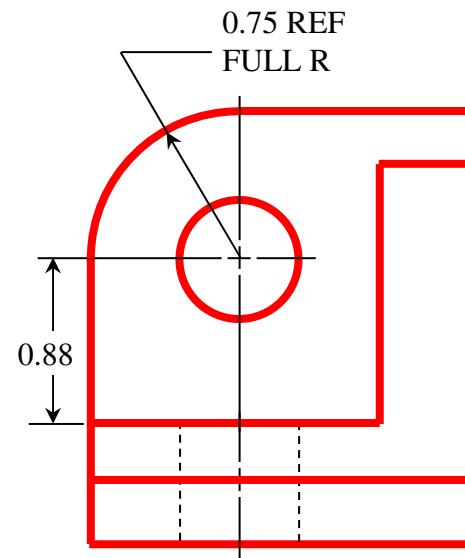
ALL DIMENSIONS IN INCHES

PART: WEDGE THING	
PROJECT: ASSIGN 3	
MAT'L: ALUMINUM	REV: 1
DR. BY: POGO	
DATE: SEP 2017	SCALE: 1:1



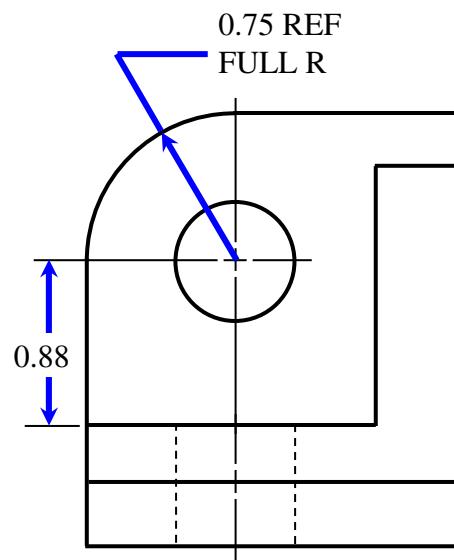
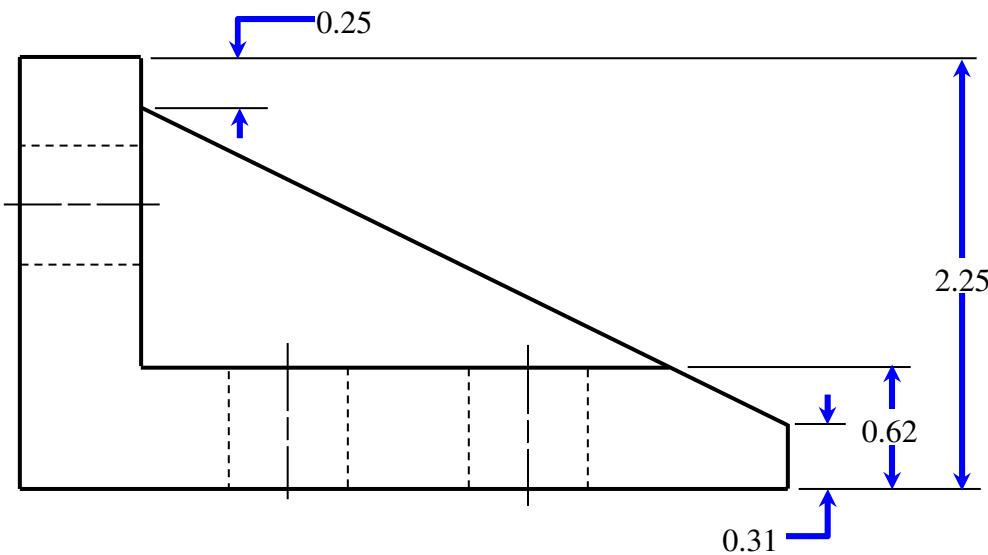
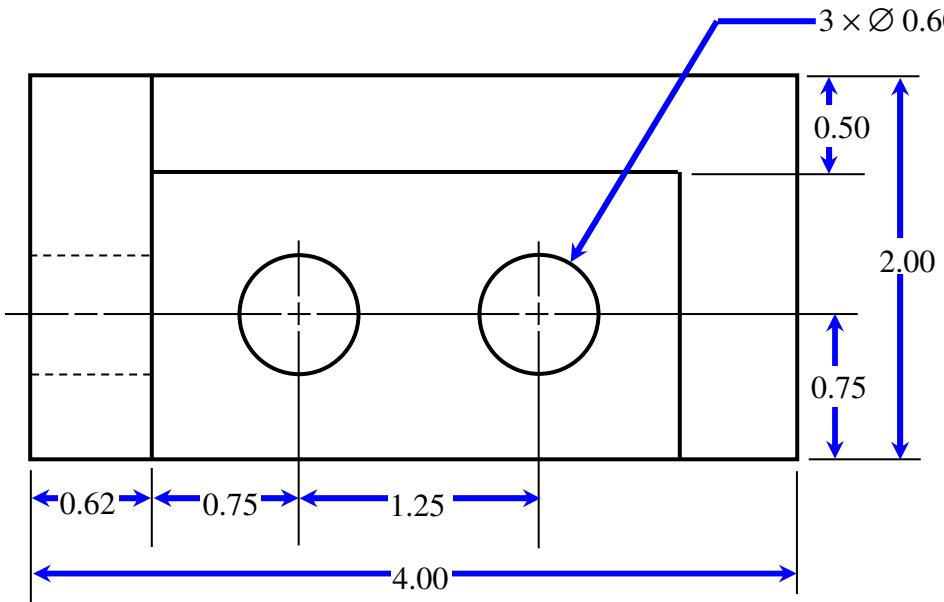
ALL DIMENSIONS IN INCHES

**Object Lines**  
 “What you see”.  
 MUST be heaviest.  
 So once “finalized”,  
 trace again darker.



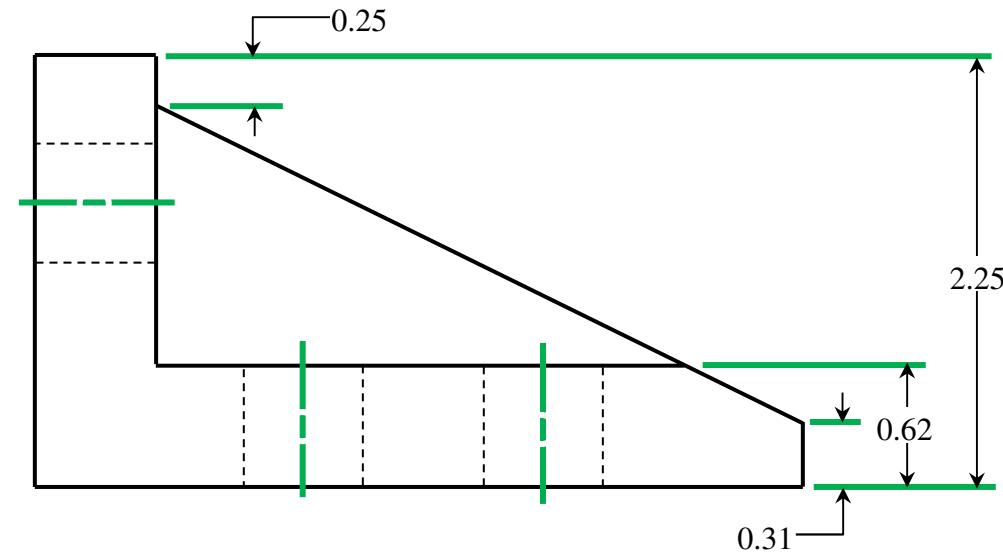
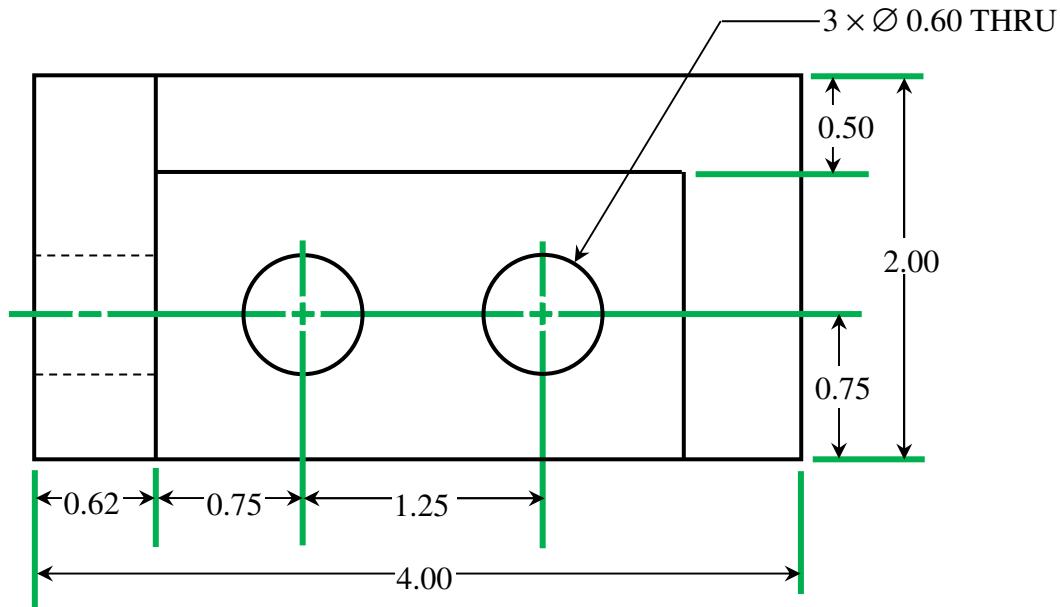
PART: WEDGE THING	
PROJECT: ASSIGN 3	
MAT'L: ALUMINUM	REV: 1
DR. BY: POGO	
DATE: SEP 2017	SCALE: 1:1

**Dimension Lines:**  
**MUST have arrows**  
**and a number.**  
**They may not cross**  
**each other!**



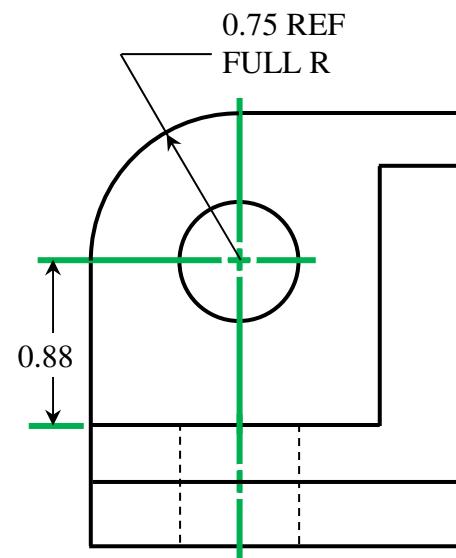
ALL DIMENSIONS IN INCHES

PART: WEDGE THING	
PROJECT: ASSIGN 3	
MAT'L: ALUMINUM	REV: 1
DR. BY: POGO	
DATE: SEP 2017	SCALE: 1:1



ALL DIMENSIONS IN INCHES

**Extension Lines & Center Lines:**  
Provide access to dimension lines.



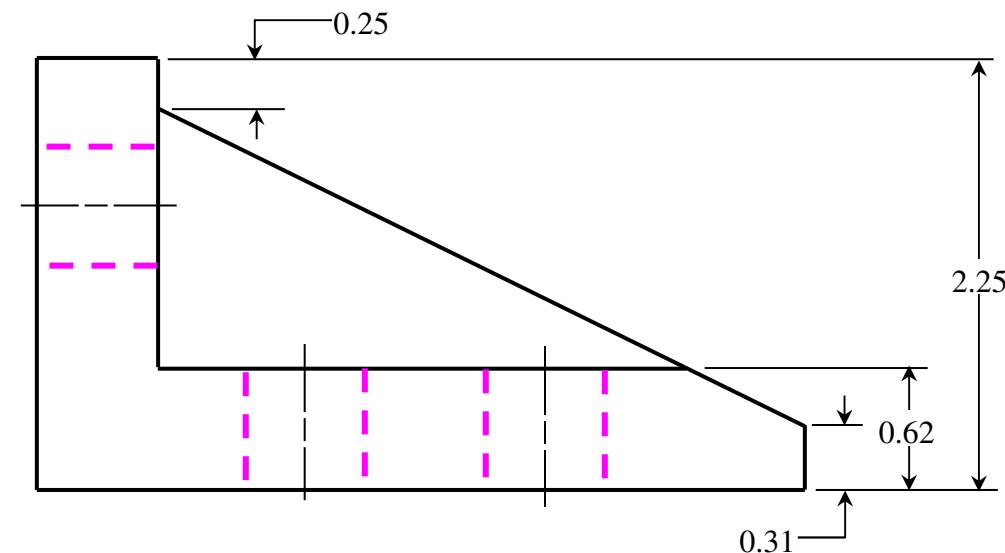
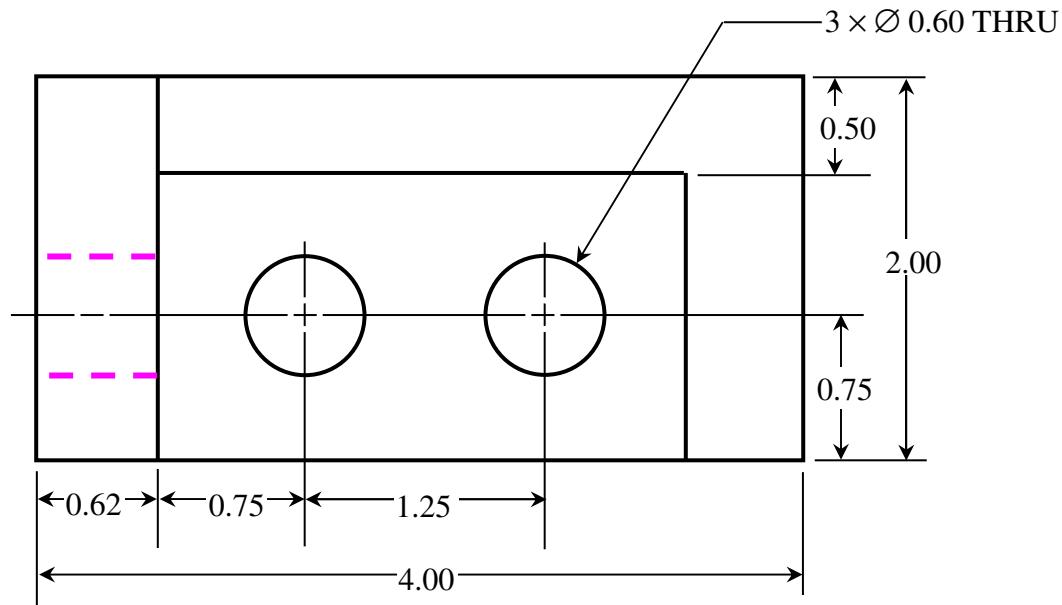
PART: WEDGE THING

PROJECT: ASSIGN 3

MAT'L: ALUMINUM      REV: 1

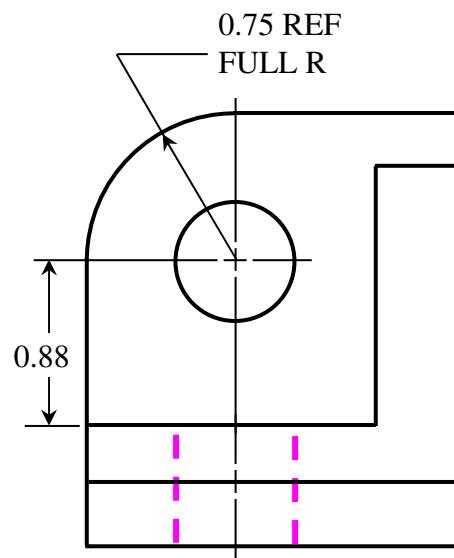
DR. BY: POGO

DATE: SEP 2017      SCALE: 1:1



ALL DIMENSIONS IN INCHES

**Hidden Lines:**  
Use evenly  
spaced dashes.  
“X-Ray Vision”



PART: WEDGE THING

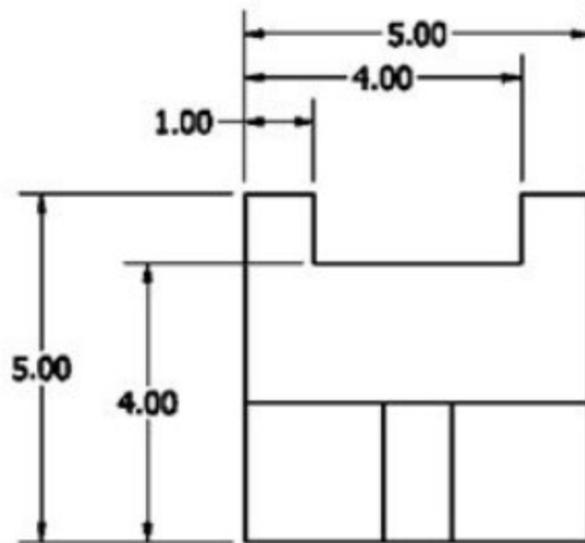
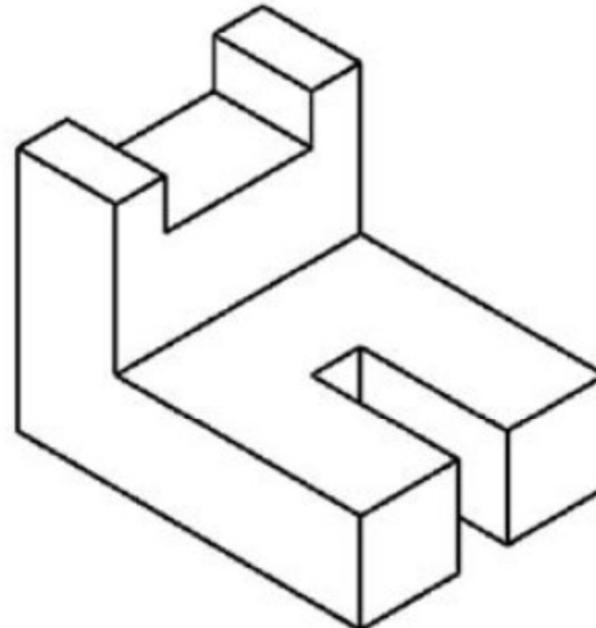
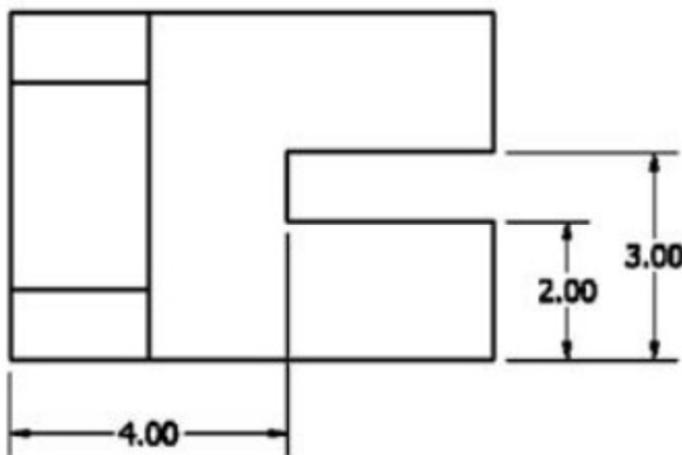
PROJECT: ASSIGN 3

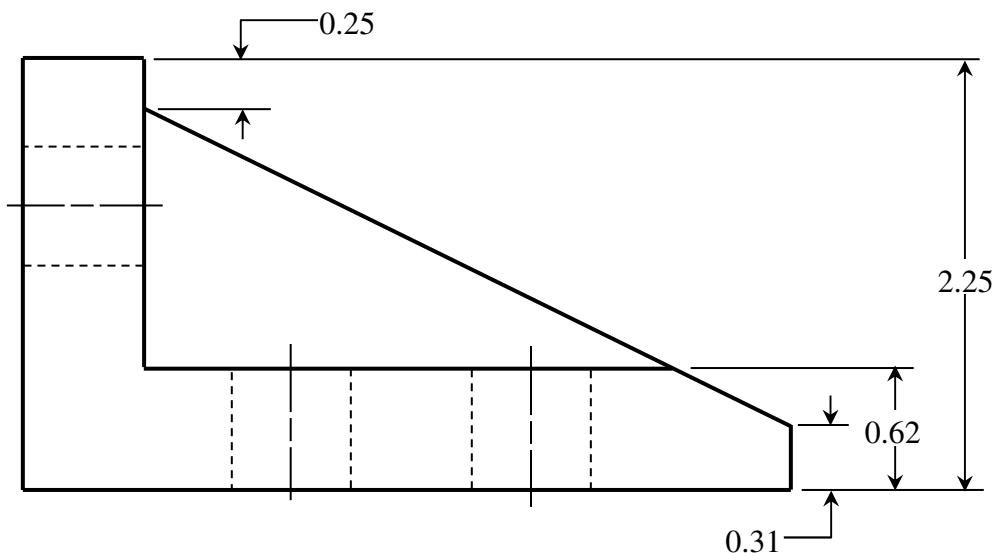
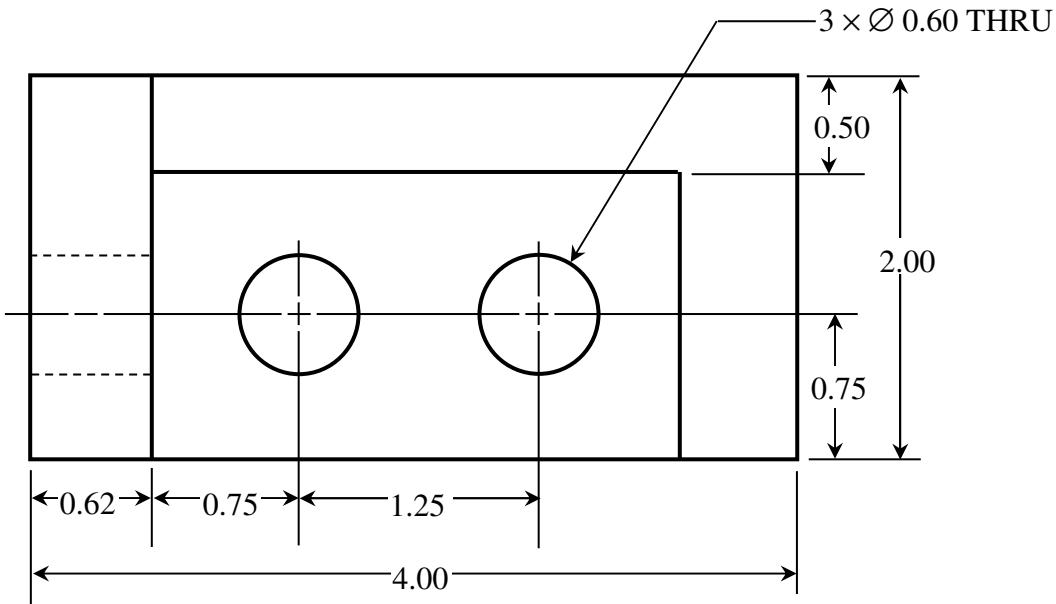
MAT'L: ALUMINUM REV: 1

DR. BY: POGO

DATE: SEP 2017 SCALE: 1:1

# More Hidden Lines...

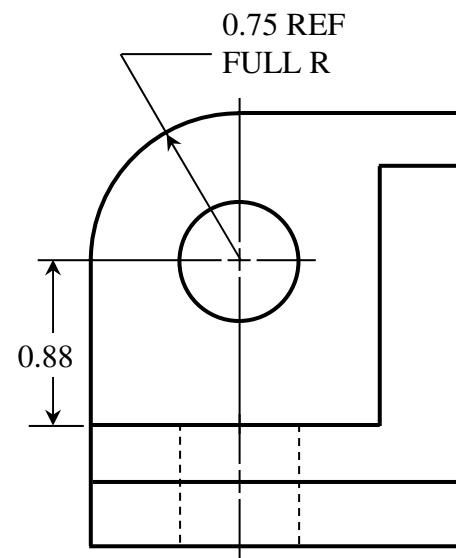




All dimensions  $\pm 0.005$  inches  
unless otherwise specified.

ALL DIMENSIONS IN INCHES

**Tolerances...**  
At Geneseo, assume  
your results will be  
within 0.005 inches of  
your stated dimension.



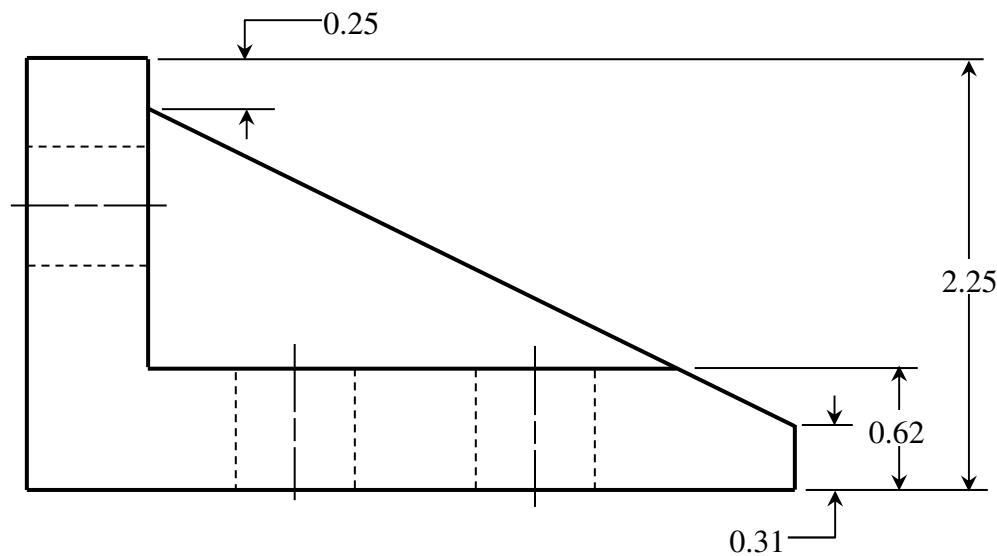
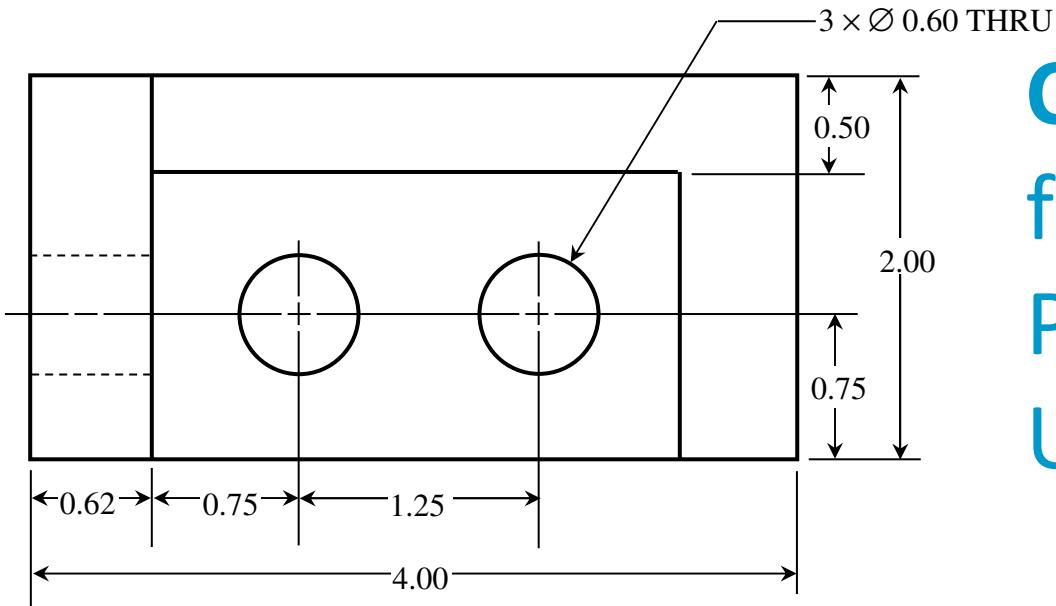
PART: WEDGE THING

PROJECT: ASSIGN 3

MAT'L: ALUMINUM REV: 1

DR. BY: POGO

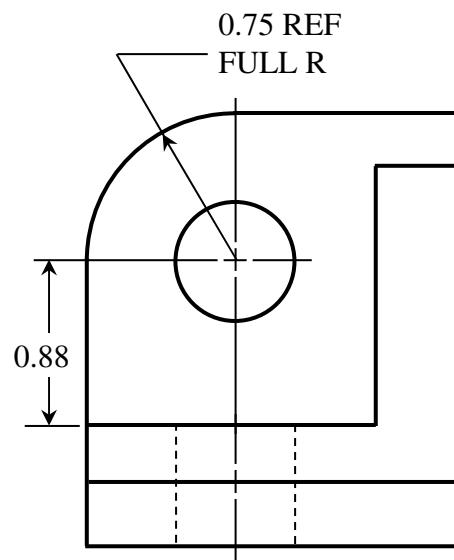
DATE: SEP 2017 SCALE: 1:1



*Inches currently preferred over mm...*

ALL DIMENSIONS IN INCHES

**Corner Block**  
for global info:  
Part Name, Material,  
Units, Date, Author.



PART: WEDGE THING

PROJECT: ASSIGN 3

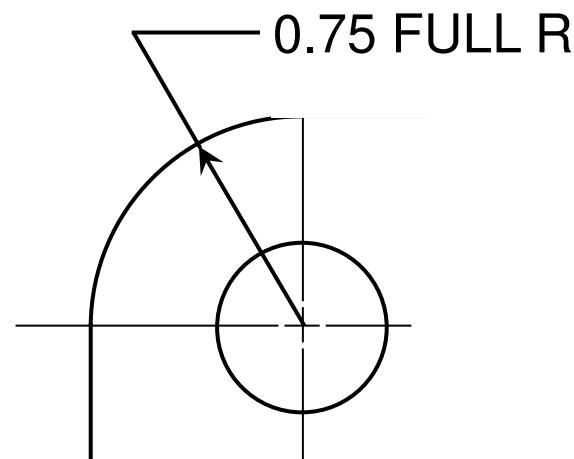
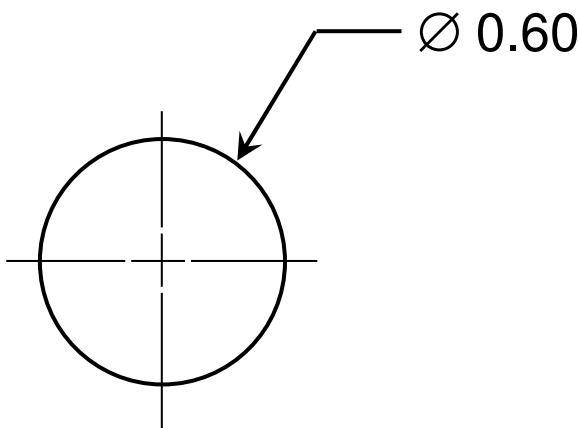
MAT'L: ALUMINUM REV: 1

DR. BY: POGO

DATE: SEP 2017 SCALE: 1:1

# Dimension Details

- Size of *circles* points radially towards the center, and shows **diameter**.
- This symbol means “diameter”:  $\emptyset$
- *Other curves* point radially outwards from the center of the curve.
- They typically show **radius** (“R”)

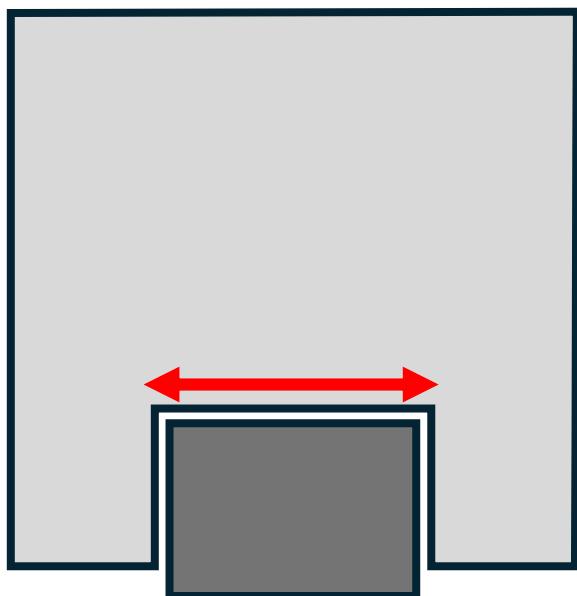


# Dimension Details

- You may never include any dimension that is already listed somewhere else.
- You may never include any dimension that *can even be calculated* from dimensions that are already listed!
- That's called “double dimensioning”.
- “Double Dimensioning” always results in inconsistent tolerance criteria.

# Dimension Details

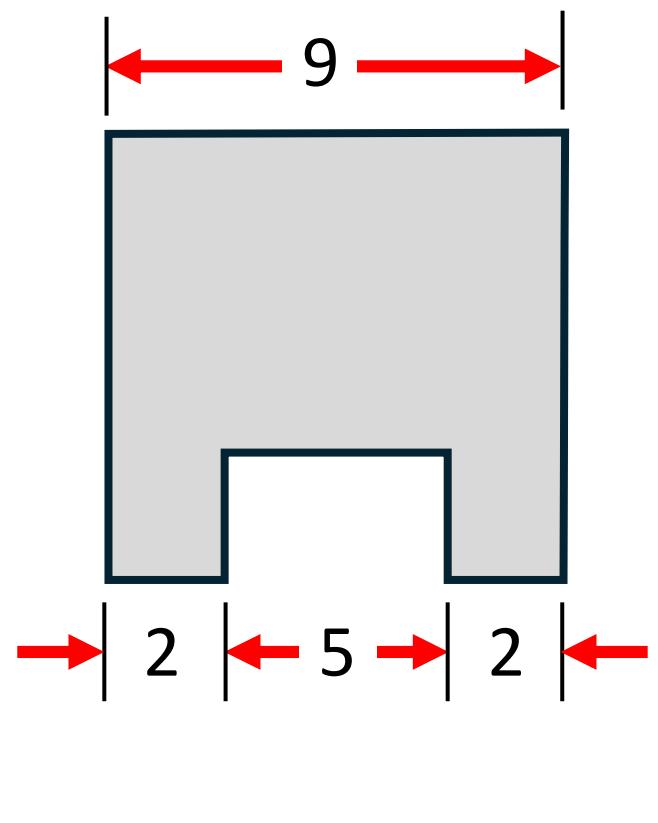
- When avoiding Double Dimensioning, always choose to include the most functional dimension possible...



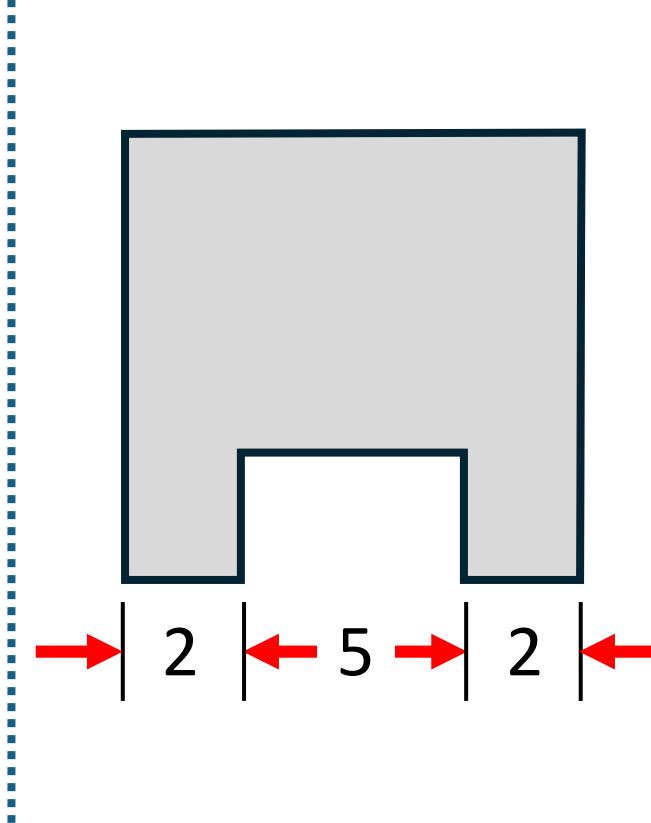
If this light gray block is intended to slide along the dark block, then **this** is the most important dimension.

# Dimension Details

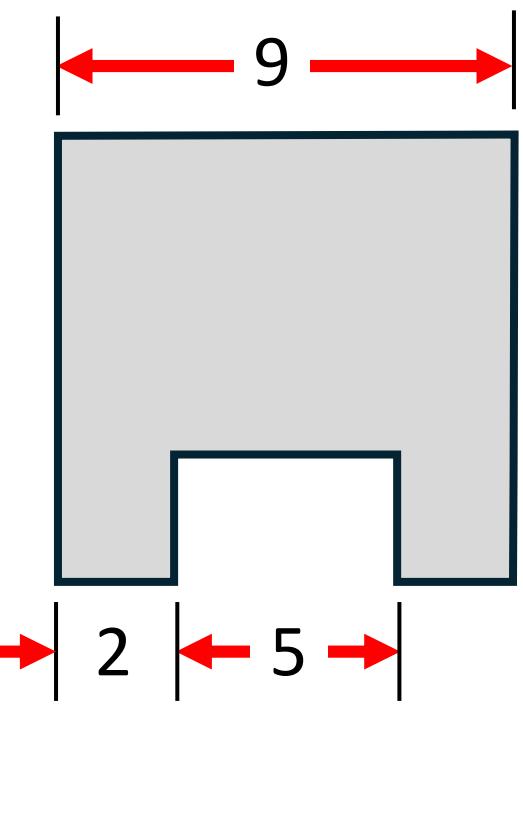
Wrong



Fine

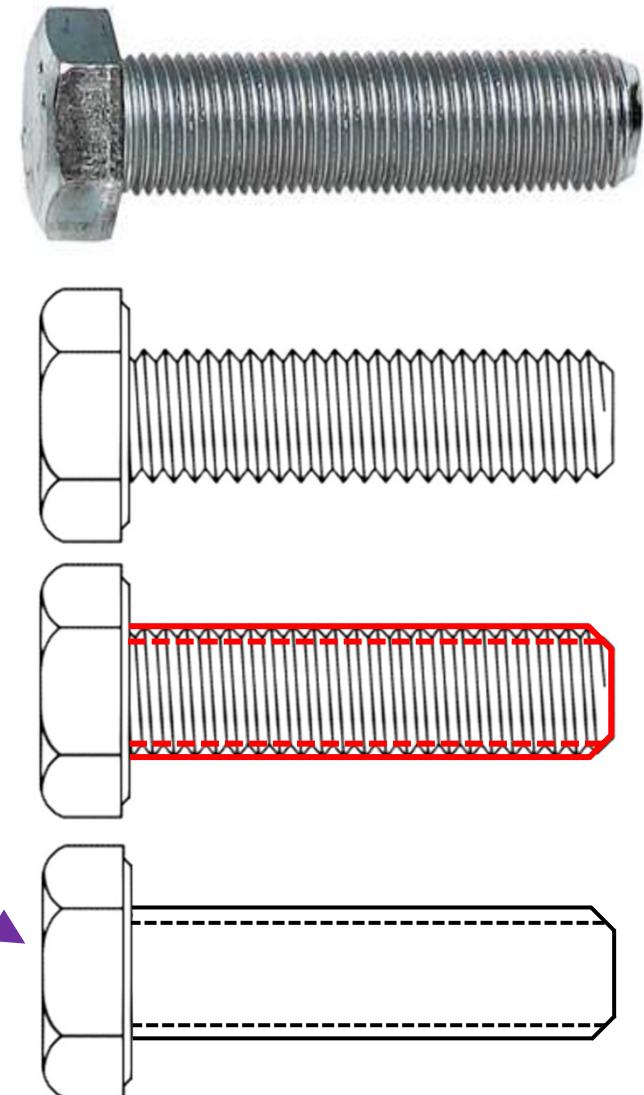
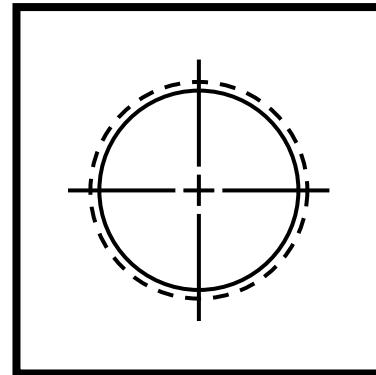
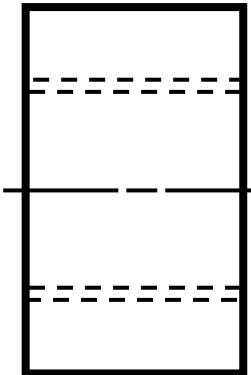


Better



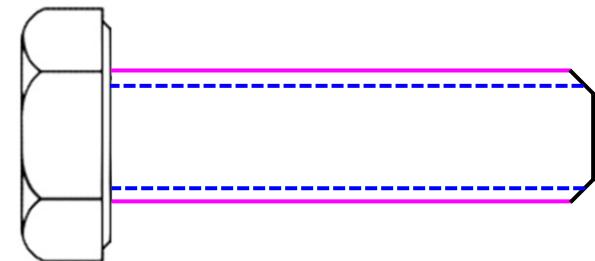
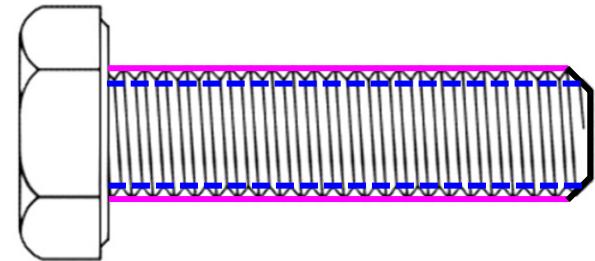
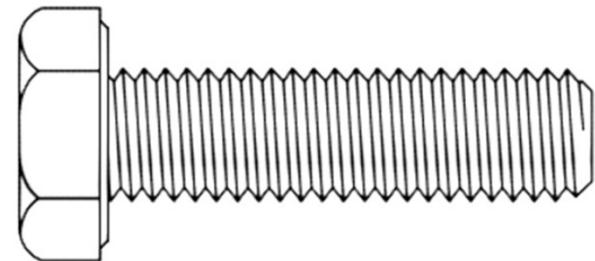
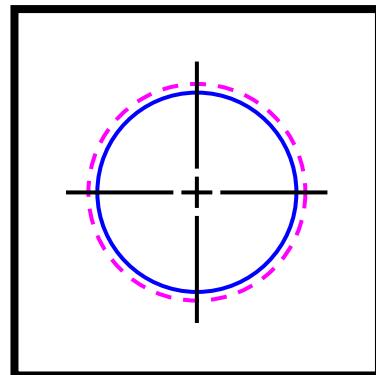
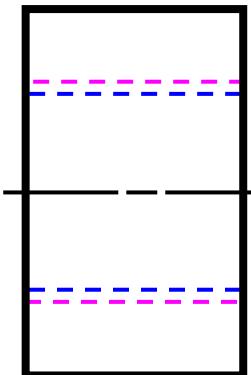
# Threads and Screws

- Most details usually not drawn
- Diameter and length always drawn
- Center lines (with spaced dashes) are **always** drawn for holes!



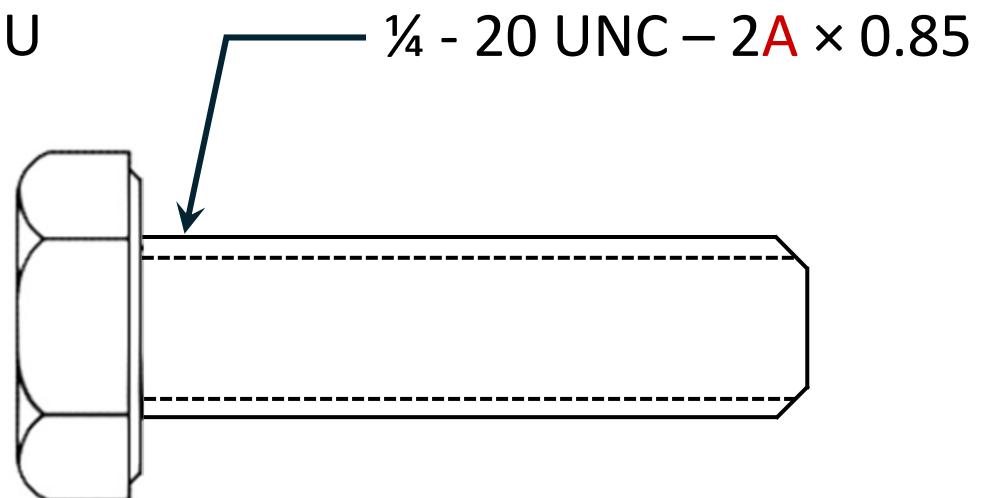
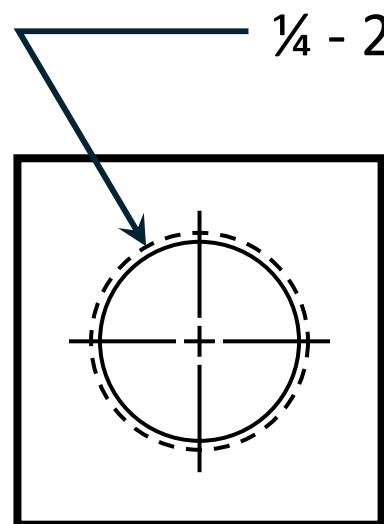
# Threads and Screws

- The **smaller or inner circle** is drawn to the diameter of “roots” of the thread.
- The **larger or outer circle** is drawn to the “nominal” diameter of the thread.



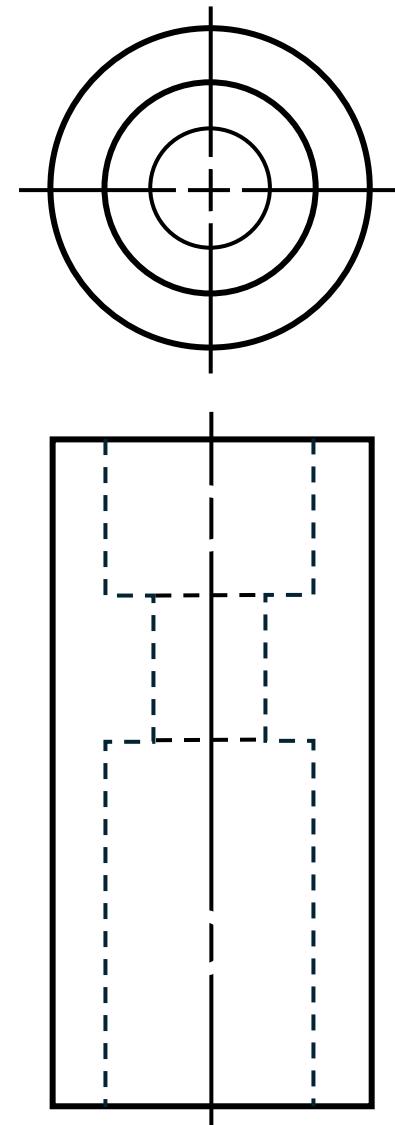
# Thread Dimensions

- Use “A” for “pegs”, and “B” for holes
- Don’t invent new threads... use UNC.
- Don’t ask machinist to create threaded pegs if it can be avoided... use a screw!



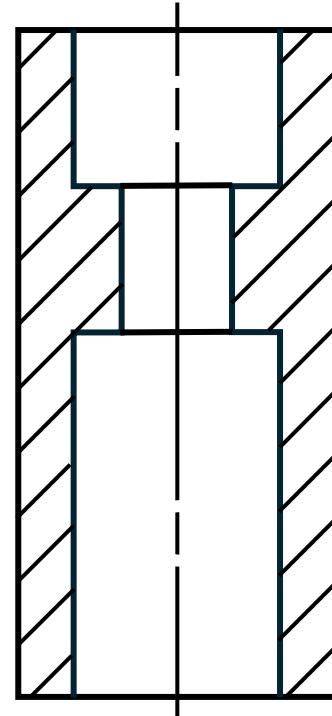
# Sections

- Used to improve clarity if important details are blocked (or hidden) in every view.



# Sections

- Label an imaginary saw cut...
- The diagonal lines indicate where you would see metal exposed by the saw cut.



Section A-A

