

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!

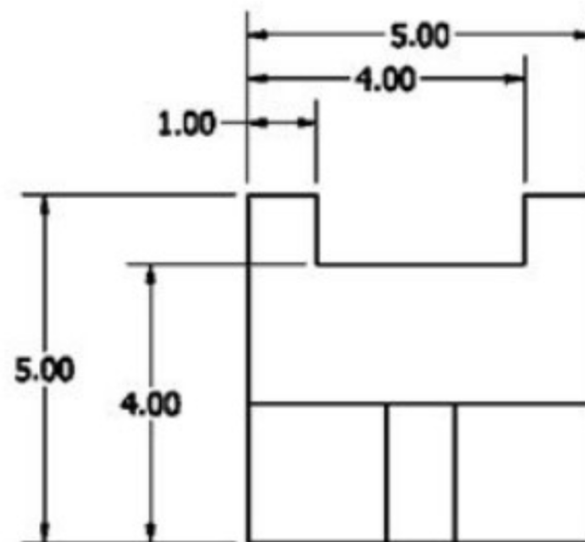
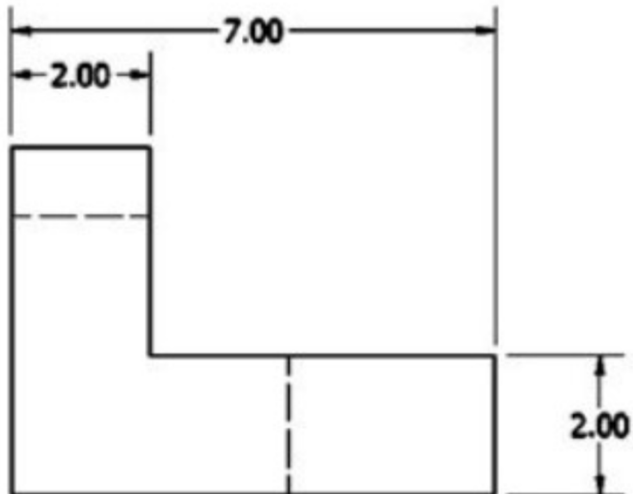
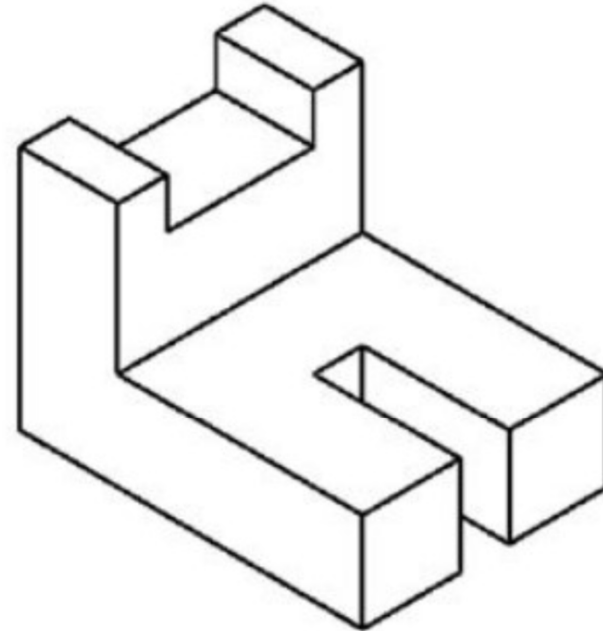
SCALE

- 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

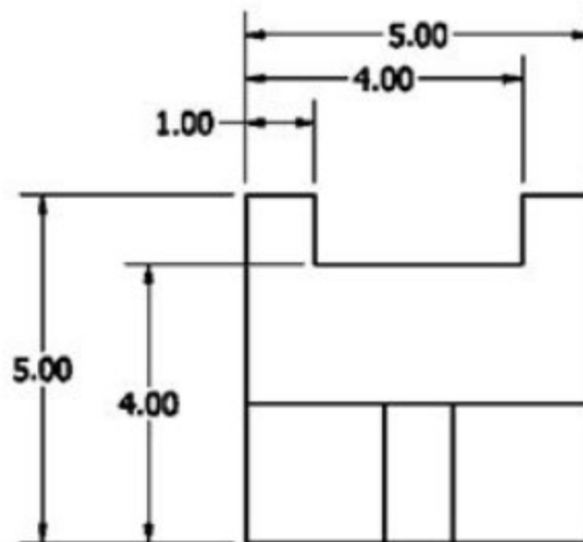
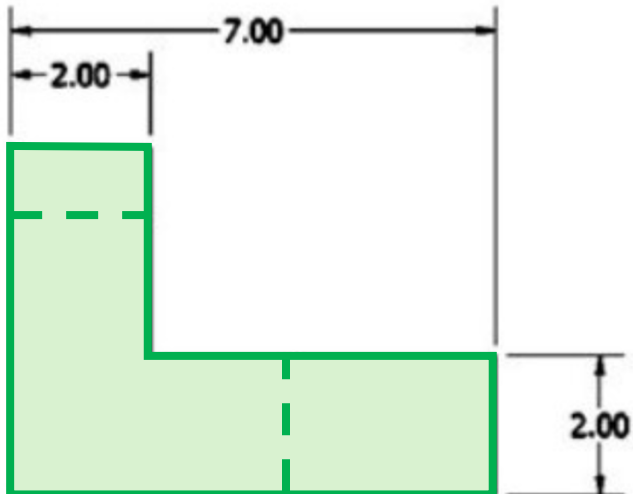
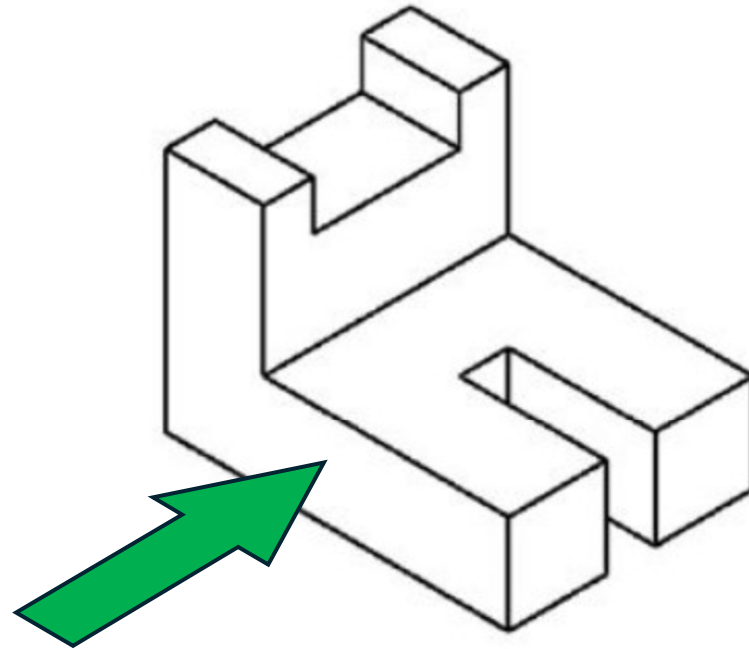
- Software will usually slow you down unless you are already an expert.
- If you are making one drawing to make *one object*, just use a pencil with a ruler.
- Dr. McLean does not care if your lines have a small wobble, or if your corners aren't perfectly at 90°.

3 VIEW Drawings (the default)

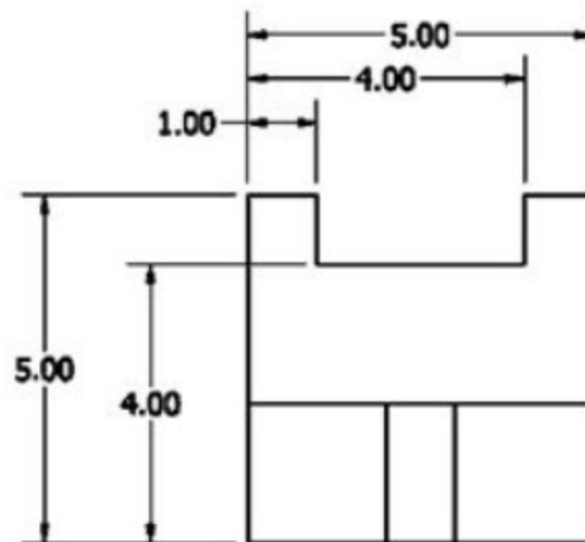
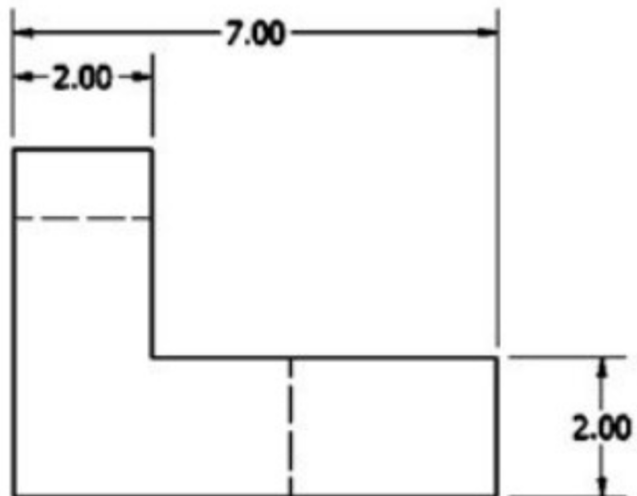
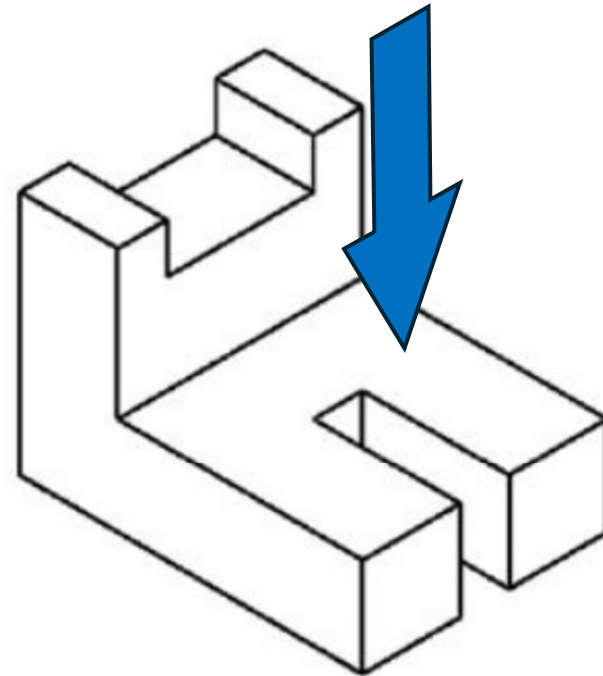
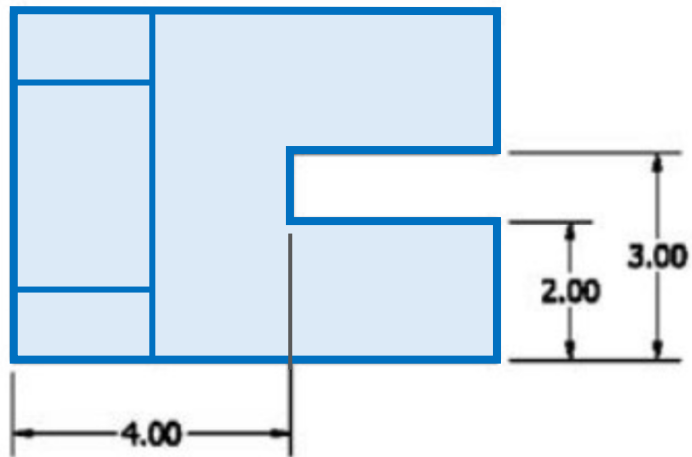


Front View

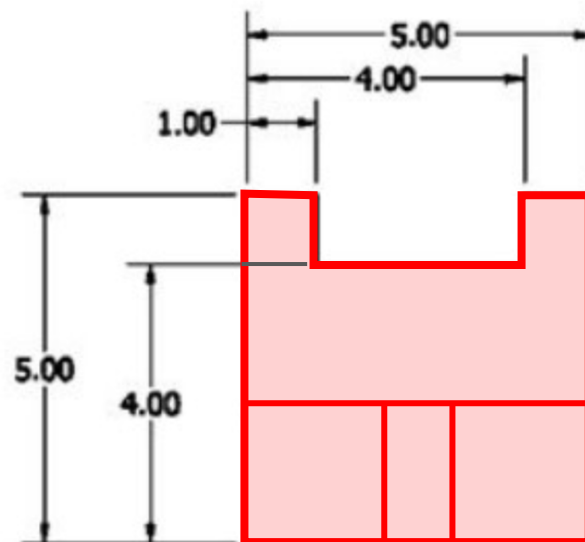
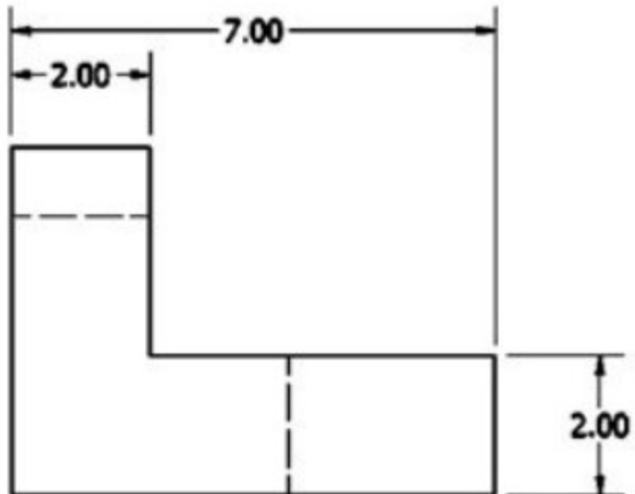
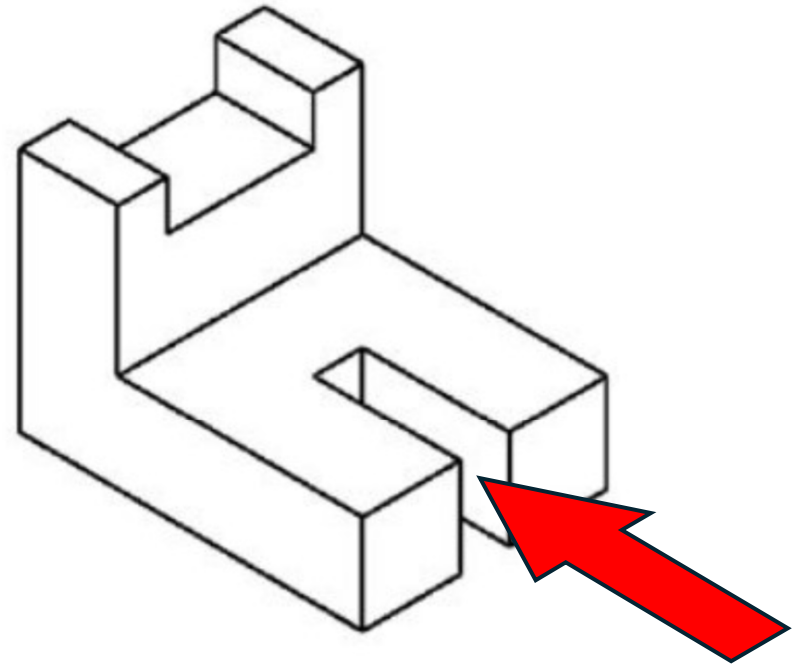
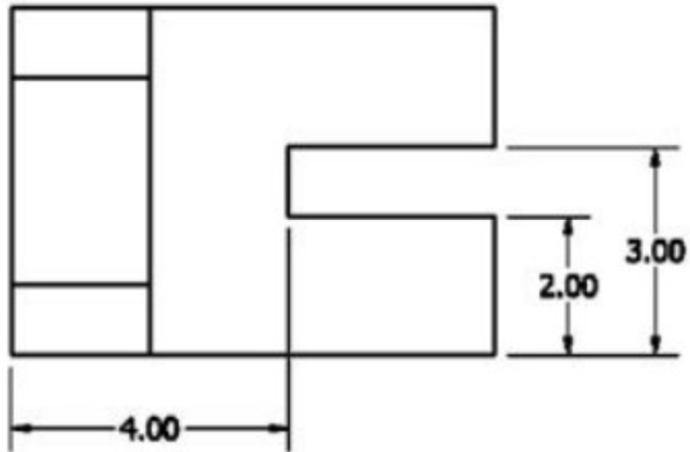
Most Important...



Top View

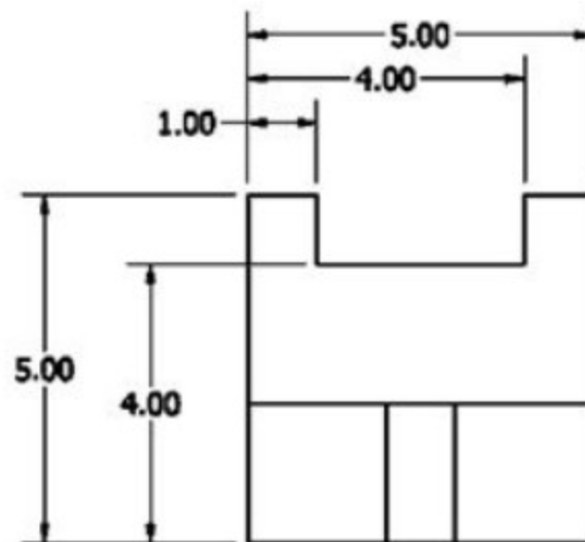
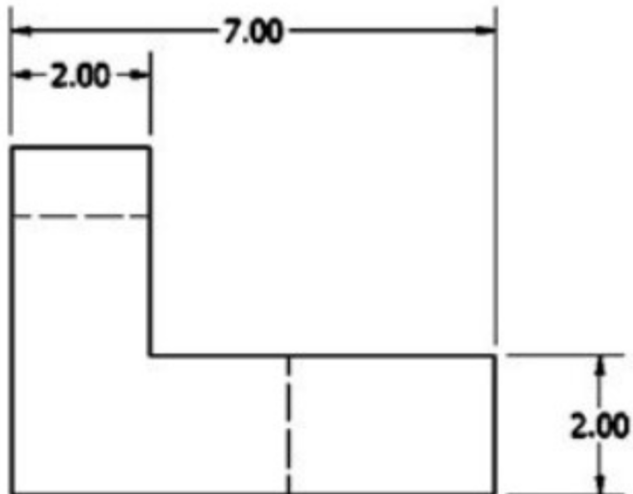
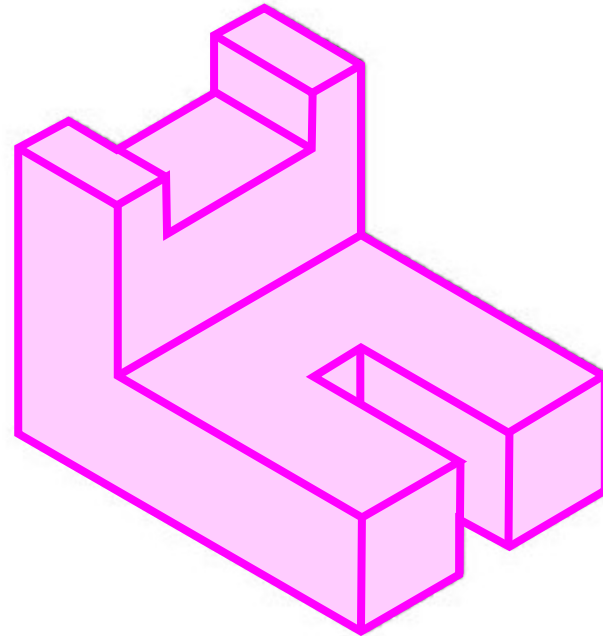


Side View



Isometric View

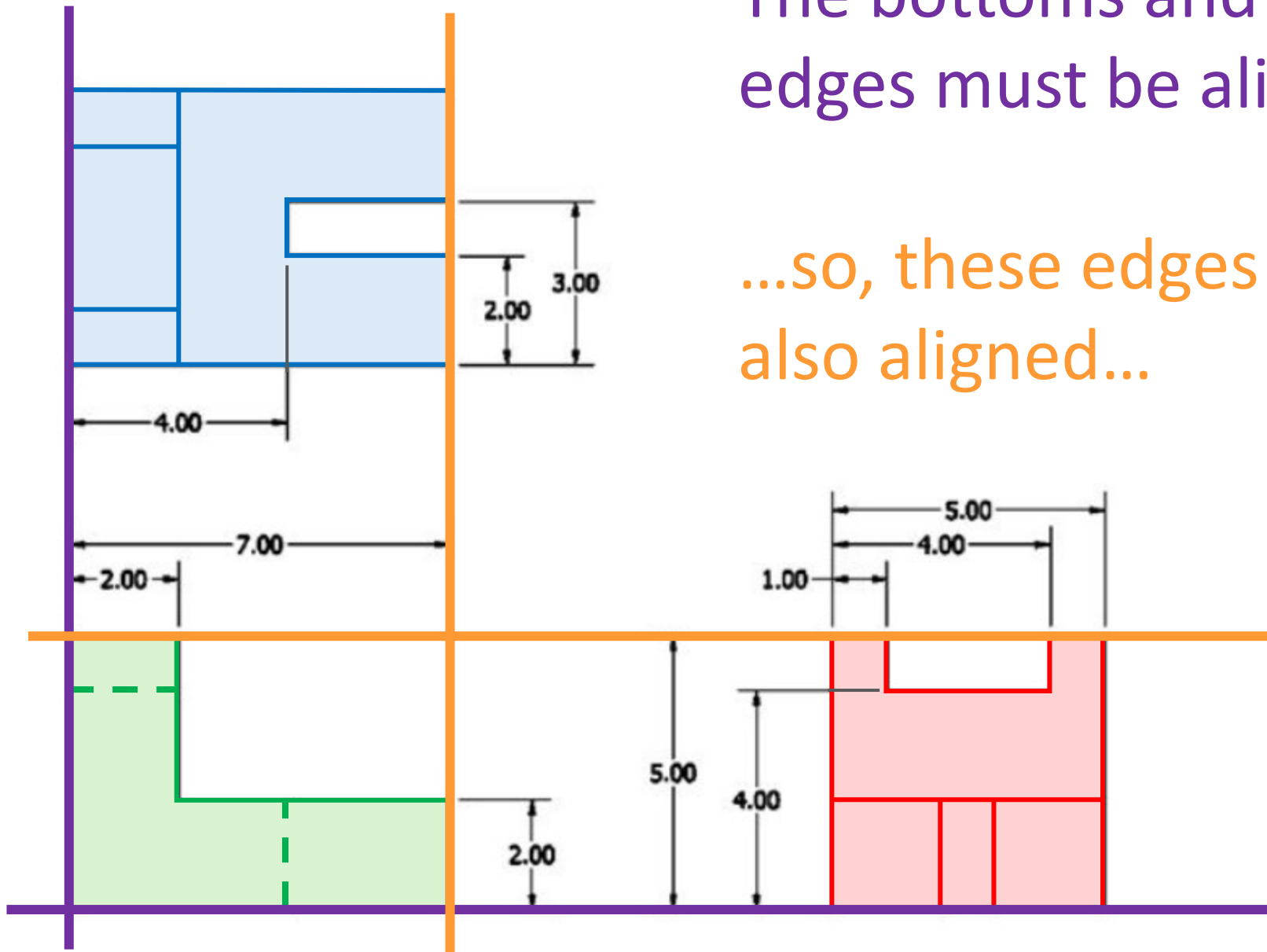
Not very important for
the machinist...



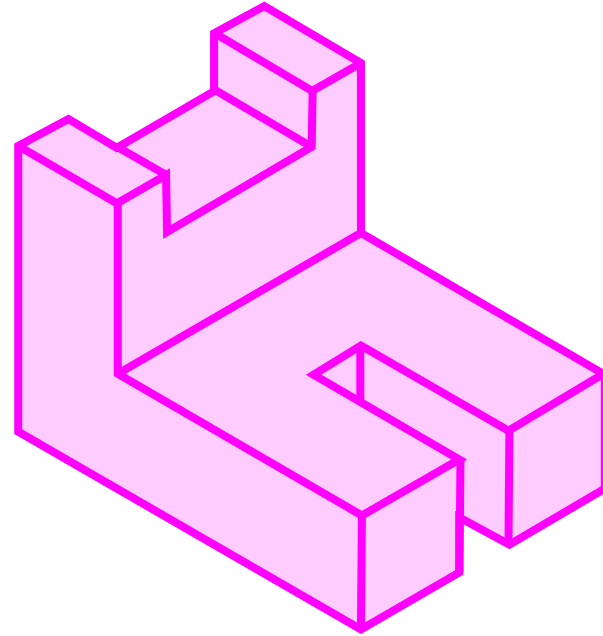
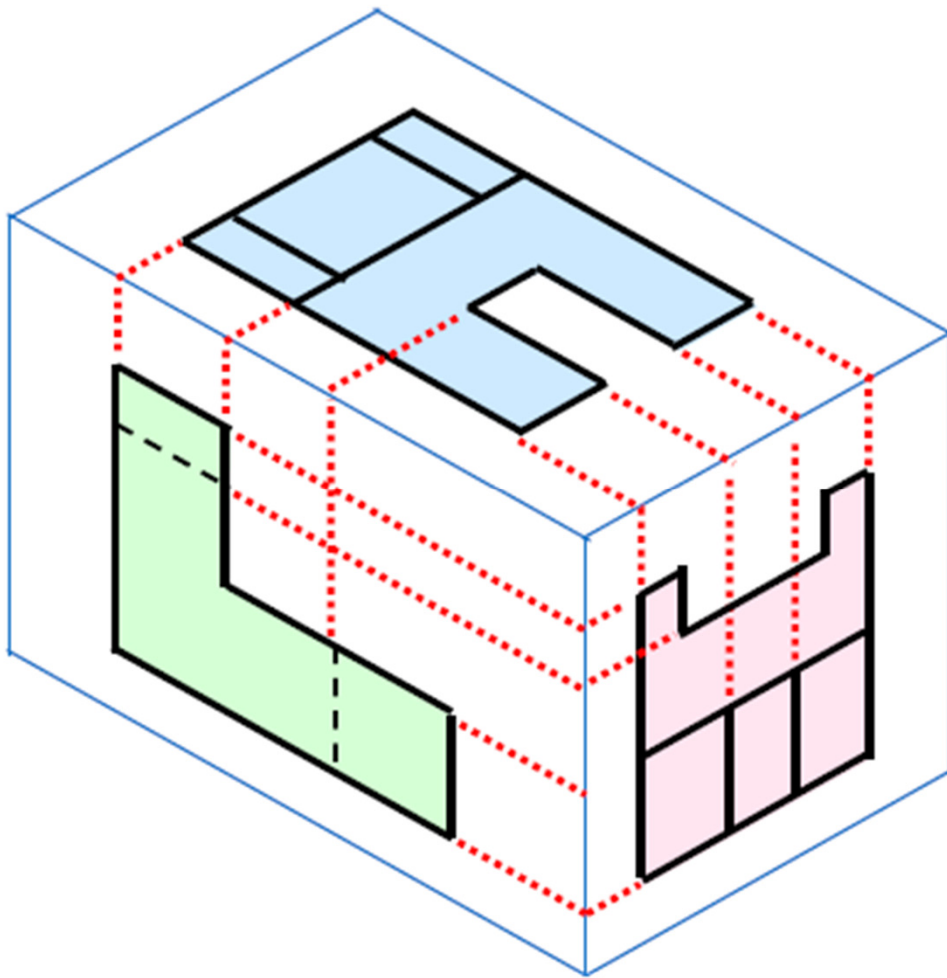
3 View Alignment

The bottoms and left edges must be aligned.

...so, these edges are also aligned...



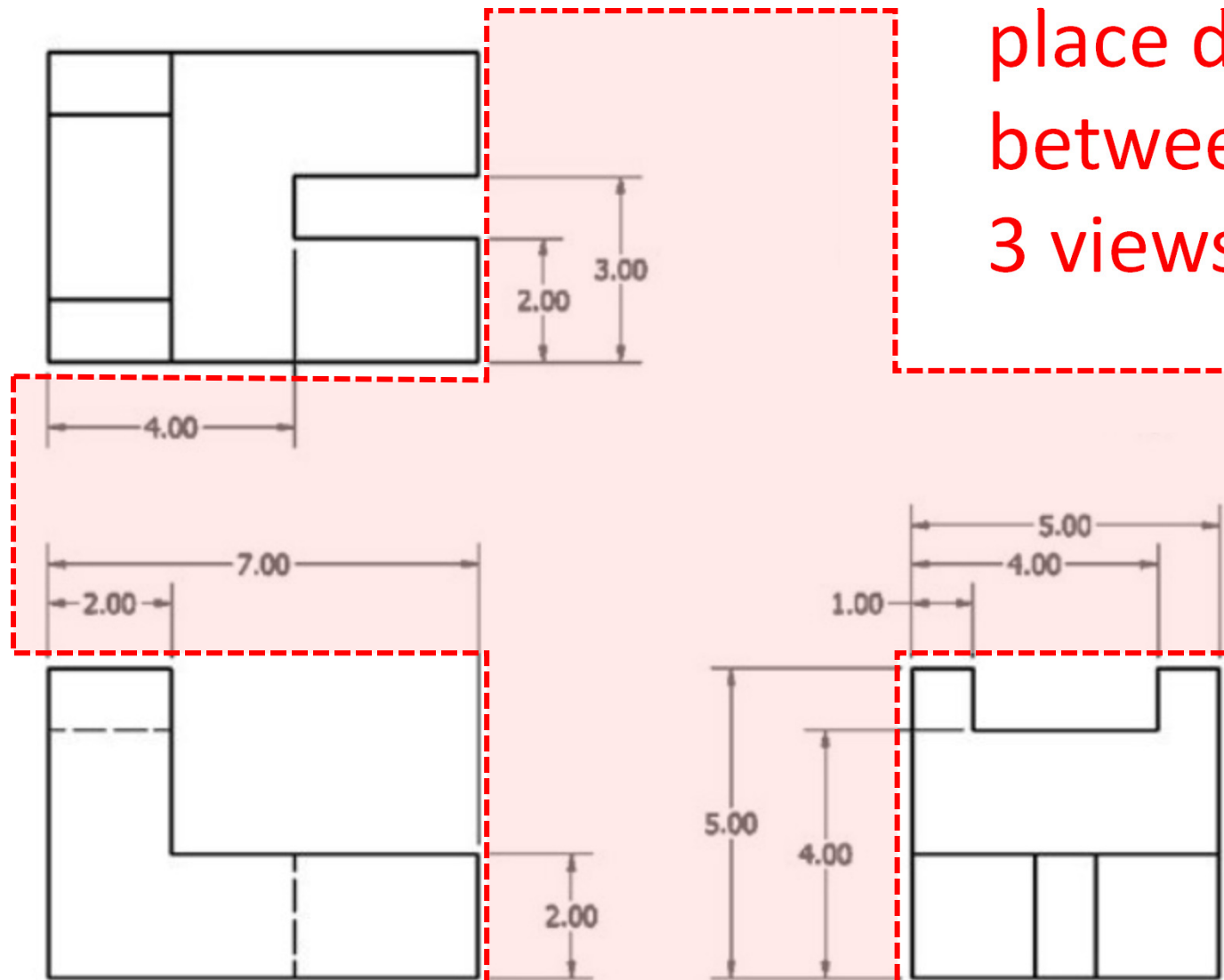
3 View Orientation



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

Dimensions

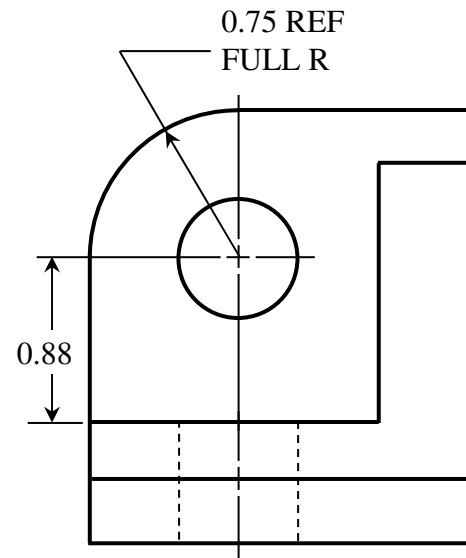
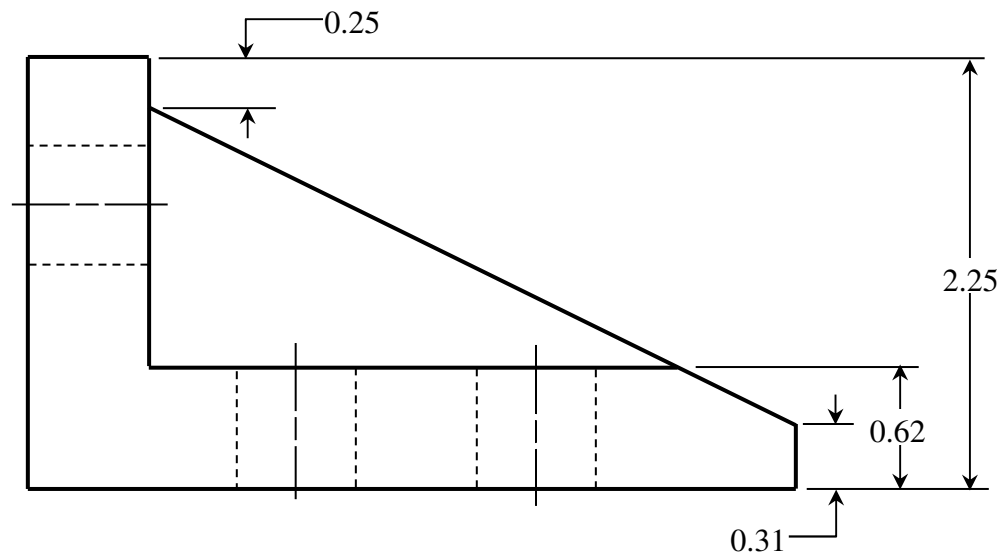
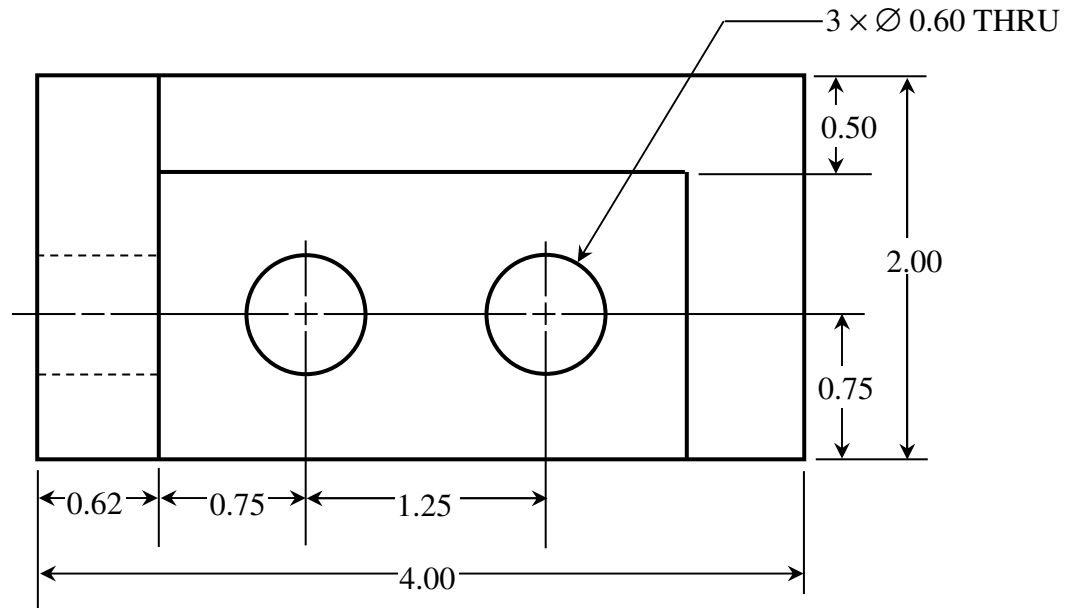
When possible,
place dimensions
between the
3 views.



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.

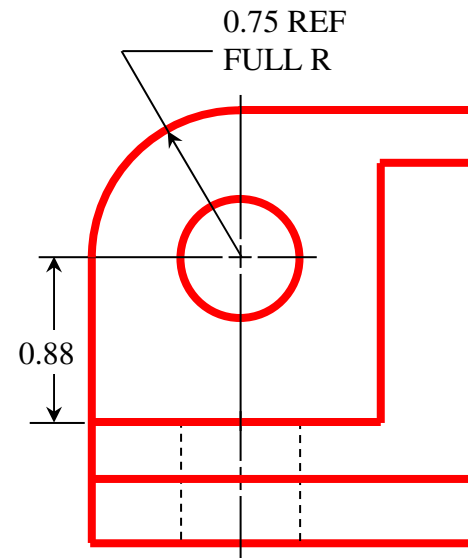
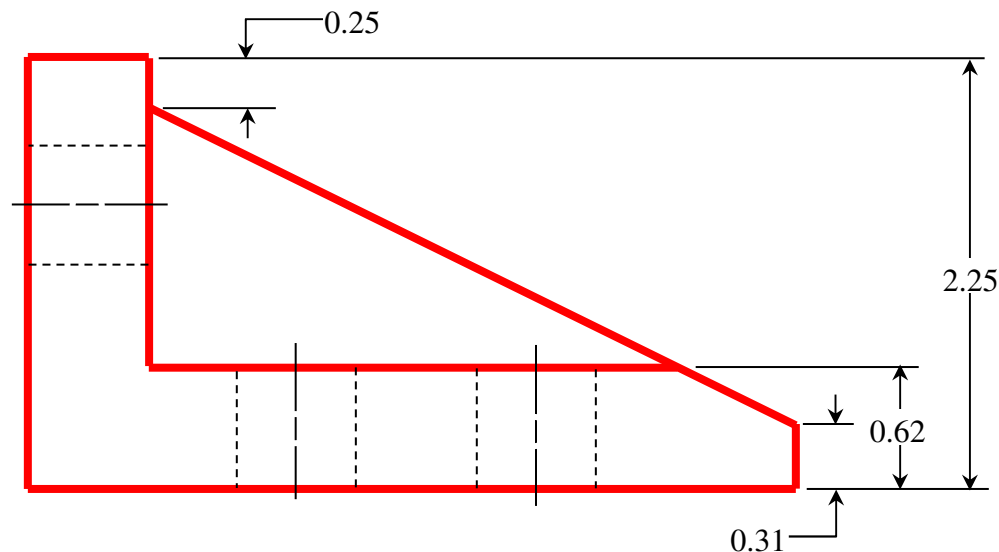
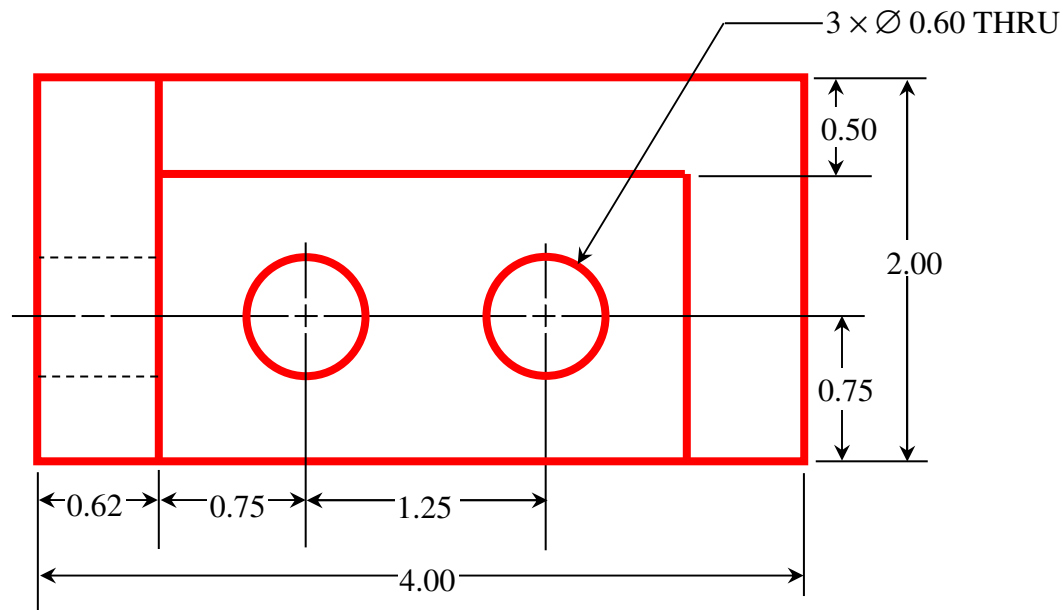
Line Types...



ALL DIMENSIONS IN INCHES

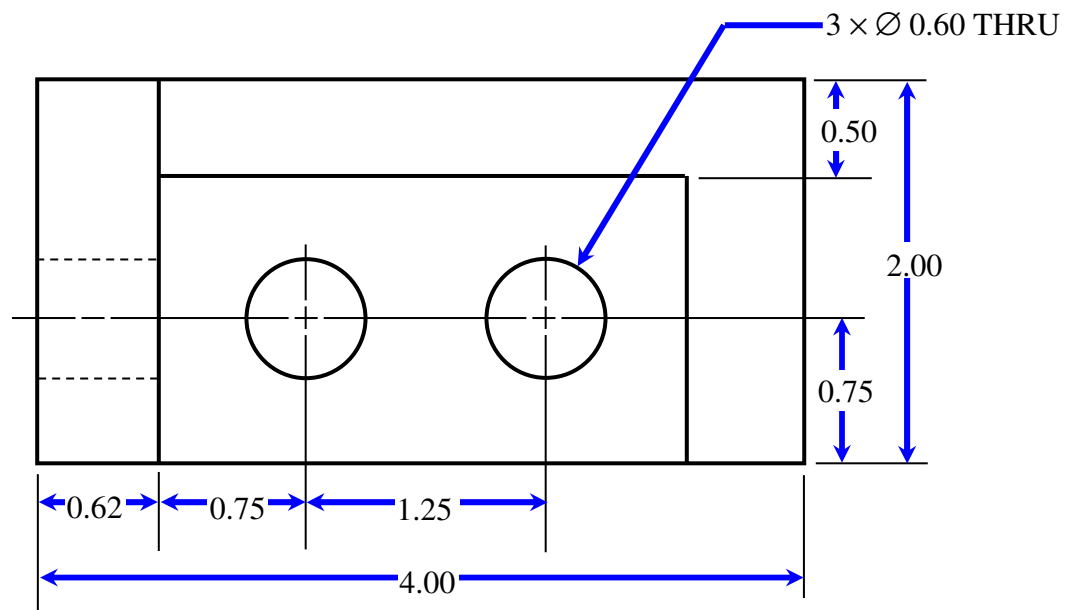
PART: WEDGE THING	
PROJECT: ASSIGN 3	
MAT'L: ALUMINUM	REV: 1
DR. BY: POGO	
DATE: SEP 2017	SCALE: 1:1

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

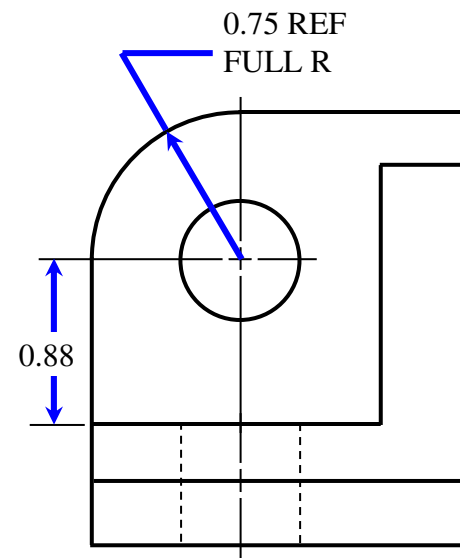
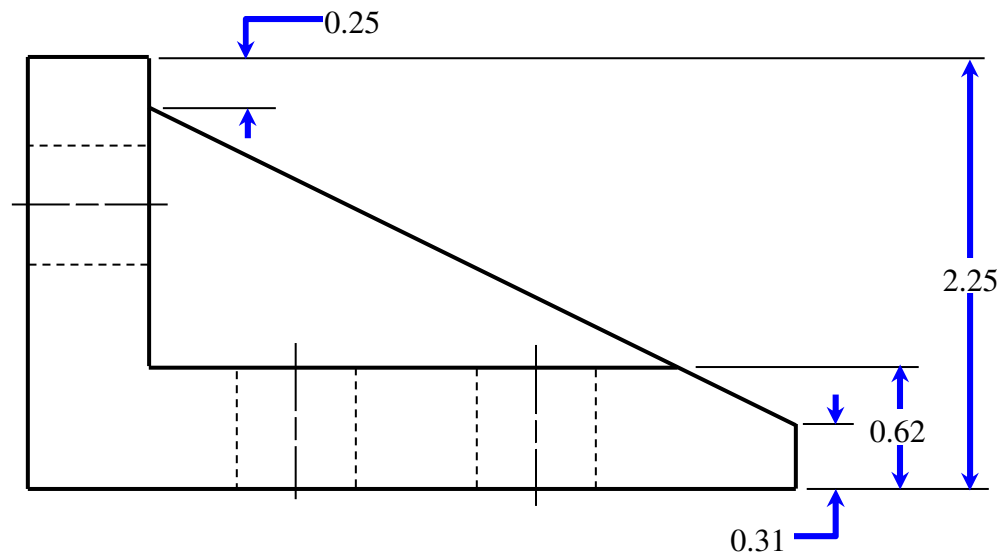


ALL DIMENSIONS IN INCHES

PART: WEDGE THING	
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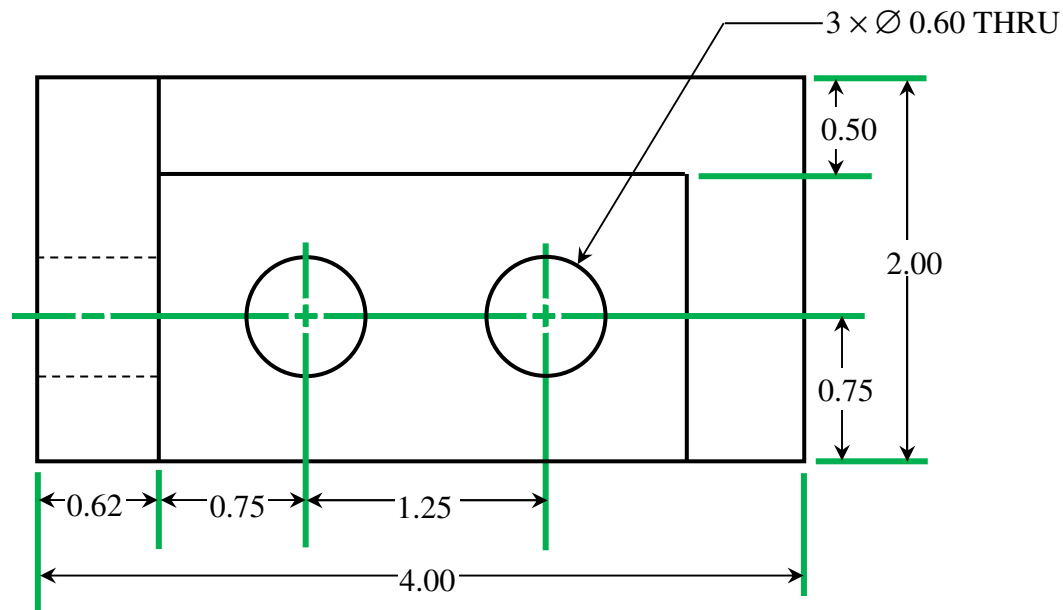


Dimension Lines:
 MUST have arrows
 and a number.
 They may not cross
 each other!

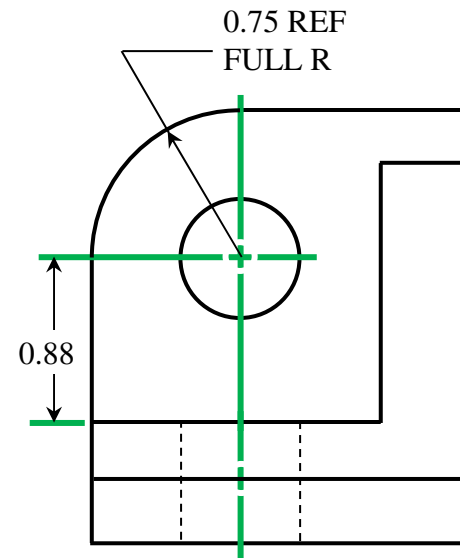
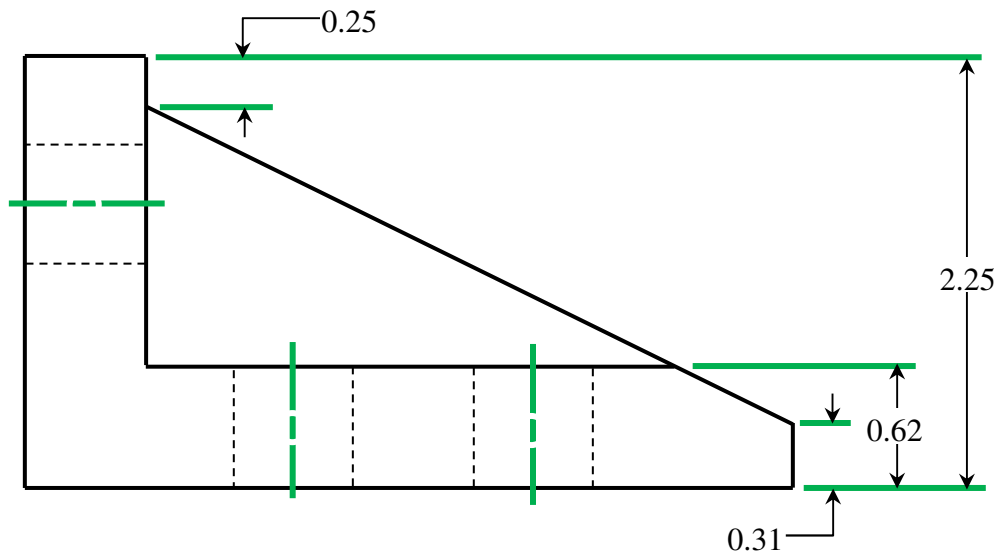


ALL DIMENSIONS IN INCHES

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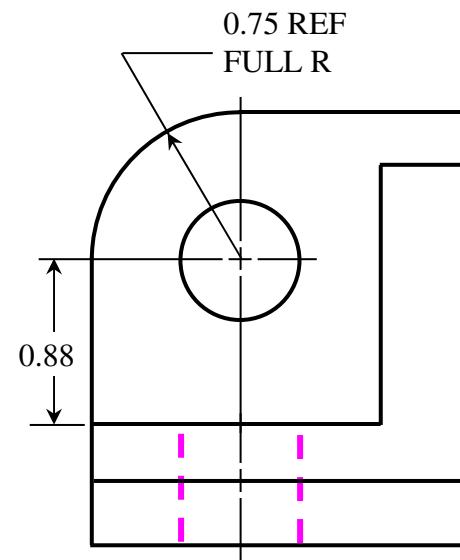
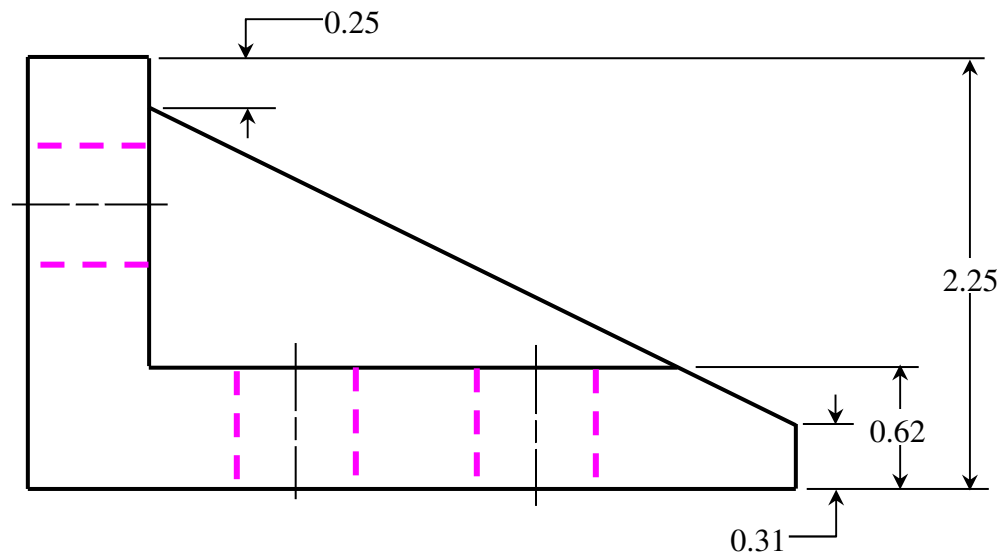
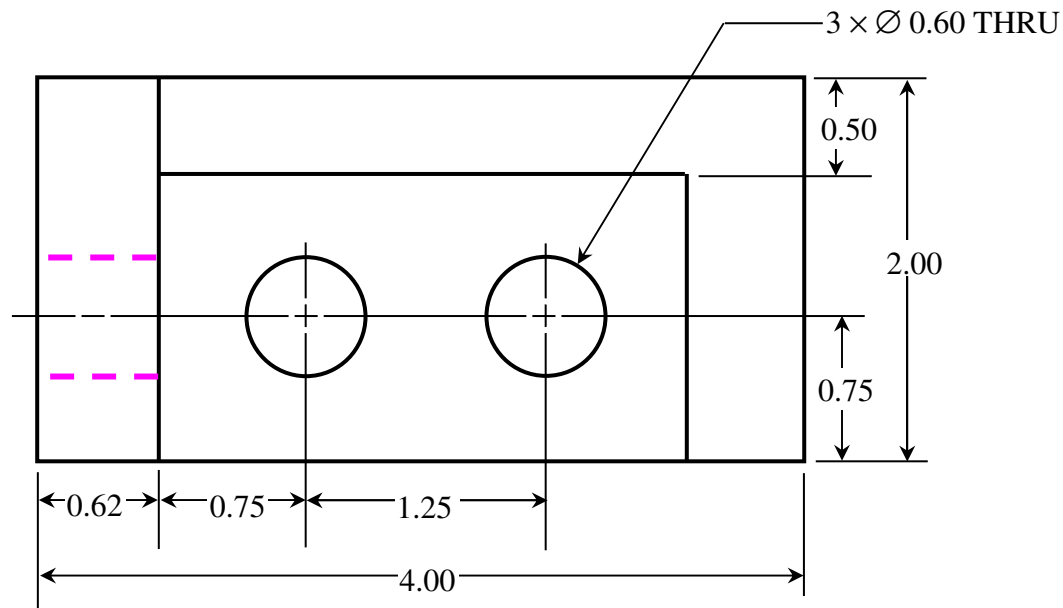
Extension Lines & Center Lines:
Provide access to dimension lines.



ALL DIMENSIONS IN INCHES

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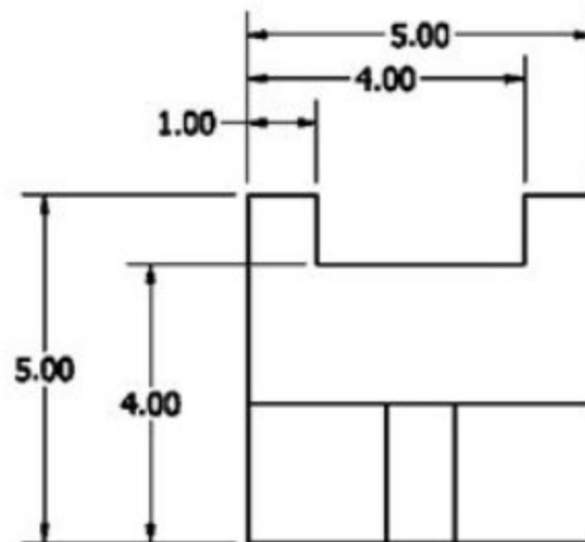
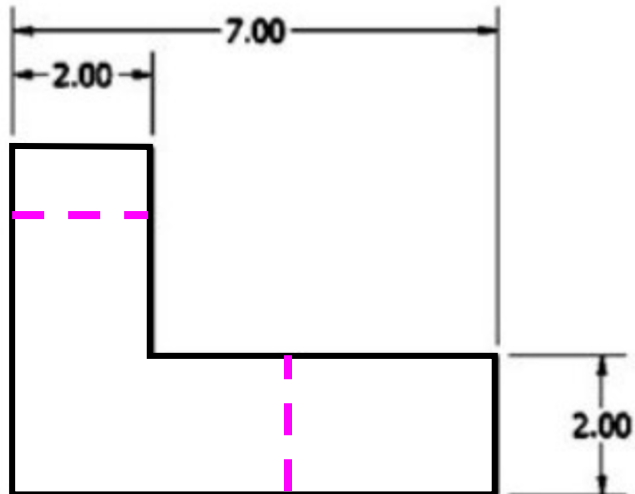
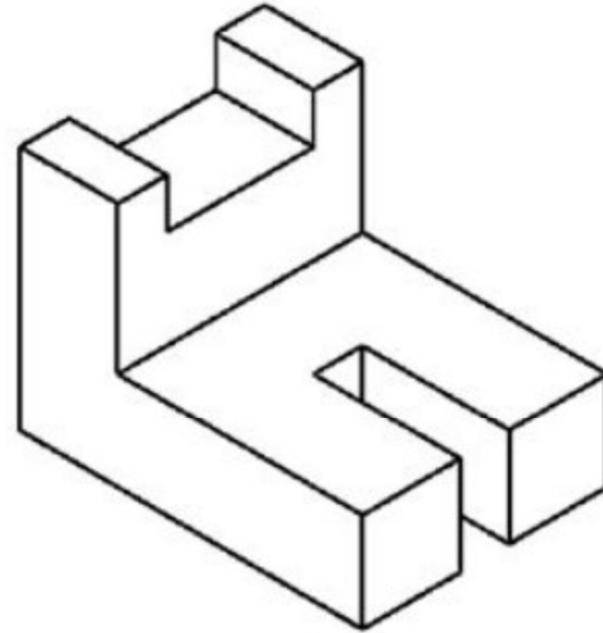
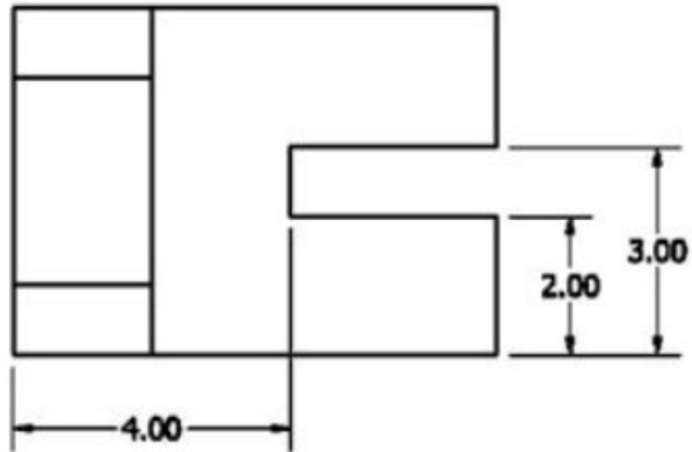
Hidden Lines:
Use evenly
spaced dashes.
“X-Ray Vision”

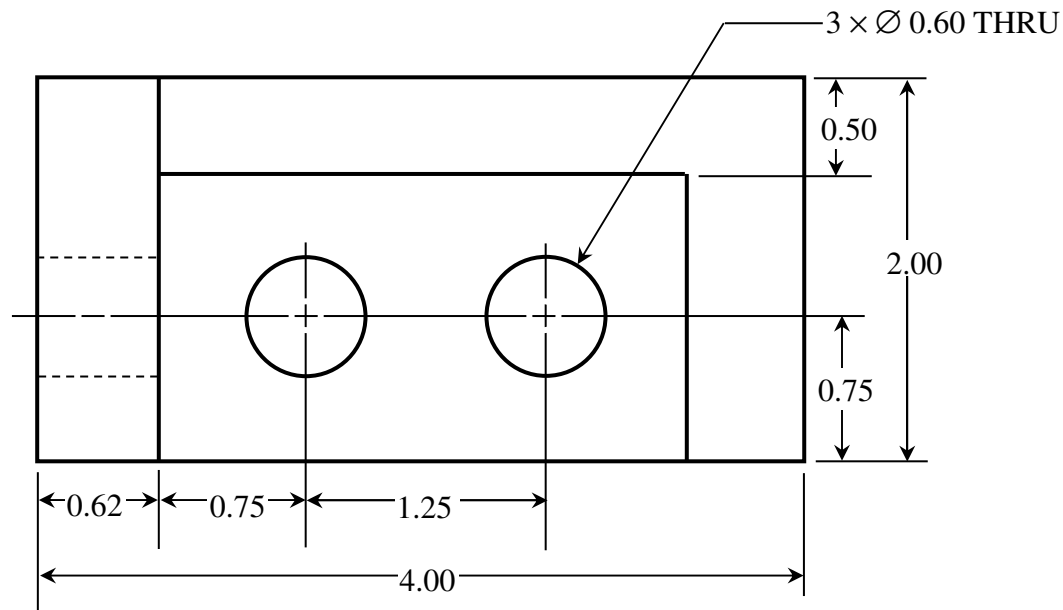


ALL DIMENSIONS IN INCHES

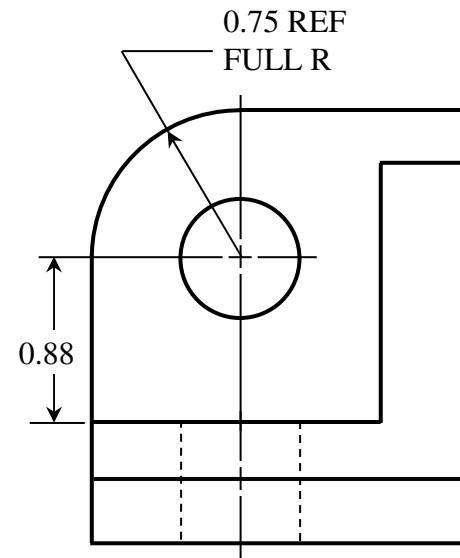
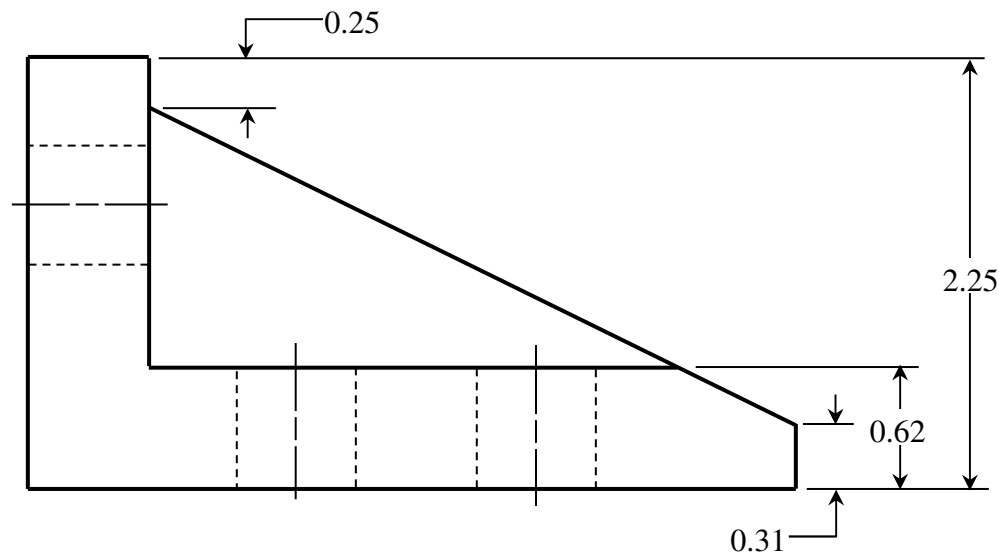
PART: WEDGE THING	
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DR. BY: POGO	
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More Hidden Lines...





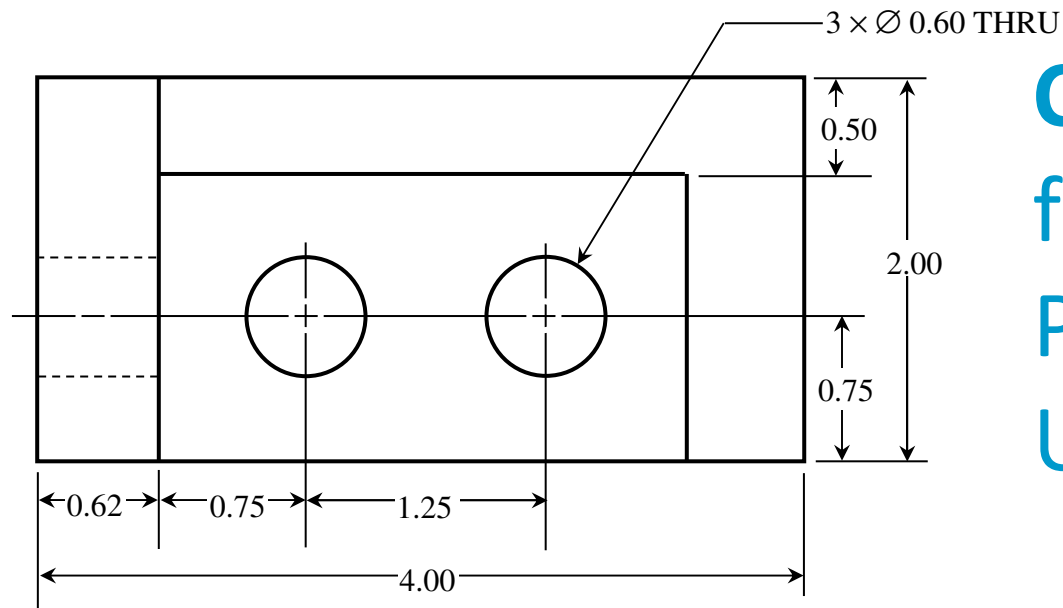
Tolerances...
 At Geneseo, assume
 your results will be
 within 0.005 inches of
 your stated dimension.



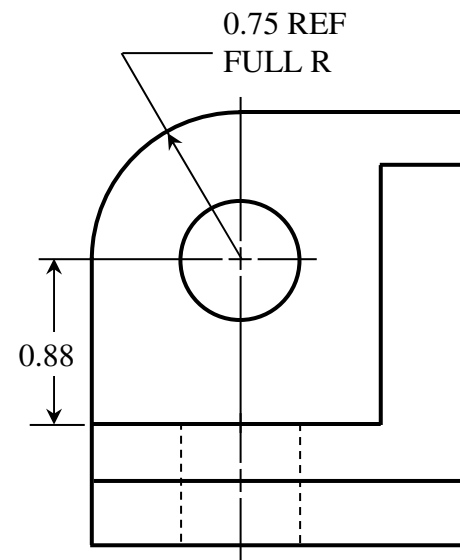
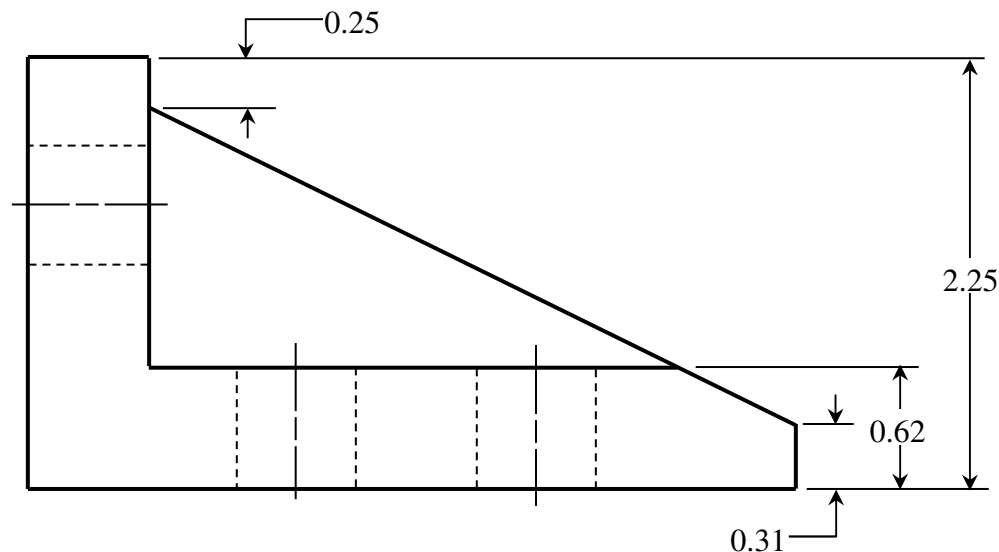
All dimensions ± 0.005 inches
 unless otherwise specified.

ALL DIMENSIONS IN INCHES

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DR. BY: POGO	
DATE: SEP 2017	SCALE: 1:1



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



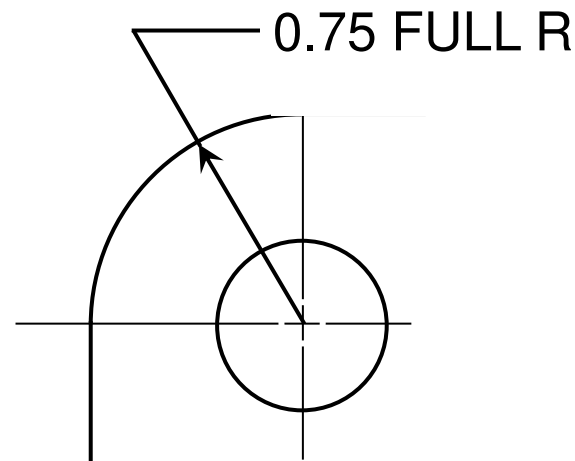
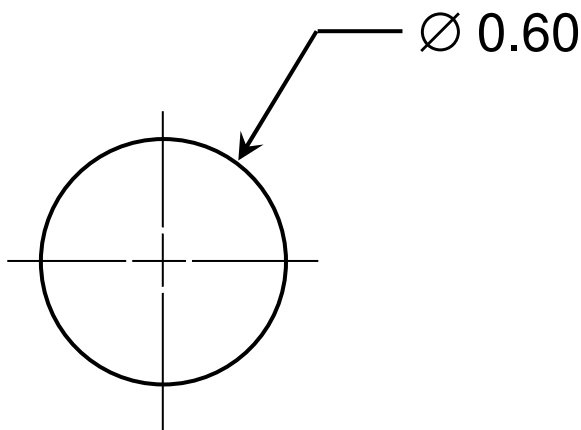
Inches currently preferred over mm...

ALL DIMENSIONS IN INCHES

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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”: \varnothing
- *Other curves* point radially outwards from the center of the curve.
- They typically show **radius** (“R”)

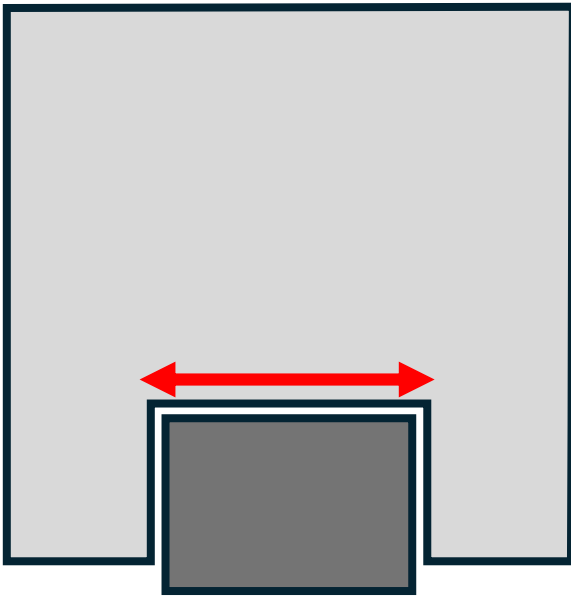


Dimension Details

- 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...



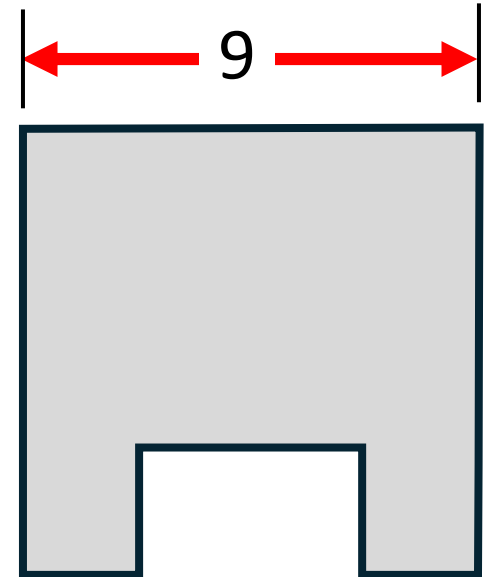
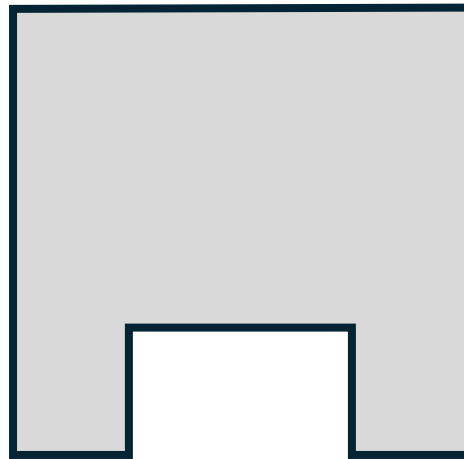
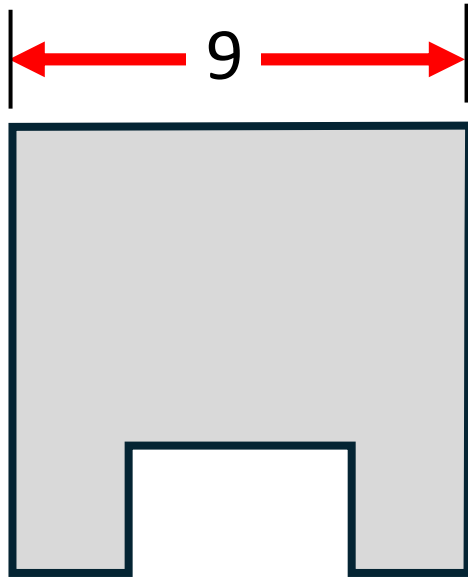
If this light gray block is intended to slide along the dark block, then **this** is the most important dimension.

Dimension Details

Wrong

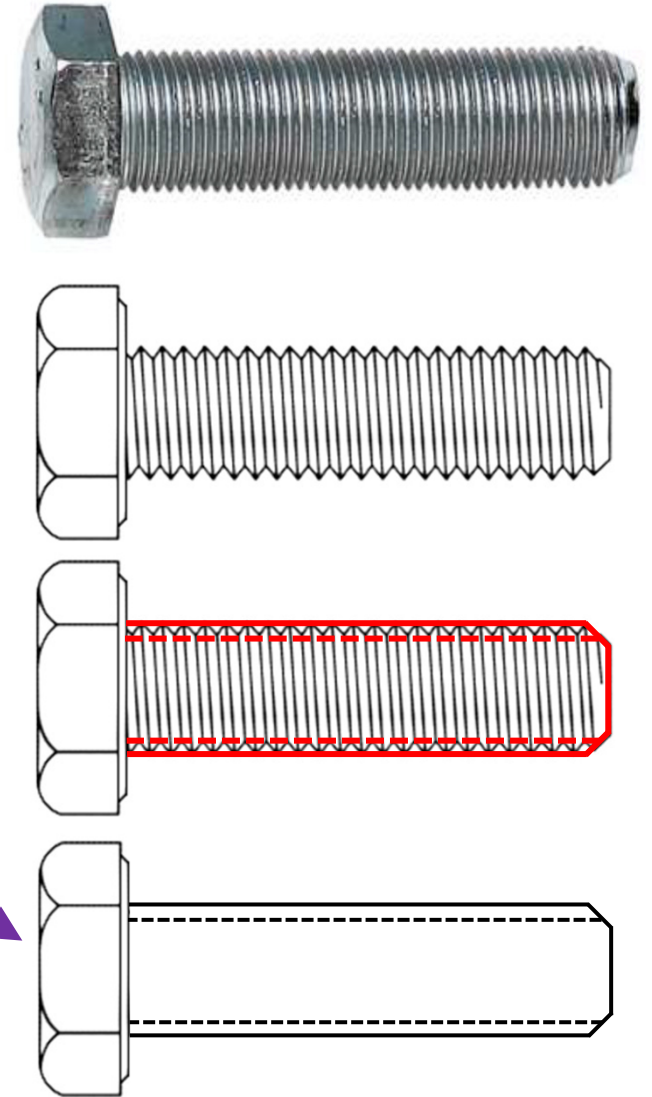
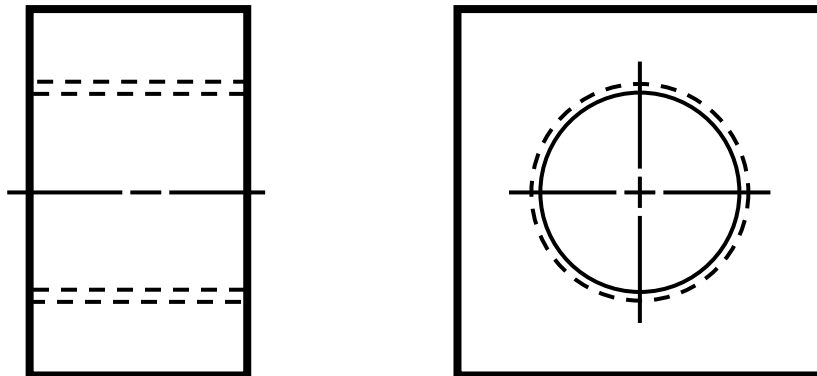
Fine

Better



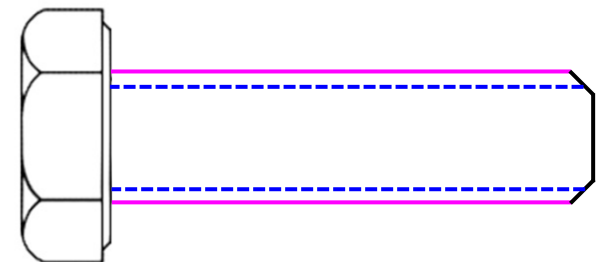
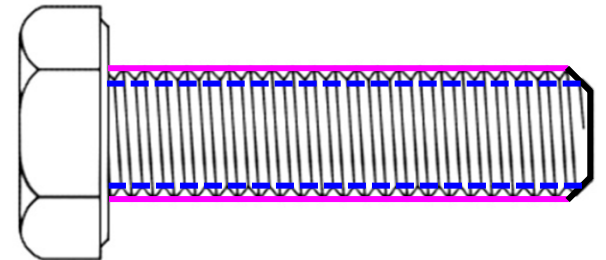
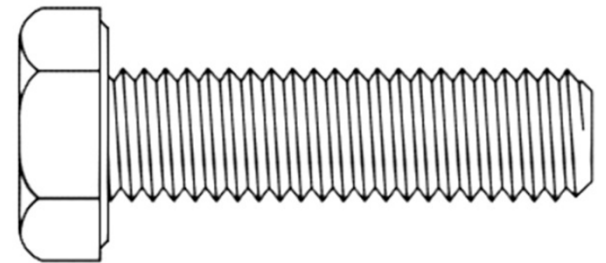
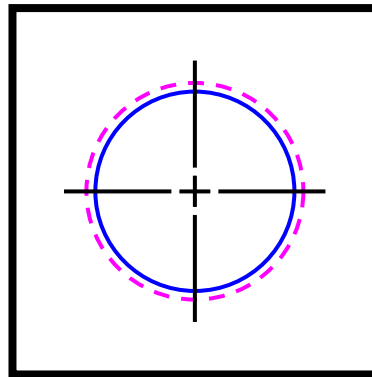
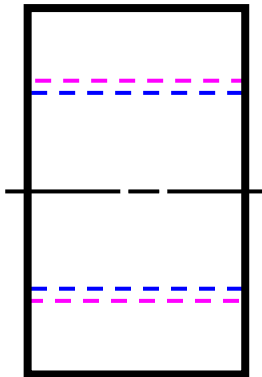
Threads and Screws

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



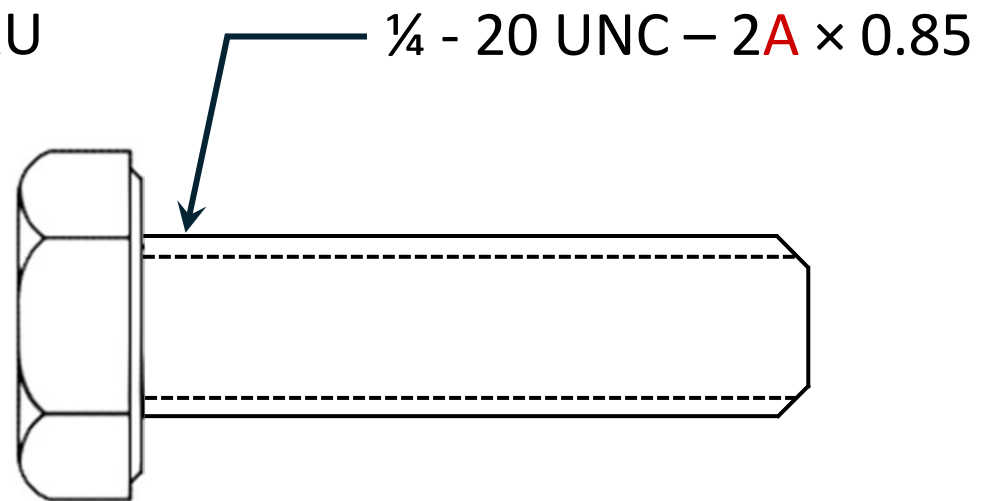
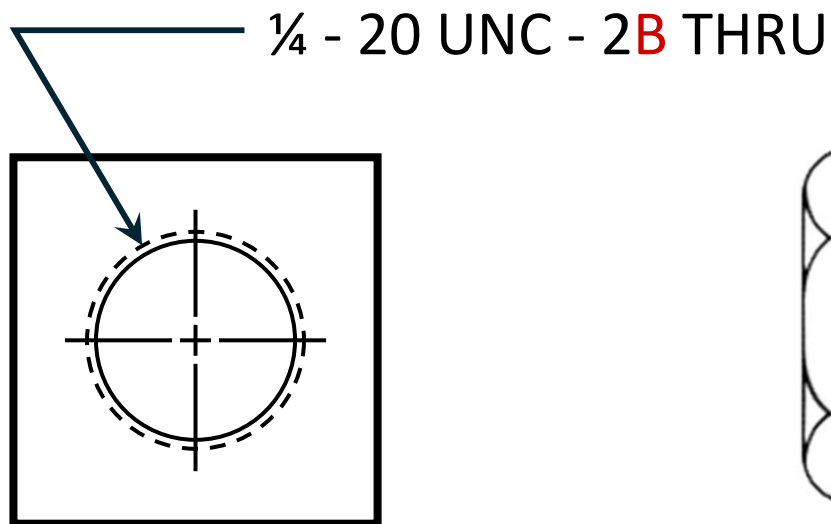
Threads and Screws

- 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.



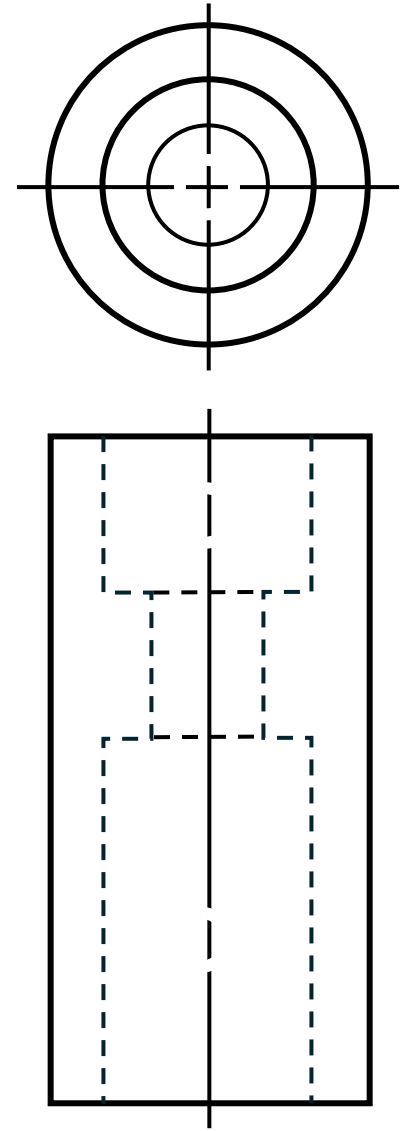
Thread Dimensions

- 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!



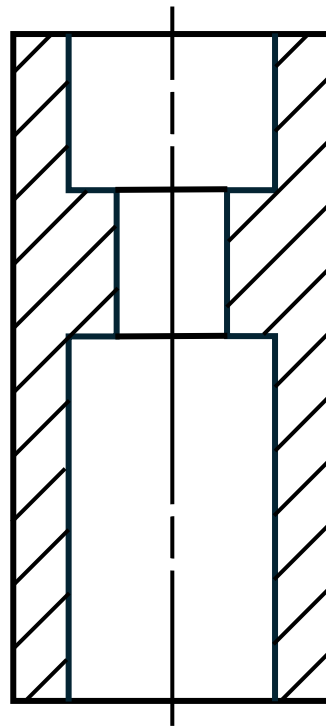
Sections

- 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

