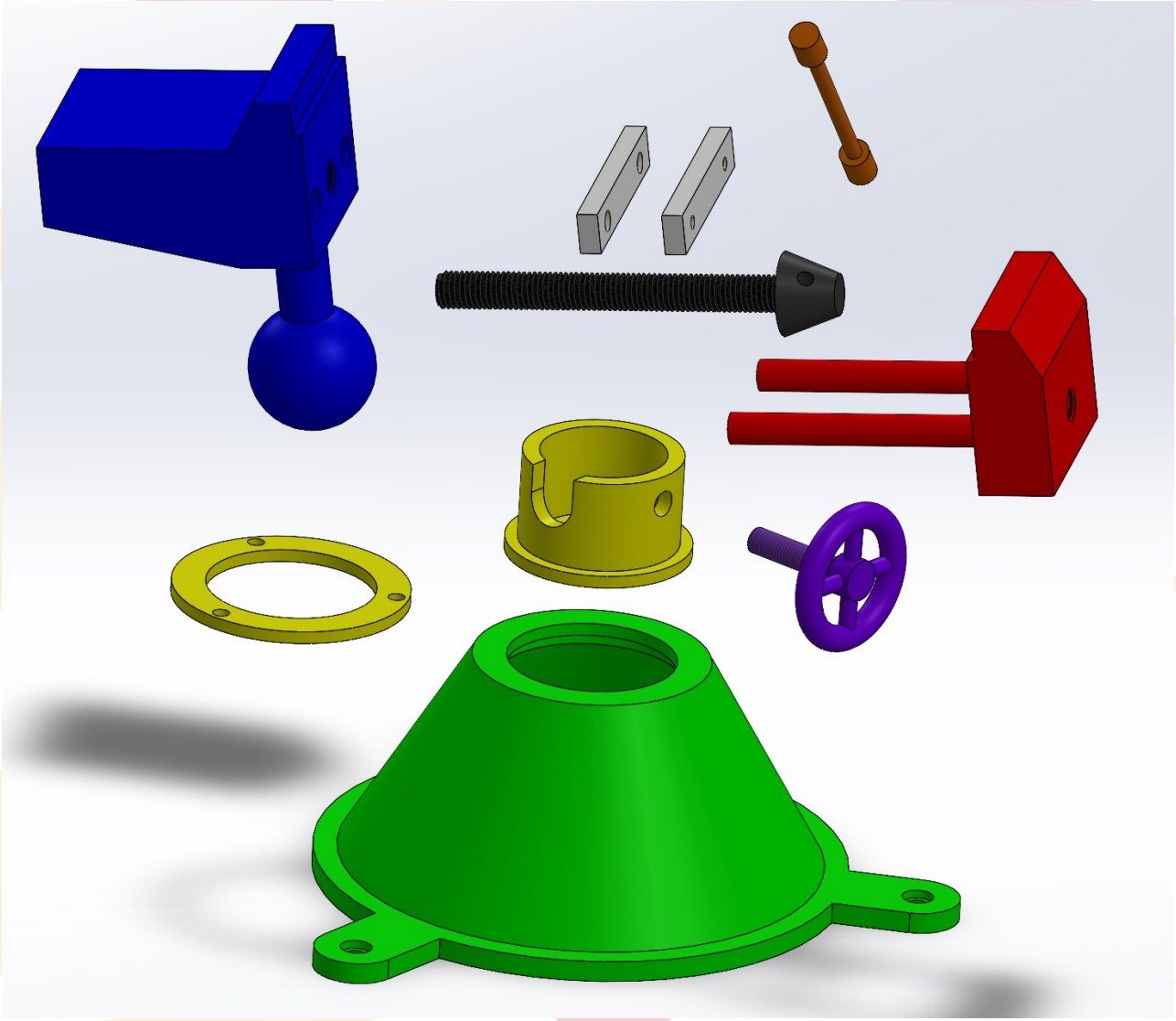
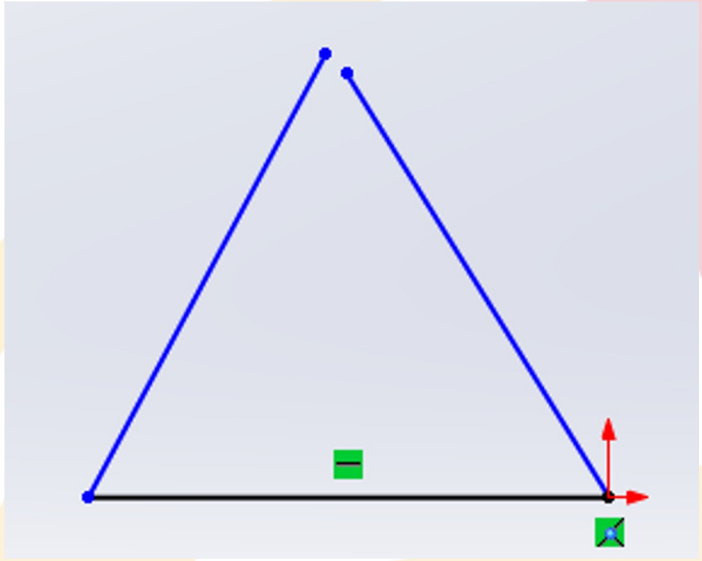
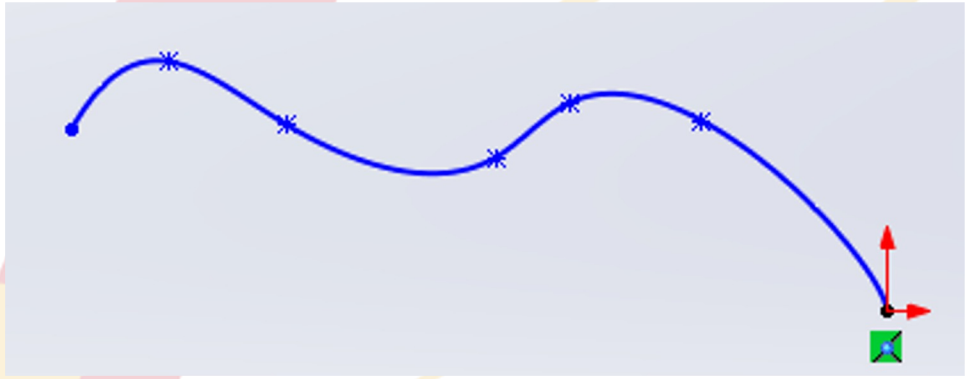
Advanced Modeling in Solidworks



Refresher:

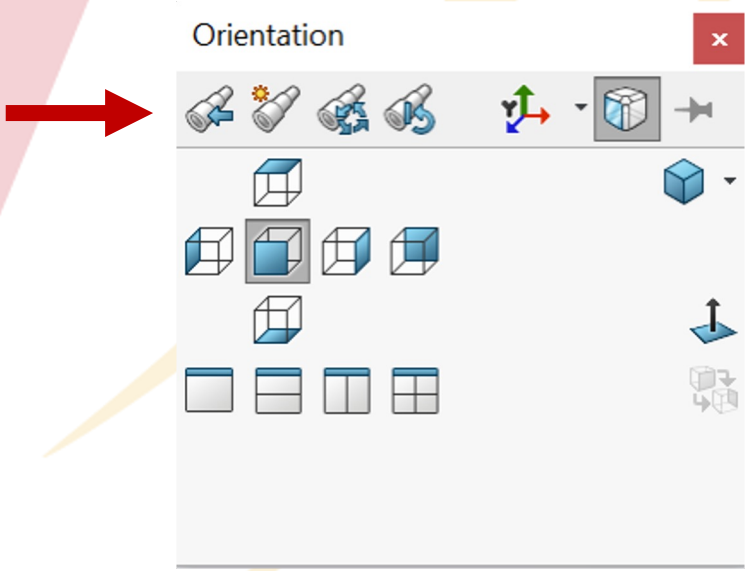
- Do these sketches create 3D features in Solidworks?





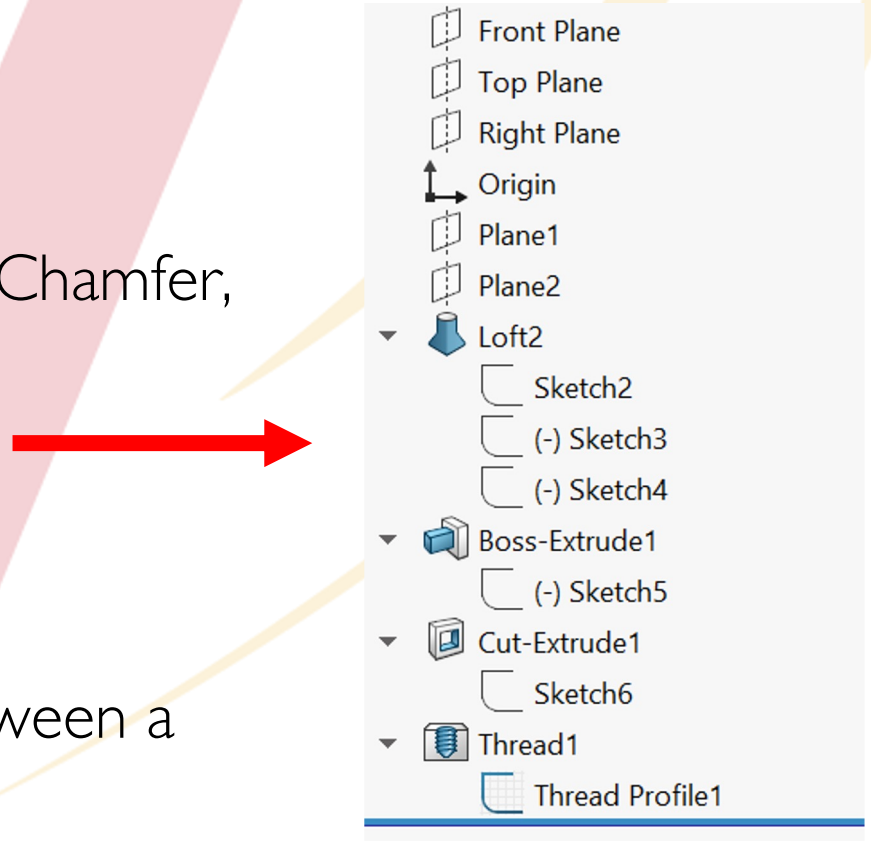
Helpful SolidWorks tools

- Normal To is your friend when sketching
- Reference Geometry>Axis
- Linear Pattern>Linear Pattern or Circular Pattern
- Hold down the center button of your mouse to rotate your part
- Press Space Bar on keyboard to get this
  - Allows you to easily orient the part being modeled



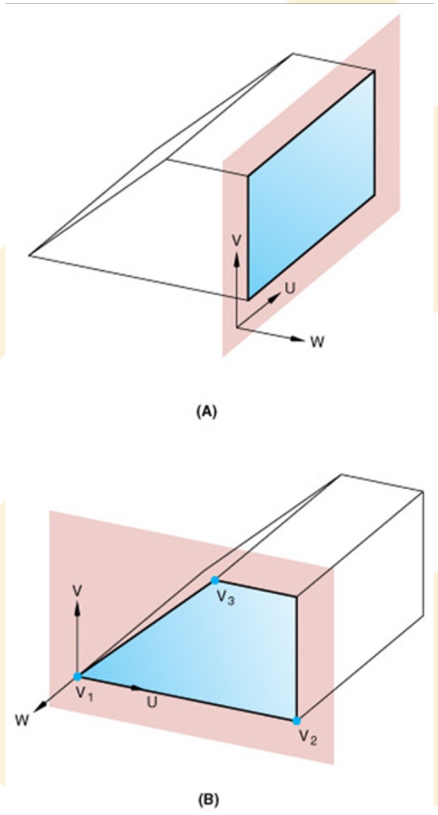
Constraint-based Modeling

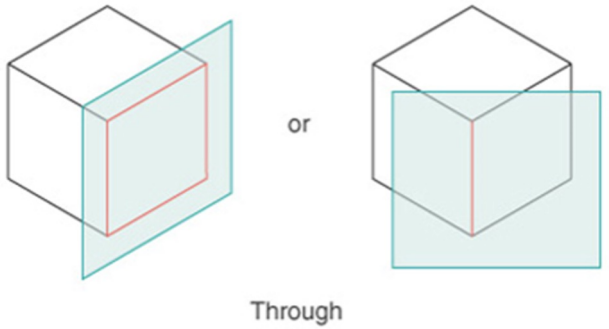
- Collection of features
  - Ex: Extrude, Extruded cut, Revolve, Fillet/Round, Chamfer, Sweep, Loft, etc.
- Parts Tree
  - Pay attention to the parent/child relationship between a feature and it's sketch

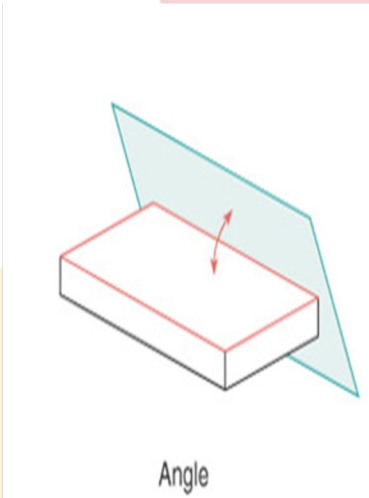


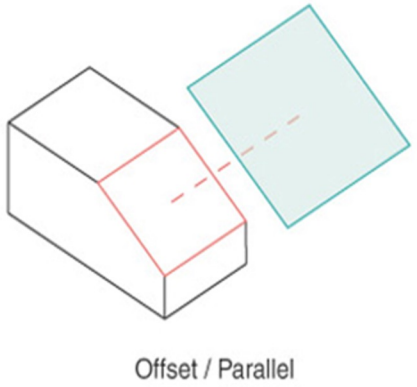
Sketch Planes

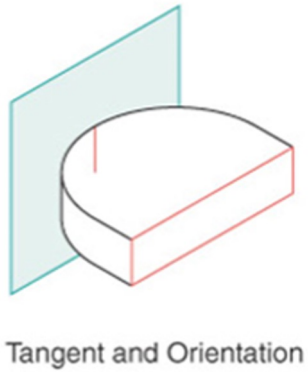
- Canvas for drawing the construction geometry of a part (profile, construction lines, etc.)



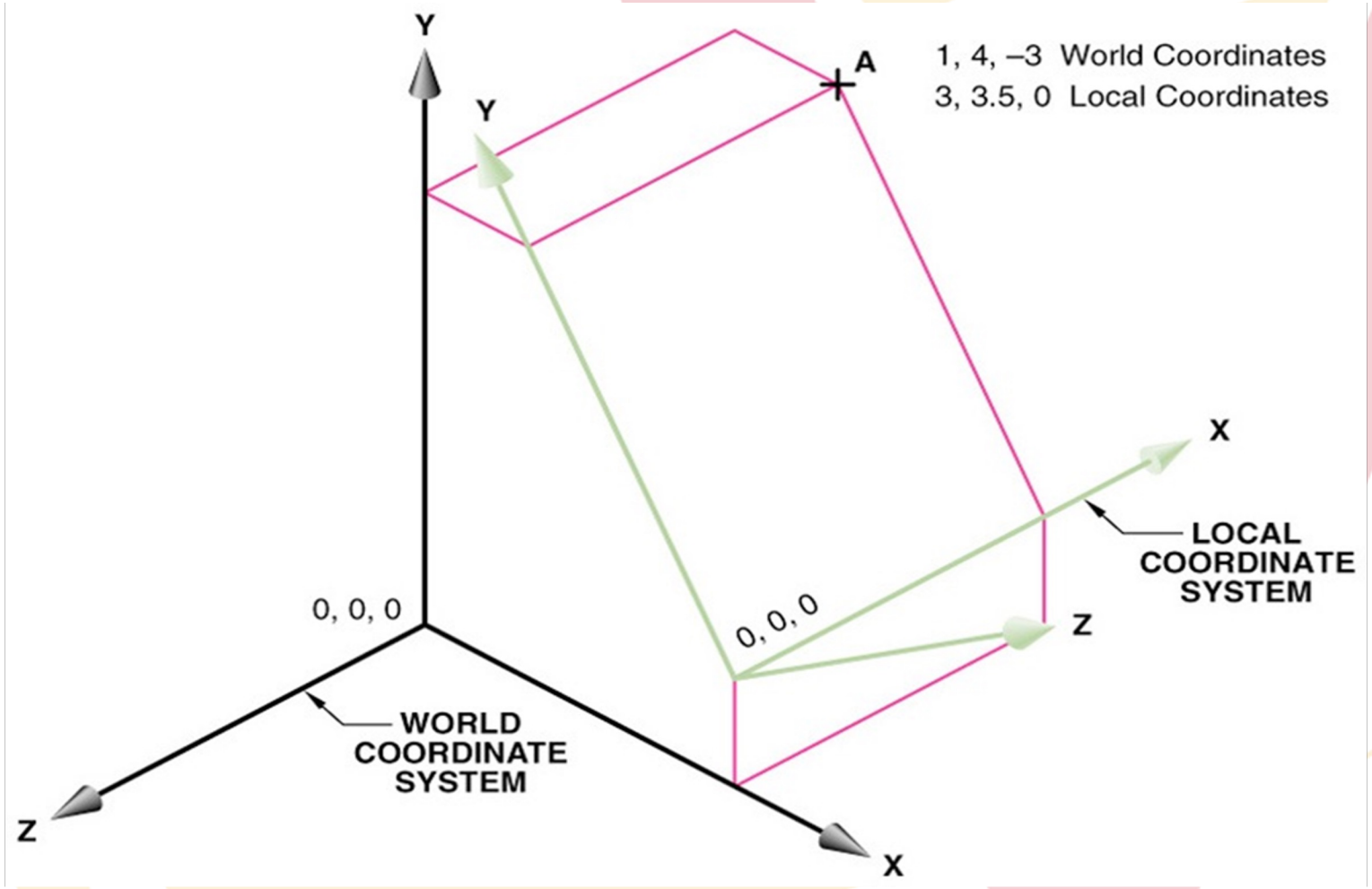








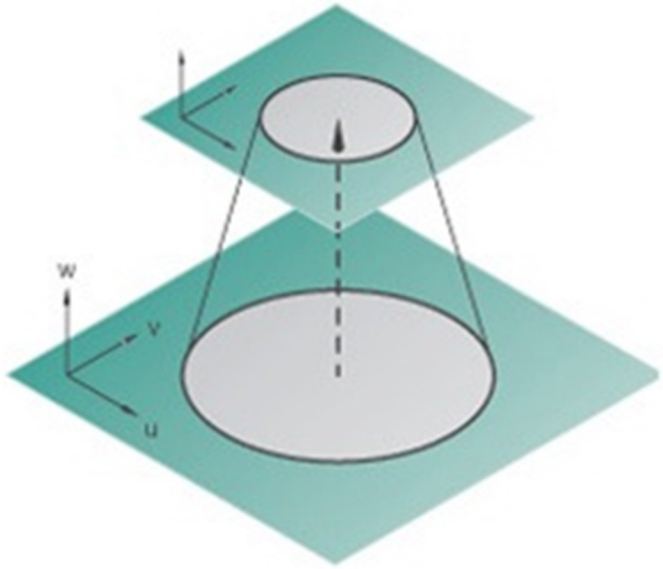
Coordinate Systems



- Local Coordinate Systems make geometry creation easier.
- Origin for LCS can be anywhere on model

Blend Extrusion

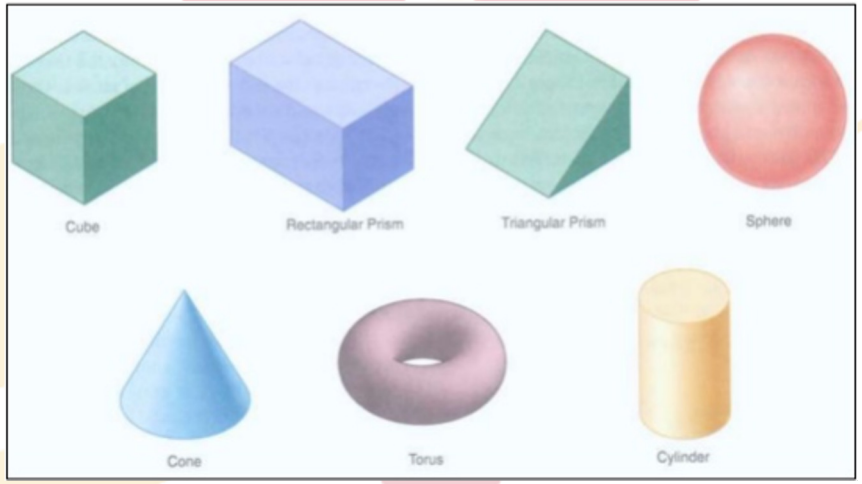
- Loft: create a profile on the base plane, define the second plane (with a second profile) to which the initial profile will be extruded to



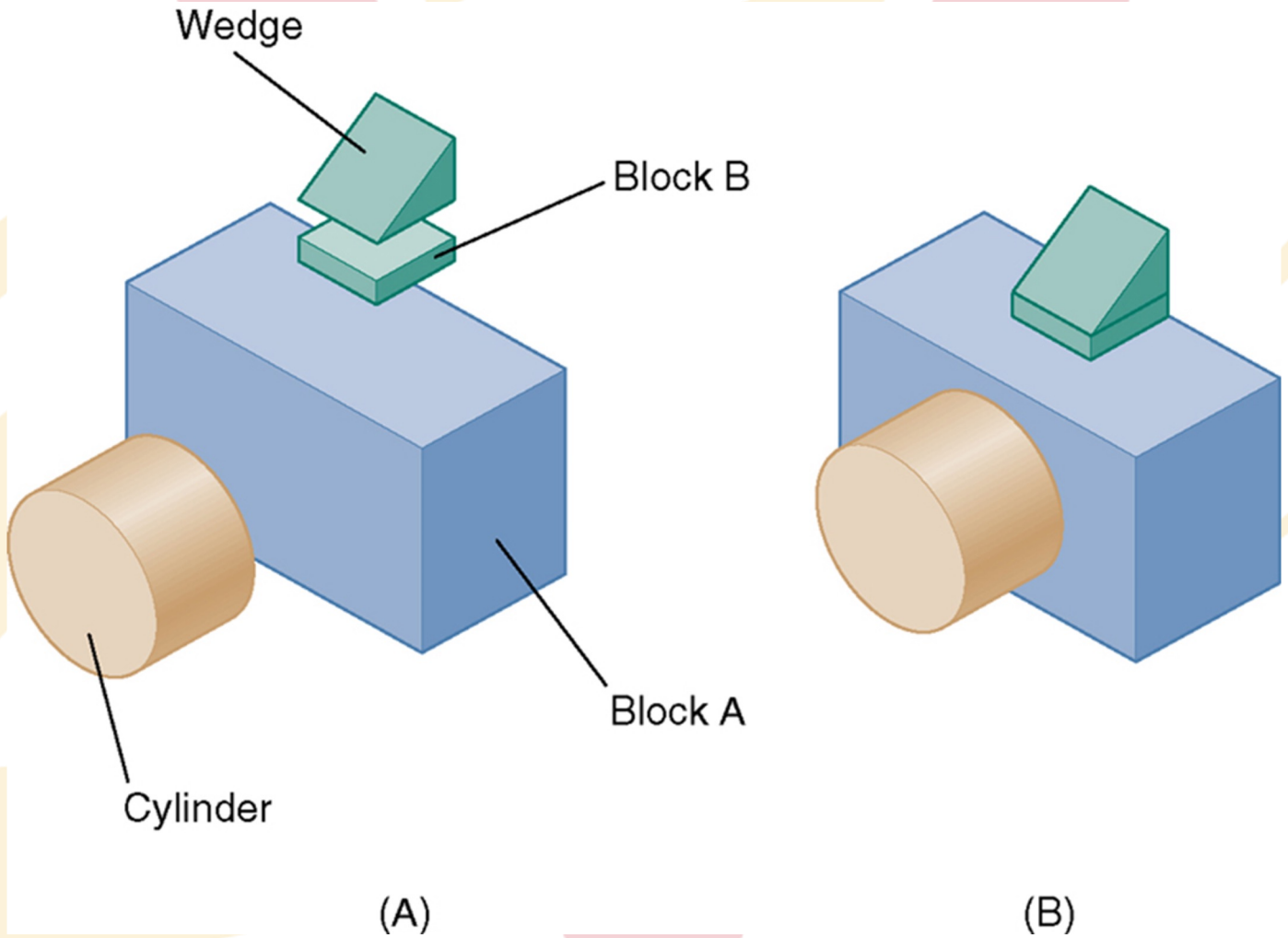
(B)

Solid Primitives

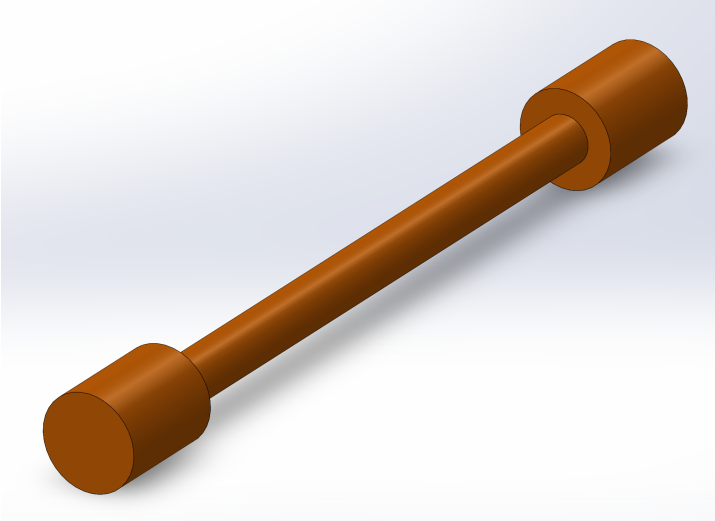
- Almost every object can be decomposed into its most fundamental, 3-dimensional geometries
- Solidworks can only create a limited set of 3D objects
- Combine these to make a complex object!

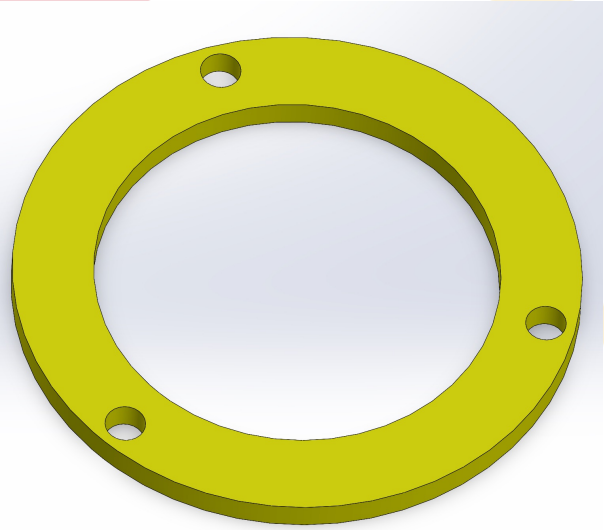


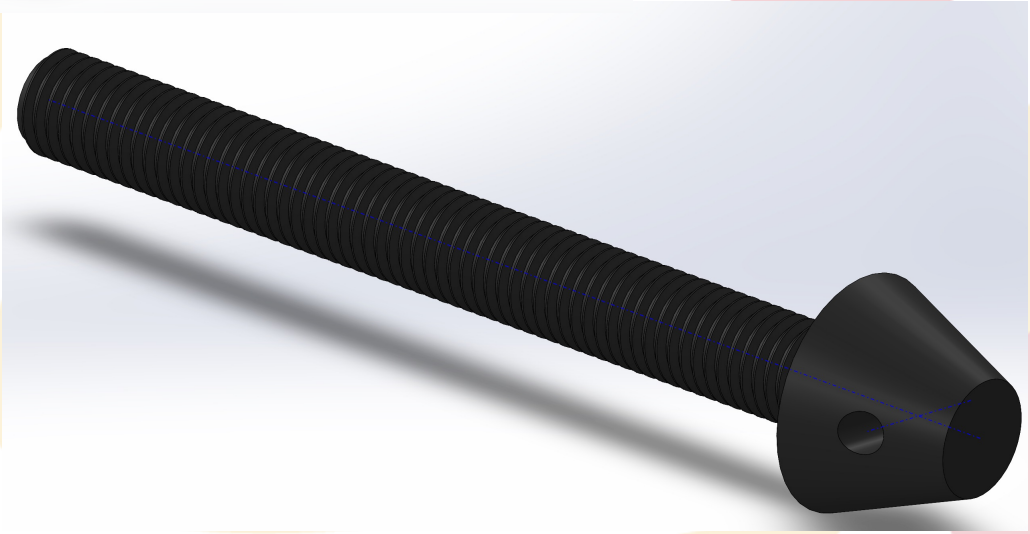
Make this part…

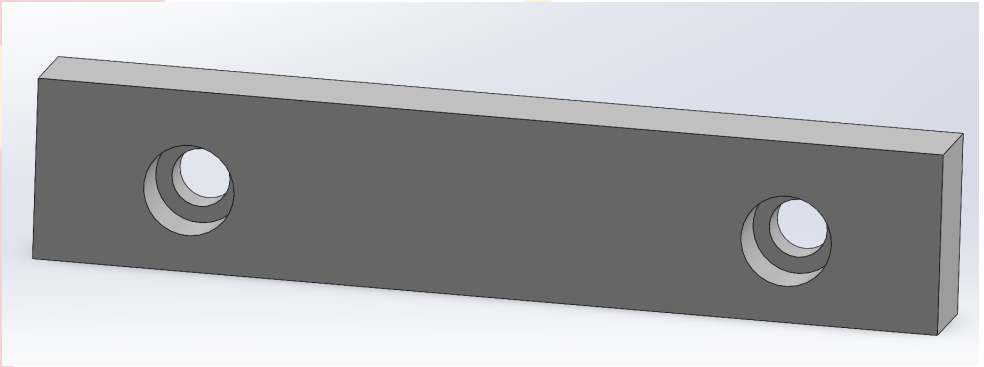


What are the fundamental 3D geometries of these parts?



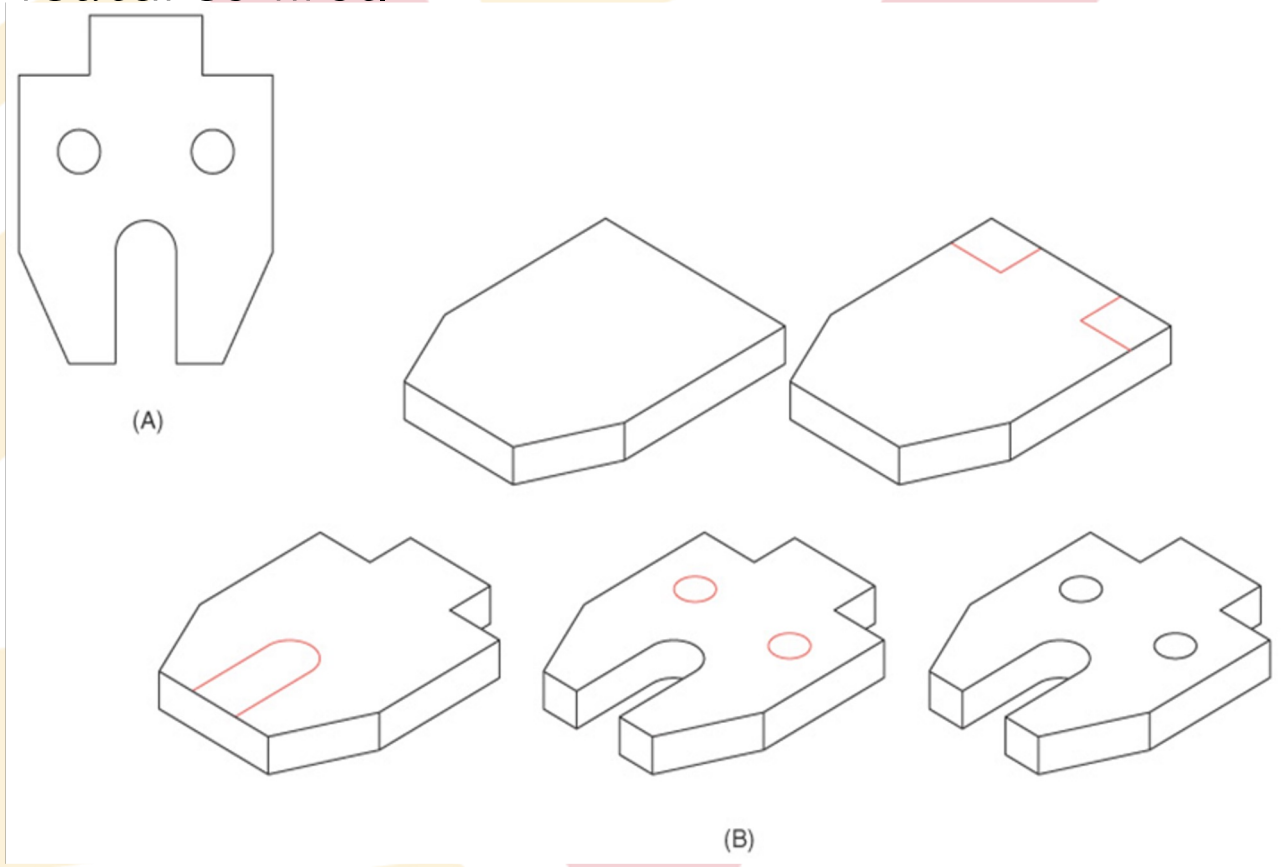




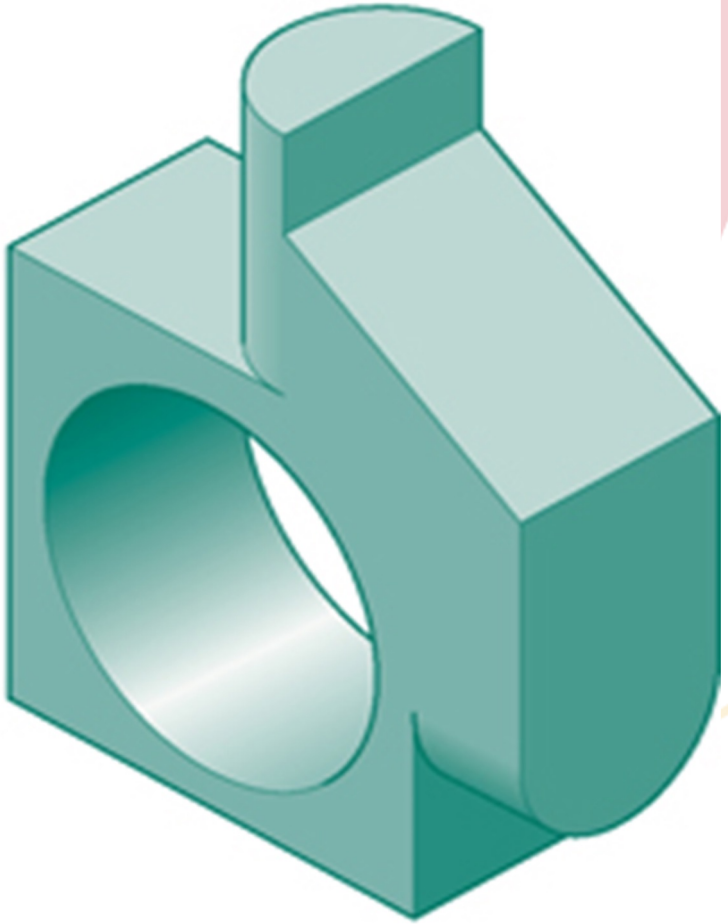


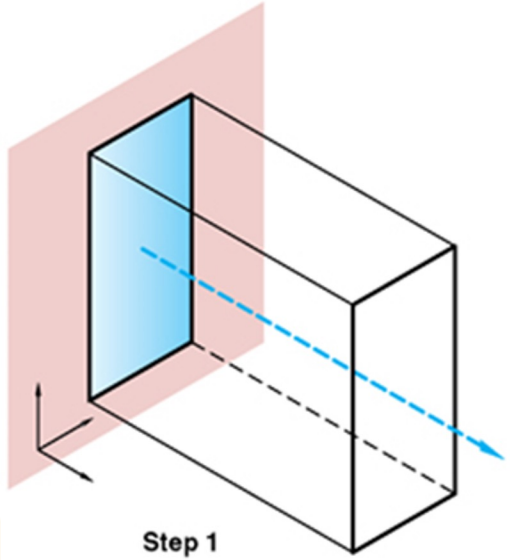
Feature Definition

- The order in which a part's features are added to it is important!
- Look for major features first.

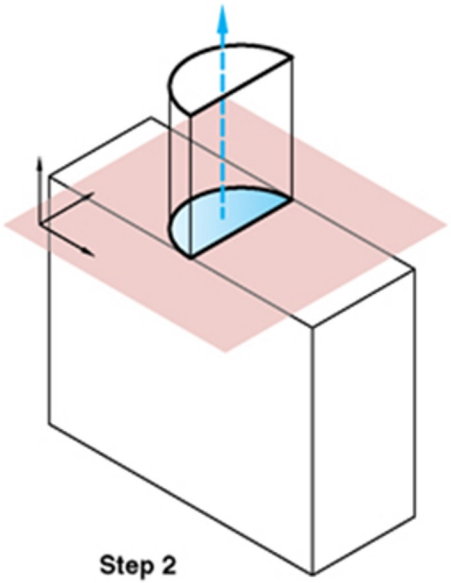


How would you model this part?

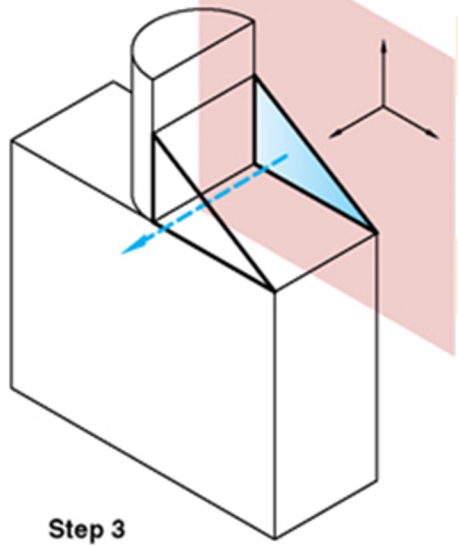




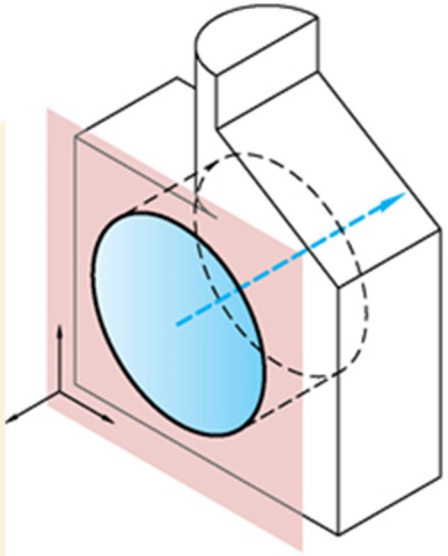
Step 1



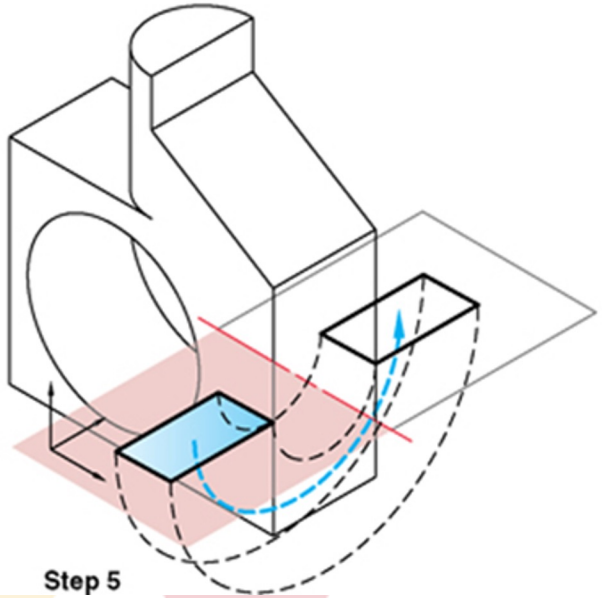
Step 2



Step 3



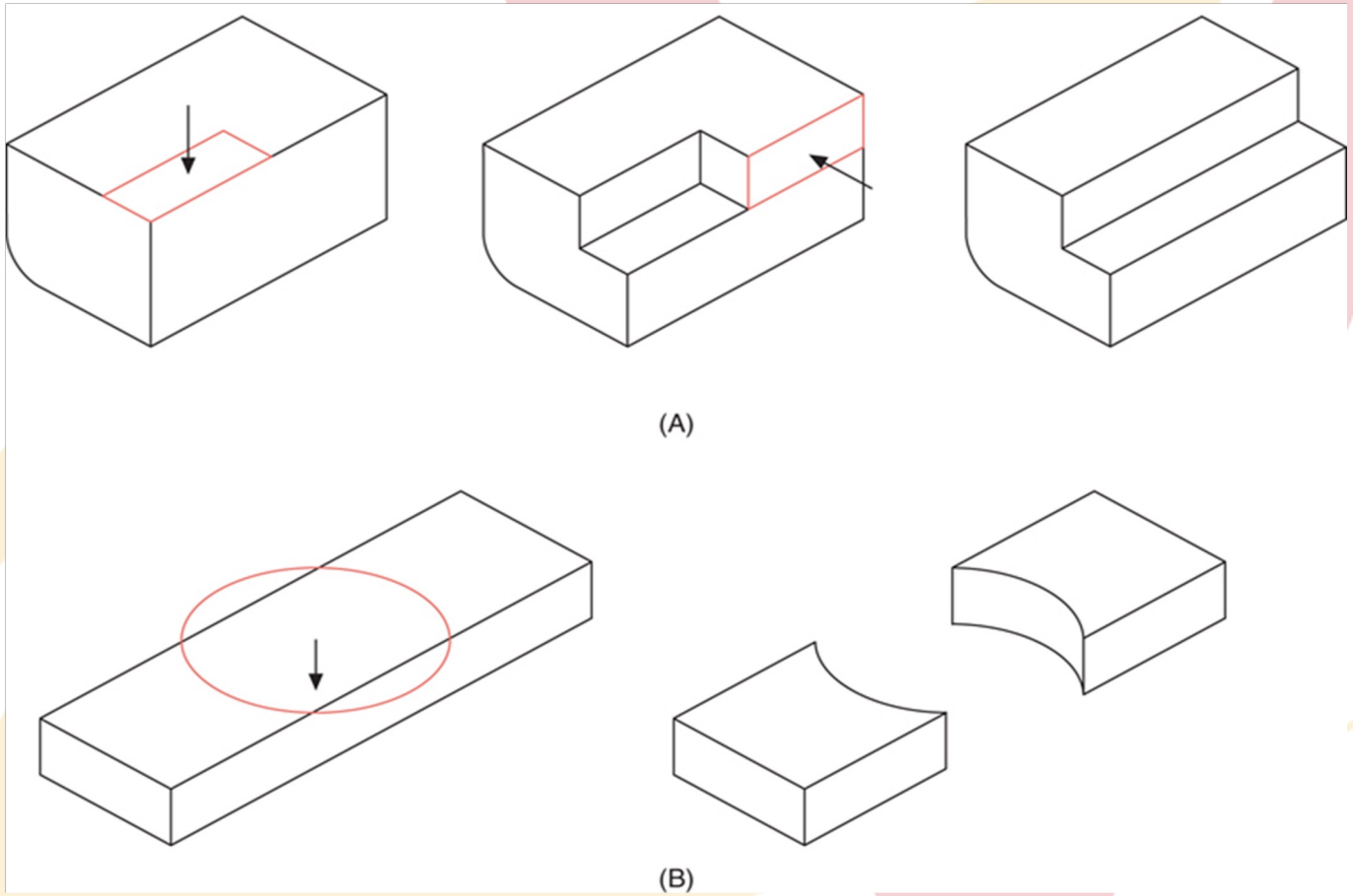
Step 4



Step 5

Completed Object

Feature Definition- How not to do it

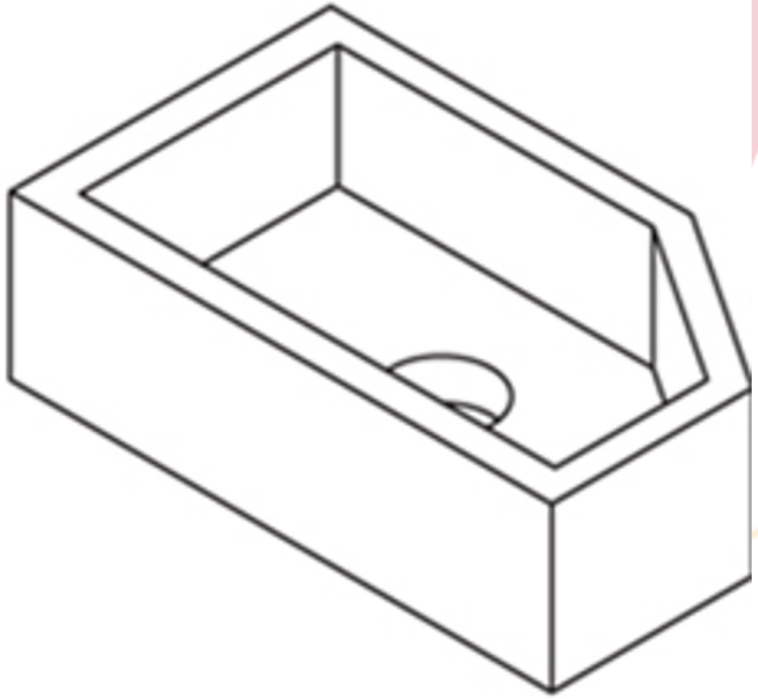


Too many steps!

Don't make two parts from one!

Try this…

- Model this hollowed out, angled, box with a hole in it.



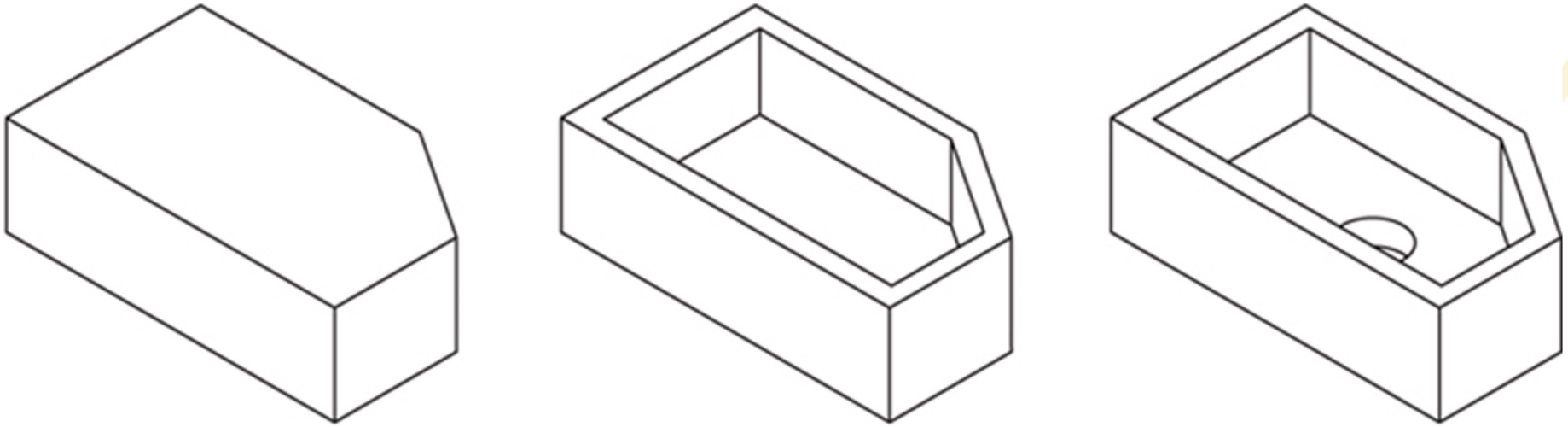
Box

↓

Shell

↓

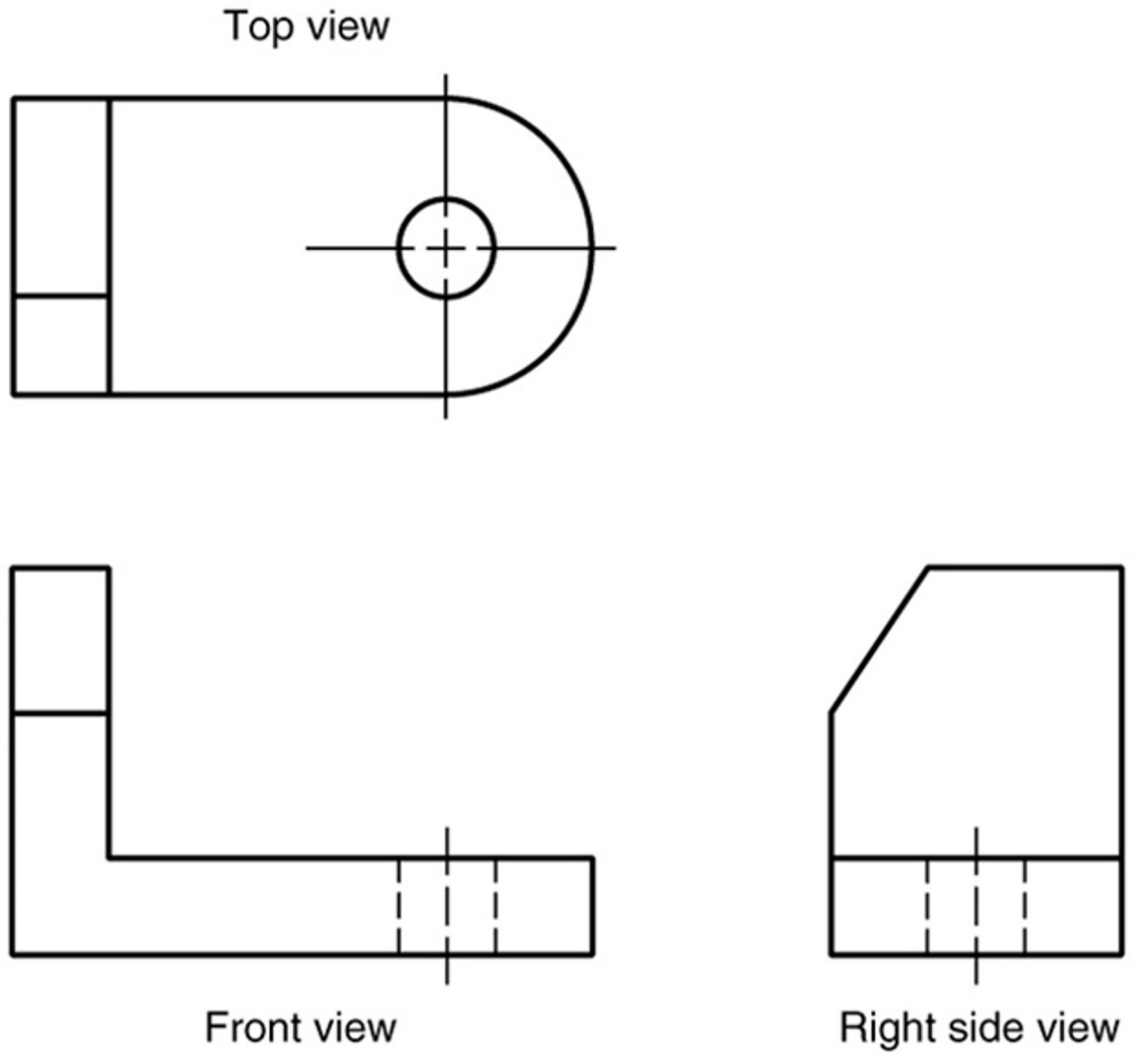
Hole



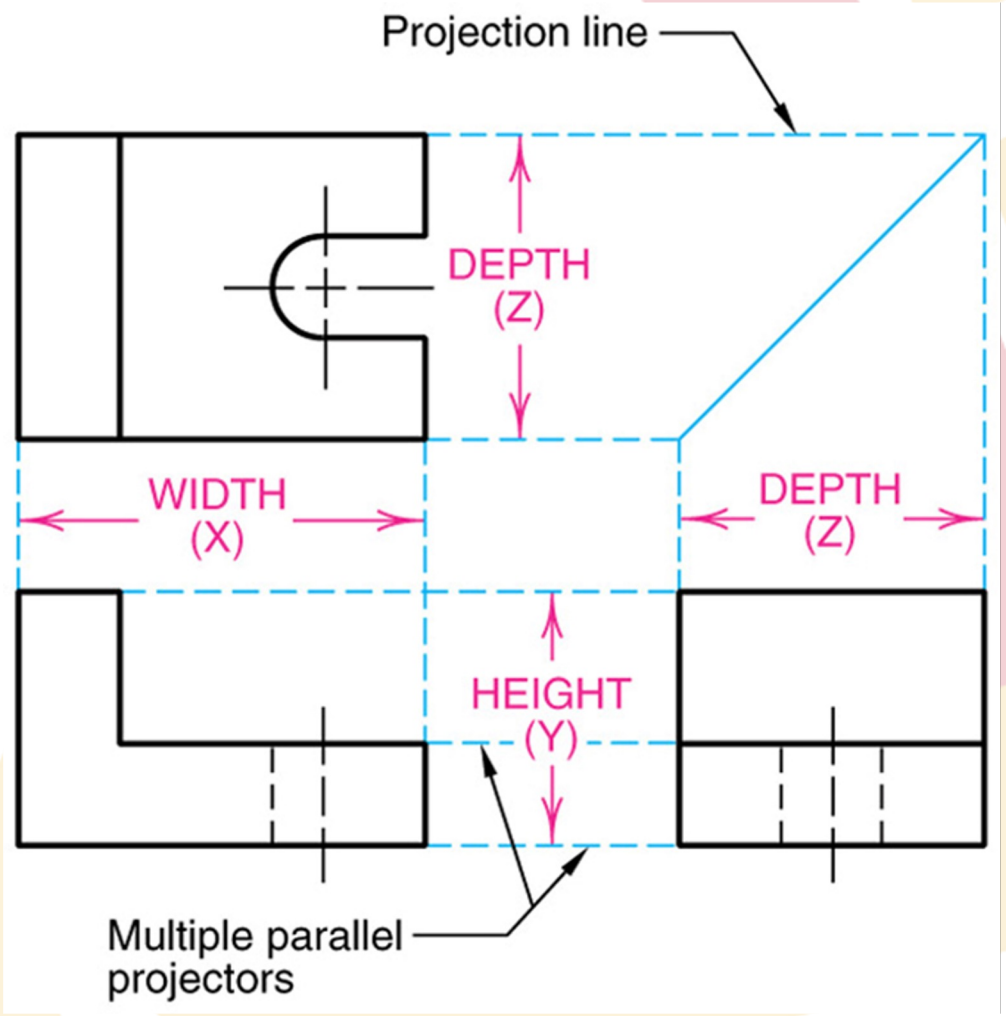
Break Time…get up and move!

Multiview Drawings

- 2-Dimensional
- Generally, three parallel projections (principle) are used.



Adjacent Views

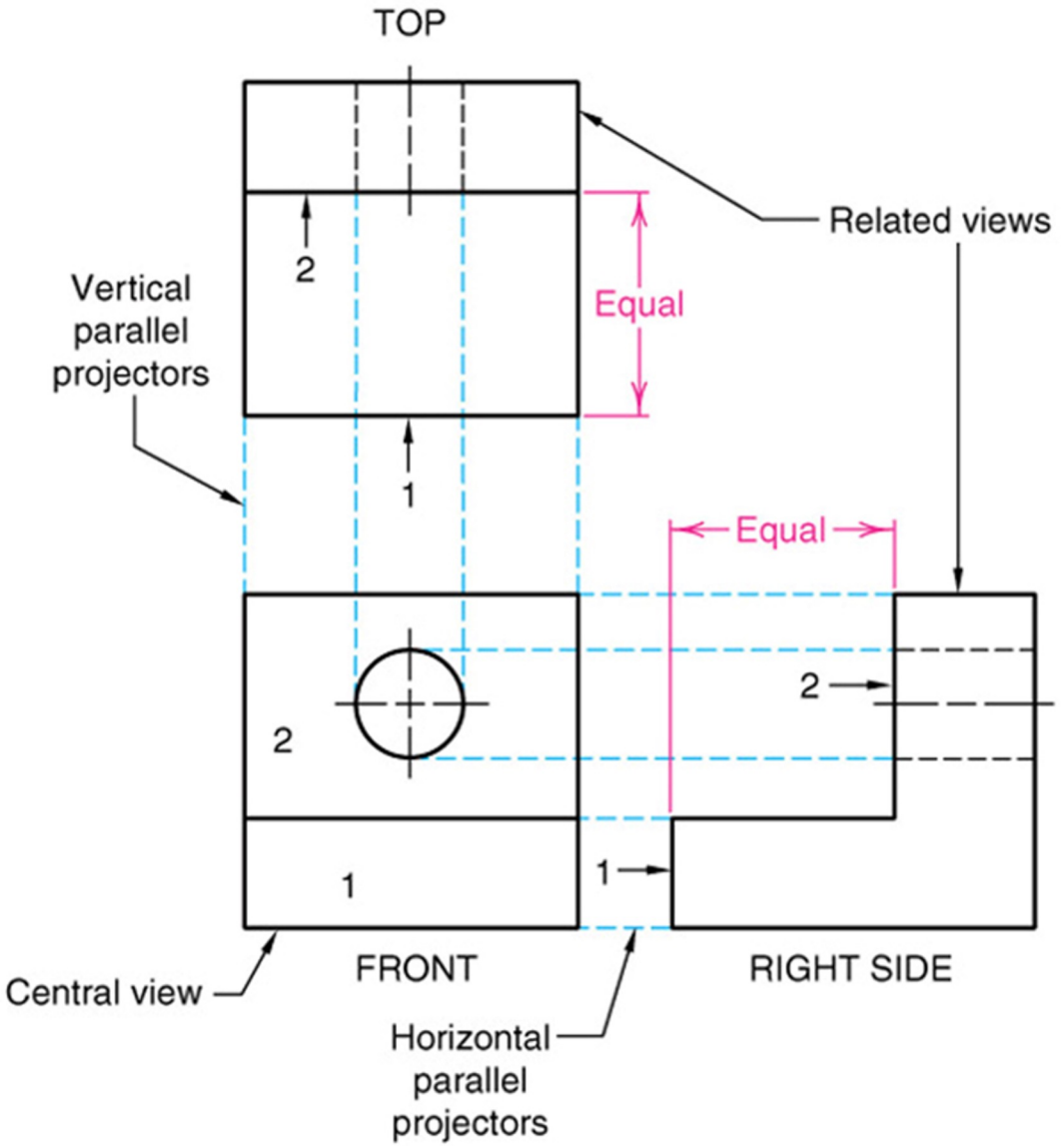


Note: all necessary information to model a part is given in its technical drawing.

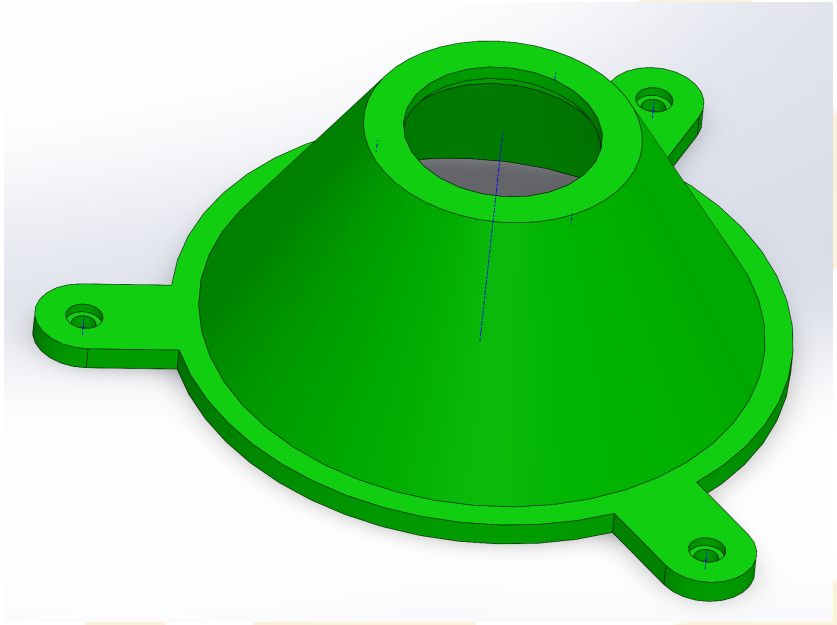
*Do the math to find the dimension of a feature that is not directly given to you.

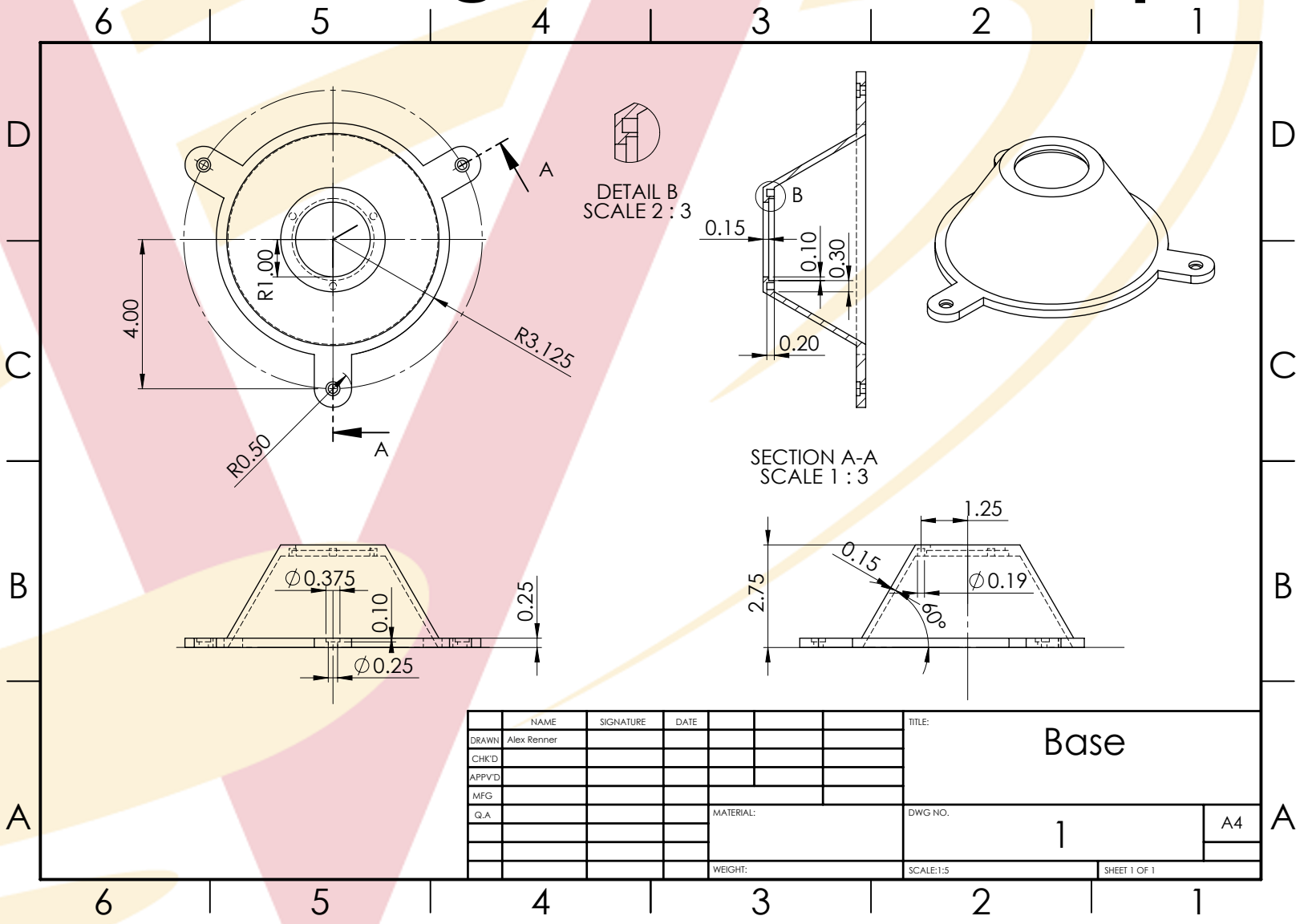
Take a closer look…

- Orthographic Projection Rule 1: Every point or feature in one view must be aligned on a parallel projector in any adjacent view.
  - Note the projection lines located on the right and top views that represent the hole on the front view.



What are the fundamental 3D geometries of this part?





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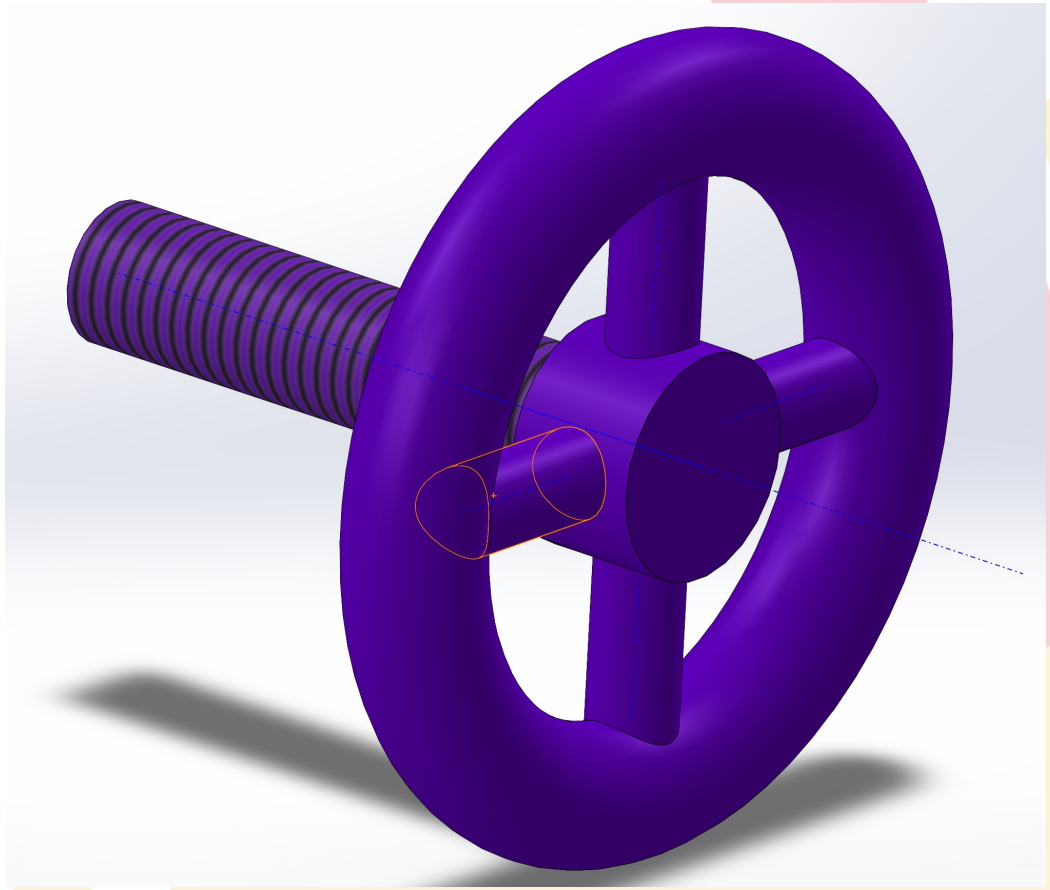

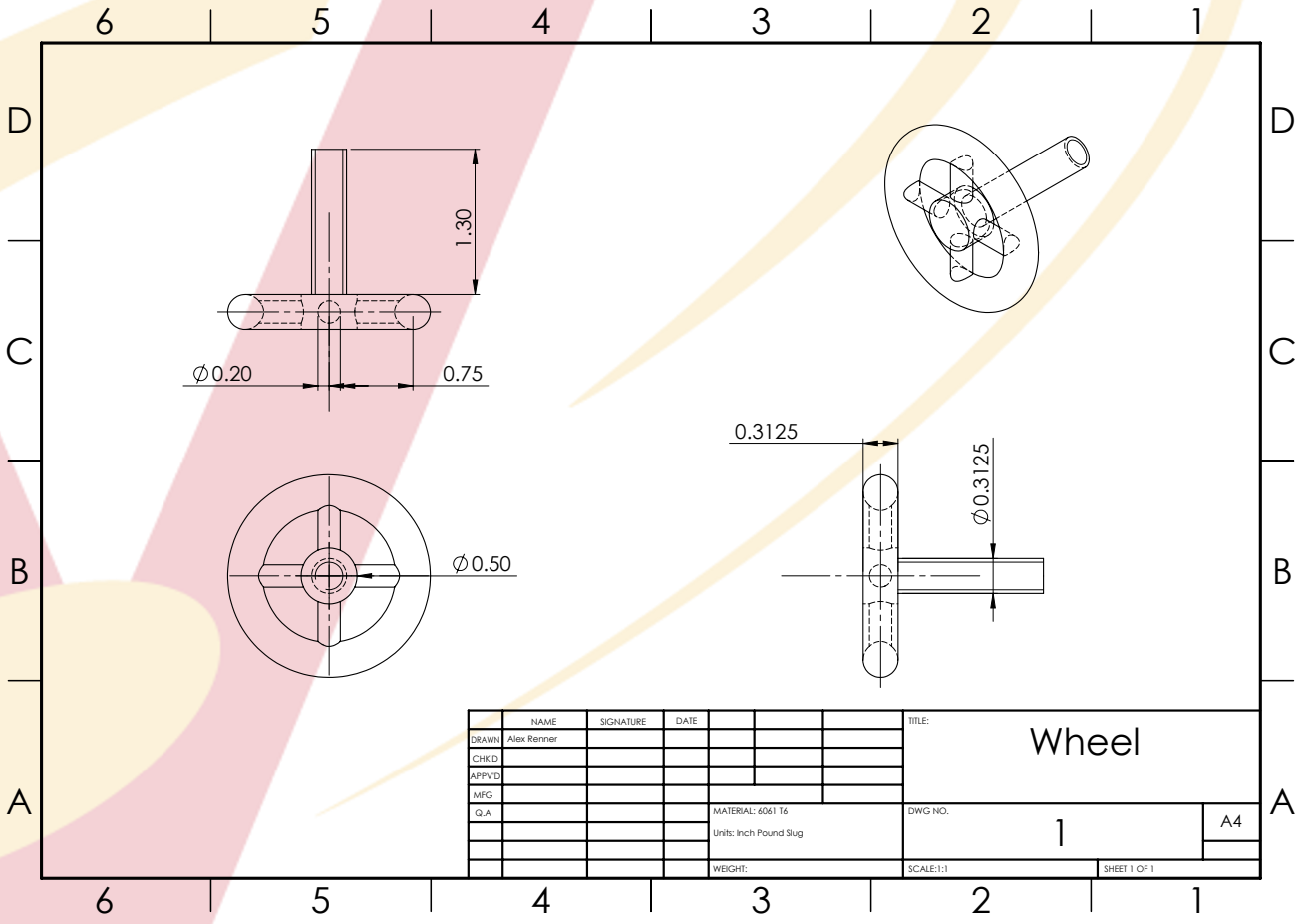

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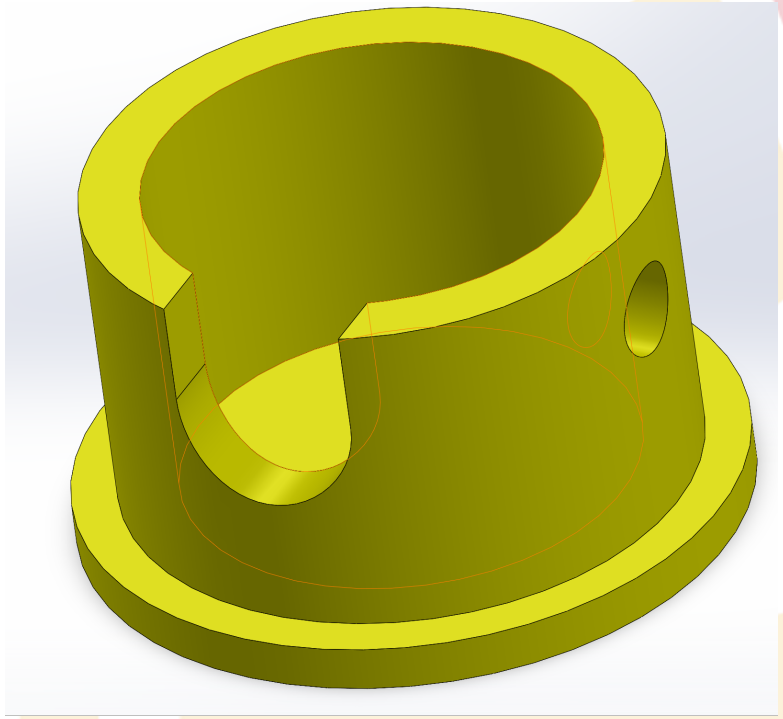

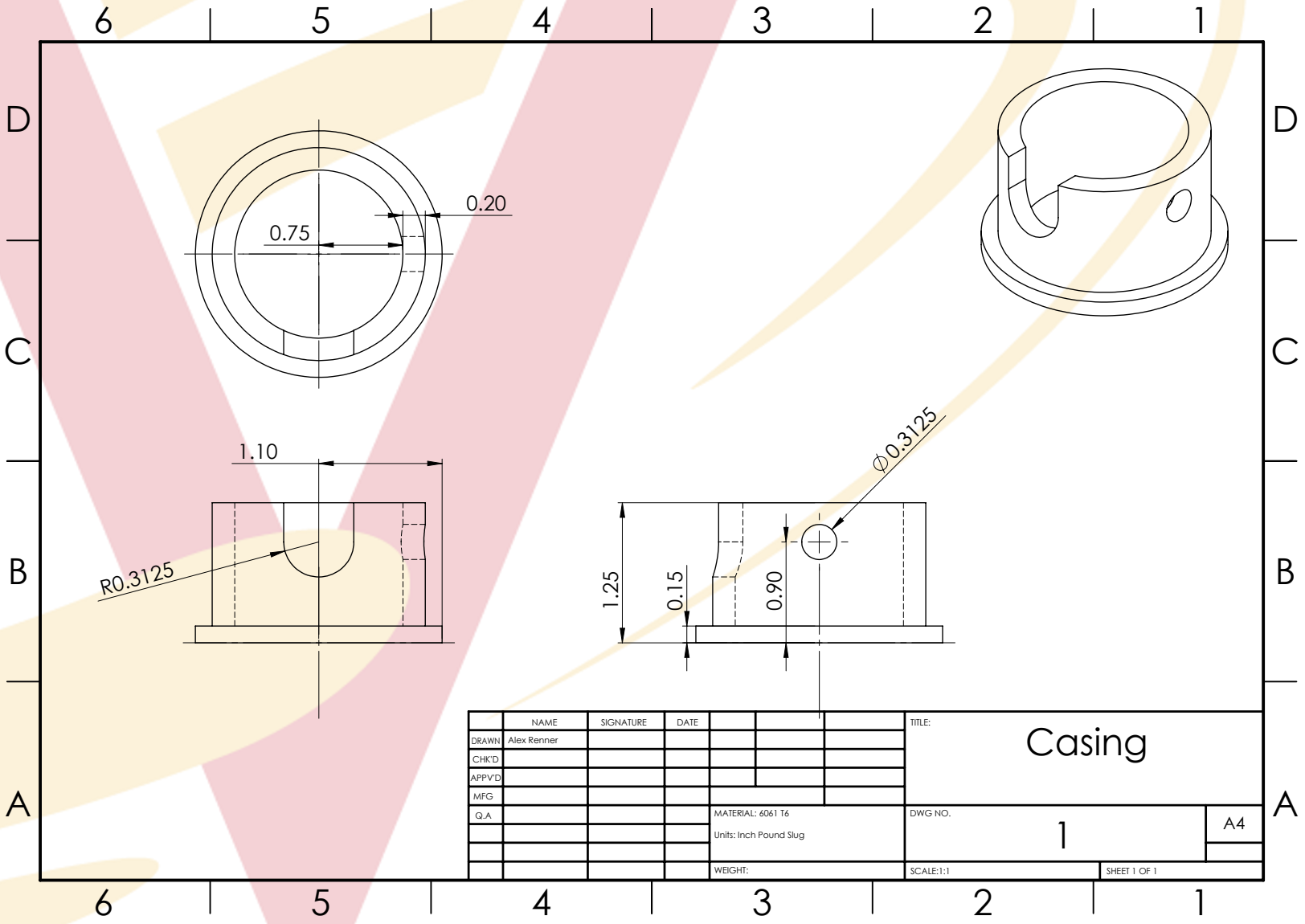

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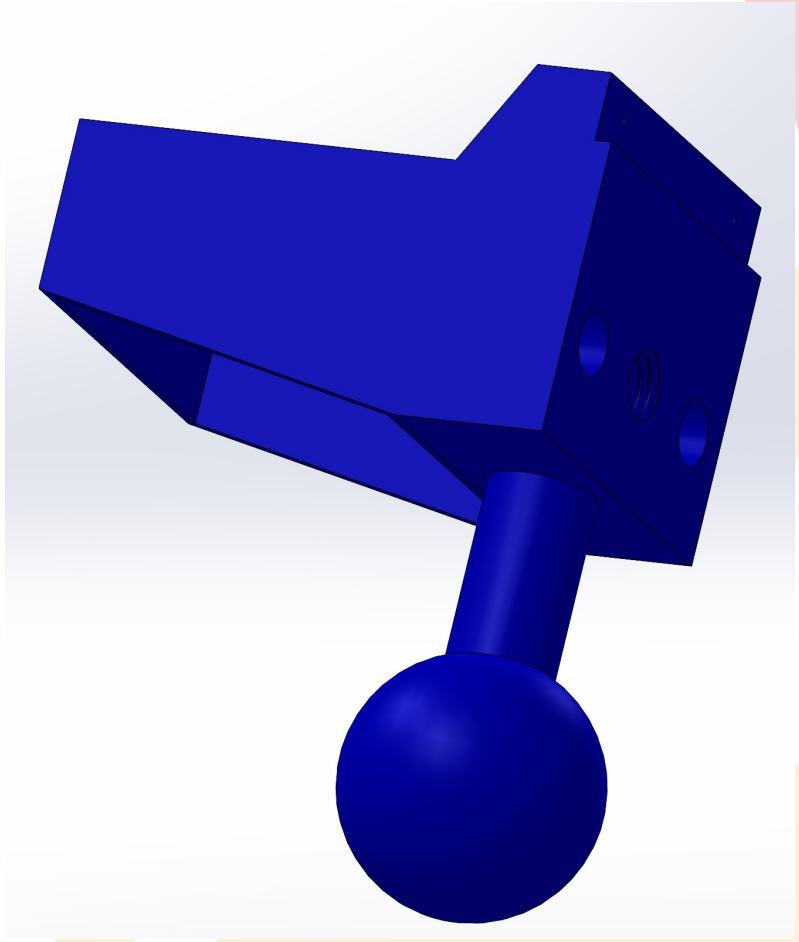

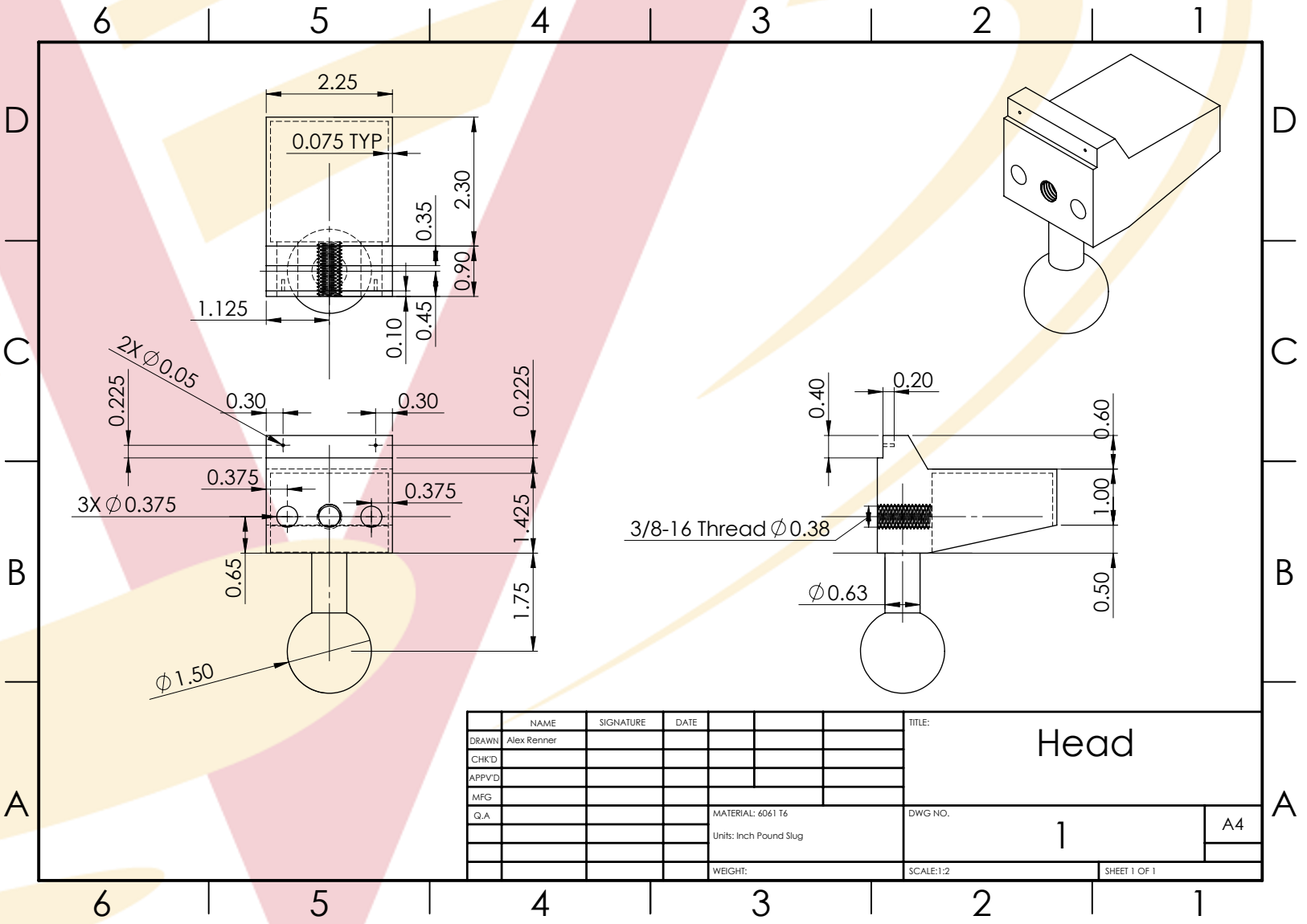

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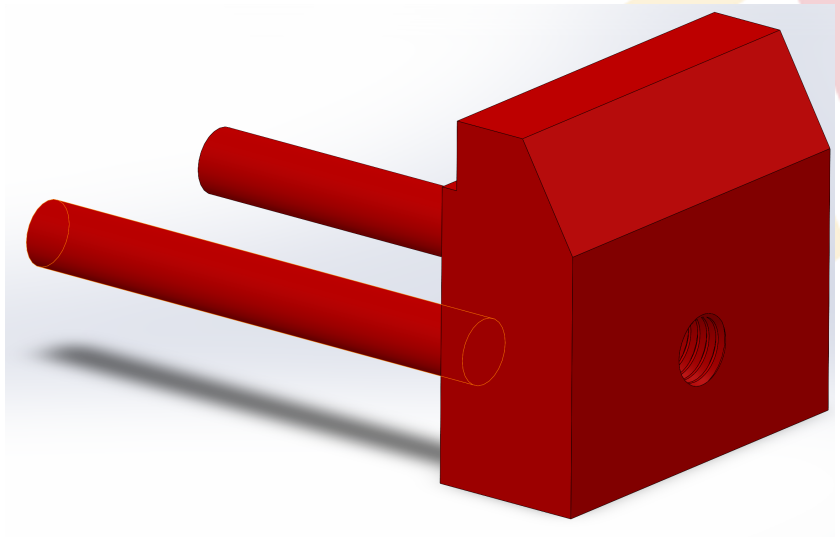

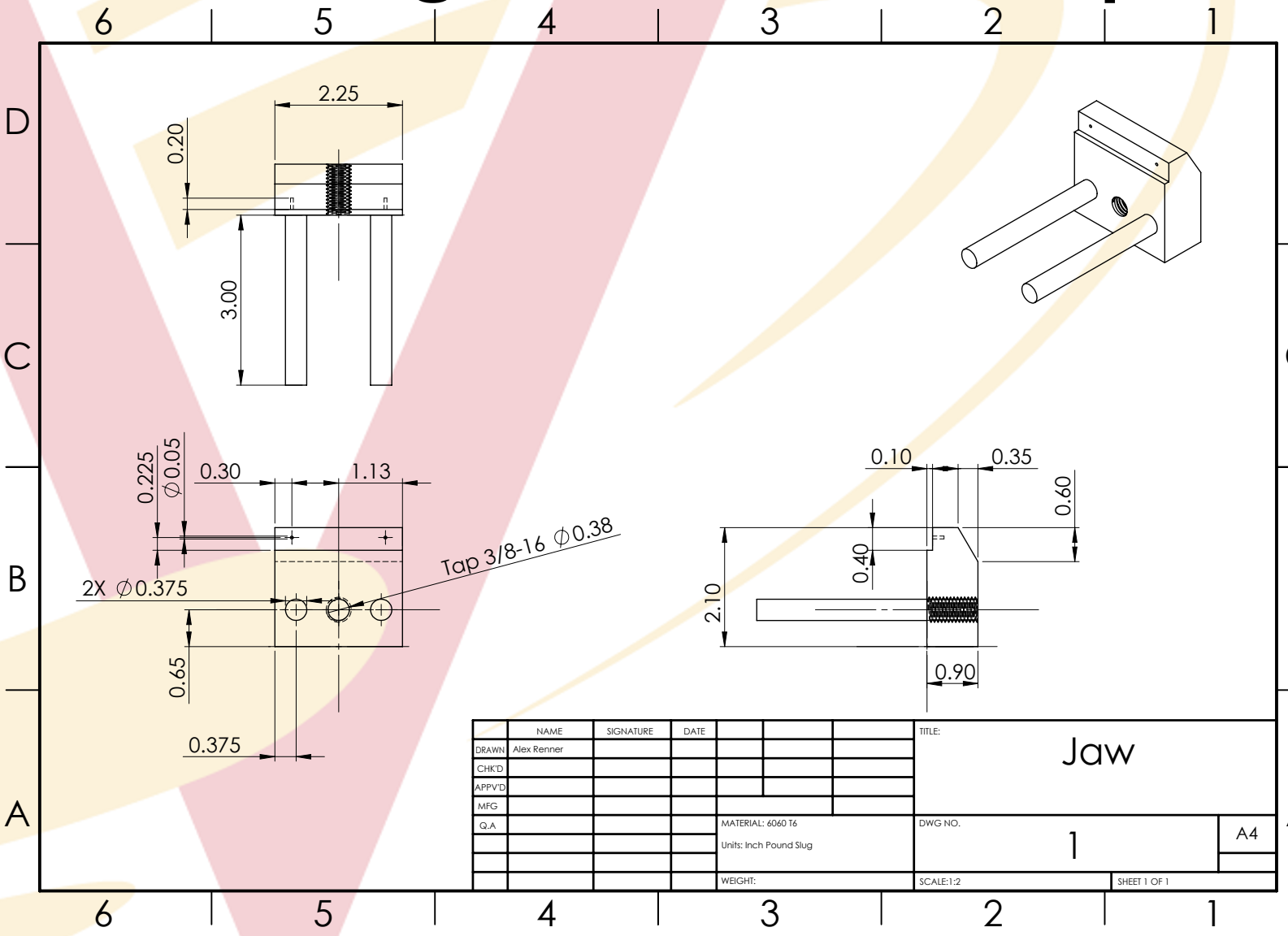

Activity

- Only provided PDFs of the drawing files
- Use what you've learned about decomposing parts into primitive shapes and technical drawings
- Model the (1) **Base**, (2) **Casing**, (3) **Head**, (4) **Grip**, (5) **Jaw**, (6) **Shaft**, (7) **Plate**, (8) **Pin** (all measurements are in inches)
- Note: Think about the part's main features and how to best model them. In what order should you model these features?