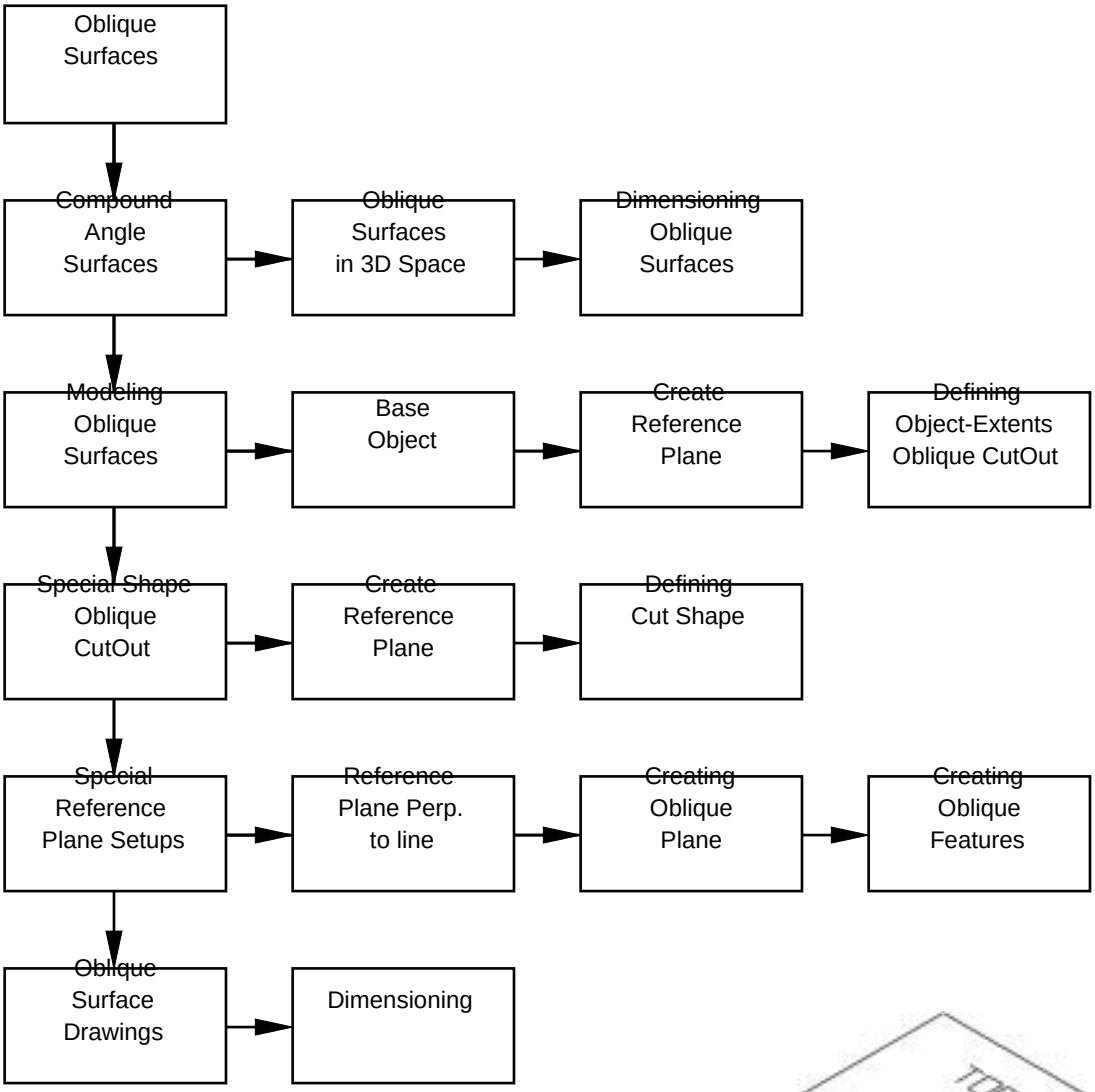
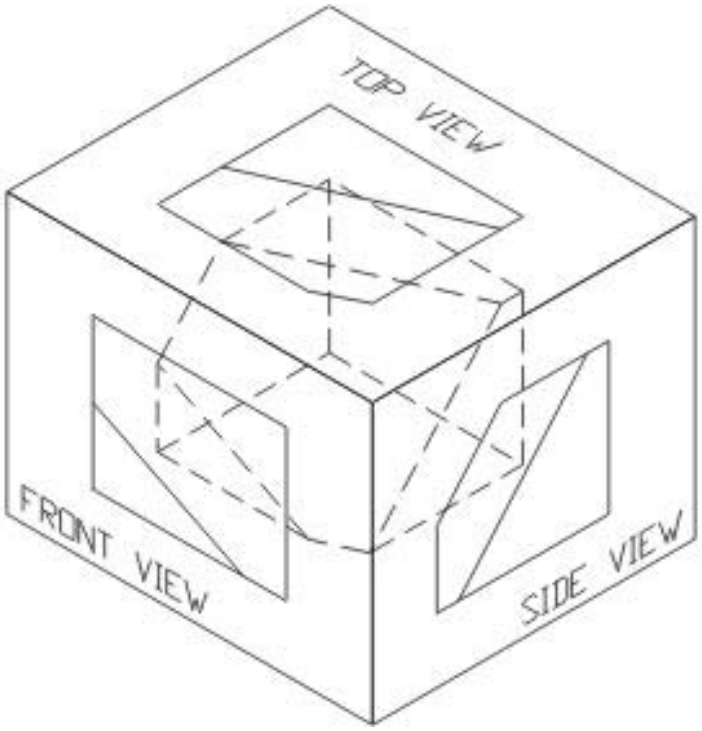
Oblique Surfaces



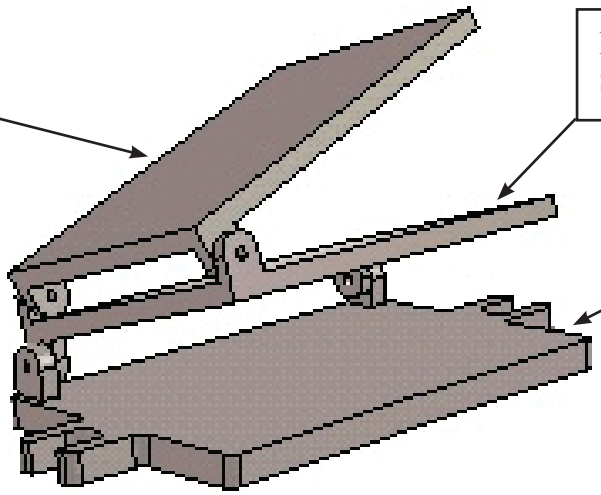
Surface “A” is cut at an angle to all three reference planes. It will appear foreshortened in all the regular views.

Oblique surfaces are also known a compound angle surfaces.



Oblique Surface
Double slant in space

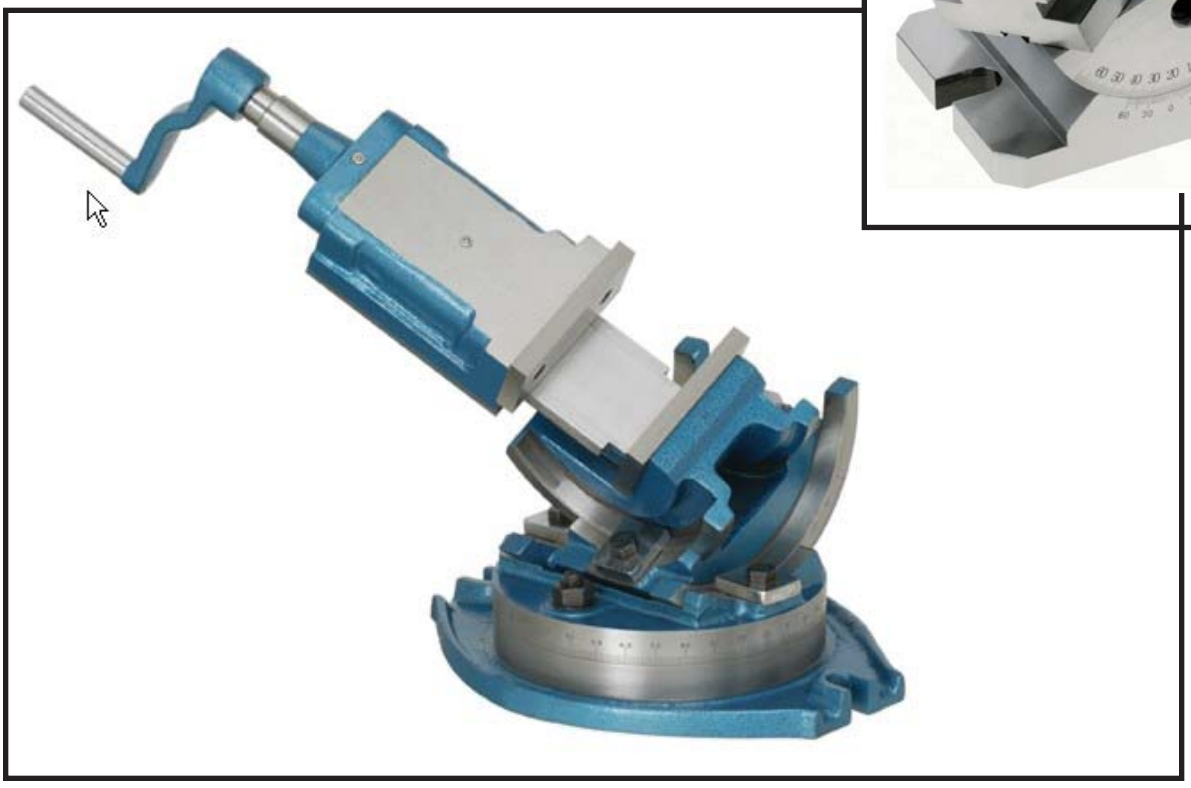
Inclined surface
Single slant in space



Normal Surface
Horizontal or
vertical in space

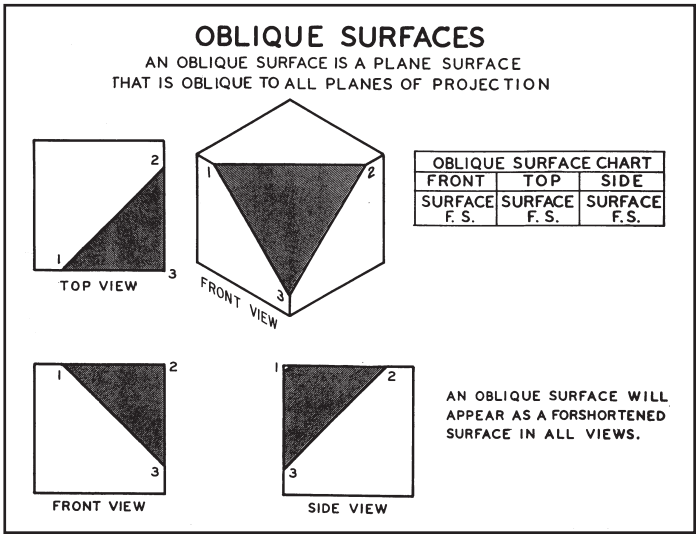
A compound angle plate is shown. Many machine tool tables and vises have similar adjustments.

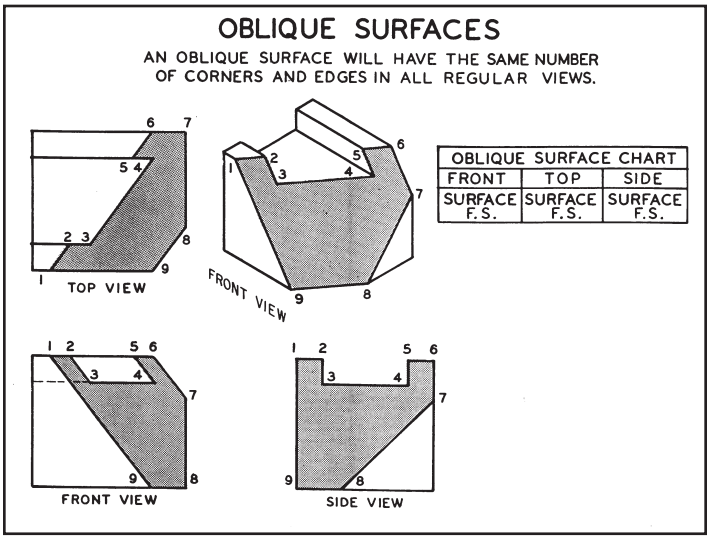
Machine Vises
for Compound-Angle
drilling and milling.



The simplest oblique surface results from cutting off the end of a cube as shown. Three points define the surface. These points may be located by linear dimensions, by angles or by a combination of linear distances and angle.

Oblique surfaces may have many corners and edges. Modeling the surface in this example requires only three points to define the cut. A cut across the entire object only requires that the cutting plane be defined. All other intersections are determined by Inventor.

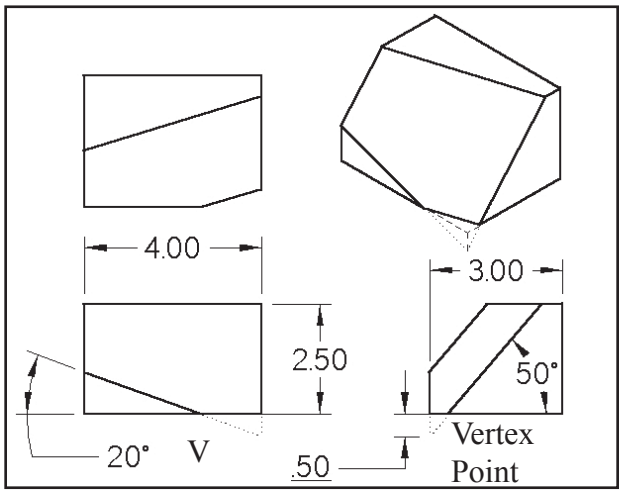




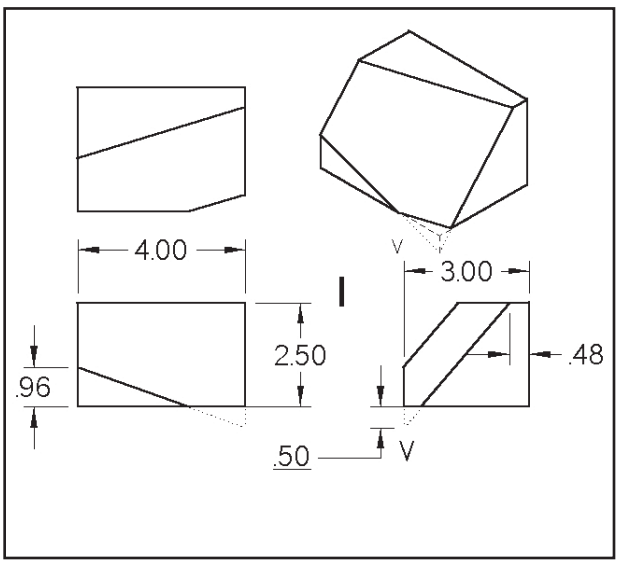
Dimensioning Oblique Surfaces

In this example the oblique surface is dimensioned by locating the vertex point “V” and two angles.

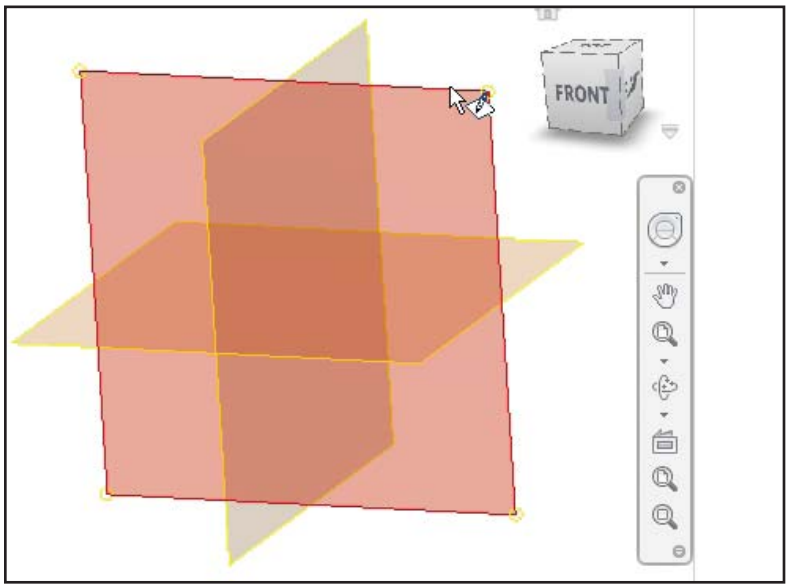
The 20 degree line in the front face and the 50 degree line in the side face (along with “V”) will define the oblique cut.



Linear dimensions were used to specify points on the Oblique surface. In this example the .48, .96 and .50 dimensions (to point “V” specify three points on the cutting plane.



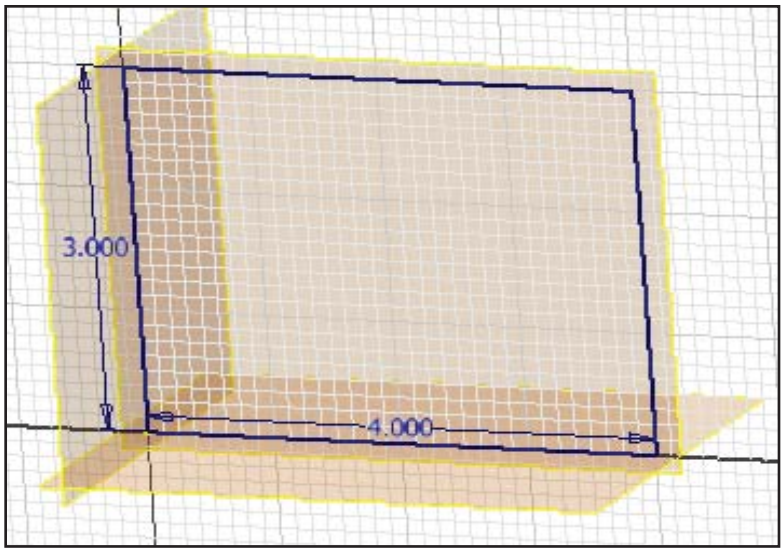
Tutorial - Oblique Surfaces - 1



Create the Base Object.
Model a rectangular solid 4.00 width X 2.50 height X 3.00 depth. Start a protrusion from the front reference plane. Draw a rectangle and dimension 3.00 height x 4.00 width. Extrude depth = 2.50__ Start a sketch on the Front plane.

__ Draw the part in the 2nd quadrant. Lower corner starts at origin point.

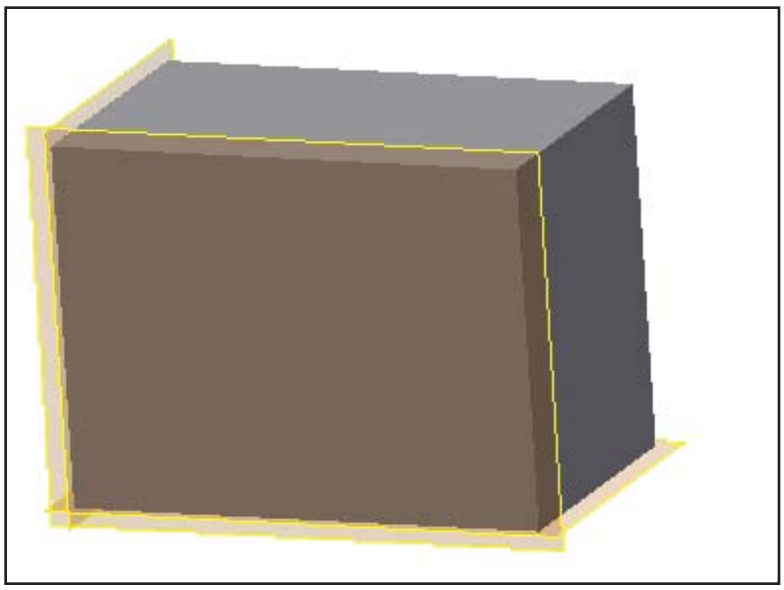
__ Draw the 3.00 x 4.00 rectangle as shown.



__ Extrude the part 2.50 deep.

__ Turn off the reference planes.

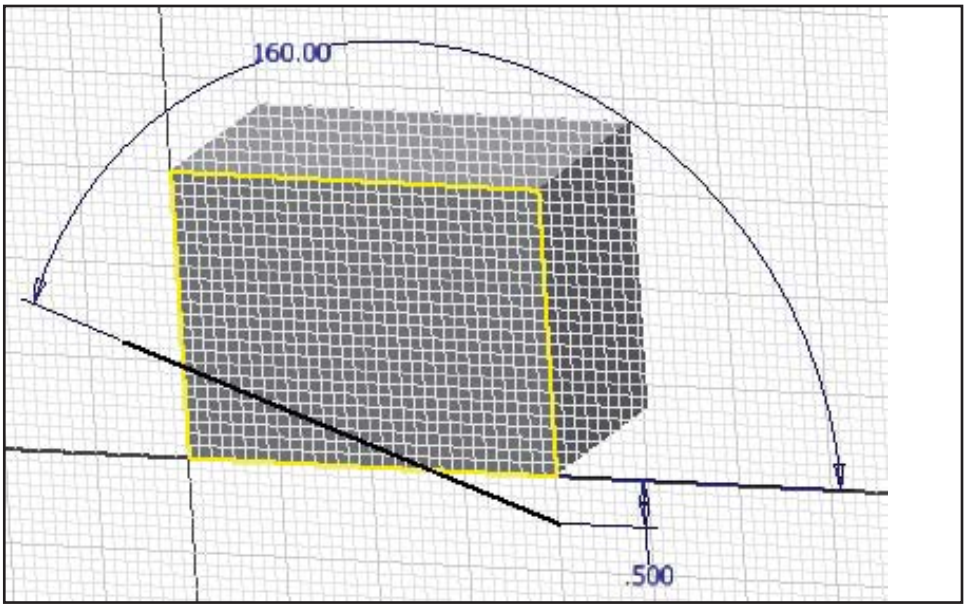
__ Save the part - “Obl-Tutor-1”



__ Start a sketch on the front surface of the part.

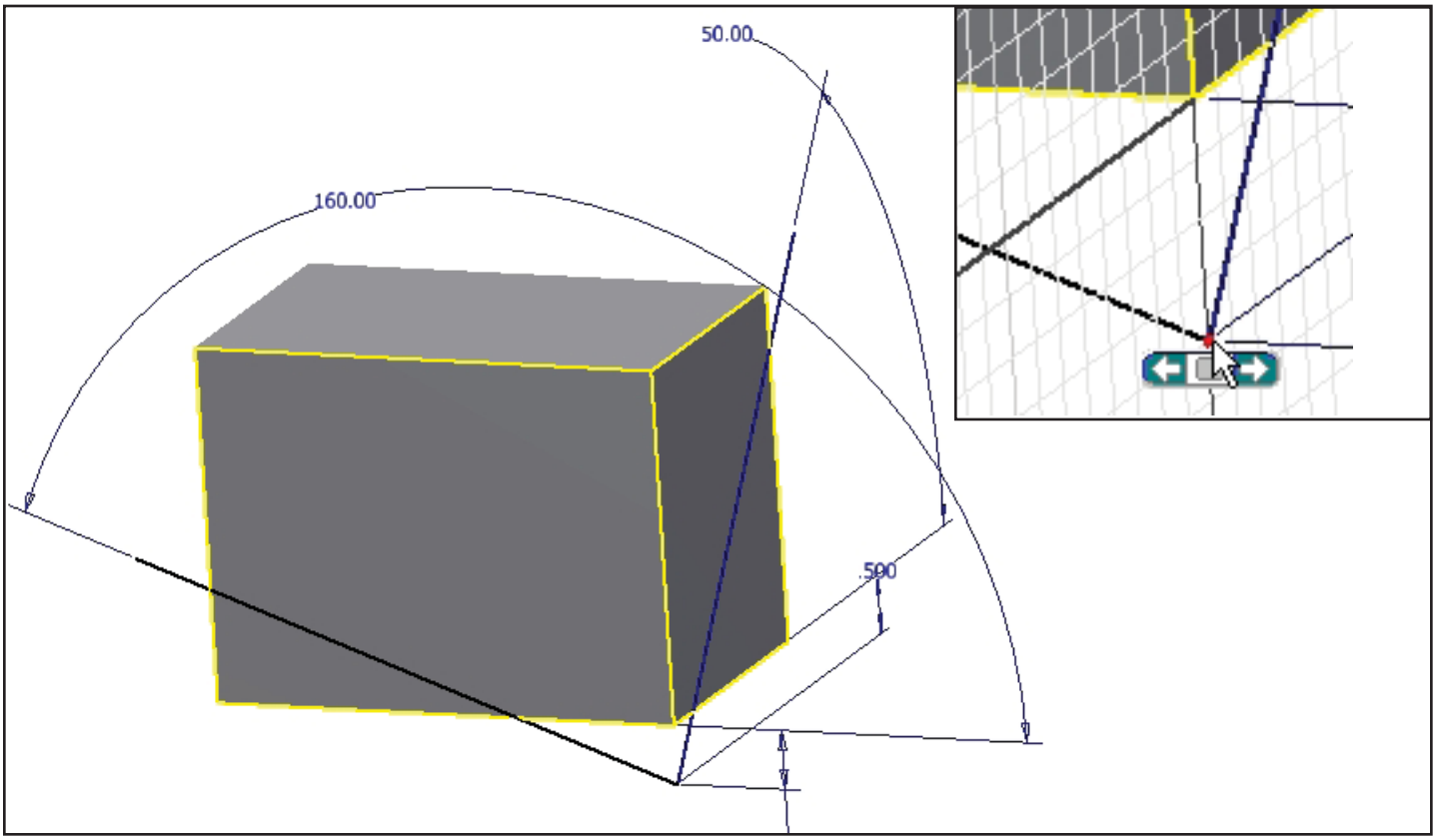
__Draw a line - any length - as shown.

__ Dimension and constrain. Lower point on line must be dimensioned as shown and constrained vertically with the lower corner of the part.



__ Start a sketch on the side face and draw a line as shown.
Dimension the end point .50 below the corner of the part.
Constrain the lower point on the line vertically to the lower corner of the part.

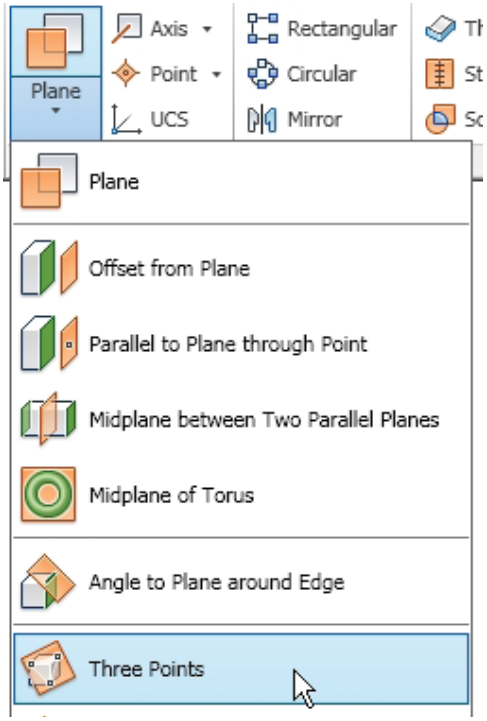
Note: Two intersecting lines determines a plane. We will use these lines to place a oblique work plane.

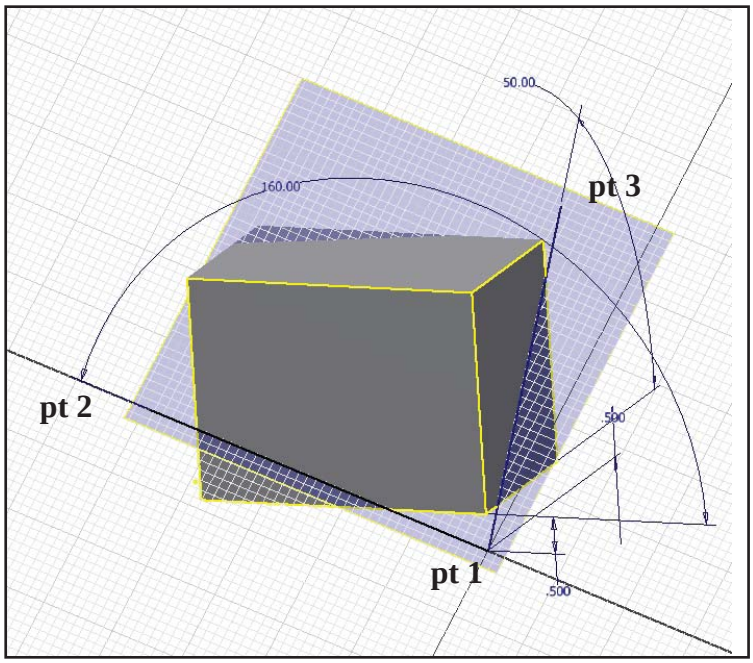


__ Select **Plane ... Three Points** option.

Click ...
pt 1
pt 2
pt 3

This will set a oblique work plane.



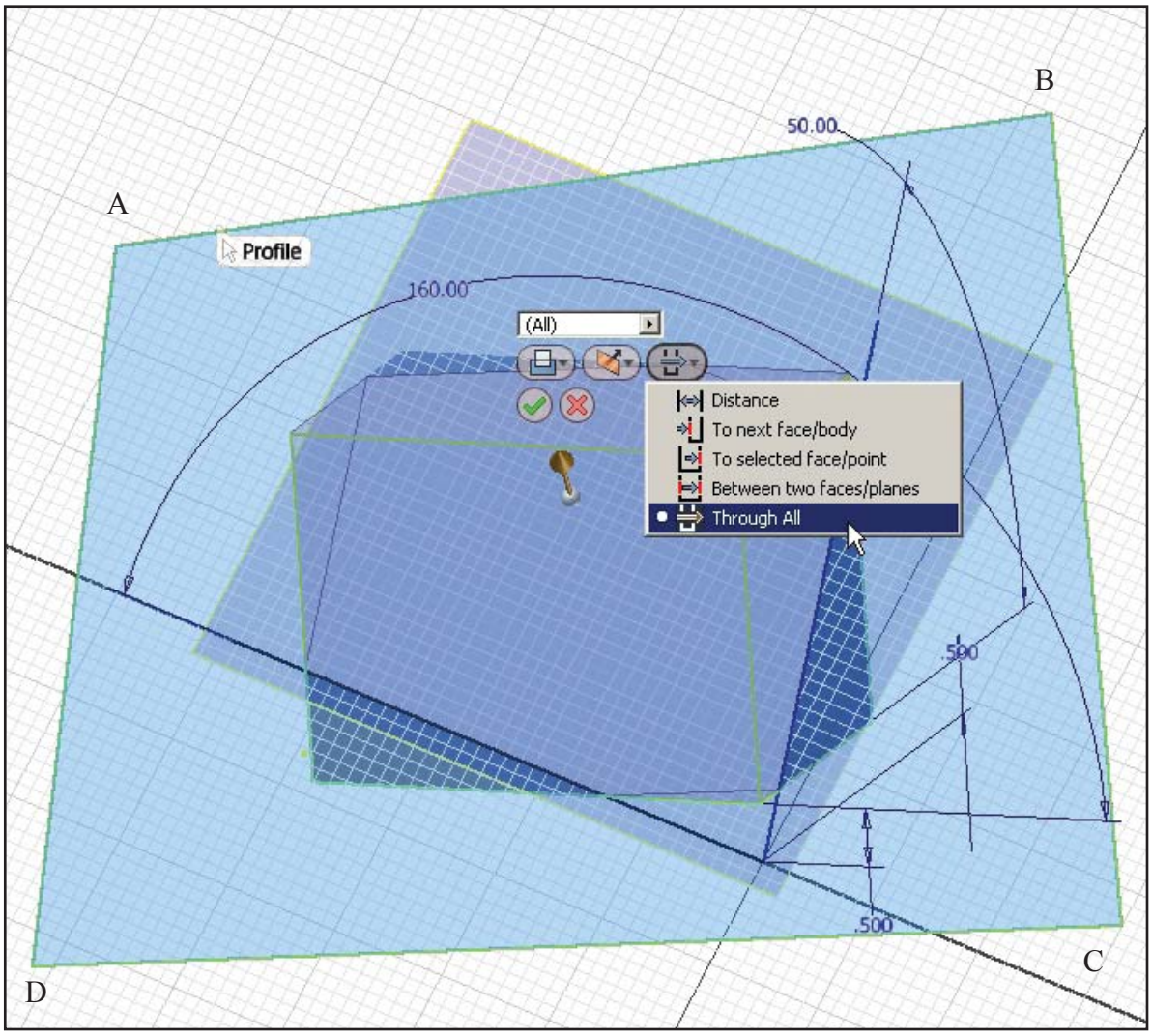


__ Start a sketch on the work plane.

__ Draw a polygon (any size) as shown on the work plane. A-B-C-D

__ Finish the sketch and start **Extrude.**

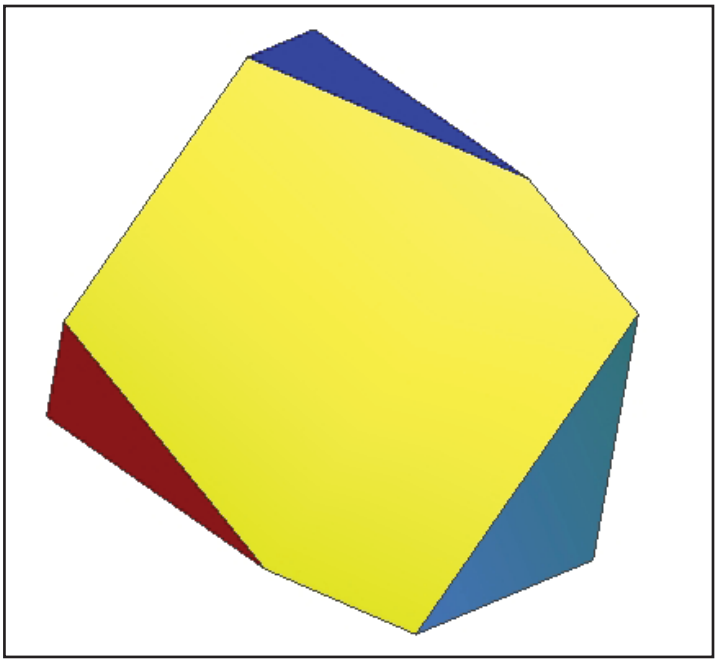
__ **Remove material through all** to cut the face upward as shown.

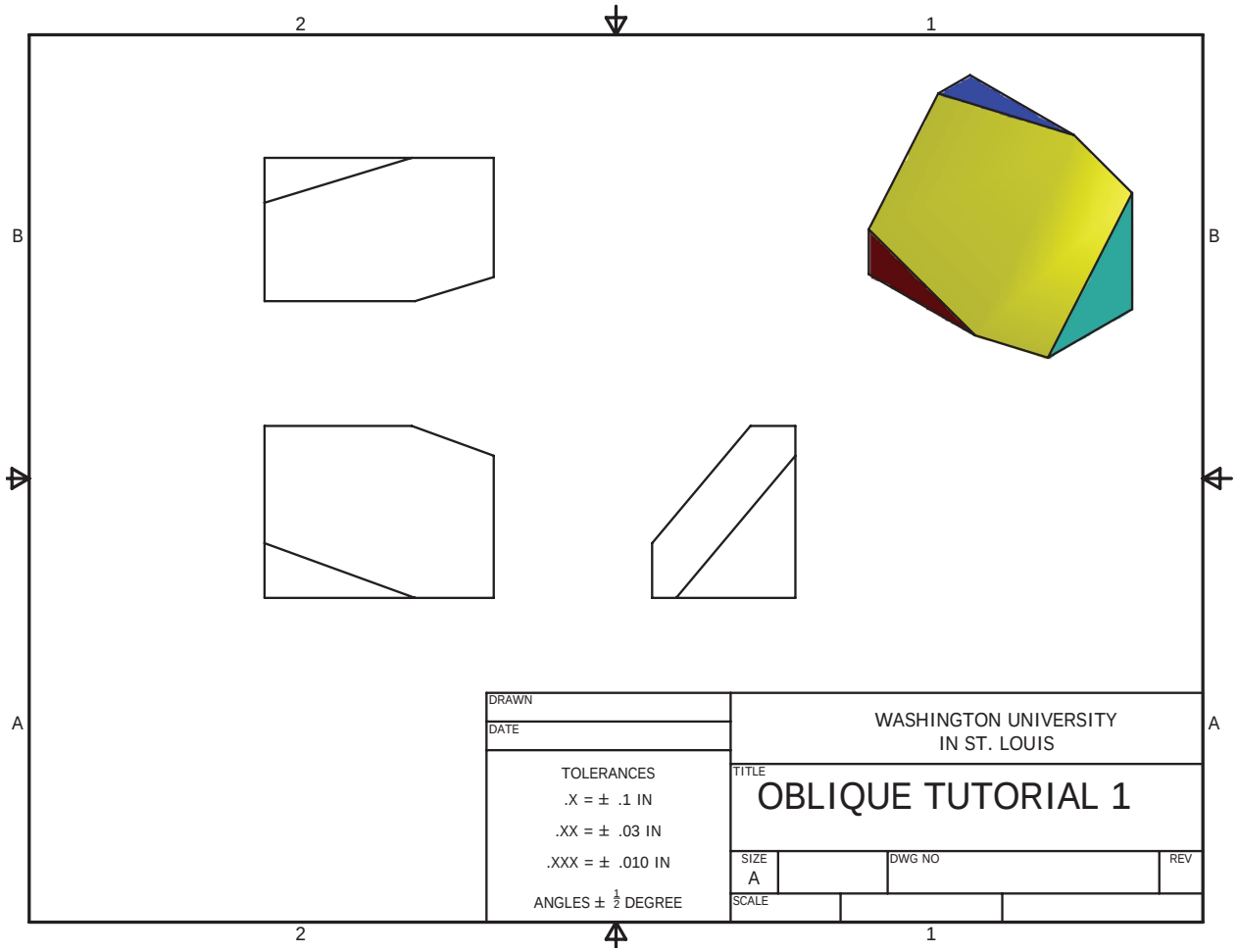


__ Save the part.

__ Make a drawing. No dimensions.

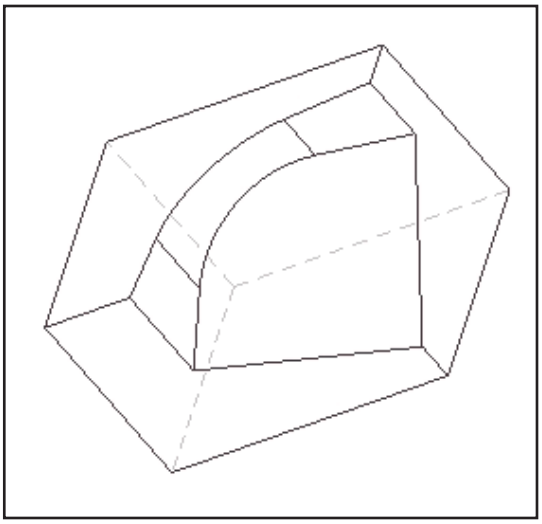
END OF TUTORIAL

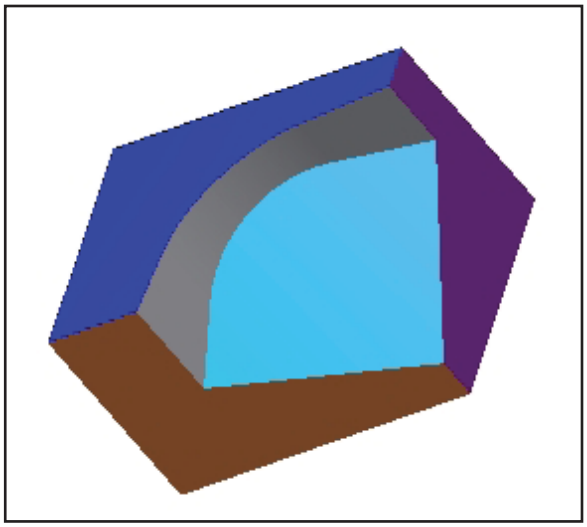




Tutorial #2

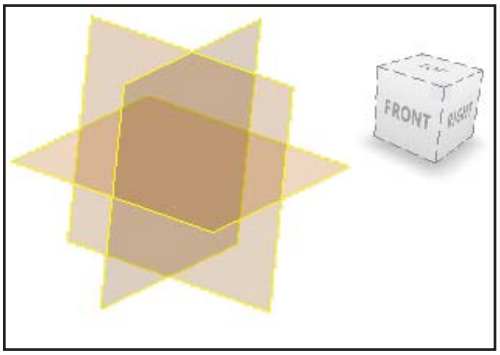
Model the **Radius Test Block**



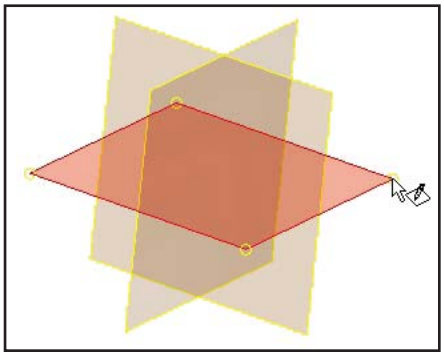


__ Start a new English part.

Orient the view cube Front-Top-Right as shown.



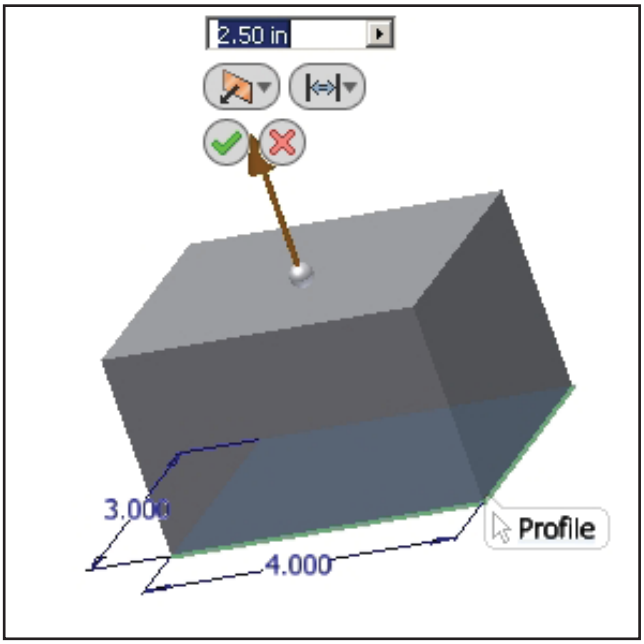
__ Start a sketch on the top plane.

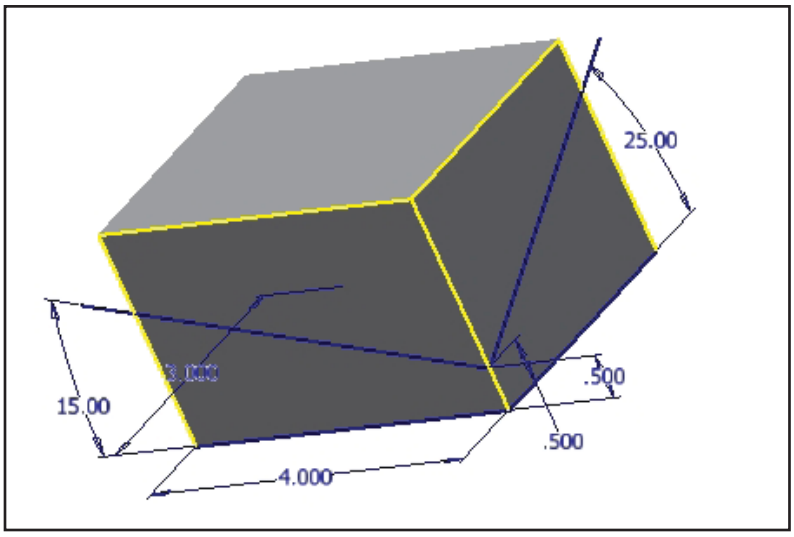


__ Create a extrusion 4.00 wide, 3.00 deep and 2.50 height.

__ Create a sketch on the front face.
Draw the 15 degree line (any length) as shown.

__ Create a sketch on the side face.
Draw the 25 degree line (any length) as shown.



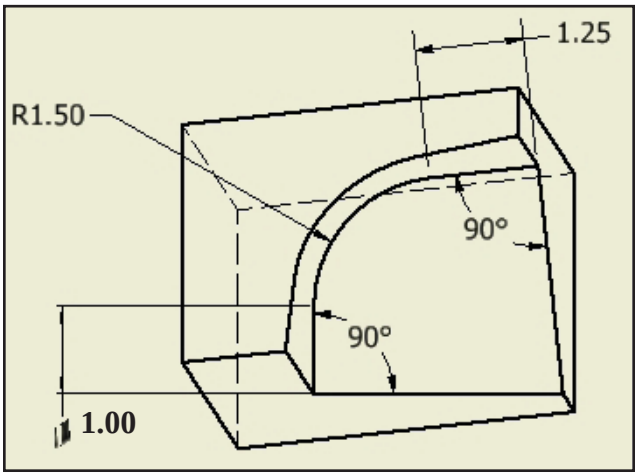


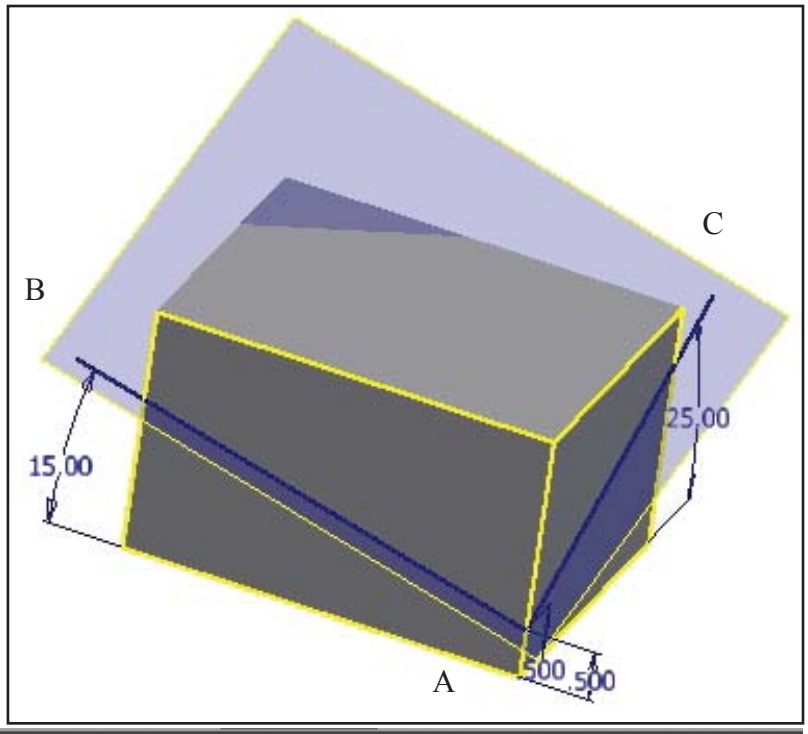
__ Construct a 3 Point Plane using points A, B and C.

__ Start a sketch on the work plane.

Draw the geometry shown.

How would you know (find) the center for the 1.50 radius?





__ After starting a sketch on the work plane, select **View**.

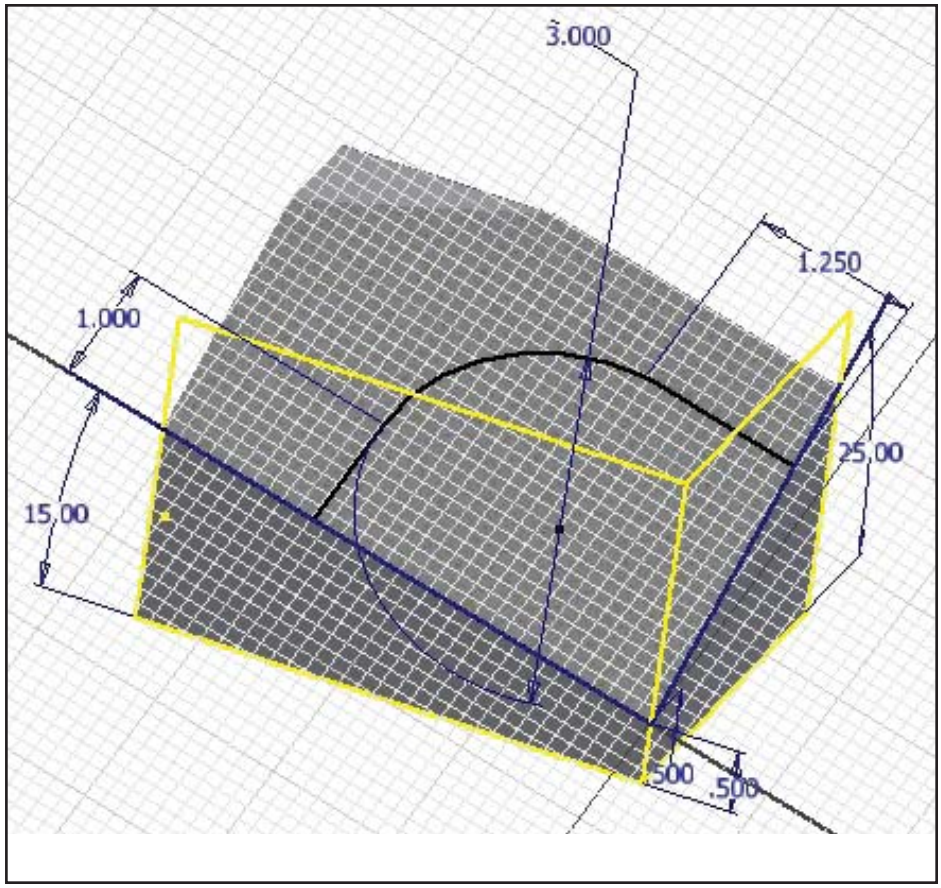
Click **Slice Graphics.**

__ Select **Sketch**.

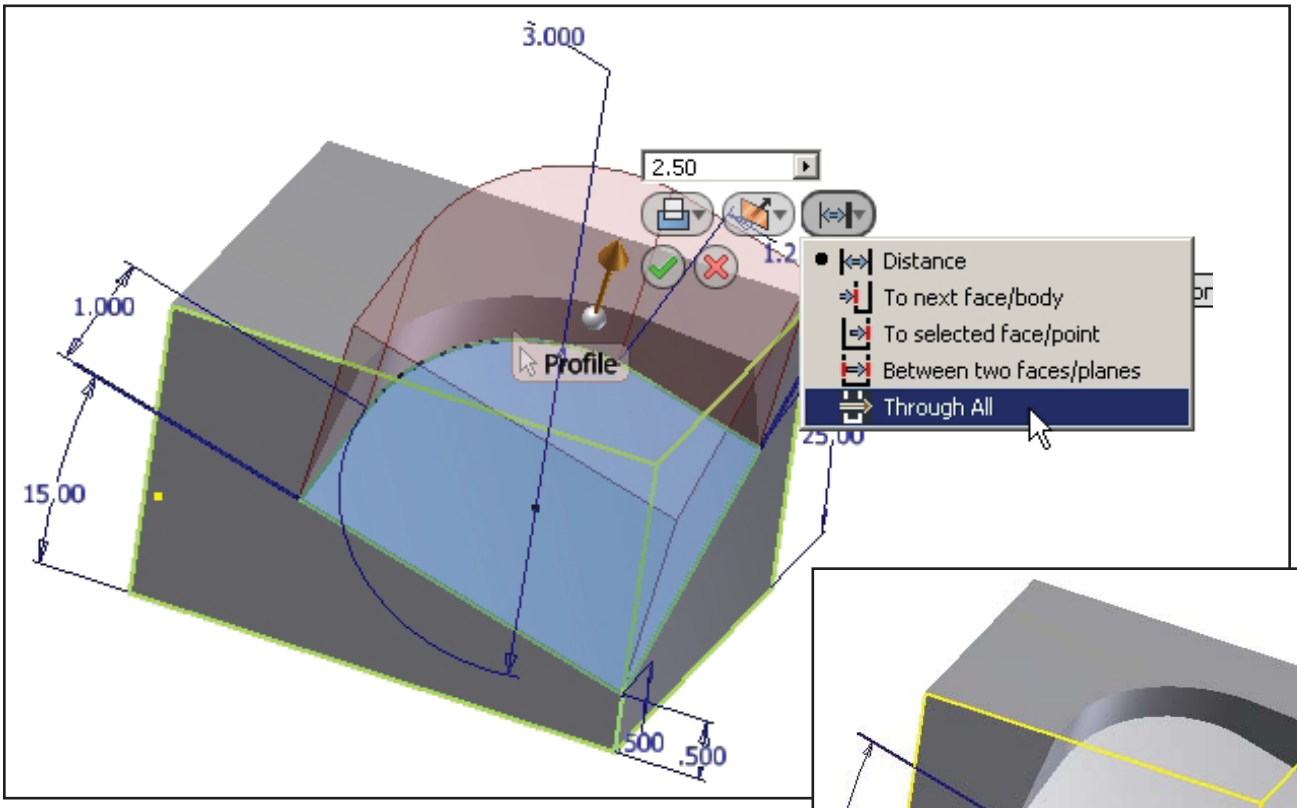
Draw the ***closed loop geometry*** as shown above.

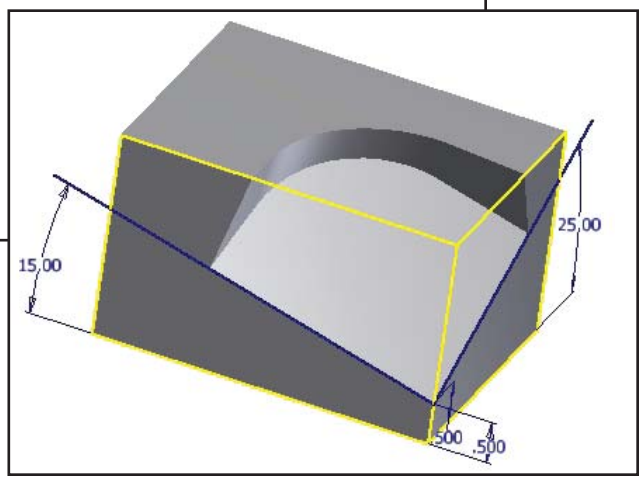
__ Finish the sketch.

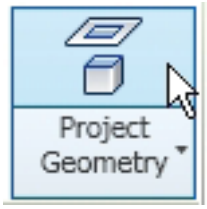
__ **Save** the model.



__ Extrude the region. Remove material. Through all. **Save** the model

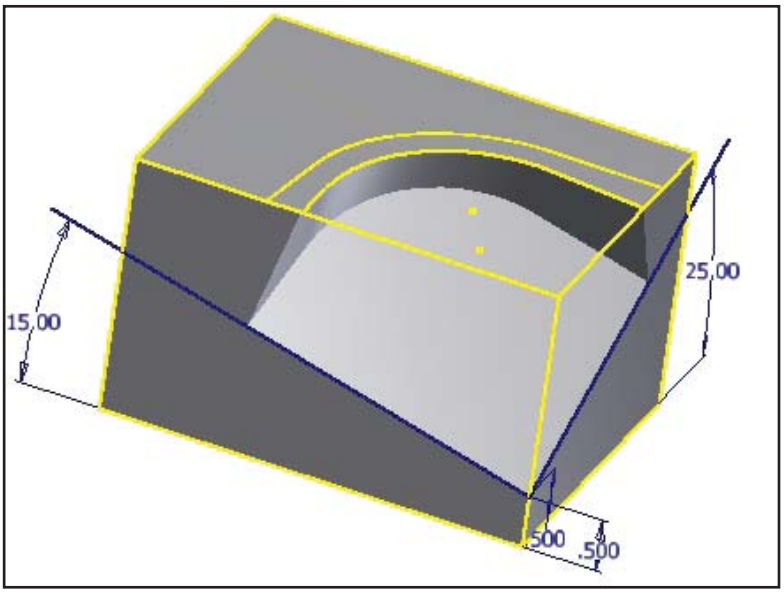


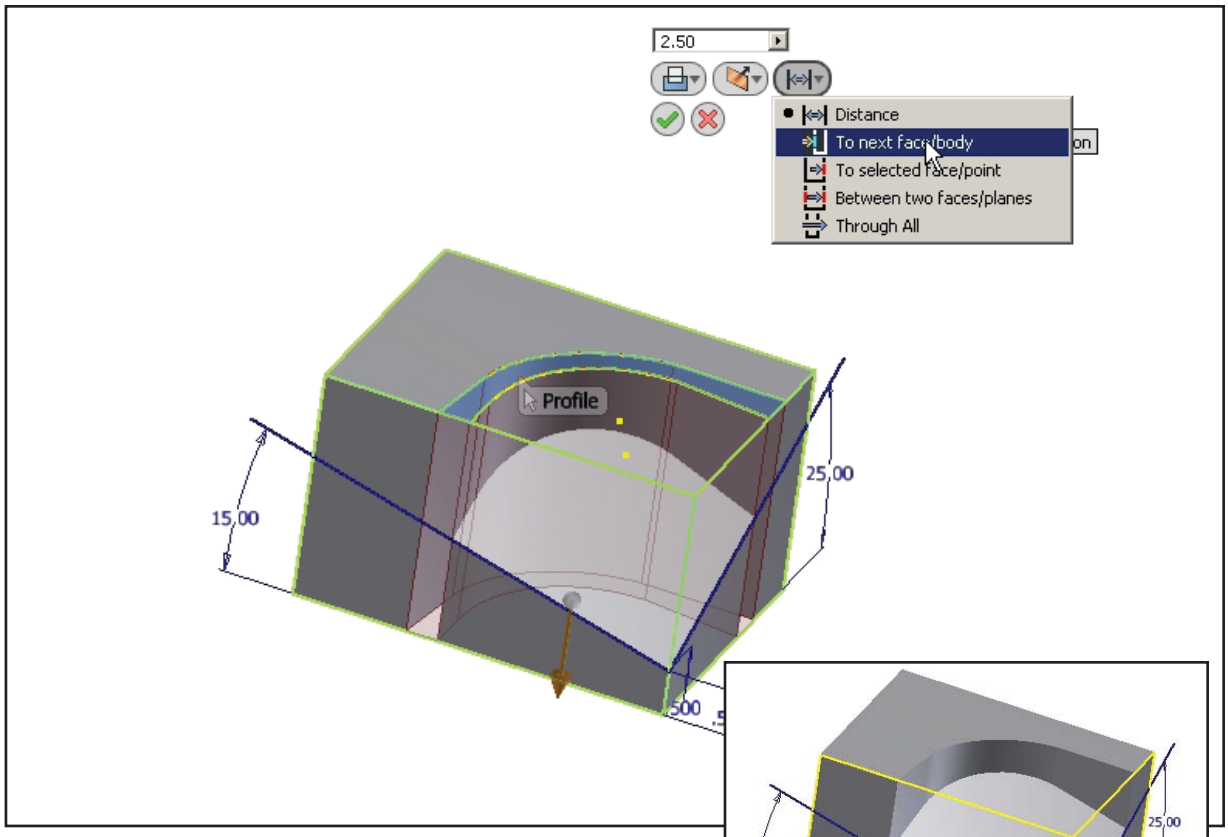


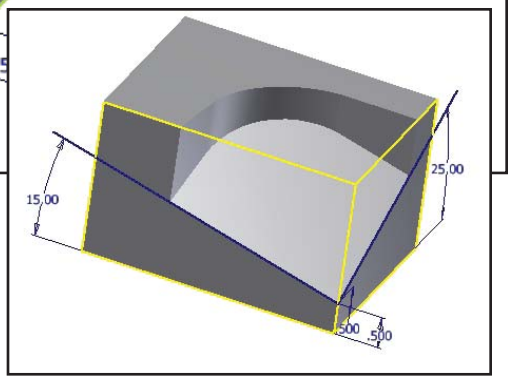


__ Start a sketch on the top surface.
Project the geometry upward to the top surface as shown.

(We need a straight cut upward to remove material.)

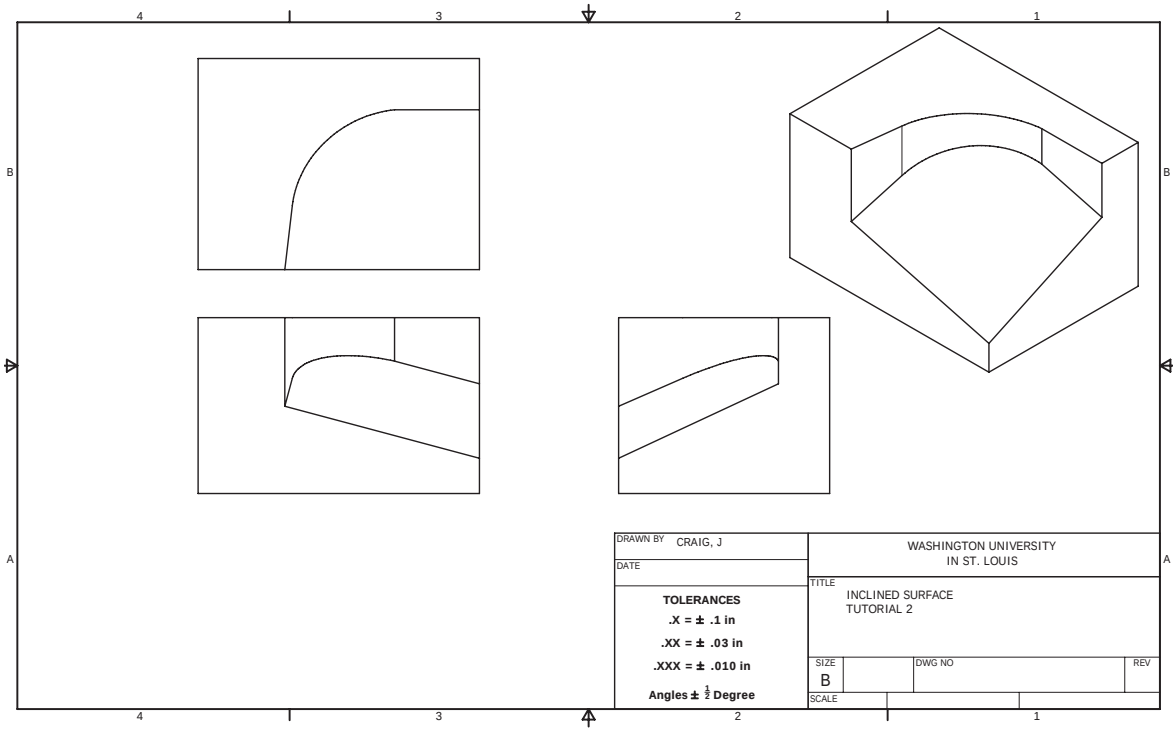




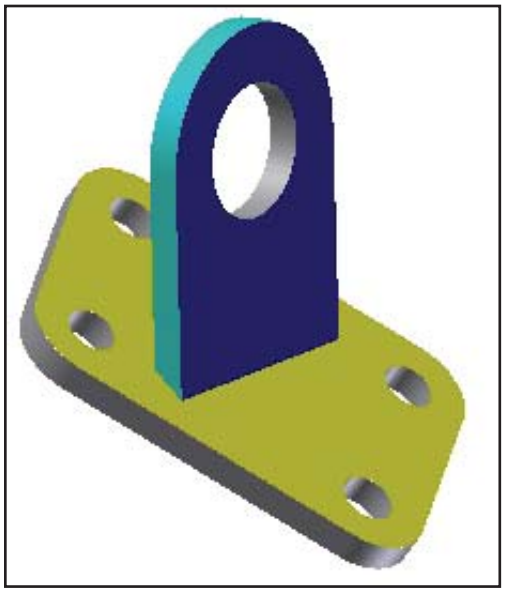


__ Start a protrusion to remove material. Select the region shown. Select **To Next Face**.

__ Save the part. Make a drawing. No dimensions. Save drawing.



Tutorial - Oblique Surfaces -3



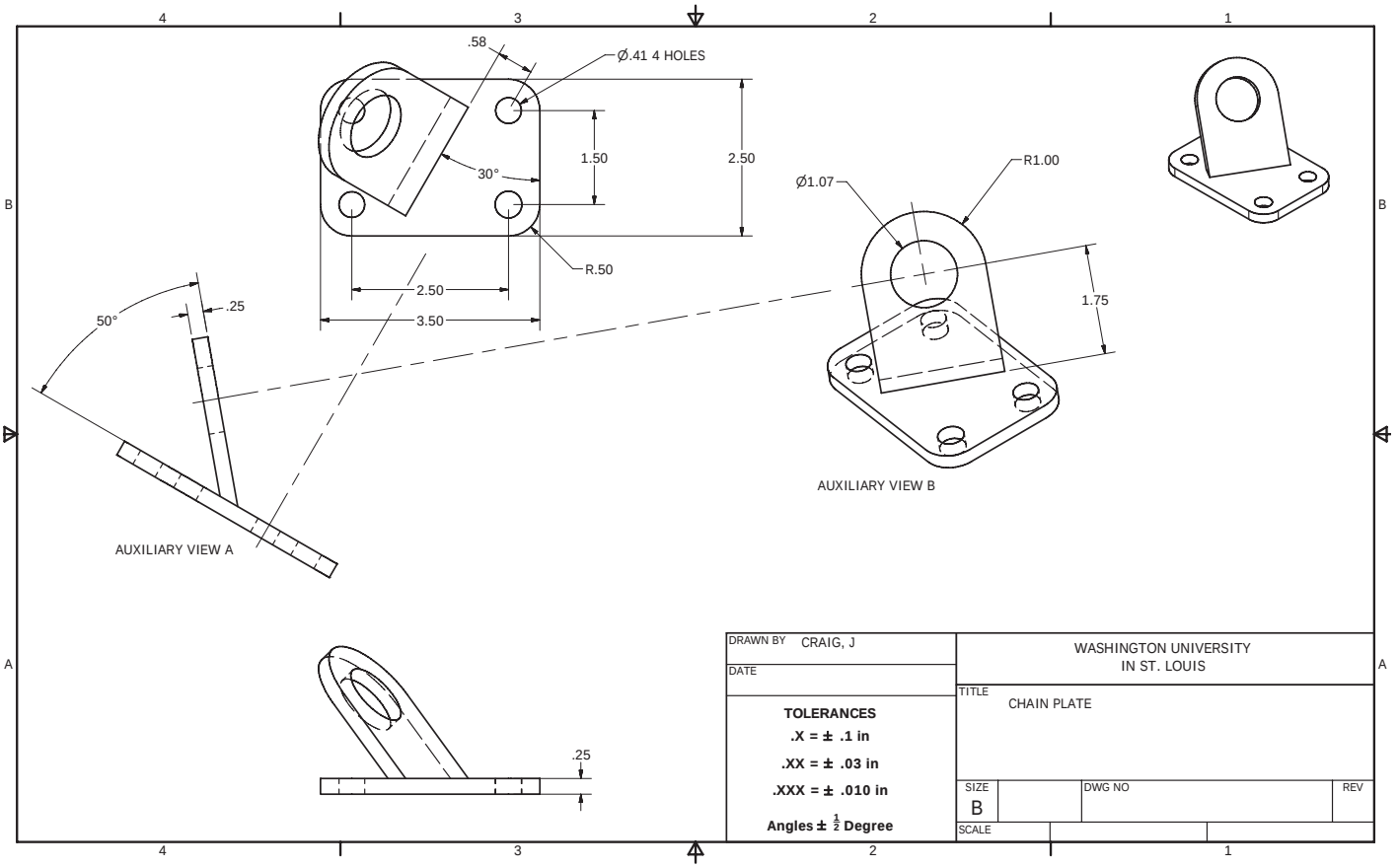
The oblique surface on the model is defined by two angles. Additional reference planes are needed to model the part.

The drawing shows two successive auxiliary views:

- Primary Auxiliary A-A
- Secondary Auxiliary B-B

The second auxiliary is projected off the first.

This is the type of detail drawing used to produce the part.



__ Start a part. Use inch measurements.

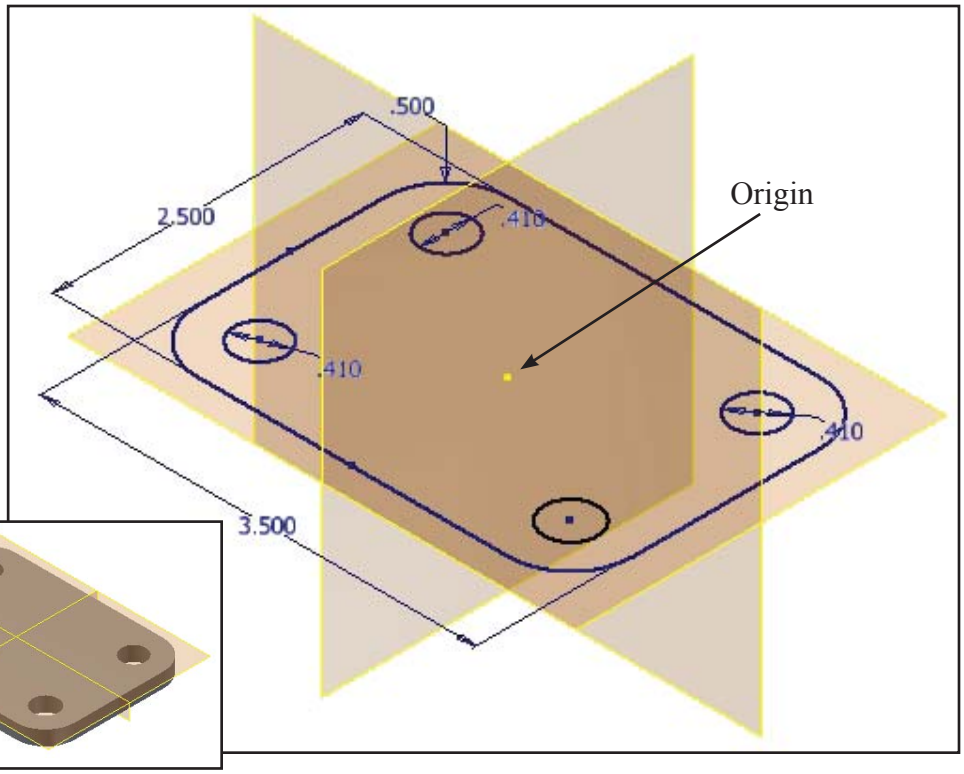
__ Turn on the reference planes.

__ Create a sketch on the top plane. The rectangle is 3.50 wide by 2.50 deep. **Center on Origin**

__ Fillet the corners .50 radius.

__ Place the .41 diameter circles concentric with the arcs at each corner.

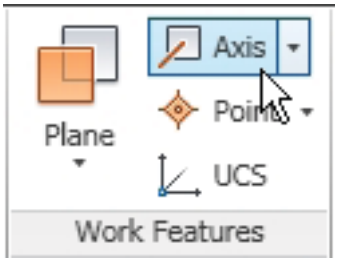
__ Extrude the shape .25 deep.

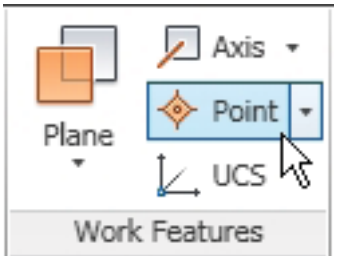


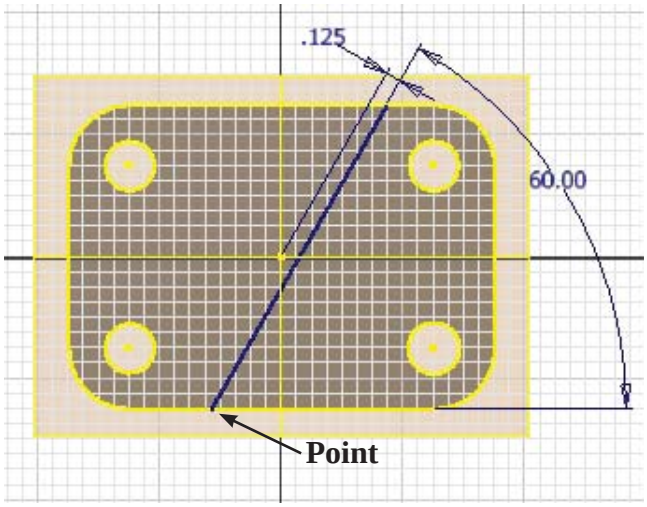
__ Draw the 60 degree line as shown.
Dimension .125 right of the origin point.
Dimension the 60 degree angle. (Needed for constraints)

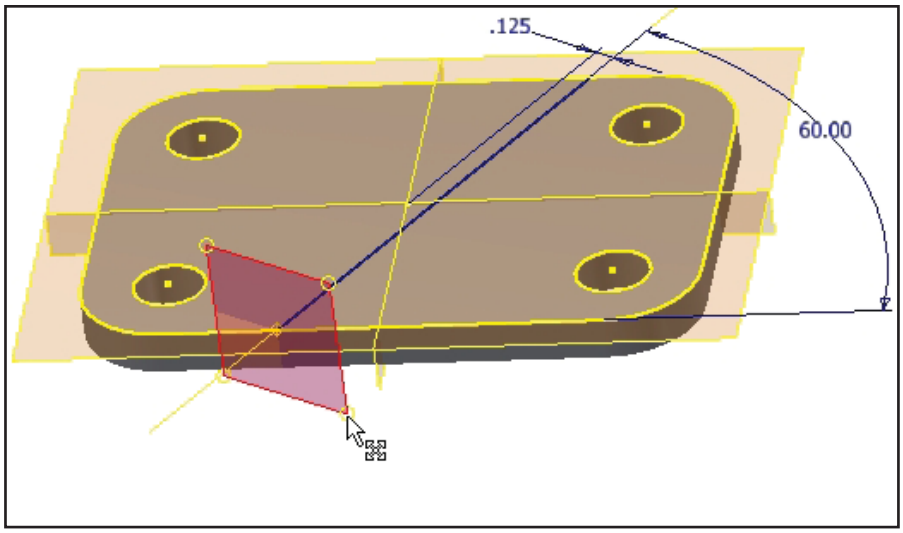
__ Set the line as an axis.

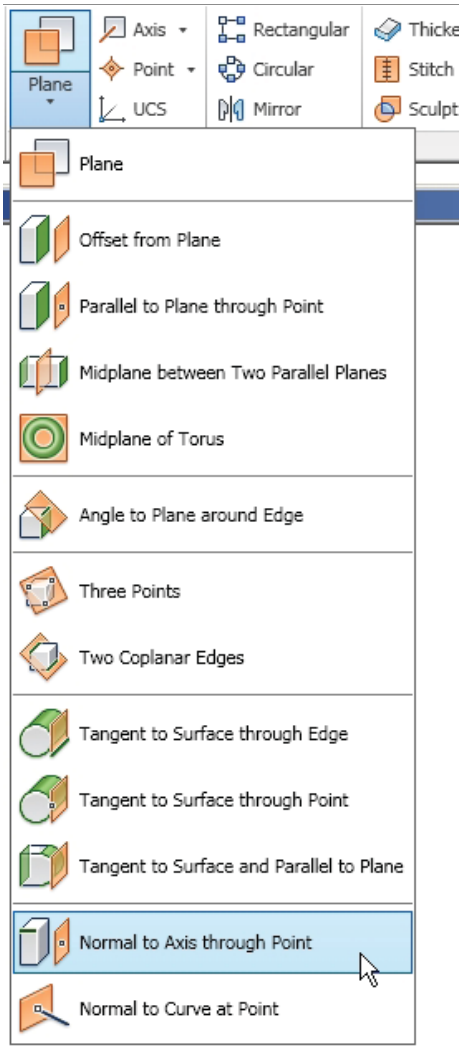
__ Set a Point at the lower end of the axis line.





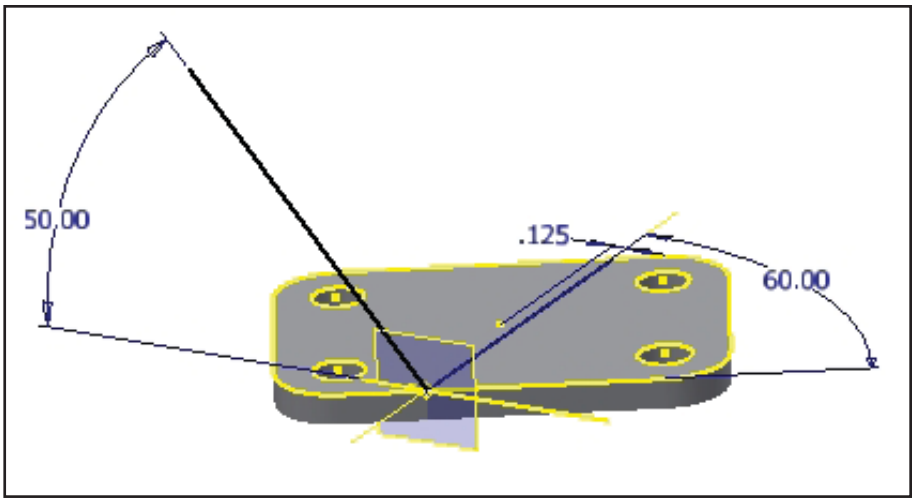




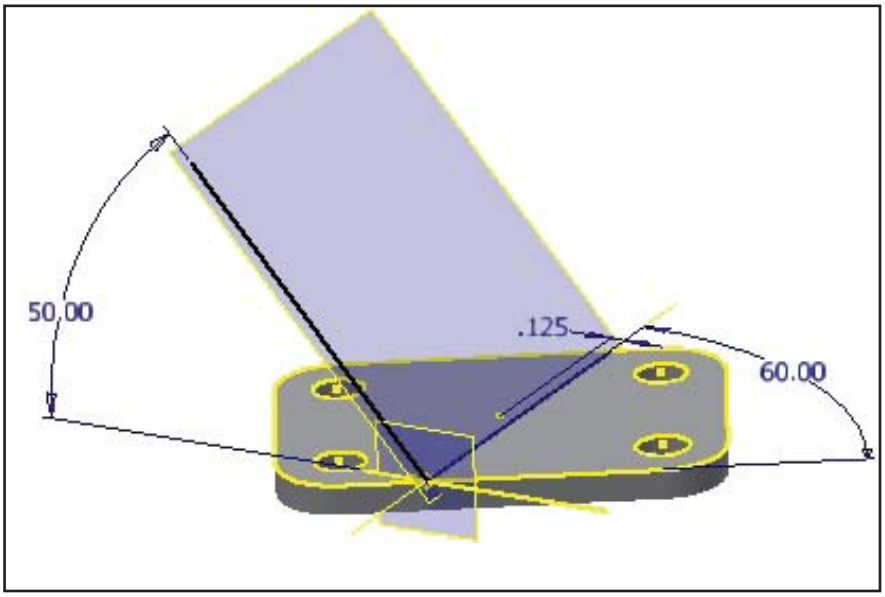


__ Create a work plane perpendicular to the axis line through the end point.

__ Draw a 50 degree line from the axis point any length as shown.



__ Create a work plane using the 60 degree line and 50 degree lines.



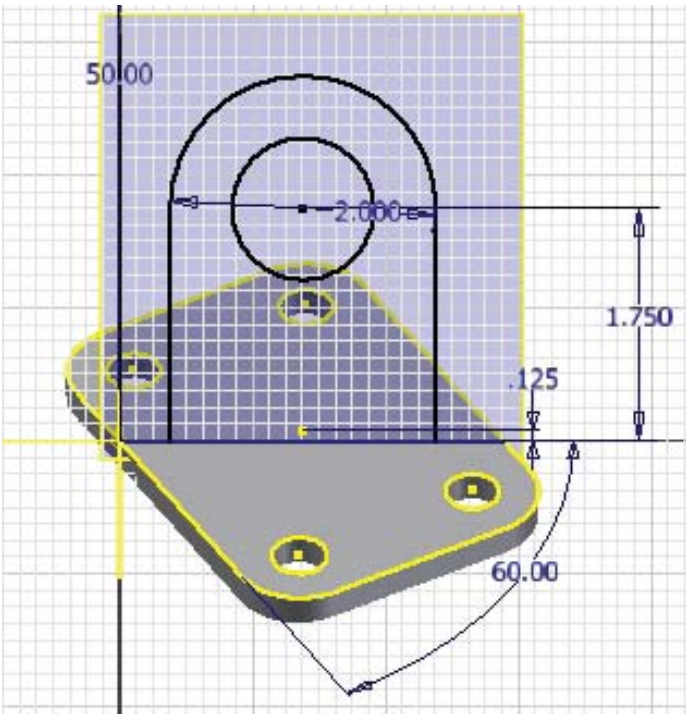
__ Start a sketch on the oblique work plane.

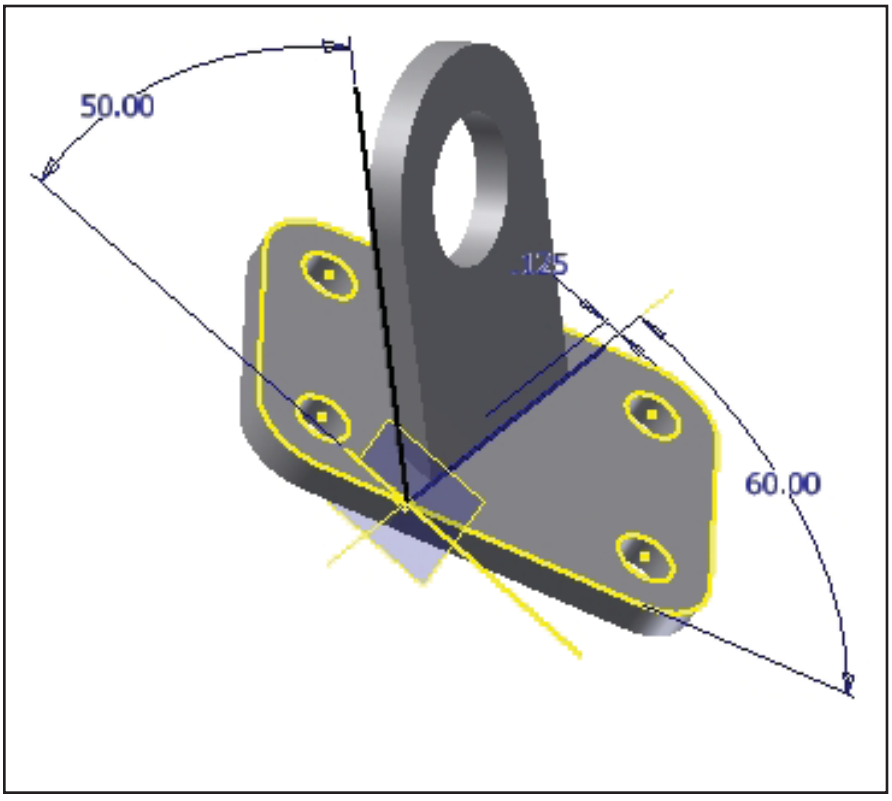
__ Project the axis line and Sketch the shape shown.

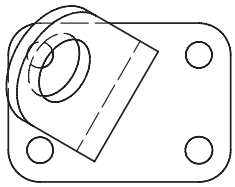
Note: The inner circle is 1.00 diameter.

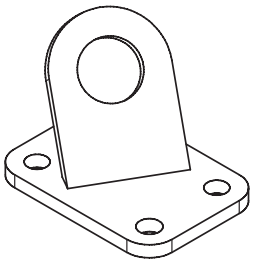
__ Extrude the region .25 deep.

__ Save the model.



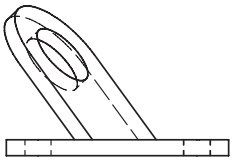


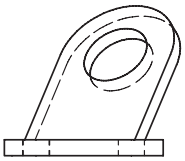




Place the regular views.

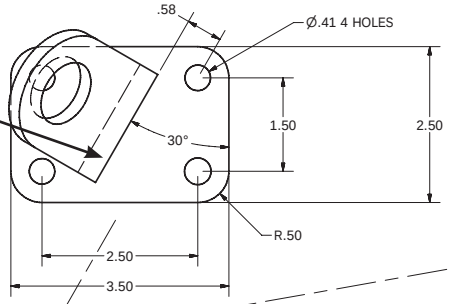
Note the Right view is not needed and was erased in the lower drawing.

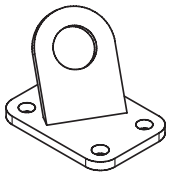


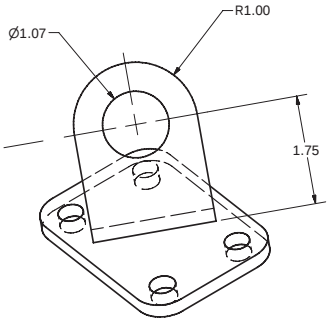


DRAWN BY	WASHINGTON UNIVERSITY IN ST. LOUIS
DATE	TITLE
TOLERANCES .X = ± .1 in .XX = ± .03 in .XXX = ± .010 in Angles ± ½ Degree	SIZE B | DWG NO | REV SCALE

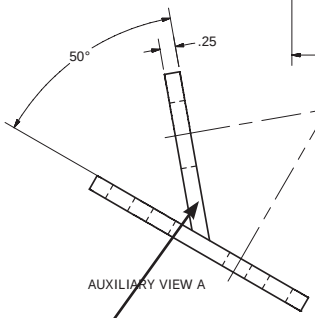
Select line for direction







AUXILIARY VIEW B



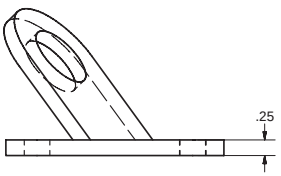
AUXILIARY VIEW A

__ Create the Auxiliary view -A projecting from the top view.

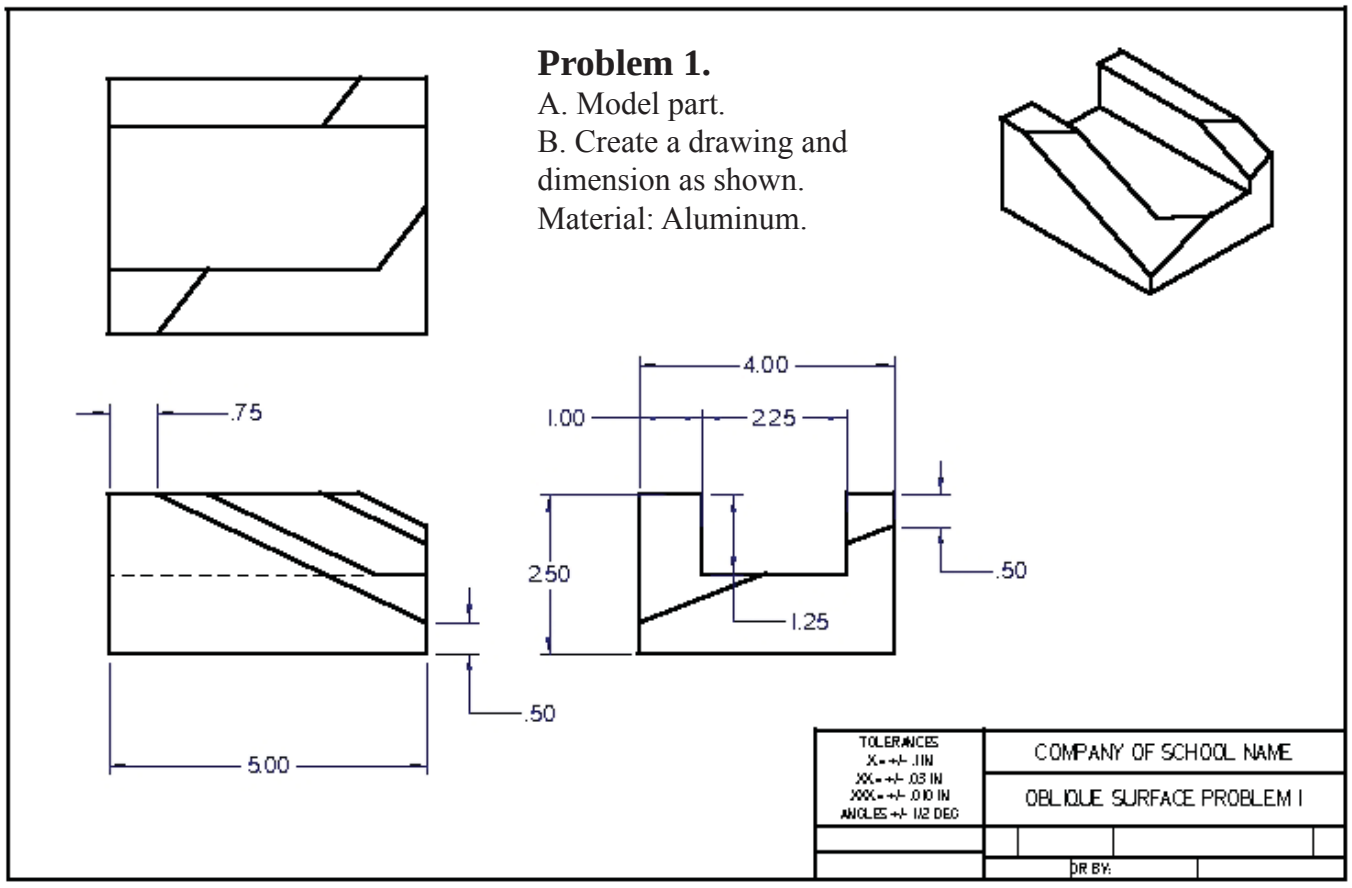
__ Create Auxiliary view B projecting from Aux View A

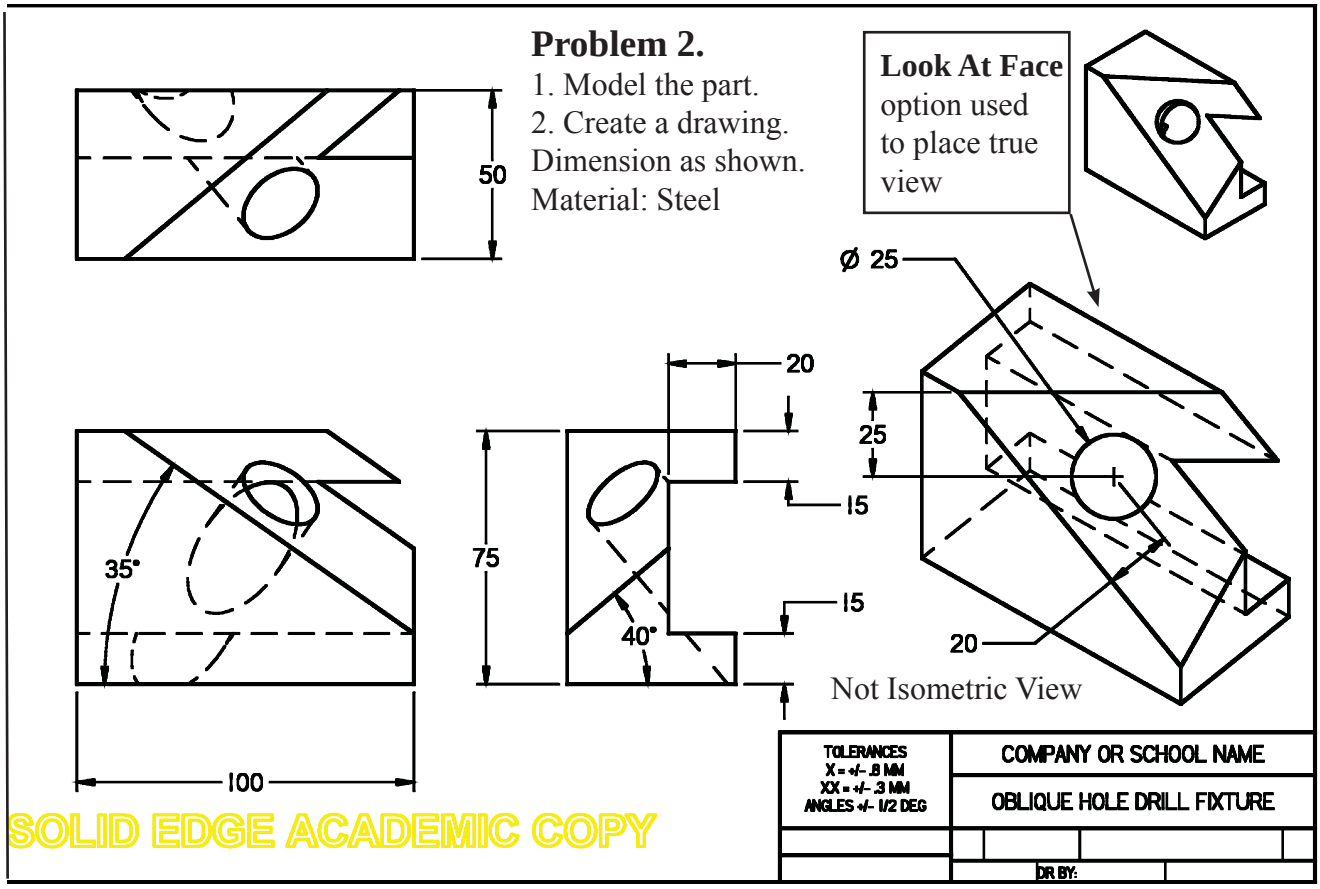
Place views and dimension as shown.

Select line for direction



DRAWN BY CRAIG, J	WASHINGTON UNIVERSITY IN ST. LOUIS
DATE	TITLE CHAIN PLATE
TOLERANCES .X = ± .1 in .XX = ± .03 in .XXX = ± .010 in Angles ± ½ Degree	SIZE B | DWG NO | REV SCALE


Problem 1.
A. Model part.
B. Create a drawing and dimension as shown.
Material: Aluminum.
.75
4.00
1.00
2.25
2.50
.50
1.25
.50
5.00
TOLERANCES
X = +/- .1IN
XX = +/- .03 IN
XXX = +/- .010 IN
ANGLES +/- 1/2 DEG
COMPANY OF SCHOOL NAME
OBLIQUE SURFACE PROBLEM I
DR BY:


Problem 2.
1. Model the part.
2. Create a drawing.
Dimension as shown.
Material: Steel
50
Look At Face option used to place true view
Ø 25
20
25
15
75
15
35°
40°
20
100
Not Isometric View
TOLERANCES
X = +/- .8 MM
XX = +/- .3 MM
ANGLES +/- 1/2 DEG
COMPANY OR SCHOOL NAME
OBLIQUE HOLE DRILL FIXTURE
DR BY:
SOLID EDGE ACADEMIC COPY

Problem 3.

A. Model the part. Material: Steel.

B. Create a drawing. Place auxiliary views A-A and B-B as shown. Dimension as shown.
Be sure to show Tolerance Block. Use correct number of decimal places in dimensions.