

3D Drawing Tutorial

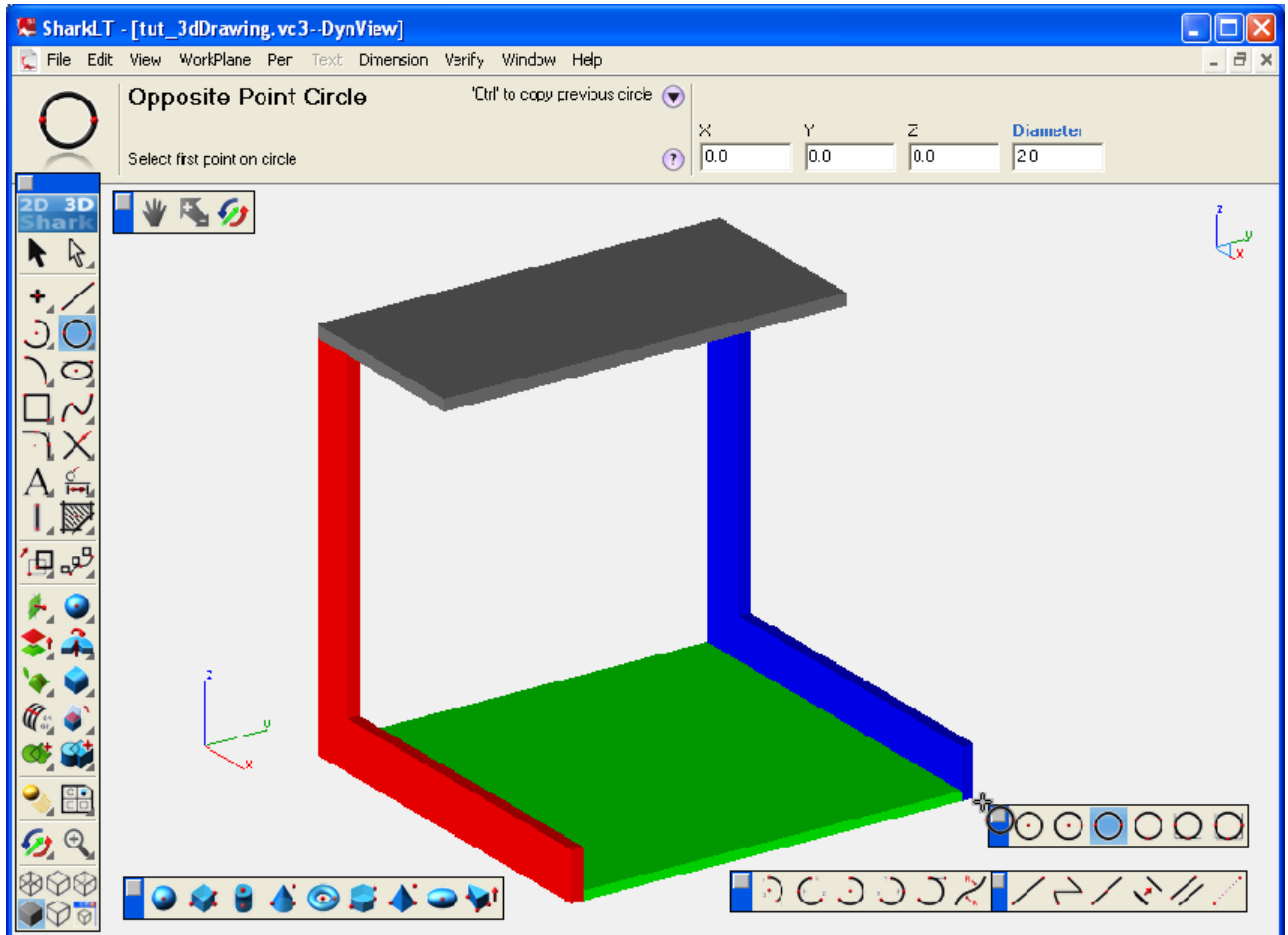
Drawing in 3D adds a third axis to the X and Y axis used in 2D. This Z axis allows you a third dimension, to create objects with a 3-dimensional thickness, or shape. These shapes can be put together to create either simple or complex objects, which are called models.

Setting up Your Workspace

Before starting this tutorial, prepare your workspace by dragging off the toolsets you'll use. From the Main Tool Palette, drag off the Dynamic Zoom toolset and place it at the top of the workspace.

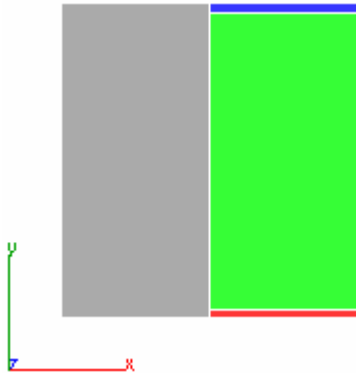
Drag off the Solid Primitives toolset and place it at the bottom of the workspace.

Drag off the Line toolset, Arc toolset, and Circle toolset. Drag the toolsets and place them in the bottom right corner of the workspace.



To control 3D views

1. From the View menu, choose Top. This view looks straight down at the X and Y axis.

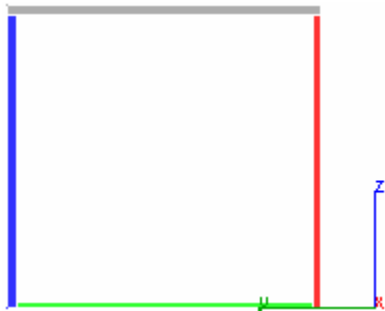


Notice each of the static front, top, back, side views is defined by two axes; in this case the X and Y. You can see both the green and the gray rectangles, but notice the gray rectangle obscures part of the green.

2. From the View menu, choose Trimetric.

Other views such as the front and back are also defined by two axes; the front view by the X and Z axis, the back view also by the X and Z axis. The difference, however, is much like looking at the back of the house or the front of the house, similarly with the left and right view.

3. From the View menu, choose Right Side. The right view is defined by the Y and the Z axis, as well the right view.



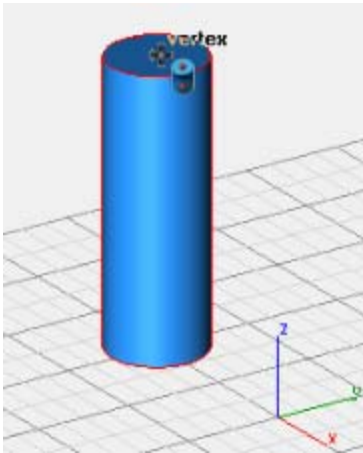
4. From the View menu, choose Trimetric.
5. Use the Dynamic Rotate Tool to rotate around the design.
6. From the View menu, choose Trimetric, to reset the view.



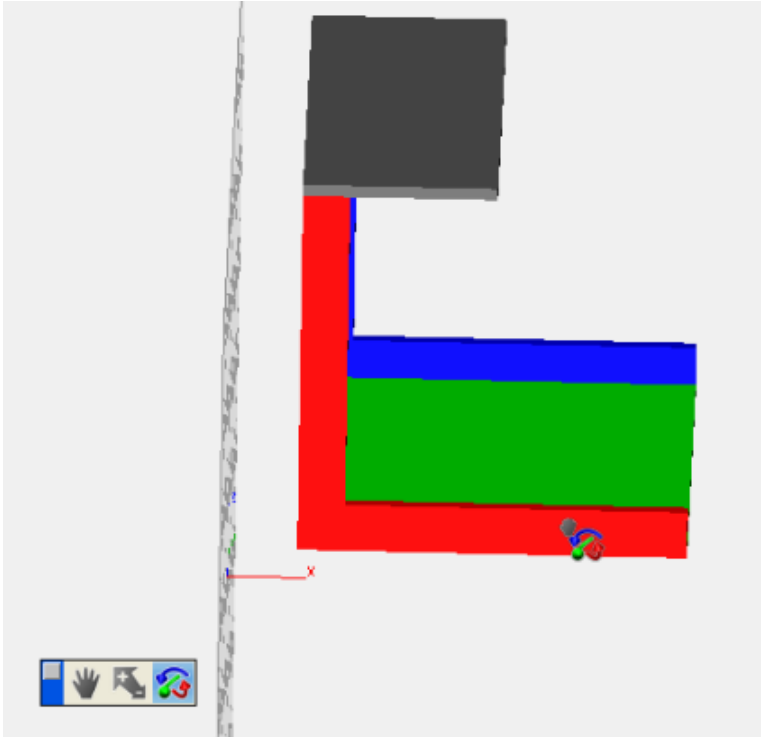
To control the workplane

1. From the WorkPlane menu, choose Show Grid. Just as in working with 2D drawings, grids can give you a great distance reference, as well as make it easier to draw.

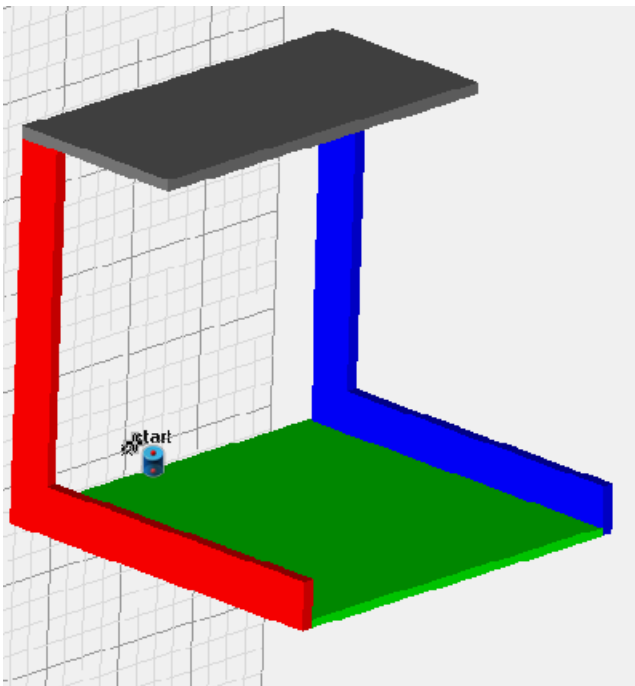
2. From the WorkPlane menu, choose Side. The grids or as they're called in 3D, WorkPlanes, allow you to quickly and easily create geometry with your mouse and cursor.
3. From the WorkPlane menu, choose Top.
4. From the Primitive toolset, choose the Cylinder Primitive.
5. From the sub-tools toolset, choose the Cylinder Two Point Tool.
6. Position your cursor on the grid and click to set the first point of the cylinder.
7. Drag up and click to set the second point and draw the cylinder. Notice you actually snap to the reference grid, called the workplane, in 3D.



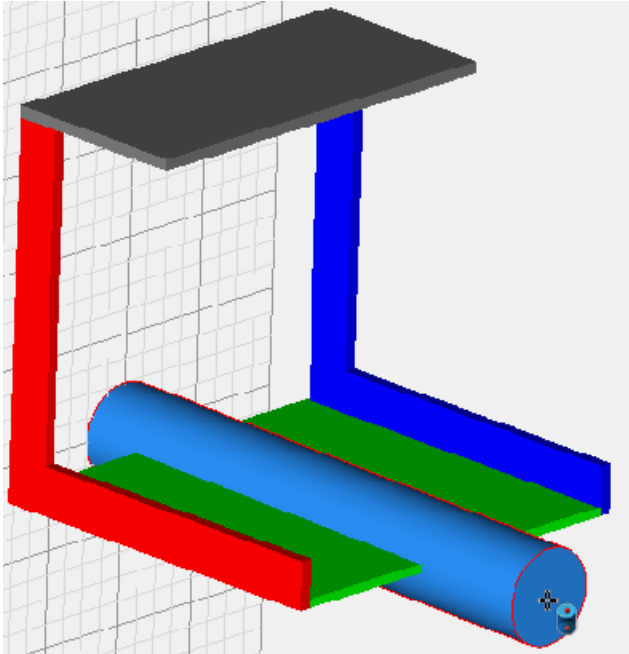
8. Delete the cylinder and, from the WorkPlane menu, choose Side.
9. Draw a horizontal cylinder along the workplane.
10. Use the Dynamic Rotate Tool to rotate around the model. Notice the workplane is drawn through the origin, or 0,0.



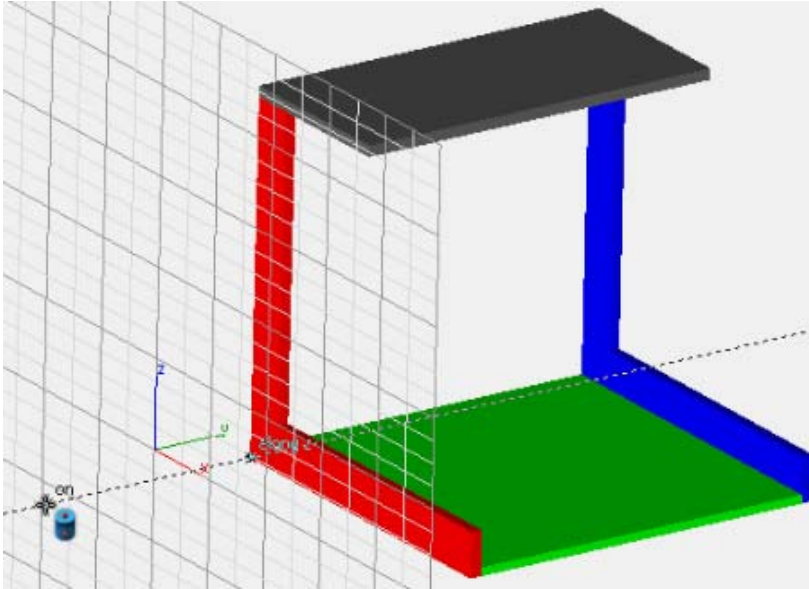
11. Rotate back so you're facing the workplane.
12. Click the Cylinder Two Point Tool.
13. Position your cursor inside the model along the workplane and click to set the first point.



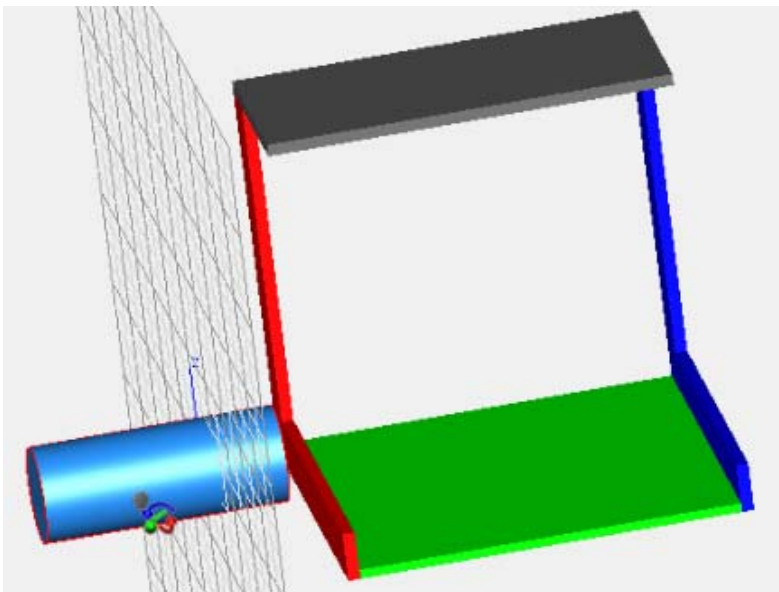
14. Drag away from the workplane and click to set the second point and draw the cylinder. The cylinder is drawn perpendicular to the workplane.



15. Delete the cylinder. Remember, the workplane allows you to pick points against it to define whatever geometry you'd like.
16. On the WorkPlane menu, choose Front.
17. Use the Dynamic Rotate Tool to see that the workplane is drawn at the origin.
18. Rotate back so the workplane is in its original position.
19. Click the Cylinder Two Point Tool.
20. Position your cursor over the bottom left corner of the model and click to set the first point.
21. Drag to the left along the Z axis.



22. Click to set the second point and draw the cylinder.
23. Using the Dynamic Rotate Tool, rotate so you can see where the cylinder is attached to the model. In this case, we've picked a point on an object, the endpoint of that red L.



24. Rotate back to the original view and delete the cylinder.
25. On the File menu, choose New.
26. On the View menu, choose Trimetric.
27. On the WorkPlane menu, be sure Show Grid is selected and the grid is active.

Drawing 3D shapes (primitives)

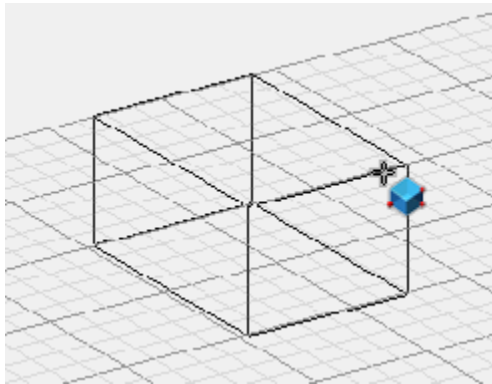
On the Main Tool Palette, hold down your mouse button over the Primitive tools to display the Primitives toolset. These are the shapes used to create 3D drawings. These are called Primitives.

To draw block primitives

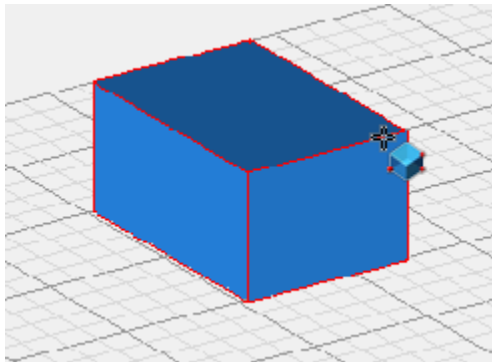
1. Click the Block Primitive. Each of the different types of primitives have sub-tool menus to give you options for draw methods.
2. On the Prompt Window, click the Block Diagonals icon to display the sub-tools.



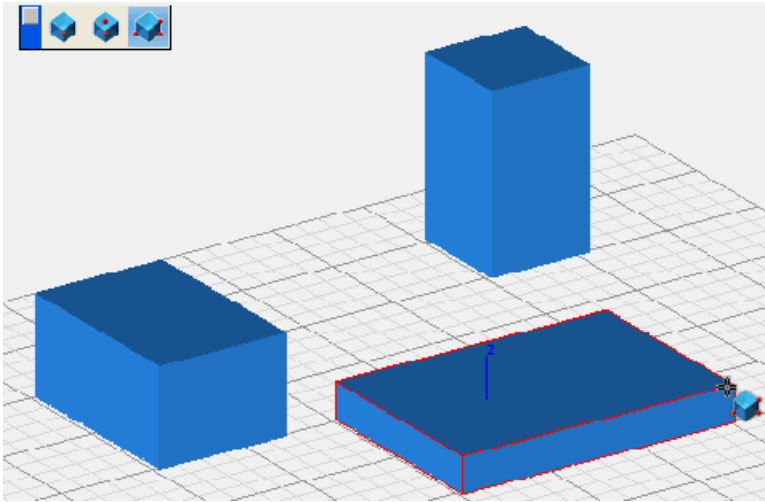
3. Drag through the tools to break the toolset away from the Prompt Window. Release to place it on the workspace.
4. Click the Block Diagonals Tool.
5. On the workspace, click to set the first point, then drag along the X and Y axis and click to set the values.



6. Drag up to set the Z value and click to draw the block.



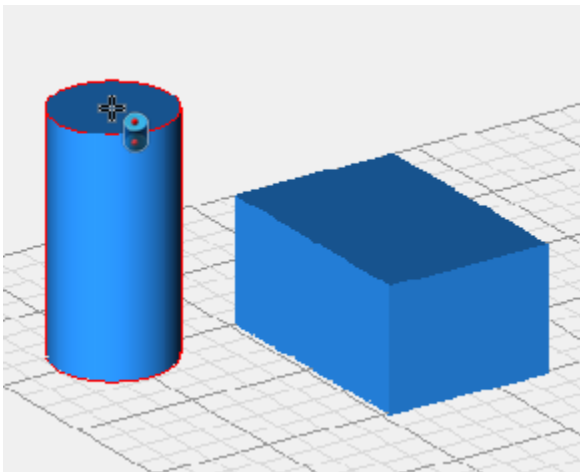
7. Draw a couple more diagonal blocks.



So in this case, you click corner to corner, to set the footprint of the 3D box.

To draw cylinder primitives

1. From the Primitive toolset, click the Cylinder. The Cylinder sub-tools appear.
2. Click the Cylinder Two Point Tool.
3. Position your cursor on the workplane and click to set the start point.
4. Drag up and click again to set the endpoint and place the cylinder.

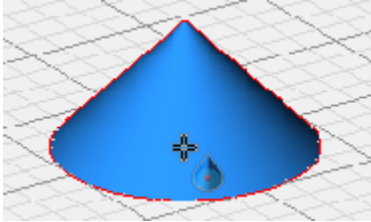


As you draw, remember you can change the properties in the data entry window.

5. With the cylinder selected, type .50 in the Diameter field and press ENTER.
6. Place another two-point cylinder on the other side of the workplane.

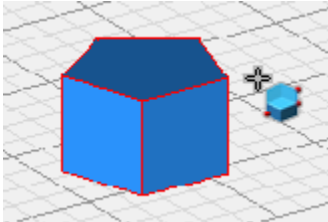
To draw cone primitives

1. From the Primitive toolset, click the Cone. The Cone sub-tools appear.
2. Click the Cone One Point Tool. This tool sets the centerpoint of its base.
3. Position your cursor on the workplane and click to place the cone.



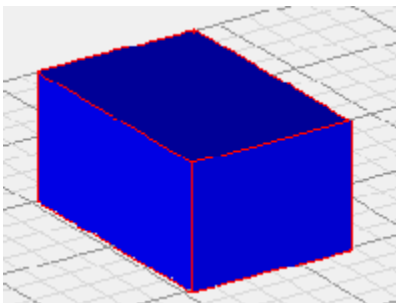
To draw prism primitives

1. From the Primitive toolset, click the Prism. The Prism sub-tools appear.
2. Click the Prism Diagonals Tool.
3. On the workplane, click to place the first point and drag to set the diagonal corner.
4. Click and drag up, to set the height.
5. Click to place.



To change object color

1. Click the Selection Tool and select one of the polygons.
2. On the ObjPen menu, choose Color, then choose Blue from the submenu.



You can also change the color before you draw, then the subsequent items that are drawn will be drawn in that color.

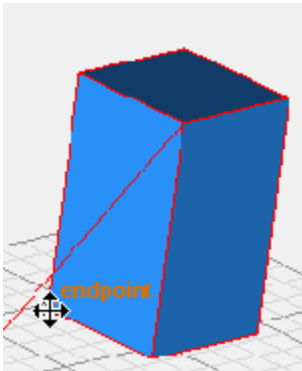
3. Deselect the polygon and click the Pen menu.
4. On the Pen menu, choose Color, then choose Red from the submenu.

To use snaps in 3D

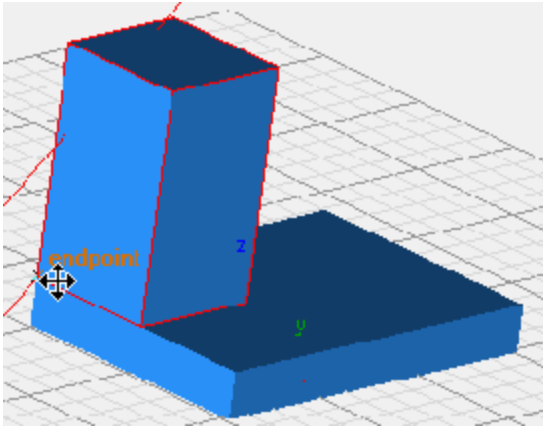
1. Click the Single Line Tool.
2. Draw lines from the blue polygon, to two blocks. Notice the LogiCursor displays the snap point.
3. Click the Single Line Tool.
4. Draw multiple lines, along the X and Y plane, as well as endpoints on the bottom and on the top of the cube.
5. Use the Dynamic Rotate Tool to rotate and see the lines drawn in 3D space.
6. Rotate back to the original position.

Editing 3D Shapes

1. Position your cursor on the bottom endpoint of the block near the back of the workplane.



2. Drag the block and snap it to the top endpoint of the flat block. By grabbing the block at an endpoint, then positioning it at a top endpoint, you can begin to stack objects.



3. Move it off of the flat block.
4. Use the Dynamic Rotate Tool to rotate about 90-degrees.
5. Click and drag the cylinder to the center, or vertex, of the top of the prism. Release to place.

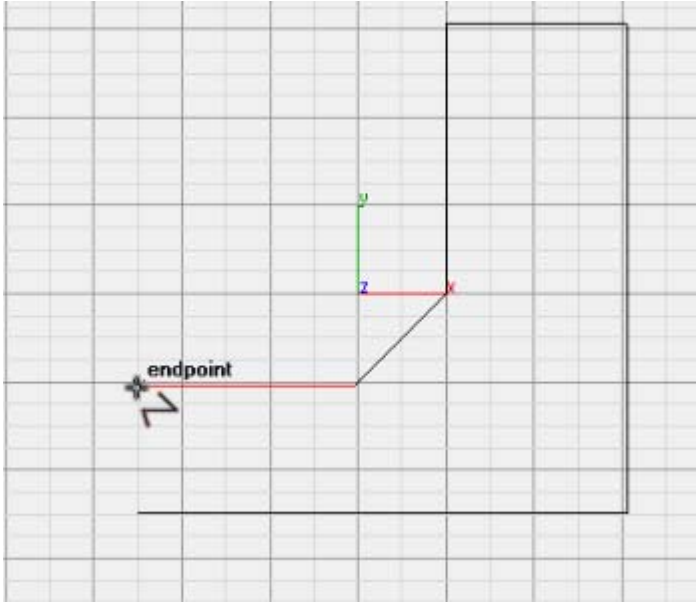


6. From the View menu, choose Top.
7. Double-click on the Selection Tool to select all.
8. Press DELETE to delete everything in the drawing.

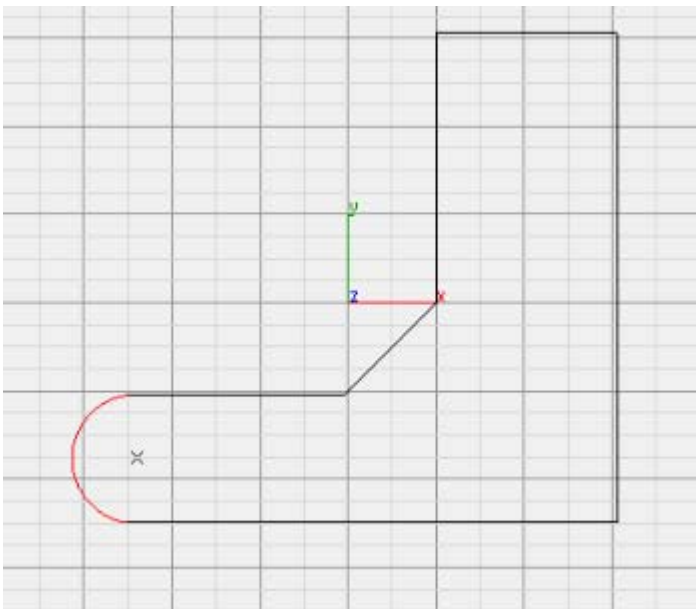
To extrude 3D objects

1. Using the Multi Line Tool, draw a shape similar to the one below.



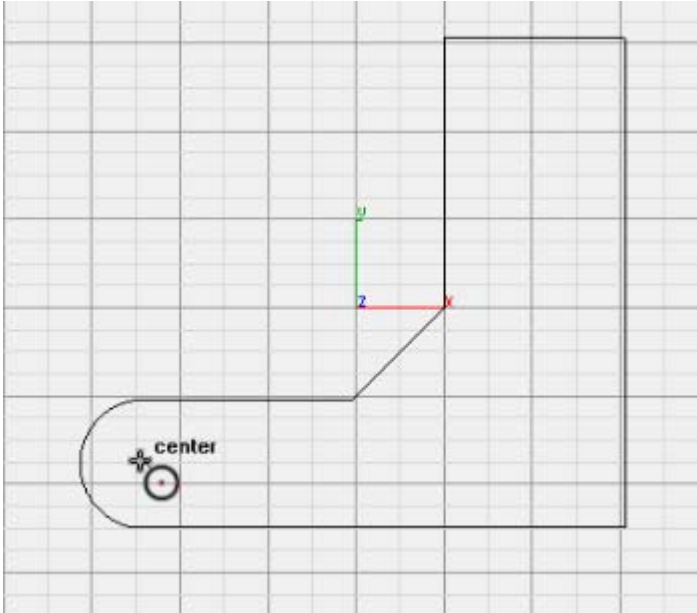


- Use the Start, End, On Arc Tool to snap to the two endpoints and drag the arc to match the image below.

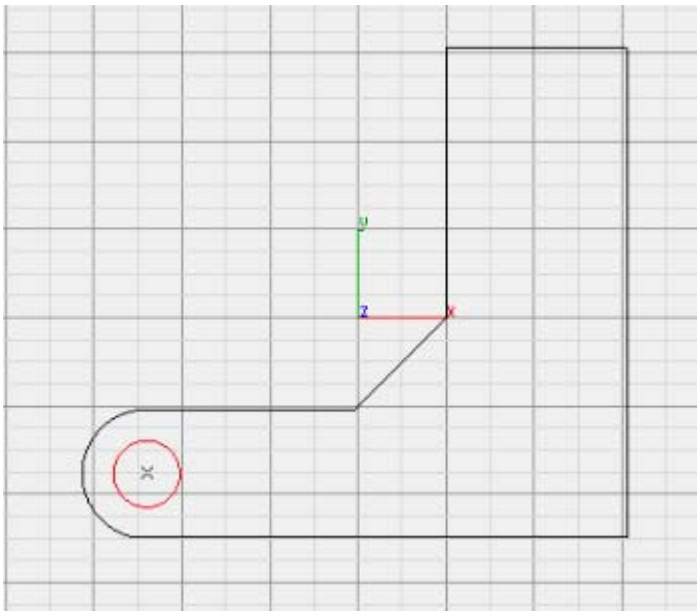


- Click the Selection Tool.
- From the Circle toolset, choose the Center Point Circle Tool. This tool allows you to set the center and side points.
- Position your cursor so the LogiCursor displays the center of the arc.



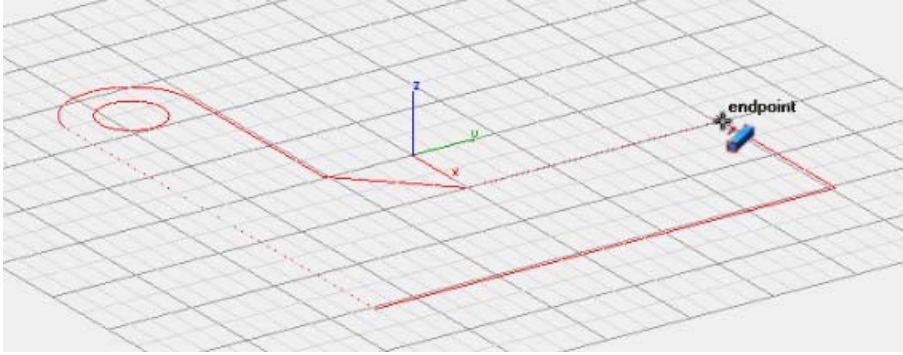


6. Click to set the first point and drag out to set the diameter.
7. Click to set the outer point and draw the circle.

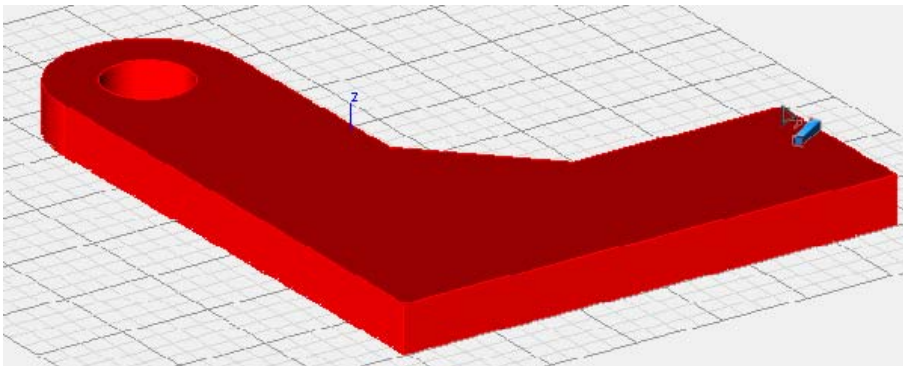


8. From the View menu, choose Trimetric.
9. Drag a selection window over the 2D shape to select everything.
10. From the Solid From Profiles toolset, choose the Extrude Solid Tool. Use this tool to choose the direction and length to which you want to extrude the selection.
11. Position your cursor on the top right endpoint.





12. Click to set the first point and drag up to set the extrusion direction.
13. Click another point along the Z axis to set the length and extrude the object.



14. Use the Dynamic Rotate Tool to rotate the object. We drew a simple 2D profile, selected it, then extruded it to create this 3D part.