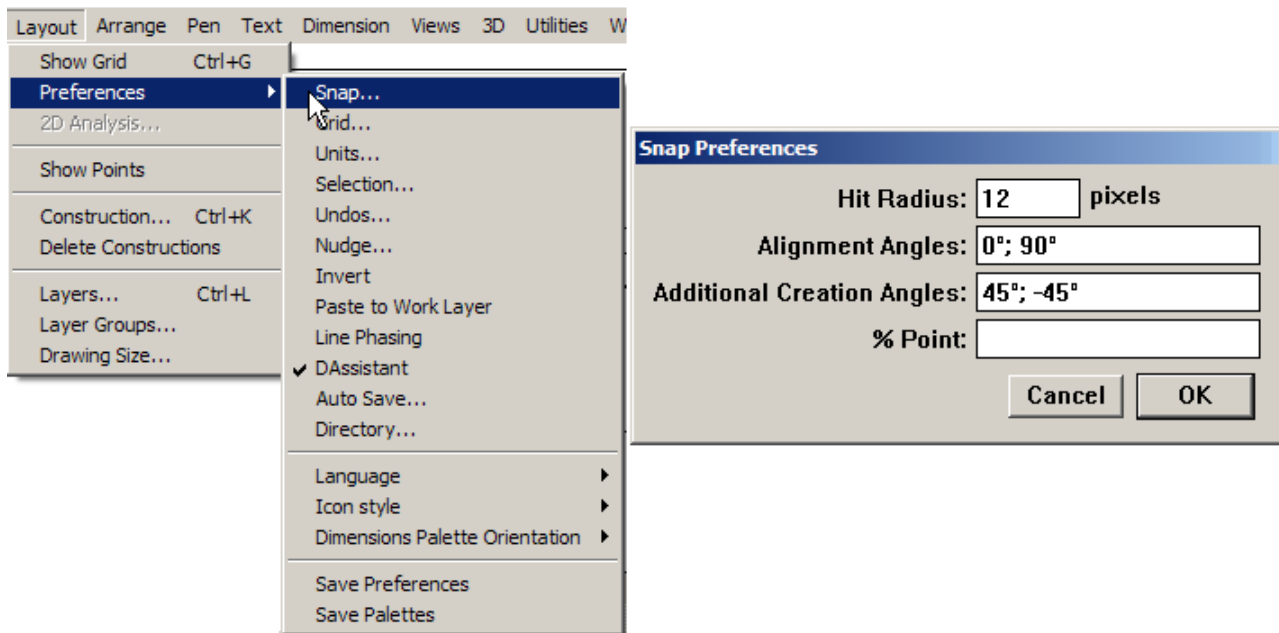# Creating 2D Isometric Drawings

Using Graphite™

Creating 2D Isometric Drawings

No matter how many Top, Front and Right side views are drawn, along with associated section views, there is sometimes nothing that will communicate your work better than a solid-looking 3D illustration. One of the great benefits of the Drafting Assistant[TM] is that you can define the angles upon which it operates. You can work on complex 3D-seeming tasks that would be tedious and prohibitive in other programs.
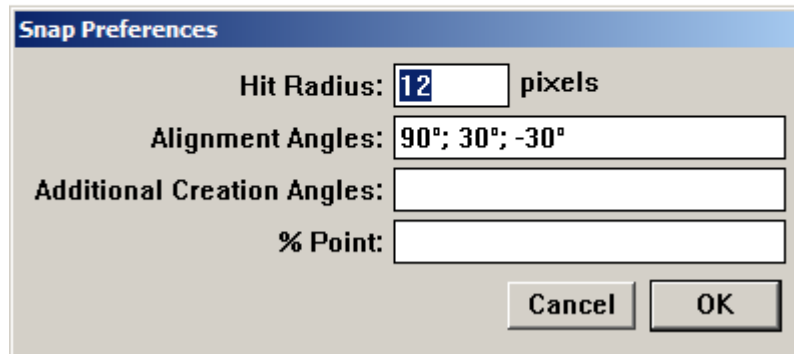
Here are the steps:

1. Choose *Layout>Preferences>Snap*.

Accessing the Snap Preferences Dialog

Initially, the settings for Alignment Angles are 0° and 90°. This tells you that when brushing-over a logical point on the drawing, it will wake up. The Drafting Assistant gives temporary Construction Lines at 0° and 90° through that point. This is the modifyable field to set up the Isometric angles. The second field, Additional Creation Angles, gives additional Drafting Assistant angles when creating geometry. When you press the mouse down at any location on the screen and with a creation tool begin dragging away to get a rubber-banding line or circle etc., then the Drafting Assistant gives the original alignment angles of 0° and 90°, and also the additional creation angles of 45° and 45° or whatever values appear in this dialog box.

2. Replace the contents of the Alignment Angles data field with one of the following sets of values, depending on the environment to be created.

FOR	ENTER
Isometric Angles:	90; 30; -30
Trimetric	90; 15; -30

Snap Preferences

Hit Radius: 12   pixels

Alignment Angles: 90°; 30°; -30°

Additional Creation Angles:

% Point:

Cancel   OK

Set the angles for doing Isometric drawings. The Snap dialog box will look like the example below. Separate each value with a semi-colon. Do not enter a degree Symbol, Graphite will do that after the dialog box is closed.
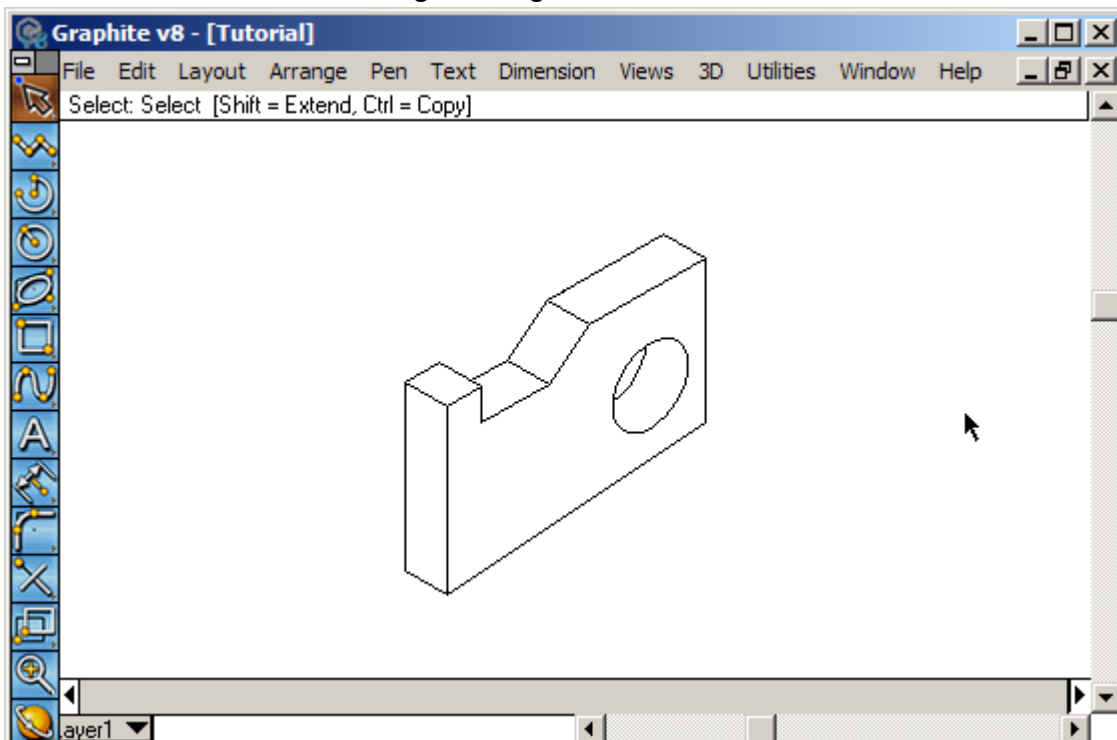
3. Clear the contents of the Additional Creation Angles data field.

Select the contents of this field and delete them. Have this field blank so there are no extra Drafting Assistant Construction Lines to interfere and confuse.

4. Click the OK button to close out the dialog box.

You have set the Drafting Assistant to work at specific Isometric angles.
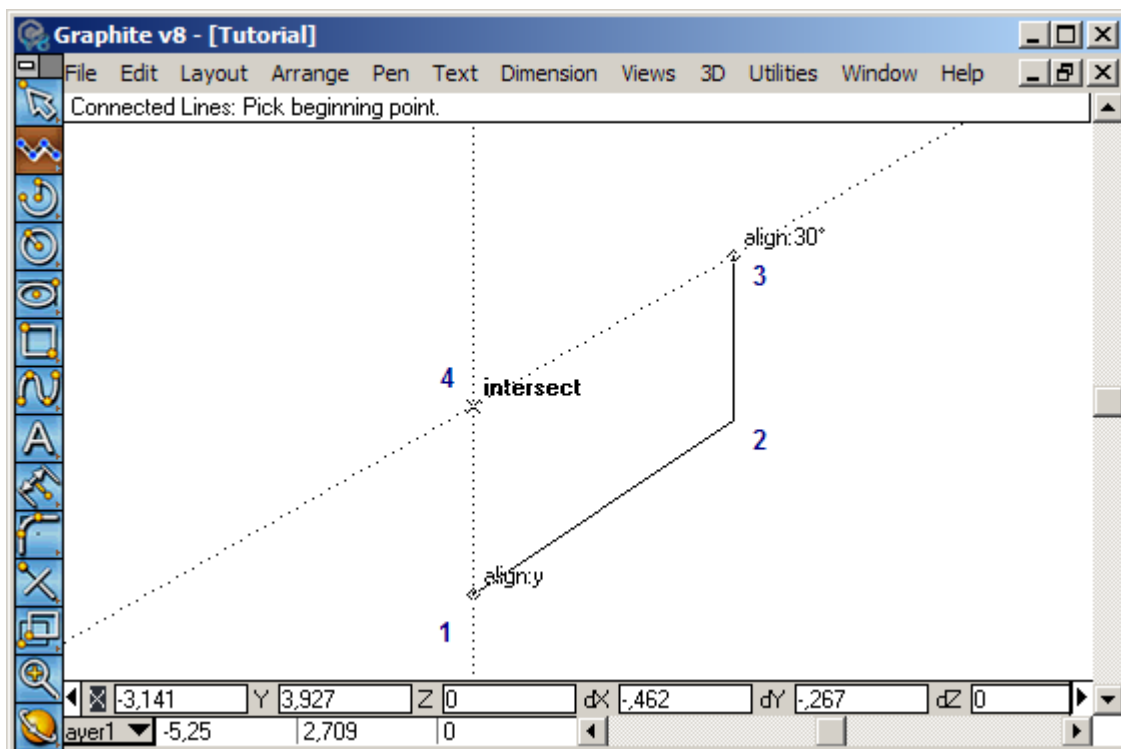
In the following example, draw with the Connected Line tool and create Drafting Assistant Construction Lines along the angles are defined.
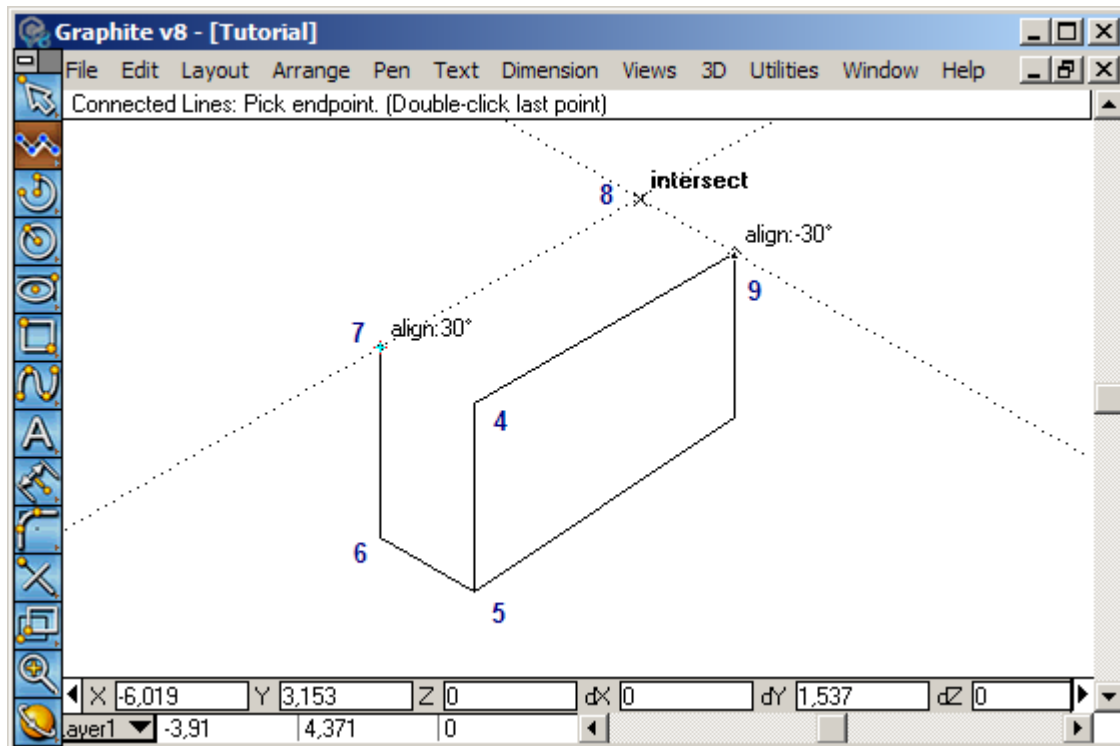
1. Pick the Connected Line tool.

2. Begin at Point 1 and click once at each location along the Drafting Assistant Construction Lines as shown in the following illustration.

   Start at point 1 and click the mouse. Then move up along a general 30° direction. Being close to 30° the Drafting Assistant will put up a temporary construction through point 1 and snap right to the 30° Construction Line. Move along that line as shown and click the mouse once at point 2. From there move as shown along a vertical Drafting Assistant Construction Line and click the mouse once at point 3. When getting to point 4 the Drafting Assistant will automatically display the temporary Construction Lines that identify the exact location for point 4.

3. Continue on with points 5-8 shown in the following diagram to create the block shape. When you get to point 9, double click the mouse to end the connected line.

While working, the Drafting Assistant will continue giving alignment lines and intersection points (as shown at point 8) that make it easy to create the block shape.
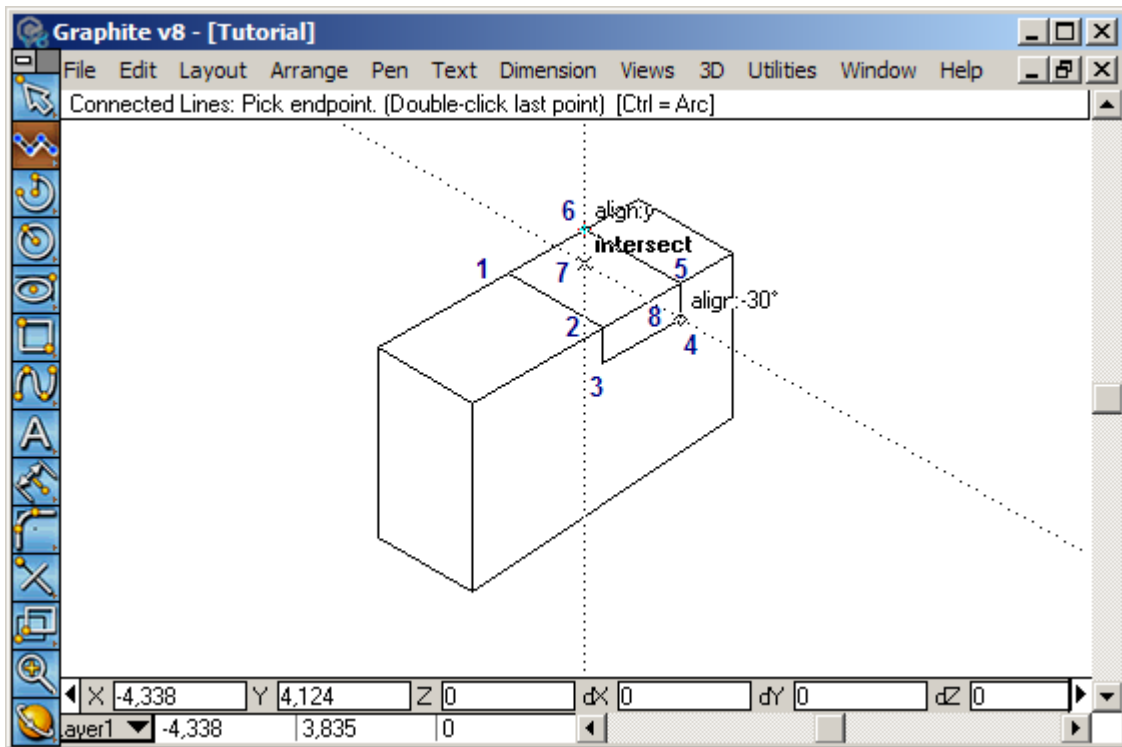

4. To finish the block, put in a single line piece from point 4 to point 7 with the Connected Line tool. Start the line at point 4 with a click and end the line at point 7 with a double-click.
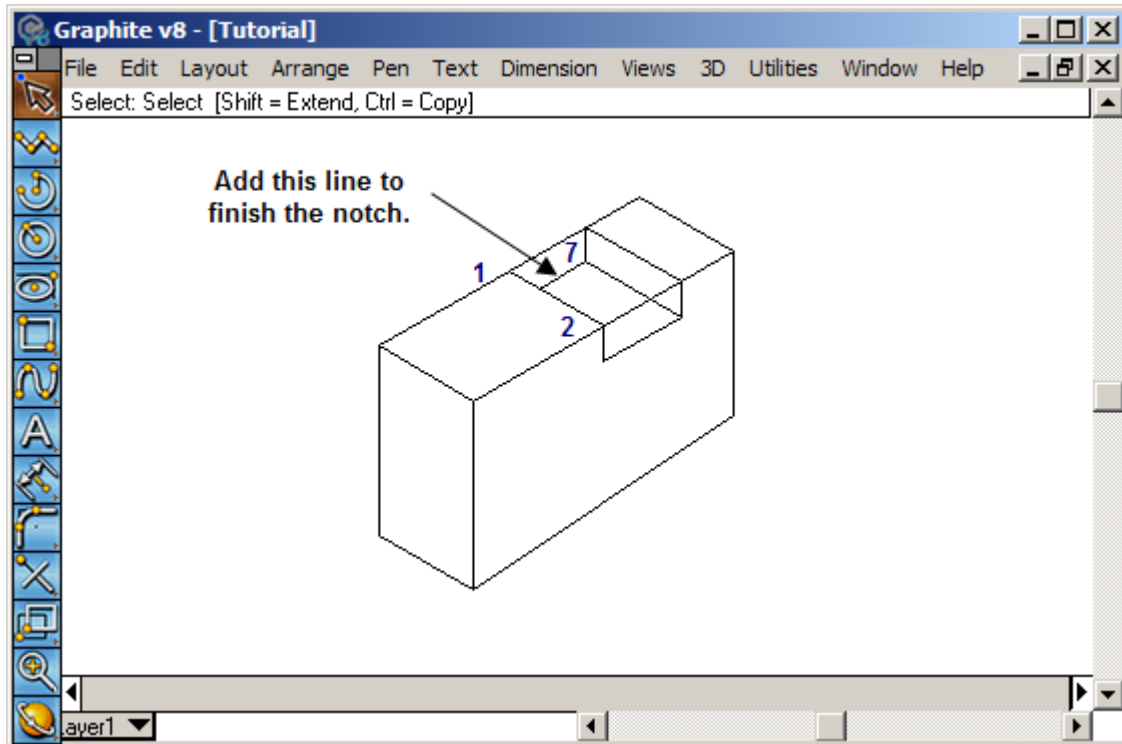
    It is possible to switch to the Single Line tool and create the same line. In the next step, draw another Connected Line series with the Connected Line tool. So stay in the Connected Line tool to draw this single extra line. Now, add the notch in the top of the block.

5. Using the Connected Line tool, click at the points 1-8 shown in the following illustration to get the notch shape. Double-Click at point 8 to end the line series.

It is not necessary to make the notch any particular size. Just create something like in the illustration. Stay on the 30° Construction Lines provided by the Drafting Assistant.
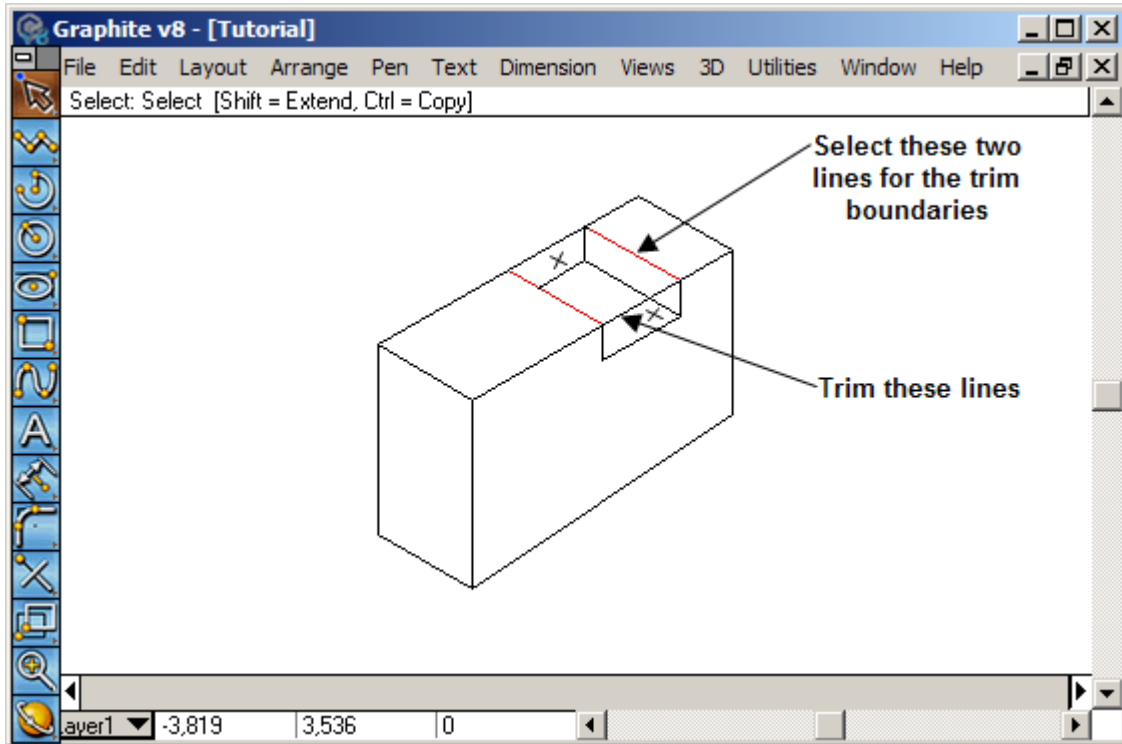
6.   Starting at point 7 add a final line piece that goes down and to the left at 30°
     until it intersects the line from 1 to 2.
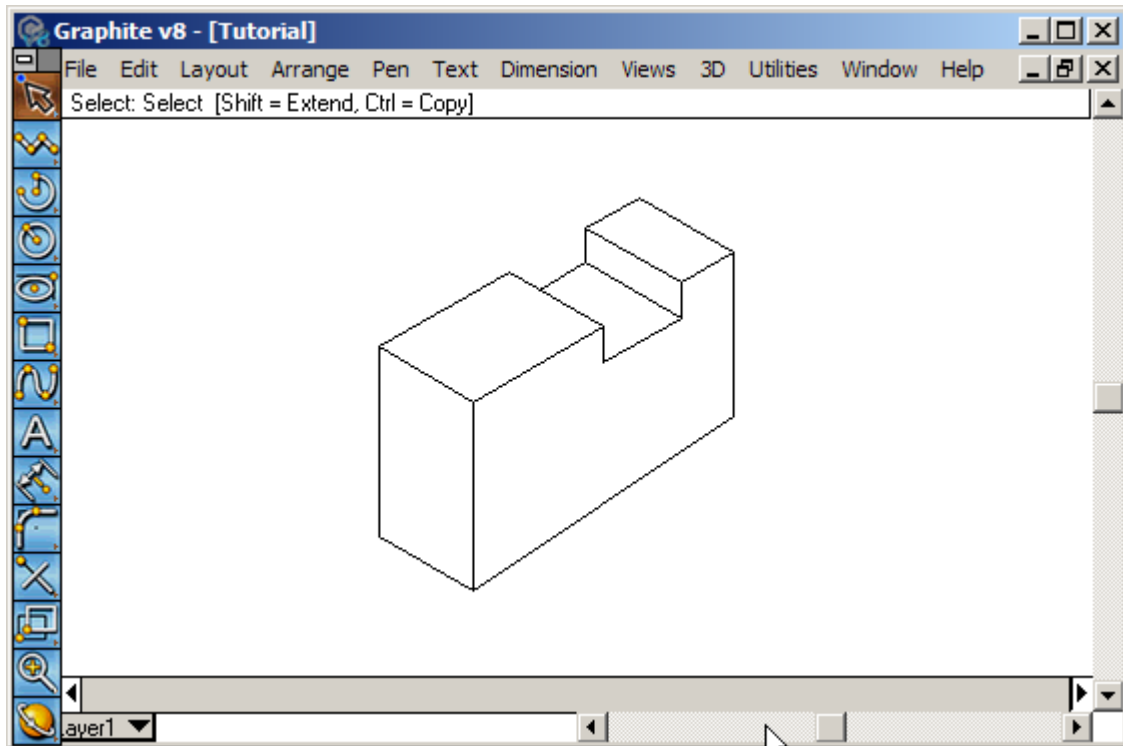

7.   With the Selection tool, select the two lines shown in bold below.

     *These two lines will act as the boundaries of a trimming operation to finish the
     notch.*

8.   Pick the Simple Trim tool from the tool palette.

9. Click the hot point of the Simple Trim tool on the two line pieces as shown to remove them.

    This Simple Trim tool removes any line clicked on between the boundaries, selected objects.

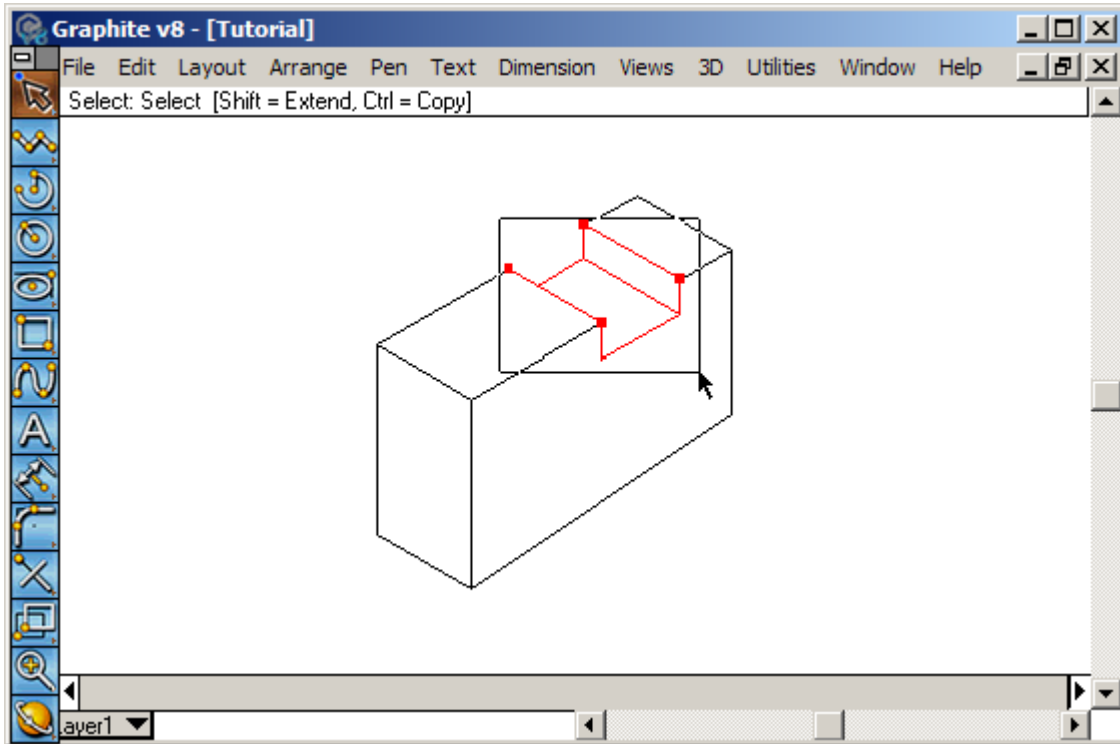What is wound up looks like the following Illustration:

By having the Drafting Assistant angles as a setting, it is possible to grab the notch and slide it back and forth across the top of the block, resize it to make it wider or narrower, and even tilt the walls. All these operations occur right along the correct 30° lines.

10. Pick the Selection tool.

11. Drag a selection fence, as shown below, around the notch area to select all the lines that make up the notch.
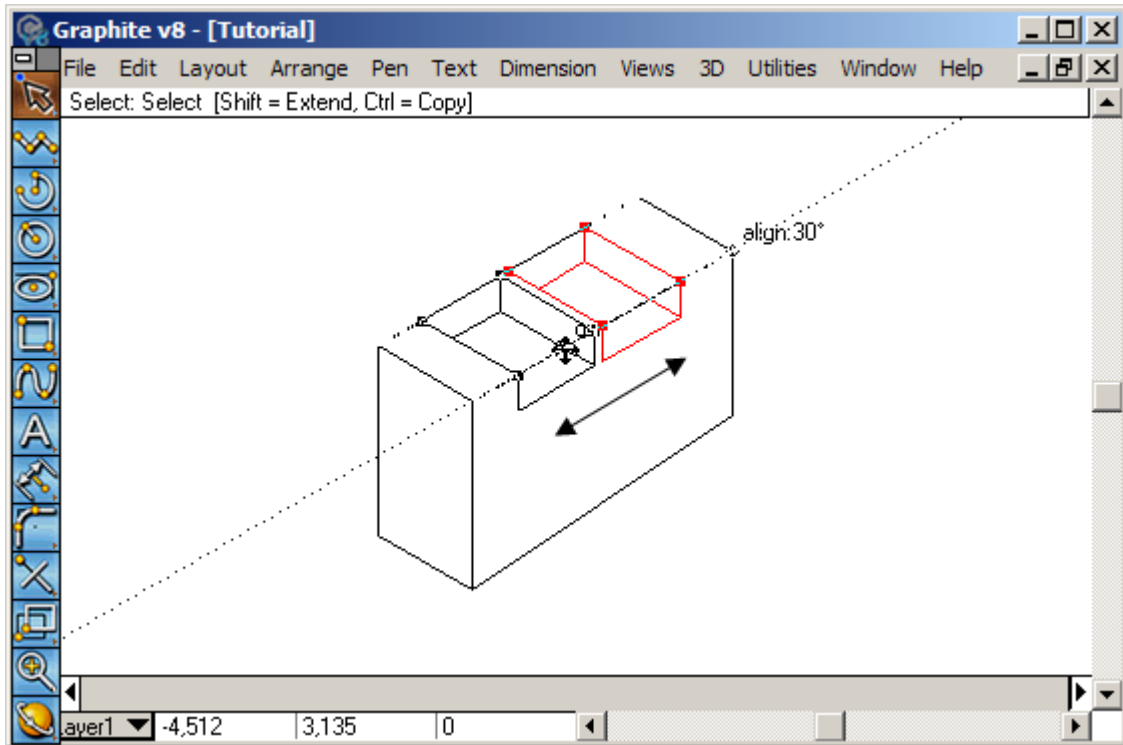
> *Position the cursor in white space to begin the selection fence. Hold down the mouse and drag diagonally across a dotted rectangle that represents the selection area. Make sure that the fence encloses no objects other than the notch.*

When the mouse is released, all the notch objects will be selected along with the endpoints of all lines that were crossed by the selection fence, but not completely enclosed by it. The selected objects are show as bold lines in this illustration. On the screen, they will turn red.

12. Move the cursor to some point on the selected geometry.

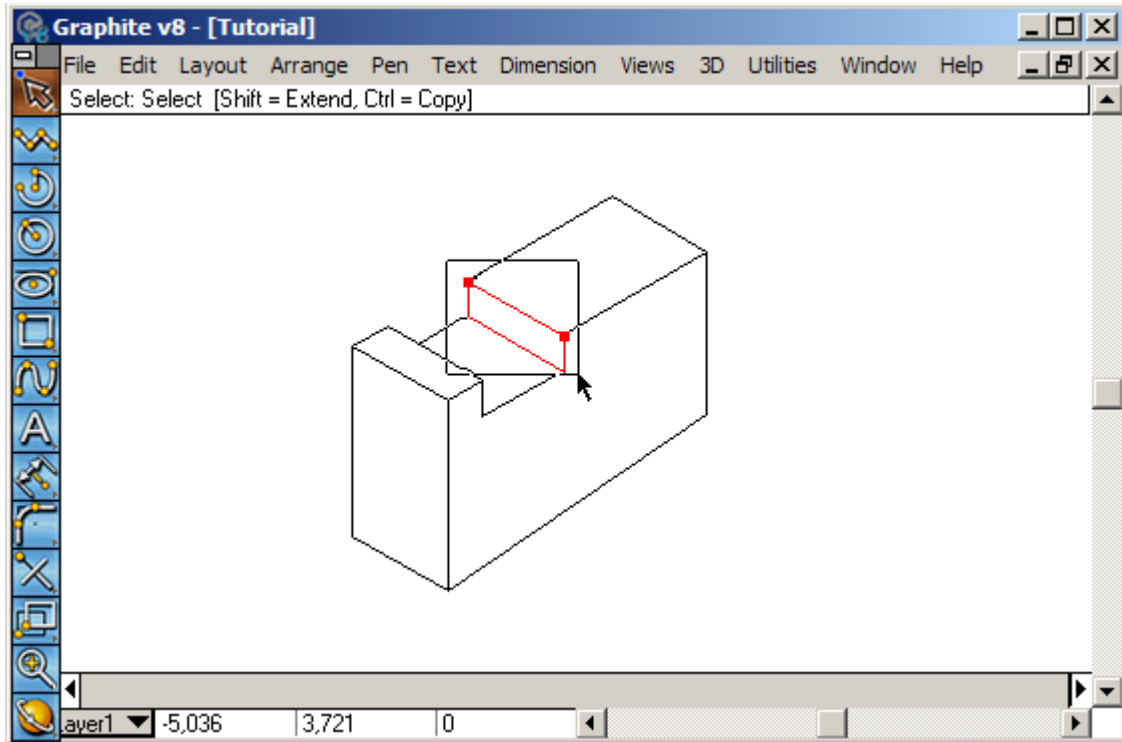   *The cursor changes to a 4-way-move cursor.*

13. Grab that point and slide the notch left and right along the 30° line to reposition it.

    The notch will move along the top of the block, and the connecting lines will stretch accordingly. Relocate the notch similar to that shown in the illustration.

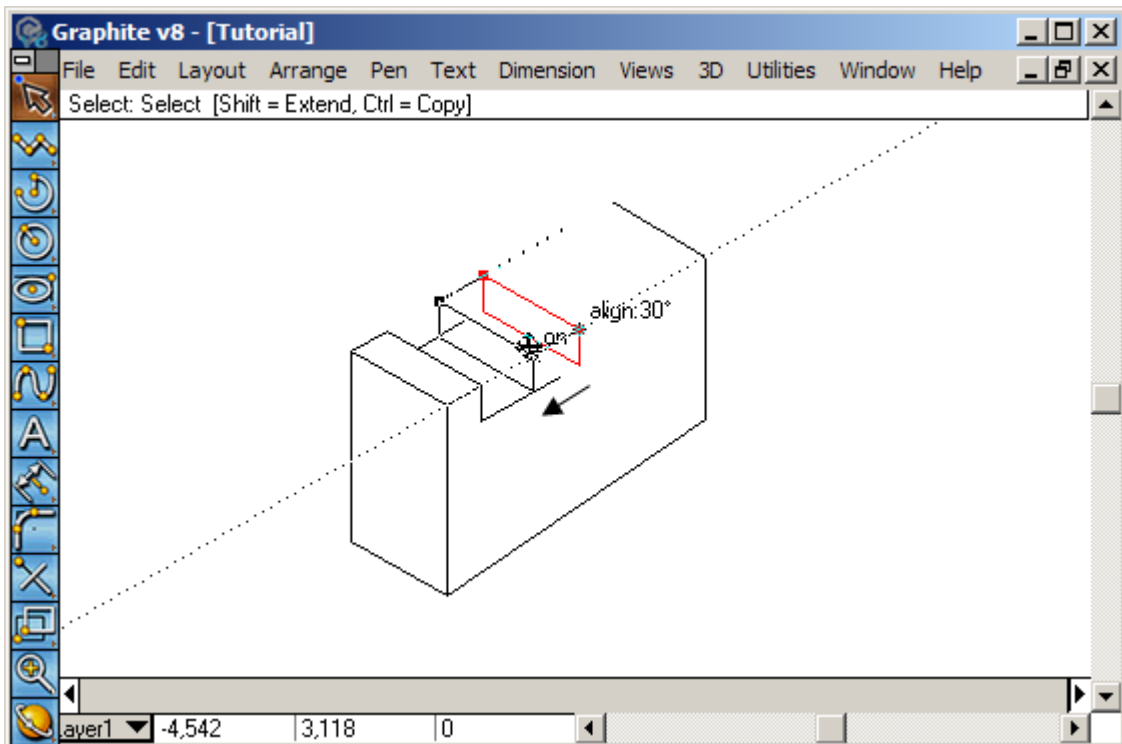14. Click in white space to deselect everything.

    Now a different selection can be made and it is possible to work on further modifications.

15. Drag a new selection fence, as shown, to enclose the back part of the notch.
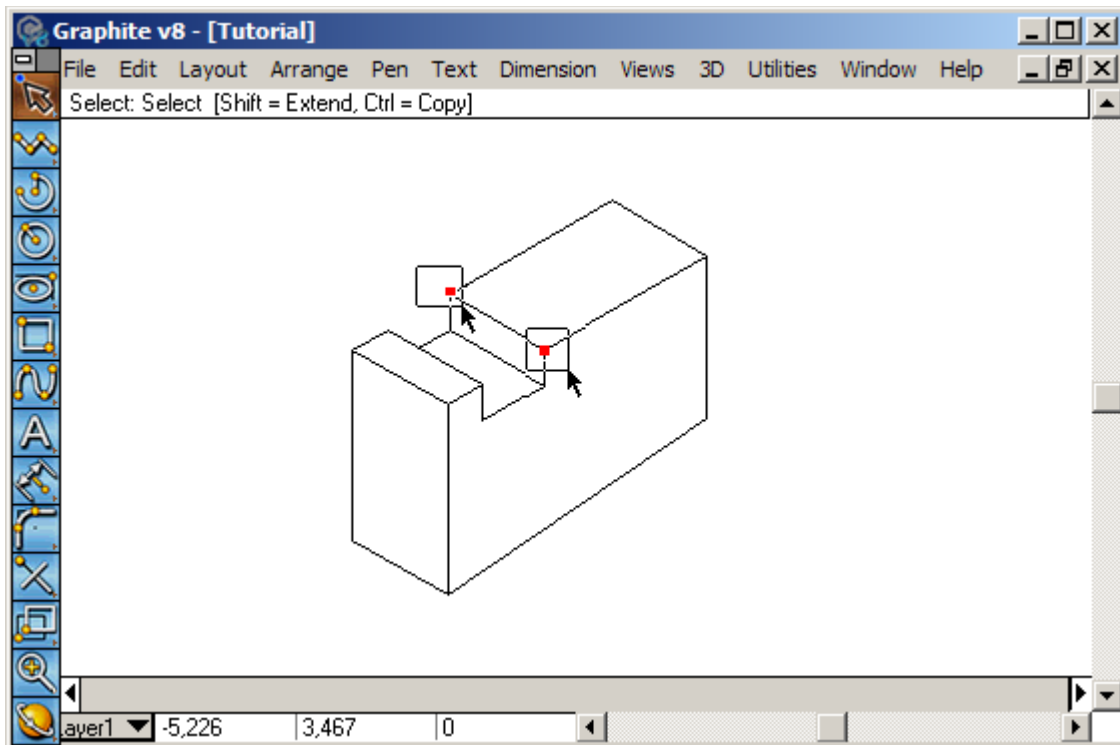

16. Grab one of these selected points and move the back wall along the 30° line of the top of the block to make the notch narrower.
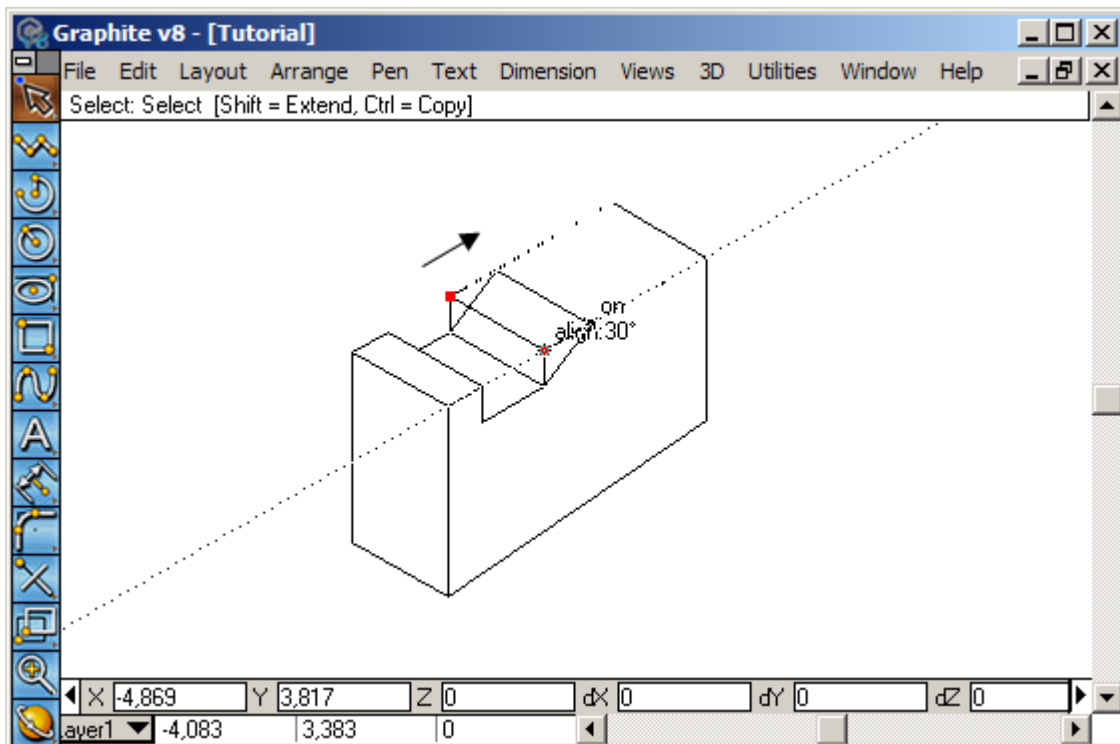
    Modify the width of the notch to make it wider or narrower. Slide the side of the notch so that it becomes narrower, somewhat like the illustration shows.
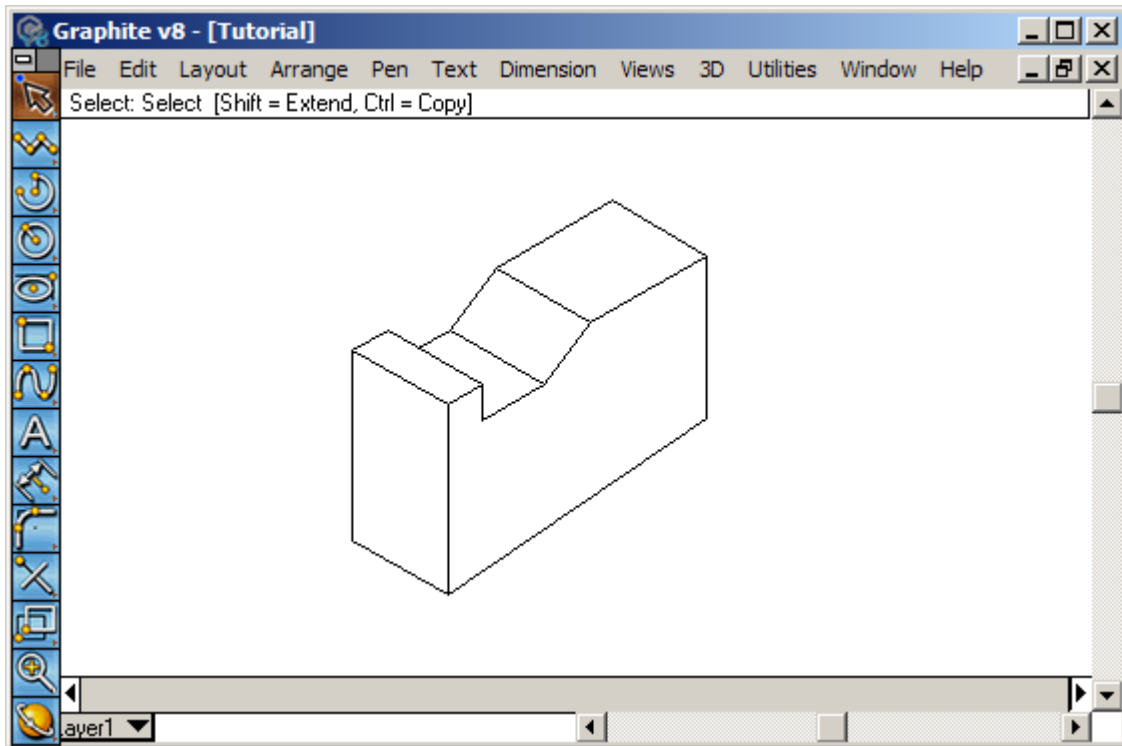
17. Deselect everything again.

18. While holding the Shift key, drag two small selection fences, as shown, to select the two endpoints at the top of the far wall of the notch.

19. Drag these two points back along the top of the part to tilt the back face of the notch.

This finishes the notch. Now move into doing circular geometry, which is somewhat more complicated than drawing straight lines.
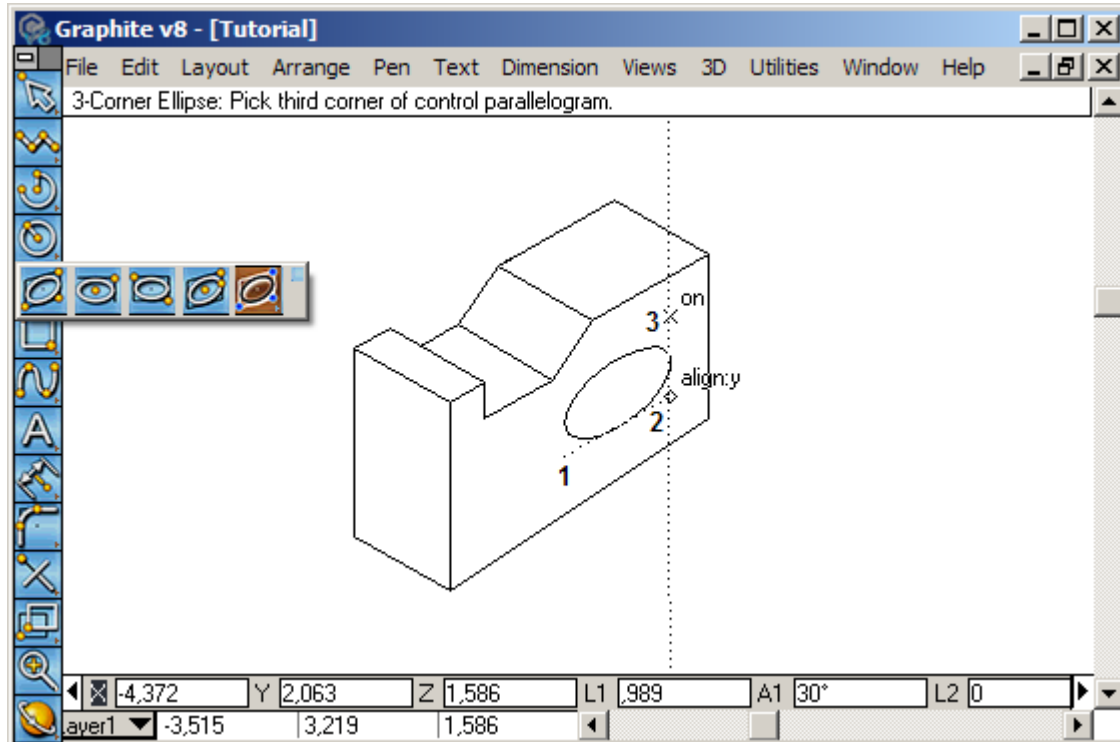

Next put a hole in the side of the block. Working in 2D Isometric, use an ellipse to represent the hole on the side.

Graphite has four Ellipse tools. The first two tools draw ellipses that are defined by rectangles whose sides are horizontal and vertical so these two tools will not work for this situation. The last two Ellipse tools create an ellipse with a slanted parallelogram, which is perfect for this exercise.

20. Pick the last Ellipse tool from the Ellipse subpalette.

    It is called the 3-Corner Ellipse tool. This tool requires defining three corners of a skewed rectangle that will surround the ellipse.

21. Roughly as shown in the illustration above, click three points that will define a slanted ellipse.

    It is not necessary to get the ellipse exactly right when it is first put on the screen, because new numbers will be typed into the status line to define a perfect isometric ellipse. (Notice in the illustration that the ellipse appears to be a bit squashed.)

Notice at the bottom of the screen there are two data fields in the Status Line; one for L1 and one for L2. L1 is the distance along the bottom of the ellipse. L2 is the distance along the side. (L1 is the distance between the first click and the second click and L2 is the distance between the second and third clicks.) In order to define this ellipse as an isometric circle, make these two values be the same.

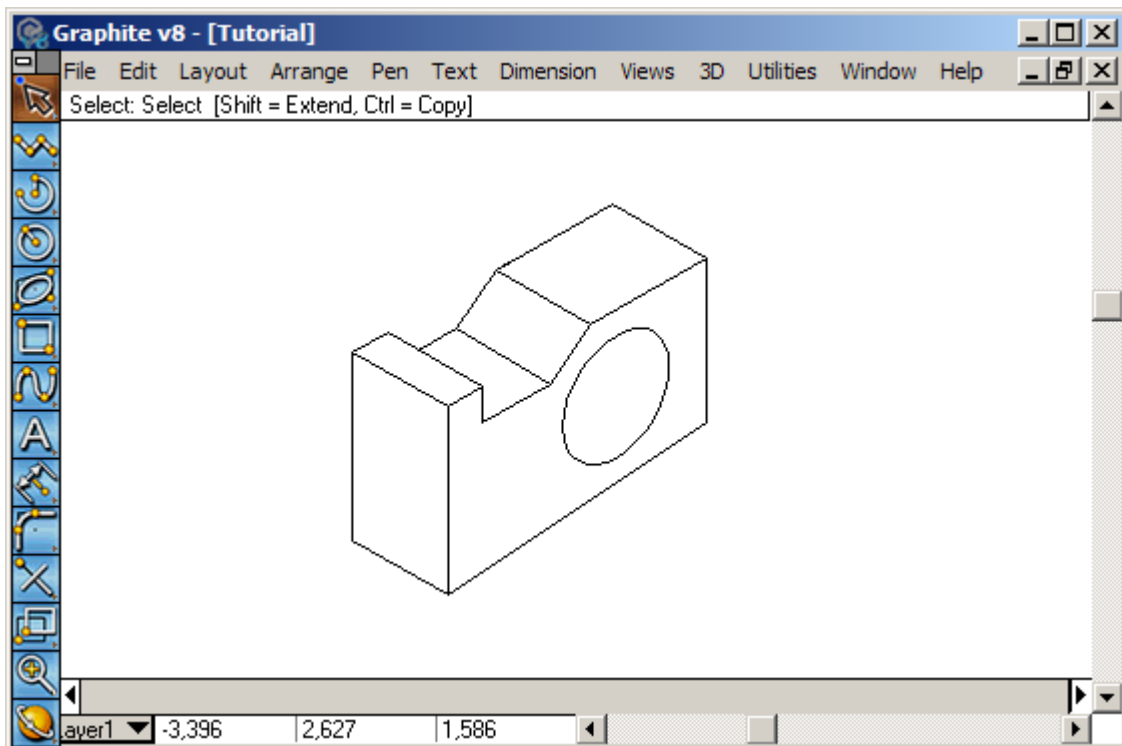22. Using the Tab key, tab over until the value in L1 is highlighted.

   Look at the values of L1 and L2 and compare them to the way the ellipse looks and make some judgment on what value to type into these two fields. In the case of this example the values are both 1.25.

23. Enter the value chosen into the L1 field.

   DO NOT press the Enter key yet.

24. Press the Tab key twice to move over to the L2 field and enter the same value.
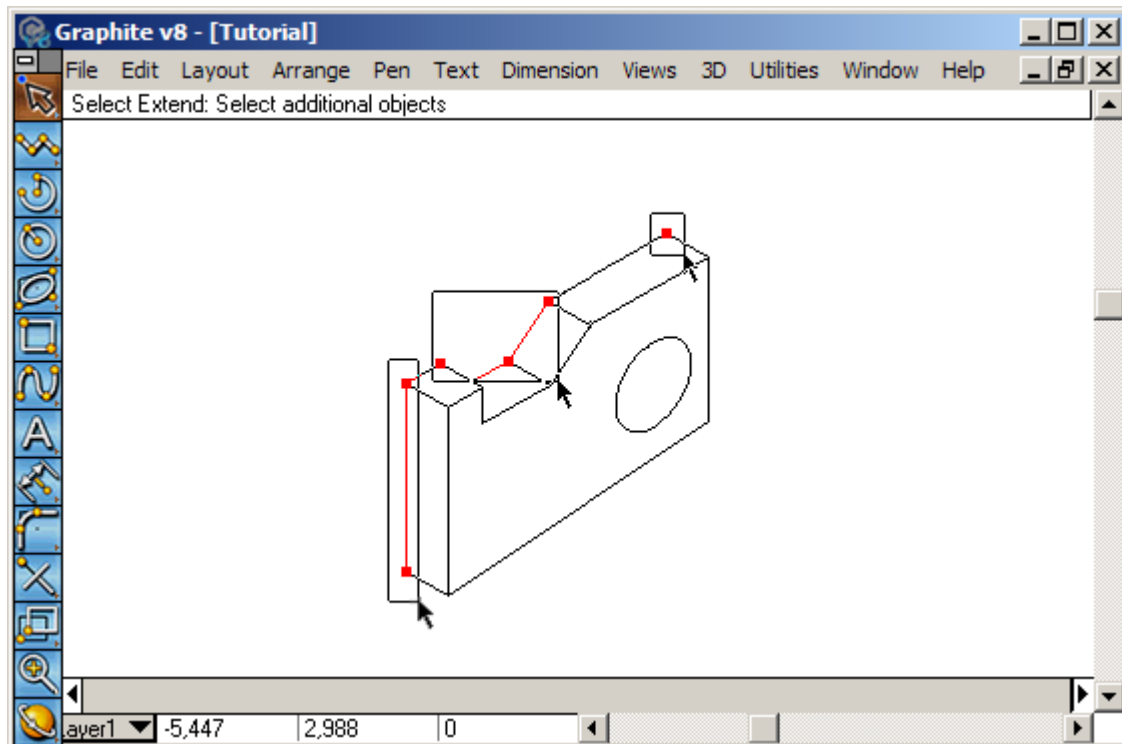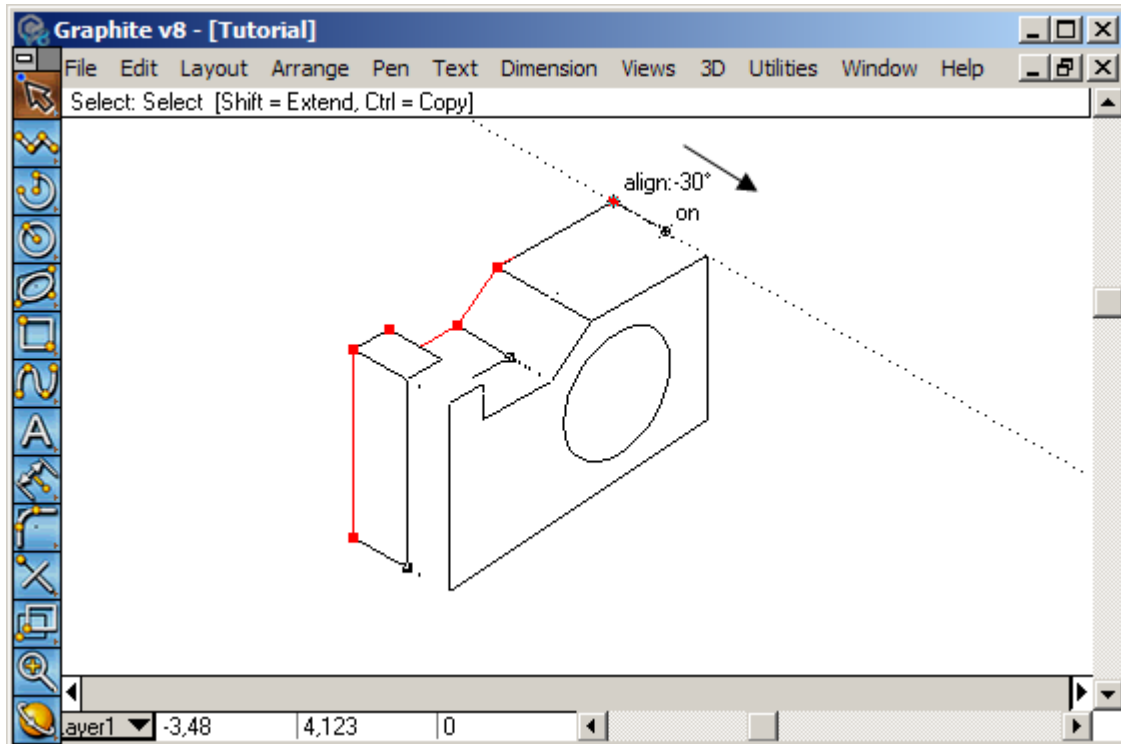
25. Now press the Enter key.

The same process works if a new isometric circle is put on the top face, or on the left face. Place an ellipse on the part and fix it with the LI and L2 fields in the Status Line.

Next, show the hole going all the way through the part. To show that more clearly, make the entire part a bit thinner.

26. Hold down the Shift key and drag three selection fences as shown to select all the points that make up the back face.

> *The endpoints and the back-face objects will all become selected. Only the objects that are completely enclosed in the selection fences get selected.*

27. Grab any one of these selected points and slide the back face closer to the front face.
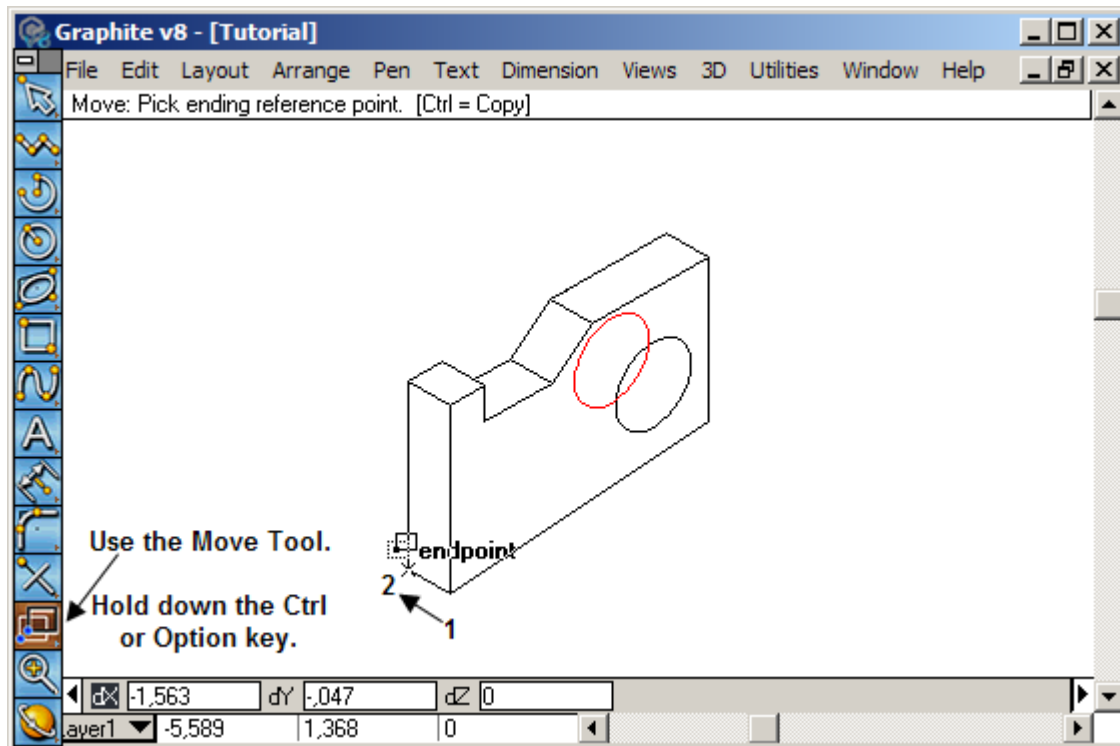

Now that the part is thinner, it will be easier to make the hole look like it goes all the way through the part. Do this by moving a copy of this circle from the front face to the back face, and then trim out the part of the back circle that will not show.

28. Using the Selection tool, select the ellipse.

29. Pick the Move tool from the tool palette.

> *Although it would be possble to do this copy operation with the Selection tool, try using the Move tool. In certain operations the Selection tool will not work as a move tool. Specifically, to move something an exact numerical distance, use the Move tool.*

30. Hold down the Ctrl (PC) or Option (Mac) key and click at Point 1 and then Point 2, as shown in the illustration.
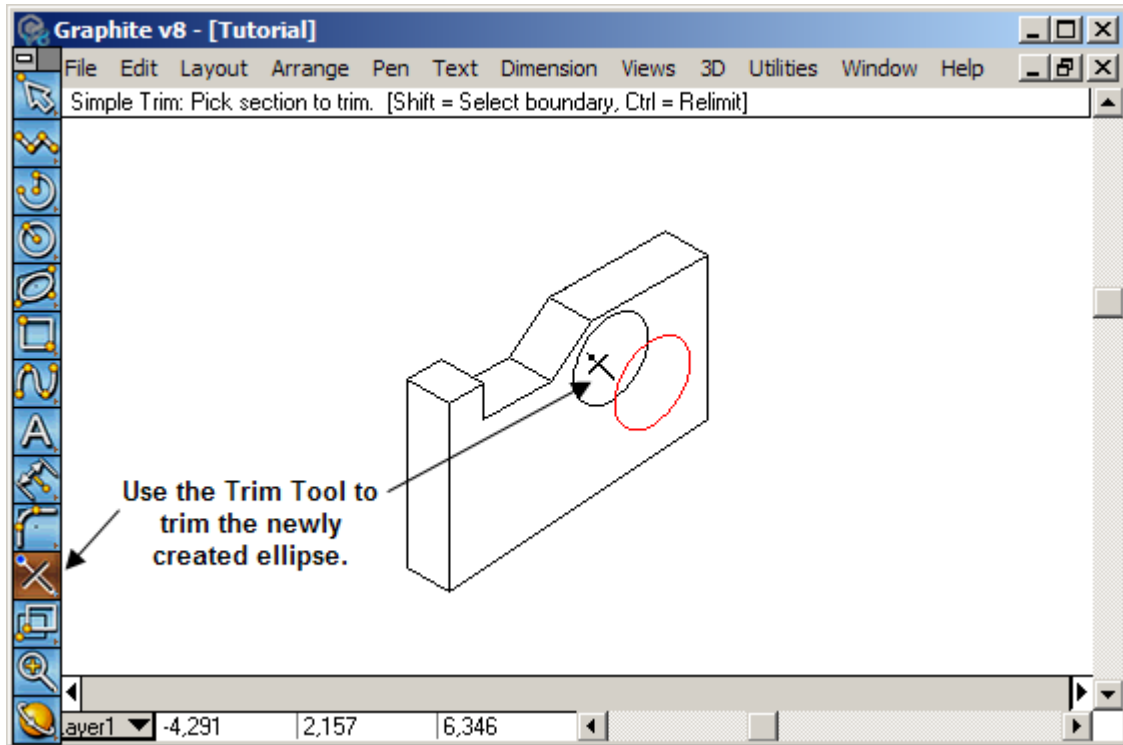

When doing this, the ellipse moves exactly the right amount in the correct direction. It is not necessary to click or grab right on the object to move. With the Move tool, indicate a move vector that can be anywhere on the screen. It does not have to start or end on the selected object(s). In this illustration, we took advantage of some nearby geometry that exactly defined the move vector. Hold down the Ctrl (PC) or Option (Mac) key to get a copy when moving the ellipse.
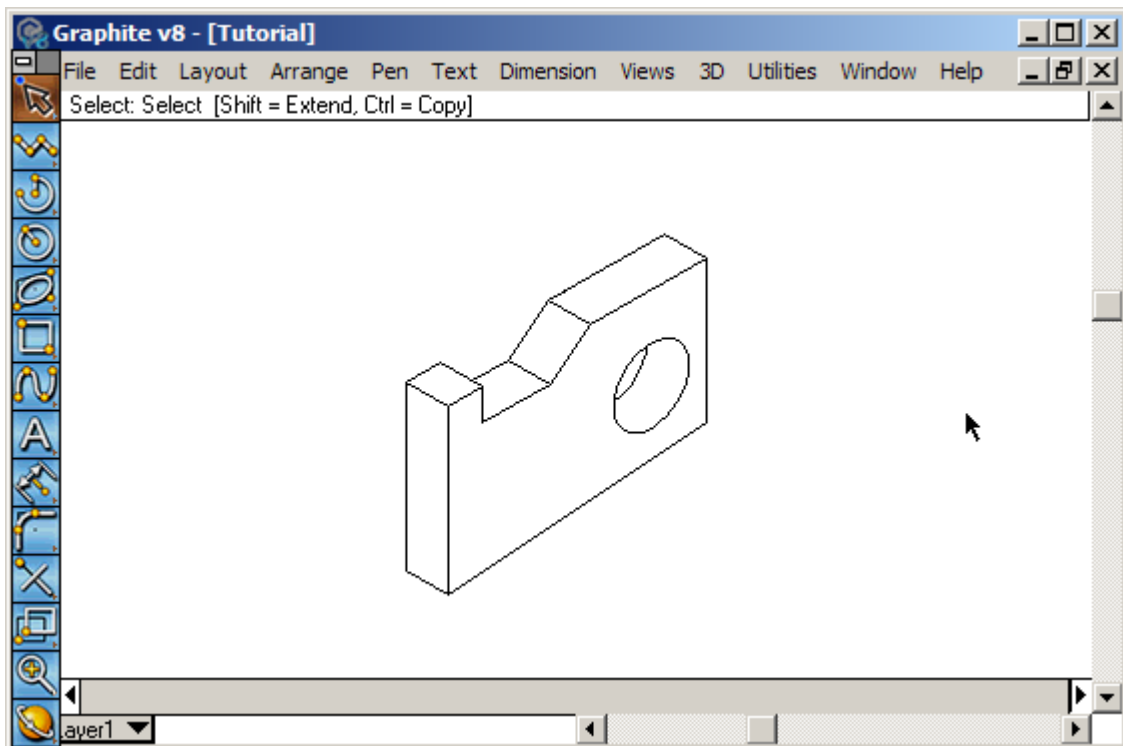
31. Now select the front ellipse with the Selection tool.

   This ellipse will act as the trim boundary to get rid of the part of the rear ellipse that will not be seen.

32. Get the Simple Trim tool and click on the back ellipse, as shown.

33. Get the Selection Tool and click in white space to deselect everything.

It is far more likely to create this part in 3D than to flatten an Isometric View to trim out the hidden lines. Do not underestimate the power of doing this in 2D to enhance some of your drawings.