

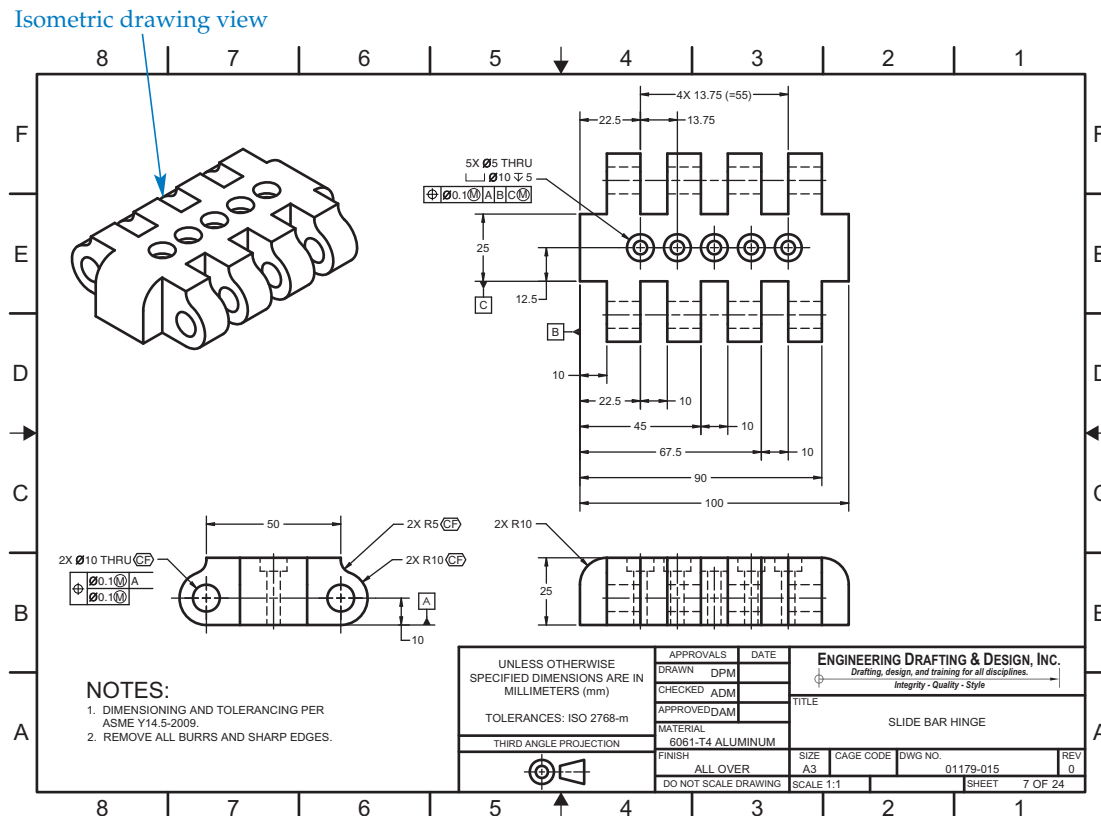
# Introduction to Isometric Drawings

A *pictorial drawing* shows the height, width, and depth of an object in a single view. The most common type of pictorial drawing used in the drafting industry is the isometric drawing. An *isometric drawing* is a view in which all three axes appear at equal 120° angles with the plane of projection. See **Figure 3A-1**. This supplement focuses on commands and drawing aids that help you create 2D isometric views that look 3D, as if the object tilts toward you. However, a 3D model provides a better way to display isometric views for most applications. *AutoCAD and Its Applications—Advanced* describes how to construct 3D models.

The term *isometric* means equal (iso) measure (metric). An isometric drawing has no perspective. Therefore, edges that are equal in length are drawn equal in length. The angles between the three principal planes and edges of an object are equal. See **Figure 3A-2A**. Lines that are parallel to the isometric axes form measurable lines and are called *isometric lines*.

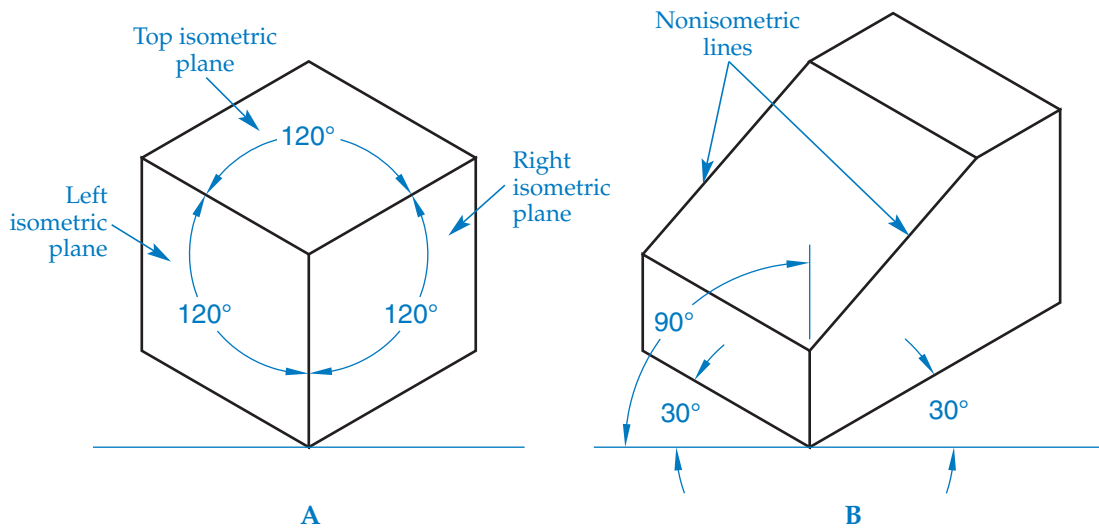
**Figure 3A-1.**

An example of a 2D mechanical part drawing with an isometric view used to help visualize the product.



**Figure 3A-2.**

A—An isometric drawing creates equal angles between the three principal planes and edges of an object. B—An example of an isometric drawing with isometric and nonisometric lines.



The vertical edges of an object in an isometric view are parallel to each other and form isometric lines 90° from horizontal. The horizontal edges of an object in an isometric view are parallel to each other and form isometric lines 30° from horizontal. Lines that are not parallel to the isometric axes cannot be measured and are called *nonisometric lines*. See [Figure 3A-2B](#).

Circular features appear elliptical in an isometric drawing. The **Isocircle** option of the **ELLIPSE** command, described in Chapter 4, allows you to construct isometric circles and arcs easily. Isometric text uses a specific oblique angle and rotation depending on the plane and drawing application. Chapters 9 and 10 cover AutoCAD text.

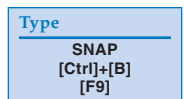
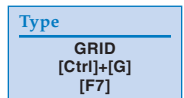
## Isometric Snap Mode

Once you understand the geometric layout of an isometric view, you can use any point entry method to construct an isometric drawing. Polar coordinates and dynamic input or dimensional input are common basic point entry options for isometric construction because they allow you to specify angles. Polar tracking set to 30° increment angles is also an effective method. One of the most useful aids for isometric drawing is isometric snap mode.

A quick way to switch isometric snap mode on and off is to pick the **Isometric Drafting** button on the status bar. You can also use the **Snap and Grid** tab of the **Drafting Settings** dialog box to set isometric snap. See [Figure 3A-3](#). A quick way to access the **Snap and Grid** tab is to right-click on the **Snap mode** button or pick the **Snap mode** flyout on the status bar and select **Snap Settings....** Pick the **Isometric snap** radio button in the **Snap type** area to activate isometric snap.

Specify the snap increment using the **Snap Y spacing:** text box in the **Snap spacing** area and the grid spacing using the **Grid Y spacing:** text box in the **Grid spacing** area. You can only set the Y snap and grid spacing. The X spacing is not applicable because the X axis relates to horizontal measurements. For the same reason, you must also check **2D model space** in the **Grid style** area to display the grid as a pattern of dots.

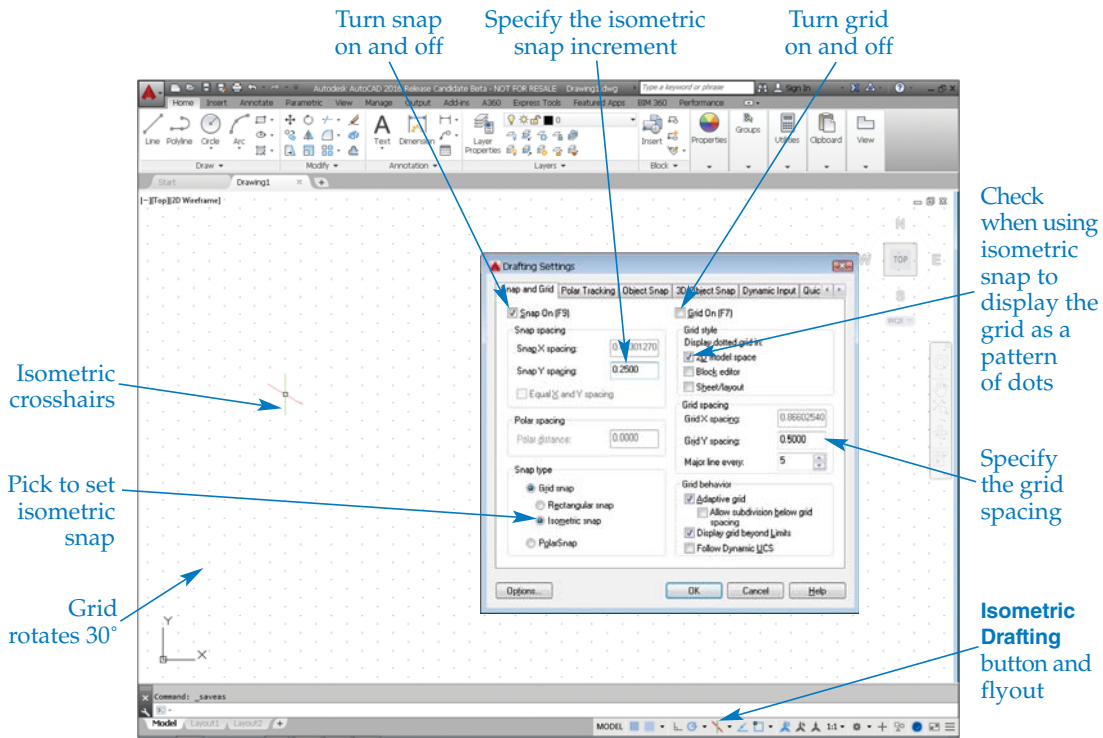
After you activate isometric snap mode, and grid mode, if desired, you are ready to begin drawing. As shown in [Figure 3A-3](#), the grid and crosshairs rotate to an isometric orientation that aids in drawing objects at isometric angles. [Figure 3A-4](#) shows the steps required to construct an isometric cube using the **LINE** command. Apply the same techniques to drawing other objects. Notice that isometric snap can be very helpful when you are constructing isometric lines.



DSETTINGS  
GRID  
SNAP

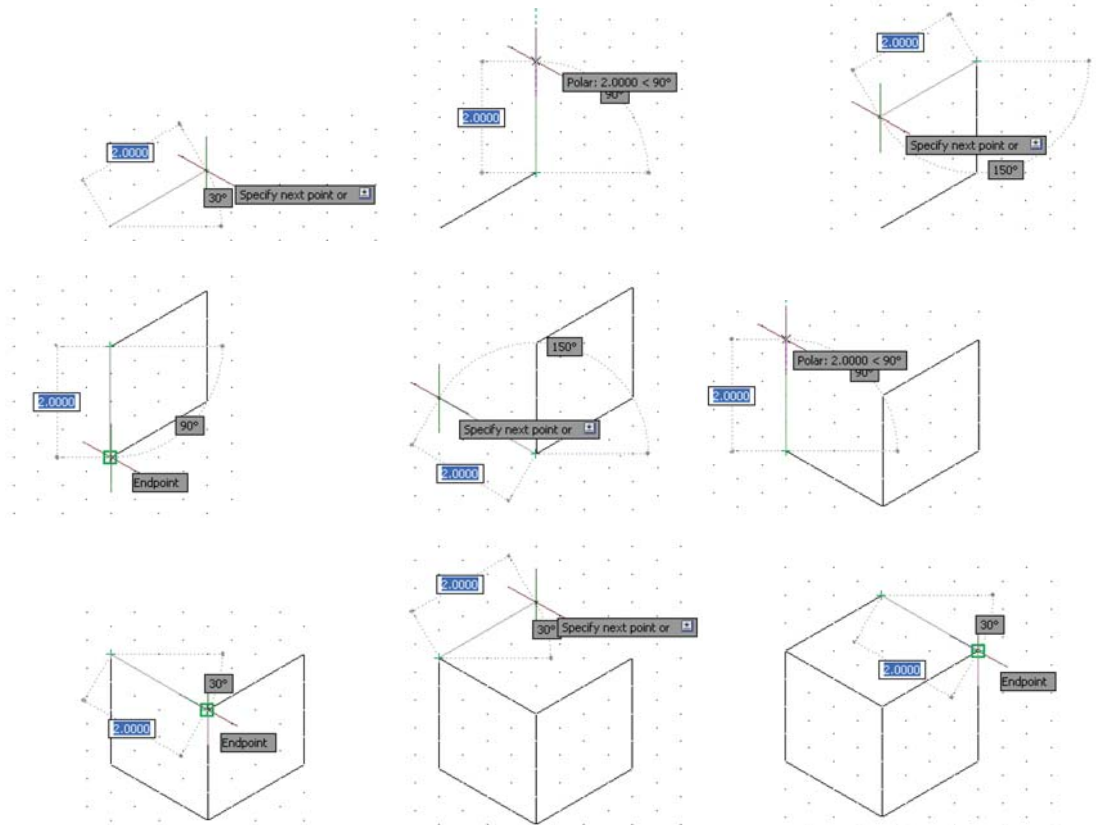
**Figure 3A-3.**

Use the **Snap and Grid** tab of the **Drafting Settings** dialog box to specify isometric grid and snap settings. To quickly toggle isometric snap on and off, pick the **Isometric Drafting** button on the status bar.



**Figure 3A-4.**

Creating a 2 unit  $\times$  2 unit cube using isometric snap and grid. Other default drawing aids are also on to help describe the construction process.



## Specifying the Isometric Plane

Isometric snap and grid modes orient the snap and grid to isometric angles. You can align the crosshairs with the left, right, or top isometric plane, depending on the plane on which you plan to draw. Each of the three isometric planes is referred to as an *isoplane*. See [Figure 3A-5](#). Changing the isoplane is not required for drawing isometric lines, but doing so can be helpful for visualization and drawing ease. You must change the isoplane orientation to construct isometric circles and arcs using the **Isocircle** option of the **ELLIPSE** command, described in Chapter 4. To specify the appropriate isoplane, right-click on the **Isometric Drafting** button or pick the **Isometric Drafting** flyout on the status bar and select from the list, or access the **ISOPLANE** command and select an option. You can also press [F5] repeatedly to cycle through isoplanes.

Type  
ISOPLANE  
[F5]

ISOPLANE

### NOTE

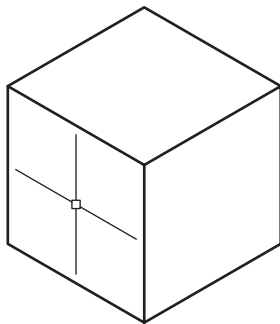
When isometric snap is active, the crosshairs is always oriented with the specified isoplane. The isoplane does not apply to window or crossing selection and similar operations that use a box to make a selection.

### NOTE

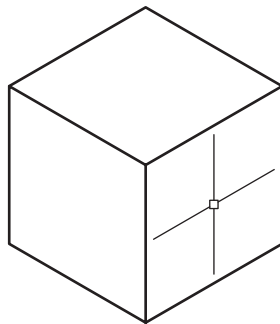
Some of the following activities require the use of a decimal-unit isometric template with active isometric snap and grid modes. If you do not have such a template, create it now. Then use it as indicated in these activities.

**Figure 3A-5.**

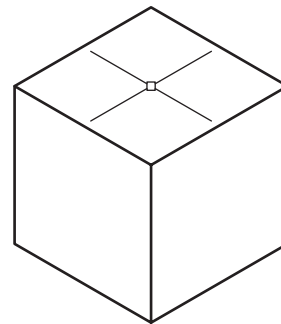
Adjusting the isoplane orientation of the crosshairs to match a specific isometric plane.



**Left Isoplane**  
150° "X axis"  
90° "Y axis"



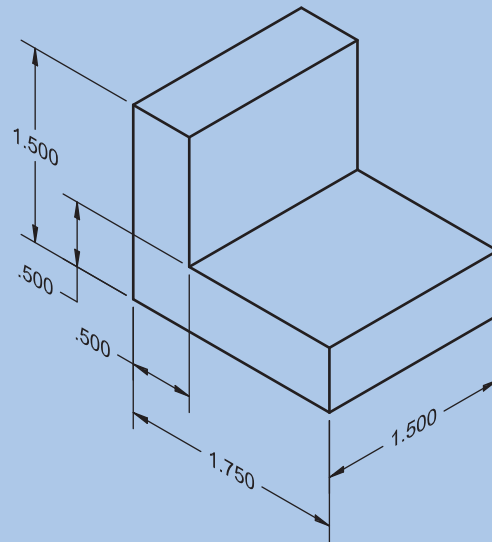
**Right Isoplane**  
30° "X axis"  
90° "Y axis"



**Top Isoplane**  
150° "X axis"  
30° "Y axis"

### Activity 3A-1

1. Start a new drawing from scratch using the imperial format. Save the drawing as ACT3A-1.
2. Pick the **Isometric Drafting** button on the status bar to activate isometric snap.
3. Access the **Snap and Grid** tab of the **Drafting Settings** dialog box. The **Isometric snap** radio button should be selected. Enter .25 for the Y snap and grid spacing values, and pick the **2D model space** check box.
4. Toggle grid mode on from the status bar if it is not active.
5. Access the **LINE** command and use isometric snap and the grid to draw the isometric view shown below. Change the isoplane orientation as appropriate for drawing objects on each isometric plane. Do not dimension the drawing.

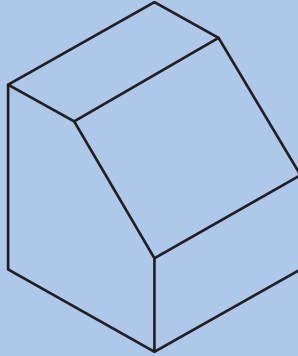


6. Resave and close the file.

## Activity 3A-2

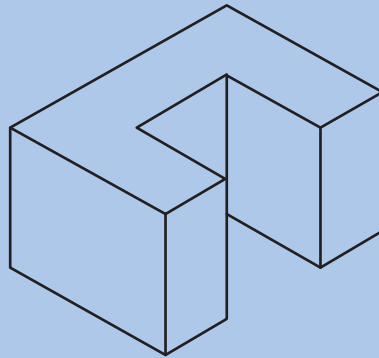
For each of the following isometric drawings, start a new drawing using a decimal-unit isometric template that includes active isometric snap and grid modes. Draw an isometric part view similar to each drawing using dimensions of your choice. Save the drawings using the file names shown.

1.



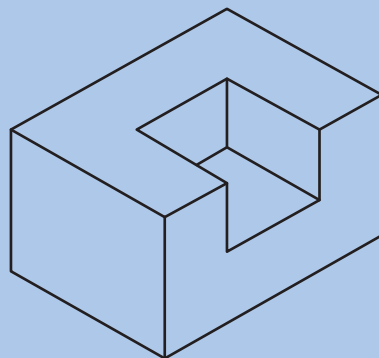
File name: ACT3A-2A

2.



File name: ACT3A-2B

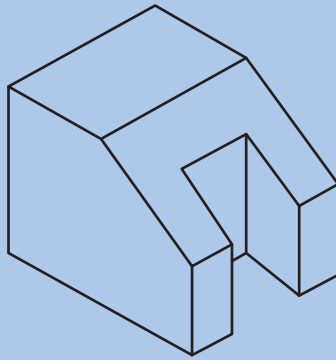
3.



File name: ACT3A-2C

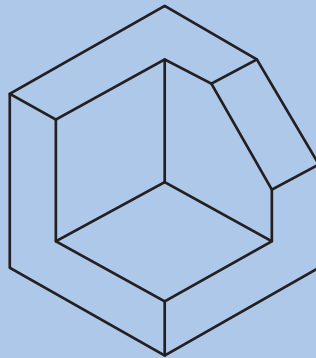
*Continued*

4.



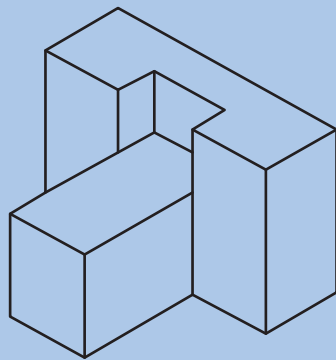
File name: ACT3A-2D

5.



File name: ACT3A-2E

6.



File name: ACT3A-2F