Tutorial 4: Precision Drawing in AutoCAD 2010

Audience: Users new to AutoCAD

Prerequisites: None

Time to complete: 15 minutes

In This Tutorial

In this tutorial, you learn to use precision drawing tools to:

NOTE For more information on the topics covered in this tutorial, see the *AutoCAD User's Guide.*

- Set up a framework to use as a guide while drawing

- Align objects and visualize the distances between them

- Determine precise locations of objects in a drawing

- Specify angles and distances

Tutorial Files

Download the tutorial files as follows:

1 Download the *precision_drawing.zip* from
  http://www.autodesk.com/autocad-tutorials.

2 Unzip *precision_drawing.zip* to *C:\My Documents\Tutorials*.

Lesson 1: Set Grid and Snap Values

The grid and snap features set up a framework that you can use as a guide while drawing.

- **Grid** is a rectangular pattern of dots that extends over the area you specify as the grid limits. Using the grid is similar to placing a sheet of grid paper under a drawing. The grid helps you align and visualize the distance between objects. The grid does not appear in the plotted drawing.

- **Snap** restricts the movement of the crosshairs cursor to an interval that you define. When Snap mode is on, the cursor adheres or "snaps" to an invisible grid. Snap mode is useful for specifying precise points with the cursor.

To display the grid

1 To open AutoCAD, click Start menu (Windows) ➤ (All) Programs ➤ Autodesk ➤ AutoCAD 2010 ➤ AutoCAD 2010- English. The AutoCAD window opens with an empty drawing file named *Drawing1.dwg*.

2 Check the status bar to make sure you are in the 2D Drafting & Annotation workspace.

3 On the status bar, click the Grid Display button to turn it on.

NOTE If you do not see the Grid button, right-click the status bar and click Status Toggles ➤ Grid (F7).

A grid is displayed in the drawing area. Notice that it covers a limited area, the grid limits.
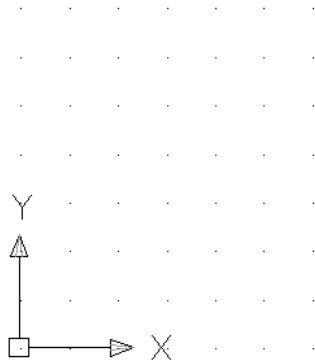
To set grid spacing

1 On the status bar, right-click the Grid button. Click Settings.

**2** In the Drafting Settings dialog box, Snap and Grid tab, ensure that Grid On (F7) is selected.
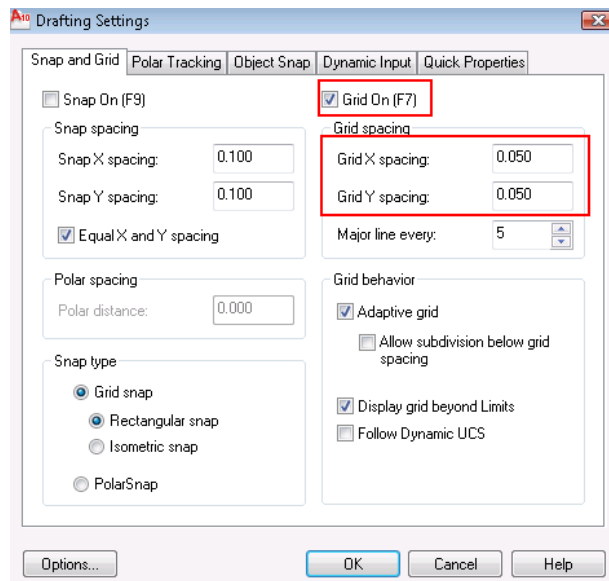
3 Under Grid Spacing, do the following:

- In the Grid X Spacing box, enter **0.0500** to set the horizontal grid spacing in units.

- In the Grid Y Spacing box, enter **0.0500** to set the vertical grid spacing in units.

4 Click OK.
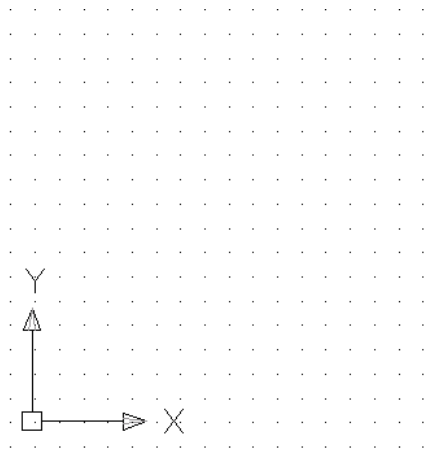
The spacing between the grid is now smaller.

To set the grid limits

1 The LIMITS command controls the drawing area covered by the grid. At the Command prompt, enter **limits** and press Enter.
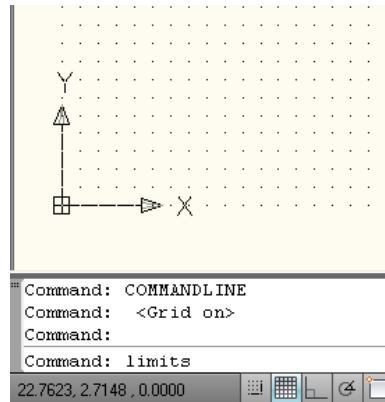
2 At the Command prompt, press Enter to accept the default coordinate value of 0,0. to specify the lower left corner of the drawing limits.
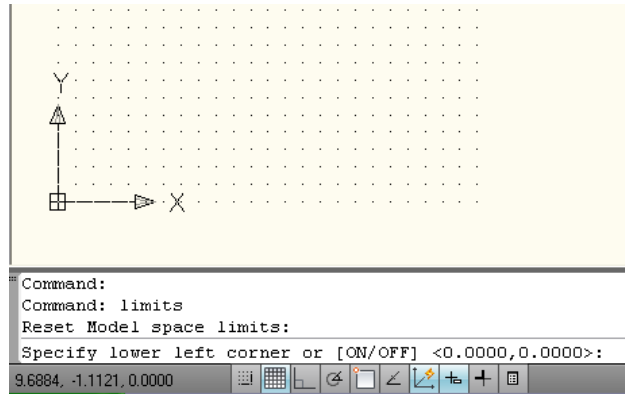
3 At the Command prompt, enter **480,360** and press Enter to specify the upper-right corner of the grid limits. The grid expands to cover a larger section of the drawing area.

To turn on Snap mode

**1** On the status bar, click the Snap Mode button to turn it on.

NOTE If you do not see the Snap Mode button, right-click the status bar and click Status Toggles ➤ Snap (F9).

2 Move the cursor around in the drawing area while Snap mode is turned on. Notice that the cursor snaps to points at equal intervals in the drawing area.

To set snap spacing

1 On the status bar, right-click the Snap Mode button and click Settings.

2 In the Drafting Settings dialog box, Snap and Grid tab, ensure that Snap On (F9) is selected.

3 Under Snap Spacing, do the following:
   ■ In the Snap X Spacing box, enter **0.500** to set the horizontal snap spacing value in units.

■ In the Snap Y Spacing box, enter **0.500** to set the vertical snap spacing value in units.
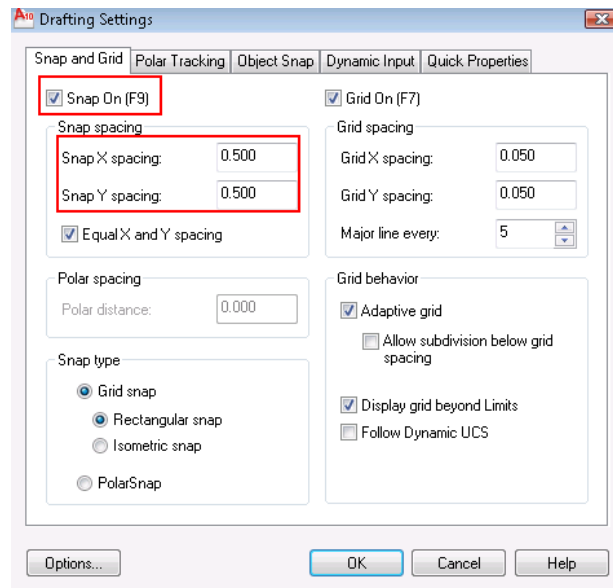
4 Click OK.

Lesson 2: Snap to Precise Points on Objects

Using object snaps is the best way to specify an exact location on an object without having to use coordinates. For example, you can use an object snap to draw a line to the exact center of a circle, to the endpoint of another line segment, or to the tangent of an arc.

You can specify an object snap whenever you are prompted for a point. By default, a marker and a tooltip are displayed when you move the cursor over an object snap location on an object. Object snaps include a visual aid called AutoSnap™ to help you see and use object snaps more efficiently.

To display and enable object snaps

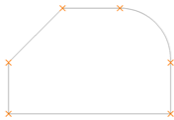**1** On the status bar, click the Object Snap button to turn it on.

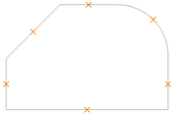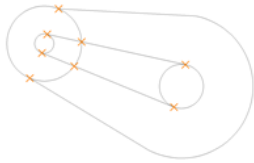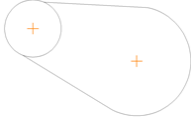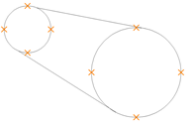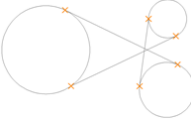**NOTE** If you do not see the Object Snap button, right-click the status bar and click Status Toggles ➤ OSnap (F3).

2 At any prompt that requests a point, you can specify a single object snap by holding down Shift, right-clicking, and choosing an object snap from the Object Snap menu.
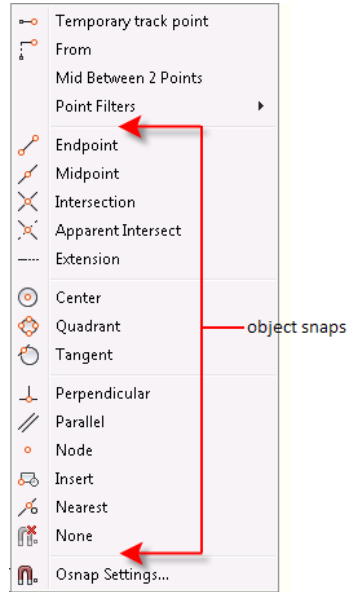
The following table illustrates commonly used object snaps.

Object Snap		Snaps to
Endpoint		Object endpoints
Midpoint		Object midpoints

| Object Snap		Snaps to
Intersection		Object intersections or, for single object snaps, locations where intersections would occur if objects were extended
Center		Center points of circles, arcs, or ellipses
Quadrant		Quadrants of circles, arcs, or ellipses.
Perpendicular		Points on objects that form a perpendicular alignment with the last point specified
Tangent		Point on a circle or arc that, when connected to the last point, forms a tangent line to the object

To specify an object snap

1 With *Drawing1.dwg* open, on the ribbon, click Home tab ➤ Draw panel ➤ Line.
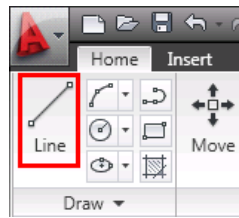
2 Draw a line in the middle of the drawing area.

3 On the ribbon, click Home tab ➤ Draw panel ➤ Circle

drop-down ➤ Center, Radius.

4 Press and while holding down Shift, right-click in the drawing area and select Midpoint from the Object Snap menu. This specifies the center point for the circle

5 Move the cursor over the middle of the line.

If AutoSnap is on, the cursor should automatically lock onto the nearest midpoint object snap location and the marker and tooltip.
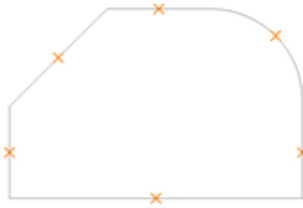
Pick in the drawing area to snap to the midpoint of the line. Specify the radius of the circle as **2**.
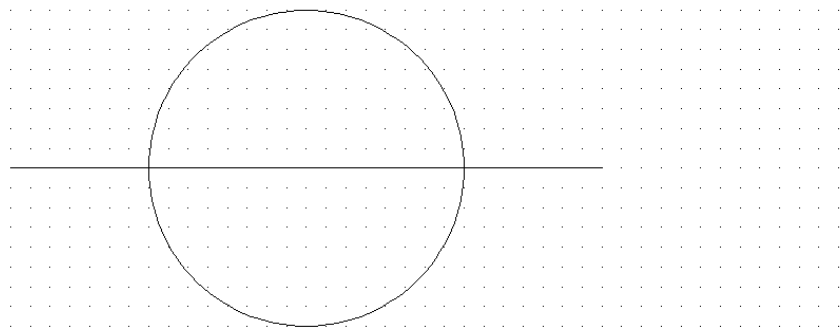
To set running object snaps

To use the same object snap repeatedly, you can set it as a running object snap. It will stay active until you turn it off. You can set multiple object snaps, such as Endpoint and Center, as running object snaps. Running object snaps can be turned on and off from the status bar.

1 On the status bar, right-click the Object Snap button and click Settings.

2 In the Drafting Settings dialog box, Object Snap tab, click Clear All and then select:

- Endpoint

- Midpoint

- Center
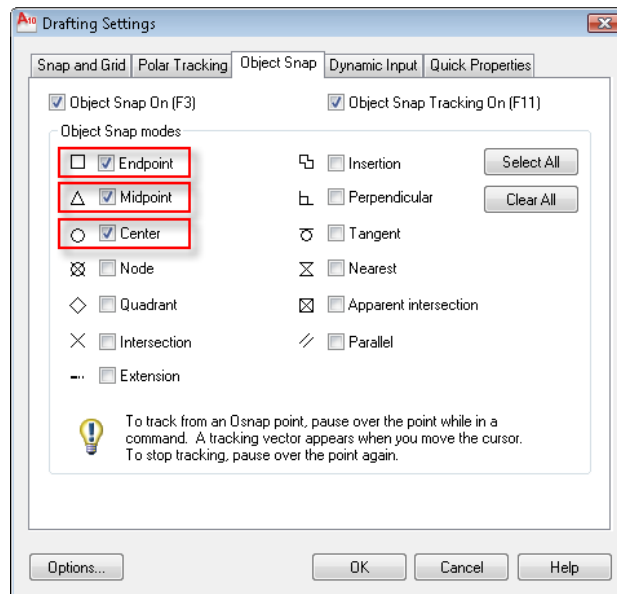
3 Click OK.

4 Draw several lines and circles using object snaps to locate points precisely.

Lesson 3: Specify Angles and Distances

In this lesson, you learn how to specify distances and angles using polar tracking, direct distance entry, and angle overrides.

As you draw lines or move objects, you can use polar tracking to restrict the movement of the cursor to specified angle increments (the default value is 90 degrees).

For example, you can create a series of perpendicular lines by turning on polar tracking before you start drawing. Because the lines are constrained to the horizontal and vertical axes, you can draw faster, knowing that the lines are perpendicular.

**To display and turn on polar tracking**

■ On the status bar, click the Polar Tracking button to turn it on.

> **NOTE** If you do not see the Polar Tracking button, right-click the status bar and click Status Toggles ➤ Polar (F10).

To use polar tracking

1 On the status bar, right-click the Polar Tracking button and click Settings.

2 In the Drafting Settings dialog box, Polar Tracking tab, ensure that Polar Tracking On (F10) is selected.

3 Under Polar Angle Settings, do the following:

   ■ In the Increment Angle drop-down list, select 45.

   ■ Click New and enter **60** to add a custom polar angle. Additional angles are absolute, not incremental.
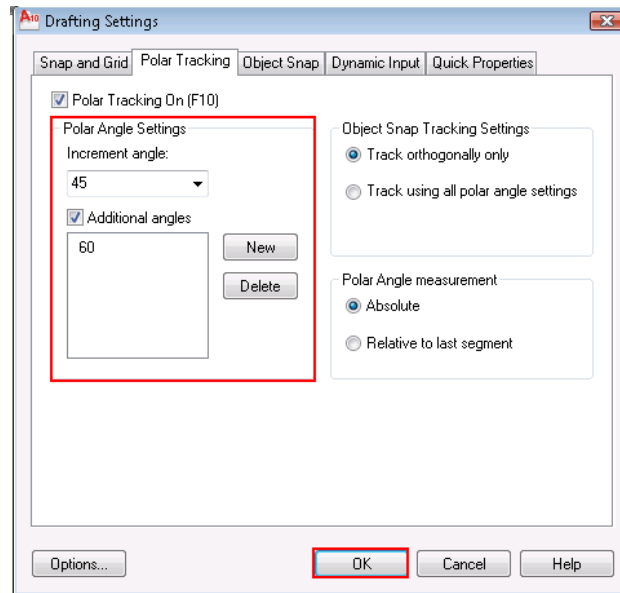
4 Click OK. Draw several lines at 45 and 60 degrees from each other. Notice that the lines snap to the angles specified. Delete the lines before going to the next exercise.
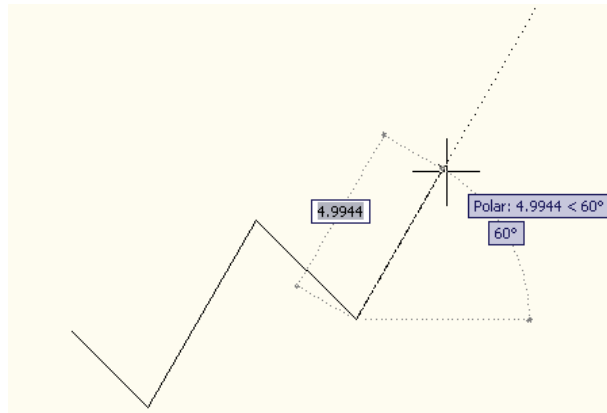

To draw objects using polar distance

You can use direct distance entry to specify a coordinate value by moving the cursor to indicate a direction and then entering a distance from the previous

point. When polar tracking is on, using direct distance entry helps you draw lines at a pre-defined angle with a specified length
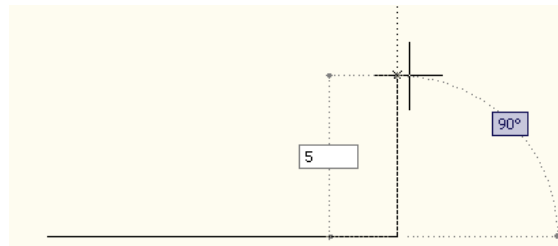
1   Ensure that Polar Tracking is on.

2   On the ribbon, click Home tab ➤ Draw panel ➤ Line.
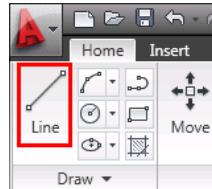
3   Click in the drawing area to specify the first point and then move the cursor to the right (0 degrees).

4   Enter **10** in the dynamic prompt to specify the distance and press Enter.

5   Move the cursor up 90 degrees, enter **5** to specify the next point, and press Enter.


6   Repeat several more times and press Enter to finish. Delete lines before going to next exercise.

To lock an angle for one point (angle)

If the angle that you want to use is not going to be used frequently, you can enter an angle override. For example, if you start drawing a line at the coordinate 5,5, and want that line to be at a 10 degree angle with a length of 20, you would do the following:

1   On the ribbon, click Home tab ➤ Draw panel ➤ Line.
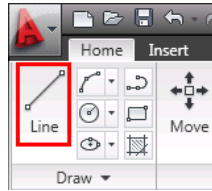
2 At the prompt, enter **#5,5** to specify the first point and press Enter.

3 At the prompt, enter **<10** to enter the angle override, and press Enter.
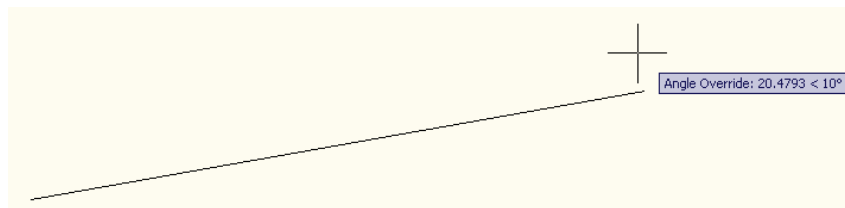
4 Move the cursor in the desired direction.

5 Enter **20** and press Enter. You have drawn a line at a 10 degree angle with a length of 20.