Learning Objectives

After completing this chapter, you will be able to:

✓ Use grips to stretch, move, rotate, scale, mirror, and copy objects.
✓ Edit associative arrays.
✓ Adjust object properties using the Quick Properties panel and the Properties palette.
✓ Use the MATCHPROP command to match object properties.
✓ Edit between drawings.
✓ Use the ADDSELECTED command to draw an object based on an existing object.
✓ Create selection sets using the SELECTSIMILAR and Quick Select commands.

One approach to editing is to access a command, such as ERASE, FILLET, MOVE, or COPY, select the objects to modify, and follow prompts to complete the operation. This chapter explains the alternative approach of selecting objects first and then using editing commands or object properties to make changes. This chapter also describes additional selection options, selection set filters, and related tools.

Grips

Use the crosshairs to select objects and display grips. See Figure 13-1. Selected objects become highlighted and grips initially appear as unselected grips. Unselected grips are blue (Color 140) by default. Grips are specific to object type. Most objects include the standard filled-square grips at critical and editable points on the object. Several objects, including elliptical arcs, mtext, polylines, splines, associative arrays, tables, hatches, and blocks, also have specialized grips. For example, elliptical arcs include filled-arrow grips for adjusting the length of the elliptical arc. This textbook explains the grips specific to various object types when applicable.

Move the crosshairs over an unselected grip to snap to the grip. Then pause to change the color of the grip to pink (Color 11). Hovering over an unselected grip and allowing it to change color helps you select the correct grip, especially when multiple grips are close together. A tooltip or options may appear, depending on the object and grip.
Grips, Properties, and Additional Selection Techniques

Chapter 13

AutoCAD and Its Applications—Basics

Press [Esc] to deactivate the current grip operation. Press [Esc] again to deselect all objects and hide the grips. You can also right-click and pick Deselect All to deselect objects and hide all grips.

Use the options in the Grip Size and Grips areas of the Selection tab in the Options dialog box to control grip size and color.

**TIP**

You can perform some conventional operations by selecting objects before you access a command. For example, you can select objects to erase and then activate the ERASE command or press [Delete]. This technique is available by default and is controlled by the Noun/verb selection check box in the Selection Modes area of the Selection tab in the Options dialog box.

**Standard Grip Commands**

Standard grip boxes provide access to the STRETCH, MOVE, ROTATE, SCALE, and MIRROR commands. In addition, the Copy option of the MOVE command and sometimes, depending on the selected grip, the STRETCH command imitate the COPY command. Select grips to display options at the dynamic input cursor and at the command line. Do not attempt to use conventional means of command access, such as the ribbon. The first command is STRETCH, as indicated by the "STRETCH" Specify stretch point or [Base point/Copy/Undo/eXit]: prompt. Use the STRETCH command, or press [Enter] or the space bar or right-click and select Enter to cycle through the MOVE, ROTATE, SCALE, and MIRROR commands.

An alternative to cycling through commands is to select grips, right-click, and select an option from the shortcut menu. A third method to activate a command is to enter the first two characters of the command name. Type MO for MOVE, MI for MIRROR, RO for ROTATE, SC for SCALE, or ST for STRETCH.

**Stretching**

Stretching using grips is similar to stretching using the STRETCH command, except that the selected grip acts as the stretch base point. In addition, depending on the selected grip and type of object, stretching using a grip can result in a move, rotate, or scale operation. See Figure 13-3. Stretch individual grips, or select multiple grips as needed depending on the desired result. See Figure 13-4.

Use the Base point option to specify a base point instead of using the selected grip as the base point. Select the Undo option to undo the previous operation. Choose the eXit option or press [Esc] to exit without completing the stretch. When you finish stretching, the selected grips return to the unselected state. Press [Esc] to hide the grips.

Dynamic input and other drawing aids, such as polar tracking, are very useful for grip editing. Dynamic input is especially effective with the STRETCH grip command. Figure 13-5 shows an example of using dimensional input to modify the size of a circle or offset the circle a specific distance. In this example, enter the new radius of the circle in the distance input field, or press [Tab] to enter an offset in the other distance input field. Another example is modifying the length of an ellipse axis by selecting the appropriate quadrant grip and using dimensional input to edit the value. These are
Figure 13-3. Examples of using the \textit{STRETCH} grip command with dynamic input active. Note the selected grip in each case and the relevant dynamic input fields.

Figure 13-4. Stretching a drawing consisting of three lines and an arc. A—Select a corner to stretch. B—Hold down [Shift] to select multiple grips to stretch.

Figure 13-5. Using the dimensional input feature of dynamic input with the \textit{STRETCH} grip command.

just two examples of using dynamic input with grips. You can apply similar processes to edit most objects.

\textbf{PROFESSIONAL TIP}

Use grid snaps, coordinate entry, polar tracking, object snaps, and object snap tracking with any grip editing command to improve accuracy. When dynamic input is active, depending on the selected grip and type of objects, pressing [Tab] activates a different set of inputs. Press [Tab] until you receive the desired input fields.
Moving

To move objects using grips, select the objects to move, pick grips to use as the base point, and activate the \texttt{MOVE} grip command. Specify a new location for the base point to move the objects. See Figure 13-6. The \texttt{Base point}, \texttt{Undo}, and \texttt{eXit} options are similar to those for the \texttt{STRETCH} grip command.

Dragging and Dropping

You can also use a drag-and-drop operation to move objects. Select the objects to move and then press and hold down the pick button on a portion of any selected object, but do not select a grip. While still holding the pick button, drag the objects to the desired location and release the pick button to complete the move. Dragging and dropping is a quick method for moving objects in the current drawing or to another open drawing, but is inaccurate because you cannot use drawing aids.

Nudging

AutoCAD includes an option called \textit{nudging} that allows you to move objects orthogonally to the screen using the arrow keys. Nudging does not involve the use of grips. Disable \texttt{Snap} mode to nudge at 2-pixel increments. Enable \texttt{Snap} mode to nudge at the current snap grid spacing. Select the objects to move, hold down \texttt{[Ctrl]}, and use the arrow keys to move the selected objects right, left, up, or down. Each time you press an arrow key, the selected objects move two pixels or one snap spacing, depending on the current state of \texttt{Snap} mode.

Scaling

To scale objects using grips, select the objects to scale, pick a grip to use as the base point, and activate the \texttt{SCALE} grip command. Enter a scale factor or pick a point to increase or decrease the size of the objects. The \texttt{Base point}, \texttt{Undo}, and \texttt{eXit} options are similar to those for the \texttt{STRETCH} grip command.

Use the \texttt{Reference} option to specify a new size in relation to an existing size. The reference size is often the current length, width, or height of the objects. If you know the current size, enter the value at the prompt. Otherwise, pick two points to identify the size. Enter a value for the new size or pick a point. Figure 13-8 shows \texttt{SCALE} grip command options.
Mirroring

To mirror objects using grips, select the objects to mirror, pick a grip to use as the first point of the mirror line, and activate the MIRROR grip command. Then pick another grip or any point on-screen to locate the second point of the mirror line. See Figure 13-9. Unlike the non-grip MIRROR command, the grip version does not give you the immediate option to delete the old objects. Old objects are deleted automatically.

Exercise 13-5
Complete the exercise on the companion website.
www.g-wlearning.com/CAD

Copying

Each standard grip editing command includes the Copy option. The effect of using the Copy option depends on the selected objects, grip, and command. The original selected objects remain unchanged, and the copy stretches when the STRETCH grip command is active, rotates when the ROTATE grip command is active, or scales when the SCALE grip command is active. The Copy option of the MOVE grip command is the true copy operation, allowing you to copy from the selected grip. The selected grip acts as the copy base point. Create as many copies of the selected object as needed, and then exit the command.

Exercise 13-6
Complete the exercise on the companion website.
www.g-wlearning.com/CAD

Object-Specific Grip Options

Several objects have specialized grips or additional grip options. Context-sensitive commands are available at the endpoint grips of a line or arc, the midpoint grip of an arc, and the endpoint grip of an elliptical arc when the endpoint is at a quadrant. You can access and apply the same context-sensitive object-specific grip commands in three different ways. Figure 13-10 illustrates each technique. Figure 13-11 illustrates...
and explains the process of using object-specific grip commands to edit lines, arcs, and elliptical arcs. Use dynamic input when possible to complete the operation.

Select an mtext object to display a standard grip at the justification point, grips for modifying the mtext boundary width and height, and grips for adjusting columns. See Figure 13-12. Using grips is an alternative to re-entering the text editor to make changes to mtext layout, as described in Chapters 9 and 10. This textbook explains specialized grips related to other objects when applicable.

<table>
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<td>Stretch the line at the selected endpoint</td>
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<tr>
<td></td>
<td>Lengthen</td>
<td>Changes the length from the selected endpoint</td>
<td></td>
</tr>
<tr>
<td>Arc endpoint</td>
<td>Stretch</td>
<td>Stretch the arc at the selected endpoint</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lengthen</td>
<td>Changes the length from the selected endpoint</td>
<td></td>
</tr>
<tr>
<td>Arc midpoint</td>
<td>Stretch</td>
<td>Stretches the radius and center point from the endpoints</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Radius</td>
<td>Changes the radius and location of the endpoints from the center point</td>
<td></td>
</tr>
<tr>
<td>Elliptical arc</td>
<td>Stretch</td>
<td>Stretches the axis of the ellipse</td>
<td></td>
</tr>
<tr>
<td>endpoint at quadrant</td>
<td>Lengthen</td>
<td>Changes the length from the selected endpoint</td>
<td></td>
</tr>
</tbody>
</table>

Figure 13-11. Examples of options available for modifying lines, arcs, and elliptical arcs using grips.

Figure 13-12. Use grips to apply standard editing commands to the justification base point, and to adjust the mtext boundary or columns.
Editing Associative Arrays

AutoCAD creates associative rectangular, polar, and path arrays by default. To create a nonassociative array, select No at the Associative option before finalizing an array, as described in Chapter 12. An associative array is a single array object. The major advantage of using associative arrays is the ability to modify the parameters of the array, and to edit or replace the source objects without recreating the array. The easiest way to edit an associative array is to select the array to display grips and the context-sensitive Array ribbon tab.

**PROFESSIONAL TIP**

Form associative arrays whenever possible to increase efficiency when making changes to arrayed objects. If necessary, use the EXPLODE command to remove the associative property from existing arrays.

**Rectangular Array**

Figure 13-13 shows an associative rectangular array selected for editing and the corresponding Array contextual ribbon tab. Use the text boxes in the Columns and Rows ribbon panels to adjust the number of items, spacing between items, and total spacing of rows and columns. The Incremental Elevation text box in the expanded Rows panel and the Levels panel are appropriate only for 3D applications. Use the Base Point button in the Properties panel to redefine the location of the base point.

The base point grip offers standard MOVE, ROTATE, SCALE, and MIRROR grip commands, and Move and Level Count context-sensitive options for moving the array and changing the number of levels. See Figure 13-13B. Use the grip selected in Figure 13-13C with dynamic input, to change the spacing between rows. The grip selected in Figure 13-13D allows you to adjust the number of rows, total spacing between the first and last rows, and the angle of the array from rows. Use the grip selected in Figure 13-13E with dynamic input to change the spacing between columns. The grip selected in Figure 13-13F allows you to adjust the number of columns, total spacing between the first and last columns, and the angle of the array from the columns. Use the grip selected in Figure 13-13G to edit the number of rows and columns and the spacing between rows and columns dynamically.

**Polar Array**

Figure 13-14 shows an associative polar array selected for editing and the corresponding Array ribbon tab. Use the text boxes in the Items and Rows ribbon panels to adjust the number of items, angle between items, and total angle of items, as well as the number and spacing between or total spacing of rows. The Incremental Elevation text box in the expanded Rows panel and the Levels panel are appropriate only for 3D applications. Use the Base Point button in the Properties panel to redefine the location of the base point, and pick the Rotate Items button to control whether items rotate as they are arrayed.

The center point grip offers standard MOVE, ROTATE, SCALE, and MIRROR grip commands. See Figure 13-14B. Use the base point grip selected in Figure 13-14C with dynamic input to stretch the radius of the array; modify the number of rows, levels, and items; and change the angle to fill. The grip selected in Figure 13-14D allows you to adjust the angle between items.
Path Array

Figure 13-15 shows an associative path array selected for editing and the corresponding Array ribbon tab. Use the text boxes in the Items panel to adjust the number of items, spacing between items, and total spacing of items. The Item Spacing text box is available if you choose the divide method. The Total Item Distance text box is available if you choose the measure method. Use the Divide and Measure buttons in the Properties panel to toggle the spacing method. The options in the Rows panel control the number and spacing between items and total spacing of rows. The Incremental Elevation text box in the expanded Rows panel and the Levels panel are only appropriate for 3D applications. Use the Base Point button in the Properties panel to redefine the location of the base point. Pick the Align Items button to control whether items align with the path. The Z direction button is used to maintain the orientation of items along a 3D path. The base point grip offers Move, Row Count, and Level Count context-sensitive options to move the array and change the number of rows and levels. See Figure 13-15B.

When using the Move option to edit a path array, pick the Continue button when you see the alert box to continue with the move operation.

Exercise 13-7

Complete the exercise on the companion website. www.g-wlearning.com/CAD

Editing Source Objects

Associative rectangular, polar, and path arrays include an option to edit the source objects, such as adding or removing geometry, and apply the changes to the array without exploding or recreating the pattern. The easiest way to edit the source objects of an associative array is to select the array to display grips and the context-sensitive Array ribbon tab. Then pick the Edit Source button from the Options panel on the Array ribbon tab. Pick any item in the array to replace with the selected replacement objects, and then right-click or press [Enter] or the space bar to continue. A rubberband line attaches to the base point of the array for reference. Select an appropriate base point for the replacement objects. Use the centroid and Key Point options if necessary.

Next, pick items in the array to replace with the selected replacement objects, and then right-click or press [Enter] or the space bar to continue. An alternative is to select the Source Objects option to replace all items in the array. To finalize the array and exit the command, press [Enter]; the space bar, or [Esc], choose the Exit option, or right-click and select Edit. AutoCAD updates the array and erases the replacement objects. Figure 13-17 shows an example of replacing specific items in a path array.

The easiest way to return an associative array to its original state, without replacements, is to select the array to display grips and the context-sensitive Array ribbon tab. Then pick the Reset Array button from the Options panel. However, you cannot reset an array to the original state if you use the Source Objects option and then exit array editing.

Replacing Items

Associative rectangular, polar, and path arrays also offer the option to replace specific items with different objects. The easiest way to replace items in an associative array is to select the array to display grips and the context-sensitive Array ribbon tab. Then pick the Replace Item button from the Options panel of the Array ribbon tab. Pick objects not related to the array to use as the replacement for items in the array. Right-click or press [Enter] or the space bar to continue. A rubberband line attaches to the base point of the array for reference. Select an appropriate base point for the replacement objects. Use the centroid and Key Point options if necessary.

Next, pick items in the array to replace with the selected replacement objects, and then right-click or press [Enter] or the space bar to continue. An alternative is to select the Source Objects option to replace all items in the array. To finalize the array and exit the command, press [Enter]; the space bar, or [Esc], choose the Exit option, or right-click and select Edit. AutoCAD updates the array and erases the replacement objects. Figure 13-17 shows an example of replacing specific items in a path array.

The layer you assign to source objects applies to all items in the array. When working with an associative array, you must edit and then assign a different layer to the source objects in order to change the layer on which the array is drawn.
Object Properties

Every object has specific properties. Properties include geometry characteristics, such as the coordinates of the endpoints of a line in XYZ space, the diameter of a circle, or the area of a rectangle. Layer is another property associated with all objects. The layer on which you draw an object defines other properties, including color, linetype, and lineweight. Most objects also include object-specific properties. For example, multiline text has a variety of text properties, and an associative rectangular array has columns, row, and other properties that define the array.

AutoCAD provides many options for adjusting object properties, depending on the object and the properties assigned to it. One method is to use grips editing or editing commands, such as STRETCH or ROTATE, to make changes. Another method is to adjust layer characteristics using layer tools. You can also use the multiline text editor to adjust existing multiline text properties. A different technique to view and make changes to the properties of any object is to use the Quick Properties panel or the Properties palette. These tools are especially effective for modifying a particular property or set of properties for multiple objects at once.

PROFESSIONAL TIP

View object, color, layer, and linetypes properties by hovering over an object. This is a quick way to reference basic object information. See Figure 13-18.

Exercise 13-8

Complete the exercise on the companion website.

www.g-wlearning.com/CAD

Using the Quick Properties Panel

The Quick Properties panel, shown in Figure 13-19, appears by default when you double-click on certain objects. For example, the Quick Properties panel appears by default when you double-click on a line, but the text editor opens when you double-click on an mtext or text object. You can also set the Quick Properties panel to display with a single-click on an object. A quick way to enable or disable this function is to pick the Quick Properties button on the status bar or type [Ctrl]+[Shift]+[P].

The Quick Properties panel floats by default above and to the right of the crosshairs. The drop-down list at the top of the Quick Properties panel identifies the selected object. Properties associated with the selected object are displayed below the drop-down list in rows. For example, if you pick a circle, the Quick Properties panel lists rows of circle properties.

The Quick Properties panel lists common properties associated with the selected objects by default. You should recognize most of the properties included in the Quick Properties panel. You can pick multiple objects by using a window to select them, then right-clicking and selecting Quick Properties, or by double-clicking sequentially on more than one object. When you pick multiple objects, use the Quick Properties panel to modify all of the objects, or pick a specific object type from the drop-down list to modify. See Figure 13-20. Select All (n) to change the properties of all selected objects. Only properties shared by all selected objects appear when you choose All (n). Select the appropriate object type to modify a single type of object.

Figure 13-18.
Hover over an object to view its color, layer, and linetype properties.

Figure 13-19.
Use the Quick Properties panel to display and modify certain object properties, such as the basic properties of the selected line shown.

Figure 13-20.
The Quick Properties panel with three objects selected. You can edit the objects individually or select All (n) to edit all of the objects together.
To change a property, pick the property or current value. The way you change a value depends on the property. Some properties, such as the Radius property of an arc or circle or the Text height property of an mtext or text object, display a text box. Enter a new value in the text box to change the property. Most text boxes display a calculator icon on the right side that opens the QuickCalc tool for calculating values. Chapter 15 covers using QuickCalc. Other properties, such as the Layer property, display a drop-down list of selections. A pick button is available for geometric properties, such as the Center X and Center Y properties of a circle. Select the pick button to specify a new coordinate. Choose an … (ellipsis) button to open a dialog box related to the property. Press [Esc] or pick the Close button in the upper-right corner of the panel to hide the Quick Properties panel.

Right-click on a Quick Properties side bar or pick the Options button on the Quick Properties panel to access options for adjusting the display and function of the Quick Properties panel. The Quick Properties tab of the Drafting Settings dialog box includes many of the same settings, as well as additional options.

Exercise 13-9
Complete the exercise on the companion website. www.g-wlearning.com/CAD

Using the Properties Palette
The Properties palette, shown in Figure 13-21, provides the same function as the Quick Properties panel, but the Properties palette allows you to view all properties and adjust all editable properties related to the selected objects. You can dock, lock, and resize the Properties palette in the drawing area. You can access commands and properties shared by all selected objects appear when you choose All (4).

When you pick multiple objects, use the Properties palette to modify all of the objects, or pick a specific object type from the drop-down list to modify. See Figure 13-22. Select All (n) to change the properties of all selected objects. Only properties shared by all selected objects appear when you choose All (n).

You should recognize most of the properties listed in the Properties palette. Do not adjust properties that you do not recognize. For example, the 3D Visualization category and any properties related to the Z axis are for use in 3D applications.

To change a property, pick the property or current value. The way you change a value depends on the property, just as it does in the Quick Properties panel. Use the appropriate text box, drop-down list, or button to modify the value. After you make changes to the objects, press [Esc] to clear grips and remove the objects from the Properties palette. Close the Properties palette when you are finished.

The upper-right portion of the Properties palette contains three buttons. The left button toggles the value of the PICKADD system variable, which determines whether you need to hold down [Shift] when adding objects to a selection set. Pick the Select Objects button in the middle to deselect the currently selected objects and change the crossovers to a pick box, allowing you to select other objects. Pick the Quick Select button on the right to access the Quick Select dialog box from which you can create a selection set, as described later in this chapter.

General Properties
The General category of the Properties palette allows you to modify general object properties such as color, layer, linetype, linetype scale, plot style, linewidth, transparency, and thickness. See Figure 13-23. The Quick Properties panel also lists some general properties.
You can change the layer of a selected object by choosing a layer from the Layer Control drop-down list in the Layers panel on the Home ribbon tab. You can override color, linetype, lineweight, and plot style by choosing from the appropriate drop-down list in the Properties panel on the Home ribbon tab. Override transparency by selecting from the flyout and using the slider, also in the Properties panel on the Home ribbon tab.

**CAUTION**
Color, linetype, lineweight, and transparency should typically be set as **ByLayer**. Changing color, linetype, lineweight, or transparency to a value other than **ByLayer** overrides logical properties, making the property an **absolute value**. Therefore, if the color of an object is set to red, for example, it appears red regardless of the color assigned to the layer on which you draw the object.

Linetype scale should usually be set globally so the linetype scale of all objects is constant. Adjusting the linetype scale of individual objects can create nonstandard drawings and make it difficult to adjust linetype scale globally. For most applications, you should not override color, linetype, linetype scale, plot style, lineweight, transparency, or thickness.

**Geometry Properties**
The **Geometry** category of the Properties palette allows you to modify object coordinates and dimensions. Refer again to Figure 13-23. The properties in the **Geometry** category vary depending on the selection. Figure 13-23A highlights the X, Y, and Z coordinates that you can use to relocate the start point and endpoint of a line. Figure 13-23B highlights the X, Y, and Z coordinates that you can use to relocate the center of a circle. Enter a value, select the calculator to calculate a value, or use the pick button to specify a point on-screen. The Quick Properties panel also lists some geometry properties.

**Text Properties**
The **Text** category appears when you select an mtext or single-line text object. Figure 13-24 shows text properties associated with mtext. The Properties palette provides a convenient way to modify a variety of text properties without re-entering the text editor. The Properties palette is especially effective to adjust a particular property for multiple selected text objects. For example, change the annotative setting of all text.

Figure 13-24. The Properties palette shows the properties of selected multiline text. The properties of single-line text are slightly different from those of mtext.
in the drawing using the Annotative property row, or reset the height of multiple mtext or text objects using the Height property row. The Quick Properties panel also lists some text-specific properties.

**PROFESSIONAL TIP**

Fields provide an effective way to display drawing information within mtext and text objects. You can use fields with many AutoCAD tools, including inquiry commands, drawing properties, attributes, and sheet sets. You can update fields when changes occur to the reference data. Chapter 10 explains using fields. Figure 13-25 shows acquiring object properties to display in fields.

### Exercises 13-11 and 13-12

Complete the exercises on the companion website.  
www.g-wlearning.com/CAD

### Matching Properties

The MATCHPROP command allows you to match, or “paint,” properties from one object to other objects. You can match properties in the same drawing or between drawings. When you first access the MATCHPROP command, AutoCAD prompts you for the source object. After you select the source object, AutoCAD displays the properties it will paint. The next prompt allows you to pick the destination objects.

To change the paint properties, select the Settings option before picking the destination objects. The Property Settings dialog box appears, showing the properties to be painted. See Figure 13-26. Properties are replaced in the destination objects if the corresponding Property Settings dialog box check boxes are active. For example, to paint only the layer property and text style of one text object to another text object, uncheck all boxes except the Layer and Text property check boxes. Pick the OK button to select destination objects.

### Exercise 13-13

Complete the exercise on the companion website.  
www.g-wlearning.com/CAD

### Editing between Drawings

You can edit in more than one drawing at a time and edit between open drawings. For example, you can copy objects from one drawing to another. You can also refer to a drawing to obtain information, such as a distance, while working in a different drawing.

Figure 13-27 shows two drawings, each of a different section for the same home remodel project, tiled vertically. The Windows copy and paste function allows you to copy objects from one drawing to another. For example, copy the rafters and exterior studs from the Proposed Entry Section A drawing to paste and reuse them in the

**PROFESSIONAL TIP**

Fields provide an effective way to display drawing information within mtext and text objects. You can use fields with many AutoCAD tools, including inquiry commands, drawing properties, attributes, and sheet sets. You can update fields when changes occur to the reference data. Chapter 10 explains using fields. Figure 13-25 shows acquiring object properties to display in fields.

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### Exercise 13-13

Complete the exercise on the companion website.  
www.g-wlearning.com/CAD

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You can edit in more than one drawing at a time and edit between open drawings. For example, you can copy objects from one drawing to another. You can also refer to a drawing to obtain information, such as a distance, while working in a different drawing.

Figure 13-27 shows two drawings, each of a different section for the same home remodel project, tiled vertically. The Windows copy and paste function allows you to copy an object from one location and paste it into another.
Proposed Bath Section B. Select the objects to copy from the source drawing and choose a copy option. Then switch to the destination drawing and select a paste option. You can cut, copy, and paste between documents using options from the Clipboard panel on the Home ribbon tab, the Clipboard cascading shortcut menu, or the Windows-standard keyboard shortcuts. Figure 13-28 briefly explains cut, copy, and paste options available when you right-click after selecting objects or after cutting or copying objects. Many of the same options are available from the Clipboard panel on the Home ribbon tab, and by typing, as shown.

**PROFESSIONAL TIP**

You may find it more convenient to use the MATCHPROP command to match properties between drawings. To use the MATCHPROP command between drawings, select the source object from one drawing and the destination object from another.

**Exercise 13-14**

Complete the exercise on the companion website.

www.g-wlearning.com/CAD

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<td>[Ctrl]+[X]</td>
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<td>Copy</td>
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<td>Copies selected objects to the Clipboard.</td>
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<td>Copy with Base Point</td>
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<td>Copies selected objects to the Clipboard using a specific base point to position the copied objects for pasting. When prompted, select a logical base point, such as a corner or center point of an object.</td>
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<th>Pasting</th>
<th>Option</th>
<th>Keyboard Shortcut</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paste</td>
<td>[Ctrl]+[V]</td>
<td>Pastes the objects on the Clipboard to the drawing. If you used the Copy with Base Point option, the objects attach to the crosshairs at the specified base point.</td>
<td></td>
</tr>
<tr>
<td>Paste as Block</td>
<td>[Ctrl]+[Shift]+[V]</td>
<td>Pastes and “joins” all objects on the Clipboard to the drawing as a block. The pasted objects act as a single object. Blocks are covered later in this textbook. Use the EXPLODE tool to break up the block.</td>
<td></td>
</tr>
<tr>
<td>Paste to Original Coordinates</td>
<td></td>
<td>Pastes the objects on the Clipboard to the same coordinates at which they were located in the original drawing.</td>
<td></td>
</tr>
</tbody>
</table>

**Add Selected**

The ADDSELECTED command allows you to draw a new object using the properties of an existing object, without locating and selecting the object command or presetting the layer or other properties. An easy way to access the ADDSELECTED command is to select the object to replicate and then right-click and choose Add Selected. AutoCAD initiates the drawing command and assigns properties corresponding to the selected object. For example, pick a circle, right-click and choose Add Selected, and draw a circle as if you had accessed the CIRCLE command. AutoCAD applies the properties of the selected circle to the new circle, regardless of the current settings.

**Select Similar**

The SELECTSIMILAR command provides another method of creating a selection set. AutoCAD selects all objects in the drawing that match certain properties of objects.
Grips, Properties, and Additional Selection Techniques

Figure 13-29
Use the Quick Select dialog box to create a specific selection set.

Quick Select

The QSELECT, or Quick Select, command is similar to the SELECTSIMILAR command, but it provides additional filters. For example, use the SELECTSIMILAR command to pick all circles in a drawing, but use the Quick Select command to pick Ø2” circles. Access the Quick Select command to display the Quick Select dialog box shown in Figure 13-29. The Quick Select dialog box provides options for specifying the selection set.

Begin the process by selecting the Entire drawing option from the Apply to: drop-down list to have access to all object types in the drawing for creating a selection set. An alternative is to pick specific objects to create an initial filter of just the selected objects. Pick objects before accessing the Quick Select dialog box, or choose the Select Objects button to return to the drawing window temporarily to pick objects. The Apply to:

- include or exclude specific objects from the selection set
- include or exclude objects that match specific properties
- create a selection set that is limited to a specific object type
- filter objects based on their properties
- apply filters to objects on specific layers
- apply filters to objects that are hidden or not visible

TIP You can pick multiple objects with different properties to select all similar objects. For example, pick a line, arc, and spline, each assigned to a different layer, to select all lines, arcs, and splines with matching layers.

You can access the Quick Select dialog box by right-clicking in the drawing area and choosing Quick Select… or by picking the Quick Select button on the Properties palette.

Exercise 13-15
Complete the exercise on the companion website.

Supplemental Material
Object Selection Filters
For detailed information about selecting multiple objects using the Object Selection Filters dialog box, go to the companion website (www.g-wlearning.com/CAD), select this chapter, and select Object Selection Filters.
Object Groups

For information about creating object groups, go to the companion website (www.g-wlearning.com/CAD), select this chapter, and select Object Groups.

Selection Express Tools

The Modify panel of the Express Tools ribbon tab includes additional editing commands. For information about the most useful selection set express tools, go to the companion website (www.g-wlearning.com/CAD), select this chapter, and select Selection Express Tools.

Chapter Review

Answer the following questions. Write your answers on a separate sheet of paper or complete the electronic chapter review on the companion website. www.g-wlearning.com/CAD

1. Name the editing commands that are available using standard grips.
2. How can you select a grip command other than the default STRETCH?
3. What is the purpose of the Base Point option in the grip commands?
4. Explain the function of the Undo option in the grip commands.
5. Which ROTATE grip option would you use to rotate an object from an existing 60° angle to a new 25° angle?
6. Identify the advantages of using an associative array.
7. Briefly explain how to change the source objects in an array.
8. Explain how to replace one or more items in an associative array.
9. Describe the options for editing object properties.
10. Describe what happens when you double-click on a line.
11. Identify at least two ways to access the Properties palette.
12. How can you change the linetype of an object using the Properties palette?
13. For most applications, what value should you use for the color, linetype, and line-weight of objects?
14. Explain how to change the radius of a circle from 1.375 to 1.875 using the Properties palette.
15. What command changes the properties of existing objects to match the properties of a different object?
16. Briefly explain how the Windows copy and paste function works to copy an object from one drawing to another.
17. Name the paste option that joins a group of objects as a block when pasted.
18. What is the purpose of the ADDSELECTED command? Provide an example.
19. What is the purpose of the SELECTSIMILAR command? Provide an example.
20. List the information you would specify in the Quick Select dialog box to select all 0.6” circles in a drawing.

Drawing Problems

Start AutoCAD if it is not already started. Start a new drawing for each problem using an appropriate template of your choice. The template should include layers and text styles for drawing the given objects. Add layers and text styles as needed. Draw all objects using appropriate layers, text styles, justification, and format. Follow the specific instructions for each problem. Use only drawing and editing commands and techniques you have already learned. Do not draw dimensions. Use your own judgment and approximate dimensions when necessary.

▼ Basic

1. Draw the objects labeled A. Then use the STRETCH grip command to make the objects look like the objects labeled B. Save the drawing as P13-1.

2. Use the LINE command to draw the object labeled A. Use the Copy option of the MOVE grip command to copy the object to the position labeled B. Edit Object A so it resembles Object C. Edit Object B so it looks like Object D. Save the drawing as P13-2.

Supplemental Material

Object Groups

For information about creating object groups, go to the companion website (www.g-wlearning.com/CAD), select this chapter, and select Object Groups.

Express Tools

Chapter 13

Selection Express Tools

For information about creating object groups, go to the companion website (www.g-wlearning.com/CAD), select this chapter, and select Object Groups.

Chapter Review

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7. Briefly explain how to change the source objects in an array.
8. Explain how to replace one or more items in an associative array.
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10. Describe what happens when you double-click on a line.
11. Identify at least two ways to access the Properties palette.
12. How can you change the linetype of an object using the Properties palette?
13. For most applications, what value should you use for the color, linetype, and line-weight of objects?
14. Explain how to change the radius of a circle from 1.375 to 1.875 using the Properties palette.
15. What command changes the properties of existing objects to match the properties of a different object?
16. Briefly explain how the Windows copy and paste function works to copy an object from one drawing to another.
17. Name the paste option that joins a group of objects as a block when pasted.
18. What is the purpose of the ADDSELECTED command? Provide an example.
19. What is the purpose of the SELECTSIMILAR command? Provide an example.
20. List the information you would specify in the Quick Select dialog box to select all 0.6” circles in a drawing.

Drawing Problems

Start AutoCAD if it is not already started. Start a new drawing for each problem using an appropriate template of your choice. The template should include layers and text styles for drawing the given objects. Add layers and text styles as needed. Draw all objects using appropriate layers, text styles, justification, and format. Follow the specific instructions for each problem. Use only drawing and editing commands and techniques you have already learned. Do not draw dimensions. Use your own judgment and approximate dimensions when necessary.

▼ Basic

1. Draw the objects labeled A. Then use the STRETCH grip command to make the objects look like the objects labeled B. Save the drawing as P13-1.

2. Use the LINE command to draw the object labeled A. Use the Copy option of the MOVE grip command to copy the object to the position labeled B. Edit Object A so it resembles Object C. Edit Object B so it looks like Object D. Save the drawing as P13-2.
3. Use the **LINE** command to draw the view labeled A. Copy the object, without rotating it, to a position below, as indicated by the dashed lines. Rotate the object 45°. Copy the rotated object labeled B to a position below, as indicated by the dashed lines. Use the **Reference** option to rotate the object labeled C to 25°, as shown. Save the drawing as P13-3.

![Image](image1.png)

▼ Intermediate

4. Draw the individual objects (vertical line, horizontal line, circle, arc, and three-line shape) in A using the dimensions given. Use these objects and grips to create the view shown in B. Save the drawing as P13-4.

![Image](image2.png)

5. Open P13-4 and save the file as P13-5. The P13-5 file should be active. Copy the view two times to positions B and C. Use the **SCALE** grip command to scale the view in position B to 50% of its original size. Use the **Reference** option of the **SCALE** grip command to enlarge the view in position C from the existing 3.0 length to 4.5, as shown in C. Resave the drawing.

![Image](image3.png)

6. Draw the portion of the gasket shown in A. Use an associative rectangular array to pattern the $0.25$ holes. Use the **MIRROR** grip command to complete the gasket as shown in B. Save the drawing as P13-6.

![Image](image4.png)

7. Open P13-6 and save the file as P13-7. The P13-7 file should be active. Use the **Properties** palette to change the diameters of the circles from $0.25$ to $0.125$. Change the layer assigned to the slots to a layer that uses the **PHANTOM** linetype. Be sure the linetype scale allows the linetypes to display correctly. Resave the drawing.

![Image](image5.png)
8. Draw an assembly view similar to the view shown within the boundaries of the given dimensions. All other dimensions are flexible. Save the drawing as P13-8.

9. Draw the half of the gasket shown. Mirror the drawing to complete the other half of the gasket. Save the drawing as P13-9.

10. Draw the control diagram shown. Draw one branch (including text) and use the COPY grip command to your advantage. Use text editing commands as needed. Save the drawing as P13-10.

Advanced

11. Draw the folded and flat pattern views of the sheet metal bracket shown. The part material is 18-gauge steel. Save the drawing as P13-11.
12. Draw a tank similar to the one shown within the boundaries of the given dimensions. All other dimensions are flexible. After drawing the tank, create a page for a vendor catalog, as follows:
   • All labels should be ROMAND text, centered directly below the view. Use a text height of .125″.
   • Label the drawing ONE-GALLON TANK WITH HORIZONTAL VALVE.
   • Keep the valve at the same scale as the original drawing in each copy.
   • Copy the original tank to a new location and scale it so it is 2 times its original size. Rotate the valve 45°. Label this tank TWO-GALLON TANK WITH 45° VALVE.
   • Copy the original tank to another location and scale it to 2.5 times the size of the original. Rotate the valve 90°. Label this tank TWO-AND-ONE-HALF-GALLON TANK WITH 90° VALVE.
   • Copy the two-gallon tank to a new position and scale it so it is 2 times this size. Rotate the valve to 22°30″. Label this tank FOUR-GALLON TANK WITH 22°30″ VALVE.
   • Left-justify this note at the bottom of the page: Combinations of tank size and valve orientation are available upon request.
   • Use the Properties palette to change all tank labels to ROMANC, .25″ high.
   • Change the note at the bottom of the sheet to ROMANS, centered on the sheet, using uppercase letters.
   • Save the drawing as P13-12.


14. Draw the views of the sailboat shown. Save the drawing as P13-14.

15. Create a dimensioned 2D sketch of a patio or deck plan. Include an outdoor kitchen with a grill, single-burner cooktop, and refrigerator. Add ample seating areas, a table with chairs, and a hot tub. Use dimensions based on your experience, research, and measurements. Start a new drawing from scratch or use an architectural template of your choice. Draw the patio or deck from your sketch. Save the drawing as P13-15.
AutoCAD Certified Associate Exam Practice

Answer the following questions. Write your answers on a separate sheet of paper.

1. Which of the following operations can be performed using grips? Select all that apply.
   A. exploding a polygon into individual lines
   B. reflecting an object to create a mirror image
   C. reversing the order of point calculation for an object
   D. rotating an object by 17°
   E. scaling an object to half its current size

2. If you do not use the Base point option of a grip command, which point does AutoCAD automatically select as the base point for the grip editing operation? Select the one item that best answers the question.
   A. the lower-left corner of the object
   B. the origin (0,0,0)
   C. a point you specify
   D. the selected grip

3. Which of the following relative operators are available for filtering data? Select all that apply.
   A. *
   B. /
   C. =
   D. <
   E. >
   F. >=

AutoCAD Certified Professional Exam Practice

Follow the instructions in each problem. Write your answers on a separate sheet of paper.

1. Navigate to this chapter on the companion website and open CPE-13grips.dwg. Use grips to rotate the metal plate 23.5°, as shown. Select the appropriate grip or use the Base point option to select the base point for the rotation. What are the coordinates of the center of the hole?

2. Navigate to this chapter on the companion website and open CPE-13select.dwg. Enter the SELECTSIMILAR command using the command line or dynamic input and specify the SETtings option. Disable all of the Similar Based On check boxes except Color, Layer, and Name. Select the port in the lower-left corner of the connector system and press [Enter]. How many ports are selected based on your settings?