# 3 CREATING AND EDITING SHAPES

Lesson overview

In this lesson, you'll learn how to do the following:

- Create a document with multiple artboards.
- Use tools and commands to create basic shapes.
- Use rulers and smart guides as drawing aids.
- Scale and duplicate objects.
- Join and outline objects.
- Work with Pathfinder commands to create shapes.
- Use Live Trace to create shapes.

This lesson will take approximately an hour and a half to complete. If needed, remove the previous lesson folder from your hard disk and copy the Lesson03 folder onto it.
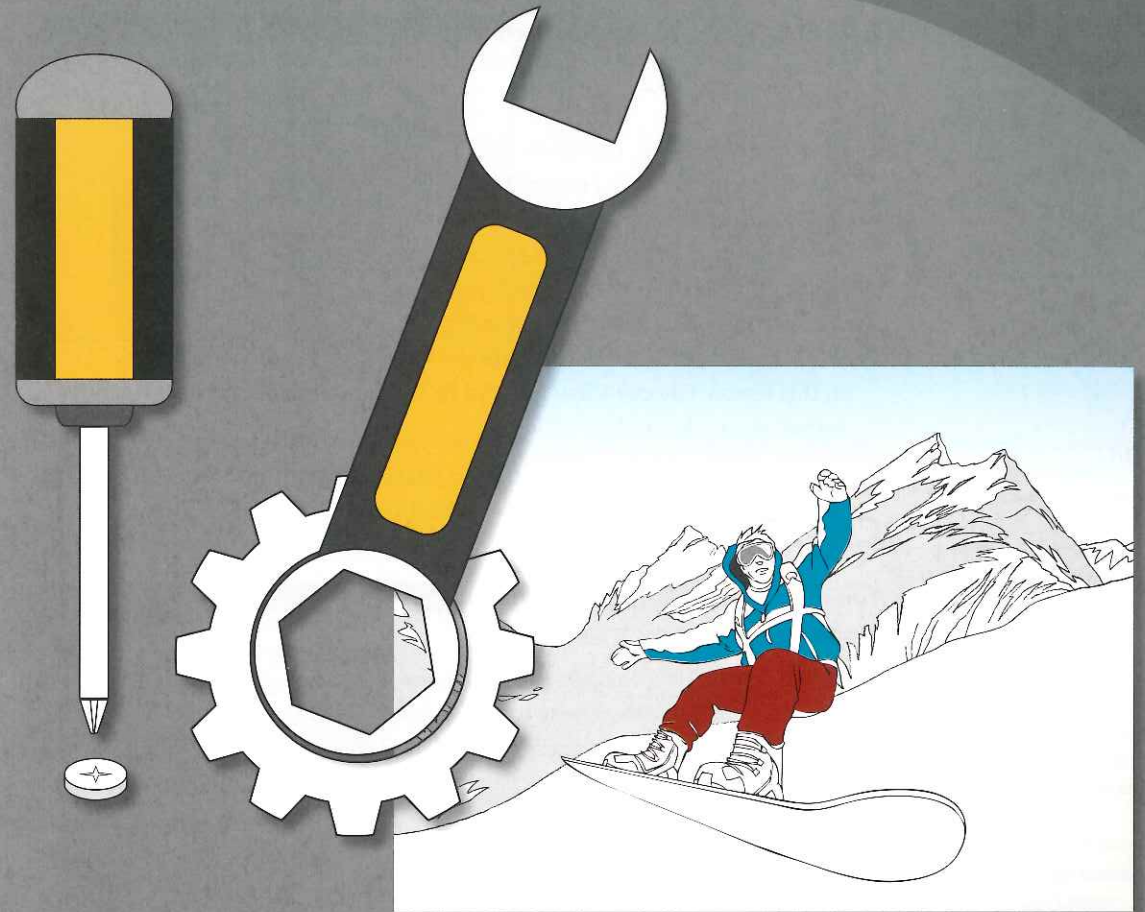
You can create documents with multiple artboards and many kinds of objects by starting with a basic shape and then editing it to create new shapes. In this lesson, you'll add and edit artboards, then create and edit some basic shapes for a technical manual.

Getting started

In this lesson, you'll create several illustrations for a technical manual.

1 To ensure that the tools and panels function as described in this lesson, delete or deactivate (by renaming) the Adobe Illustrator CS4 preferences file. See "Restoring default preferences" on page 3.

2 Start Adobe Illustrator CS4.

● **Note:** If you have not already copied the resource files for this lesson onto your hard disk from the Lesson03 folder on the Adobe Illustrator CS4 Classroom in a Book CD, do so now. See "Copying the Classroom in a Book files" on page 2.

3 Choose File > Open. Locate the file named L3end.ai in the Lesson03 folder in the Lessons folder that you copied onto your hard disk. There are two artboards containing illustrations for a technical manual, including a screwdriver and a wrench with gears. You will create the tools in this lesson. Choose View > Fit All In Window and leave the file open for reference, or choose File > Close.
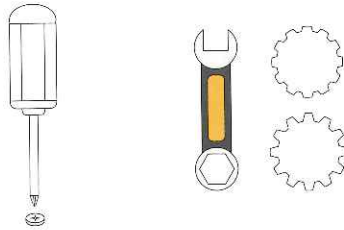
Creating a document with multiple artboards

You will now make two illustrations for a technical manual. The document that you create will have several artboards.

● **Note:** When typing values in fields, if the correct unit is showing, you don't need to type the value again.

1 Choose File > New to open a new, untitled document. In the New Document dialog box, change the Name to tools, choose Print from the New Document Profile menu (if it isn't already selected) and change the Units to inches. When you change the units, the New Document Profile becomes [Custom]. Keep the dialog box open for the next step.

Document startup profiles

Using document profiles, you can set up a document for different kinds of output, such as print, web, video, and more. For example, if you are designing a web page mock-up, which you will do in this lesson, you can use a web document profile, which automatically displays the page size and units in pixels, changes the color mode to RGB, and the raster effects to Screen (72 ppi).
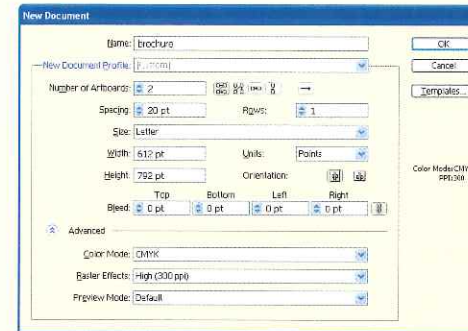
2 Change the Number Of Artboards option to 2 to create two artboards. Click the Arrange By Row button (⊡) and make sure that the Left To Right Layout arrow (→) is showing. In the Spacing text field, type 1. Click the word Width and type 7 in the Width field. Type 8 in the Height field. Click OK.

● **Note:** The spacing value is the distance between each artboard.

● **Note:** At left, the New Document dialog box shows the Print Document profile after customizing the options. The Advanced options (click the arrow left of Advanced to toggle open) are context-sensitive, which means that the options change based on which document profile is chosen.
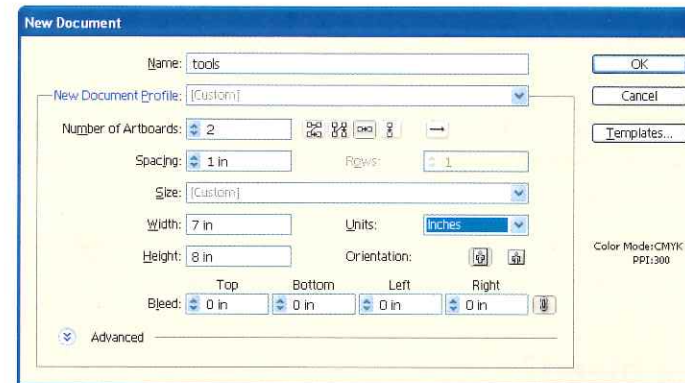
3 Choose File > Save As. In the Save As dialog box, ensure that the name of the file is tools.ai, and choose the Lesson03 folder. Leave the Save As Type option set to Adobe Illustrator (*.AI) (Windows) or the Format option set to Adobe Illustrator (ai) (Mac OS), and click Save. In the Illustrator Options dialog box, leave the Illustrator options at their default settings, and click OK.

Tiling multiple artboards

Illustrator CS4 allows you to create multiple artboards. Setting up the artboards requires an understanding of the initial artboard settings in the New Document dialog box. After specifying the number of artboards for your document, you can set the order you'd like them laid out on screen. They are defined as follows:

- **Grid By Row:** Arranges multiple artboards in the specified number of rows. Choose the number of rows from the Rows menu. The default value creates the most square appearance possible with the specified number of artboards.

- **Grid By Column:** Arranges multiple artboards in the specified number of columns. Choose the number of columns from the Columns menu. The default value creates the most square appearance possible with the specified number of artboards.

- **Arrange By Row:** Arranges artboards in one straight row.

- **Arrange By Column:** Arranges artboards in one straight column.

- **Change To Right-To-Left Layout:** Arranges multiple artboards in the specified row or column format, but displays them from right to left.

—From Illustrator Help

4 Choose Select > Deselect (if it's not dimmed) to make sure nothing is selected on either artboard. Click the Document Setup button in the Control panel.

After deselecting, the Document Setup button appears. When you click it, you can change the artboard size, units, bleeds, and more, after a document is created.

5 In the Bleed section of the Document Setup dialog box, change the value in the Top field to .13 in by clicking the up arrow to the left of the field once or typing the value. Click in the Bottom field or press the Tab key to make all the Bleed settings the same. Click OK.

Notice the red line that appears around both artboards. The red line indicates the bleed area. Typical bleeds for printing are about 1/8 of an inch.

What is a bleed?

Bleed is the amount of artwork that falls outside of the printing bounding box, or outside the artboard. You can include bleed in your artwork as a margin of error—to ensure that the ink is still printed to the edge of the page after the page is trimmed or that an image can be stripped into a keyline in a document.

—From Illustrator Help

Working with basic shapes

You'll begin this exercise by displaying a grid to use as a guideline for drawing and setting up the workspace.

1 Choose Window > Workspace > Essentials.

2 Choose View > Show Grid to display a grid that is useful for measuring, drawing, and aligning shapes. The grid doesn't print with the artwork. Choose View > Snap To Grid. The edges of drawn objects will now snap to, or pull toward, the grid lines.

3 Choose View > Show Rulers, or press Ctrl+R (Windows) or Command+R (Mac OS), to display rulers along the top and left side of the window if they are not already showing. The ruler units are inches because of the change you made in the New Document dialog box.

You can change the ruler units used for all documents or for only the current document. The ruler unit applies to measuring objects, moving and transforming objects, setting grid and guide spacing, and creating ellipses and rectangles. It does not affect the units in the Character, Paragraph, and Stroke panels. The units used in these panels are controlled by the options in the Units & Display Performance dialog box in the program preferences (Edit > Preferences (Windows) or Illustrator > Preferences (Mac OS)).

Accessing the basic shape tools

In the first part of this lesson, you'll create a screwdriver using the basic shape tools. The shape tools are organized under the Rectangle tool. You can tear this group off the Tools panel to display it as a separate free-floating panel.

1 Hold down the mouse button on the Rectangle tool (▭) until a group of tools appears, and then drag to the small triangle at the right end and release the mouse button.
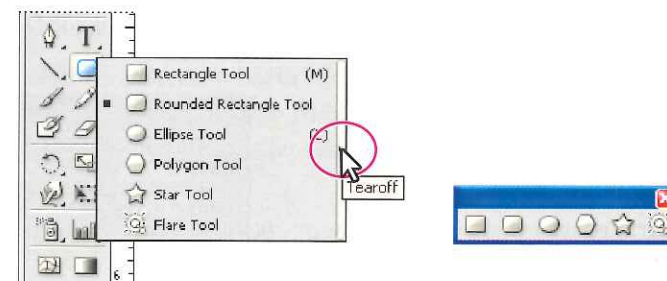
2 Move the Rectangle tool group away from the Tools panel.

Creating with shapes

In Adobe Illustrator CS4, you control the thickness and color of lines that you draw by setting stroke attributes. A stroke is the paint characteristic of a line, or the outline of an object. A fill is the paint characteristic of the inside of an object. The default settings use a white fill and black stroke for objects.

First, you'll draw a series of shapes that make up the illustrations. You'll also use smart guides to align your drawing.

1   Choose View > Fit Artboard In Window.

2   Make sure that 1 is showing in the Artboard Navigation area, which indicates that the first artboard is selected.

3   Choose Window > Transform to display the Transform panel. Then choose Window > Info.

4   Select the Rectangle tool (▭), and start dragging with pointer crosshairs on a vertical guide in the grid, roughly in the center of the artboard. Drag to draw a rectangle that's approximately 0.75 inches wide and 2.5 inches tall. Use the Info panel to determine the size. This will be part of the body of the first illustration (a screwdriver). Notice that as you drag, the rectangle edge snaps to the grid lines. You can also use the rulers and the grid as guides.
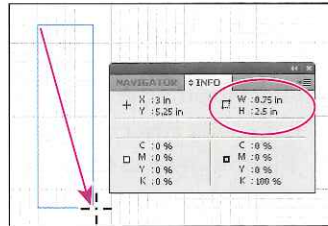
When you release the mouse button, the rectangle is automatically selected, and its center point appears. All objects created with the shape tools have a center point that you can drag to align the object with other elements in your artwork. You can make the center point visible or invisible using the Attributes panel, but you cannot delete it.

▶ **Tip:** If the unit in appears in the Width and Height fields in the Transform panel, you can simply type a value (.75), and Illustrator assumes that it is inches.

5   In the Transform panel, note the rectangle's width and height. If necessary, enter .75 in in the width text field and 2.5 in in the height text field.

6   Close the Transform panel group by clicking the x in the upper right corner of the group title bar (Windows) or the dot in the upper left corner (Mac OS).

Next you'll draw another rectangle centered inside the first one to continue creating the body of the screwdriver.

7   Choose View > Snap To Grid to deselect snapping.

8   Choose View > Hide Grid to hide the grid.

Next, you will use the smart guides, which are selected by default, to align and size objects.

● **Note:** Choose View > Smart Guides if the smart guides are not selected.

9   With the Rectangle tool still selected, position the pointer over the center point of the rectangle that you just drew. Notice that the word center appears next to the pointer. Hold down Alt (Windows) or Option (Mac OS), and drag out diagonally (down and to the right) from the center point to draw a rectangle that's centered inside the other. Don't release the mouse button yet.
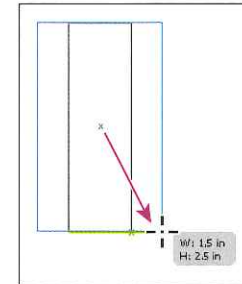
10 As you drag, notice the tooltip that appears (as a gray box) indicating the width and height of the shape as you draw. Drag down and to the right until the width is approximately 1.5 in and the height is 2.5 in. The pointer should snap to the height (at 2.5 in), and a green line appears indicating that you are snapping to the bottom of the existing rectangle. Release the mouse button and then the Alt or Option key.

Holding down Alt or Option as you drag the Rectangle tool draws the rectangle from its center point rather than from its upper left corner. As you drag the pointer, the smart guides snap the pointer to the edges of the existing rectangle by displaying the word path. The new shape that you drew is on top of the previous shape.

● **Note:** If Snap To Grid is selected, you can't use smart guides.

You will now arrange the new shape behind the old shape.

11 Select the Selection tool (▶) in the Tools panel. With the second rectangle still selected, choose Object > Arrange > Send To Back. The larger rectangle should now be behind the smaller one.

● **Note:** As you draw with the shape tools, smart guides give you feedback in the form of green lines. Most of the time, the green lines indicate that objects are snapping to other objects, or that the edges of the objects are aligned horizontally or vertically.

About smart guides

Smart Guides are temporary snap-to guides and pop-ups that appear when you create or manipulate objects or artboards. They help you align, edit, and transform objects or artboards relative to other objects, artboards, or both by snap-aligning and displaying location or delta values. You can choose what type of guides and values appear with smart guides by setting the Smart Guides preferences.

To activate Smart Guides, choose View > Smart Guides. You can use Smart Guides in the following ways:

- When you create an object with the pen or shape tools, use the Smart Guides to position a new object's anchor points relative to an existing object. Or, when you create a new artboard, use Smart Guides to position it relative to another artboard or an object.

- When you create an object with the pen or shape tools, or when you transform an object, use the smart guides' construction guides to position anchor points to specific preset angles, such as 45 or 90 degrees. You set these angles in the Smart Guides preferences.

- When you move an object or artboard, use the Smart Guides to align the selected object or artboard to other objects or artboards. The alignment is based on the center point or edge of the objects or artboards. Guides appear as the object approaches the edge or center point of another object.

- When you rotate or move an item, use Smart Guides to snap to the last used angle or the nearest alignment option.

- When you transform an object, Smart Guides automatically appear to assist the transformation. You can change when and how Smart Guides appear by setting Smart Guide preferences.

    Note: When Snap To Grid is turned on, you cannot use Smart Guides (even if the menu command is selected).

—From Illustrator Help

Besides dragging on the artboard with a tool to draw a shape, you can select a tool and then double-click the artboard to open a dialog box with options for that tool. Now you'll create a rounded rectangle for another portion of the illustration by setting options in a dialog box.

12 Select the Rounded Rectangle tool (▢), and click once in the artwork to open the Rounded Rectangle dialog box. Type 1.5 in the Width field, press the Tab key, and type 0.5 in the Height field. Press the Tab key again, and type 0.2 in the Corner Radius field. The radius determines the amount of the curve of the corners. Click OK.
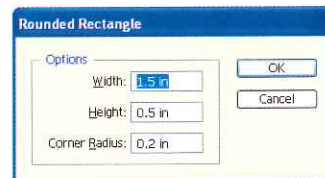
You'll use smart guides to help you align the new shape to the existing shapes.

13 Select the Selection tool (▶) in the Tools panel. Select anywhere inside the rounded rectangle and begin dragging toward the right edge of the rectangles. Don't release the mouse button yet.

● **Note:** Notice the gray box that appears when you drag the shape? This Smart Guide tooltip indicates the x and y distance that the pointer has moved.

14 Drag the shape to align with the right side of the larger rectangle. A vertical green smart guide appears in the center to indicate that the rounded rectangle is centered on the other rectangles. When the rounded rectangle is centered horizontally and vertically with the bottom of the larger rectangle, the word intersect appears. Release the mouse button, then the key, to drop the rounded rectangle on top of the larger rectangle.
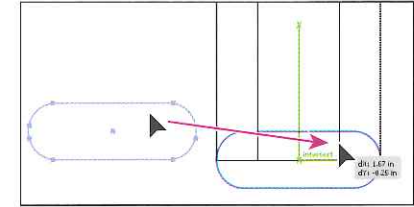
15 Choose Object > Arrange > Send To Back.

You've been working in preview mode. This default view of a document lets you see how objects are painted (in this case, with a white fill and black stroke). If paint attributes seem distracting, you can work in outline mode.

16 Choose View > Outline to switch from preview to outline mode.

Next you'll create another shape by duplicating the rounded rectangle using the Alt key (Windows) or Option key (Mac OS).

17 Select the Selection tool (▶) in the Tools panel, and with the rounded rectangle still selected, hold down Alt (Windows) or Option (Mac OS) and drag from the bottom edge down until the word intersect appears, indicating that the center of the shape is aligned with the bottom of the rounded rectangle. Release the mouse button, and then the key.
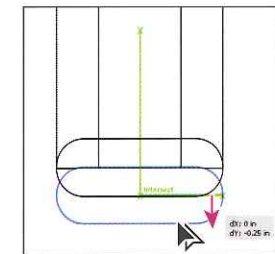
● **Note:** Don't drag a bounding point or the shape will become distorted.

18 With the Selection tool, hold down Alt (Windows) or Option (Mac OS), click and drag the right bounding point of the rounded rectangle toward the center of the shape (to the left) until the right edge is aligned with the right edge of the smaller rectangle. The word intersect appears with a green line, indicating that it's snapping to the rectangle shape.
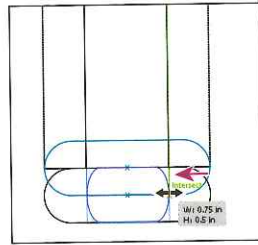
19 With the new rounded rectangle still selected, choose Object > Arrange > Send To Back.

You can control the shape of polygons, stars, and ellipses by pressing certain keys as you draw. You'll draw an ellipse next to represent the top of the screwdriver.
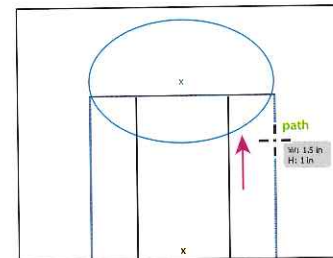
20 Select the Ellipse tool (◯) from the Rectangle tool group, and position the pointer over the upper left corner of the larger rectangle. Notice the word anchor appear. Click and begin dragging down and to the right. Don't release the mouse button yet.
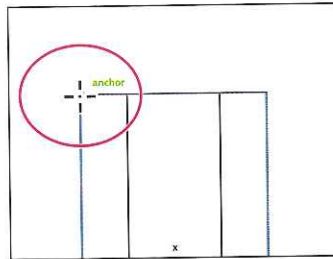
21 Drag the pointer down and to the right until it touches the right edge of the largest rectangle and the word path appears. Without releasing the mouse button, drag up or down slightly until the height is 1 in. in the smart guide measurement label that appears. Don't release the mouse button yet.
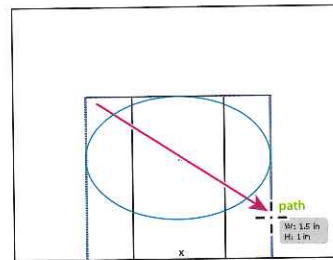
22 Hold down the spacebar and drag the ellipse up a little bit, making sure that as you drag up, you still see the word path. This ensures that the ellipse is still aligned with the right edge of the larger rectangle. Release the mouse button when the ellipse is positioned and sized as in the figure at right, and then release the keys.

● **Note:** Ensure that the width is 1.5 in, which is the same as the larger rectangle, and that the height is 1 in. To check the width, open the Transform panel (Window > Transform). Click the ellipse, then click the larger rectangle to see if the widths are the same. If not, correct the ellipse by typing the same width value as the larger rectangle.

Hold down the spacebar while drawing to reposition the ellipse.

23 Choose Object > Arrange > Send To Back.

24 Choose Select > All In Active Artboard to select the shapes in this artboard only. Choose Object > Group to group them.

Now you'll create two triangles for the screwdriver tip using the Polygon tool.

25 Choose Select > Deselect.

26 Select the Zoom tool and click three times on the bottom of the screwdriver shapes to zoom in.
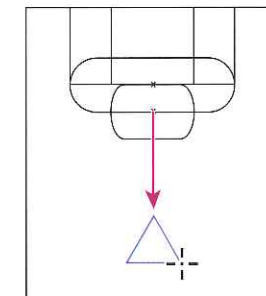
27 Select the Polygon tool (◯) from the Rectangle tool group and position the pointer over the center point of the bottommost rounded rectangle (the word center appears). Don't worry if it's not perfectly centered; that will be fixed later.

28 Drag to begin drawing a polygon, but don't release the mouse button. Press the Down Arrow key three times to reduce the number of sides on the polygon to a triangle. Hold down the Shift key to straighten the triangle. Without releasing the Shift key, drag down and to the right until the smart guide measurement label tells you that the width is 0.5 in. Don't release the mouse button or the Shift key yet.
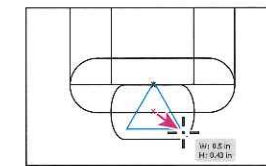
29 Hold down the spacebar as well and drag the triangle down to position it below the group of objects. Release the mouse button when the triangle is positioned below the other shapes. Release the keys.

30 Select the Selection tool (▶) in the Tools panel and, holding down the Shift key, click the grouped objects to select both.

● **Note:** Because you are still in outline mode, you may need to either drag across to select objects or click on their strokes.

Hold down the spacebar while drawing to reposition the triangle.

31 In the Control panel, click the Horizontal Align Center button (≐) to align the objects to each other.

● **Note:** If you don't see the align options in the Control panel, click the word Align. Otherwise, choose Window > Align to open the Align panel.

32 Choose Select > Deselect.

33 With the Selection tool, click to select the triangle shape. Double-click the Rotate tool (↻) in the Tools panel to open the Rotate dialog box. Change the angle value to 180, and click OK.
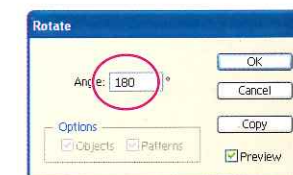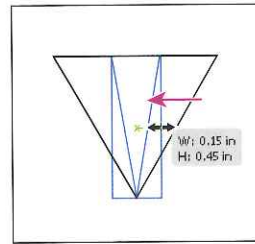
34 Select the Zoom tool (🔍) in the Tools panel and click the triangle shape twice to zoom in.

35 With the Selection tool, click the triangle, and choose Edit > Copy, and then Edit > Paste In Front to paste a copy directly on top.

36 Select the Selection tool. Holding the Alt key (Windows) or Option key (Mac OS), resize the new triangle from the middle point on the right side of the bounding box until the smart guide measurement label displays a 0.15 in width.

37 With the Selection tool, drag across both triangles and choose Object > Group.

38 Double-click the Hand tool (✋) in the Tools panel to fit the artboard in the window.

39 Choose File > Save.

Resize the triangle while pressing Alt or Option.

## Tips for drawing polygons, spirals, and stars

You can control the shapes of polygons, spirals, and stars by pressing certain keys as you draw the shapes. As you drag the Polygon, Spiral, or Star tool, choose any of the following options to control the shape:

- To add or subtract sides on a polygon, points on a star, or number of segments on a spiral, hold down the Up Arrow or Down Arrow key while creating the shape. This only works if the mouse button is held down. When the mouse button is released, the tool remains set to the last specified value.

- To rotate the shape, move the mouse in an arc.

- To keep a side or point at the top, hold down the Shift key.

- To keep the inner radius constant, start creating a shape and then hold down Ctrl (Windows) or Command (Mac OS).

- To move a shape as you draw it, hold down the spacebar. This also works for rectangles and ellipses.

- To create multiple copies of a shape, hold down the ~ (tilde) key as you draw.

Outlining strokes

Paths, such as a line, can only have a stroke color and not a fill color by default. If you create a line in Illustrator and you want to apply both a stroke and a fill, you can outline the stroke, which converts the line into a closed shape (or compound path). Next you will create the shaft of the screwdriver by drawing a line segment. You will then outline that stroke so that you can apply a stroke and a fill to the object.

1 Choose Select > Deselect.

2 With the Selection tool (▸), click and drag the grouped objects that make the handle straight up toward the top of the artboard. A smart guide construction guide appears, constraining the movement horizontally as you drag up. At right, you can see the artwork so far.
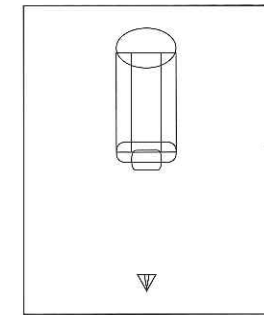
⬤ **Note:** If the construction guide does not appear, make sure the smart guides are selected (View > Smart Guides), and that you are dragging straight up.

3 Select the Line Segment tool (╲) in the Tools panel.

4 Place the pointer at the bottom of the handle, in the center, until the word intersect and a green vertical line appear. Hold the Shift key to ensure that the line is straight, and click and drag down. Don't release the mouse button yet.

5 Stop dragging when you reach the grouped triangles and the word intersect appears. Release the mouse button, and then the Shift key.
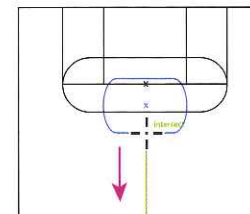
Shift-drag with the Line Segment tool.
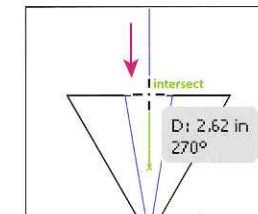
Drag to the screwdriver tip to create the line.

6 With the line still selected, type .5 in into the Stroke Weight field in the Control panel. Press Enter or Return to accept the value. Notice that the value changes to points. Make sure the Fill color is None (⬜) and the Stroke color is black in the Control panel.

⬤ **Note:** If the line initially has a color fill, a more complex group is created when you choose Outline Stroke.

**7** Choose View > Preview to see the thick black stroke on the line.

⬤ **Note:** As you drag to create the line, the smart guide measurement label may show an angle of 270 degrees, but your distance (D:) may be shorter or longer. That's alright.

8 Choose Object > Path > Outline Stroke. This creates a filled rectangle that is 0.5 inches wide. With the new shape selected, click the Fill color (■▾) in the Control panel and change the color to white, and click the Stroke color (▢▾) to change the color to black.
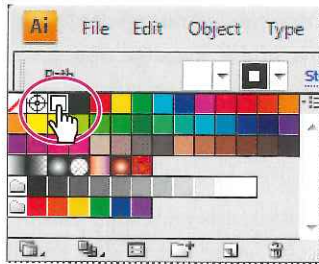
Set the stroke and fill colors.
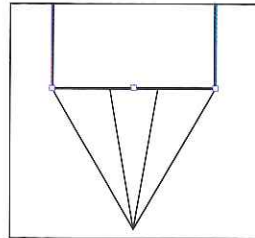
Align the stroke for the rectangle to the inside.

9 With the object selected, open the Stroke panel by clicking the Stroke icon (≣) on the right side of the workspace.

10 In the Stroke panel, select the Align Stroke To Inside button (▦). This aligns the stroke to the inside edge of the shape.

● **Note:** You may need to zoom in to see the change.

11 With the Selection tool, select the group of triangles and repeat the same step to align the stroke to the inside of both shapes in the group. The rectangle and the group of triangles should now be the same width visibly. Leave the triangle group selected for the next steps.

Align stroke

If an object is a closed path (such as a circle or square), select an option in the Stroke panel to align the stroke along the path:
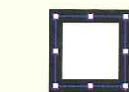
Align Stroke To Center

Align Stroke To Inside

Align Stroke To Outside

● **Note:** If you try to align paths that use different stroke alignments, the paths may not exactly align. Make sure the path alignment settings are the same if you need the edges to match up exactly.

12 Choose View > Smart Guides to deselect smart guides temporarily.

13 With the Selection tool, Shift-click the rectangle to add it to the selection, so that the triangles and the rectangle are both selected.

14 Click and drag the center point on the right side of the bounding box to the left to make the triangles and rectangle narrower. As you drag, hold down Alt (Windows) or Option (Mac OS) to resize both sides at once. Release the mouse button, and then the key.

15 Choose Select > All In Active Artboard, and then Object > Group.

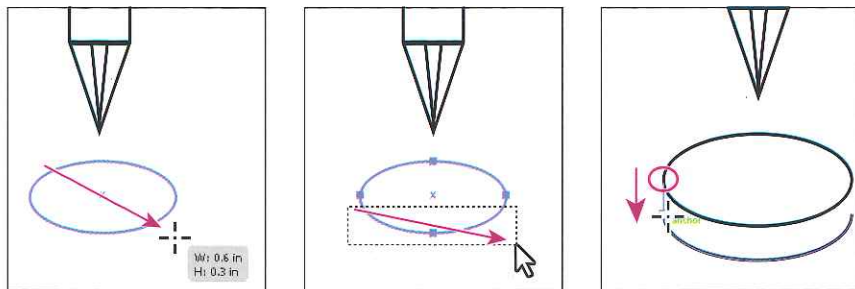**16** Choose File > Save.
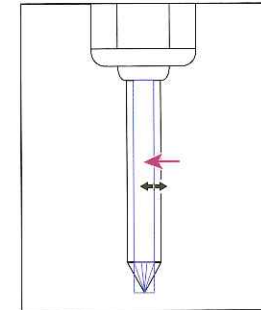
Working with line segments

Next you'll work with straight lines and line segments to create a screw for the screwdriver. Shapes can be created in many ways in Illustrator, and the simpler way is usually better.

1 With tools.ai open, select the Hand tool (✋) in the Tools panel, and click and drag up to move to the bottom of the artboard to give yourself room to work.

2 Select the Zoom tool (🔍) in the Tools panel, and click three times below the screwdriver tip to zoom in.

3 Choose View > Smart Guides and make sure that smart guides are selected.

4 Choose Essentials from the workspace switcher in the Control panel.

5 Select the Ellipse tool (◯) from the same group as the Polygon tool (◯) in the Tools panel. Draw an ellipse that has a width of 0.6 in and a height of 0.3 in. To see the size of the shape as you draw, reference the measurement label that appears.

6 Click the Fill color in the Control panel and select None (▱). Make sure that the stroke weight is 1 pt.

▶ **Tip:** Zooming in to the artwork gives you finer control over the size of the shape as you draw.

7 With the Direct Selection tool (⟐), drag across the lower part of the ellipse to select the bottom half. Choose Edit > Copy, and then Edit > Paste In Front to create a new path. Switch to the Selection tool and press the Down Arrow key about seven times to move the new line down.

8 Select the Line Segment tool (⟍) in the Tools panel. Hold down Shift while drawing a line from the left anchor point of the ellipse to the left anchor point of the new path. The anchor points highlight when the line snaps to them. Repeat this on the right side of the ellipse.


9 Choose File > Save.

Next you will take the three line segments that make up part of the screw head and join them together as one path.

Joining paths

When the end points of an open path are selected, you can join them together to create a closed path (like a circle). You can also join the end points of two separate paths. Next you will join the three open paths to create a single open path.

1 Choose Select > Deselect.

2 Select the Direct Selection tool (⟐) in the Tools panel.

3 Click and drag on the left side of the shapes, where the lower two paths meet (see figure at the top of the next page). This selects the two end points. Click the Connect Selected End Points button (⌒) in the Control panel. This opens the Join dialog box.

4 In the Join dialog box, make sure that the Corner option is selected and click OK.

5 Choose Select > Deselect.

6 Repeat the above two steps where the line segment on the right side and the bottom path meet.

7 With the Direct Selection tool still selected, hold down the Shift key and click the top two points of the selected path (on the right and left). Release the Shift key. Click the Connect Selected End Points button (⌒) in the Control panel. A line appears connecting the two end points.
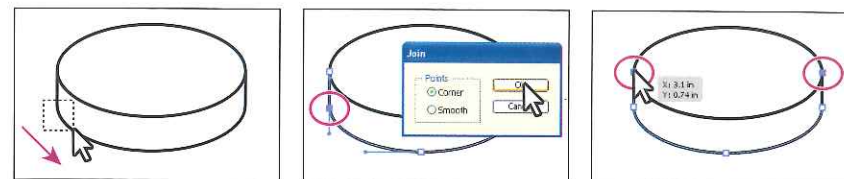
● Note: Joining the points in this step is not necessary if you only want to fill the shape with a color, because an open path can have a color fill. It is necessary if you want a stroke to appear around the entire fill area.

8 Select the Selection tool (▶), click a blank area of the artboard, and then reselect the path you just joined.

9 Change the Fill color in the Control panel to a light gray (K=20).

10 Choose Object > Arrange > Send To Back.

11 Click the path of the ellipse shape to select it. In the Control panel, click the Fill color (⟋▾) and choose white. This covers the shape that you just put in the back.
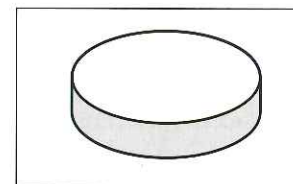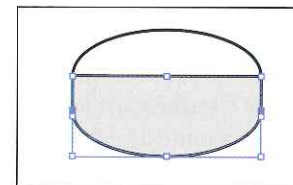

● Note: Selecting paths without fills requires that you select them by clicking or dragging across the path.

Join paths

As shown below, if the end points of two separate paths are on top of each other (called coincident points), a dialog box appears when you join them that allows you to specify the type of join you want: corner or smooth, merging the two points together.

If the end points are noncoincident (apart from each other), and you join them, a connecting line is drawn between them, joining the end points.
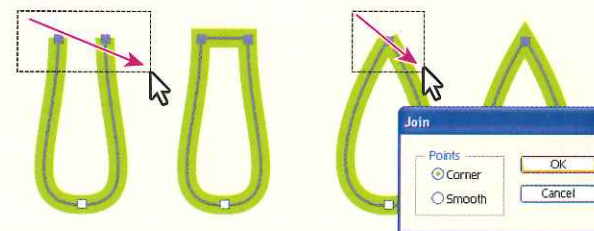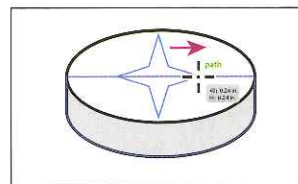

Noncoincident points   Coincident points

Next you will finish this part of the lesson by drawing with the Star tool.

12 Select the Selection tool, hold down the Shift key, and click both shapes to select them. Choose Object > Group.

13 With the group still selected, choose Object > Lock > Selection. This temporarily locks the group so that it cannot be accidentally selected.

14 Select the Star tool (✩) from the same group as the Ellipse tool (⬭) in the Tools panel. Place the pointer in the center of the ellipse shape. Notice that the word center appears.

Click and drag to the right to create a star shape. Without releasing the mouse button, press the Down Arrow key once so that the star has four points. Hold down Control (Windows) or Command (Mac OS) and continue dragging to the right. This keeps the inner radius constant. Without releasing the mouse button, release the Control or Command key, and then hold down the Shift key. Resize by dragging until the star fits within the ellipse (about 0.25 in width and 0.25 in height). Release the mouse button, and then the Shift key.

15 Select the Selection tool. Holding down Alt (Windows) or Option (Mac OS), click and drag the top, center anchor point down. This resizes both sides of the star, giving it a more realistic appearance. Release the mouse button, and then the key.
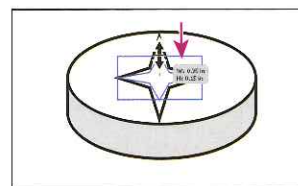
16 Holding down Alt (Windows) or Option (Mac OS), click and drag the center anchor point on the right side of the star to the right.

17 Change the Stroke Weight in the Control panel to 0.5 pt.

18 Choose Object > Unlock All.

19 Choose File > Save.
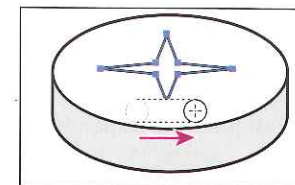
Using the Eraser tool

The Eraser tool lets you erase any area of your artwork, regardless of the structure. You can use the Eraser tool on paths, compound paths, paths inside Live Paint groups, and clipping paths.

1 Choose Select > Deselect.

2 Select the Zoom tool (🔍) in the Tools panel, and click the star you just created twice to zoom in.

3 With the Selection tool (▶), click to select the star.

4 Select the Eraser tool (✐) in the Tools panel. With the pointer on the artboard, press the Left Bracket key ([) several times until the eraser diameter becomes smaller. Position the pointer just to the left of the bottom point of the star, hold down the Shift key, and click and drag across the bottom star point to cut part of it off in a straight line. Repeat for the top star point. The path remains closed (the erased ends are joined).

● **Note:** If you erase and nothing seems to happen, erase more of the star on the bottom and top. Zooming in can also be helpful.

5 Choose Select > Deselect.

6 Choose View > Fit Artboard In Window.

7 Hold down Ctrl+spacebar (Windows) or Command+spacebar (Mac OS) to temporarily access the Zoom tool. Click the tip of the screwdriver (the bottom triangle group) several times to zoom in.

8 Release the keys to return to the Eraser tool. Press the Right Bracket key (]) three times to make the Eraser diameter larger. Drag across the bottom of the screwdriver tip in a "u" shape to create a slightly rounded tip (it's not meant to be perfectly round).

▶ **Tip:** Like many other tools in Illustrator, if it doesn't turn out the way you wanted, you can always drag across again, or choose Edit > Undo Eraser and try again.

9 Choose View > Fit Artboard In Window.

10 Choose Select > All In Active Artboard, and then choose Object > Group.

11 Choose Select > Deselect, and then choose File > Save.

▶ **Tip:** Step 14 uses several keyboard commands for working with stars. Take it slow and understand each as you draw the star.

● **Note:** To erase a specific object, select it with the Eraser tool. Otherwise, leave all objects deselected to erase any object that the tool touches.
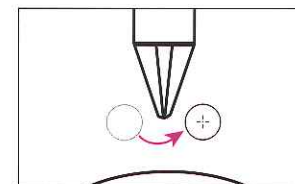
▶ **Tip:** To change the Eraser tool preferences, such as roundness and diameter, double-click the Eraser tool in the Tools panel to open the Eraser Tool Options dialog box.

Combining objects

Pathfinder commands let you combine objects to create shapes. There are two types of Pathfinder commands: Pathfinder effects and shape modes.

Pathfinder effects in the Pathfinder panel let you combine shapes in many different ways to create paths or groups of paths by default. When a Pathfinder effect is applied (such as Merge), the original objects selected are permanently transformed. If the effect results in more than one shape, they are grouped automatically.

Shape modes create paths like Pathfinder effects, but they can also be used to create compound shapes. When several shapes are selected, clicking a shape mode while pressing the Alt (Windows) or Option (Mac OS) key creates a compound shape rather than a path. The original underlying objects of compound shapes are preserved. As a result, you can select each object within a compound shape, as shown below.
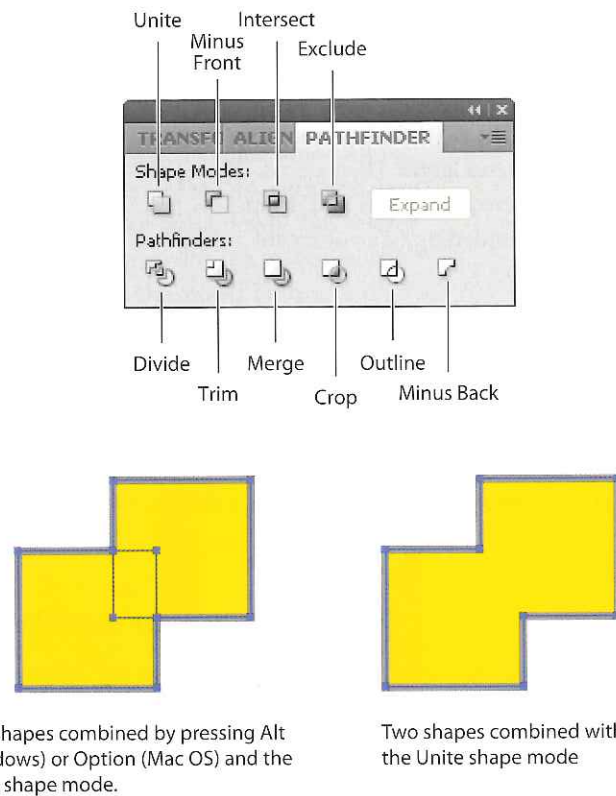
Two shapes combined by pressing Alt (Windows) or Option (Mac OS) and the Unite shape mode.

Two shapes combined with the Unite shape mode

Working with Pathfinder effects

Next, you will create several shapes for a wrench that use Pathfinder effects. But first, you will copy some shapes from an existing document.

1 Click the Next button (▶) in the status bar in the lower left corner of the Document window to navigate to the second artboard.

2 Choose File > Open and open the wrench.ai file in the Lesson03 folder in the Lessons folder.

3 Select the Selection tool (▶) in the Tools panel, and choose Select > All.

4 Choose Edit > Copy. Close the wrench.ai file by clicking the x on the wrench.ai Document window tab.

5 In the tools.ai file, choose Edit > Paste, and then choose Select > Deselect.

6 Select the Rectangle tool (▢) from the same group as the Star tool (☆) in the Tools panel. Position the pointer in the artboard and click. When the Rectangle dialog box opens, change the width to 0.8 in, and then click the word Height to make it the same value. Click OK.
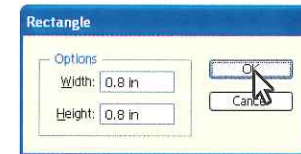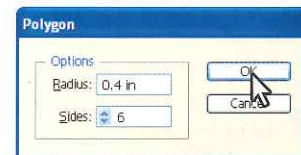

7 With the Selection tool, Shift-click the top circle of the wrench and the rectangle. Release the Shift key and click the circle one more time indicating that it is the key object. Notice the blue outline around it. In the Control panel, click the Horizontal Align Center button (⬒) and the Vertical Align Top button (▯) to align the objects to each other.
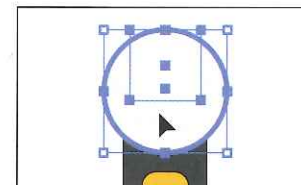
Set the key object.

8 Choose Window > Pathfinder.

9 Click the Minus Front button (◱) in the Pathfinder panel to subtract the rectangle from the circle. Notice that the fill and stroke are preserved.

10 Choose Select > Deselect.

11 Select the Polygon tool (◯) in the Tools panel. Click the artboard to open the Polygon dialog box. Change the radius to 0.4 in and the sides to 6. Click OK.


12 With the Selection tool, hold the Shift key and click the bottom circle of the wrench. Click the circle once more to set it as the key object. In the Control panel, click the Horizontal Align Center button (⬒) and the Vertical Align Center button (▯) to align the two objects to each other.

13 In the Pathfinder panel, click the Minus Front button (⬚). With the new shape selected, notice the words Compound Path on the left side of the Control panel.

14 With the Selection tool (▶), double-click the newly created compound path to enter isolation mode. The rest of the content on the artboard is now dimmed and can't be selected and a bar appears at the top of the Document window indicating that the Compound Path is on Layer 1. The compound path is also temporarily ungrouped so that you can select its parts individually. Click the stroke (the edge) of the polygon (in the center of the circle) to select it.
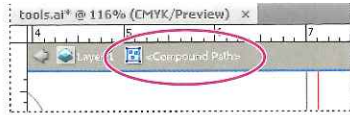
▶ **Tip:** Another way to enter isolation mode is to select the object and click the Isolate Selected Object button (⊡) in the Control panel.

15 In the Control panel, click the Constrain Width And Height Proportions button (🔒). Change the width to 1.125 in by clicking the arrow to the left of the field three times. This also changes the height value proportionally.

16 With the Selection tool, double-click outside the shapes on the artboard to exit isolation mode.

17 Click to select the rectangle that is the wrench body. Click and drag the bottom, center bounding point up until it snaps the top edge of the polygon. The word intersect appears. Release the mouse button.

Click and drag the bottom center bounding point up.
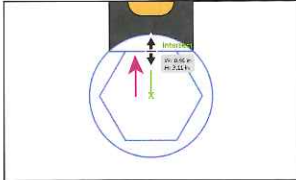
18 Choose Select > All In Active Artboard. Choose Object > Group. Drag the wrench to the left side of the artboard.

**19** Choose Object > Hide > Selection to give you room to create more content.

Working with shape modes

Next you will use Pathfinder effects and shape modes to create two gears.

1 Select the Star tool (☆) in the Tools panel. Click and drag on the left side of the artboard to create a star. Without releasing the mouse button, press the Up Arrow key until the star has 12 points. Hold down the Shift key and drag toward the center or away until the width and height are approximately 3.42 in in the measurement tooltip. Release the mouse button.
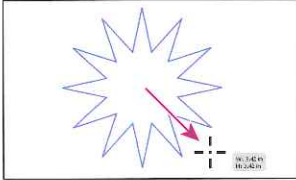
▶ **Tip:** As you are drawing a star, you can hold down Ctrl or Command and drag away from or toward the center of a star to increase or decrease the radius.

2 Click the Fill color in the Control panel and select white in the Swatches panel that appears.

3 Select the Ellipse tool (○) in the Tools panel. While holding down Alt (Windows) or Option (Mac OS), click in the center of the star you just created (the word center appears). In the Ellipse dialog box, change the width and height to 2 in and click OK.
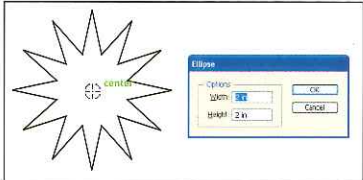
4 With the Selection tool, hold down the Shift key, and select both the ellipse and the star. To ensure that the shapes are centered on each other, in the Control panel, click the Horizontal Align Center button (♣) and the Vertical Align Center button (♦▸) to align the two objects to each other.

5 With the objects selected, click the Merge button (▣) in the Pathfinder panel (Window > Pathfinder). Notice that the shapes are combined but the stroke disappears. With the shape selected, click the Stroke color in the Control panel and select black.
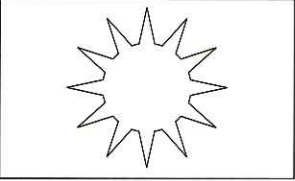
The shapes are combined.

6 Select the Ellipse tool in the Tools panel and click in the center of the star you just created. In the Ellipse dialog box, change the width and height to 2.5 in and click OK.

7 With the Selection tool, hold down the Shift key, and select both the ellipse and the star. In the Control panel, click the Horizontal Align Center button (♣) and the Vertical Align Center button (♦▸) to align the two objects to each other. This is gear A.
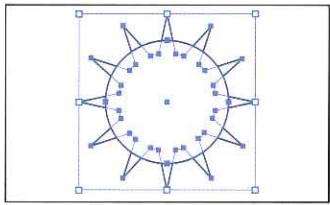
At this point, you have the two shapes selected that will combine to make a gear.

Next, you will create a copy of the selected gear shapes so that you will have two gears when finished. You will combine the shapes to create two gears, but they will be combined in two different ways.
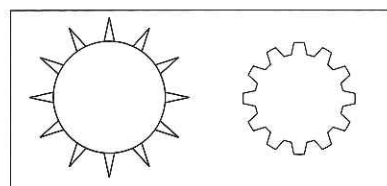
8 With the shapes still selected, choose Edit > Copy, and then Edit > Paste. Drag the copied shapes (called gear B) to the right of gear A. Keep the two copied shapes for gear B selected.
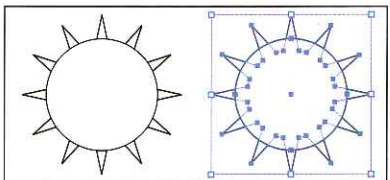
Gear A   Gear B

9 Click the Intersect button (⬚) in the Shape Modes section of the Pathfinder panel to trace the outline of the overlapping area.

10 Choose Select > Deselect.

The result is a single gear shape. Notice that you cannot edit the original objects. You will now combine the shapes for gear A so that you can edit the shapes, even after they are combined to form the gear.

11 With the Selection tool, click and drag across both shapes that make up gear A to select them both.

12 Hold down the Alt (Windows) or Option (Mac OS) key, and click the Intersect button (⬚) in the Pathfinder panel.
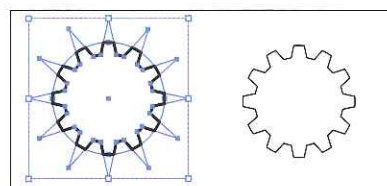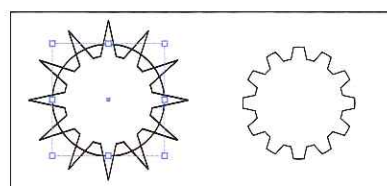
This creates a compound shape that traces the outline of the overlapping area of both objects. It also means that you can still edit the ellipse and the star shape separately.

● **Note:** The stroke weight for gear A in the figure has been exaggerated so that it is easier to see.

▶ **Tip:** To edit the original shapes in a compound shape like gear A, you can also select them individually with the Direct Selection tool (⬚).

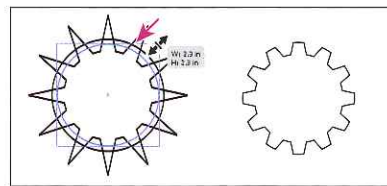**13** With the Selection tool, double-click gear A to enter isolation mode.

14 Choose View > Outline so that you can see the two pieces (the ellipse and the star). Click to select the circle if it isn't already selected.

● **Note:** In outline mode, notice that gear B is still a single shape.

15 While pressing Shift+Alt (Windows) or Shift+Option (Mac OS), click and drag a corner of the ellipse bounding box toward its center to make it smaller. This resizes the ellipse from the center. Drag until the width and height are roughly 2.3 inches in the measurement tooltip. It does not have to be exact. Release the mouse button, and then the keys.

● **Note:** Resizing a shape precisely can be easier when you zoom in. You can also change the width and height of the selected shape in the Transform panel.

Gear A   Gear B

16 Choose View > Preview.

17 With the Selection tool, double-click outside of gear A to exit isolation mode.

You will now expand gear A. Expanding a compound shape maintains the shape of the compound object, but you can no longer select or edit the original objects.
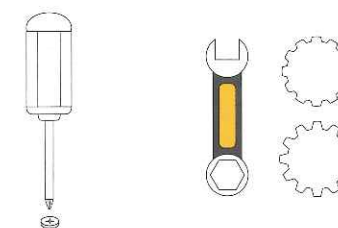
18 Click to select gear A. Click the Expand button in the Pathfinder panel. Close the Pathfinder panel group.

19 Choose Select > Deselect.

20 With the Selection tool, click and drag the gears so that one is on top of the other on the right side of the artboard.

21 Choose Object > Show All. The wrench now appears.

22 Choose View > Fit Artboard In Window.

You may want to position the wrench and gears so that they look something like the figure at right.

23 Choose File > Save, and then File > Close.

In the next lesson, you'll learn how to work with Live Trace.

Using Live Trace to create shapes

In this part of the lesson, you will learn how to work with the Live Trace command. Live Trace traces existing artwork, like a raster picture from Photoshop. You can then convert the drawing to vector paths or a Live Paint object.

1 Choose File > Open, and open the L3start_02.ai file in the Lesson03 folder.

2 Choose File > Save As, name the file snowboarding.ai, and select the Lesson03 folder in the Save As dialog box. Leave the Save As Type option set to Adobe Illustrator (*.AI) (Windows) or the Format option set to Adobe Illustrator (ai) (Mac OS), and click Save. In the Illustrator Options dialog box, leave the Illustrator options at their default settings, and click OK.

● **Note:** A Missing Profile dialog box may appear. Click OK to continue.

3 Choose View > Fit Artboard In Window.

**4** With the Selection tool (⬚), select the snowboarder sketch.

Note that the Control panel options change when the scanned image is activated. It says Image on the left side of the Control panel, and you can see the resolution (PPI: 150).

**5** Click the Live Trace button in the Control panel. This converts the image from raster to vector.
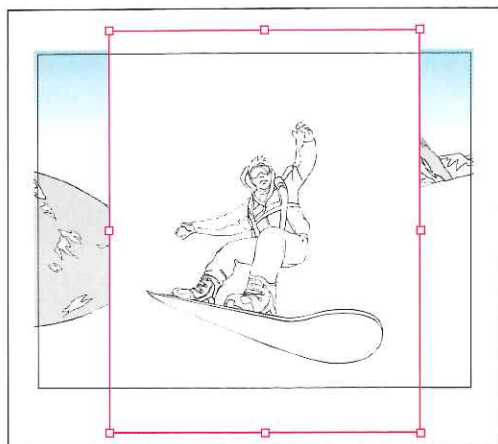
Raster versus vector

Raster images use a rectangular grid of picture elements (pixels) to represent images. Each pixel is assigned a specific location and color value. When working with bitmap images, you edit pixels rather than objects or shapes.
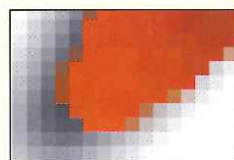
Raster image

Vector graphics (sometimes called vector shapes or vector objects) are made up of lines and curves defined by mathematical objects called vectors, which describe an image according to its geometric characteristics.
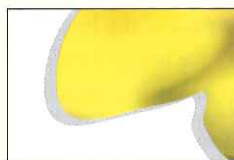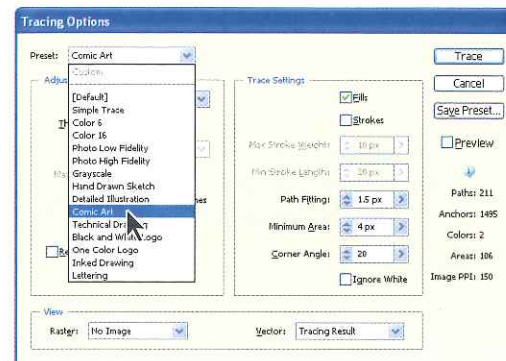
—From Illustrator Help

Vector graphic

With Live Trace, you can view your changes as you make them. You can change the settings, or even the original placed image, and then see the updates immediately.

6 Click the Tracing Options Dialog button (⊞) in the Control panel, and choose Comic Art from the Preset pop-up menu. Check Preview to experiment with different presets and options. Leave the Tracing Options dialog box open.

▶ **Tip:** For information on Live Trace and the options in the Tracing Options dialog box, see "Tracing artwork" in Illustrator Help.

As you see, the Live Trace feature can interpret black and white sketches as well as full-color images.

7 In the Tracing Options dialog box, change Threshold to 220. After experimenting with other settings in the Tracing Options dialog box, make sure that Comic Art preset is selected, and click Trace.

The snowboarder is now a tracing object (vector), however the anchor points and paths are not yet editable. To edit the content, you must expand the tracing object.

● **Note:** Threshold specifies a value for generating a black and white tracing result from the original image. All pixels lighter than the Threshold value are converted to white, and all pixels darker than the Threshold value are converted to black.

8 With the snowboarder still selected, click the Expand button in the Control panel.

9 Choose Object > Ungroup, and then Select > Deselect.

10 Select the Selection tool (➤) in the Tools panel, and then click the white background surrounding the snowboarder. Press Delete to remove the white shape.
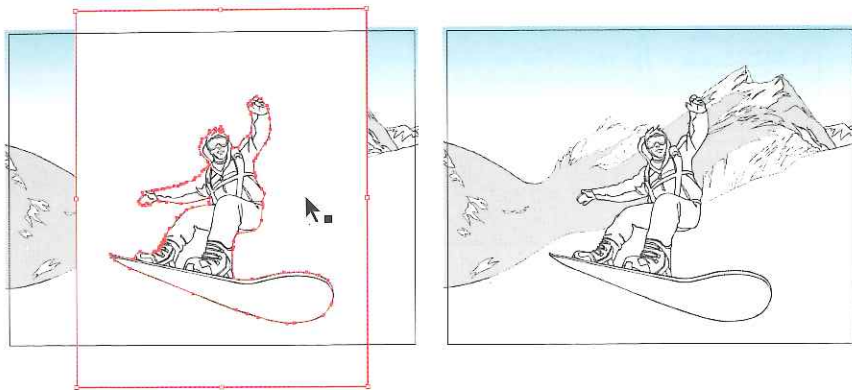

11 With the Selection tool, try clicking to select other parts of the snowboarder. Notice that it is composed of many shapes and paths.

12 Choose File > Save, and close the file.

Exploring on your own

Experiment with shapes by creating a shape such as a circle, star, or rectangle. Clone it several times using the Alt or Option key.

Open the tools.ai file. Select the gear shapes and create an ellipse that is centered on the gear. Click the Minus Front button (▢) in the Pathfinder panel to create a compound path.
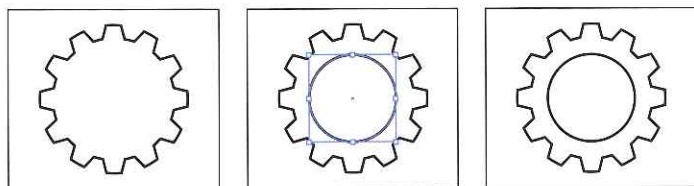
The original gear   Create the ellipse.   Create the compound path.

In the tools.ai file, choose File > Place and place a raster image. Try selecting the raster image, and then clicking the Live Trace button in the Control panel. Choose a preset from the Tracing Preset menu in the Control panel.

Review questions

1 What are the basic shape tools? Describe how to tear or separate a group of shape tools away from the Tools panel.

2 How do you select a shape with no fill?

3 How do you draw a square?

4 How do you change the number of sides on a polygon as you draw?

5 How do you combine several shapes into one?

6 How can you convert a raster image to editable vector shapes?

Review answers

1 There are six basic shape tools: Ellipse, Polygon, Star, Flare, Rectangle, and Rounded Rectangle. To tear off a group of tools from the Tools panel, position the pointer over the tool that appears in the Tools panel and hold down the mouse button until the group of tools appears. Without releasing the mouse button, drag to the triangle at the bottom of the group, and then release the mouse button to tear off the group.

2 Items that have no fill must be selected by clicking the stroke.

3 To draw a square, select the Rectangle tool in the Tools panel. Hold down Shift and drag to draw the square, or click the artboard to enter equal dimensions for the width and height in the Rectangle dialog box.

4 To change the number of sides on a polygon as you draw, select the Polygon tool in the Tools panel. Start dragging to draw the shape, and hold the Down Arrow key to reduce the number of sides and the Up Arrow key to increase the number of sides.

5 Using the Pathfinder commands, you can create new shapes out of overlapping objects. You can apply Pathfinder effects by using the Effects menu or the Pathfinder panel.

6 If you want to base a new drawing on an existing piece of artwork, you can trace it. To convert the tracing to paths, click Expand in the Control panel or choose Object > Live Trace > Expand. Use this method if you want to work with the components of the traced artwork as individual objects. The resulting paths are grouped.