8 VECTOR DRAWING TECHNIQUES

Lesson overview

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

- Differentiate between bitmap and vector graphics.
- Draw straight and curved paths using the Pen tool.
- Save paths.
- Draw and edit shape layers.
- Draw custom shapes.
- Import and edit a Smart Object from Adobe Illustrator.
- Use Smart Guides.

This lesson will take about 90 minutes to complete. Please log in to your account on peachpit.com to download the lesson files for this chapter, or go to the Getting Started section at the beginning of this book and follow the instructions under "Accessing the Lesson Files and Web Edition."

As you work on this lesson, you'll preserve the start files. If you need to restore the start files, download them from your Account page.

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PROJECT: COFFEE SHOP SIGN

Unlike bitmap images, vector graphics retain their crisp edges when you enlarge them to any size. You can draw vector shapes and paths in your Photoshop images and add vector masks to control what is shown in an image.

# About bitmap images and vector graphics

Before working with vector shapes and vector paths, it's important to understand the basic differences between the two main categories of computer graphics: *bitmap images* and *vector graphics*. You can use Photoshop to work with either type of graphic; in fact, you can combine both bitmap and vector data in an individual Photoshop image file.

Bitmap images, technically called *raster images*, are based on a grid of dots known as *pixels*. Each pixel is assigned a specific location and color value. In working with bitmap images, you edit groups of pixels rather than objects or shapes. Because bitmap graphics can represent subtle gradations of shade and color, they are appropriate for continuous-tone images such as photographs or artwork created in painting programs. A disadvantage of bitmap graphics is that they contain a fixed number of pixels. As a result, they can lose detail and appear jagged when scaled up on screen or printed at a lower resolution than they were created for.

Vector graphics are made up of lines and curves defined by mathematical objects called *vectors*. These graphics retain their crispness whether they are moved, resized, or have their color changed. Vector graphics are appropriate for illustrations, type, and graphics such as logos that may be scaled to different sizes.


Logo drawn as vector art
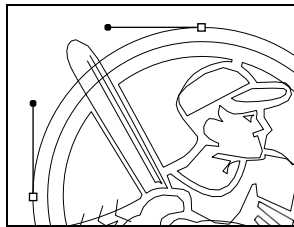
Logo rasterized as bitmap art
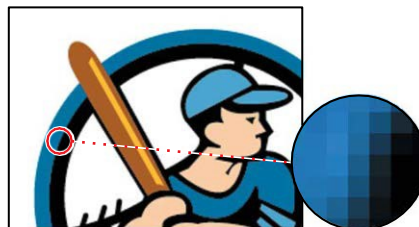
About paths and the Pen tool

In Photoshop, the outline of a vector shape is called a *path*. A path is a curved or straight line segment you draw using the Pen tool, Freeform Pen tool, Curvature Pen tool, or a shape tool. The Pen tool draws paths with the greatest precision; shape tools draw rectangles, ellipses, and other shape paths; the Freeform Pen tool draws paths as if you were drawing with a pencil on paper.
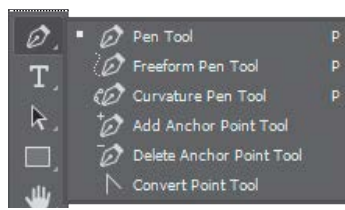
Paths can be open or closed. An open path (such as a wavy line) has two distinct endpoints. A closed path (such as a circle) is continuous. The type of path you draw affects how it can be selected and adjusted.

Paths that have no fill or stroke do not print when you print your artwork. This is because paths are vector objects that contain no pixels, unlike the bitmap shapes drawn by the Pencil tool and other painting tools. If you want a path to have a fill or stroke, create it as a shape. A shape is a layer based on vector objects instead of pixels. Unlike a path, you can apply colors and effects to a shape layer.

Getting started

In this lesson, you'll draw a path around a coffee cup in an image, and create another path inside the handle. You'll subtract one selection from the other so that a lightning bolt shape (provided in the Shapes panel) knocks out of the cup shape. Finally, you'll import an Illustrator title treatment as a Smart Object and apply a color and emboss effect.

Before you begin, you'll view the image you'll be creating—a sign for a fictitious coffee shop.

1 Start Photoshop, and then immediately hold down Ctrl+Alt+Shift (Windows) or Command+Option+Shift (Mac) to restore the default preferences. (See "Restoring Default Preferences" on page 5.)

2 When prompted, click Yes to delete the Adobe Photoshop Settings file.

3 Choose File > Browse In Bridge.

4 In the Favorites panel, click the Lessons folder, and then double-click the Lesson08 folder in the Content panel.

5 Select the 08End.psd file, and press the spacebar to see it in full-screen view.

To create this sign, you'll trace the coffee cup in an image, and use that tracing to make a vector logo. You'll resize that logo and combine it with an Illustrator typographic logo imported as a Smart Object. First, you'll practice making paths and selections using the Pen tool.

6 When you've finished looking at the 08End.psd file, press the spacebar again. Then double-click the 08Practice_Start.psd file to open it in Photoshop.

7 Choose File > Save As, rename the file **08Practice_Working.psd**, and click Save. If the Photoshop Format Options dialog box appears, click OK.
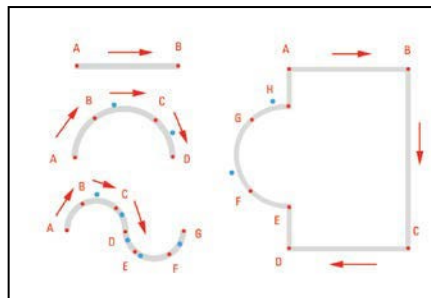
Drawing with the Pen tool

Tip: The Curvature Pen tool offers a potentially simpler way to draw precise vector paths; consider learning it if you find the Pen tool to be challenging to use. The Pen tool is taught here because it's a traditional way to precisely draw vector paths and shapes, used in many applications.

You'll use the Pen tool to select the coffee cup. The cup has long, smooth, curved edges that would be difficult to select using other methods.

The Pen tool works a little differently from most Photoshop tools. We've created a practice file which you can use to get familiar with the Pen tool before making your Kailua Koffee sign.

Paths include anchor points (smooth and corner) and segments (straight and curved). You'll get a feel for the Pen tool by drawing a straight path, a simple curve, and then an S-curve before you practice tracing the coffee cup.

Creating paths with the Pen tool

You can use the Pen tool to create paths that are straight or curved, open or closed. If you're unfamiliar with the Pen tool, it can be confusing to use at first. Understanding the elements of a path and how to create those elements with the Pen tool makes paths much easier to draw.

To create a straight path, click the mouse button. The first time you click, you set the starting point. Each time that you click thereafter, a straight line is drawn between the previous point and the current point. To draw complex straight-segment paths with the Pen tool, simply continue to add points.

Creating a straight line

To create a curved path, click to place an anchor point, drag to create a direction line for that point, and then click to place the next anchor point. Each direction line ends in two direction points; the positions of direction lines and points determine the size and shape of the curved segment. Moving the direction lines and points reshapes the curves in a path.

Smooth curves are connected by anchor points called *smooth points*. Sharply curved paths are connected by *corner points*. When you move a direction line on a smooth point, the curved segments on both sides of the point adjust simultaneously, but when you move a direction line on a corner point, only the curve on the same side of the point as the direction line is adjusted.

A. *Curved line segment*
B. *Direction point*
C. *Direction line*
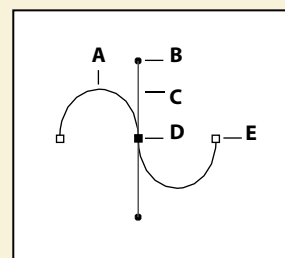**D.** *Selected anchor point*
E. *Unselected anchor point*

Path segments and anchor points can be moved after they're drawn, either individually or as a group. When a path contains more than one segment, you can drag individual anchor points to adjust individual segments of the path, or select all of the anchor points in a path to edit the entire path. Use the Direct Selection tool to select and adjust an anchor point, a path segment, or an entire path.

Creating a closed path differs from creating an open path in the way that you end it. To end an open path, press Enter or Return. To create a closed path, position the Pen tool pointer over the starting point, and click. Closing a path automatically ends the path. After the path closes, the Pen tool pointer appears with a small *, indicating that your next click will start a new path.
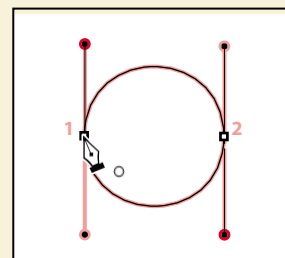

Creating a closed path

As you draw paths, a temporary storage area named Work Path appears in the Paths panel. It's a good idea to save work paths, and it's essential if you use multiple discrete paths in the same image file. If you deselect an existing Work Path in the Paths panel and then start drawing again, a new work path will replace the original one, which will be lost. To save a work path, double-click it in the Paths panel, type a name in the Save Path dialog box, and click OK to rename and save the path. The path remains selected in the Paths panel.

First, you'll configure the Pen tool options and the work area.

1 In the Tools panel, select the Pen tool (⌀).

2 In the options bar, select or verify the following settings:

- Choose Shape from the Tool Mode pop-up menu.

- In the Path Options menu, make sure that Rubber Band is not selected.

- Make sure that Auto Add/Delete is selected.

- Choose No Color from the Fill pop-up menu.

- Choose a green color from the Stroke pop-up menu.

- Enter **4 pt** for the stroke width.

- In the Stroke Options window, choose Center (the second option) from the Align menu.
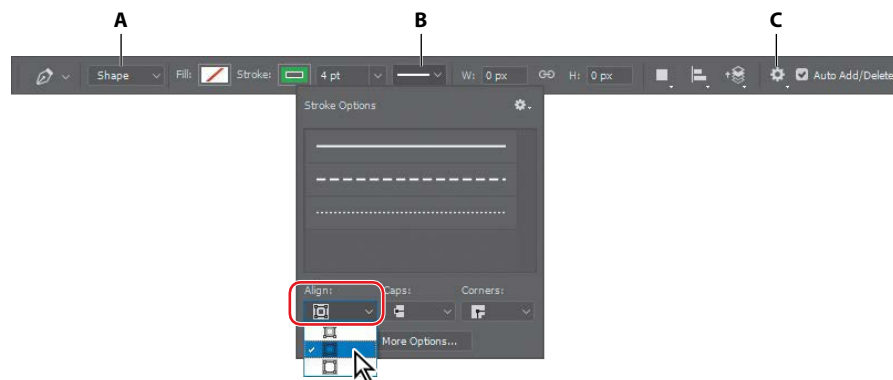
A. *Tool Mode menu*   **B.** *Stroke Options menu*   **C.** *Path Options menu*

Drawing a straight line

You'll start by drawing a straight line. Anchor points mark the ends of path segments; the straight line you'll draw is a single path segment with two anchor points.

1 Click the Paths tab to bring that panel to the front of the Layers panel group.

The Paths panel displays thumbnail previews of the paths you draw. Currently, the panel is empty, because you haven't started drawing.

2 If necessary, zoom in so that you can easily see the lettered points and blue dots on the shape template. Make sure you can see the whole template in the image window, and be sure to reselect the Pen tool after you zoom.

3 Click point A on the first shape, and release the mouse button. You've created an anchor point.

4 Click point B. You've created a straight line with two anchor points.
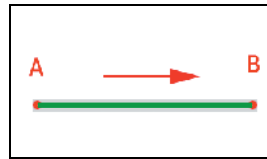
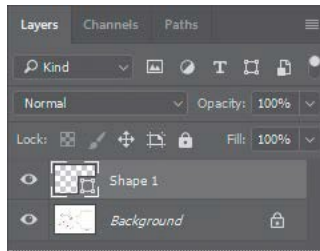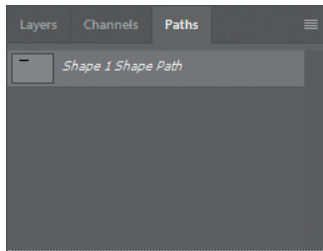**5** Press Enter or Return to stop drawing.
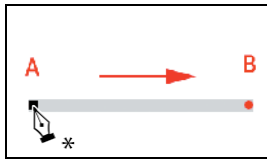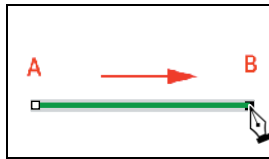
Create an anchor point. *Click to create a straight line.* *Complete the path.*

The path you drew appears in the Paths panel and as a new layer in the Layers panel.

Drawing curves

On curved segments, selecting an anchor point displays two direction lines (smooth points) or one direction line (corner point). Direction lines end in direction points, and the positions of the direction lines and direction points determine the size and shape of the curved segment. You'll create curved lines, using smooth points.
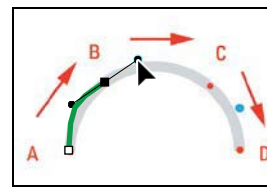
1 Click A on the semicircle, and release the mouse to create the first anchor point.

2 Click point B, but don't release the mouse button. Instead, drag the cursor to the blue dot to the right of point B to create a curved path segment and a smooth anchor point. Then release the mouse button.
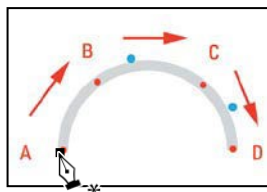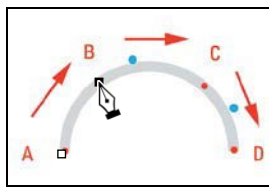
*Create an anchor point.* *Click and hold.* *Drag to curve the path segment.*
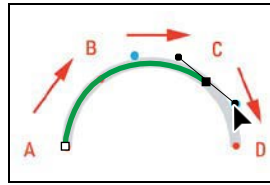
Smooth anchor points have two linked direction lines. When you move one, the curved segments on both sides of the path adjust simultaneously.
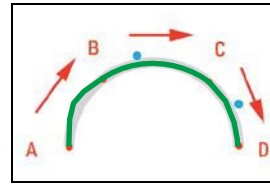
3 Click point C, and drag down to the blue dot below. Then release the mouse button. You've created a second curved path segment and another smooth point.

4 Click point D, and release the mouse to create the final anchor point. Press Enter or Return to complete the path.
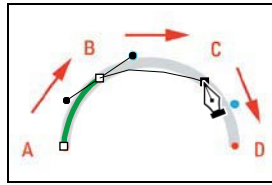
*Click C to create a point.*   *Drag to curve the segment.*   *Click D to finish the semicircle.*

When drawing a freehand path using the Pen tool, use as few points as possible to create the shape you want. The fewer points you use, the smoother the curves are—and the more efficient your file is.

Using the same techniques, you'll draw an S-shaped curve.

5 Click point A, and then click point B; then drag the cursor to the first blue dot.

6 Continue with points C, D, E, and F, in each case clicking the point and then dragging to the corresponding blue dot.

7 Click point G to create the final anchor point, and then press Enter or Return to complete the path.
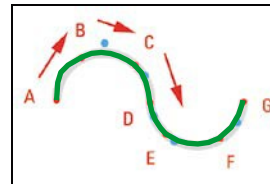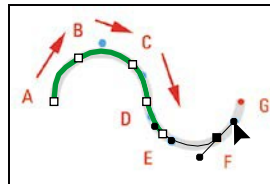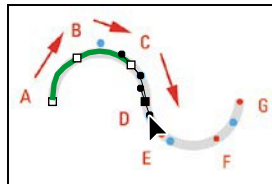
This shape is on its own layer in the Layers panel. Only one path is in the Paths panel because the work path for the second shape overwrote the work path for the first one.

Notice that the curves you drew with the Pen tool are much smoother and easier to precisely control than if you had drawn them freehand.

Drawing a more complex shape

Now that you've got the idea, you'll have a chance to draw a more complex object: the outline of a coffee cup.

1 Click point A on the shape on the right side to set the first anchor point.

2 Press the Shift key as you click point B. Pressing the Shift key constrains the line so that it is perfectly straight.

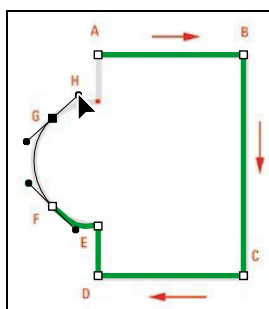**3** Press the Shift key as you click points C, D, and E to create straight path segments.

4 Click point F, and drag to the blue dot to create a curve. Then release the mouse button.

5 Click point G, and drag to the blue dot to create another curve. Then release the mouse button.

6 Click point H. Then press Alt (Windows) or Option (Mac) as you click point H again to create a corner point.

When you move a direction line on a corner point, only the curve on the same side of the point as the direction line is adjusted, so you can create a sharp transition between two segments.
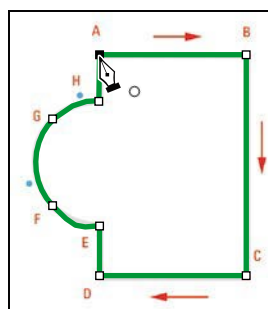
7 Click point A to draw the final path segment and close the path. Closing a path automatically ends the drawing; you don't need to press Enter or Return.
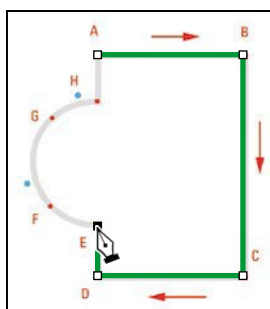
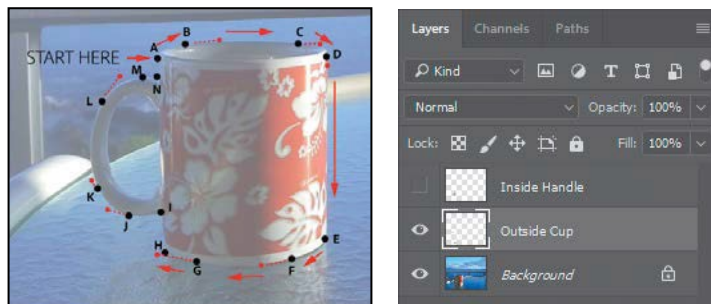*Start with straight segments.*   *Drag to create a curve.*   *Close the path.*

8 Close the file without saving changes.

Tracing a shape from a photo

Now you're ready to draw a path around the coffee cup in the image. You'll use the techniques you've practiced to draw a path around the outside of the cup and another one inside the handle.
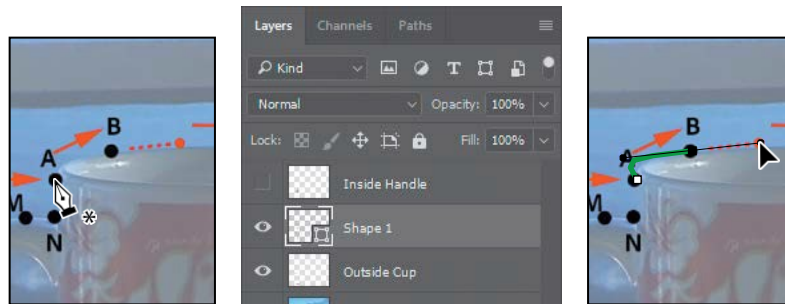
1 Open the 08Start.psd file in Photoshop.

The image includes three layers: the background layer and two template layers to guide you as you draw shapes.

2 Choose File > Save As, rename the file **08Working.psd**, and click Save. Click OK in the Photoshop Format Options dialog box.

3 With the Pen tool selected, click point A. Photoshop creates a new layer for the shape.

4 Click point B, and drag the cursor to the red dot on the right to create the initial curve.

5 Click point C, and drag to the red dot to its right.

6 Continue tracing the cup, clicking each point, and dragging the cursor to the corresponding red dots when you need to create a curve.

7 Close the shape by clicking point A again.
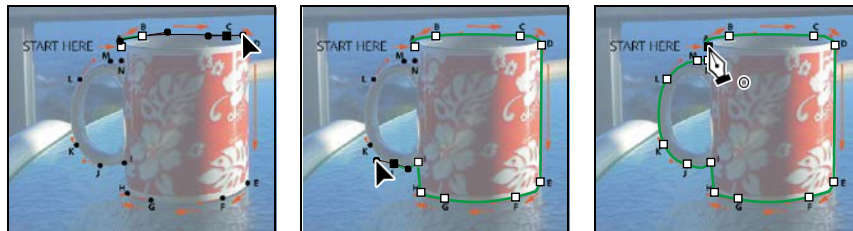
8 Evaluate your path. If you want to adjust any segments, use the Direct Selection tool to select a point, and then move its direction lines to edit the segment.

9 Press Enter or Return to deselect the path, and save your work so far.

Adding a second shape to a path

You've drawn a path that outlines the exterior of the cup, but you want the inside of the handle to be transparent. You'll draw a shape to isolate the inside of the cup handle.

1 Hide the Outside Cup layer, and make the Inside Handle layer visible.

2 Make sure Shape 1 is selected in the Layers panel, and then, in the Paths panel, select Shape 1 Shape Path.

3 Make sure the Pen tool is selected, and choose Subtract Front Shape from the Path Operations pop-up menu in the options   bar.
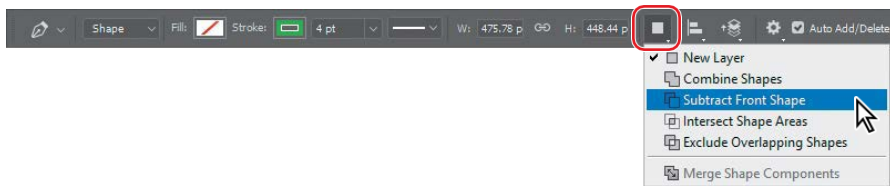
Options in the Path Operations menu determine how multiple shapes interact with each other in a path. After you draw the cup outline, you'll subtract the inside of the handle from it.

4 Click point A to begin drawing. Then click point B, drag to the next red dot, and release the mouse button.

**5** Continue drawing, clicking and drag- ging as indicated at points C and D.
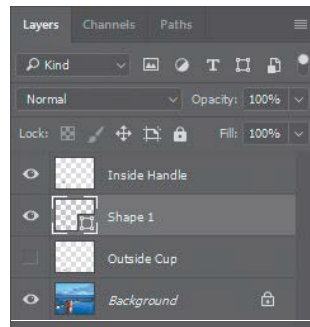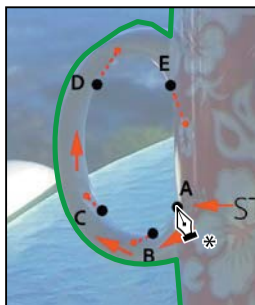
● **Note:** If your green cup outline and Layers panel don't appear exactly as they do in the figure at the left, choose Edit > Step Backward until Shape 2 disappears from the Layers panel, press Enter or Return to deselect the path, and start again at step 2.

6 Click point E, drag slightly down to the red dot, and release. Then, press Alt (Windows) or Option (Mac) as you click point E to convert the point to a corner point.

Converting point E to a corner point enables you to draw a straight path segment between it and point A. If point E remained a smooth point, the path between points E and A would be slightly curved.

7 Click point A to close the shape and stop drawing.
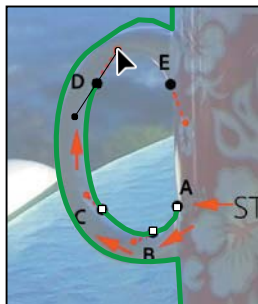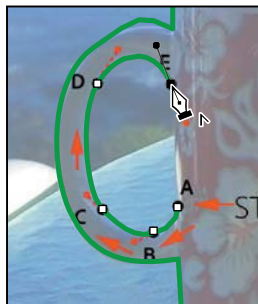
Create curved path.   *Convert E to corner point.*   *Create final straight segment.*

Now you'll save the path to use later.

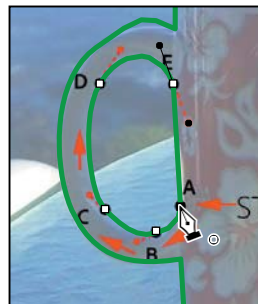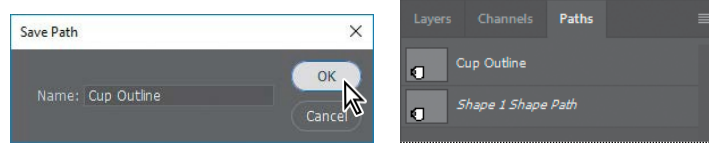**8** In the Paths panel, double-click Shape 1 Shape Path, type **Cup Outline** in the Save Path dialog box, and click OK to save it; then, still in the Paths panel, click in an empty area to deselect all paths.

You won't need the Shape 1, Outside Cup, and Inside Handle layers any more, so you'll delete them.

9 In the Layers panel, select the Shape 1 layer, and then click the Delete Layer icon (🗑 at the bottom of the Layers panel. Click Yes if you're asked to confirm the deletion. This will also remove the Shape 1 Shape Path from the Paths panel. In the same way, delete the Inside Handle and Outside Cup layers.
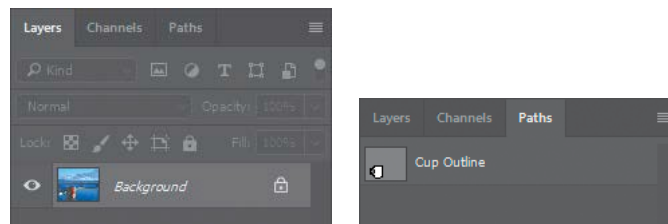
10 Choose File > Save to save your work.

Working with defined custom shapes

Photoshop includes several predefined custom shapes in the Custom Shape Picker, but you can also create your own.

Converting a path to a shape

You'll define the cup outline path as a custom shape that you can use for the logo. The shape will be available in the Custom Shape Picker.

1 Select the Cup Outline path in the Paths panel.

2 Choose Edit > Define Custom Shape.

3 Name the shape **Coffee Cup**, and click OK.
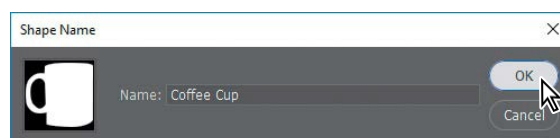
4 Select the Custom Shape tool (, hidden under the Rectangle tool (in the Tools panel.

5 Open the Custom Shape Picker in the options menu, and scroll to the bottom of the picker. The shape you added should be the last one displayed. Click to select the Coffee Cup shape.

6 Position the Custom Shape tool near the top left corner of the document. Hold down the Shift key to maintain original proport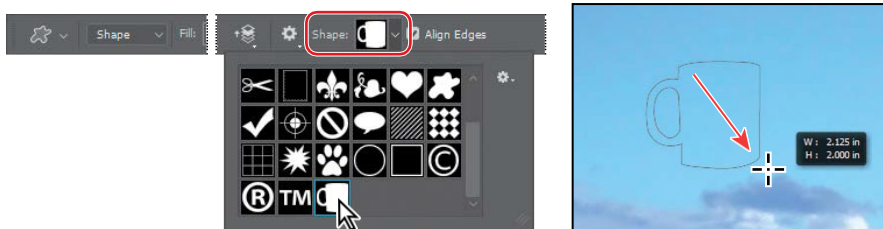ions, and start dragging down and to the right. When the logo is about 2 inches tall, release the mouse button, and then release the Shift key.

7 Double-click the name of the Shape 1 layer in the Layers panel, and name it **Coffee Cup**.

Changing the fill color of a shape layer

You've created a custom shape from your path, and you've used the Custom Shape tool to draw the shape on the image. But it's just an outline. You'll add a fill.

1 Make sure the Coffee Cup layer is selected in the Layers panel.

2 Select the Pen tool (∅) in the Tools panel.

3 In the options bar, select Black for the Fill color and No Color for the stroke.
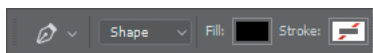
The coffee cup shape is now solid black.

4 Press Enter or Return to deselect the coffee cup path.

Subtracting shapes from a shape layer

After you create a shape layer, you can subtract new shapes from it. You'll add some interest to the coffee cup shape by subtracting a lightning bolt shape from it, allowing the background to show through.

1 In the Tools panel, select the Custom Shape tool.

2 In the Paths panel, select Coffee Cup Shape Path.

3 In the options bar, choose Subtract Front Shape from the Path Operations menu. The pointer now appears as cross-hairs with a small minus sign ($\frac{+}{-}$).

4 Select the lightning bolt from the Custom Shape Picker (it's in the second row). Start at the upper left corner of the black coffee cup, and drag down to the bottom right. Click first, and as you drag diagonally, press the Shift key to keep the dimensions proportional.

Importing a Smart Object

Smart Objects are layers that you can edit in Photoshop nondestructively; that is, changes you make to the image remain editable and don't affect the actual image pixels, which are preserved. Regardless of how often you scale, rotate, skew, or otherwise transform a Smart Object, it retains its sharp, precise edges.

You can import vector objects from Adobe Illustrator as Smart Objects. If you edit the original object in Illustrator, the changes will be reflected in the placed Smart Object in your Photoshop image file.

When you place a Smart Object, you can link it or embed it. If you link it, Photoshop retains a link to the original file so that you can easily update it later, and it includes a preview image of the Smart Object in the Photoshop file. If you embed a Smart Object, Photoshop includes the entire object in the Photoshop file, but does not retain a link. However, you can convert an embedded Smart Object to a linked Smart Object if the original file is still available.

You'll work with a Smart Object now by placing a Kailua Koffee logotype that was created in Illustrator.

1   Select the Move tool (✛) in the Tools panel.

2   Select the Coffee Cup layer, and choose File > Place Linked. Select the Logotype.eps file in the Lesson08 folder, and click Place.

The Kailua Koffee logotype is added to the middle of the composition, inside a bounding box with adjustable handles. A new layer, Logotype, appears in the Layers panel.

3   Drag the logotype object to the upper left corner of the sign, just to the right of the coffee cup logo, and then press Shift and drag a corner to make the text object proportionally larger—large enough that it fills the top portion of the image, as in the following illustration. When you've finished, either press Enter or Return, or click the Commit Transform button (✓) in the options bar.
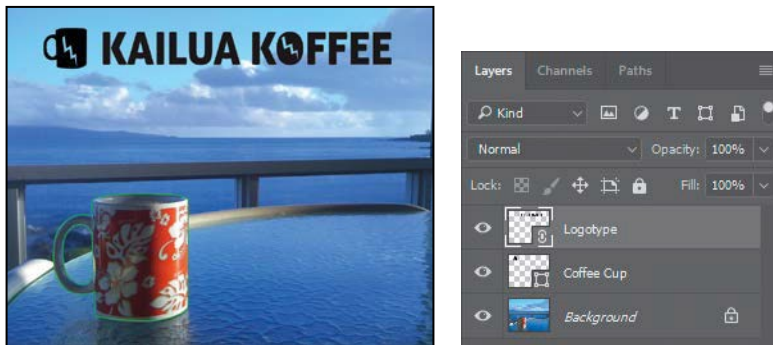
When you commit to the transformation, the layer thumbnail icon changes to show a link icon, indicating that the Logotype layer is a linked Smart Object.

As with any shape layer or Smart Object, you can continue to edit its size and shape if you'd like. Simply select the layer, choose Edit > Free Transform to access the control handles, and drag to adjust them. Or, select the Move tool (✛) and select Show Transform Controls in the options bar. Then adjust the handles.

Adding color and depth to a shape using layer styles

You created the shape with a black fill. Now you'll make it snazzier by changing the fill color and adding a Bevel & Emboss effect.

1   With the Logotype layer selected, choose Color Overlay from the Add A Layer Style menu (*fx*) at the bottom of the Layers panel.

2   In the Layer Style dialog box, choose a dark red or burgundy color.

3 Click Bevel & Emboss on the left side of the Layer Style dialog box to add another layer style. Accept the defaults for the Bevel & Emboss layer style, and click OK.
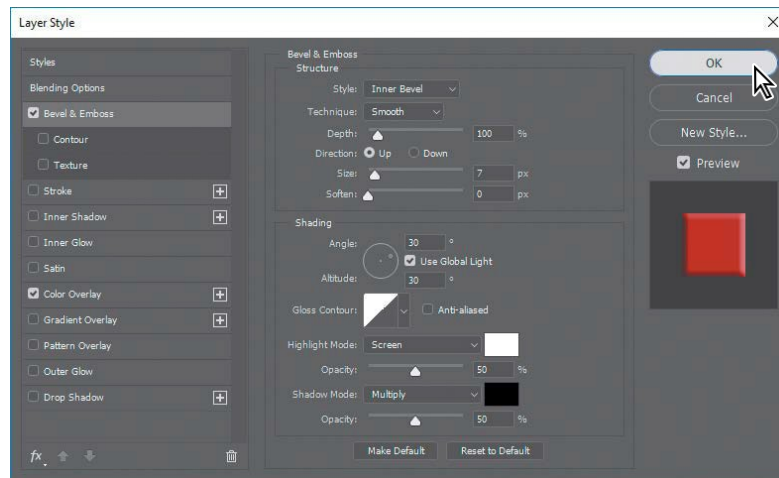
The Color Overlay and Bevel & Emboss layer styles affect the Logotype layer. You'll copy them to the Coffee Cup layer.

4 Press Alt (Windows) or Option (Mac) as you drag the layer effects indicator (*fx*) from the Logotype layer onto the Coffee Cup layer.
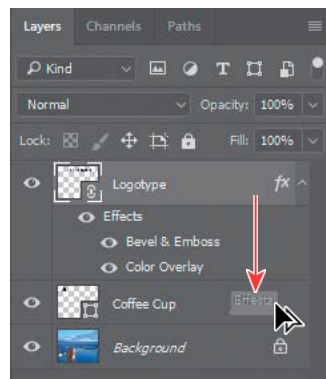
5 Clean up the Paths panel by deleting the Cup Outline path.

6 Choose File > Save to save your work. The coffee shop sign is complete.

7 Close the file.

Extra Credit

Using Creative Cloud Libraries with linked Smart Objects

When you organize and share your design assets using Creative Cloud Libraries, you and your team can use those library items in many Creative Cloud desktop and mobile apps. Let's take a look:

1 Open 08End.psd. If the Libraries panel isn't open, choose Window > Libraries to open the Libraries panel.

2 In the Libraries panel menu, choose Create New Library, and name it **Kailua Koffee**.

3 In the Layers panel, select the Background layer. In the Layers panel menu, choose Convert to Smart Object. This layer is now named "Layer 0."

4 Select the Move tool. Drag the layer from the document window (not the Layers panel) into the Kailua Koffee library.

5 Repeat steps 3 and 4 for the Logotype layer and the Coffee Cup layer.

Now all three elements will appear in Creative Cloud applications and mobile apps. Because each item is a linked Smart Object, you can edit the logo in the Kailua Koffee library and it will update in all documents that use it. To edit a library item, just double-click it in the Libraries panel.
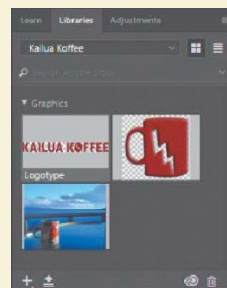
Adding colors

1 With the Eyedropper tool, click the red mug in the document window. Then choose Select > Deselect Layers.

2 At the bottom of the Libraries panel, click the Add Content button (⊹, make sure the Foreground Color swatch is selected, and click Add. That adds the color you sampled to the current library. Use the same method to sample a light blue from the sky in the background, and add that color to your library too.
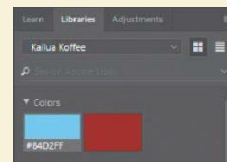
Collaborating

When you share a Creative Cloud Library, your team always has the current version of those assets. In the Libraries panel menu, choose Collaborate, and fill in the Invite Collaborators screen that appears in your web browser. Collaborators will see the library you shared in their Creative Cloud applications (to utilize this feature, you must have a Creative Cloud account and be logged in).

Adding assets to libraries using Adobe mobile apps

Use Adobe mobile apps—such as Adobe Capture CC—to record color themes, shapes, and brushes from real life and add them to your Creative Cloud libraries. Library assets you add with mobile apps are automatically synced to your Creative Cloud account, so you'll see the new assets in your Libraries panel when you return to your computer.
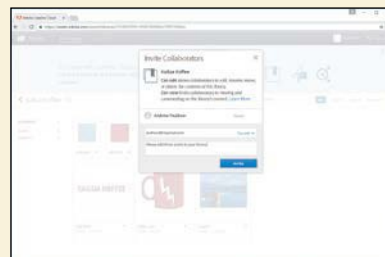
Extra credit

Smart Guides

Let's take this design to the next level. You can use the coffee cup logo to make a repeated motif at the bottom of the sign. Smart Guides can help you position the images evenly.

1 In 08Working.psd, choose View > Show, and make sure Smart Guides are enabled. If there's a check mark next to Smart Guides, they're on. Otherwise, select Smart Guides to enable them.

2 Select the Coffee Cup layer. Then select the Move tool, and press Alt (Windows) or Option (Mac) as you drag the cup logo to the lower left corner of the sign. The Alt or Option key copies the selected object; the magenta lines that appear are Smart Guides that align the copy to the center or edges of the original, as long as you keep the object snapped to the guides. Without Smart Guides, you'd have to also press Shift to keep the copy aligned.

3 Choose Edit > Free Transform. Then press Shift to maintain the proportions as you scale the cup to about half its original size. Press Enter or Return to confirm the transformation.

4 Make sure the Move tool and the Coffee Cup layer are still selected, and then press Alt or Option as you drag the coffee cup copy to the right until the measurements displayed in pink show you that the images are 4.5 inches apart. Again, keep the copy snapped to the Smart Guides as you drag, and use the transformation value display to see how far you've dragged and the space between objects.

5 Select the second image on the bottom, and repeat step 4. This time, when you drag the image 4.5 inches, Photoshop displays the distance between each of the sets of images.

6 Repeat step 5 so you have a total of four equally spaced logos.