

Adobe Photoshop

2026 Release



Classroom in a Book®

The official training workbook from Adobe

Conrad Chavez

FREE SAMPLE CHAPTER |



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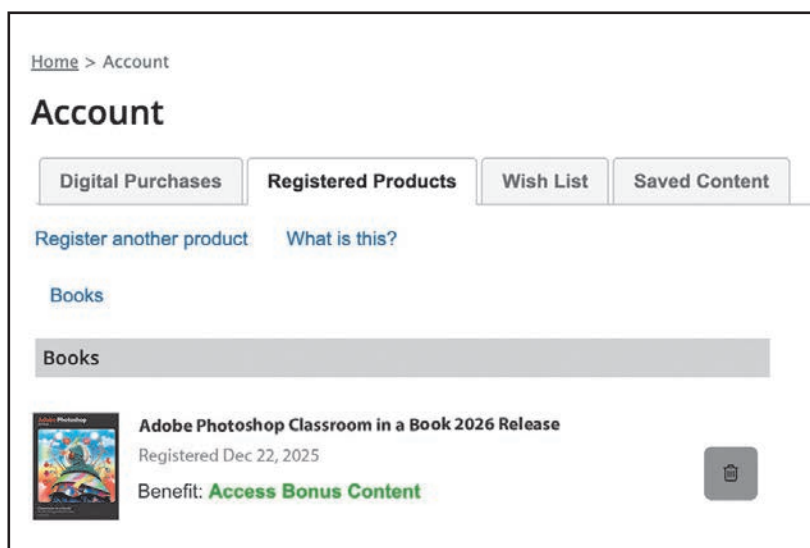
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CONTENTS

WHERE ARE THE LESSON FILES?	iii
GETTING STARTED	1
About Classroom in a Book.	1
What's new in this edition.	2
Prerequisites	2
Installing Adobe Photoshop, Adobe Bridge, and Adobe Camera Raw	2
Installing fonts.	4
Starting Adobe Photoshop.	4
Online content	4
Restoring default preferences	5
Additional resources	6
1 GETTING TO KNOW THE WORK AREA	8
 Starting to work in Adobe Photoshop	10
Starting a new document	13
Adding an image	14
Touring the Photoshop work area	15
Using the tools	17
Combining elements using layers	22
Adding type	26
Adding a solid color layer	29
Painting a graphic element.	31
Undoing and redoing steps	34
Extending an image	36
Exporting a copy for delivery.	39

2 BASIC PHOTO CORRECTIONS 42



Opening a file with Adobe Bridge	44
Evaluating an image before editing	46
Adjusting contrast and color using Curves	47
Using a Color & Vibrance adjustment	52
Removing distractions	56
Using color creatively	62
Cropping an image for print.	66
Sharpening an image	68

3 WORKING WITH SELECTIONS 74



About selecting and pixel selection tools	76
Getting started	76
Automatically selecting a subject.	76
Using the Object Selection tool	82
Selecting a sky.	91
About manual selection tools	93

4 LAYER BASICS 102



About layers	104
Getting started	104
Using the Layers panel	105
Rearranging layers.	110
Applying a gradient to a layer	120
Applying a layer style	124
Using Adjust Colors	128
Updating layer effects	130
Creating a border from a selection.	130
Flattening and saving files	132

5	QUICK FIXES	136
	Getting started	138
	Correcting red eyes	138
	Adjusting facial features with Liquify	140
	Using Blur Gallery effects.....	144
	Creating a panorama	152
	Filling empty areas when cropping.....	156
	Correcting lens distortions	159
	Extending depth of field using focus stacking.....	162
	Making linear perspective consistent.....	165
6	MASKS AND PATTERNS	172
	Why masks are useful	174
	Getting started	174
	Using Select And Mask and Select Subject.....	175
	Manipulating an image with Puppet Warp.....	186
	Creating a pattern for the background.....	188
7	TYPOGRAPHIC DESIGN	194
	About type	196
	Getting started	196
	Creating a clipping mask from type.....	197
	Creating type on a path.....	203
	Warping point type.....	206
	Designing paragraphs of type.....	208
	Finishing up	211
8	VECTOR DRAWING TECHNIQUES	216
	About bitmap images and vector graphics.....	218
	About paths and the Pen tool	219
	Getting started with vector drawing.....	219
	Drawing a shape with the Pen tool	220
	Drawing a path traced from a photo.....	226
	Converting a path to a selection and a layer mask.....	230
	Creating a logo with text and a custom shape	231

9	ADVANCED COMPOSITING	240
	Getting started	242
	Arranging layers	243
	Using Smart Filters	246
	Colorizing an image by painting	252
	Adding a background	254
	Using the History panel to undo edits	255
	Improving a low-resolution image	261
10	PAINTING WITH THE MIXER BRUSH	264
	About the Mixer Brush	266
	Getting started	266
	Selecting brush settings	267
	Mixing colors	270
	Mixing colors with a photograph	273
	Using brush presets to paint and mix colors	276
11	EDITING VIDEO	284
	About video and animation in Photoshop	286
	Using the Timeline panel	287
	Getting started	288
	Adding video	288
	Adding audio	291
	Changing clip durations in a video group	292
	Animating with keyframes	293
	Adding transitions	297
	Rendering the timeline as a finished video file	298
12	WORKING WITH CAMERA RAW	304
	Getting started	306
	About camera raw files	307
	Processing files in Camera Raw	308
	Retouching a portrait in Camera Raw	328

13	PREPARING FILES FOR THE WEB	342
	Getting started	344
	Creating placeholders with the Frame tool.....	345
	Using layer groups to create button graphics	350
	Automating a multistep task	358
	Designing with artboards	367
14	EDITING FOR CONSISTENT COLOR	380
	Understanding digital color reproduction	382
	Getting started	382
	About color management.....	383
	Checking colors for the final medium.....	386
	Inspecting document color values.....	389
	Editing while simulating final output	392
	Preparing files for printing	394
	Converting an image to CMYK	395
	Saving the image as Photoshop PDF.....	397
	Printing to a desktop color printer.....	398
15	EXPLORING GENERATIVE AI	404
	About Adobe Firefly generative AI.....	406
	How does Photoshop use generative AI?	406
	Getting started	407
	Generating a complete image.....	408
	Refining a generative layer.....	412
	About generative credits.....	414
	Popular questions about generative AI	416
	Exploring the possibilities.....	417
	INDEX	420

2 BASIC PHOTO CORRECTIONS

Lesson overview

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

- View and open files using Adobe Bridge.
- Evaluate an image.
- Make basic tonal and color corrections to an image.
- Delete unwanted or distracting items using the Remove tool.
- Try different color looks for the image.
- Crop the image to a different aspect ratio.
- Sharpen the image.



This lesson will take about an hour to complete. To get the lesson files used in this chapter, refer to the instructions in “Accessing the lesson files and Web Edition” in the “Getting Started” section at the beginning of this book.

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.



PROJECT: BASIC PHOTO CORRECTIONS

Photoshop includes a variety of tools and commands for improving the quality of a photographic image. This lesson steps you through the process of correcting and enhancing a digital photograph.

● **Note:** In this lesson, you edit images using Photoshop. For images captured in camera raw format, it's often more effective to start editing in Adobe Camera Raw, which is installed with Photoshop. You'll learn about Camera Raw editing in Lesson 12, "Working with Camera Raw."

● **Note:** If Bridge isn't installed, the File > Browse In Bridge command in Photoshop will start the Creative Cloud desktop app, which will download and install Bridge. After installation completes, you can start Bridge. If you're asked to approve file access, startup scripts, or extensions for Bridge, allow them.

● **Note:** If Bridge asks you if you want to import preferences from a previous version of Bridge, select Don't Show Again, and click No.

▶ **Tip:** In Bridge, if the Favorites panel list and a folder you want to add to Favorites are both visible, you can drag the folder and drop it in the Favorites panel. You can even drag and drop to add a folder from your computer desktop to the Favorites panel.

Opening a file with Adobe Bridge

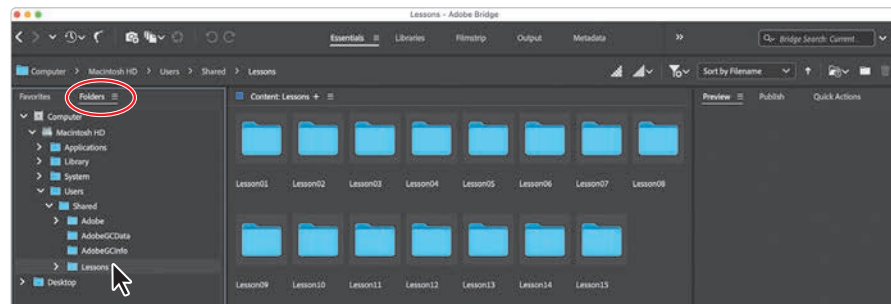
For each lesson in this book, you can perform the steps using files from a specific folder. You may make copies of these files and save them under different names or locations, or you may work from the original files and then download them from the peachpit.com website again if you want a fresh start. In this lesson, you'll start by improving a photo taken with a digital camera.

In Lesson 1, "Getting to Know the Work Area," you used the Open command to open a file. You'll start this lesson by comparing the original image to the finished image using Adobe Bridge, a visual file browser that integrates with Photoshop and other Creative Cloud applications.

- 1 Start Photoshop, and then simultaneously hold down Ctrl+Alt+Shift (Windows) or Command+Option+Shift (macOS) to reset the default settings.
- 2 When prompted, click Yes to confirm that you want to delete the Adobe Photoshop Settings file.
- 3 Choose File > Browse In Bridge. If you're prompted to enable the Photoshop extension in Bridge, click Yes or OK.

Adobe Bridge opens. In its Folders panel, you can browse and opens files on your computer like you can on your computer desktop. What Bridge offers are features useful for graphics work, such as managing camera metadata. For example, you can view a photo's exposure data and add a caption, a star rating, and keywords.

- 4 Select the Folders tab in the upper-left corner, and then browse to the Lessons folder you downloaded to your computer so that the lessons in the Lessons folder appear in the Content panel.

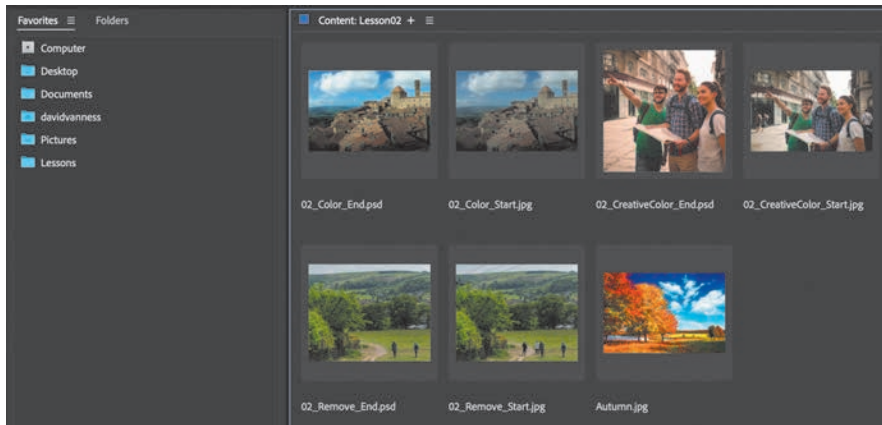


- 5 With the Lessons folder still selected in the Folders panel, choose File > Add To Favorites.

The Favorites panel lets you quickly access files, folders, applications, and other assets that you frequently use.

- Click the Favorites tab to open the panel, and click the Lessons folder to open it. Then, in the Content panel, double-click the Lesson02 folder.

Thumbnail previews of the folder contents appear in the Content panel.

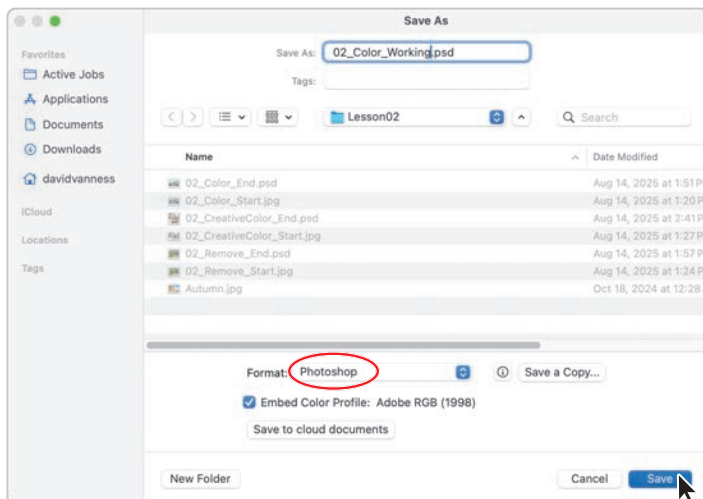


- Compare the 02_Color_Start.jpg and 02_Color_End.psd files. To enlarge the thumbnails in the Content panel, drag the thumbnail slider at the bottom of the Bridge window to the right.

In the 02_Color_Start.jpg file, notice that the tonal contrast and color saturation are weak. You'll fix these problems in this lesson.

- Double-click the 02_Color_Start.jpg thumbnail to open the file in Photoshop. Click OK if you see the Embedded Profile Mismatch dialog box, and close any messages that might appear about new features.
- In Photoshop, choose File > Save As. Choose Photoshop from the Format menu, and name the file **02_Color_Working.psd**. Then click Save.

► **Tip:** In Bridge, you can see a larger preview of a selected item in the Preview panel (choose Window > Preview). If that's not big enough, you can resize the Preview panel. Or, press the spacebar to see a full-screen preview of the selected item.



● **Note:** If Photoshop displays a dialog box about the difference between saving to Cloud Documents and On Your Computer, click Save On Your Computer. You can also select Don't Show Again, but that setting will deselect after you reset Photoshop preferences.

Evaluating an image before editing

► **Tip:** In the film era, photographers wrote and drew on test prints to indicate the edits they planned to do. In Photoshop you can use the Notes tool, or collect comments from others using File > Share for Review. Or, mark up a copy of a photo using annotation tools on your smartphone.

► **Tip:** Adjusting tonal contrast affects color saturation, so it can be better to edit contrast first. For example, if you adjust color saturation first, increasing contrast later would change the saturation so you'd have to adjust that again.

► **Tip:** Your editing choices can change depending on the condition of the image and how it will be used.

You could simply jump in and start editing, but it's often better to first look over the image to understand what kind of editing it needs. Work from general problems to specific problems: First resolve issues affecting the whole image, and then address problems that affect only certain areas of the image. In this lesson, you'll focus on overall edits and basic image repairs and retouching. In later lessons you'll learn how to use selections and masks, which restrict edits to part of an image.

This is the sequence of basic edits we'll explore in this lesson:

Tonal correction. Does the image make the best use of the tonal levels from black to white, with an appropriate amount of contrast?

Color correction. Do colors that should be neutral appear neutral, or does the image have an unnatural color cast?

Distraction removal. Would the image be improved by removing items, such as people in the background, overhead power cables, or dust on the camera lens?

Creative color. Do you want the image colors to express a certain style or look? You can make creative color decisions after the color correction step gives the image a balanced starting point.

Sharpness. Are image details sharp enough?

Composition. Does the image need to be cropped or resized for the final medium?

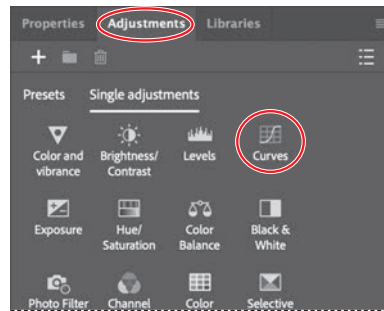
Let's start by looking at the overall tone of the image that's open in Photoshop. The image lacks contrast, especially in the sky, wall bricks, and roof tiles. Next, look at the overall color: It looks OK, but as a sunlit image it should probably look warmer than it does. For this image you'll learn about tonal and color corrections; later in the lesson you'll use other images to learn about the other types of basic edits.



Adjusting contrast and color using Curves

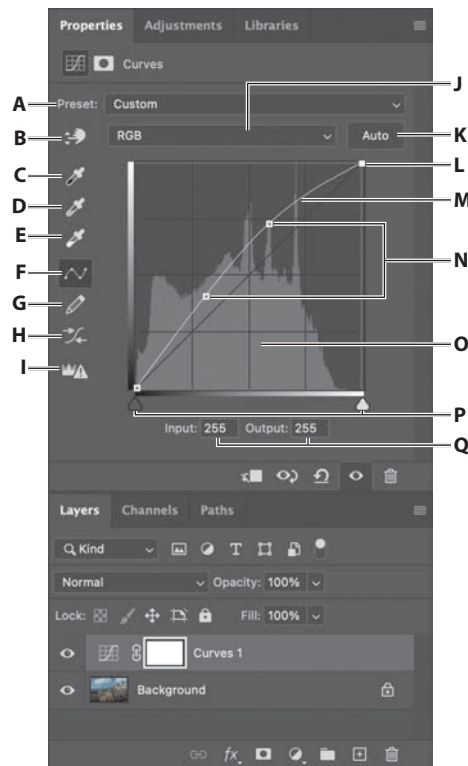
In Photoshop, most image corrections can be done using options in the Adjustments panel. You'll use a Curves adjustment to improve contrast.

- 1 If the Adjustments panel isn't visible, click its tab to bring it forward or choose Window > Adjustments.
- 2 In the Single Adjustments section, click Curves. A new Curves 1 adjustment layer appears in the Layers panel. The Properties panel comes forward and changes to show Curves options, because Curves is the currently selected layer.



► **Tip:** In your own work you can start with an easier-to-use tonal adjustment such as Brightness/Contrast or Levels, as long as they achieve the result you want. Curves is a more versatile and powerful adjustment, so it's often used by professionals.

► **Tip:** To make more room for the Properties and Layers panels, adjust panel heights or collapse or hide unneeded panels. For example, this lesson doesn't use the top panels (Color, Swatches, Gradients, Patterns).



- A. Curves presets
- B. On-Image Adjustment tool
- C. Black point eyedropper (color sampler)
- D. Gray point eyedropper
- E. White point eyedropper
- F. Point mode (edit curve by adjusting points)
- G. Draw mode (edit curve by drawing freehand)
- H. Smooth curve (available when Draw mode is active)
- I. Calculate a More Accurate Histogram
- J. Composite or single channel curve display
- K. Auto button
- L. Selected curve point (appears solid)
- M. Tone curve
- N. Points on the curve
- O. Histogram
- P. Black point (left) and white point (right); tones outside these sliders are clipped
- Q. Input (original) and Output (edited) values of the selected curve point

The Curves graph shows the current tone curve as a straight diagonal line because no curve edits have been made yet. Behind the curve grid you see a *histogram*, a graph that shows you how much each tonal level in the image is used. To understand the histogram and tone curve, refer to the gradient bars along the left and bottom of the graph. For example, the bottom bar's gradient shows that black is at

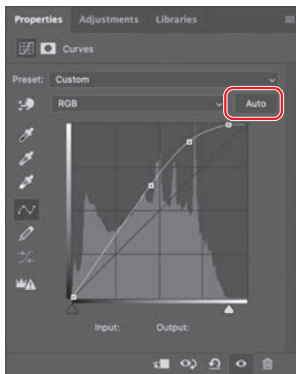
► **Tip:** The histogram that initially appears is an approximation so that it draws quickly. For full accuracy, click the Calculate a More Accurate Histogram icon (📊), the bottom icon to the left of the curve graph.

the left edge and white is at the right edge. Below it, a dark triangle and light triangle mark the image levels currently used as the darkest and lightest tones, respectively. One way to increase contrast is to drag the triangles inward to exclude extreme levels that aren't needed for image quality.

The histogram shows that there are image pixels using most tonal levels except those closest to white, so the lightest tone in the image is not near pure white. That helps explain why the image doesn't have the sunny contrast that it should.

You can shape the curve by adding points, controlling contrast from the darkest to lightest tonal levels. Where the curve steepens, the tones along that segment have more contrast. Where the curve flattens, the tones have less contrast.

- 3 In the Properties panel, click the Auto button.



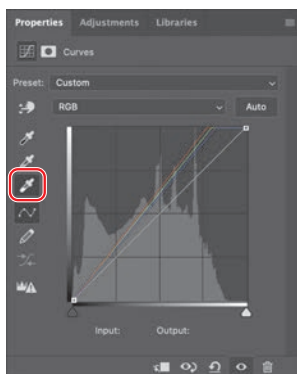
Photoshop analyzes the image and applies a custom curve with four points. The images brightens because the white point triangle was pulled in to set the lightest tone in the image to white, and also because the curve is high at the light end.

Auto works well for many images, but this image now seems a bit too light and the colors are too cool (blue), so now you'll try a more precise manual method: The color samplers for a Curves adjustment layer. There are three of them, for the black point, gray point, and white point. You don't always have to use all of them.

- 4 With the Curves adjustment layer still selected, in the Properties panel click the white point eyedropper icon to select it, and click that sampler on the lightest part of the clouds because it's the lightest tone that should be neutral.

► **Tip:** Editing a curve adjustment is a valuable, transferable skill. You'll find this type of curve in many graphics, video, and audio applications.

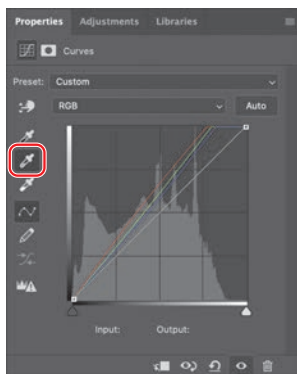
► **Tip:** Need help starting a Curves edit? When a Curves layer is selected, in the Properties panel choose a preset from the Preset menu. For example, the Increase Contrast (RGB), Medium Contrast (RGB), and Strong Contrast (RGB) presets can be good starting points.



Notice that the curve changed in two ways: You now see red, green, and blue (RGB) curves because the white end of each of the image's channels was shifted by different amounts to make the clicked level a neutral white, removing a color cast. Those ends were also brought in slightly to set the brightness of that image level to white, enhancing contrast. Also, this replaces the curve that Auto applied.

- 5 In the Properties panel click the gray point eyedropper icon to select it, and click that sampler on something in the image that should be neutral gray. We clicked the large antenna dish in the middle of the image.

► **Tip:** To see how the black point or white point color sampler changed the RGB curves, click the RGB menu and choose Red, Green, or Blue to show each channel's curve. When done, choose RGB again to see the composite curve.



The midtone image colors are rebalanced based on the neutral gray reference you clicked, removing the cool color cast. In the Curves graph the RGB curves update.

You've improved both the tonal contrast and the color balance of the image just by refining the end points of the curves. Now refine contrast by shaping the curve.

You can edit the curve by clicking it to add points and then dragging the points to shape the curve. But if you're still learning, you might not know where on the curve to add points. It's easier to use the On-Image Adjustment tool to shape the curve by dragging the tool on image tones that you want to lighten or darken.

6 In the Properties panel, click the On-Image Adjustment tool (⌘) to select it.

A good way to use this tool is to identify two tonal levels in the image that you want to move further apart (to increase contrast) or closer together (to decrease contrast). In this image the stone buildings could use more “snap,” so focus on those.

7 Position the On-Image Adjustment tool over the dark roof tiles, then drag down slightly until you think the tiles should be no darker, and then release the mouse button. Notice that a point was added to the curve at the tonal level where you started dragging, and that point pulled down the curve.

► **Tip:** This lesson doesn't use the Curves black point color sampler. You can use it when you want to remove a color cast from shadow tones.

● **Note:** As you edit a Curves or Levels adjustment, watch out for light areas that become solid white, or shadow areas that become solid black. When that happens, those tonal ranges have lost detail. It's a sign that the white point or black point was pulled in too far so that tonal detail was *clipped*.



- 8 Position the On-Image Adjustment tool over some lighter building walls (we used a wall to the left of the dome), drag up slightly until you think those walls are light enough, and then release the mouse button. Notice that a point was added to the curve at that tonal level, and it now pulls up the curve there.



The S-shaped curve you created is the typical shape of a curve that enhances mid-tone contrast, because it's steeper in the midtones. If you want to adjust it further, drag the points on the curve or click the curve to add more points to drag until you think the image contrast looks right. It's easier to control a curve with fewer points.

- 9 Choose File > Save. Click OK if the Photoshop Format Options dialog box appears; it appears because the document now has multiple layers.

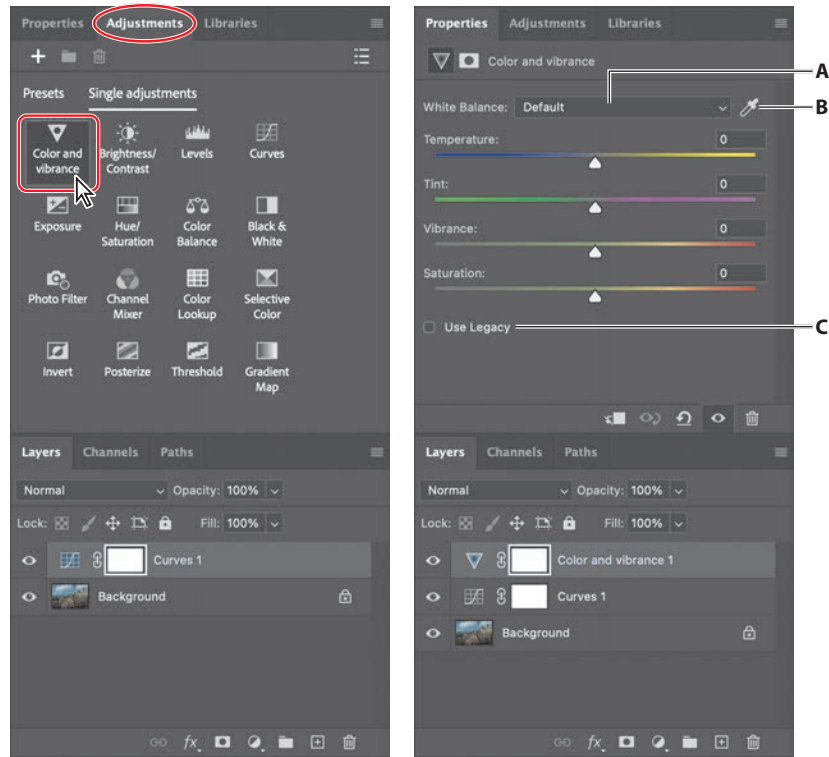
► **Tip:** When you click or drag a curve point, it's selected; it appears solid, unlike unselected points that appear hollow. When a point is selected, you can make fine adjustments by pressing the arrow keys to "nudge" that point.

Using a Color and Vibrance adjustment

The image could still benefit from additional saturation, but adjusting saturation can be difficult when using Curves. You could use the Hue/Saturation adjustment, but the Color and Vibrance adjustment can be easier to control, so you'll try that.

You may find that the best values for your image are different than ours; it depends on how the image looks after your edits in the previous section.

- 1 In the Single Adjustments section of the Adjustments panel, click Color and Vibrance. A Color and Vibrance 1 adjustment layer appears in the Layers panel. The Properties panel comes forward and shows Color and Vibrance options.



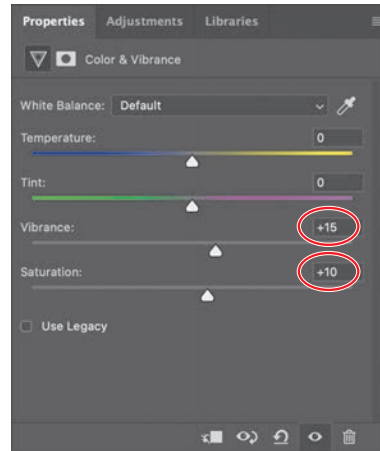
- A. White Balance reset menu
- B. White Balance eyedropper (color sampler)
- C. Use older method to adjust Vibrance and Saturation

► **Tip:** Adjusting color balance using Temperature and Tint may be more familiar to you than using RGB curves if you've used raw editing software such as Adobe Camera Raw or Lightroom.

- 2 If you think the overall color balance is still a little off, adjust the values for Temperature and Tint. Temperature adjusts color balance along a blue/yellow axis, and Tint adjusts color balance along a green/magenta axis.

3 Adjust the Saturation value as needed to control color intensity. Watch for colors that become garish or unrealistic; when you see that happen, reduce the value. We increased Saturation to +10.

4 If needed, adjust the Vibrance value. Vibrance adjusts saturation at different rates depending on the color, to help prevent skin tones from oversaturating and to minimize clipping of color detail. That means you can increase Vibrance further than Saturation before colors become unrealistic. We increased Vibrance to +15.



► **Tip:** If you want to know the color values of the pixels that the pointer is positioned over, they're displayed in the Info panel (Window > Info).

You might notice that the White Balance option wasn't used. White Balance offers a color sampler (eyedropper icon) that's similar to the gray point color sampler you used in the Curves panel: You can use it to color-balance the image by clicking the sampler on an area that should be neutral gray. You already did that in Curves, so there was no need to do it again in Vibrance.

This image started out as a scene that didn't look very warm or bright. You've edited the image to have the sunny, colorful appearance it deserves.

5 Choose File > Close and save changes if asked.

You'll use different images for the next exercises.

► **Tip:** The White Balance color sampler in Vibrance is useful if you aren't already using any other adjustment layers to color-balance the image.



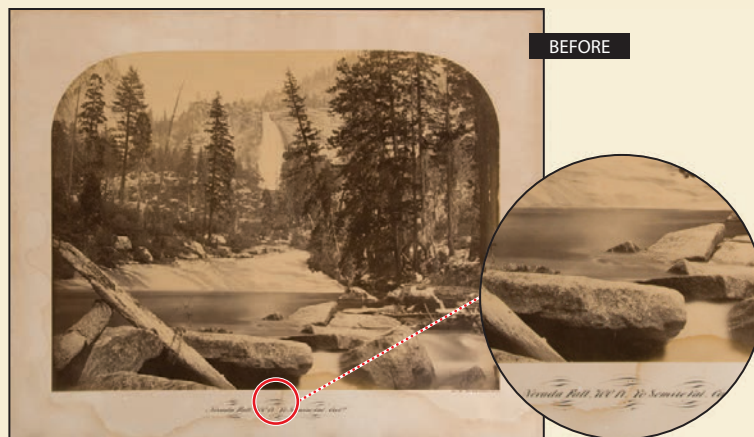
As owner of Gawain Weaver Art Conservation, Gawain Weaver has conserved and restored original works by artists ranging from Eadweard Muybridge to Man Ray and from Ansel Adams to Cindy Sherman. He teaches workshops internationally as well as online on the care and identification of photographs.

Find out more at gawainweaver.com.

Real-world photo restoration

The tools in Photoshop make restoration of old or damaged photographs seem like magic, giving virtually anyone the power to scan, retouch, print, and frame their photo collections.

However, when dealing with works by famous artists, museums, galleries, and collectors need to preserve original objects to the greatest degree possible despite deterioration or accidental damage. Professional art conservators are called upon to clean dust and soiling from print surfaces, remove discoloration and staining, repair tears, stabilize prints to prevent future damage, and even paint in missing areas of a work.



Carleton E. Watkins, *Nevada Fall, 700 FT, Yosemite Valley, CA*, mammoth albumen print, 15 $\frac{5}{8}$ " $\times$ 20 $\frac{3}{4}$ ". This print was removed from its mount to remove the stains and then remounted.

"Photograph conservation is both a science and an art," says Weaver. "We must apply what we know about the chemistry of the photograph, its mount, and any varnishes or other coatings in order to safely clean, preserve, and enhance the image. Since we cannot quickly 'undo' a step in a conservation treatment, we must always proceed with great caution and a healthy respect for the fragility of the photographic object, whether it's a 160-year-old salt print of Notre Dame or gelatin silver print of Half Dome from the 1970s."

Many of the manual tools of an art conservator have analogous digital versions in Photoshop:

-  An art conservator might wash a photograph to remove the discolored components of the paper, or even use a mild bleaching process known as light-bleaching to oxidize and remove the colored components of a stain or overall discoloration. In Photoshop, you can use a Curves adjustment layer to remove the color cast from an image.
-  A conservator working on a fine-art photograph might use special paints and fine brushes to manually “in-paint” damaged areas of a photograph. Likewise, you can use the Spot Healing Brush tool in Photoshop to spot out specks of dust or dirt on a scanned image.
-  A conservator might use Japanese papers and wheat-starch paste to carefully repair and rebuild torn paper before finalizing the repair with some skillful in-painting. In Photoshop, you can remove a crease or repair a tear in a scanned image with a few clicks of the Remove tool.



A fixative was applied to the artist's signature with a small brush to protect it when the mount was washed.

“Although our work has always been first and foremost about the preservation and restoration of the original photographic object, there are instances, especially with family photographs, where the use of Photoshop is more appropriate,” says Weaver. “More dramatic results can be achieved in far less time. After digitization, the original print can be safely stored away, while the digital version can be copied or printed for many family members. Often, we first clean or unfold family photographs to safely reveal as much of the original image as possible, and then we repair the remaining discoloration, stains, and tears on the computer after digitization.”

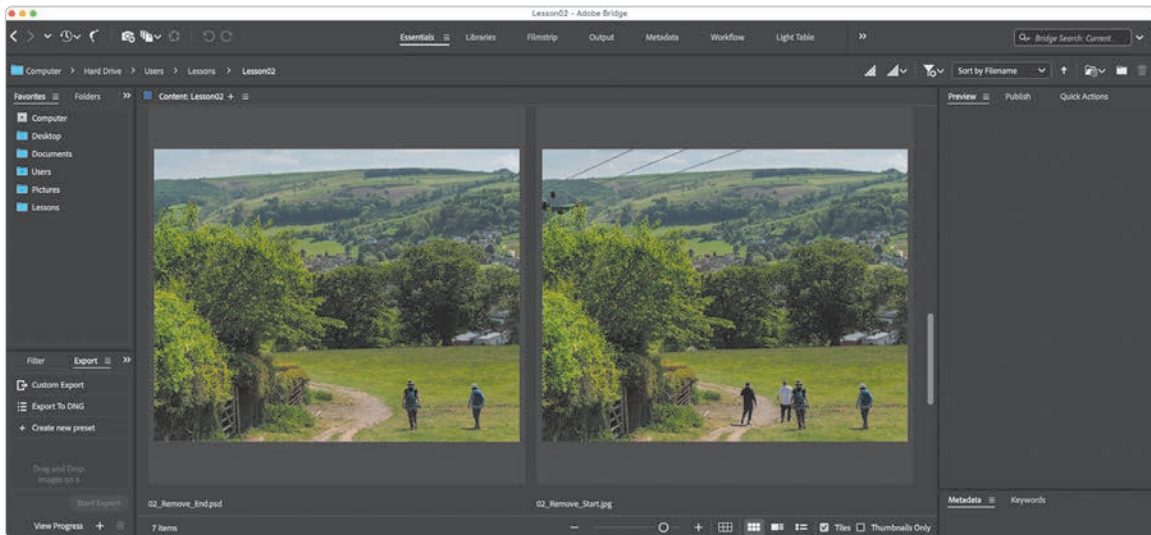


AFTER

Removing distractions

Sometimes there are items in a photo that distract you from the subject enough that you want to remove them. They might be extra people in the background, overhead utility cables, or dust on a surface or on the camera lens. In older versions of Photoshop and other similar photo editors, removing distractions often required time-consuming manual retouching. The current version of Photoshop can remove some common distractions automatically.

- 1 In Photoshop, choose File > Browse In Bridge.
- 2 In the Content panel, compare the files 02_Remove_Start.jpg and 02_Remove_End.psd. Notice that 02_Remove_Start.jpg contains overhead utility cables and people that have been removed in 02_Remove_End.psd.

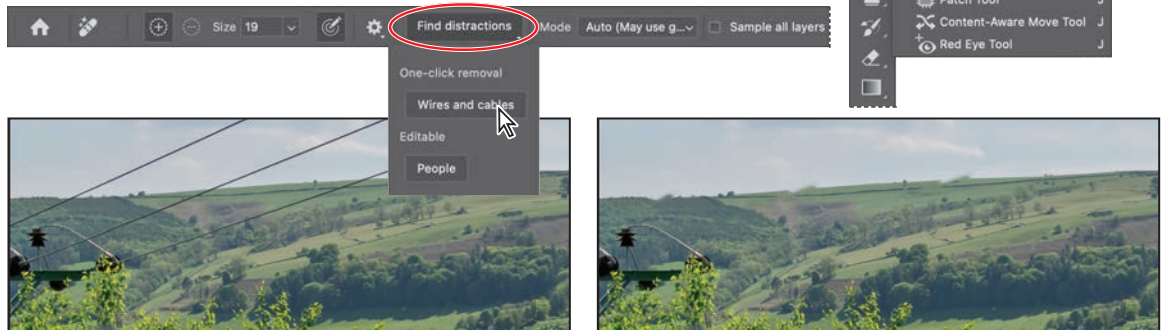


- 3 Double-click the 02_Remove_Start.jpg thumbnail to open the file in Photoshop. Click OK if you see the Embedded Profile Mismatch dialog box, and close any messages that might appear about new features.
 - 4 In Photoshop, choose File > Save As. Choose Photoshop from the Format menu, and name the file **02_Remove_Working.psd**. Then click Save.
- **Note:** If Photoshop displays a dialog box about the difference between saving to Cloud Documents and On Your Computer, click Save On Your Computer. You can also select Don't Show Again, but that setting will deselect after you reset Photoshop preferences.

Removing wires and cables

One of the automatic removal features is Wires And Cables. That will be useful for removing the utility cables in this image.

- 1 In the Tools panel, click and hold the mouse button on the Spot Healing Brush tool (👉) to reveal the other retouching tools in its tool group, and select the Remove tool (👉).
- 2 In the options bar, click the Find Distractions button, and then click the Wires And Cables button.



The utility cables disappear because the Remove tool replaced them with content it generated, but it isn't perfect. You can see some visual discontinuities where the cables were removed, especially along the top of the hill. You can improve that by manually using the Remove tool.

► **Tip:** For a quick before/after view of the change, choose the command Edit > Toggle Last State or press its keyboard shortcut. Choosing the command repeatedly toggles between the last state of the document and the current state.

- 3 In the options bar, set a brush Size of about 45 px, and drag the Remove tool to paint a magenta highlight over the areas where the removed cable area doesn't look right. Each time you release the mouse button, your last stroke is processed. If it doesn't look right after the first try, drag the Remove tool over the same spot again.

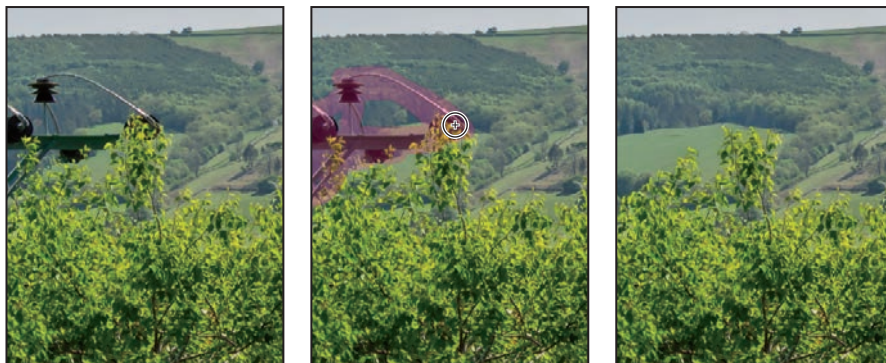


► **Tip:** The Remove tool may run slowly on older or less powerful computers. If you think the Remove tool takes too long, try the Spot Healing Brush tool instead. It should be faster but may require more manual steps to get a good result.

► **Tip:** When dragging any retouching tool, cover an area not much larger than the part you're trying to remove. Covering too large of an area might make a retouch more obvious.

At this point it should almost look like the cables were never there, except for one thing: The utility pole that held up the cables is still there. The Remove tool can handle that too.

- 4 Drag the Remove tool over the utility hardware, including any remaining cables. It's OK to drag multiple Remove tool strokes and to drag over utility hardware that you see behind the tree leaves.

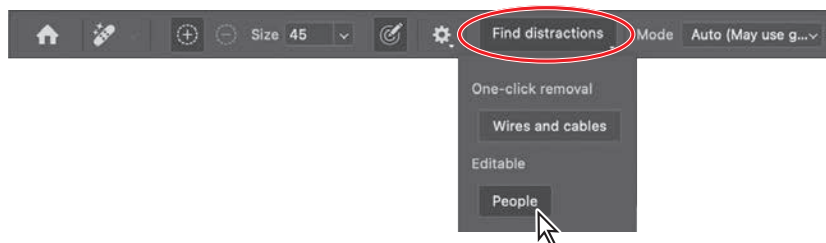


Removing people

In this image, the two people on the right are friends, but the two on the left are other people. The Remove tool can easily remove the people on the left.

► **Tip:** If you don't want the Remove tool to use generative AI, in the options bar click the Mode menu and choose Generative AI Off.

- 1 With the Remove tool selected, in the options bar click the Find Distractions button, and then click the People button.



A Finding People progress bar appears; when it's finished, you see that the image hasn't changed, but some areas are highlighted in magenta. A magenta highlight marks a candidate for removal. In your own work, if you think all magenta regions should be removed, you'd go ahead and apply the removal (step 4). But in this case, to preserve the two people on the right, you'll remove their highlight color.

► **Tip:** If you see more people you want to remove, in the options bar click the Add to Brushed Area icon (⊕) and drag over those areas to add a magenta highlight.

- 2 In the options bar set a brush Size of about 60 px, and click to select the Subtract from Brushed Area icon (⊖).



- 3** Drag the Remove tool to erase the magenta highlight over the two people on the right; be sure to include a subject's shadows when highlighting or removing a highlight. You may also see magenta highlights in other parts of the image that mark areas incorrectly identified as people; drag to remove those magenta highlights too; we saw and removed some magenta highlights in the distant landscape on the right.

► **Tip:** Increase the view magnification if it makes it easier for you to use the Remove tool more precisely.



- 4** In the options bar, click the Apply To Current Strokes icon (✓) to apply the removal to the areas highlighted in magenta.



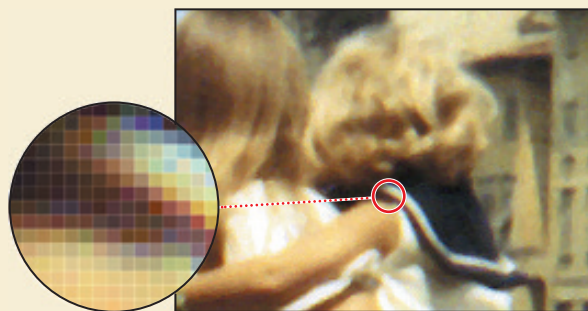
► **Tip:** If you get tired of clicking the check mark icon in the options bar to commit a pending operation, press the Enter or Return key instead.

Well done! You've removed distractions from the image. The photo more effectively focuses attention on the landscape and the friends.

- 5** Close the document, saving changes.

Understanding image size and resolution

Resolution is a term that has different meanings depending on the medium. For video and electronic displays, resolution means the width and height of an image in *pixels*, the small squares that describe an image. For example, the resolution of a 4K video frame is 3840×2160 pixels. For print, resolution means *pixel density*, a ratio such as 300 pixels per inch (ppi).



Pixels in a photographic image

In Photoshop, the most common ways to change the number of pixels are the Crop tool and the Image > Image Size command. To change pixel density (ppi), when using the Crop tool, enter a value in the Resolution field; or when using Image > Image Size, enable the Resample option.

How do you know how many pixels are in an image?

Multiply the width and height of an image, in pixels. For example, suppose an image is 2100×2100 pixels. That equals 4,410,000 pixels or 4.41 *megapixels* (one million pixels equals one megapixel). The number of pixels affects an image's file size and its upload/download time.

How do you know an image's resolution in pixels per inch?

Divide an image's width or height in pixels by its number of inches. For example, if a 2100×2100 pixel image is 7 inches wide, then each dimension is 2100 pixels divided by 7 inches, or 300 pixels per inch.

How much resolution is enough?

The requirements of a delivery medium determine how much resolution an image needs. For example, in video, if an image must fill every pixel of a 4K frame, it must be 3840×2160 pixels. For a print job, an image must have enough pixels to print at the required size with the required pixel density. For example, if an image must fill a space 7 inches wide and the production requirement for resolution is 300 ppi, then the image must be at least 2100 pixels wide (7 inches times 300 ppi).

How does physical reproduction size affect resolution?

Changing an image's reproduction size alters its *effective resolution*, because the same number of pixels now cover a smaller or larger area. For example, if a 2100×2100 pixel image was 300 ppi when printed 7 inches wide image, at 14 inches wide (double its original width) its 2100 pixels divided by

14 inches equals 150 ppi, because the same number of pixels is spread across twice the width. For this reason, when preparing images for print, knowing that they need to be 300 ppi is not enough. You also need to know at what size in inches each image needs to be 300 ppi.

Viewing distance influences the pixel density our eyes actually perceive, and this affects resolution requirements too. The traditional 300 ppi guideline for print is based on a viewing distance of roughly arm's length, like when you read a book. A very large photo print intended to be seen from several feet away can be printed at lower than 300 ppi, because beyond a certain viewing distance, your eyes see the pixels as dense enough to have a high effective resolution. For the same reason, a 50 ppi image can appear perfectly sharp on a highway billboard because it's seen from hundreds of feet away.

Does image resolution always have to match the resolution of the printer or display?

Because of the way display and output technologies work, an image file might not need to match the resolution of the hardware that reproduces the image. For example, some commercial printing platesetters and photo-quality inkjet printers have a device resolution of 2400 dots per inch (dpi) or more, but those dots are grouped into larger halftone cells or dot patterns that build tones and colors. Because of that, for images the appropriate image resolution to send to those devices may be only 200 to 360 ppi. Whether you're editing for print or online viewing, ask your production team or output service provider to verify what resolution they require for the images you'll deliver, whether it's a ppi value or a width and height in pixels.

What's considered high resolution?

For images reproduced on screens, one way to currently define *high resolution* is when an image has enough pixels to fill every pixel on a HiDPI (Windows/Android) or Retina (Apple) display. These displays generally have twice the pixel density of older displays.

For print, an image might be considered high resolution when its ppi value is around 240–360 ppi at its final reproduction size, because at that pixel density, it can reproduce enough detail to take advantage of the device resolutions of printing presses and professional photo printers.

Does changing the resolution affect the storage size of a file?

Only when the number of pixels changes. If an image starts with a width and height of 2100 × 2100 pixels at 300 ppi and you change either the size in inches or the ppi value but it still has 2100 × 2100 pixels, the file size does not change because it's still storing 4,410,000 pixels. In the Image > Image Size dialog box in Photoshop, this is how it works when the Resample option is disabled.

If the Resample option is enabled, it's possible to change the width and height in inches and/or the ppi value so that the number of pixels changes, and that does change the file storage size. If the example image is changed to 72 ppi while maintaining 7 × 7 inches, now there are only 254,016 pixels, so the file size goes down. (72 ppi × 7 inches = 504 pixels, and 504 × 504 = 254,016 pixels total.)

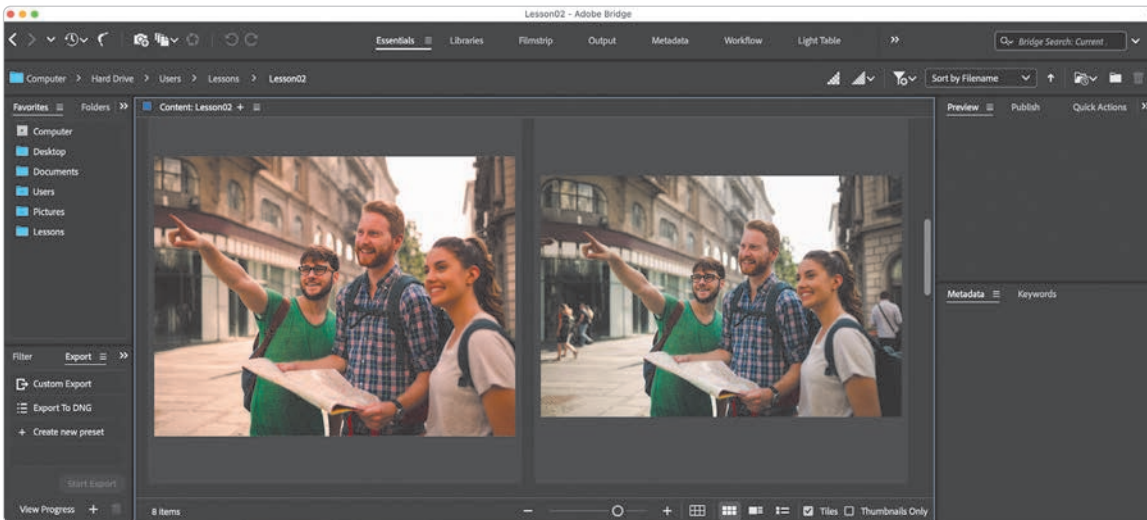
It's important to remember that the number of pixels is not the only factor that determines file size. The file size of an image can also go up or down depending on its file type, bit depth, number of channels and layers, its compression method and quality level (if compressed), and more.

Using color creatively

After the image color looks balanced, if you want, you can move on from color correction to *color grading*: Alter the colors creatively, based on your creative goals for the image or to fit a mood or the art direction of a project.

Earlier you used the Curves adjustment for tone and color correction. Many of the other options in the Adjustments panel are also useful for expressive color and color grading.

- 1 In Photoshop, choose File > Browse In Bridge.
- 2 In the Content panel, compare the files 02_CreativeColor_Start.jpg and 02_CreativeColor_End.psd. Notice that color looks different in the file 02_CreativeColor_End.psd, and also the people in the background are gone.

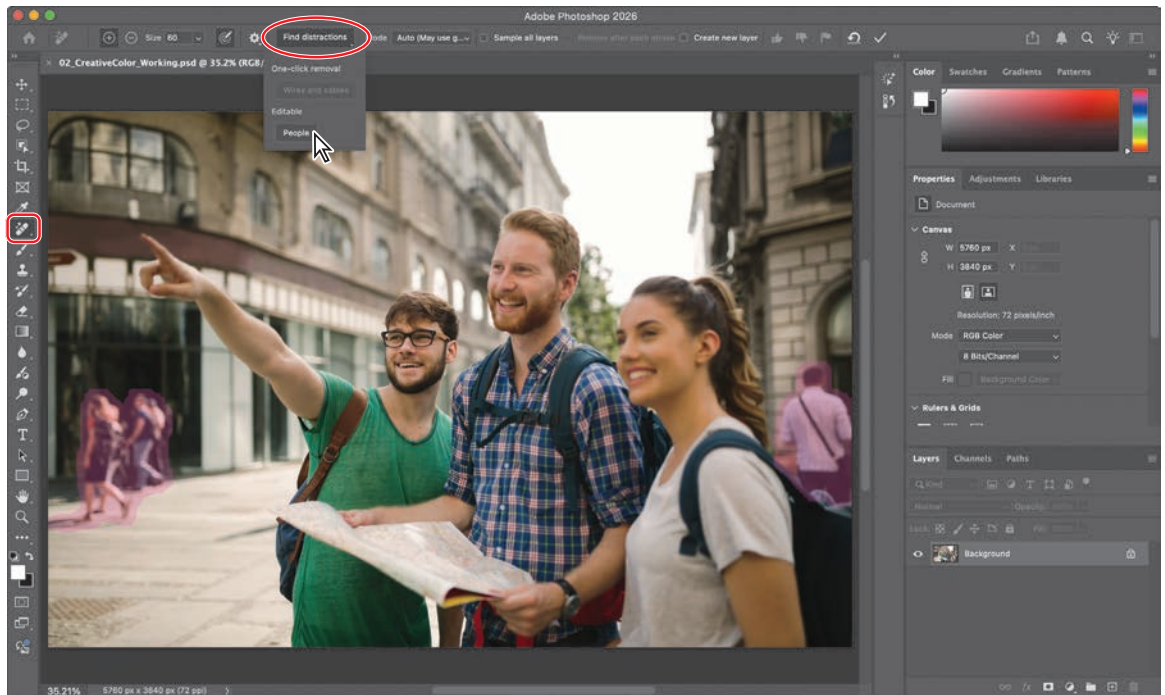


- 3 Double-click the 02_CreativeColor_Start.jpg thumbnail to open the file in Photoshop. Click OK if you see the Embedded Profile Mismatch dialog box, and close any messages that might appear about new features.
- 4 In Photoshop, choose File > Save As. Choose Photoshop from the Format menu, and name the file **02_CreativeColor_Working.psd**. Then click Save.

The people in the background are distracting, so let's remove them first in the way you just learned.

- 5 Make sure the Remove tool is selected, then in the options bar click Find Distractions, and then click the People button.

● **Note:** If Photoshop displays a dialog box about the difference between saving to Cloud Documents and On Your Computer, click Save On Your Computer. You can also select Don't Show Again, but that setting will deselect after you reset Photoshop preferences.



This time it worked differently: The people in the background are highlighted, but the foreground people aren't. If the Remove tool thinks foreground people might be the subjects you want to keep in the image, it won't propose removing them.

- 6 In the options bar, click the Apply To Current Strokes icon (✓). The Remove tool takes out the people in the background.



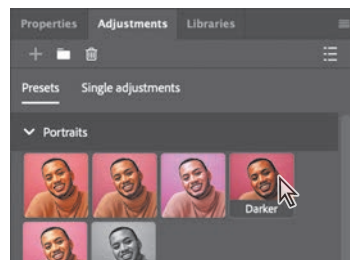
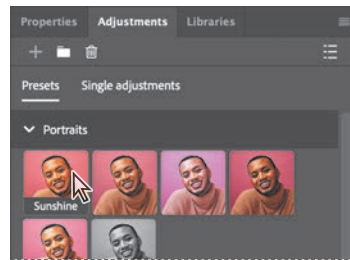
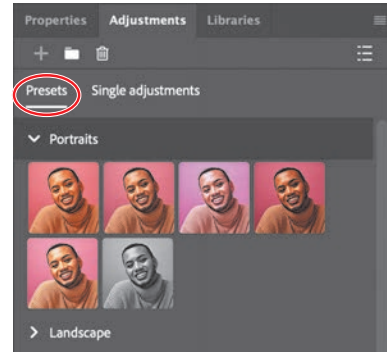
► **Tip:** Remember, if the Remove tool incorrectly highlights which people to remove, just drag the tool in Add or Subtract mode to customize the highlights as needed.

Now try some different color looks using the Adjustments panel. The many choices can be overwhelming; fortunately Photoshop offers ways to easily explore them and learn what's possible.

- 7 Click the Adjustments panel tab to bring it forward. If you can't see it, choose Window > Adjustments.

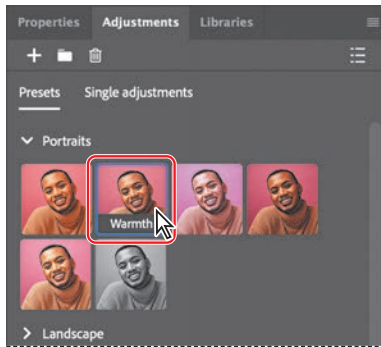
► **Tip:** Always check Remove tool results in case there are some details that should be manually retouched.

- 8 In the Adjustments panel, make sure Presets is underlined; if it isn't, click it to display the Presets list.
- 9 Hover the pointer over the Presets list (without clicking), and pause the pointer over each one to preview how the image looks with that preset. This is a great way to decide whether you want to apply any of them.

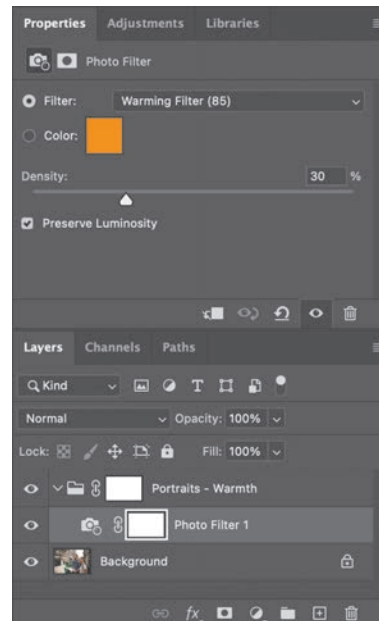


- 10** Click the Warmth preset in the Portraits category. Clicking applies the preset by adding a layer group to the Layers panel. The new layer group contains one or more adjustment layers. The image was already color balanced; making it warmer is a creative color decision.

► **Tip:** The Photo Filter adjustment layer emulates glass filters that can be added to a camera lens to adjust color, more commonly in traditional film photography.



The advantage of applying a preset as a group of adjustment layers is that you can easily customize the look. Select any adjustment layer and its options appear in the Properties panel. The Warmth preset uses a Photo Filter adjustment layer, so if you want it to look slightly different, select the Photo Filter layer that was added. In the Properties panel, you can adjust options such as which photo filter is applied as well as its Color and Density. You can add more adjustment layers if you want.



► **Tip:** Settings for an adjustment layer are always in the Properties panel. The more you use adjustment layers, the more you'll want the Properties panel to be open all the time in your Photoshop workspace.

Cropping an image for print

The plan is to print the image at the standard US size of 11 by 8.5 inches, at 300 ppi. The aspect ratio (proportions) of the image are 3 : 2, used by many digital camera sensors but too wide for the proportions of the intended print size. You can use the Crop tool to quickly trim the image to the proportions and resolution it needs.

► **Tip:** If the Crop tool is selected but the crop handles aren't visible, press the Enter or Return key. If they still aren't visible, click the View menu and make sure the Extras command is enabled.

- 1 In the Tools panel, select the Crop tool () . A crop rectangle appears.



- 2 In the options bar, click the Select A Preset Aspect Ratio or Crop Size menu and choose the crop preset **8.5 x 11 in 300 ppi**. This preset fills in the width, height, and resolution fields in the options bar. When you have crop requirements that aren't available in a preset, you can enter values into those fields yourself.

- A. Select A Preset Aspect Ratio or Crop Size menu
- B. Width
- C. Height
- D. Resolution
- E. Crop rectangle and handles
- F. Crop shield



A *crop shield* now dims the area outside the crop handles; it helps more clearly indicate what areas will be trimmed. But there's a problem: The crop rectangle is 8.5 : 11 (tall), but you need it to be 11 : 8.5 (wide). There's a quick solution.

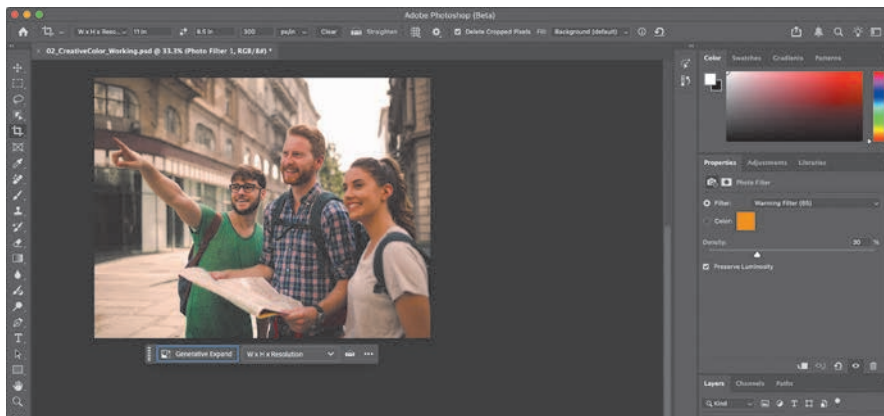
- 3 Press the X key. This keyboard shortcut swaps the width and height of the crop rectangle so that it's now the 11 : 8.5 aspect ratio needed for the print.



► **Tip:** If you need to see crop edges more clearly, it's OK to change the view magnification while the crop rectangle is active.

The default composition with the crop rectangle in the center works well enough, but if you want, you can adjust it. If you drag inside the crop rectangle, you can reposition the image with it, and you can drag any edge of the crop rectangle to change its size. When it looks right, you can apply the crop.

- 4 In the options bar, click the Commit Current Crop Operation icon (✓) to trim off the areas outside the crop rectangle.



► **Tip:** The Crop tool keeps the last used aspect ratio until you change it. If you want to crop with total freedom by resetting those options, click the Clear button in the Crop tool options bar.

The image is now cropped to print on 11.5 by 8 inch paper. Because a value was entered in the Resolution field, the image pixels were also *resampled* to 300 pixels per inch: The image that started out with 5760 × 3840 pixels became 3300 × 2550 pixels, because that equals 11.5 by 8 inches at 300 ppi. (If you want, you can verify this by choosing the command Image > Image Size.)

Straightening an image

When the Crop tool is selected, you can straighten an image in a single drag. Click the Straighten icon () to select it, which changes the pointer to a Straighten tool. Drag it along a line in the image that should be perfectly horizontal or vertical. The image is rotated by the correct angle, straightening the image.



Sharpening an image

► **Tip:** If you sharpen images for print, consider verifying your sharpening settings using proof prints because a computer display can't simulate how sharpening varies with different papers and printing processes.

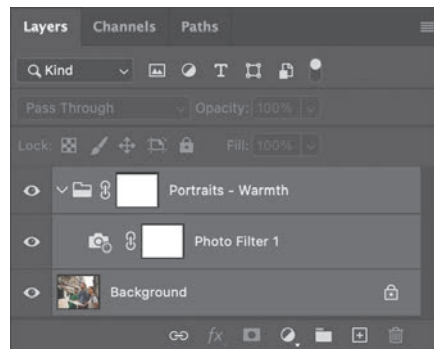
How you sharpen an image depends on the quality of the details in a specific image (for example, how sharp is the image already?) while also taking into account its final width, height, resolution, and viewing distance on screen or in print. That's why this image wasn't sharpened until after it was cropped and resampled to the size and resolution of its final medium.

Some advanced sharpening workflows include certain steps at earlier stages of editing. Here you'll try simpler one-step sharpening using the Smart Sharpen filter, because it produces good results while also being relatively easy to use.

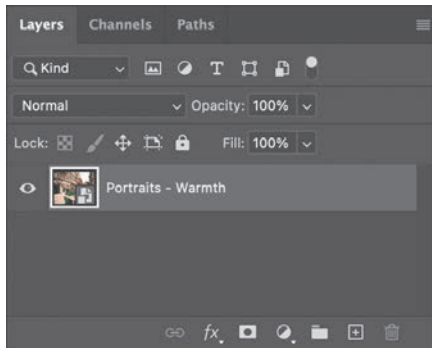
A filter applies to the selected layer only. When a document has multiple layers, to sharpen everything the layers must first be combined. One way is to flatten it (Layer > Flatten Image), but that loses the ability to edit adjustment layers. Another way is to combine all layers into a Smart Object that preserves each layer.

- 1 In the Layers panel select the first layer (the Portraits – Warmth layer group); then hold down Shift and select the last layer (Background) to select all layers.

► **Tip:** In step 1 you could also choose Select > All Layers instead, but that won't select the Background layer because it's locked.

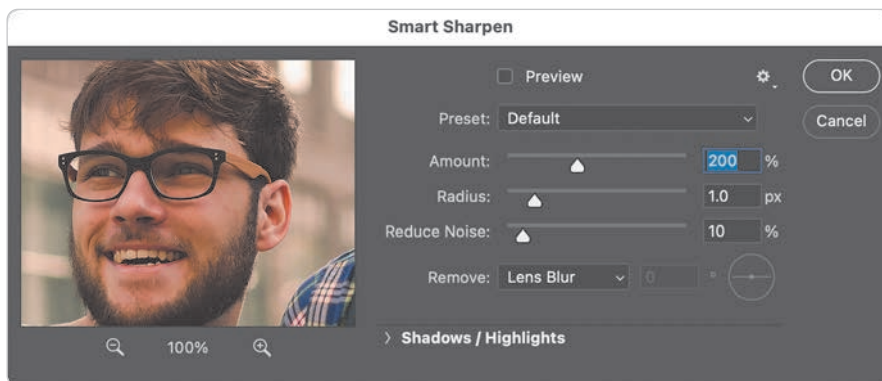


- 2 Choose Layer > Smart Objects > Convert To Smart Object. The selected layers are combined into a single Smart Object.



► **Tip:** To open a Smart Object so that you can edit the layers inside it, double-click it. When done editing the contents, close the document that opened.

- 3 Choose Filter > Sharpen > Smart Sharpen.
- 4 In the Smart Sharpen dialog box, make sure that Preview is selected so you can see the effect of settings you adjust in the document window.



► **Tip:** For a before/after comparison of your changes, toggle the Preview option. It displays the result in the document window, not just in the dialog box. You'll find the Preview option in many dialog boxes in Photoshop.

You can drag inside the preview window in the dialog box to inspect different parts of the image, or you can click the magnification buttons below the thumbnail.

- 5 Make sure Lens Blur is chosen in the Remove menu.

You can choose to remove Lens Blur, Gaussian Blur, or Motion Blur in the Smart Sharpen dialog box. Lens Blur is good for general sharpening. Gaussian Blur is similar to the older Unsharp Mask filter. Motion Blur helps reduce streaks from the camera or subject moving in one direction when the photo was taken.

- 6 Drag the Amount (of sharpening) slider to about 400%, and inspect it by magnifying the Smart Sharpen preview or the document window. An Amount of 400% probably looks like too much, so you'll lower the Amount value.

► **Tip:** Images with coarse details or slight blur may benefit from a larger Radius setting. Images showing very fine details and no blur may benefit from a smaller Radius value.

- 7 Drag the Amount slider to about **220%**. Adjust it further if you want.

We left the Radius value at 1, a good starting value for an image that's already reasonably sharp. Radius determines the number of pixels surrounding the edge pixels that affect the sharpening. If the finest details are not sharp, a higher Radius value can help.



- 8 Feel free to adjust the settings. When you're satisfied, click OK to apply the Smart Sharpen filter. Because it was applied to a Smart Object it's a Smart Filter, so you can edit Smart Sharpen by double-clicking it in the Layers panel.
- 9 Choose File > Save, and click OK if the Photoshop Format Options dialog box appears. Then close the project file.

► **Tip:** If you want the document to keep the pixels outside the crop area, deselect Delete Cropped Pixels in the options bar. That will let you reveal previously cropped areas by enlarging the Crop tool rectangle, which is useful if you change your mind later.

More ways to deliver a photo

At the end of Lesson 1, you used the Export As command to create a JPEG copy of the image. There are more ways to deliver a photo, depending on what you need:

- The command File > Save A Copy offers a range of file formats with options useful for professional printing, such as resolution metadata and layers.
- The command File > Export > Save For Web is an older alternative to the File > Export > Export As command. Both commands can prepare graphics for screen-based media, but offer different features.
- Click the Export or Share Files button (📎) at the top of the application window to reveal the Share menu, which offers simpler access to a range of options including online review and a direct link to Lightroom Classic. On the Share menu on macOS, click Send to Apps > Other Apps for sharing options such as AirDrop.

Manual retouching with the healing and cloning tools

The rise of generative AI technology has led to powerful new retouching tools such as Generative Fill and the Remove tool. However, sometimes you may prefer to use the more traditional Photoshop healing and cloning tools instead. For example, some retouching tasks are specialized or simple enough that the traditional tools are faster, because their calculations aren't so complex. The older tools can also be useful when you're working on a project that doesn't allow using generative AI.

The easiest tools to use are those you can simply click or drag to repair an area, such as the Spot Healing Brush tool () and the Remove tool (). Both try to fill in the repair area in a way that looks consistent with the content near where you click or drag the tool.

The Remove tool uses newer technology that can produce better results when repairing larger or more complex areas. Although the Remove tool can use generative AI, it doesn't have to. When the Remove tool is selected, the options bar displays a Fill menu that lets you control how a Remove tool repair is processed. For example, if you're not allowed to use AI for a project, you can set the Fill menu to "Never use generative AI."

Sometimes it works better to tell Photoshop to use a specific area as a source for filling in the area you're retouching. You can do that with the Clone Stamp tool () and Healing Brush tool (). The Clone Stamp tool retouches by exactly copying pixels you sample from another area. The Healing Brush tool tries to blend sampled content into the area you're repairing. To use these tools, first click while holding down Alt (Windows) or Option (macOS) to sample an area, and then click or drag the tool to apply the sampled pixels to the area you want to retouch. For both tools, the Window > Clone Source panel offers more options that don't fit in the options bar.

The Patch tool () is similar to the Spot Healing brush tool, but instead of setting the source by Alt/Option-clicking to sample a small area, you drag the Patch tool to select a region of any size or shape.

The Content-Aware Move tool () is useful for moving or copying a selection to another area of an image and blending it into the new area. You can use the Content-Aware Move tool to extend content such as grass or a building, by selecting the Extend setting in the Mode menu in the options bar.

If you want to learn more about these tools, you can find the location of any Photoshop tool, and step-by-step instructions for it, by choosing Edit > Search. As with all tools, you can customize how they work by using the options bar to change settings for the current tool.

► **Tip:** If you digitize many photo prints by placing multiple prints on a scanner, try opening a scan and choosing File > Automate > Crop And Straighten Photos. When a scan contains multiple photos on a solid white background, that command can automatically separate them into individual documents, as long as there is empty space between each print.



Extra credit

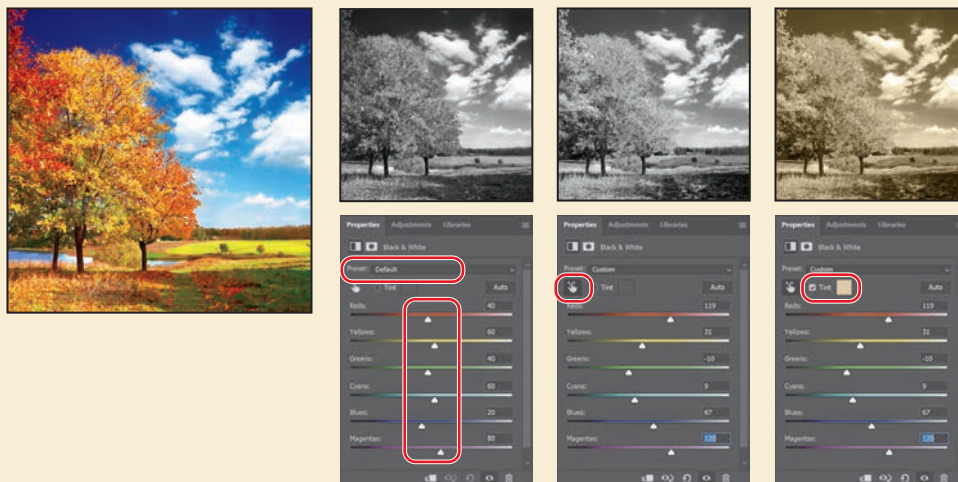
Creatively converting a color image to black and white

You can control how a color image converts to black and white to get the look you want. The lightness of colors is not the same. For example, at maximum saturation, yellow is much lighter than blue. When you convert using the Black & White adjustment layer, you can control the lightness of different colors. For example, if the original sky is light blue, lowering the Blue value in the Black & White adjustment layer darkens the sky in the black-and-white version. This technique started in film photography, where a photographer would attach a color filter to the front of the lens to change the lightness of the sky, foliage, or portrait skin relative to the other original colors in the image.

- 1 Choose File > Open, navigate to the Autumn.jpg file in the Lesson02 folder, and click Open.
- 2 In the Adjustments panel, make sure the Single Adjustments category is underlined, and click the Black & White button. A new Black & White adjustment layer appears in the Layers panel, and the options for it appear in the Properties panel.
- 3 In the Properties panel, adjust the color sliders to change the lightness of different colors until you create the tonal relationships you want.

You can experiment with options from the Preset menu, such as Darker or Infrared. Or, select the on-image adjustment tool (👉) in the upper-left corner of the Properties panel, position it in the image over a color you want to adjust, and drag horizontally. The tool moves the sliders associated with the original color of the image where you started dragging; for example, dragging on the yellow leaves adjusts the lightness of all yellow areas.

- 4 If you want to colorize the entire photo with a single hue, select Tint in the Properties panel, click the color swatch, and select a tint color. You can continue to adjust the color sliders.



Review questions

- 1 How can you adjust the tone and color of an image in Photoshop?
- 2 What does *resolution* mean?
- 3 What are some ways to use the Crop tool to improve an image?
- 4 When does the People option of the Remove tool select just some of the people to remove from an image?
- 5 What tools can you use to remove unwanted content from an image?

Review answers

- 1 You can adjust the tone and color of an image in Photoshop using adjustment layers such as Curves, Color and Vibrance, Brightness/Contrast, and Levels adjustment layers.
- 2 For media such as print, the term *resolution* refers to the number of pixels per unit of physical width or height in an image, such as pixels per inch (ppi). Printer resolution may be expressed in dots per inch (dpi), because device dots do not always correspond to image pixels. For media measured in pixels, such as web and video, resolution typically refers to width and height in pixels, not pixels per inch.
- 3 You can use the Crop tool to trim, straighten, resize, expand, and change the resolution of an image.
- 4 The Remove People option won't propose removing more prominent people that may be the subjects of the photo. You can customize which people will actually be removed.
- 5 In this lesson you used different options of the Remove tool to take out unwanted content and people, but you can also use other healing/cloning/patching tools available in Photoshop such as the Spot Healing Brush tool.

INDEX

SYMBOLS

2 Up Vertical command 389

32 Bits/Channel mode 327

A

actions

Classic Actions 359, 364

playing 363

recording 358–363

sets 359

Actions panel 358, 364

Add Artboard button 369

Add Audio option 291

Add Layer Mask button 145

Add Media button 290

Add Noise filter 259

Adjust Colors 128

Adjustment Brush tool 256

adjustment layers

Adjustment Presets 364

Black & White 72

Hue/Saturation 230

Levels 154

to part of a layer 255

Adjustment Presets 364

Adjustments panel 47

Adobe After Effects 326

Adobe Bridge

about 44

installing 3

Load Files into Photoshop Layers

command 243

opening files in Camera Raw from 308

opening files in Photoshop from 44

opening images from 308

previewing a file 152, 286

Adobe Camera Raw

about 307

adjusting white balance in 312

Background mask 317, 340

Before/After Views button 309, 314

cameras supported by 308

Clone tool 330

deleting documents 309

file formats for saving changes 326

filmstrip 329

as a filter 335

gradient masks 340

Heal tool 330

histogram 318

landscape mask 340

masking 309

masks panel 332

object mask 340

Open As Object button 323

people mask 317, 336, 340

preferences 339

profiles 311

Raw Details 319

Remove tool 330

saving files from 321–322

Set Raw Defaults 339

sky mask 317, 340

subject mask 317, 340

Super Resolution 319

synchronizing settings across

images 320

version 306

workspace 309, 310

- Adobe Capture 234
- Adobe Creative Cloud
 - installing applications 3
 - mobile apps 234
 - portfolio online 400
- Adobe Creative Cloud desktop
 - application 3, 7
- Adobe DNG (Digital Negative) file format
 - 308, 326, 327, 341
- Adobe Express 406
- Adobe Firefly 10, 406
 - commercial use 416
 - compensation plan for contributors 416
 - effects 412
 - generative layer 410
 - prompt 409
 - reference image 413
 - refining 412
 - training 416
- Adobe Fonts 4, 26, 200, 211, 214
- Adobe Generator 377
- Adobe Illustrator 220, 326
- Adobe InDesign 203, 326
- Adobe Lightroom 12
- Adobe Lightroom Classic 324–325
- Adobe PDF (Portable Document Format)
 - Photoshop PDF format 211
 - printing on press 394
- Adobe Photoshop
 - installing 2
 - new features 2
 - resetting default preferences 10
 - starting 4, 10
 - work area 10–41
- Adobe Photoshop Classroom in a Book (2026 release)
 - about 1
 - lesson files and Web Edition 5
 - prerequisites 2
- Adobe Portfolio 400–402
- Adobe Raw profile 311
- Adobe RGB 385
- Adobe Sensei 315
- Adobe Stock 12
 - designing with 134
 - Libraries panel import 117
 - licensing 134
 - Place Free Adobe Stock Images
 - command 134
 - Search Adobe Stock command 109
- AI. *See* Adobe Firefly; generative AI; machine learning
- AI Edit Status in Camera Raw 309
- AirDrop 70
- alpha channels 175
- anchor points 221, 224
- animating
 - Pan & Zoom effect 297
 - position 293
 - text 293–296
- animation, frame 300
- anti-aliasing 93
- Apple iPad 98, 99
- applying an edit 15
- artboards
 - about 367
 - adding 369
 - duplicating 367
 - exporting 375
 - mobile devices and 370
 - presets for sizes 369
 - resizing 372
- Artboard tool 369, 372
- audio, in a video timeline
 - adding 291
 - fading 292
 - muting 292–293
- Audio track 291
- Auto-Align Layers command 164
- Auto-Blend Layers command 164
- automating tasks 358–366
- Auto-Select option 130
- AVIF file format 326, 327

B

- background color 31
- background layer
 - about 104, 106
 - converting to a regular layer 106, 361
 - erasing 109
- background, removing 175
- barrel distortion, correcting 159
- batch processing. *See* actions
- bitmap image mode 104
- bitmap images
 - as used in Photoshop 10
 - vs. vector graphics 218–219
- black and white, converting color images
 - in Camera Raw 311
 - in Photoshop 72
- black point 47, 315
- Black & White adjustment layer 72
- Blend Images Together option 153
- Blending Modes 112, 113, 114
- Bloat tool in the Liquify filter 251
- blog, Photoshop tips and info 7
- blur
 - Blur Gallery 144
 - Field Blur 142
 - Iris Blur 142
 - Path Blur 142, 143, 145
 - restore noise 143
 - Spin Blur 142, 150
 - Tilt-Shift 142
- Blur Effects panel 143
- Blur Gallery 142–143, 144
- borders, adding 109, 130
- bounding box 14.
 - See also* transform box
- Bridge. *See* Adobe Bridge
- Brightness/Contrast adjustment layer 47
- bristle tips, for brushes 266
- Browse In Bridge command
 - 44, 56, 62

brushes

- loading with color 271
- presets. *See* brush presets
- rotation angle 275
- settings 267
- Brushes panel 273
- brush presets
 - exporting 274
 - loading 273–276
 - painting with 276–278
- Brush Settings panel 267
- Brush tool
 - about 32
 - Paint Symmetry 279
- buttons, as web graphics 345–364, 353

C

- calibration, monitor 386
- Calibration panel, in Camera Raw 317
- Camera Raw. *See* Adobe Camera Raw
- Canvas Size command 361
- central processing unit (CPU) 3
- channels. *See* color channels
- Character panel 119, 213
- character styles 203
- checkerboard transparency indicator 109
- chromatic aberration 159
- Clarity, in Camera Raw 329, 335
- Classic Actions 359
- Classroom in a Book. *See* Adobe Photoshop Classroom in a Book (2026 release)
- Clean Brush After Every Stroke icon 270
- Clean Brush option 271
- clipping, gamut 393
- clipping masks
 - about 175, 197
 - creating 129, 200–202
 - indicator 201
 - shortcut 201
- Clone Stamp tool 71
- closing a Photoshop file 12

- Cloud Documents
 - about 98–99
 - opening 11, 99
 - saving 98
- Clouds filter 117
- CMYK
 - color model 383, 384
 - Color Settings 385
 - converting to 395
 - editing while soft-proofing 392
 - soft-proofing for 386
- collaborating
 - libraries and 234
 - sharing an image 16
- color
 - additive 384
 - adjusting for printing 392
 - changing foreground 31
 - channels. *See* color channels
 - converting to black and white 72
 - correction (Camera Raw) 312, 328
 - correction (Photoshop) 47, 392
 - default text 200
 - fonts 213
 - foreground and background 31
 - management. *See* color management
 - mixing with the Mixer Brush 270
 - out-of-gamut 389
 - sampling 31, 267
 - softening edge transitions 93
 - temperature and tint 52
- Color And Vibrance adjustment 52
- Color blending mode 114, 252
- Color Burn blending mode 114
- color casts, removing 49
- color channels 175, 308, 395–397
- Color Dodge blending mode 114
- color gamut. *See* gamut
- color grading 62
- Color Grading panel, in Camera Raw 317
- Colorize Neural Filter 418
- colorizing
 - images 72, 418
 - layers 252
- color management 383–386, 385–386, 399
- Color Mixer panel, in Camera Raw 317
- color profile. *See* profiles, color
- Color Range command 92, 336
- color sampler
 - in Camera Raw 309
 - in Photoshop 391
- color separations 396
- Color Settings dialog box 385–386
- color settings, saving and restoring 6
- color space 384
- combining images
 - using Adobe Bridge 243
 - by dragging layers 107–110
 - into an HDR merge 327
 - into a panorama 152–155, 327
 - using Place Embedded/Linked commands 14
 - with different lighting and colors 415
 - with different perspectives 165–168
- committing (applying) an edit 15
- compositing 415. *See* combining images
- Content Authenticity Initiative 417
- Content-Aware Crop 156
- Content-Aware Fill for panoramas 153
- Content-Aware Move tool 71, 170
- Content Credentials 417
- Content panel, in Bridge 45
- context menus 105, 112, 202, 211
- Contextual Task Bar 15, 406
- contrast 47, 51
- Contrast option in Camera Raw 315
- Control Timeline Magnification slider 289
- Copy command 107

- copying. *See also* duplicating
 - anti-aliasing edges 93
 - images 133, 389
 - layers 107, 107–109
 - settings in Camera Raw 320
 - text 209
- corner points 221
- Create Video Animation 300
- Create Video Timeline 288
- Creative Cloud. *See* Adobe Creative Cloud
- Crop and Straighten Photos command 71
- Crop tool 66–68
- Cross Fade transition 297
- Curvature Pen tool 219, 220, 223
- curved paths 221
- Curve panel, in Camera Raw 317

D

- Darken blending mode 114
- Darker Color blending mode 114
- Decontaminate Colors option 185
- default settings. *See* resetting
- Define Custom Shape command 235
- Define Pattern command 191
- Delete Cropped Pixels option 70
- Denoise, in Camera Raw 340
- depth of field 162
- deselecting 82
 - Deselect button 24
 - Deselect command 25
- Detail panel, in Camera Raw 318
- Difference blending mode 114
- Difference Clouds filter 255
- Direct Selection tool 221, 229
- discretionary ligatures 213
- distortions, correcting lens 165
- distractions, removing 56
- DNG. *See* Adobe DNG (Digital Negative)
 - file format
- docking panels 30
- document size, displaying 16, 132

- dots per inch (dpi) 61
- drag-and-drop importing 117
- Drop Shadow layer style 355, 362
- drop shadows 124–125, 126
- Duplicate Layer command 205
- duplicating
 - artboards 367
 - buttons 353–357
 - frame placeholders 348
 - frames, animation 300
 - images 133, 389
 - layers 112, 148, 188, 205, 353
 - selected pixels to a new layer 78, 91
- duration of video clips, changing 292

E

- editing, evaluating an image for 46
- educators, resources for 7
- Elliptical Marquee tool 94
- emoji fonts 213
- Evaluating an image 46
- Exclusion blending mode 114
- Export As command 375, 377
- exporting
 - Adobe Camera Raw edited version 308, 321–327, 339
 - artboards 375
 - brushes 274
 - layers as separate files 377
 - for online media and web 39
 - for press 397
 - video 298
- Export or Share Files button 70
- Extras command 79
- Eyedropper tool 31, 32, 267, 391
- eye icon, in the Layers panel 105

F

- face adjustments 418
 - healing tools in Camera Raw 330
 - Liquify filter 140, 246
 - select facial skin 96

- Face-Aware Liquify filter 140
- fading audio 292
- Farrer, Lisa 436
- Faulkner, Andrew 282
- Favorites panel in Bridge 44
- Feather command 93
- Field Blur 142
- file formats. *See* name of format
- file size 61
- fills
 - foreground color 131
 - gradient 120
 - pattern 191
 - shape layer 219
 - Solid Color layer 29
- filmstrip, in Camera Raw 309
- filters
 - adding clouds with 116
 - Add Noise 259
 - Camera Raw Filter 335
 - Difference Clouds 255
 - Liquify 246–247
 - Neural Filters 418
 - Smart Filters. *See* Smart Filters
 - Smart Sharpen 68, 360
- Find. *See* Search command
- Flatten Image command 133.
 - See* flattening
- flattening 132, 394
- Focus Area command 92
- focus stacking 162
- fonts
 - alternates 213
 - changing in the options bar 26
 - color 213
 - emoji 213
 - Font Similarity 211
 - formats 196
 - installing 4
 - OpenType format 213
 - PostScript format 213
 - previewing in context 199

- selecting 198
 - special characters 212
 - TrueType format 196
 - variable 213
- Font Similarity option 211
- Foreground and Background
 - colors 31, 122
- forum, Photoshop community 7
- four-color printing. *See* CMYK
- fractions 213
- frames 345
- Frame tool 345
- Freeform Pen tool 219
- free stock images 134
- Free Transform command
 - keyboard shortcut 115
 - moving with 371, 374
 - options bar settings 295, 370
 - rotating with 205
 - scaling a video clip with 302
 - scaling with 350, 371
- Free Transform Path command 189
- G**
 - gamut, color
 - clipping 393
 - colors outside of 389–390
 - defined 383
 - Gamut Warning 389–390
 - Generate Image command 12, 407, 409
 - Generation History 12
 - generative AI 58, 406. *See*
 - also* Adobe Firefly
 - Generative Credits 414
 - Generative Expand 156, 407
 - Generative Fill button 36–38
 - Generative Fill command 407
 - generative layer 410
 - Generative Upscale command 261
 - Generator. *See* Adobe Generator
 - GIF animation 300

- GIF format 104, 300, 367
- Global Light option 124
- Glyphs panel 212, 213
- Google Gemini 411
- Go To First Frame button 291
- GPU. *See* graphics processing unit (GPU)
- Gradient Fill layer 408
- gradients
 - editing 123
 - listing by name 121
 - masks in Camera Raw 340
- Gradients panel 122
- Gradient tool 122
- Graham, Jay 324, 436
- graphics processing unit (GPU) 3
- gray point 47, 49
- guides
 - ruler 197, 350
 - Smart Guides 238

H

- Hand tool 17
- Hard Light blending mode 114
- Hard Mix blending mode 114
- Harmonize 415
- HDR, in Camera Raw
 - HDR editing 321, 326, 327
 - HDR merging 327
- Healing Brush tool 71
- Heal tool, in Camera Raw 309, 330
- Help, Photoshop 7
- hiding layers 108
- HiDPI 61, 378
- histogram
 - Camera Raw 309, 318
 - in Curves adjustment layer 47
- History panel 255–260
- Home screen 11
- Horizontal Type tool 26, 119, 198
- Hue blending mode 114
- Hue/Saturation adjustment layer 128, 230

I

- Illustrator. *See* Adobe Illustrator
- importing. *See also* Place Embedded
 - command, Place Linked command
 - audio 291
 - embedded Smart Objects 365
 - multiple files from Bridge 243
- InDesign. *See* Adobe InDesign
- Info panel 345, 350, 390
- inkjet printers 398
- Inner Shadow layer style 201
- installing the software 2
- interface. *See* user interface
- International Color Consortium (ICC) 384
- iOS 98, 99
- iPad 99
- iPhone, designing for 369
- Iris Blur 142
- Isolate Layers command 113

J

- JPEG file format
 - Camera Raw and 308, 321, 326
 - compared to other formats 326
 - Export As 39, 376
 - type quality 211
 - web design 367
- JPEG XL file format 326, 327

K

- Kent, Lynette 282
- keyboard shortcuts 129
 - Camera Raw panels 318
 - copying pixels to a layer 144
 - customizing 272
 - guide visibility 211
 - layer grouping 352
 - Play/Stop Timeline 287
 - previewing a dialog box 141
 - Proof Colors 389
 - ruler visibility 345

- Tools panel 219
- Undo/Redo and History 251, 255
- Zoom tool 180
- keyframes
 - animating with 293
 - appearance of 293
 - moving to the next or previous 294
- Kost, Julieanne 7, 180, 202, 219, 272, 436

L

- landscape masking, in Camera Raw 340
- Large Document Format 326
- Lasso tools 94
- layer comps 132
- layer effects. *See* layer styles
- layers
 - about 104
 - adding 116–117
 - Background 106
 - blending modes 112–113
 - converting Background 106, 361
 - copying 107–109
 - copying and pasting 107
 - copying to other 107
 - deleting 149
 - duplicating 112, 144, 353
 - effects. *See* layer effects; *See also* layer styles
 - exporting individually 377
 - flattening 132, 133
 - generating images from 367
 - groups 350
 - hiding and showing 105, 108, 109
 - linking 115–117
 - locking 105
 - masks 175
 - merging visible 132
 - opacity 112
 - overview 104
 - painting 252
 - preserving position between
 - documents 108
 - rearranging 110–112

- renaming 107
- resizing 115–117
- rotating 115
- saving in GIF or JPEG formats 104
- showing and hiding 108
- stacking order 111
- styles. *See* layer styles
- thumbnail icons 105
- transforming 115
- transparency 112–113
- type 119
- Layers panel
 - filtering 113
 - overview 105–106
- layer styles
 - adding to type 201
 - applying 120–123, 124–127
 - in Creative Cloud Libraries 125
 - Drop Shadow 124, 127, 355, 362
 - overview 120, 124
 - presets 237
 - Satin 127
 - Stroke 126, 356
 - updating 130
- Layer Via Copy command 144, 148
- leading 210
- learning resources for Adobe Photoshop 6
- Learn & Search 6
- Learn tutorials 12
- Lee, Megan 280
- Lens Correction filter 159–161
- lesson files, accessing 5
- leveling a tilted image 68
- Levels adjustment layer 47
- Levels adjustment layers 154
- Libraries, Creative Cloud
 - Adobe Stock 117
 - color swatches 117
 - images 117
 - layer styles 125
 - linked Smart Objects 234
 - mobile apps 234

- Libraries panel 134
- licensing, Adobe Stock 134
- ligatures 213
- Lighten blending mode 114
- lightening an image 154
- Lighter Color blending mode 114
- Light panel, in Camera Raw 315
- Lightroom. *See* Adobe Lightroom Classic
- Lightroom photos online storage 41
- Linear Burn blending mode 114
- Linear Dodge blending mode 114
- linear gradients 116–118
- Linear Light blending mode 114
- Liquify, Face-Aware filter 140
- Liquify filter 246–247
- Load Files Into Photoshop Layers
 - command 243
- local adjustment 255
- low resolution images, upscaling 261
- luminance mask 92, 340
- Luminosity blending mode 114

M

- machine learning 76, 214, 261,
 - 315, 340
- macros. *See* actions
- Magic Wand tool 92, 94
- Magnetic Lasso tool 94
- magnification. *See also* Zoom tool
 - document 18–20
 - Timeline panel 289
- magnifying glass. *See* Zoom tool
- mandalas, painting 279
- marching ants. *See* selection marquee
- marquee tools 94
- masks 174
 - on adjustment layers 255
 - channel 175
 - creating 145, 175–178
 - in Adobe Camera Raw 317, 332
 - luminance 92
 - overview 174
 - refining 180–185
 - compared to selections 174
 - terminology 175
 - vector 175
- Match Font command 214
- megapixels 60
- merging
 - images into a panorama 152
 - images with different
 - perspectives 165–168
 - layers 132
- metadata 160
- mistakes, correcting 34
- Mixer Brush tool 266, 271
- Mixer tab, in Camera Raw 317
- mixing colors
 - with a photograph 273
 - with Mixer Brush tool 270
- mobile devices
 - designing for, with artboards 370
 - using with libraries 234
- monitor calibration 386
- More Image Settings, in Camera
 - Raw 339
- motion blur effects 143
- Motion panel 297
- Move tool
 - animating with 294, 300
 - Auto-Select option 36, 130, 131
 - copying while moving 238, 353
 - dragging layer to another
 - document 107
 - Show Transform Controls
 - option 79, 116
 - Smart Guides and 28
- moving
 - layers. *See* Move tool
 - panels 30
- Multiply blending mode 114
- muting audio 292–293

N

Navigator panel 20
Neural Filters 141, 418
New Window command 389
noise reduction, in Camera Raw 340
nondestructive filters 246
notes. *See also* Note tool
 deleting 211
 Notes panel 209
Note tool 209
nudging layers 374

O

Object Selection tool 82–83, 145
objects, masking in Camera Raw 340
On-Image Adjustment tool 47, 50, 72
opacity, changing 112–113
opening images in Camera Raw 308
Open Object button in Camera
 Raw 323
OpenType font format 196, 213
OpenType SVG 213
options bar 15
 reference point icon 370
 setting type options in 26
organizing photos 324–325
out-of-gamut color 389–390
output resolution, determining 61
Overlay blending mode 113, 114

P

P3 color space 385
painting gallery 280
painting with the Mixer Brush
 tool 264–278
Paint Symmetry option 279
panels
 adding to another group 30
 defined 15
 docking 30
 floating 30–31

 resizing 30
 undocking 30
panning with the Navigator panel 20
panoramas
 in Camera Raw 327
 in Photoshop 152–155
Pan & Zoom option 297
Paper Color option 388
paper, simulating white 388
paper size, print 398
paragraph styles 203
paragraph type 198
Paste command 107
Paste Into command 262
Paste Profile Mismatch dialog box 260
Paste Without Formatting command 209
pasting layers 107
Patch tool 71
Path Blur 142–143, 143, 145
paths
 about 219
 adding type to 203–204
 closing 221
 compared to shapes 227
 converting to/from selection 230
 drawing 220–225
 drawing curved segments 221
 drawing straight segments 221
 editing 229
 moving 229
 saving 221
 work path 221
Path Selection tool 229
Paths panel 222
patterns
 Pattern command 191
 Pattern Preview command 189
 Patterns panel 237
patterns, creating 188
Pavlov, Victoria 281
PDF. *See* Photoshop PDF file format

- Pen tool. *See also* paths
 - drawing paths 220–224
 - keyboard shortcut 219
 - overview 219–220, 221
 - as selection tool 220
 - setting options 222–223
- Perspective Warp command 165
- Photomerge 152–155
- photo restoration, manual 54–55
- Photoshop Format Options 51
- Photoshop PDF file format 211, 326, 397
- Photoshop Raw format (not camera raw format) 326
- pincushion distortion 159
- Pin Light blending mode 114
- pixels
 - compared to vector graphics 218
 - defined 10
 - path tools option 227
 - resolution and 60
- pixels per inch 60
- Placed Linked command 346
- Place Embedded command 200, 365, 366, 409
- Place Free Adobe Stock Images
 - command 134
- placeholders 345
- PNG (Portable Network Graphics) file
 - format 326, 367
- Point Color tab, in Camera Raw 317
- point type
 - defined 198
 - distorting 206–207
- Polygonal Lasso tool 94
- Polygon tool 188
- portfolio. *See* Adobe Portfolio
- portraits. *See* face adjustments
- position, animating in video 293
- PostScript font format 213
- ppi (pixels per inch) 60
- preferences
 - Camera Raw 309, 339
 - Export 376
 - History States 260
 - opening 22
 - restoring defaults 5, 10
 - searching 22
 - Units & Rulers 22, 345
- Preserve Details (Enlargement) option 261
- Preserve Numbers option 387
- presets
 - Adjustments panel 64
 - artboard 369
 - brush 273–276
 - in Camera Raw 309, 312, 339
 - Curves panel 48
 - Gradients panel 122
 - overview 35–36
 - shapes 233
 - Styles panel 237
- previewing
 - colors for printing 386
 - edits in dialog boxes 69
 - files in Adobe Bridge 45
 - fonts before applying 199
- printing
 - CMYK model and 384–385
 - on a desktop printer 398
 - identifying out-of-gamut color 389–390
 - for inkjet printers 398
 - preparing images for 394
 - for press 381–403
 - proofing images onscreen 386–389
- printing inks, simulating onscreen 388
- process colors 384
- profiles, Adobe Raw 311, 328
- profiles, color
 - CMYK 395
 - display (monitor) 386
 - ICC 384
 - printer 387

- project 12
- prompt 409
- Proof Color 390
- proofing colors 386–389
- Properties panel 15–16, 122
 - artboard editing 369
 - targeted adjustment tool 72
 - type settings 199
- proxy icon 370
- PSB (Large Document Format) 326
- PSD (Photoshop) format 308, 326
- public domain 416
- Pucker tool in the Liquify filter 251
- Puppet Warp command 186

Q

- Quick Mask mode 92, 175
- Quick Selection tool 94, 177

R

- radial symmetry 279
- RAM (random access memory) 3
- range masks, in Camera Raw 340
- raster images, overview 218
- rate images, in Camera Raw 309
- Raw Details, in Camera Raw 319
- raw profiles 317
- recording actions 358–363
- Rectangular Marquee tool 94, 351
- red eye, correcting 138–140
- Red Eye Removal, in Camera Raw 309
- Red Eye tool 139–140
- Redo command 34
- reference image, for generative AI 413
- reference point 370
- Refine Edge. *See* Select and Mask
- Refine Edge Brush tool 180
- Remove tool 71
 - in Camera Raw 309, 330
 - generative AI option 58

- People 58, 62
- Wires And Cables 57
- Remove tool generative AI option 407
- rendering video 298
- resampling 67
- resetting, Camera Raw
 - edit settings 329, 339
 - preferences 308
- resetting, Photoshop
 - colors, foreground and background 31
 - dialog box values 251
 - preferences 5, 10
- resizing. *See also* scaling
 - from center 249
 - layers 115
 - panels 30
- resolution
 - about 60–61
 - Adobe Stock images 109, 134
 - best practices 325
 - bitmap images vs. vector graphics 218
 - Camera Raw 310, 322
 - increasing 261
 - professional printing 394
 - Retina/HiDPI scale factors 378
 - screens, high and low 367, 378
 - text 215
- responsive design 368
- Retina resolution 61, 378
- retouching a portrait, in Camera Raw
 - Raw 328
- review, share online for 70
- RGB color model 383, 384
- rotating
 - layers 115
 - paths 205
 - in Puppet Warp 187
 - stylus 275
- rounded corners, creating 190
- ruler guides 197, 350
- rulers 22, 198

S

- sampling colors 31, 267
- Satin layer style 127
- Saturation
 - in Camera Raw 315
 - in Photoshop 53
- Saturation blending mode 114
- Save A Copy command 70
- Save For Web command 70, 367.
 - See also* Export As command
- saving documents. *See also* exporting
 - Cloud Documents 98
 - flattening and 132–135
 - Photoshop Format Options 51
 - Photoshop PDF format 211, 397
 - Photoshop (PSD) format 14
- Scale to Fit Media print option 398
- scaling
 - animating 295
 - document (Image Size command) 60
 - using Free Transform command 115
 - low resolution image 261
 - pattern fills 192
 - when printing 398
 - raster (bitmap) images vs. vector graphics 218
 - in Sky Replacement 158
 - using Free Transform command 370
- Screen blending mode 114
- screening, print 396
- scrubbing numeric values 27
- Search command 6
- Search icon 11, 12, 16
- searching
 - Adobe Stock 134
 - for features and help 11
 - panel lists 35
 - Preferences 22
- Select And Mask command 92, 175
- selecting. *See also* selections
 - about 76
 - adding to selection 86
 - by color 94
 - creating from a path 230
 - deselecting 24, 82
 - intersecting with existing 86
 - luminance 92
 - modifier keys 86
 - new selection 86
 - non-transparent pixels 92
 - objects 82
 - by painting 92
 - people 96
 - sky 91
 - subject 177
 - subtracting from 86
 - text 130
- selecting, in Camera Raw
 - luminance 340
 - objects 340
 - people 336, 340
 - sky 340
- Selection Brush tool 92, 94, 148
- selections. *See also* selecting
 - converting between pixels and paths 95, 230
 - feathering 93
 - freehand 94
 - geometric 94
 - in Camera Raw 340
 - softening 93
- selection tools 76–77
- separations. *See* color separations
- Set Raw Defaults, in Camera Raw 339
- shapes
 - creating your own 235
 - defined 227
 - editing 235
 - presets 231–234
- Share button 16
- Share For Review command 209
- sharpening
 - in Adobe Photoshop 68
 - in Camera Raw 318–319

- sholby (artist) 281
- shortcuts. *See* keyboard shortcuts
- shortening video clips 292
- Show/Hide Visibility column 109
- Show Transform Controls 79, 116, 190, 245, 353
- side by side documents 107
- sidecar XMP files 320
- Single Column Marquee tool 94
- Single Row Marquee tool 94
- skin tones, selecting 336
- Sky Replacement command 158
- Smart Filters 70, 145, 246–249, 251, 263
- Smart Guides 28, 235, 238, 245
- Smart Objects
 - converting layers to 69, 246
 - editing 248
 - embedded 365
 - icon badge 246
 - linked 234
 - Smart Filters and 246
- Smart Sharpen filter 68, 360
- smooth points 221
- snapshots, in Camera Raw 309, 339
- Soft Light blending mode 114
- soft-proofing 386–389
- Solid Color fill layer 29
- sort, in Camera Raw 309
- special characters 212
- spell checking 202
- Spin Blur 142, 150
- Spot Healing Brush tool 71
- sRGB IEC61966-2.1 color space 385, 387, 399
- stacking order, changing 110–112
- star, creating a 188
- starting Photoshop 10
- Status Bar 16, 18
- stock images, free 134
- Stop Recording button 363

- stopwatch icon in Timeline
 - panel 293
- storage space 3
- Straighten icon 68, 156
- strobe effect 143
- Stroke layer style 126, 356
- strokes 219
- Structure option 170
- Styles panel 237
- Super Resolution, in Camera Raw 319
- SVG (Scalable Vector Graphics) file
 - format 213
- swashes 213
- symmetry, painting with 279
- synchronizing Camera Raw
 - settings 320
- system requirements 3

T

- tablet, graphics 267
- tabs, document 15
- teachers, resources for 7
- Temperature, color 52, 312
- text. *See also* type
 - adding 198
 - applying edits 199
 - centering 119
 - creating 26, 119–120
 - default color 200
 - moving 120
 - selecting 130, 199
- Texture, in Camera Raw 329, 335, 337
- thumbnail icons, layer 105
- TIFF (Tagged Image File Format)
 - type quality 211
- Tilt-Shift Blur 142
- timeline, creating 288
- Timeline panel 287
 - changing the magnification 289
 - returning to the first frame 291

- Tint
 - in Black & White adjustment layers 72
 - in Color and Vibrance adjustment layer 52
 - in white balance (Camera Raw) 312
- Toggle Last State command 255
- Toggle Reference Point option 370
- Tolerance option for Magic Wand tool 92
- tone curve 47
- tools
 - Brush tool 32
 - Clone Stamp tool 71
 - Content-Aware Move 170
 - Content-Aware Move tool 71
 - Crop tool 66
 - Elliptical Marquee 262
 - Eyedropper 31, 267
 - Healing Brush tool 71
 - Horizontal Type tool 26
 - keyboard shortcuts 219
 - Magic Wand tool 82
 - Object Selection tool 82, 83
 - Patch tool 71
 - Quick Selection tool 177
 - Rectangle tool 351
 - Remove tool 71
 - selection 76–77
 - Spot Healing Brush tool 71
 - using 17–23
- Tools panel. *See also* tools
 - selecting and using tools from 18–24
- tool tips, displaying 18
- tracing a photo 226
- tracks, in a timeline 288
- transform box 14
- transform controls 107, 116
- transforming 115. *See also* Free Transform command
- transitions, video 297
- transparency
 - adjusting 112–113
 - blending modes and 114
 - recognizing (checkerboard) 109
- Transparency & Gamut preference 389
- TrueType font format 196, 213
- tutorials built into Photoshop 11
- type. *See also* text
 - aligning 198
 - clipping mask 197, 200–202
 - creating 198–199
 - fractions 213
 - on a path 203–204
 - overview 196
 - resizing 196
 - setting options 198
 - swashes 213
 - tricks 202
 - warping 206–207
- typefaces. *See* fonts
- Typekit. *See* Adobe Fonts
- type layers
 - creating new 119, 202
 - selecting contents 202
- Type tool 26–27

U

- undocking panels 30
- undoing steps
 - with commands 34–35
 - with the History panel 255–260
- unit of measure 22
- Units & Rulers command 22
- Units & Rulers preferences 345
- Update AI Settings (Camera Raw) 339
- upsampling images 261
- Use Global Light command 124
- user interface
 - Adobe Camera Raw overview 310
 - Photoshop overview 10–12

V

Variable Fonts 213

Variations 410

vector graphics

 bitmap images vs. 218

 defined 10

 overview 218

vector masks 175

version, Photoshop 2

Vibrance

 in Camera Raw 315

 in Photoshop 53

video

 adding audio to 291

 adding pan and zoom effects 297–298

 adding transitions 297–298

 clip duration, changing 292

 exporting 298

 groups 291

 overview 286

 rendering 298

video card. *See* graphics hardware

vignetting 159

visibility icon. *See* eye icon

Vivid Light blending mode 114

W

warping

 images with the Liquify filter 246

 perspective 165–168

 Puppet Warp 186–187

 type 206–213

watermark, Adobe Stock 134

Weaver, Gawain 54, 436

web assets, exporting from layers 377

web browser, using Photoshop in 99

web design

 HiDPI 378

 layout 342–357, 367–375

 responsive 368

 Retina 378

Web Edition 5

wetness options, in painting 268

White Balance tool

 in Camera Raw 312–314

 in Photoshop 52

white point 47, 48, 315

wide gamut 385

work area 10–41

workflow preferences, Adobe Camera

 Raw 309

workflows

 color-managed 385–387

 compositing 104

 frame animation 300

 prepress 394

 professional photography 324–325

 video 284

 web design 343

work path 221

workspaces

 Graphic And Web 197

 Painting 267

 Workspaces menu 16

Workspaces menu 16

X

XMP files 320

Y

YouTube 299

Z

Zoom option in video 297

Zoom tool. *See also* magnification

 in Camera Raw 309

 shortcuts 180