CHAPTER 8

Graphics and Color

When you complete this chapter, you will be able to:

- Understand graphics file formats
- Choose a graphics tool
- Use the <img> element
- Control image properties with CSS
- Understand computer color basics
- Control color properties with CSS
- Control background images with CSS

The ability to freely combine graphics, text, and color into page-type layouts is one feature that makes the Web so attractive and popular, but it also can be the undoing of many Web sites. When you combine these elements wisely, you can produce an attractive and engaging site. Conversely, the use of too many large or complex images, poor color choices, or complicated backgrounds forces users to endure long download times and wade through unreadable text and confusing navigation choices.

Find a good balance between images and text. Use CSS to control image characteristics, such as spacing and text alignment. CSS background images let you enhance page layouts and brand your site.

Use color carefully to communicate, to guide the reader, or to create branded areas of your site. Test your color choices carefully to make sure they appear properly across different browsers. Also, test at a variety of connection speeds to make sure the time needed to download your graphics does not discourage your readers.

Understanding Graphics File Formats

You currently can use three image file formats on the Web: GIF, JPG, and PNG. A fourth format, SVG, has had limited success because it is not supported by Internet Explorer 8 and earlier, although support is promised in Internet Explorer 9. Choosing the right file format for an image is important. If you choose the wrong file type, your image will not compress or appear as you expect.

GIF

The **Graphics Interchange Format (GIF)** is designed for online delivery of graphics. GIF uses a "lossless" compression technique, meaning that no color information is discarded when the image is compressed.

The color depth (described in the "Understanding Computer Color Basics" section of this chapter) of GIF is 8-bit, allowing a palette of no more than 256 colors. The fewer colors you use, the greater the compression and the smaller the file size. The GIF file format excels at compressing and displaying flat (unshaded) color areas, making it the logical choice for line art (simple drawings) and color graphics. Because of its limited color depth, however, GIF is not the best file format for photographs or more complex graphics that have gradations of color, such as shadows and feathering.

GIF Transparency

With GIF files you can choose one color in an image to appear as transparent in the browser. The background color or pattern of the page will show through the areas in the image that you have designated as transparent. Using transparent areas allows you to create graphics that appear to have an irregular outside shape, rather than a rectangular shape. Figure 8-1 shows the same shape with and without transparency.

You can create transparent areas using a graphics editor. When you choose the transparent color, all pixels of that color in the image let the background color show through. In Figure 8-1, the top image has no transparency. In the bottom image, the white background has been made transparent in an image-editing program, and the page color shows through the transparent areas of the graphic.

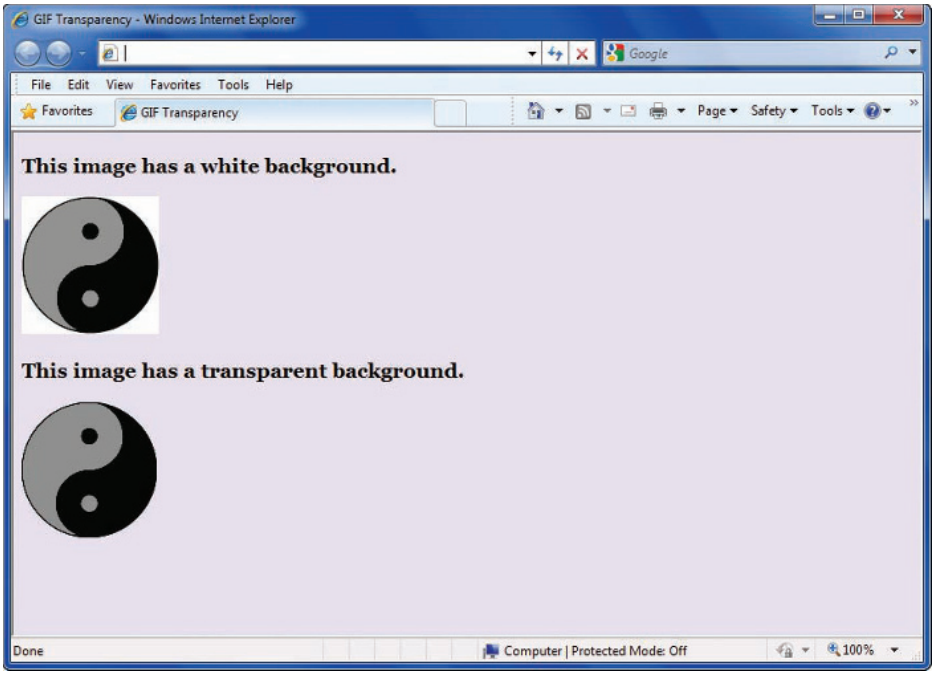


Figure 8-1 Transparent and nontransparent GIFs

GIF Animation

The GIF format lets you store multiple images and timing information about the images in a single file. This means that you can build animations consisting of multiple static images that change

continuously, creating the illusion of motion. You can create animated GIFs by using a variety of shareware and commercial software. Animated GIFs were very popular in the earlier days of the Web, but they have gone out of favor in modern Web design.

When you create a GIF animation, you can determine the time between frames and the number of times the animation plays. Figure 8-2 shows a series of individual GIFs combined to play as one animated GIF. The final GIF animation file is a single file whose name ends in the .gif extension.

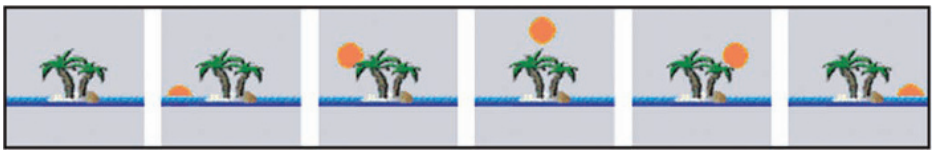


Figure 8-2 Individual frames of a GIF animation

GIF animation is somewhat limited when compared with the results of proprietary animation tools such as Adobe Shockwave or Flash, which can play synchronized sounds and allow Web users to interact with the animation. However, unlike most proprietary tools, animated GIFs do not require any special plug-ins for viewing. Also, if you limit color and motion when creating your animations, you can keep your file sizes small for faster downloads.

Use restraint when adding animated GIFs such as blinking icons and scrolling banners to your pages; users may find them annoying because they are repetitive and distract from the page content. Consider choosing to play an animation a limited number of times rather than letting it loop endlessly. Creating animated images with GIF animation software streamlines the process of setting the timing, color palette, and individual frame effects. See Table 8-1 for a list of GIF animation tools.

GIF Animation Tool	URL
GIF Construction Set Professional	*www.mindworkshop.com/gifcon.html*
GIFMation	*www.boxtopsoft.com/gifmation.html*
Advanced GIF Animator	*www.gif-animator.com*

Table 8-1 GIF Animation Tools

JPG

The **Joint Photographic Experts Group** (**JPG**, sometimes called **JPEG**) format is best for photographs or continuous-tone images. JPGs are 24-bit images that allow millions of colors. Unlike GIFs, JPGs do not use a palette to display color.

JPGs use a "lossy" compression routine specially designed for photographic images: when the image is compressed, some color information is discarded, resulting in a loss of quality from the original image. Because the display device is a low-resolution computer monitor, the loss of quality is not usually noticeable. Furthermore, JPG's faster download time compensates for its loss of image quality.

Using Adobe Photoshop or other imaging software, you can translate photographic images into the JPG format. When you create the JPG file, you can balance the amount of compression versus the resulting image quality manually. Figure 8-3 shows the Photoshop Save for Web & Devices dialog box, which is the tool you use in Adobe Photoshop to adjust quality and find the estimated download time.

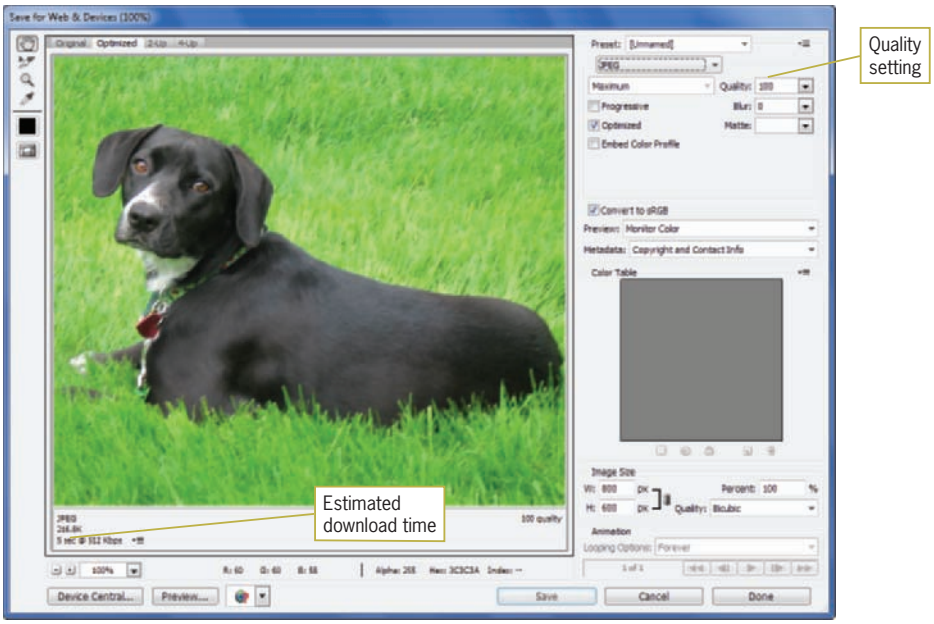


Figure 8-3 Photoshop Save for Web & Devices dialog box

Whether you are creating GIFs or JPGs, always remember to save an original copy of your artwork or photo. Both file formats permanently degrade the quality of an image as a result of compression. Once you have converted to GIF or JPG, you cannot return to the original image quality.

The Quality list box lets you adjust the quality of the file; the higher the quality, the lower the file compression. You can play with this setting to create good-looking files that are as small as possible. Many photos can sustain quite a bit of compression and still maintain image integrity. The Preview window shows the result of your changes, allowing you to experiment with the image quality before saving the file. Photoshop displays the estimated download time based on the file size.

PNG

The **Portable Network Graphics (PNG)** format is designed specifically for the Web. PNG is a royalty-free file format that is intended to replace GIF. This lossless format compresses 8-bit images to smaller file sizes than GIF. PNG supports greater color depths than GIF, so it supports 8-bit indexed color, 16-bit gray scale, and 24-bit true-color images. Even though PNG supports 24-bit color, its lossless compression routine does not compress as efficiently as JPG, so it is not the best choice for photographic images.

PNG supports transparency and interlacing, but not animation. (**Interlacing** is the gradual display of a graphic in a series of passes as the data arrives in the browser.) One useful feature of PNG is its built-in text capabilities for image indexing, allowing you to store a string of identifying text within the file itself.

SVG

The **Scalable Vector Graphics (SVG)** format is a language for describing two-dimensional graphics using XML. SVG files can contain shapes such as lines and curves, images, text, animation, and interactive events. SVG is compatible with common Web technologies such as HTML, XML, JavaScript, and Cascading Style Sheets (CSS). For more information on SVG, visit the W3C's SVG page at *www.w3.org/Graphics/SVG*.

SVG graphics are scalable to different display resolutions and can be printed on high-resolution printers. An SVG graphic can be reused at different sizes throughout a Web site without downloading multiple files to the user. SVG graphics can be viewed at different sizes based on user needs, allowing magnification of an image to see fine detail or to increase legibility.

SVG is a vector graphics file format. **Vector graphics** represent images as geometrical formulas, as compared with the **raster graphics** format, which represents images pixel by pixel for the entire image. GIFs and JPGs are raster formats. The vector graphics format allows SVG graphics to be scalable and cross-platform compatible.

All computer displays, whether desktop or handheld, are raster-type devices. The conversion of vector-based SVG files to pixels is based on the individual display type and settings, resulting in images that reproduce more faithfully for the greatest number of users.

All major modern Web browsers except Microsoft Internet Explorer (IE) support and render SVG graphics. The next major version of IE, Internet Explorer 9, promises support for the SVG format.

Using Interlacing and Progressive Display

Most Web-capable graphics editors let you save images in an interlaced (progressive) format. You can choose this display option when creating GIF, PNG, and JPG files. GIF and PNG files use an interlacing format, while JPG files use a progressive format. Interlacing and progressive formats generally are the same thing—the gradual display of a graphic in a series of passes as the data arrives in the browser. Each additional pass of data creates a clearer view of the image until the complete image is displayed. Figure 8-4 shows three rendering passes to display a complete image.

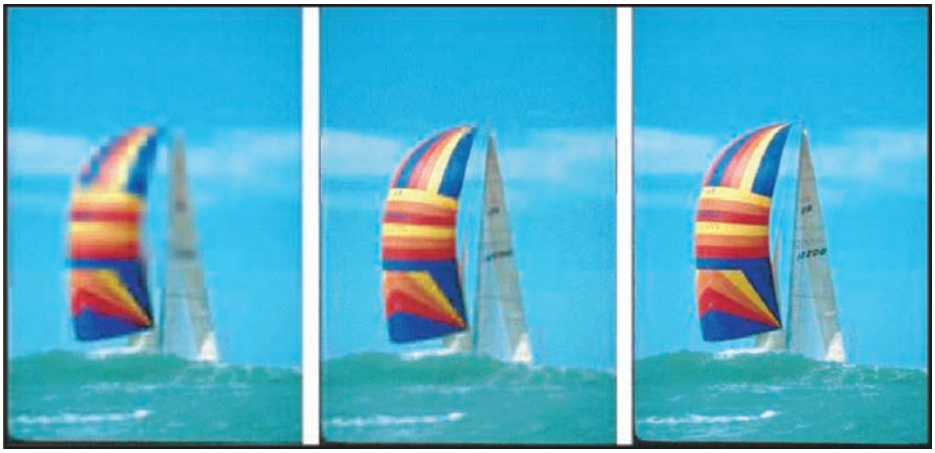


Figure 8-4 Three passes complete this progressive JPG image

The only real advantage to displaying graphics in the interlaced or progressive method is that users immediately see at least a blurred view of the complete image, giving them something to look at while waiting for the entire graphic to download. The disadvantage of choosing this display method is that older browsers may not display the graphic properly, and more processing power is needed on the user's machine to render the image. The use of these methods has declined as increased connection speeds have become more widespread.

Where You Can Find Images

You can acquire images from a variety of sources, including from a graphics professional you hire to create and prepare your images. If your budget does not allow for funding this service, consider one of the following resources:

- *Stock photo collections*—Stock photo collections can cost anywhere from thousands of dollars for a few images to under $20 for thousands of images at your local computer discount store or Web site retailer. These collections contain royalty-free images that you can use for any Web site. You can manipulate the graphics to add or delete text or images, change the color, or make any other modifications. Most stock photo collections include a built-in browsing program that lets you search for a particular image, and some also provide image-editing software.
- *Digital camera*—A digital camera lets you take your own photos and use them on the Web. These cameras store photos in JPG format, so you do not have to convert them. Most also provide image-cataloging software, and some include basic image-editing software. The price of digital cameras continues to drop, while the quality of the images gets better and better.
- *Scanner*—Good scanners are available for under $100. You can scan your own photos or images and save them as GIF, JPG, or PNG files for use on your Web site.
- *Public domain Web sites*—Many Web sites maintain online catalogs of images that are available for download. Some of these sites charge a small membership fee, so you can download as many images as you want. Other public domain Web sites are completely free.

Wikipedia maintains a list of public domain stock photo Web sites at *http://en.wikipedia.org/wiki/Wikipedia:Public_domain_image_resources*

- *Create your own*—If you need a basic image or if you have graphic design skills, you can download a shareware or freeware graphics tool and learn to use it. Keep your custom image simple, such as text on colored backgrounds, and use fundamental shapes and lines. Look at graphics on other Web sites; many are simple but effective and may provide a useful model for your own images.

Do not borrow images from other Web sites. Although your browser allows you to copy graphics, you should never use someone else's work unless it is from a public domain Web site and freely available for use. Digital watermarking technology lets artists copyright their work with an invisible signature; if you use someone else's graphics, you may find yourself in a lawsuit.

Choosing the Right Format

The following list summarizes the advantages and disadvantages of each graphic file format for the Web.

- *GIF*—Still the most common format for all types of simple colored graphics and line art. GIF's transparency feature lets you seamlessly integrate graphics into your Web site.
- *JPG*—Use JPG for all 24-bit full-color photographic images, as well as more complicated graphics that contain color gradients, shadows, and feathering.
- *PNG*—You can use PNG as a substitute for GIF. PNG offers greater compression and color depth than GIF. Because PNG does not compress your 24-bit images as well as JPG does, do not use it for photos.
- *SVG*—Offers many advantages, but lack of support in all major browsers means SVG is not a common image format.

Choosing a Graphics Tool

As a Web designer, you may be in the enviable position of having a complete staff of graphic design professionals preparing graphics for your site. Most Web designers, however, do not have this luxury. Whether you want to or not, you eventually must use a graphics tool. Most of your graphics tasks are simple, such as resizing an image or converting an image from one file format to another. More complex tasks often include changing color depth or adding transparency to an image. These are tasks that anyone can learn using any of the popular graphics software currently available.

When it comes to creating images, you may want to enlist professional help. Your Web site will not benefit if you choose to create your own graphics and you are not up to the task.

Professional-quality graphics can greatly enhance the look of your Web site. Take an honest look at your skills and remember that the best Web sites usually are the result of collaboration.

You use graphics software to create or manipulate graphics. Most Web designers use Adobe Photoshop, which is an expensive and full-featured product that takes time to master. Adobe Illustrator, a high-end drawing and painting tool, also is available. Other commercial tools you can consider include Ulead PhotoImpact and Adobe Fireworks. Most are available as downloadable demos, so you can try before you buy. In general, look for a tool that meets your needs and will not take a long time to learn. Table 8-2 shows a list of Web sites for the graphics tools mentioned in the text.

Graphics Tool	URL
Adobe Photoshop and Illustrator	*www.adobe.com*
Adobe Fireworks	*www.adobe.com*
Corel Paint Shop Pro	*www.corel.com*
Ulead PhotoImpact	*www.ulead.com*

Table 8-2 Graphics Tools Web Sites

The list in Table 8-2 is not exhaustive, and you may have to try different tools to find the one that suits your needs.

Of course, you also can choose from a variety of shareware or freeware graphics tools. One of the more established tools is Paint Shop Pro. This tool is reasonably priced and contains a full range of image-editing features. Like most other shareware, this tool can be downloaded and used for a trial period.

For a list of freeware graphic-editing programs, see: *www.freewarefiles.com/category/graphics.php*

For a list of shareware graphic-editing programs, see: *www.tucows.com/Windows/DesignTools/Image/ImageEditors*

Using the Image Element

By definition, the image element <img> is a replaced element in HTML, meaning that the browser replaces the <img> element with the image file referenced in the src attribute. The browser treats the image as it treats a character; normal image alignment

is to the baseline of the text. Images that are within a line of text must have spaces on both sides or the text will touch the image.

The <img> element only needs the src attribute for the image to be displayed in the browsers, though using only the src attribute is not good coding practice. The <img> tag should always contain additional attributes shown in the following code sample and described in Table 8-3.

```
<img src="logo.gif" width="258" height="130" alt="Company logo
graphic" title="Click the logo to view the company home page" />
```

Attribute	Use
alt	Displays an alternate string of text instead of an image if the user has a text-only browser or has graphics turned off
height	Specifies the height of the image in pixels
src	The only required attribute, src specifies the URL of the graphic file you want to display; as with any URL, the path must be relative to the HTML file
title	A string of text that provides information about the image; visual browsers display the contents of the title attribute as a ToolTip or ScreenTip (a pop-up window that appears when the user pauses the pointing device over an object); an audio browser could speak the title information
width	Specifies the width of the image in pixels

Table 8-3 <img> Element Attributes

Replacing Image Element Attributes with Style Sheet Properties

Much of the HTML code on the Web does not match current standards. When you visit different Web sites and view their code, you often see a variety of older HTML attributes in use to control image characteristics. Specifically, the align, border, vspace, and hspace attributes have been deprecated in HTML 4.01 in favor of CSS. Table 8-4 shows the equivalent CSS properties that replace these attributes.

Deprecated Image Attribute	Equivalent CSS Property
align	The float property allows you to flow text around an image or other object; for example, img {float: left;}
border	The border property lets you set a border on an image or remove the border from a linked image
vspace and hspace	The padding or margin properties set white space around an image; you can control individual sides of the image, or apply white space around the entire image

Table 8-4 CSS Properties that Replace img Attributes

Specifying alt and title Attribute Text

The alt attribute provides a description of the image if the image does not appear in the browser. Proper use of the alt attribute improves Web accessibility by describing the function of each image in your Web site. This information can be used by screen readers and other adaptive devices. Your page layouts should still be readable and navigable even with images turned off. Figure 8-5 shows an example from the Barnes and Noble Web site (*www.bn.com*). Notice that all images have appropriate alt attribute values that let users navigate and understand the site content.

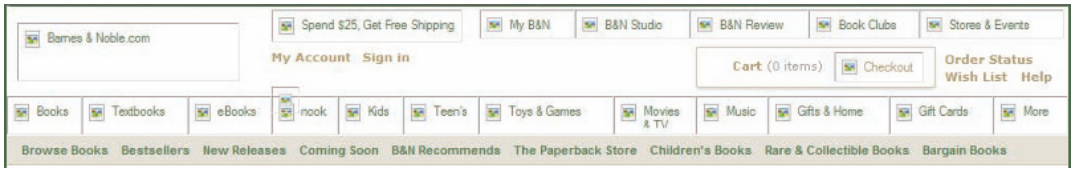


Figure 8-5 Alt text provides navigation and content information

The title attribute contains information about the element like you would see in a ToolTip or pop-up help window. This is usually a description, such as identifying the target of a link, providing copyright or identifying information about an image, or other comments or notations. The following code shows an example of the title attribute used with an <img> element.

```
<img src="balloons_sm.jpg" width="200" height="267" alt="Hot
Air Balloon image" title="Balloons at the Great Falls Festival
in Lewiston, Maine"/>
```

Figure 8-6 shows the pop-up text that appears as a result of using the title attribute.

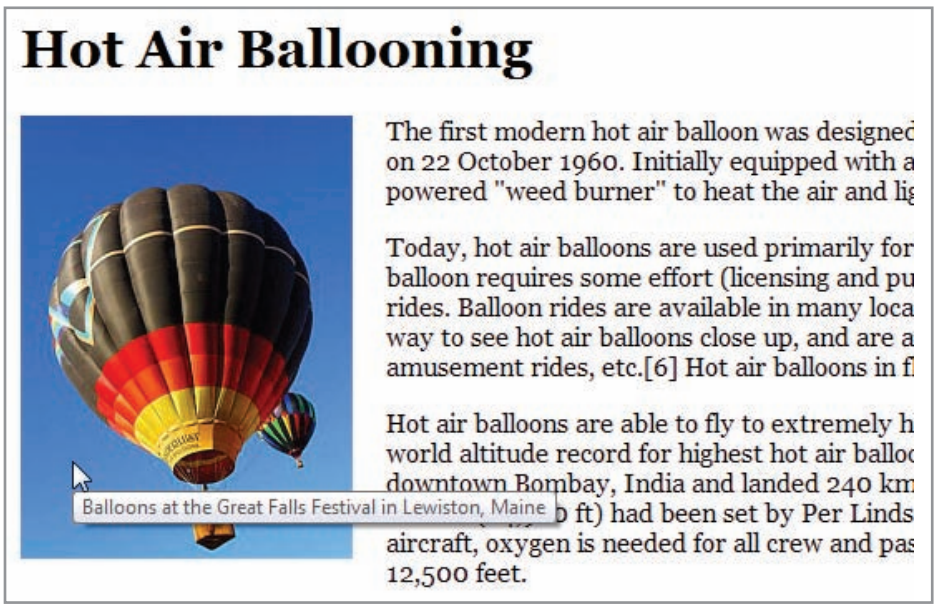


Figure 8-6 Using the title attribute

Specifying Image Width and Height

Every <img> element on your Web site should contain width and height attributes. These attributes provide important information to the browser by specifying the amount of space to reserve for the image. This information dramatically affects the way your pages download, especially at slower connection speeds. If you have included the width and height, the browser knows how much space the image needs. The browser reserves the space on the page without waiting for the image to download, and displays the rest of your text content. If the browser does not know the width and height values, it must download the image before displaying the rest of the page. At slower connection speeds, the user will be looking at a blank page while waiting for the image to download.

You should set the width and height to preserve the look of your layout, whether the images are displayed or not. In Figure 8-7, the width and height have been omitted. Notice that if the browser does not know the width and height, the text wrapping and appearance of the page change dramatically when the image is not displayed

Hot Air Ballooning

Hot Air Balloon image The first modern hot air bal
Bruning, Nebraska on 22 Oc
moved onto using a modified propane powered "w

Today, hot air balloons are used primarily for recr
balloon requires some effort (licensing and purcha
rides. Balloon rides are available in many locations
to see hot air balloons close up, and are an enjoyab
amusement rides, etc.[6] Hot air balloons in flight

Hot air balloons are able to fly to extremely high a
air balloon flight, reaching 21,290 meters (69,852
Panchale. The previous record of 19,811 meters (6
registered aircraft, oxygen is needed for all crew a

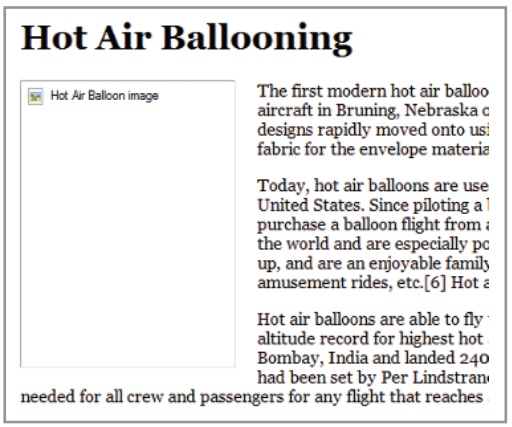
On January 15, 1991, a balloon carrying Per Linds
Northern Canada, completing 7,671.91 km. This re
circumnavigated the globe and set records for dur

Figure 8-7 Browser unable to reserve image size

The following code shows the width and height attributes for the image. It indicates that the browser should reserve a 200 × 267-pixel space for the balloons_sm.jpg image and should display the alternate text "Hot Air Balloon image" if it cannot display the image.

```
<img src="balloons_sm.jpg" width="200" height="267" alt="Hot
Air Balloon image" title="Up, up and away in a hot air
balloon" >
```

In Figure 8-8, the width and height have been specified and the image size is reserved by the browser, retaining the look of the page layout.



Hot Air Ballooning

Hot Air Balloon image The first modern hot air balloo
aircraft in Bruning, Nebraska c
designs rapidly moved onto usi
fabric for the envelope materia

Today, hot air balloons are use
United States. Since piloting a
purchase a balloon flight from a
the world and are especially po
up, and are an enjoyable family
amusement rides, etc.[6] Hot a

Hot air balloons are able to fly
altitude record for highest hot
Bombay, India and landed 240
had been set by Per Lindstran
needed for all crew and passengers for any flight that reaches

Figure 8-8 Image size reserved in the browser

You may notice that you can manipulate the width and height of the image itself using the width and height attributes in the <img> element. While it is tempting to use these attributes to change a graphic's size without using a graphics program, it is not a good idea. If the original graphic's area is too large and you reduce the size using the width and height attributes, you are not changing the file size of the image—only the area that the browser reserves for the graphic. The user is still downloading the original graphic file; no time is saved. Also, if you do not maintain the ratio of width to height, called the **aspect ratio**, you distort the image. Figure 8-9 shows an image in its actual size, the size after changing the width and height values in proportion to one another, and the distortion caused by incorrect width and height values.

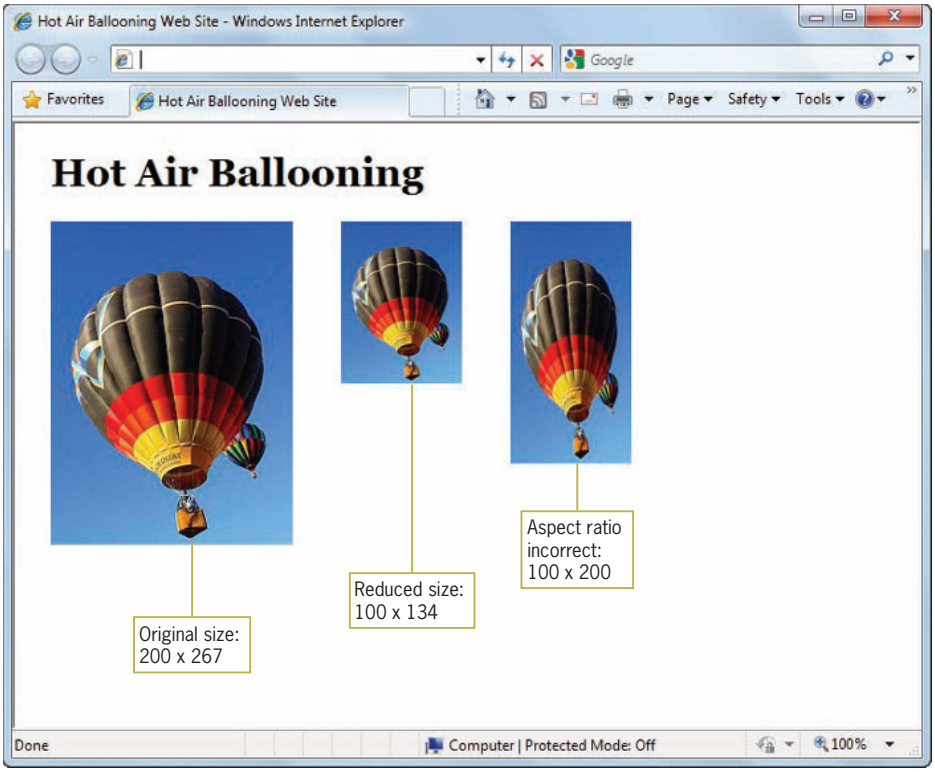


Figure 8-9 Manipulating images with width and height attributes

In the following code for the three images, the width and height attributes appear in bold, colored text:

```
<-- Original size -->
<img src="balloons_sm.jpg" alt="Hot Air Balloon image"
title="Balloons at the Great Falls Festival in Lewiston,
Maine" width="200" height="267" />
```

```
<-- Reduced size -->
<img src="balloons_sm.jpg" alt="Hot Air Balloon image"
title="Balloons at the Great Falls Festival in Lewiston,
Maine" width="100" height="134" />

<-- Incorrect Aspect Ratio -->
<img src="balloons_sm.jpg" alt="Hot Air Balloon image"
title="Balloons at the Great Falls Festival in Lewiston,
Maine" width="100" height="200" />
```

However, the ability to manipulate image size using the width and height attributes comes in handy in certain circumstances. When creating a layout mock-up, you can test image sizes by manipulating the code.

Sizing Graphics for the Page

One way to keep file sizes small is to size graphics appropriately. Few experiences are more annoying than opening a Web page you haven't visited before and waiting to download an overly large image. One of the easiest ways to make your graphics download quickly is to keep their dimensions small and appropriate to the size of the page. Figure 8-10 shows a variety of image sizes at 1024 × 768 screen resolution.

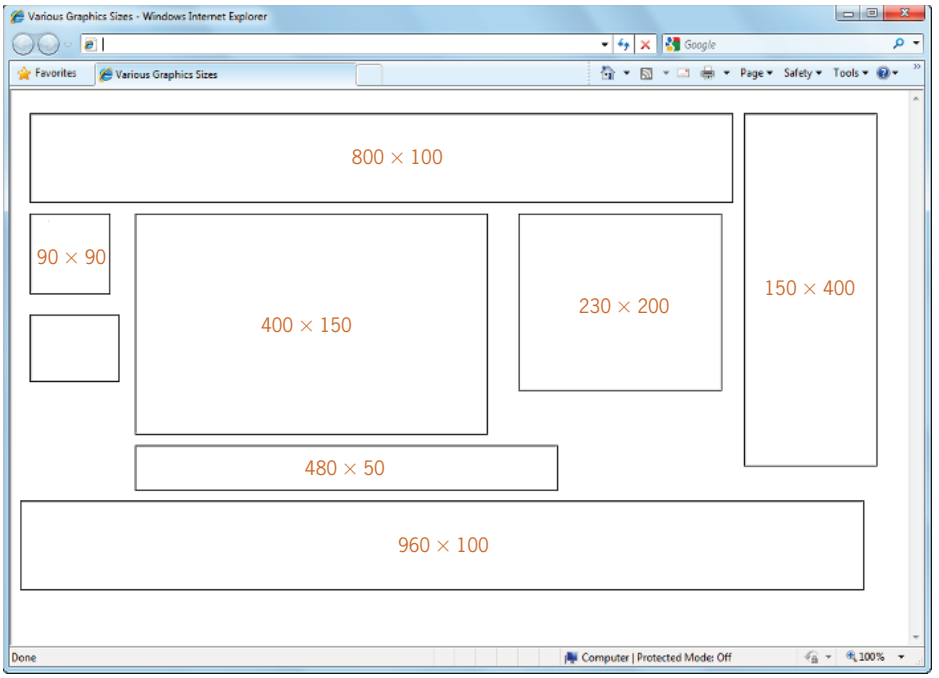


Figure 8-10 Sample image sizes at 1024 × 768 screen resolution

Use these sample image sizes as guidelines when you size your graphics. It is also useful to think of image size in relation to the number of columns in your layout; size your graphics to occupy one, two, or more columns of the page.

Controlling Image Properties with CSS

In this section, you will use Cascading Style Sheet properties to control the following image characteristics:

- Removing the hypertext border
- Aligning text and images
- Floating images
- Adding white space around images

Removing the Hypertext Border from an Image

When you create a hypertext image, the browser's default behavior is to display the hypertext border around the image, as shown in Figure 8-11. This border appears blue before—and purple after—you click the image. In a well-designed site, this border is unnecessary because users often use their mouse to point to each image to see whether the hypertext pointer appears. Another reason to abandon the display of hypertext borders is that their color may not complement your graphic.

To remove the hypertext border, add a style attribute with the border property set to *none*. Here is the code for the second balloon in Figure 8-11, which has the hypertext border turned off:

```
<img src="balloon.jpg" width="100" height="100" alt="balloon"
style="border: none" />
```

You can read more about the border property in Chapter 6.

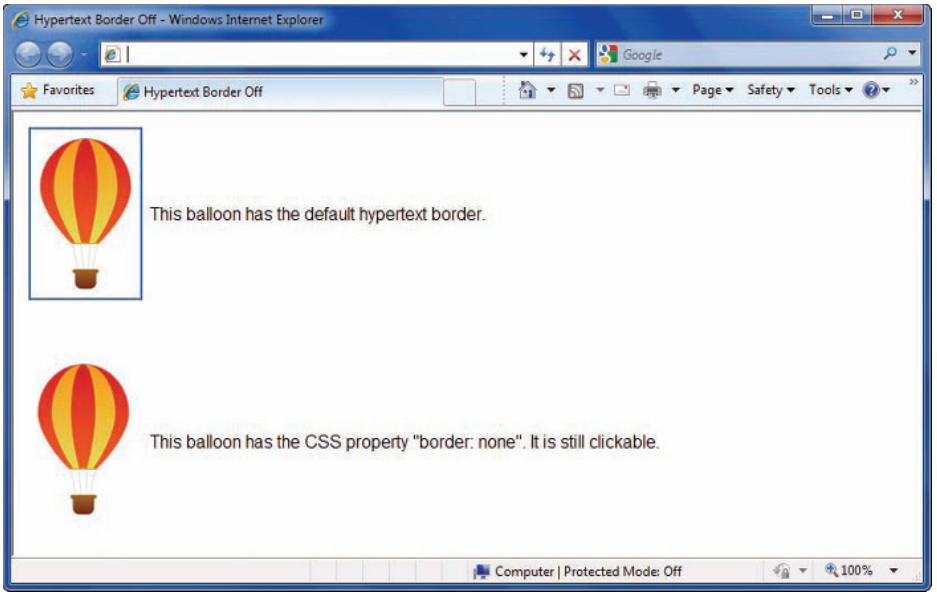


Figure 8-11 Removing the hypertext border from an image

Aligning Text and Images

You can align text along an image border using the vertical-align property. The default alignment of the text and image is bottom-aligned, which means the bottom of the text aligns with the bottom edge of the image. You can change the alignment by using either the top or middle values. Figure 8-12 shows all three alignment values.

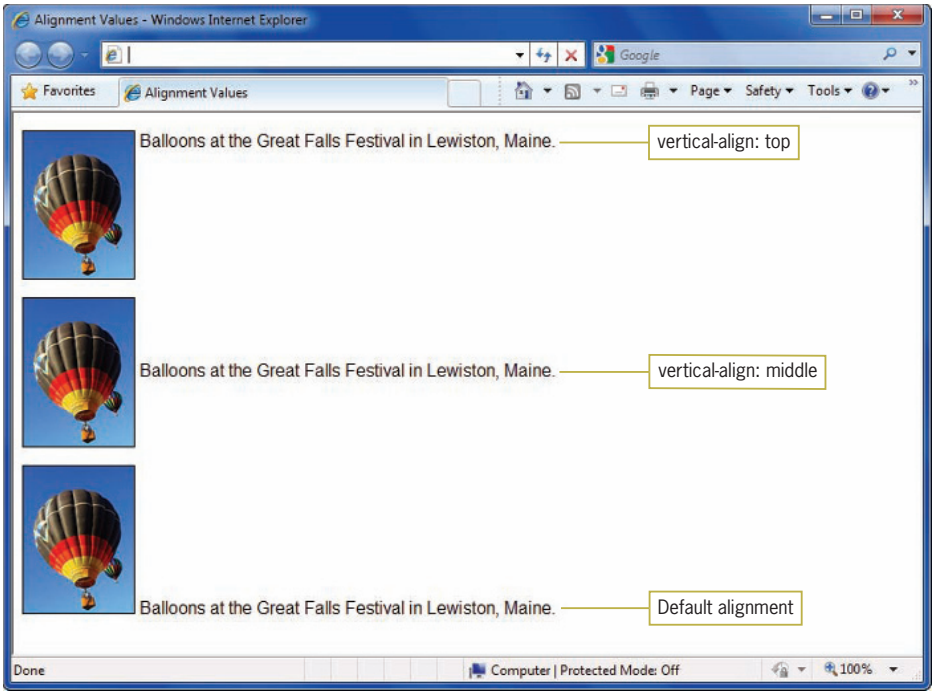


Figure 8-12 Text alignment

Floating Images

float property description	
Value:	left | right | none
Initial:	none
Applies to:	all elements except positioned elements
Inherited:	no
Percentages:	N/A

The float property can be used to float an image to the left or right of text.

The following style rules create two classes of <img> elements, one of which floats to the left of text; the other floats to the right:

```
img.left {float: left;}
img.right {float: right;}
```

You can apply these rules to an image using the class attribute within the <img> element, as shown in the following code fragment:

```
<img src="sample.gif" class="left" />
```

Figure 8-13 shows two floating images within a page.

Figure 8-13 Floating images

Adding White Space Around Images

Add white space around your images to reduce clutter and improve readability. As shown in Figure 8-14, the default spacing is very close to the image.

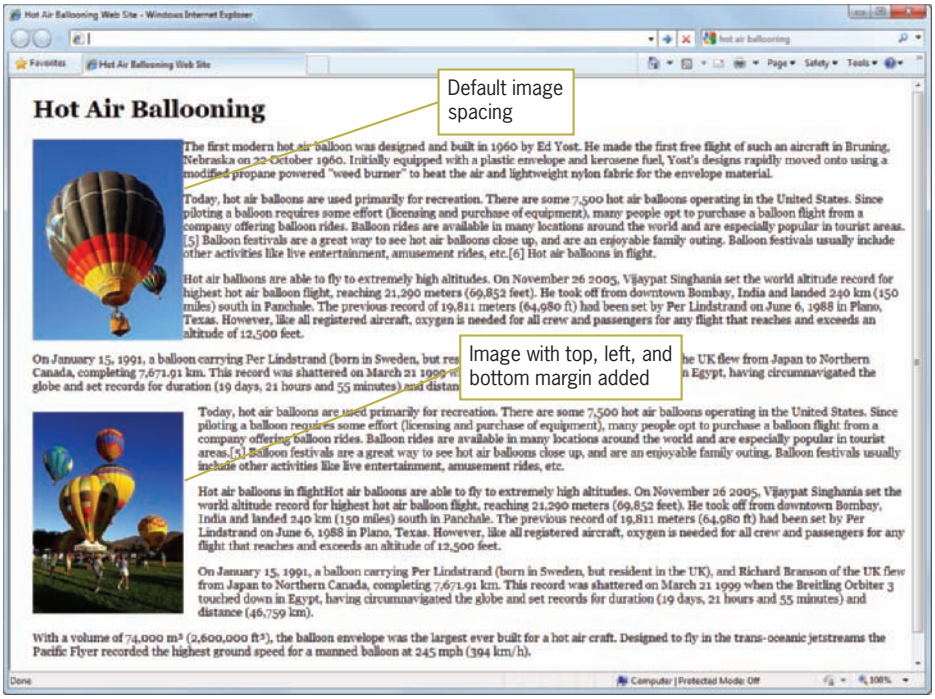


Figure 8-14 Image spacing

Use the CSS margin property to increase the white space around an image. You can read more about the margin property in Chapter 6. The margin property lets you add margins on all four sides or to individual sides of an image. The following code shows an image with a 20-pixel margin on the left, top, and bottom sides, floating to the left of text:

```
img.left {
   float: left;
   margin-left: 20px;
   margin-top: 20px;
   margin-bottom: 20px
}
```

You also can add white space into the graphic itself using graphic-editing software.

Understanding Computer Color Basics

Before you create or gather graphics for your Web site, you need a basic understanding of how color works on computer monitors.

Your computer monitor displays color by mixing the three basic colors of light: red, green, and blue, often called RGB colors. Each of these three basic colors is called a color channel. Your monitor can express a range of intensity for each color channel, from 0 (absence of color) to 255 (full intensity of color). Colors vary widely among monitors based on both the user's preferences and brand of equipment.

Color Depth

The amount of data used to create color on a display is called the **color depth**. If your monitor can display 8 bits of data in each of the three color channels, it has a 24-bit color depth (8 × 3 = 24). 24-bit images can contain almost 17 million different colors and are called true-color images. Both JPG and PNG support 24-bit color. If your users have a 24-bit color display, they can appreciate the full color depth of your images. But many older monitors cannot display 24-bit images; some have only 16-bit color depth (called high color), and some have only 8-bit color depth. If a monitor does not support the full color depth of an image, the browser must resort to mixing colors in an attempt to match the original colors in the image.

Dithering

The browser must mix its own colors when you display a 24-bit image on an 8-bit monitor, or when you use a file format that does not support 24-bit color. Because the 8-bit monitor has fewer colors to work with (256, to be exact), the browser must try to approximate the missing colors by creating colors from the ones the browser already has. This type of color mixing is called dithering. **Dithering** occurs when the browser encounters a color that it does not support, such as when you try to turn a 24-bit photographic image into an 8-bit, 256-color image. Dithered images often appear grainy and pixilated. The dithering is most apparent in gradations, feathered edges, or shadows. Figure 8-15 shows the same image in both JPG and GIF format at 8-bit, 256 colors.

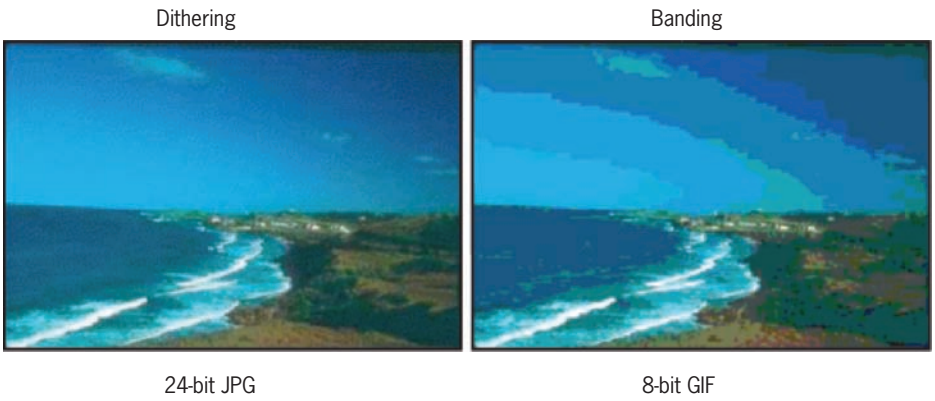


Figure 8-15 24-bit images on an 8-bit display

The JPG file on the left has a lot of dithering in the sky area of the photo, where the browser was forced to mix colors to approximate the existing colors in the image. The GIF file on the right exhibits a different type of color matching called banding. Unlike dithering, **banding** is an effort to match the closest colors from the GIF's palette to the original colors in the photo. When you create a GIF, you can choose whether or not to use dithering. A nondithered image is smaller than one that uses dithering, but the banding may create an unacceptable image. JPGs, when viewed on an 8-bit or 16-bit display, dither to the closest colors. Photos are best saved as JPGs, even when viewed at a lower color depth, because the dithering creates a more acceptable image.

Using the Web Palette

One way to control dithering is to create images that use non-dithering colors. The 216 nondithering colors that are shared by PCs and Macintoshes are called the **Web palette** or **browser-safe colors**. The nondithering palette only applies to GIF or 8-bit PNG, not to 24-bit JPG. Most Web-capable graphics programs include the Web palette colors. If you do create graphics for the Web, you can avoid trouble by using the Web palette as your color palette for all flat color areas of your graphics.

The Web palette, which was once the only color palette acceptable for the majority of monitors, is now becoming less important as higher color depth monitors become the norm. Unless you know specifically that your audience has older monitors, you can forgo using the Web palette.

Creating Web Site Color Schemes

The color scheme used on a Web site can be the result of many factors, including the company's branding colors, designer preferences, and usability studies. Colors convey important

meanings to the user and set the tone for a Web site. Think of the types of colors a designer might choose for a site that promotes ecology and conservation versus a site that celebrates spicy foods. The color choices that come to mind would certainly be different, possibly cool greens and blues for the ecology site, and hot yellows and reds for the spicy foods site. The scheme of colors you choose should work together to create a distinctive look for your site without detracting from your content's legibility. Choosing colors for your site can be difficult, so it helps to have a basic understanding of color theory to help make choices that suit your site's needs.

The study of color theory began with Isaac Newton's series of experiments with prisms published in 1672. Newton found that with a prism, he could separate white light into its component colors: red, orange, yellow, green, blue, and violet. Newton arranged these colors into a wheel that arranged colors logically, as show in Figure 8-16.

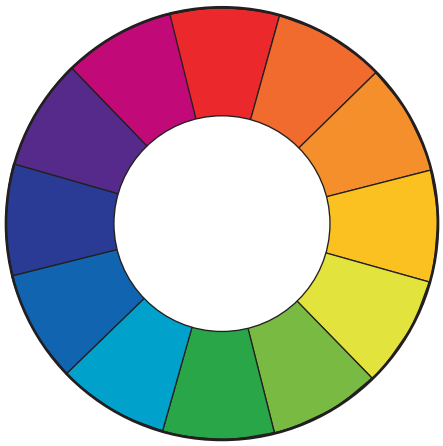
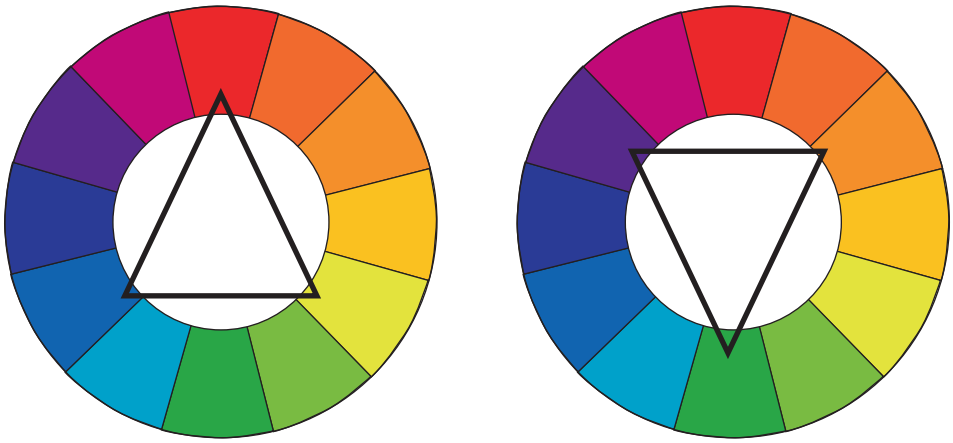


Figure 8-16 Color wheel

In Newton's color wheel, the primary colors—red, yellow, and blue—are arranged opposite their complementary colors; for example, red is opposite green. The primary colors are basic colors of light that cannot be created by mixing other colors. The secondary colors are combinations of primary colors. White, black, and gray are neutral and not included in the wheel. For example, Figure 8-17 shows how the color wheel arranges various relationships between colors.



Primary colors Secondary colors

Figure 8-17 Primary and secondary colors on the color wheel

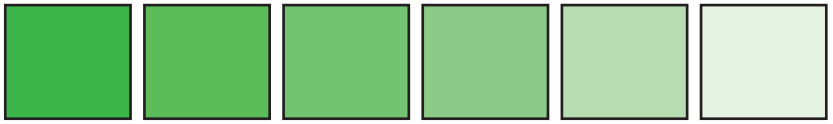
Warm and Cool Colors

The color wheel is often divided into warm and cool colors. The warm colors include colors that are normally seen in daylight or sunsets, reds through yellow, browns, and tan. The cool colors are associated with water, clouds, and overcast days, and include blue through greens and violet. Although these perceptions are culturally dependent, they provide a broad characterization of color usage. The warm colors are generally seen as vivid and energetic, while cool colors are calming and relaxing.

Tints and Shades

In color theory, a pure color is called a **hue**, a color without a tint or shade. If a color is made lighter by adding white, the result is called a **tint**. If black is added, the darker version is called a **shade**. The result of adding these neutral colors to a pure color is shown in Figure 8-18.

Tints: Adding white to a pure hue



Shades: Adding black to a pure hue

Figure 8-18 Tints and shades of colors

Types of Color Schemes

When using color for Web sites, the color wheel can guide your color choices.

Complementary color schemes use the complementary colors that are always arranged opposite of each other on the color wheel. Complementary colors are vivid opposites and do not always go well together, despite their name. Complementary colors are a poor choice for text and backgrounds (for example, yellow text on a blue background) because of their high contrast. Using a complementary color scheme brings high contrast and excitement to your content. See Figure 8-19.

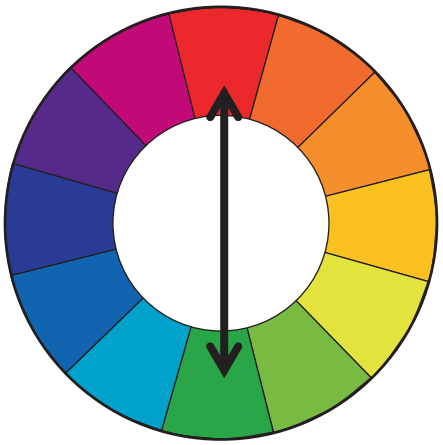


Figure 8-19 Complementary colors

Analogous color schemes use the analogous colors that are located next to each other on the color wheel as shown in Figure 8-20. Analogous colors match well and create designs that are harmonious and pleasing to the eye. One color is usually dominant while the other colors are used to enhance the color scheme. Analogous schemes sometimes need the addition of a more contrasting color to add interest or highlight sections of a layout.

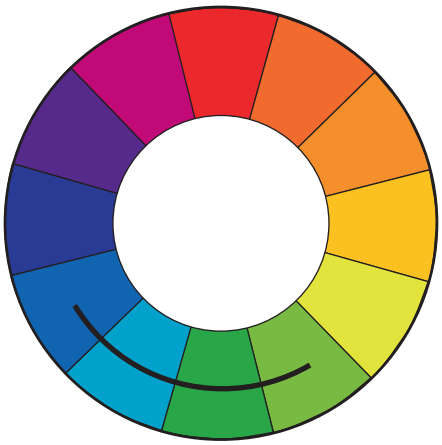


Figure 8-20 Analogous colors

Monochromatic color schemes use tint and shades of a single hue, as shown in Figure 8-21. This scheme looks unified and clean. Monochromatic colors go well together and are easy on the eyes, especially with cool colors. This scheme is a common choice for Web designers who want to create a dignified, understated look. The primary color can be integrated with the neutral colors black white and gray. Like the analogous scheme, it can be difficult to highlight the most important elements because of a lack of color contrast.

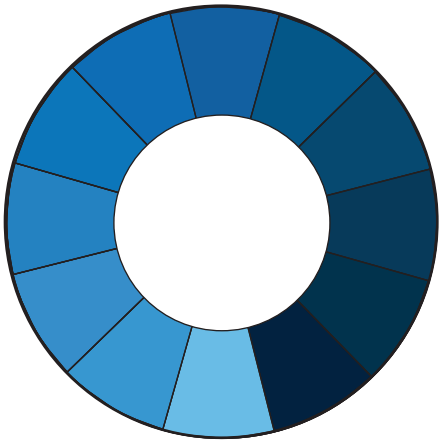


Figure 8-21 Monochromatic colors

The Color Wizard (*www.colorsontheweb.com/colorwizard.asp*) is an easy-to-use color matching tool that can help you choose colors for your Web site designs.

The paletteman Web site (*http://paletteman.com*) lets you choose colors by theme. You can choose up to five colors and see how they interact.

Using Color Wisely

Because of the variable nature of color on the Web, be sure to test the colors you choose, and use restraint when adding color to your design. Remember that colors do not look the same on different monitor brands and operating systems. When used properly, color can enhance the presentation of your information, providing structural and navigation cues to your user. Conversely, poor use of color distracts from your content and can annoy your users. Dark backgrounds, clashing colors, and unreadable links are just a few examples of the unrestrained use of the HTML color attributes that are common on the Web. Just because CSS allows you to easily apply color to any element does not mean that you should apply color haphazardly. Remember that many of your users might have accessibility issues that prevent them from seeing color the way you do. The user's ability to navigate, read, and interact with your content should always determine the choices and use of color in a Web site.

Approximately 7–10 percent of the male population in the United States is color blind. You can test your designs to determine how they will look to users affected by color blindness with one of the following utilities:

www.etre.com/tools/colourblindsimulator

www.vischeck.com/vischeck

Specifying CSS Color Values

In this section, you will learn about the different ways to express color using CSS properties. CSS lets you specify color values in one of three ways:

- Color names
- RGB color values
- Hexadecimal color values

Which color value method should you use? Hexadecimal color values probably should be your first choice because they are supported by all browsers and are the Web's color language. Both hexadecimal and RGB values are more specific and let you express a wider range of color than the color names. Whichever method you choose, make sure to use that method consistently throughout your entire Web site.

Using Color Names

The color name values let you quickly state color using common names. The valid CSS color name values are the 16 basic color names stated in the W3C HTML 4.01 specification, listed in Table 8-5. These are still acceptable for use today.

Color Name	Hex	Color Name	Hex
Aqua	00FFFF	Navy	000080
Black	000000	Olive	808000
Blue	0000FF	Purple	800080
Fuchsia	FF00FF	Red	FF0000
Gray	808080	Silver	C0C0C0
Green	008000	Teal	008080
Lime	00FF00	White	FFFFFF
Maroon	800000	Yellow	FFFF00

Table 8-5 Color Names Recognized by Most Browsers

Although the color names are easy to use, they allow only a small range of color expression. To use a wider variety of available color, you must use a more specific value, such as RGB or hexadecimal.

Using RGB Colors

The RGB color model is used to specify numeric values that express the blending of the red, green, and blue color channels. When you specify RGB values, you are mixing the three basic colors to create a fourth color. Each of the three color channels can be specified in range from 0 to 100%, with 0 representing the absence of the color, and 100% representing the full brilliance of the color. If all three values are set to 0, the resulting color is black, which is the absence of all color. If all three color values are set to 100%, the resulting color is white, which is the inclusion of all colors.

The syntax for specifying RGB is the keyword *rgb* followed by three numerical values in parentheses—the first for red, the second for green, the third for blue. The following rule states a percentage RGB value:

```
p {color: rgb(0%, 100%, 100%);}
```

RGB color values can be specified as an integer value as well. The integer scale ranges from 0 to 255 with 255 equal to 100%. The following rules specify the same color:

```
p {color: rgb(0%, 100%, 100%);} /* percentages */
p {color: rgb(0, 255, 255);} /* integers */
```

Using Hexadecimal Colors

Sometimes you will see colors that you like on a Web site but don't know what the exact color values are. A color picker or eye dropper tool lets you sample a color onscreen so you know the rgb or hexadecimal value. You can download an excellent free color picker tool at *www.iconico.com/colorpic*.

HTML uses hexadecimal numbers to express RGB color values, and you can use them in CSS as well. Hexadecimal numbers are a base-16 numbering system, so the numbers run from 0 through 9, and then A through F. When compared to standard base-10 numbers, hexadecimal values look strange because they include letters in the numbering scheme. Hexadecimal color values are six-digit numbers; the first two define the red value, the second two define the green, and the third two define the blue. The hexadecimal scale ranges from 00 to FF with FF equal to 100%. Hexadecimal values are always preceded by a pound sign (#). The following rules specify the same color:

```
p {color: #00ffff;} /* hexadecimal */
p {color: rgb(0%, 100%, 100%);} /* percentages */
p {color: rgb(0, 255, 255);} /* integers */
```

Understanding Element Layers

The color and background properties you will learn about in this chapter let you control three different layers of any element. You can imagine these layers as three individual pieces of tracing paper laid over each other to complete the finished Web page. Each layer is transparent until you add a color or an image. These are the three layers listed in order from back to front:

- *Background color layer*—The back or bottom layer, specified by the background-color property
- *Background image layer*—The middle layer, specified by the background-image property
- *Content layer*—The top layer; this is the color of the text content, specified by the color property

Figure 8-22 shows the three layers and their order from front to back. The background color layer (colored sky blue) lies behind all of the other layers. The background image layer displays the balloon image, which overlays the background color. The top layer contains the content. Notice that the content layer overlays both the background image and background color layers.

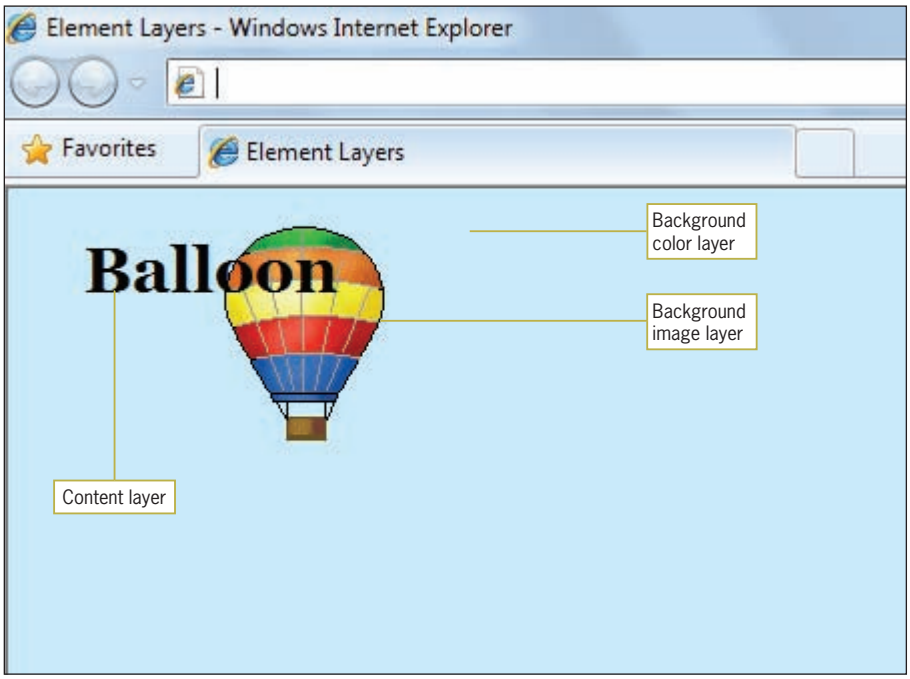


Figure 8-22 Element layers

Controlling Color Properties with CSS

In this section you will use Cascading Style Sheet properties to control the following color characteristics:

- Specifying color values
- Setting default text color
- Changing link colors
- Specifying background color
- Setting the page background color
- Creating a text reverse

Specifying Color Values

Color property description	
Value:	<color>
Initial:	depends on browser
Applies to:	all elements
Inherited:	yes
Percentages:	N/A

The color property lets you specify the foreground color of any element on a Web page. This property sets the color for both the text and the border of the element unless you have specifically stated a border color with one of the border properties (see Chapter 6).

The value for the color property is a valid color keyword or numerical representation, either hexadecimal or RGB (described earlier in the "Using RGB Colors" section). The following style rules show the different methods of specifying the same color:

```
p {color: blue;}              /* color name */
p {color: #0000ff;}           /* hexadecimal value */
p {color: rgb(0,0,255);}      /* RGB numbers */
p {color: rgb(0%,0%,100%);}   /* RGB percentages */
```

Figure 8-23 shows an <h1> element with the color set to red (hexadecimal #f90000). By default, the element's border is the same color as the element content.

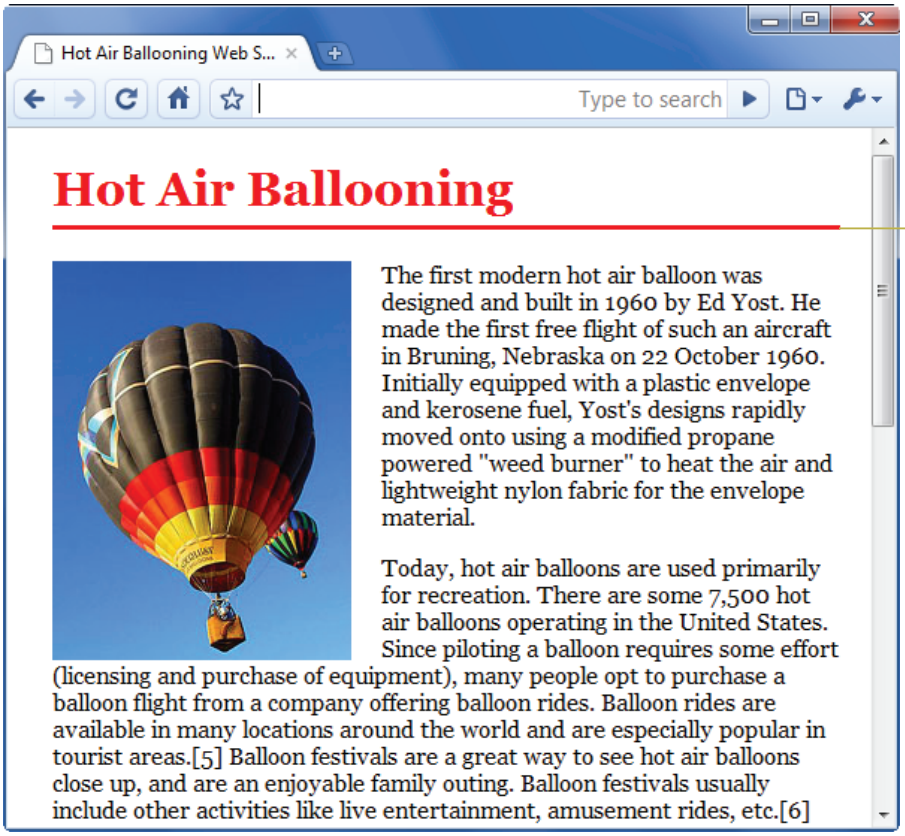


Figure 8-23 Element border defaults to the text color

Here is the style rule for the heading. Notice that the border color is not specified, so the element's border is the same color as the element text.

```
h1 {
   color: #f90000;
   border-bottom: 3px solid;
   padding-bottom: 6px;
}
```

Setting the Default Text Color

Color is inherited from parent to child elements. If you set the color for <body>, all elements on the page inherit their color from the <body> element, effectively setting the default text color for the entire Web page. The following rule sets the color for the <body> element:

```
body {
   color: #006633;}
```

Changing Link Colors

You can change the colors of hypertext links by using the link pseudo-classes:

- *link*—The unvisited link color; the default is blue.
- *active*—The active link color; this is the color displayed when the user points to a link and holds down the mouse button. The default is red.
- *visited*—The visited link color; the default is purple.

The following code shows the link pseudo-classes in use:

```
a:link {color: #cc0033;} /* new links are red */
a:active {color: #000000;} /* active links are black */
a:visited {color: #cccccc;} /* visited links are green */
```

Figure 8-24 shows a text-based navigation bar where the links have been colored red to match the design of the heading.

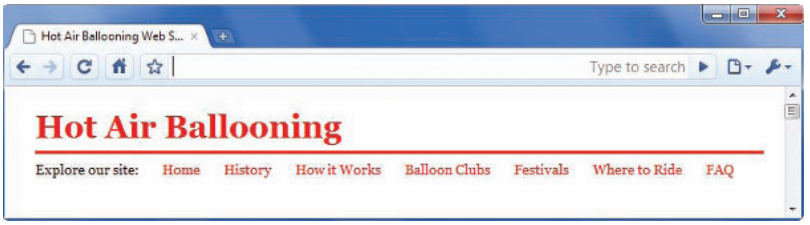


Figure 8-24 Changing link colors

Remember to place your link pseudo-class in the following order:

1. Link
2. Visited
3. Hover
4. Active

Refer to Chapter 4 for more information on link pseudo-classes.

The familiar blue (for new links) and purple (for visited links) colors are one of the most recognizable navigation cues for users visiting your site. Keep in mind that some users might have sight disabilities, such as color blindness, that could prevent them from seeing your Web pages in the way you intend. However, many sites do change their links to match their design color scheme. Changing link colors is acceptable as long as you maintain color consistency and preserve the contrast between the new and visited link colors to provide a recognizable difference to the user.

Specifying Background Color

The background-color property lets you set the background color of any element on a Web page.

The background color includes any padding area (explained in Chapter 6) that you have defined for the element. Figure 8-25

shows an <h1> element with background color and padding. The style rule looks like this:

```
h1 {
   color: #f90000;
   background-color: #fec893;
   border-bottom: 3px solid;
   padding-top: 20px;
   padding-bottom: 6px;
   padding-left: 20px;
}
```

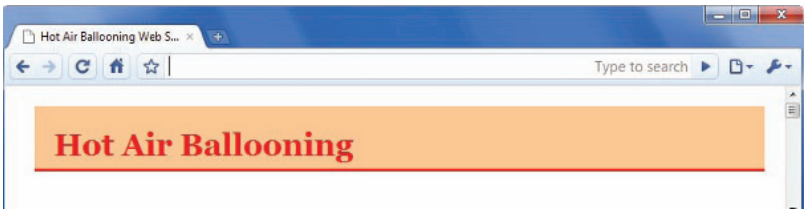


Figure 8-25 Background color and padding

The background-color property can be applied to both block-level and inline elements. To apply a background image color to inline text, use the element to select the text. The following style rule selects a span element to apply a background color with 4 pixels of padding:

```
span.bgcolor {
   background-color: #fec893;
   padding: 4px;
}
```

This span element with class="bgcolor" selects the words "Hot Air" in the heading:

```
<span class="bgcolor">Hot Air</span> Ballooning
```

The result is shown in Figure 8-26.

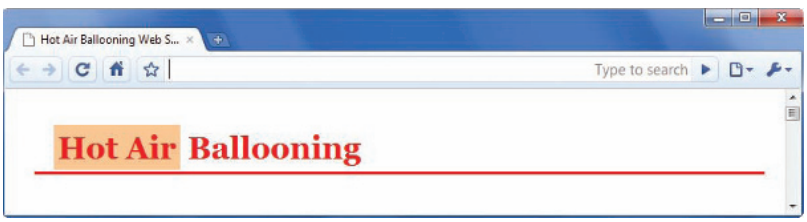


Figure 8-26 Inline element with a background color

Setting the Page Background Color

To set the page background color, use *body* as the selector. This sets the background color for the content area of the Web page. By default, the background color of any element is transparent. Therefore, all elements show the page background color unless the background-color property is specifically stated. The following rule sets a background color for the <body> element as shown in Figure 8-27.

```
body {background-color: #c5f0ff;}
```

Notice in Figure 8-27 that the navigation links at the top of the page have a white background. This is because the element that contains the navigation links has a background color set to white.

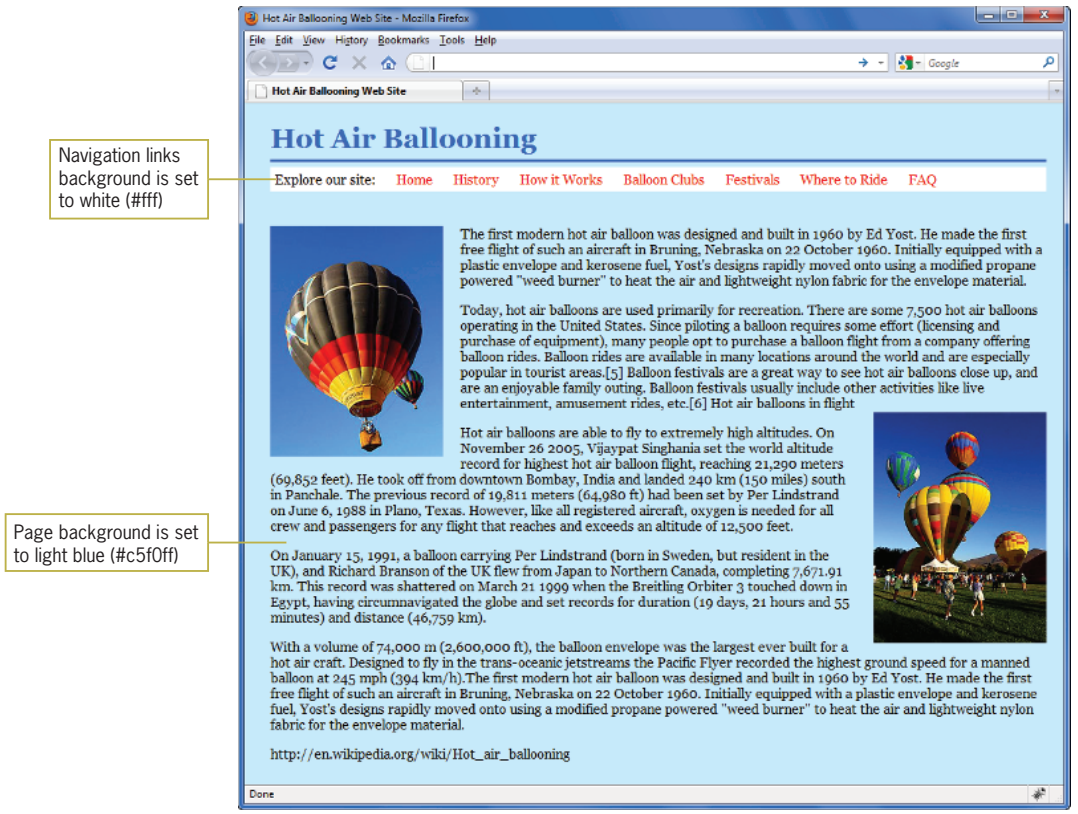


Figure 8-27 Page background color

It is always a good practice to include a page background color because some users might have a default background color that is different from the color you chose in your design. Even if you plan

on a white page background, you can never be sure that all users have their default set to white, so include the background-color property rather than relying on the user's settings.

Creating a Text Reverse

A reverse is a common printing effect where the background color, which is normally white, and the text color, which is usually black, are reversed. On the Web you can do this in your choice of color. Reverses are usually reserved for headings rather than the regular body text. You can easily create a reverse with a style rule. The following rule sets the background color of the <h1> element to red and the text color to white:

```
h1 {
   background-color: #f90000;
   padding: 10px;
   color: #fff;
}
```

The element padding is set to 10 pixels to increase the background color area. Figure 8-28 shows the result of the style rule.

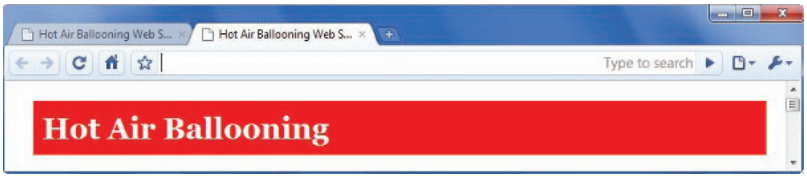


Figure 8-28 Reverse text in a heading

Controlling Background Images with CSS

In this section, you will use Cascading Style Sheet properties to control the following background characteristics:

- Specifying a background image
- Creating a page background
- Specifying background repeat
- Creating a vertical and horizontal repeat
- Creating a nonrepeating background image
- Specifying background position
- Positioning repeating background images

Specifying a Background Image

background-image property description	
Value:	<url>
Initial:	none
Applies to:	all elements
Inherited:	no
Percentages:	N/A

The background-image property lets you specify which image to display. Other CSS background properties control how the image is displayed.

With standard HTML, the only behavior of background images is to tile completely across the browser background. This is also the default behavior with the CSS background-image property. Figure 8-29 shows a document with an image tiled across the background.

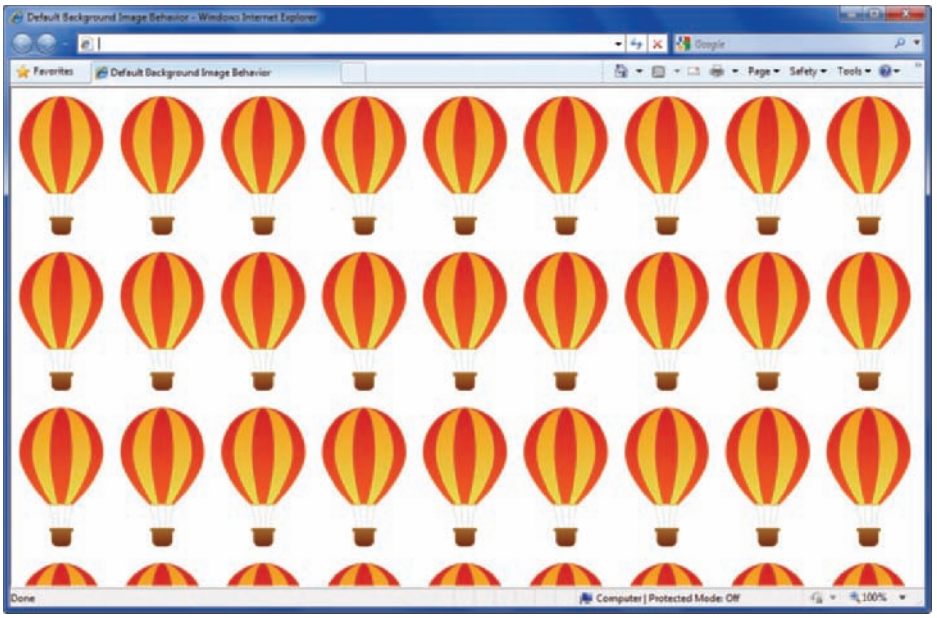


Figure 8-29 Default background image behavior

The background image from this example is shown in Figure 8-30. It is tiled repeatedly both vertically and horizontally.

Figure 8-30 Individual background image

In Figure 8-29, the background would obviously detract from the legibility of any Web page text. When choosing page backgrounds, keep the legibility of your text in mind. Avoid overly busy and distracting backgrounds that make your content difficult to read.

Specifying the Background Image URL

To specify a page background image, use the <body> element as the selector, because <body> is the parent element of the content area. To use an image in the background, you must specify the relative location of the image file in the style rule. CSS has a special notation for specifying a URL, as shown in Figure 8-31.

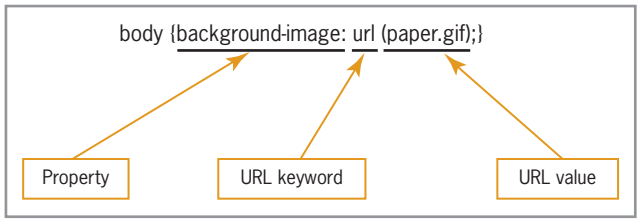


Figure 8-31 URL value syntax

If you are using external style sheets, the URL of the background image is relative to the location of the style sheet, not the HTML file to which the style sheet is applied.

Creating a Page Background

To tile an image across the entire background of the Web page, use body as the selector, as shown in the following rule. This is the style rule that was used to create the background in Figure 8-32.

```
body {background-image: url(clouds.jpg);}
```

In this example, a seamless background graphic tiles repeatedly across the page background, and behind the wrapper division that contains the page content. This technique lets you frame your content on the left and right margins with a background color that integrates with your design. This also fills the browser window no matter the user's resolution, so your pages are always framed by an active part of the design, rather than passive screen space.

Figure 8-32 Repeating page background behind wrapper division

Figure 8-33 shows the seamless graphic that was used to create the page background in Figure 8-32.

Figure 8-33 Seamless image used to create continuous background

Specifying Background Repeat

background-repeat property description	
Value:	repeat | repeat-x | repeat-y | no-repeat | inherit
Initial:	repeat
Applies to:	all elements
Inherited:	no
Percentages:	N/A

The background-repeat property lets you control the tiling of background images across the document or element background.

A background image must be specified for this property to work, so you always use the background-image property with the background-repeat property. Table 8-6 lists the background-repeat values.

Value	Background Image Behavior
repeat	The image is repeated across the entire background of the element; this is the default behavior
repeat-x	The image is repeated across the horizontal (x) axis of the document only
repeat-y	The image is repeated across the vertical (y) axis of the document only
no-repeat	The image is not repeated; only one instance of the image is shown in the background

Table 8-6 Background-Repeat Property Values

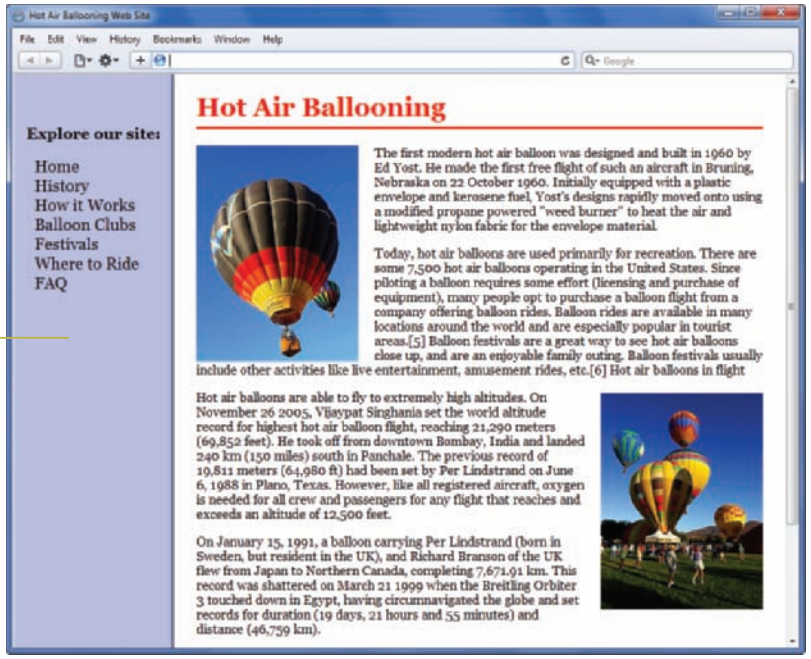
Creating a Vertical Repeat

The repeat-y value of the background-repeat property lets you create a vertical repeating background graphic. Figure 8-33 shows an example of this effect. The background graphic shown in Figure 8-34 is a 200-pixel wide by 50-pixel high JPG file.

Figure 8-34 Background graphic used to create background column

This property lets you easily create columns with image or color backgrounds because the graphic is repeated vertically. You can

then align content or division elements over the background image columns as shown in Figure 8-35.



Graphic repeats vertically to create column background

Figure 8-35 Vertical repeating background image

The Web page in this figure is a 2-column layout as you saw in Chapter 7. The navigation content is contained in a division that is the same width as the background graphic behind it. The background graphic is repeated only on the y-axis to create a vertical column. The style rule for the background uses body as the selector with background-repeat set to repeat-y:

```
body {
   background-image: url(column.jpg);
   background-repeat: repeat-y;
}
```

Creating a Horizontal Repeat

The repeat-x value of the background-repeat property lets you create a horizontal repeating background graphic. Figure 8-33 shows an example of this effect. The background graphic shown in Figure 8-36 is a 50-pixel wide by 110-pixel wide graphic.

Figure 8-36 Background graphic used to create background banner

This property lets you easily create a background banner with a graphic that is repeated horizontally as shown in Figure 8-37.

Figure 8-37 Horizontal repeating background image

The style rule for the background uses body as the selector with background-repeat set to repeat-x:

```
body {
   background-image: url(header.jpg);
   background-repeat: repeat-x;
   }
```

Creating a Nonrepeating Background Image

The no-repeat value of the background-repeat property lets you create a single instance of an image in the background. This is a great way to add images to your site that appear consistently as part of your layout or branding.

The following style rule shows the use of the no-repeat value:

```
body {
   background-image: url(balloon_sm.jpg);
   background-repeat: no-repeat;}
```

The background position property is normally used with a non-repeated image to position it properly. Figure 8-38 shows a single balloon image centered at the bottom of a division element.

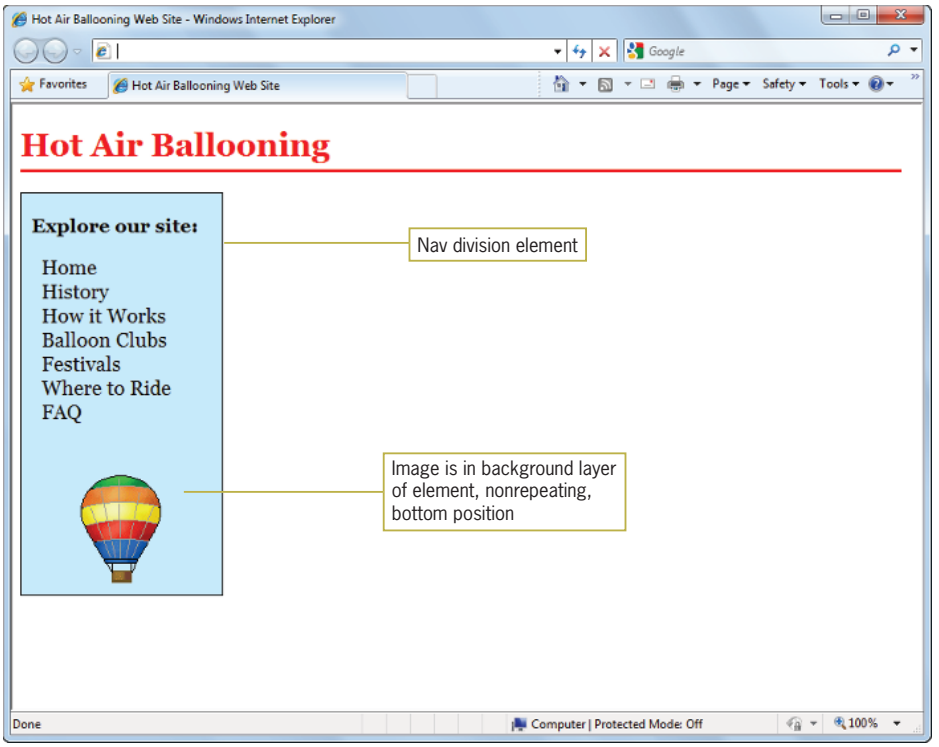


Figure 8-38 Nonrepeating background image positioned in column

Specifying Background Position

background-position property description	
Value:	[[<percentage> | <length>]{1,2} | [[top | center | bottom] || [left | center | right]]
Initial:	0% 0%
Applies to:	block-level and replaced elements
Inherited:	no
Percentages:	refer to the size of the box itself

The background-position property lets you use three types of values: percentage, length, or keywords. Table 8-7 lists the values

and their meanings. Figure 8-39 shows the keyword positions in the element box and their equivalent percentage values.

You can use the keywords in Table 8-7 alone (*left*) or in combination (*left top*) to position the background image. Figure 8-39 shows the nine keyword positions and their percentage equivalents. The keywords can be used interchangeably, so the values *left top* and *top left* are the same.

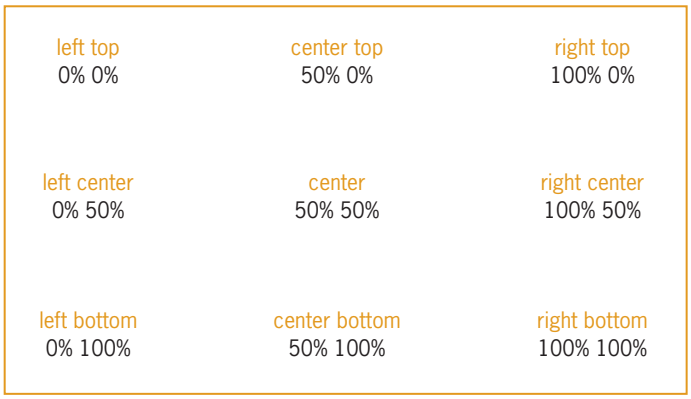


Figure 8-39 Keyword and percentage background positions

Value	Background Image Behavior
percentage	The percentage values are based on the starting point of the upper-left corner of the containing element's box. The first percentage value is horizontal; the second is vertical. For example, the value *45% 30%* places the background image 45% from the left edge and 30% from the top edge of the containing box.
length	Length values work in much the same way as percentages, starting from the upper-left corner of the element's containing box. The first length value is horizontal; the second is vertical. For example, the value *100px 200px* places the background image 100 pixels from the left edge and 200 pixels from the top edge of the containing box
keywords	The keywords are: • left • right • center • top • bottom

Table 8-7 Background-position Property Values

Positioning Repeating Background Images

You can also position images that repeat on either the horizontal or vertical axis of the Web page. The following style rule positions the vertical repeating background image along the right side the element:

```
#right {
   background-image: url(rightgradient.gif);
   background-repeat: repeat-y;
   background-position: right;}
```

Figure 8-40 shows the four different alignments of repeating images. For repeat-y, the default is left. For repeat-x, the default is top.

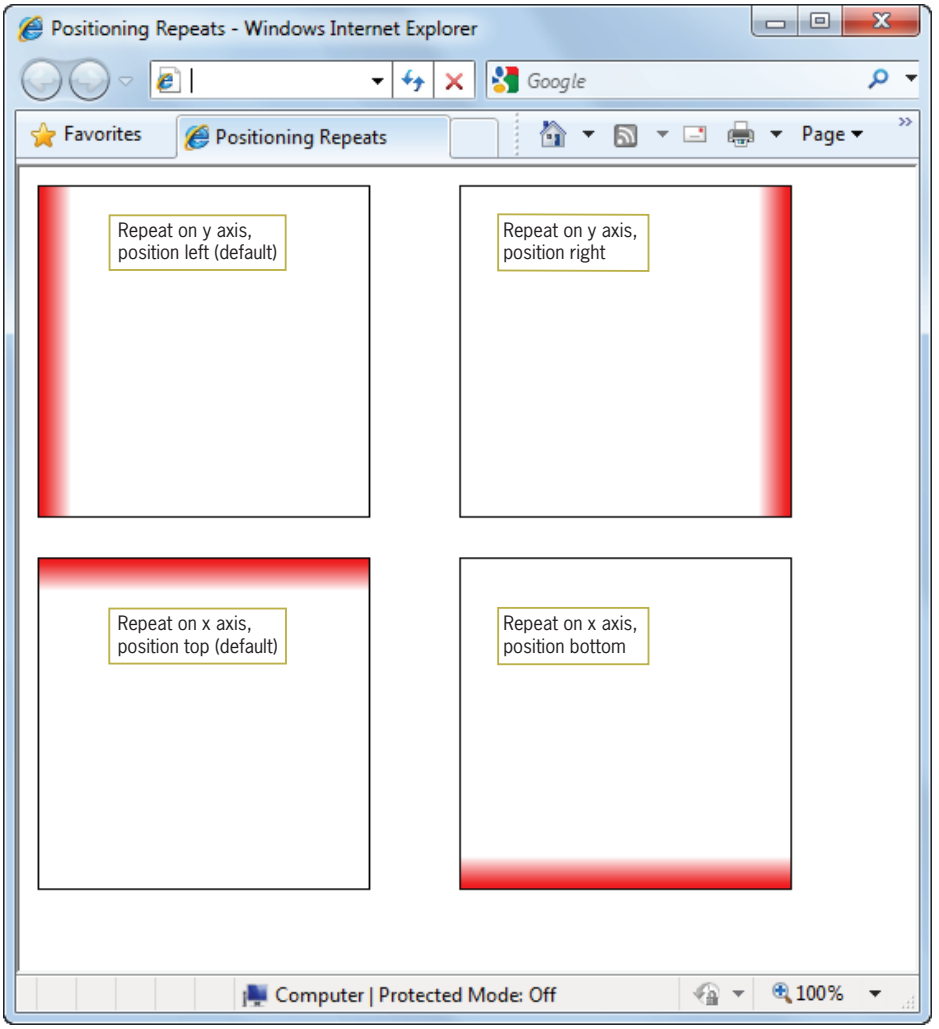


Figure 8-40 Four positions for repeats

Once again, these repetitive borders are composed from a single image, in this case a small gradient box that was rotated with an image-editing program for the four different positions. The graphic is shown in Figure 8-41.

Figure 8-41 This gradient image is rotated as necessary to create the repeats

Chapter Summary

To create an engaging, accessible, and informative Web site, you must use graphics wisely. Keep the following points in mind:

- The four popular file formats for the Web are GIF, JPG, PNG, and SVG. The first three formats compress images to create smaller files. Unless you choose the appropriate file format, your image will not compress and appear as you expect. As a vector graphics format, SVG graphics are scalable and cross-platform compatible.
- Your computer monitor displays color by mixing the three basic colors of light: red, green, and blue (RGB). Colors vary widely from one monitor to another, based on both the user's preferences and the exact brand of equipment.
- Reduce image size to the appropriate dimensions for a Web page.
- The color scheme you choose for a Web site should work together to create a distinctive look without detracting from your content's legibility. Use hexadecimal values when specifying colors for your Web site. Color names are not always the best way to specify color values because of their variable nature.
- Use the color property to set foreground colors for elements. Remember that the element border defaults to the element color unless you specifically state a border color.
- Background colors affect any padding areas in the element. They can be applied to both block-level and inline elements.

- Choose background images that do not detract from the legibility of your content. Use the background-repeat and background-position properties to control the appearance of images in the background.
- Test your work on different browsers and computing platforms, because they render colors differently. Test at different color depths as well.

Key Terms

analogous color scheme—A color scheme that uses colors located next to each other on the color wheel.

aspect ratio—The the ratio of width to height in an image or shape.

banding—An effect created in GIF images when browsers try to match the closest colors from the GIF's palette to the original colors in the image.

browser-safe colors—The 216 colors shared by PCs and Macintoshes. These colors are displayed properly across both platforms without dithering. These are now becoming less important as higher color depth monitors become the norm.

color depth—The amount of data used to create color on a display. The three common color depths are 8-bit, 16-bit, and 24-bit. Not all displays support all color depths.

complementary color scheme—A color scheme that uses colors that are arranged opposite of each other on the color wheel.

dithering—This color-mixing process occurs when a browser encounters a color on a Web page that it does not support. The browser is forced to mix the color. The resulting color may be grainy or unacceptable. To avoid dithering, work with browser-safe colors.

Graphics Interchange Format (GIF)—A file format designed for online delivery of graphics. The color depth of GIF is 8-bit, allowing a palette of no more than 256 colors. The GIF file format excels at compressing and displaying flat color areas, making it the logical choice for line art and graphics with simple colors.

hue—A pure color in color theory.

interlacing—The gradual display of a graphic in a series of passes as the data arrives in the browser. Each additional pass of data creates a clearer view of the image until the complete image is displayed. You can choose an interlacing process when you are creating GIFs.

Joint Photographic Experts Group (JPG or JPEG)—A file format, commonly shortened to JPG, designed for the transfer of photographic images over the Internet. JPGs are best for photos and images that contain feathering, complex shadows, or gradations.

monochromatic color scheme—A color scheme that uses tint and shades of a single hue.

Portable Network Graphics (PNG)—A graphics file format for the Web that supports many of the same features as GIF.

raster graphics—Images represented pixel-by-pixel for the entire image. GIFs and JPGs are raster formats.

Scalable Vector Graphics (SVG)—A language for describing two-dimensional graphics using XML. SVG files can contain shapes such as lines and curves, images, text, animation, and interactive events.

shade—A color made darker by adding black.

tint—A color made lighter by adding white.

vector graphics—Images represented as geometrical formulas, as compared with a raster graphics format, which represents images pixel by pixel for the entire image. SVG is a vector graphic format. Vector graphics are scalable and cross-platform compatible.

Web palette—The 216 colors shared by PCs and Macintoshes. These colors display properly across both platforms without dithering.

Review Questions

1. What are the three image file formats you can use on a Web site?

2. Which file formats support 24-bit color?

3. How many colors does GIF support?
4. What is the browser-safe palette?
5. What is lossless file compression?
6. Which file formats support transparency?
7. What are the drawbacks of using animated GIFs?
8. Explain lossy image compression.
9. What image characteristics can you control using the JPG format?
10. What are some options for acquiring images for your site?
11. Which image format should you use for a two-color company logo?
12. Which image format should you use for a photograph?
13. What three attributes should you always include in the image tag? Why?
14. How many layers can you work with when designing pages?
15. What are the three different ways to express color values in CSS?
16. How is the default border color of an element determined?
17. What are the three special selectors that let you change link colors?
18. To what type of elements can you apply a background color?
19. What is the default background image behavior?

Hands-On Projects

1. Practice using the CSS float property.
   a. Download an image from the Online Companion Web site, or find an image of your own.
   b. Add text around the image. Experiment with the float property and its values to view the way text wraps.
   c. Test the work in multiple browsers to verify that the text wraps consistently.

2. Practice using the CSS margin property attributes with images.
   a. Download an image from the Online Companion Web site, or find an image of your own.
   b. Add text around the image. Experiment with the margin property to add white space around the image.
   c. Test the work in multiple browsers to verify that the text spacing is consistent.

3. Practice using width and height image attributes.
   a. Download an image from the Online Companion Web site, or find an image of your own.
   b. Build a simple page that contains text and multiple images. Do not include the width and height attributes in the <img> tag.
   c. With the images turned off in your browser, view the page.
   d. Add the appropriate width and height information to the <img> tag for each image.
   e. Again, turn the images off in your browser and view the page. Note the differences between the two results and the way your layout is affected.

4. In this project, you add an image and color information to a Web page. The code you will add to the file appears in blue.

   a. Copy the **wildflowers.html** file and the **daisy.jpg** file from the Chapter 08 folder provided with your Data Files to the Chapter08 folder in your work folder. (Create the Chapter 08 folder, if necessary.)

   b. Start your text editor, and open the file **wildflowers.html**.

   c. Add an <img> element to the page immediately after the opening <p> tag, as shown in the following code in blue text:

```
<html>
<head>
<title>Growing Wildflowers</title>
</head>
<body>
<h1>Growing Wildflowers</h1>
(p)<img src="daisy.jpg" /> Lorem ipsum dolor sit
    amet, consectetuer adipiscing elit, sed diem
    nonummy nibh euis mod tincidunt ut lacreet
    dolore magna aliguam erat volutpat.

...body text...

    adipiscing elit, sed diem nonummy nibh euismod
    tincidunt ut lacreet dolore magna aliguam erat
    volutpat. Ut wisis enim ad minim veniam, quis
    nostrud exerci tution ullamcorper suscipit
    lobortis nisl ut aliquip ex eacommodo consequat.
</p>
</body>
</html>
```

   d. Save the file and view it in the browser. It should look like Figure 8-42.

Figure 8-42 Adding an image to a Web page

e. Add attributes to the image to provide size and alternate text information. The image width and height are both 100 pixels. The alt and title attributes can contain any text you choose to describe the image, such as *daisy image*. The following code fragment shows the attribute additions:

```
<img src="daisy.jpg" width="100" height="100"
alt="daisy image" title="The Wild Daisy" />
```

f. Wrap the text around the image by adding a CSS style rule to the image. Use the style attribute with the float property set to *left* as shown in the following code fragment:

```
<img src="daisy.jpg" width="100" height="100"
alt="daisy image" title="The Wild Daisy"
style="float: left;" />
```

g. Save the file and view it in the browser. When you view the file it looks like Figure 8-43.

Figure 8-43 Floating the image to the left of text

h. Adjust the right margin of the image by adding a margin-right property to the style attribute. Set the measurement value to 20px, as shown in the following code:

```
<img src="daisy.jpg" width="100" height="100"
     alt="daisy image" title="The Wild Daisy"
     style="float: left; margin-right: 20px;" />
```

i. Save the file and view it in the browser. It should look like Figure 8-44.

Figure 8-44 Adding a right margin to the image

j. Add a style attribute to the <h1> element to change the color to a forest green. The hexadecimal code is 006633. The following code fragment shows the <h1> element with the style attribute.

```
<h1 style="color: #006633">Growing Wildflowers</h1>
```

k. Finish the page by setting the background color to a light green. Add a style attribute to the body element, and set the background color to light green, hexadecimal value 99cc99, as shown in the following code fragment:

```
<body style="background-color: #99cc99">
```

l. Save the file and close the editor. Then view the finished page in the browser. It should look like Figure 8-45, with a deep green heading and light green page background. The complete code for the page follows.

Figure 8-45 Completed wildflowers.html Web page

```
<html>
<head>
<title>Growing Wildflowers</title>
</head>
<body style="background-color: #99cc99">
<h1 style="color: #006633">Growing Wildflowers</h1>
```

```
<p><img src="daisy.jpg" width="100" height="100"
    alt="daisy image" title="The Wild Daisy"
    style="float: left; margin-right: 20px;"> Lorem
    ipsum dolor sit amet, consectetuer adipiscing
    elit, sed diem nonummy nibh euis mod tincidunt
    ut lacreet dolore magna aliguam erat volutpat.

...body text...

    adipiscing elit, sed diem nonummy nibh euismod
    tincidunt ut lacreet dolore magna aliguam erat
    volutpat. Ut wisis enim ad minim veniam, quis
    nostrud exerci tution ullamcorper suscipit
    lobortis nisl ut aliquip ex eacommodo consequat.
</p>
</body>
</html>
```

5. In this project, you have a chance to apply some of the background properties you learned about in this chapter. As you work through the steps, refer to Figure 8-47 to see the results you will achieve. Save your file and test your work in the browser as you complete each step.

   a. Copy the **mars.html** and **pattern1.jpg** files from the Chapter08 folder provided with your Data Files to the Chapter08 folder in your work folder. Then open **mars.html** in your HTML editor.

   b. In your browser, open **mars.html**. When you open the file, it looks like Figure 8-46.

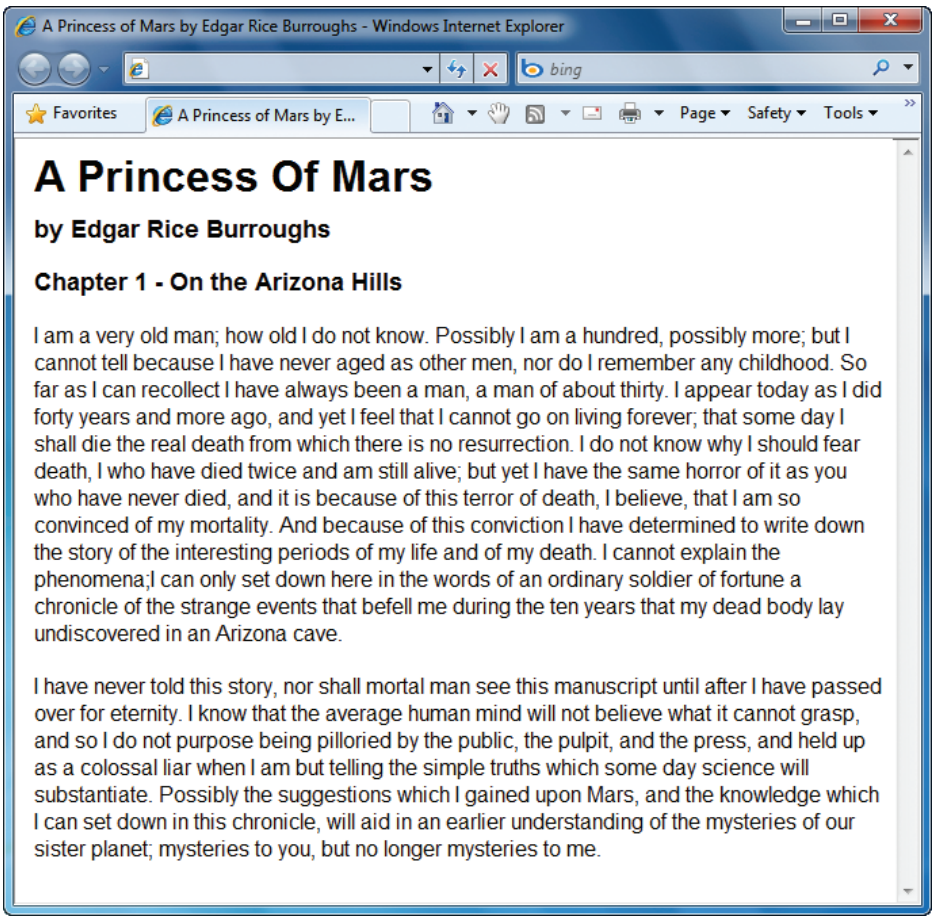


Figure 8-46 Beginning mars.html Web page

c. Examine the code. Notice the <style> section of the file. It currently contains a style rule that sets the font family and line height for the text. The complete code for the page follows:

```
<html>
<head>
<title>A Princess of Mars by Edgar Rice Burroughs</
  title>
<style type="text/css">
body   {font-family: sans-serif;
       line-height: 1.25em;}
</style>
</head>
<body>
<h1>A Princess Of Mars</h1>
<h3>by Edgar Rice Burroughs</h3>
```

```
<h3>Chapter 1 - On the Arizona Hills</h3>
<p>I am a very old man; how old I do not know.
   Possibly I am a hundred, possibly more; but I
   cannot tell because I have never aged as other
   men, nor do I remember any childhood. So far
   as I can recollect I have always been a man, a
   man of about thirty. I appear today as I did
   forty years and more ago, and yet I feel that
   I cannot go on living forever; that some day I
   shall die the real death from which there is no
   resurrection. I do not know why I should fear
   death, I who have died twice and am still alive;
   but yet I have the same horror of it as you who
   have

...body text...

   Possibly the suggestions which I gained upon
   Mars, and the knowledge which I can set down
   in this chronicle, will aid in an earlier
   understanding of the mysteries of our sister
   planet; mysteries to you, but no longer mysteries
   to me.</p>
</body>
</html>
```

d. In your HTML editor, start by setting the background color for the Web page. The finished design uses a brown background. Write a style rule that uses body as the selector and sets the background-color property to #cc6633 (reddish brown):

```
<style type="text/css">
body   {font-family: sans-serif;
        line-height: 1.25em;
        background-color: #cc6633;}
</style>
```

e. Next, build the style for the <h1> element, which is a text reverse. Use h1 as the selector, specify a background color of #663300 (dark brown) and a text color of #ffffff (white). Add padding of .25em:

```
h1 {color: #ffffff; background-color: #663300;
    padding: .25em;}
```

f. Add a background image for the Web page (**pattern1.jpg**). Add the background-image property to the existing style rule for the <body> element, because you want to apply the background image to the entire Web page.

```
body {font-family: sans-serif;
     line-height: 1.25em;
     background-color: #cc6633;
     background-image: url(pattern1.jpg);}
```

g. When you test the new style rule you added in Step 5f, you see that the background image tiles across the entire background of the Web page. You want to restrict the tiling of the background graphic to the left margin of the browser. To accomplish this, use the background-repeat property set to repeat-y. Add this property to the existing style rule:

```
body {font-family: sans-serif;
     line-height: 1.25em;
     background-color: #cc6633;
     background-image: url(pattern1.jpg);
     background-repeat: repeat-y;}
```

h. The background now repeats correctly on the left side of the browser window, but the content text is illegible against it. To fix this problem, add a margin-left property for all of the elements that contain text: <h1>, <h2>, <h3>, and <p>. Specify a value of 125px, as shown in the following rule:

```
h1, h2, h3, p {margin-left: 125px;}
```

i. The finished code for the style sheet follows. Figure 8-47 shows the completed Web page.

```
<html>
<head>
<title>A Princess of Mars by Edgar Rice Burroughs
 </title>
<style type="text/css">
body {font-family: sans-serif;
     line-height: 1.25em;
     background-color: #cc6633;
     background-image: url(pattern1.jpg);
     background-repeat: repeat-y;}
h1   {color: #ffffff;
     background-color: #663300;
     padding: .25em}
h1, h2, h3, p {margin-left: 125px;}
</style>
</head>
```

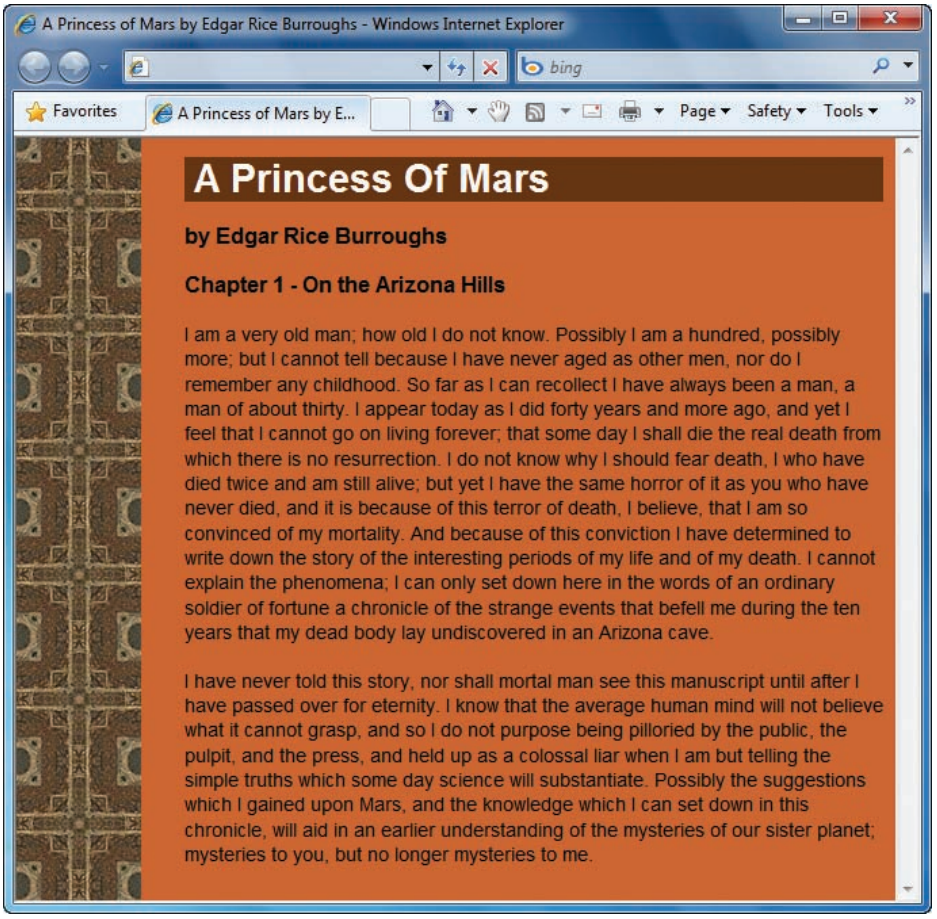


Figure 8-47 Completed mars.html Web page

6. Browse the Web and choose a site that you feel exhibits positive use of color, in both content and backgrounds. Write a short design critique that describes how the use of color enhances the legibility of the site and improves user access to information.

7. Browse the Web and choose a mainstream (not amateur) site that can benefit from a change in color scheme. Look for problems with legibility of text over background colors, use of nonstandard linking colors, and so on. Write a short essay that describes the changes you would implement to improve the use of color on the site.

Individual Case Project

Gather or create the graphics to use on the different pages of your site. These include any banner, navigation, section, or identifying graphics. Add these graphics to the test pages of your site. Test the images in multiple browsers to make sure they are displayed properly.

Think about the different color requirements for your content, and decide how you can enhance the legibility of the content. Can color communicate information about the structure of your information?

Determine the color choices for your Web site. Pick the colors for text, the background color in tables, and page backgrounds.

Establish graphics standards for your Web site, including but not limited to the following:

- Decide whether you will use a standard amount of white space around each graphic.
- Determine exactly which img attributes should be included in all <img> tags.
- Formulate a standard for all alt and title attributes.
- Formulate a basic set of image standards for your site. Use this as the display standard for testing your graphics.
- Determine colors of links and visited links.

Write a short standards document that can be provided to anyone contributing to the site.

Team Case Project

Work with your team to decide on the graphics and color choices for your project Web site. These include any banner, navigation, section, or identifying graphics, and the colors for text, the background color in tables, and page backgrounds.

You may need to bring sample graphics or mock-up HTML pages to present your ideas on these characteristics to your team members.

Establish graphics standards for your Web site, including but not limited to the following:

- Decide whether you will use a standard amount of white space around each graphic.
- Determine exactly which img attributes should be included in all <img> tags.
- Formulate a standard for all alt and title attributes.
- Formulate a basic set of image standards for your site. Use this as the display standard for testing your graphics.
- Determine colors of links and visited links.

Write a short standards document that can be submitted to the instructor and provided to the team members.

After you have reached a general consensus, go back to work on the page template you adopted in Chapter 7. Create more finished mock-ups of your page design. Trade the page layout examples with your team members. Look for unifying characteristics that give your site a unique identity. Make sure the colors and graphics flow though the different page levels on the site. Work towards smooth transitions between your pages. You want all the pages to exhibit a graphic identity that connects them together.