Color, graphics and hardware
Monitors and Display

• No two monitors display the same image in exactly the same way

1. Gamma settings - hardware setting on a monitor that controls the brightness of the pixels that display.
   • MAC displays lighter, PC displays a bit darker
   • You can “correct” for gamma settings by lightening or darkening images.

2. Color Calibration on different monitors
   • Everyone’s monitor will display differently
     • particularly if monitor has been calibrated for a special purpose.
     • There is no consistent color calibration that you can count on!
3. **Different Display Technology:**
   - CRT (Cathode Ray Tube)
   - LCD (Liquid Crystal Display)
   - Plasma
   - They use different technologies and will display differently; some differences are subtle, others are not.

4. **Monitor Resolution Settings:**
   - People choose the size of the pixel they want to display.
   - The higher the resolution, the smaller the pixel.
   - Images “look” bigger on lower settings than on higher settings. Common settings are (4:3 ratio):

   640 x 480, 800 x 600, 1024 x 768

   - Laptops generally have a different aspect ratio for their display than traditional CRT monitors.
   - Be very careful when designing sites that your pages aren’t too wide for other displays.
Web-Safe Color

What is a web-safe color?

1. The palette of 216 colors that will display consistently in the browser in all circumstances when color will display.

2. Monitors as hardware can display different “bit depths.”
   - Monochrome monitors can only display 2-bit color (pixel is on or off with no RGB options).
   - Older color monitors display 8-bit color (each pixel holds 8 bits of color information - the amount of R, G and B).
     - That means that the monitor can only display 256 colors maximum at one time, but any 256 colors or 256 values of gray (or combination) depending on the image being displayed.

3. “True Color” or “Millions of Colors” represents 24-bit color and usually means that all visible colors are possible. Almost all monitors now have the capability to display this amount of color information
3. “Web Safe” colors

- A palette of 216 plus platform system colors that are used to remap any color in a web page when the monitor will only support 256 colors.
- Guarantees that the viewer has the same 216 colors as the designer used.
- A smart way to unify the viewing experience and control color when hardware limited the number of colors that could be viewed.
- If your monitor will only display 256 colors, the browser will automatically invoke the websafe palette.
Named Colors vs. Hex Colors

1. There are only 16 supported color names. They can be specified by name; they were chosen for the HTML 3.2 recommendation because they are the standard colors supported in the Windows VGA palette. Only 16 color names are supported by the W3C CSS standard (aqua, black, blue, fuchsia, gray, green, lime, maroon, navy, olive, purple, red, silver, teal, white, and yellow).

- In HTML, you can specify colors by one of 140 color names, even though these are not supported by the W3C (ie: considered bad HTML to use them).
The preferred method for specifying color on the Web is by using **hexadecimal colors**.

- Hexadecimal is a base 16 system
  - expressing R, G and B values of all colors.
  - Because computers like to think in groups of 8 rather than in groups of 5, the numbering system needs more characters than our base-10 system of counting.

<table>
<thead>
<tr>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
</tr>
</thead>
</table>

- Any color can be converted from base-10 RGB values into Hex colors that describe the amount of R G and B in the specific color.
**Web-Safe** Hex colors have specific color pairs that must be used:

<table>
<thead>
<tr>
<th>hex</th>
<th>rgb</th>
</tr>
</thead>
<tbody>
<tr>
<td>00, 33, 66, 99, CC, FF</td>
<td>0, 51, 102, 153, 204, 255</td>
</tr>
</tbody>
</table>

#3366CC

You can always tell by looking at a hex color whether or not it is “web safe.”

Not all named colors are web-safe
Why use Web Safe colors? Why use hex colors?

1. Most monitors display more than 8-bit color, so any color you choose will probably display okay. If someone uses an 8-bit monitor, then colors will remap, and they don’t always remap the way you’d like them to (ie: math, not aesthetics, makes the decision).

2. Although you can find the hex values of color names, it is easier to use web safe colors so that graphics and code-specified colors match when you want them to.

3. There are fewer named colors than hex colors, so go ahead and find the values of the colors you like, and use them. You will find that your sites have fewer visual “mismatches” if you do.

4. You’ll know if your color is web-safe when you use hex values; same not true for named colors.

*****Example Hexidecimal Color Chart on W3C*****
http://www.w3schools.com/HTML/html_colorvalues.asp
http://www.academictutorials.com/images/color-chart-values.gif
Using Images/Graphics on the Web

1. File size is very important. File size refers to the amount of data that is in the file (not how large it will print).
   - All images display at “screen resolution”
   - 72 ppi or 96 ppi
   - The standardized size for “screen graphics” is 72 ppi.

2. File size depends on several factors:
   - pixel dimensions (how many pixels are in the image)
   - bit depth (amount of potential information in each pixel) compression

3. *Optimize your images to get them as small as possible.*
   - Image file sizes “add up” and can make your pages much “heavier” than you think - slow down performance & loading time
   - Proper Image Size + Proper Pixel Dimension = Image for Web
   - Make your images the size you want to use on your site
     - Best practice is to resize for display you want
Image File Formats for the Web

GIF (.gif) - Graphic Interchange File Format
Graphics Interchange Format

1. supported by all graphical browsers

2. “non-lossy” compression

3. uses “indexed” color. a color palette that consists of all the colors in the image is stored with the image (color look-up table). Can specify particular colors and they remain exactly the same even after compression - can choose a web-safe palette, for instance.

4. allows transparency. Any color in the Color Look-Up Table can be specified to be transparent.

5. uses 8-bit color only (256 colors max). Don’t need to be the web-safe palette - can be made up of any 256 colors the designer chooses. Can use fewer colors, reducing the bit-depth and therefore reducing the file size *before compression*!

6. uses the LZW compression (same as .tif compression) that works efficiently with large lines of identical pixel values in horizontal line, not vertical.

7. can be animated (.gif animation)

8. best for flat-color graphics/type/logos because of the compression, the color look up table and the limited color.
JPEG (.jpg) - Joint Photographic Experts Group

1. supported by most graphical browsers

2. “lossy” compression
data is discarded when file is compressed.

3. compression choices allow you to choose size over quality or vice-versa. High quality results in better image fidelity and larger file size. Lower quality discards more data, but makes file much smaller.

4. best for photographic images because compression algorithm chooses “redundant” information to discard - things that the eye isn’t supposed to notice. Most continuous-tone images - photos - won’t show the image degradation until compression is very high. Flat-color images look terrible as .jps. “Artifacting” - the visual results of the destruction and re-invention of image data.

5. 24 bit color space - “real color” - so represents full-color images better than a .gif file does. Forgives compression better.

6. Colors in a jpeg are not static. The compression algorithm allows for similar information to replace original data, but sometimes similar isn’t close enough. Cannot specify web-safe (or any specific color) and have it remain that same/identical RGB values. If a jpeg remaps into the web safe palette, it will probably look bad.

7. no transparency

8. no animation
PNG (.png) Portable Network Graphic

1. lossless compression

2. can choose 8-bit or 24-bit color depending on file needs

3. has alpha transparency (levels of transparency)

4. potential to carry the gamma information so image looks good on all monitors (but not supported universally yet).

5. older releases don’t support .png; special .png features are not identically supported across browsers.

6. not used much since 24-bit images are bigger than .jpegs and 8-bit are similar to .gif without animation. Becoming more common

7. Mostly used for the alpha transparency feature.