Creating Colours Using RGB

Hi everyone!

Let's talk about using colour in our programs. While the world itself is full of colour, if we want to use it in our programs, we have to work out how to let the computer know which of the millions (billions?) of possible shades we actually want to use.

Colour representation isn't just a problem in computing, as people who print things also have to work out how to print the same colour that the artists and graphic designers specified. It turns out that colours on a computer can look quite different when they are printed out so this is something that you'll have to find out about if it's ever important to you that a particular shade of green on your screen look exactly the same on a real poster.

We need to work out how to take the thing in our world and provide a *representation* that the computer will be able to use to produce the colour that we want on the screen. There are many ways of doing this but we'll concentrate on one today. The most common way to specify colours on a computer is the RGB system, which stands for Red, Green and Blue. Many of you will remember the primary colours you used to mix paints to get different colours were Red, Blue and Yellow. Why do computers use RGB?

The answer is that computers display coloured light and mixing coloured light together is different from mixing coloured pigments (in paint) together. When you combine red and green light, you get yellow, which is *not* what happens with paint! Perhaps the biggest difference is that combining the red, green and blue colours of light gives you white, whereas combining red, blue and yellow paint will give you black (or something very close to black).

In the RBG system, we tell the computer how much of each colour we want, where the minimum amount is 0 and the maximum is 255. Given that there are three different colours to start from and each has 256 possible values, this means that there are over 16 million different colours we can produce!

When you first start programming, you need some simple colour recipes to help you pick colours. We're going to give these as (r,g,b) where the value given is for red, green and blue, respectively. Here are some basics:

Black: (0,0,0)
White: (255,255,255)
Red: (255,0,0) [Note that the red is set to 100%, everything else is 0]
Bright Green: (0,255,0)
Blue: (0,0,255)
Yellow: (255,255,0)
Magenta: (255,0,255)
Cyan: (0,255,255)

We don't have to use just 0 or 255. We can use all of the values in between and that gives us a range of different colours. First of all, here are some of the greys. Remember, the higher the numbers get, the closer we're getting to white. Black is the 'darkest' grey of all because it's using no coloured light!

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Light Grey: (153,153,153)
Darker Grey: (102,102,102)

Of course, we have many shades built around red:

Maroon: (128,0,0)
Coral: (240,128,128)
Orange: (255,140,0)

And many built around green:

Dark green: (0,100,0)
Pale green: (152,251,152)
Turquoise: (64,224,208)

And we can't leave out blue!

Cornflower: (100,149,237)
Midnight blue: (25,25,112)
Indigo: (75,0,130)

And these are just the start! You might have noticed that when we set R, G and B to exactly the same values, we get greys, ranging from white to black. It's when we start to change the relative amounts of red, green and blue that we get colours.

There's a lot more to know about colour but the best way to get experience is try it out in your programs! You'll find other resources, including colour pickers and tables of colours on the Internet very easily, however it's what that colour looks like in your program that is going to tell you if it's the right one or not.

Final thoughts.

A lot of people are colour-blind and this means that they can have difficulty telling two colours apart, especially when they're used close together. Red/green colour-blindness is by far the most common so try to avoid using red/green combinations that are side-by-side in your programs to convey important information. (About 6% of men have this issue so it's worth keeping in mind.)

Colours are not guaranteed to look the same on every computer for a range of reasons that are beyond the scope of this course. If it is important that your colours look pretty similar on every computer, then look into the Web Safe Colour range.