Hexadecimal Proportions

When we use hexadecimal numbers to create colors, we usually just want to know a proportion. For example, we might want to make a nice brown color:

- the color red ¾ of the way on
- the color green to be ½ of the way on
- the color blue to be ¼ of the way on

With floating point numbers that is easy:

- red = 0.75
- green = 0.50
- blue = 0.25

With decimal numbers in the range 0-255, that is a little more complicated:

- red = 192
- green = 128
- blue = 64

Note: We usually create these proportions on a scale of 0–256 instead of 0–255 to make the math a little easier, but 100% would still be 255 because we can't go any higher than that with one byte (8 bits) of memory.

With hexadecimal numbers, we can mostly ignore the 2nd digit and just look at the 1st digit of the number. We could have 16 numbers in the range 0 to F (15), so each increase in the 1st digit is an increase of about 6.25%; for estimating purposes, we could just say 6%. But frequently the math can be even easier than that: since there are 16 numbers, we can break them down into four groups like this:

Hex number	Decimal number	Proportion
00	0	0
40	64	¼ or 25%
80	128	½ or 50%
C0	192	¾ or 75%
FF	255	1 or 100%

A number like 60 hex would be between ¼ and ½, maybe 3/8. It's harder with letters: A0 would be between ½ and ¾, maybe 5/8. How do we know that A0 is halfway between 80 and C0? Because we count 8, 9, A, B, C. So you can see that A is halfway between 8 and C. We don't have to worry much about the 2nd digit when making these estimations. Here are a couple other useful numbers to remember:

Hex number	Decimal number	Proportion
55	85	1/3
AA	170	2/3

A single number in the "one's place" would raise the percent by less than one percent, actually a little less than ½ percent, because there are actually 256 steps. So a number like C4 would be something like ¾ (75%) plus 2 more percent, or 77%. We can estimate these without even using pencil and paper, just in our heads.

Hexadecimal Proportions Estimation

Estimate the proportion (such as 1/3) or percentage (such as 33%) of each of the following hexadecimal numbers. Do not use a calculator. Do not try to perform a precise calculation, but just estimate.

1. 20 hex = _____

2. B0 hex = _____

3. A0 hex = _____

4. 70 hex = _____

5. 60 hex = _____

7. 50 hex = _____

7. E0 hex = _____

8. 33 hex = _____

9. 66 hex = _____

10. BB hex = _____

11. 99 hex = _____

12. 24 hex = _____

13. 48 hex = _____

14. 6C hex = _____

15. 90 hex = _____

16. B4 hex = _____

17. D8 hex = _____

18. F0 hex = _____