Hexadecimal Numbers

Think about colour codes:

#2BFF36

These are written using **hexadecimal**

Hexadecimal Numbers

Hex colour codes are made up of three different values: Red - Green - Blue

#2BFF36

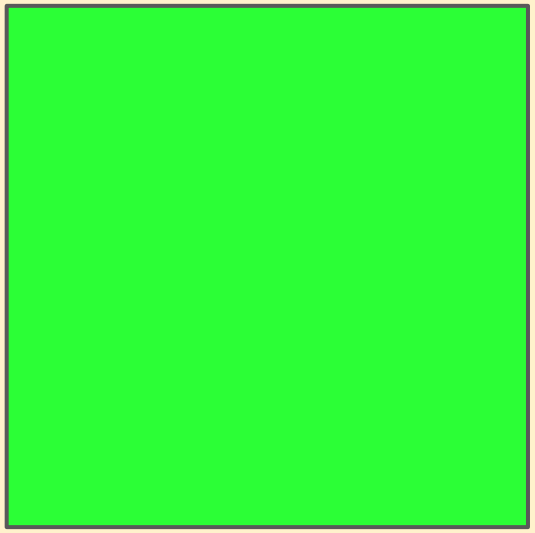
2B FF 36

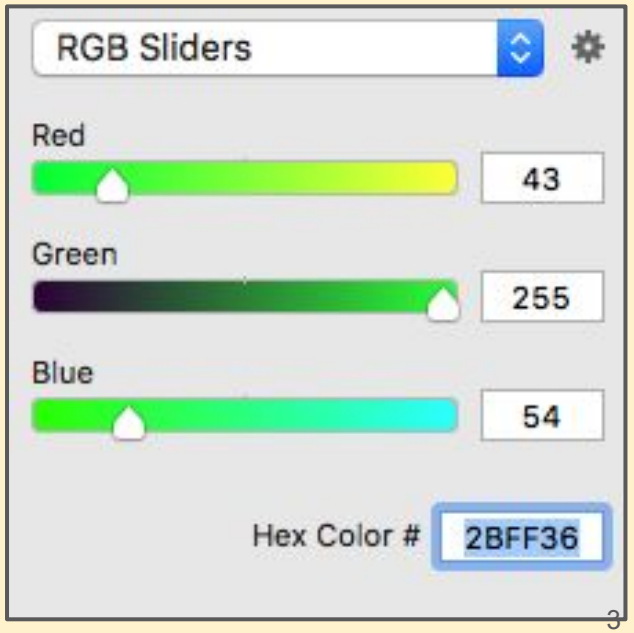
Each represents a value between 0 and 255

Hexadecimal Numbers

#2BFF36

2B FF 36





Hexadecimal Numbers

Hexadecimal uses **base 16**

Each “number” goes from 0 to 15

16s	1s
3	4

= (3 x 16) + (4 x 1)

2 hex digits represent 0 to 255 (FF)

Hexadecimal Numbers

Letters are used to represent the numbers 10 to 15.

10 = A

11 = B

12 = C

13 = D

14 = E

15 = F

3D = (3 x 16) + (13 x 1)

A3 = (10 X 16) + (3 x 1)

7F =

23 =

Hexadecimal Numbers

Important:

Hexadecimal is used by **people**, not by computers

Computers just use binary to store:

1. all data
2. all instructions

Hexadecimal Numbers

Important:

- FF = 15 x 16 + 15 = 255
- FF is the same as 11111111

Important:

- FF is stored in the computer as 11111111 - using 8 bits
- FF uses the same storage of 11111111

Hexadecimal Numbers

Reasons for using hexadecimal:

1. long binary numbers are hard for **humans** to read - hex is easier to read
2. 2 hex digits (FF) represent one Byte (11111111) - so writing binary numbers in hex is simple
3. it's easy to convert from hex to binary because binary "magic numbers" also come up in hex

Hexadecimal Numbers

“Magic numbers”:

- F = 15 = 1111 (4 bits)
- FF = 255 = 11111111 (8 bits)
- FFF = 4,096 = 111111111111 (12 bits)
- FFFF = 65,535 = 1111111111111111 (16 bits)