

ALIEN MUSIC - CRYPTO (EASY)

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We've intercepted an alien transmission that seems to be composed of sheet music notes. Our lead translator is tone-deaf, our pianist can't spell 'binary', and the guitarist keeps shouting 'hex' in his sleep! Can you help us decode the tune?

DC# C#D# C#C C#C DC# C#D# E2 C#5 CA EC# CC DE CA EB EC# D#F EF# D6 D#4 CC EC
EC CC# D#E CC E4

Flag format: TFCCTF{I33t_t3xt_h3r3}

This challenge does require some knowledge in music, you only need to know what exactly is one octave of music notes: <https://www.masterclass.com/articles/music-101-what-is-an-octave>
Remember, the sharp (AKA hashtag #) belongs to the character before it!

It's purposely exaggerated on binary and hex. So we need to do something with them.
We know that the flag format is TFCCTF{...}. As we look at the text, we try to see if the first 6 groups of chars are TFCCTF:

We can see that the first six groups of characters have 2 sets of DC# C#D# C#C respectively, we can examine them with substitute singular letters when DC# (A) C#D# (B) C#C (C)
The first 6 groups would be ABCCAB. What do you notice? It matches the format of TFCCTF, where A is T, B is F, C is F!

Ok now that we know that we are on the right track, we need to know why DC# C#D# C#C are T, F, C respectively. The question did talk about hexadecimals, so let's work from there.

One way we can think of converting Hex to UTF-8 is by ASCII Table:

<https://www.asciitable.com/>, and as we can see that the Hex are paired up as well.

Let's try coming up with a way that substitutes the music notes to fit the table and give us the value.

From the ASCII table, we know that DC# is T --> 54 in hex, C#D# is F --> 46 in hex, C#C is C --> 43 in hex,

This gives us in hex:

D# = 6

D = 5

C# = 4

C = 3

We can see a pattern that from one note to an increasing pitch, the hex representation increases by one. Which gives us:

F# = 9

F = 8

E = 7

D# = 6

D = 5
C# = 4
C = 3
B = 2
A# = 1
A = 0

Now we see that there are numbers in the encrypted text. We know that Hex has values from 0-9 and A-F, where A-F represents 10-15 in decimal.

Since we have yet to represent A-F in hex, we know that the numbers in the encrypted text should represent them. (That's why we can ignore G music note)

The key should now look like this:

6 = F
5 = E
4 = D
3 = C
2 = B
1 = A
F# = 9
F = 8
E = 7
D# = 6
D = 5
C# = 4
C = 3
B = 2
A# = 1
A = 0

For example, E2 --> 7B in hex --> { in UTF-8

Now if we convert each pair of notes and mixture of numbers, we would get:

TFCCTF{N0t3W0rthy_m3ss4g3}