That Strange Music Note Frequency (Pitch) Multiplier 1.0594630944

In the talk about the science of music, we said we use an equal temperament scale with 12 notes in an octave.

From any note, the next note is higher in frequency by the multiplier 1.0594630944

The same music note in each octave, going up in frequency (pitch) is double the frequency of the previous octave.

Let's call the above number N. Multiply N by itself 12 times like this:

1 2 3 4 5 6 7 8 9 10 11 12
N x N x N x N x N x N x N x N x N x N x N x N

and the result is the number 2

How did we calculate the number 1.0594630944 ?

It's called the 12^{th} root of 2.
In maths we use this symbolic form.

$$\sqrt[12]{2}$$

Roots are quite common in maths.

We use a calculator to work out roots, such as this web-based calculator:

https://captaincalculator.com/math/root/nth-root-calculator/

The smaller number "up in the air" is how many identical numbers multiplied together give the big number inside the root symbol.

More on Roots

If you see a root without a number "up in the air", like this:

$\sqrt{4}$ it means $\sqrt[2]{4}$ and the answer is 2 because 1 2

2 x 2 = 4

If the number "up in the air" is missing then assume it's 2. For historical reasons (just to confuse!) it's called the square root of 4 although if you said the 2nd root of 4, a mathematician would know what you mean. The word square is used because a square has 2 dimensions (2D).

For historical reasons also $\sqrt[3]{27}$ is called the cube root of 27 although 3rd root would be understood. The word cube is used because a cube has 3 dimensions (3D).

Don't worry; bigger root numbers are called 4th, 5th and so on.

Some other examples

$\sqrt{9} = 3$ $\sqrt{16} = 4$ $\sqrt{25} = 5$

also

$\sqrt{9} = -3$ $\sqrt{16} = -4$ $\sqrt{25} = -5$

Because "minus" x "minus" = "plus"

$\sqrt[3]{27} = 3$ because 1 2 3

3 x 3 x 3 = 27

Remember:

The smaller number "up in the air" is how many identical numbers multiplied together give the big number inside the root symbol.

Decibels for Sound Amplitude (Volume) Measurement

Remember “deci” means a tenth and “bel” is named after the famous Alexander Graham Bell.

30 decibels is 10 times the sound power of 20 decibels.

What exactly is a 1 (one) decibel increase or how much bigger is 2 decibels than 1 decibel?

It’s

$\sqrt[10]{10}$ The 10^{th} root of 10 That is: 1.2589254118

So 2 decibels is 1.2589254118 times bigger than 1 decibel.

Let’s call the above number N. Multiply N by itself 10 times like this:

1 2 3 4 5 6 7 8 9 10
N x N x N x N x N x N x N x N x N x N

and the result is the number 10.

Check out the web-based root calculator:

https://captaincalculator.com/math/root/nth-root-calculator/

Remember:
The smaller number “up in the air” is how many identical numbers multiplied together give the big number inside the root symbol.