How Decibels Work - an "apples to APPLES" description:

Putting sound into numerical terms can be confusing to almost anyone not specifically engaged in evaluating sound with numbers. Sound is not perceived in numerical terms, but is usually described in terms of "Quite," "Loud," and "Excessive." Coming to terms with the numbers is aggravated by the use of decibels to express sound levels. Decibels are not an expression of a specific quantity, rather they are an expression of relative quantities or amounts, expressed in terms of relative orders of magnitude.

Decibels becomes a useful tool when working with large ranges of numbers such as 1, 100, 1,000,000 and 1,000,000,000. It is a way of keeping lots of "zeros" from confusing your math.

In order to take advantage of decibels, you first need to establish a useful quantity that the dB scale relates to. This sets your "0 dB" reference. From that point, every number in dB expresses a relationship to that "0 dB point." This relationship is in terms of factors of 10 (hence the word **deci**bel.) Every increase of 10 dB indicates a ten-fold increase in quantity, i.e.: 0 dB = 1, 10 dB = 10, 20 dB = 100, 30 dB = 1,000, and so forth (notice the correlation between how many zeros and the first digit in the number!).

To put this in tangible terms we will express relative quantities of apples in terms of dB.

For me, a single apple is a useful number of apples, so I can express one apple as "0 dB_{apple}" A bag of 10 apples is "10 dB_{apple}", a bushel of 100 apples is "20 dB_{apple}" and a trunk load of a 1000 apples is "30 dB_{apple}". Beyond this number, quantity of apples is not useful to me.

For an industrial distributor of apples, a single apple is not a useful reference point, so they might use a trunkload of 1000 apples as their reference point of "0 dB_{APPLE}". For them, a storage unit of 10,000 apples is "10 dB_{APPLE}", and a boxcar of 100,000 apples is "20 dB_{APPLE}", and a cargo ship of 1,000,000 apples is "30 dB_{APPLE}". As long as we know that "0 dB_{apple}" is a single apple and "0 dB_{APPLE}" is 1000 apples, we can keep track of how many apples we have.

The difference between "0 dB_{apple}" and "0 dB_{APPLE}" expressed in mathematical terms is:

"0 dB_{APPLE}"= "+30 dB_{apple}"
and
"0 dB_{apple}" = "- 30 dB_{APPLE}"

The conversion factor between these numbers is 30 dB.