DECIBELS IN ACOUSTICS:

The decibel (dB) is used as a measure for sound levels. It is also a measurement unit in electronics, signals and communications.

The difference in intensity or 'loudness', L, between two sounds of intensity S_1 and S_2 is defined by the formula:

$$L = 10 \log_{10} \left(\frac{S_2}{S_1} \right)$$

Similarly, the absolute measurement of the intensity or loudness of a sound, S, is given by:

$$L = 10 \log_{10} \left(\frac{S}{S_0} \right)$$

where S_0 is a reference value and has a value of $0\, dB$

11.1 WORKED EXAMPLE

What is the value of $10 \log_{10} \left(\frac{S_1}{S_2} \right)$ when:

1. $S_2 = S_1$

2. $S_1 = 10000 S_2$

11.2 WORKED EXAMPLE

A sound that causes pain in humans is about 10^{14} times more intense than P_0. Find L for a sound of this intensity.