Combining sound levels

Slide#12 solution)

$$L_w = 10log_{10}\frac{W}{W_{ref}}$$

$$\frac{W}{W_{ref}} = 10^{L_w/10}$$

$$\frac{W_{tot}}{W_{ref}} = 10^{68/10} + 10^{75/10} + 10^{79/10} = 1.17 \times 10^8$$

$$L_{w,tot} = 10log_{10}(1.17 \times 10^8) = \mathbf{80.7\ dB}$$

Weighting networks

Slide#17 solution)

i) 100 Hz

A = -19.1, B = -5.6, C = -0.3

→ 49.9 dBA, 54.4 dBB, 59.7 dBC

ii) 1000 Hz

A = 0, B = 0, C = 0

→ 60 dBA, dBB, dBC

iii) 10000 Hz

A = -2.5, B = -4.3, C = -4.4

→ 57.5 dBA, 55.7 dBB, 55.6 dBC

Sound rating systems

Slide#20 solution)

$$L_{eq} = 10log_{10}\left[\sum_{i=1}^{n} 10^{L_i/10} \cdot t_i\right]$$

$$= 10log_{10}\left[10^{45/10} \times \frac{1\ min}{5\ min} + 10^{38/10} \times \frac{3\ min}{5\ min} + 10^{36/10} \times \frac{1\ min}{5\ min}\right]$$

$$\boldsymbol{= 40.4\ dBA}$$

The result exceeds the L_{eq} limit of 40 dBA for air-transmitted noise at nighttime. You got the data to file a lawsuit!