

A given harmonic sound wave which has a sound level, $\beta_1 = 100 \text{ dB}$.
Now double both the frequency and the amplitude of vibrations, then
the new sound level, β_2 is

- A) $\beta_2 \simeq 103 \text{ dB}$.
- B) $\beta_2 \simeq 106 \text{ dB}$.
- C) $\beta_2 \simeq 112 \text{ dB}$.
- D) None of these.

$$I = \frac{1}{2} \rho v (\omega s_{max})^2,$$

$$\frac{I_2}{I_1} = \left(\frac{\omega_2}{\omega_1}\right)^2 \left(\frac{s_{max2}}{s_{max1}}\right)^2 = 2^2 2^2 = 16.$$

$$\beta = 10 \log_{10} \left(\frac{I}{I_0}\right),$$

$$\beta_2 = 10 \log_{10} \left(\frac{16 I_1}{I_0}\right) = \beta_1 + 10 \log_{10} 16 \simeq 100 + 40 \times 0.30 = 112 \text{ dB}.$$

Answer **C**.