

## Physics of Sound Worksheet

### Useful equations

$$f = \frac{v}{\lambda}$$

$$f = \frac{1}{T}$$

$$\beta(dB) = 10\log\left(\frac{I}{I_0}\right)$$

$f$  = frequency

$\lambda$  = wavelength

$T$  = period

$v$  = wave velocity

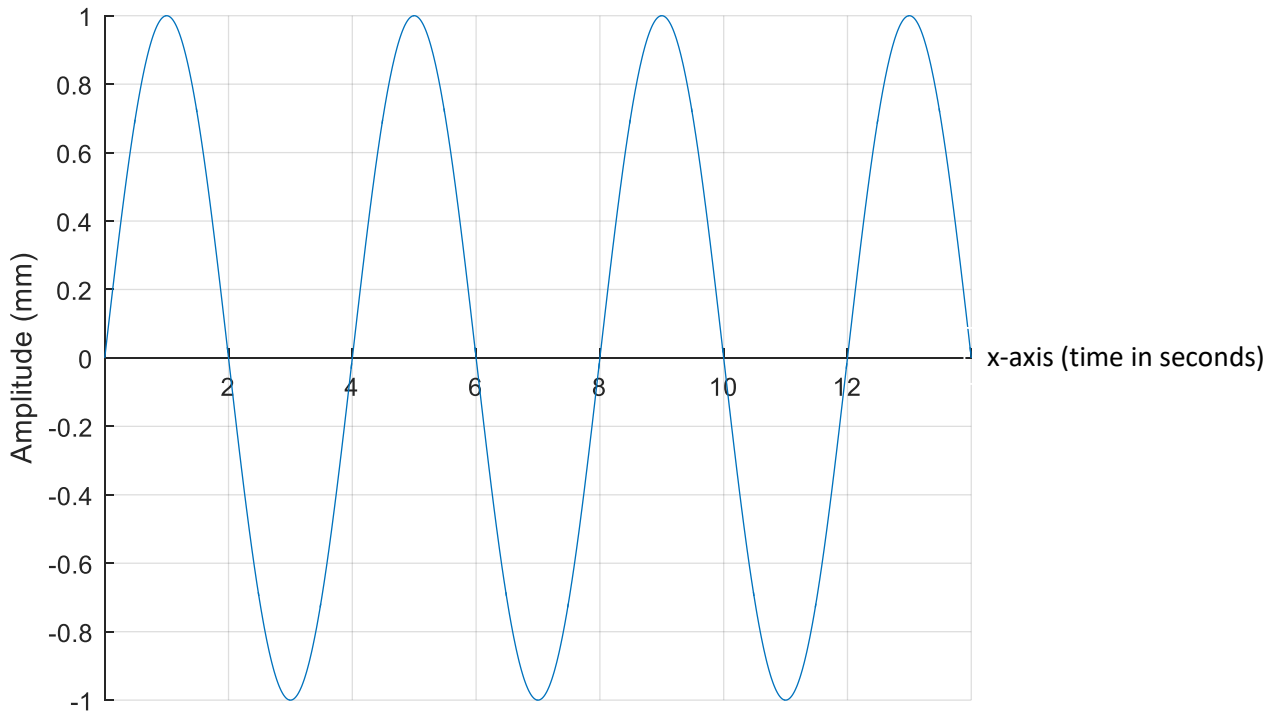
$\beta(dB)$  = sound intensity

$I_0 = 10^{-12} \frac{\text{watts}}{\text{m}^2}$   $I_0$ , reference intensity, is the standard threshold of hearing intensity

1. How does sound move through different media?

2. Calculate the wave velocity of the given wave.

$$\lambda = 4\text{mm}$$



3. A soundwave hits a wall at a rate of 32.2 Hz.

a. What is the period of the wave?

b. Calculate the speed of the wave if the distance between wave crests is 12 meters.

4. The speed of sound at room temperature is 346 m/s.

a. What is the frequency of a wave with a wavelength of 2.5 mm?

b. What is the period?

5. A quiet library has a sound intensity of  $1 \times 10^{-8} \text{ W/m}^2$

a. Calculate the sound intensity in dB.

b. What is the threshold of pain?