

## Unit 11 Traditional – Vocabulary and Equations – Waves & Sound

### Vocabulary:

previous vocabulary  
 simple harmonic motion  
 wave, wavelength, wave speed  
 medium, mechanical wave  
 frequency, period, equilibrium line, amplitude  
 crest, trough, hertz (Hz)  
 transverse wave, longitudinal wave  
 standing wave, pulse wave  
 node, anti-node  
 reflection, free end, fixed end  
 harmonics, fundamental frequency  
 natural frequency, resonance  
 sound, timbre, pitch  
 interference, superposition principle  
 constructive interference, destructive interference  
 rarefaction, compression, condensation  
 Doppler effect, Mach number  
 shockwave, bow wave  
 sound intensity, decibel, bel, watt  
 ultrasonic, infrasonic  
 beat, beat frequency

### Symbols:

$f, T, v, \lambda, I, M, T(^{\circ}\text{C})$

### Equations & constants:

#### **You get these on test:**

$f = 1/T, v = f\lambda$  wave speed =  $v$ , Period =  $T$ ,


Frequency =  $f$ , Wave length =  $\lambda$   $d = v t$

$V_{\text{light}} = c = 3 \times 10^8 \text{ m/s}, v_{\text{sound}} \sim 340 \text{ m/s}$

$v_{\text{sound}} = 331 + 0.6T(^{\circ}\text{C});$

+10 dB = 2x volume (human perception of loudness) =  
 10x intensity ( $\text{W/m}^2$ ) Beats =  $f_1 - f_2$

$$I = \frac{P}{4\pi r^2} \quad M = V_0/v_{\text{sound}} \quad P = W/t$$

closed-closed 

open-open 

open-closed 

### **Unit Objectives - Williams**

1. Properties of a wave (crest, trough, amplitude, frequency, period, wavelength, node, antinode)
2. Types of waves: transverse and longitudinal (with examples)
3. Wave equation and  $\Delta x$  TNEOM applied to wave calculations
4. Sound terms and demos (natural frequency, forced vibration, sympathetic vibration, beats, resonance)
5. Harmonics (drawing harmonics for three types of instruments, calculating fundamental frequency)
6. Intensity: absolute and relative (with rules of thumb)
7. Doppler effect and shock waves

### **DuPage ROE Objectives**

801. I can distinguish between transverse or longitudinal waves.
802. I can identify waves as either mechanical or electromagnetic.
803. I can identify: wavelength, amplitude, crest, trough, and period, given a visual representation.
804. I can solve problems using the relationships between velocity, wavelength, frequency, and period.
805. I can recognize that the speed of a wave is dependent upon the material/medium through which the wave travels.
806. I can recognize that waves transfer energy and not matter.
807. I can analyze wave superposition in terms of the effects of constructive and destructive interference.