Conversion Factors:
1 m = 3.281 ft; 1 in = 2.54 cm; 1 mile = 5280 ft; 1 mile = 1.61 km;
1 hr = 3600 s; 1 liter = 1000 cm$^3$; 2π radians = 360°; 1 N = 1 kg·m/s$^2$; 1 Hz = 1 cycle/s.

Standard Prefixes:

<table>
<thead>
<tr>
<th>Prefix</th>
<th>Symbol</th>
<th>Exponent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Giga</td>
<td>G</td>
<td>10$^9$</td>
</tr>
<tr>
<td>Mega</td>
<td>M</td>
<td>10$^6$</td>
</tr>
<tr>
<td>Kilo</td>
<td>k</td>
<td>10$^3$</td>
</tr>
<tr>
<td>Centi</td>
<td>c</td>
<td>10$^{-2}$</td>
</tr>
<tr>
<td>Milli</td>
<td>m</td>
<td>10$^{-3}$</td>
</tr>
<tr>
<td>Micro</td>
<td>µ</td>
<td>10$^{-6}$</td>
</tr>
<tr>
<td>Nano</td>
<td>n</td>
<td>10$^{-9}$</td>
</tr>
</tbody>
</table>

Velocity, speed: $v = \frac{\Delta x}{\Delta t}$; Average speed over time interval $\Delta t$: $v_{\text{ave}} = \frac{x_f - x_i}{t_f - t_i}$; Distance traveled: $d = vt$.

Acceleration: $a = \frac{\Delta v}{\Delta t} = \frac{v_f - v_i}{t_f - t_i}$.

Density: $\rho = \frac{m}{V}$.

Newton’s Second Law: $F = ma$; Weight: $W = mg (g = 9.8 \text{ m/s}^2)$.

Force due to a spring: $F_{\text{spring}} = -k\Delta x$.

Pressure: $P = \frac{F_L}{A}$.

Kinetic energy: $KE = \frac{1}{2}mv^2$; Potential energy due to gravity: $PE_{\text{grav}} = mgh$, stored in spring: $PE_{\text{spring}} = \frac{1}{2}kx^2$.

Conservation of energy: $KE_i + PE_i = KE_f + PE_f$.

Frequency, period: $f = \frac{1}{T}$; Frequency mass/spring system: $f = \frac{1}{2\pi}\sqrt{\frac{k}{m}}$; Frequency of pendulum: $f = \frac{1}{2\pi}\sqrt{\frac{g}{L}}$.

Wavelength: $\lambda = \frac{v}{f}$.

Speed of Sound:

(i) On a string or wire: $v = \sqrt{\frac{T}{\mu}}$;
(ii) In air: $v = (331.3 + 0.6t) \text{ m/s}$, where $t$ is temperature in °C, i.e., at room temperature ($t = 20^\circ$C), $v_{\text{sound}} = 343.3 \text{ m/s}$.

Interference due to path length difference:

(i) Constructive: $|d_2 - d_1| = n\lambda$, $n = 0, 1, 2, 3 \ldots$; (ii) Destructive: $|d_2 - d_1| = \left(n + \frac{1}{2}\right)\lambda$, $n = 0, 1, 2, 3, \ldots$.

Importance of diffraction: if encountering an opening of approximate diameter $d$, or an obstacle of typical size $d$, diffraction is (i) important for $\lambda \geq d$; (ii) much less important for $\lambda \ll d$.

Change in frequency due to Doppler Effect:

(i) Source moving, observer stationary: $f_{\text{obs}} = f_s \left(\frac{v_{\text{sound}}}{v_{\text{sound}} \pm v_s}\right)$, ($-$ approaching, $+$ receding);
(ii) Observer moving, source stationary: $f_{\text{obs}} = f_s \left(\frac{v_{\text{sound}} \pm v_{\text{obs}}}{v_{\text{sound}}}\right)$, ($+$ approaching, $-$ receding);

Velocity of wave on a string or wire of tension $T$ and mass per unit length $\mu = m/L$: $v_{\text{wave}} = \sqrt{\frac{T}{\mu}}$.

Harmonic series for standing waves on a string of length $L$ and mass per unit length $\mu = m/L$:

$f_n = nf_1 = \frac{n\nu}{2L} = \frac{n}{2L}\sqrt{\frac{T}{\mu}}$, $\lambda_n = \frac{2L}{n}$, where $n = 1, 2, 3, \ldots$.