WAVES AND OSCILLATIONS SUMMARY

1. SIMPLE HARMONIC MOTION (SHM)

Displacement	$x = A\cos(\omega t + \varphi)$
Velocity	$v = -A\omega \sin(\omega t + \varphi)$
Acceleration	$a = -\omega^2 x$
Angular Freq.	$\omega = 2\pi f = \sqrt{(k/m)}$

2. WAVE FUNDAMENTALS

Wave Speed	$v = f\lambda$
Wave Number	$k = 2\pi / \lambda$
Phase Speed	$v = \omega / k$
Intensity	$I \propto A^2$

3. OSCILLATING SYSTEMS

Spring Period	$T = 2\pi\sqrt{(m/k)}$
Pendulum Period	$T = 2\pi\sqrt{(L/g)}$
Total Energy	$E = \frac{1}{2}kA^2$

4. SOUND AND INTERFERENCE

Doppler Effect	$f' = f(v \pm v_0)/(v \mp v_s)$
Path Diff (Const.)	$\Delta L = n\lambda$
Path Diff (Dest.)	$\Delta L = (n + \frac{1}{2})\lambda$
Beat Frequency	$f_{beat} = \lvert f_1 - f_2 \rvert$

5. STANDING WAVES

System Type	Fundamental Frequency (f_1)	Harmonics
String / Open Pipe	$v / 2L$	n = 1, 2, 3...

System Type	Fundamental Frequency (f_1)	Harmonics
Closed Pipe (one end)	`v / 4L`	n = 1, 3, 5...