





Chapter 11 – Quick Revision Sheet

Sound

SOUND & ITS PROPAGATION

Sound is a form of energy produced by vibrating objects and it travels through a material medium (solid, liquid, gas) as a longitudinal wave made of alternating compressions (high pressure) and rarefactions (low pressure); since vibration transfer needs particles, sound cannot travel in vacuum.

WAVE TERMS + WAVE RELATION

Amplitude = height of vibration → controls loudness  |
Wavelength (λ) = distance between two consecutive compressions or rarefactions  | Frequency (f) = number of vibrations per second (unit: Hz)  | Time Period (T) = time taken for one vibration  | Wave relations: $v = f\lambda$ and $f = 1/T$ ⚡ 0

LOUDNESS vs PITCH

Loudness depends on amplitude (bigger vibration = louder sound) while pitch depends on frequency (higher frequency = sharper sound); therefore, amplitude controls volume, frequency controls shrillness.



AUDIBLE RANGE + TYPES OF SOUND

Human ear detects sound between 20 Hz to 20,000 Hz called audible sound, frequencies below this are infrasonic waves (used by elephants, earthquakes) and frequencies above this are ultrasonic waves used by bats, dolphins, and SONAR technology.



SPEED OF SOUND + DEPENDING FACTORS

Speed of sound is maximum in solids, lower in liquids, minimum in gases because particle spacing decides vibration transfer speed; it depends on nature of medium, temperature, and humidity but does not depend on amplitude or frequency.



ECHO CONDITION + NUMERICAL FACT

Echo is heard only when reflected sound reaches the ear after at least 0.1 second, therefore the reflecting surface must be at least 17.2 m away from the listener at normal temperature to hear a clear echo.



REFLECTION OF SOUND + ITS APPLICATIONS

Sound follows the laws of reflection (angle of incidence = angle of reflection) just like light and this property is used in echo formation, megaphones, soundboards in halls, hearing aids, and SONAR systems to control or detect sound direction.



SONAR + CHARACTERISTICS OF SOUND

SONAR (Sound Navigation and Ranging) works using reflection of ultrasonic waves to measure sea depth and detect underwater objects like submarines, while sound is identified using three main characteristics: loudness (amplitude), pitch (frequency), and quality (waveform that distinguishes sources like guitar vs piano).