Points to Remember

Categories of Sound Wave	❋ *Audible waves* *- 20 Hz to 20,000 Hz* ❋ *Infrasonic waves - below 20Hz* ❋ *Ultrasonic waves - greater than 20,000 Hz*
Velocity of sound wave	*Particle velocity :* The velocity with which the particles of the medium vibrate in order to transfer the energy in the form of a wave is called particle velocity. *Wave velocity :* The velocity with which the wave travels through the medium is called wave velocity. *Affecting Factors :* Temperature, Density, Relative humidity, Elasticity(Only solids)
Reflection	The bouncing of sound waves from the interface between two media is termed as reflection of sound. Its applications are, ❋ **Megaphone :** A horn-shaped device, used to address a small gathering of people. ❋ **Sound board :** Used in auditoria and halls to improve the quality of sound. ❋ **Ear trumpet :** A hearing aid, used by people who have difficulty in hearing. ❋ **Whispering hall (or) gallery** : A person talking at one focus, can hear his voice distinctly at the other focus.
Echo	An echo is the sound reproduced due to the reflection of the original sound wave from various rigid surface.
Apparent frequency	It is a frequency of the sound as heard by the listener.
Doppler effect	The frequency of the sound heard by listener is different from the original frequency of sound emitted by the source, whenever there is a relative motion between source and listener.
RADAR	*Radio Detection And Ranging* – It is used to track the speed and location of aeroplanes, aircrafts by sending and detecting the radio waves.
SONAR	**SONAR** – Sound Navigation and Ranging By measuring the change in the frequency between the sent signal and received signal, the speed of marine animals and submarines can be determined.

★ Wave velocity $V = \frac{\lambda}{T} = n\lambda$;

★ Effect of density $V \propto \sqrt{\frac{1}{d}}$

★ Effect of Temperature $V \propto \sqrt{T}$;
$$V_T = (V_0 + 0.61\ T)ms^{-1}$$

★ Speed of Echo $= \frac{2d}{t}$

★ Hearing range : 20 Hz to 20,000 Hz

★ Persistence of hearing : 0.1 sec

★ Minimum distance to hear an echo is 17.2 m

★ Velocity of sound in air is 340 (or) 344 ms^{-1}

★ $1°C$ change in temperature gives 0.61ms^{-1} change in velocity of sound.

★ $V_S > V_L > V_G$

★ Doppler Apparent Frequency $n' = \left(\frac{V + V_L}{V - V_S}\right)n$