Topic 5: Waves

Subtopic 5.1: Wave Model

Knowledge	Application
Waves are periodic oscillations that transfer energy from one point to another. In longitudinal waves, the direction of oscillation is parallel to the direction of travel of the wave. In transverse waves, the direction of oscillation is perpendicular to the direction of travel of the wave.	Represent transverse waves graphically and analyse the graphs. Describe waves in terms of measurable quantities, including amplitude, wavelength (λ), frequency (f), period (T), and velocity (v). Solve problems using: • $f = 1/T$ • $v = f\lambda.$

Subtopic 5.2: Mechanical Waves

Knowledge	Application
Mechanical waves, such as sound and seismic waves, transfer energy through a physical medium. The natural frequency is the rate at which an object vibrates when it is disturbed by an outside force. A forced vibration occurs when a wave forces an object to vibrate at the same frequency as the wave. Resonance is the large-amplitude vibration that occurs in the object when the forced vibration is the same as its natural frequency.	Explain a range of wave-related phenomena, including echoes, refraction, and resonance, using the mechanical wave model. Use the principle of superposition of waves to explain a range of interference phenomena, including standing waves and beats.

Subtopic 5.3: Light

Knowledge	Application
Light is the visible part of the electromagnetic spectrum — a spectrum that also includes radio waves, microwaves, infrared and ultraviolet radiations, X-rays, and gamma rays. Electromagnetic waves can be modelled as a transverse wave that can travel through a vacuum. Refraction is the change in direction of propagation of a wave as its speed changes. Diffraction is the bending/spreading of waves as they pass through an aperture or past a sharp edge. The plane of polarisation of an electromagnetic wave is the plane defined by the direction of travel and the oscillating electric field.	Describe reflection and refraction, using the ray model of light. Explain a range of light-related phenomena, including reflection, refraction, total internal reflection, diffraction, and polarisation, using the wave model. Undertake experiments to investigate reflection or refraction of light using different media.