Year 9 – Waves – Properties

Name of unit

Expected Outcomes

- Students will describe key properties of waves, including amplitude, frequency, wavelength, and wave speed.
- Students will use the wave speed equation: **wave speed = frequency × wavelength**.
- Students will distinguish between transverse and longitudinal waves.
- Students will investigate how wave properties relate to energy transfer.
- Students will draw and interpret wave diagrams and graphs.

Developmental Focus Opportunities

- Mathematical application: Using formulas to calculate wave speed and interpret units.
- Graphical reasoning: Analysing wave graphs to identify amplitude and wavelength.
- Practical science: Conducting simple wave experiments (e.g. ripple tanks, slinkies).
- Scientific communication: Using diagrams and models to explain wave behaviour.

Key Learning Points	**Powerful Knowledge**
• All waves have common properties: amplitude, wavelength, frequency, and speed. • Transverse waves have vibrations perpendicular to the direction of travel; longitudinal waves have parallel vibrations. • Wave speed depends on the medium and can be calculated using a formula. • Higher frequency waves transfer more energy.	• Developing transferable problem-solving and analytical skills. • Understanding fundamental concepts that apply to light, sound, and more advanced physics. • Building a strong foundation for GCSE physics, including wave behaviour and the electromagnetic spectrum. • Appreciating how abstract models describe real-world phenomena.
Subject-Specific Vocabulary	**Reading Opportunities**
• Amplitude • Wavelength • Frequency • Wave speed • Transverse wave • Longitudinal wave	• Scientific explanations of how waves behave in different materials. • Instructions and analysis sheets for practical investigations. • Articles on wave applications in music, technology, and medicine.

Year 9 – Waves – Properties

• Crest • Trough • Compression • Rarefaction	
Possible Misconceptions	**Cross-Curricular Links**
• Believing that frequency and wave speed are the same. • Confusing transverse and longitudinal wave directions. • Thinking that all waves need a medium to travel. • Assuming energy is lost rather than transferred by waves.	• **Maths**: Algebraic manipulation and graph interpretation. • **Music**: Understanding sound waves and pitch. • **DT/ICT**: Applications of wave properties in sensors, devices, and design.