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D I A G R A M S H E E T

AQA AS Level Physics

Companion to: Superposition and Stationary Waves Explanation Sheet

AS LEVEL

Superposition and Stationary Waves

Figures in this Sheet

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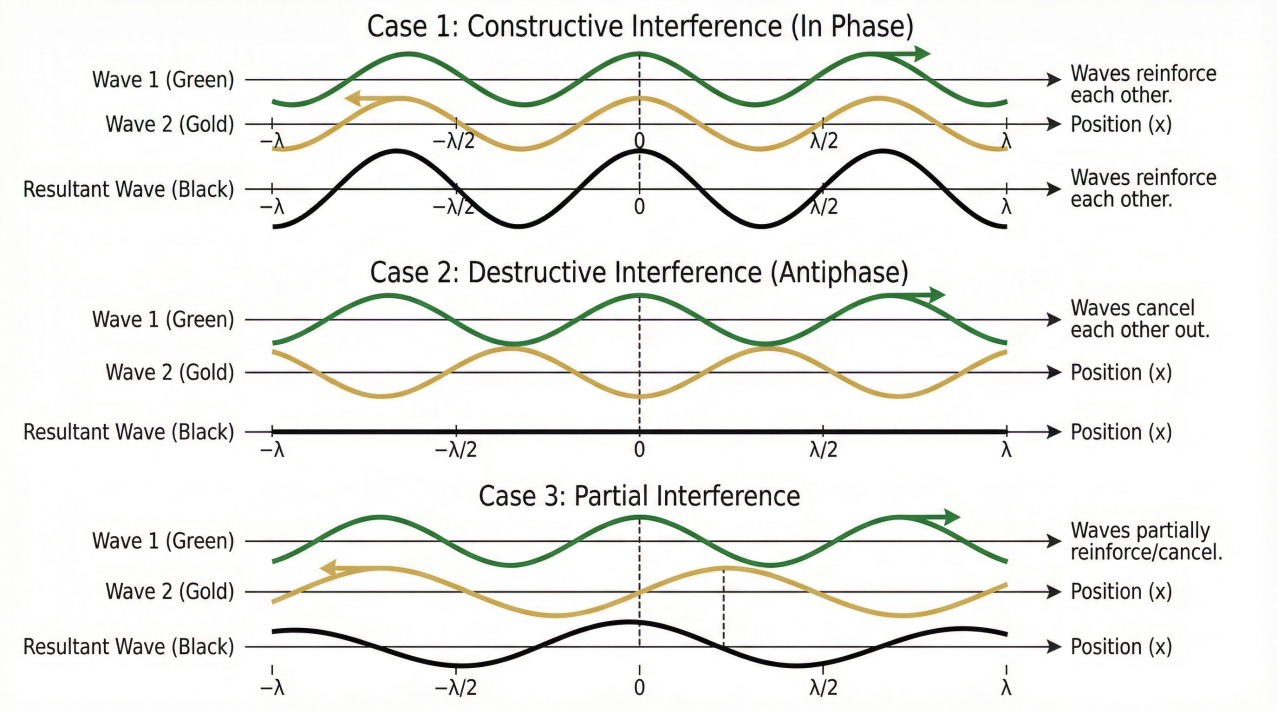
Superposition and Stationary Waves — Diagram Sheet

Figure 1: Superposition of Two Waves



This diagram illustrates the principle of **superposition**, where two waves traveling in the same medium overlap and combine. It shows two individual sinusoidal waves moving towards each other and their resultant wave formed by the sum of their displacements. The concept is fundamental because it explains how waves interact to produce new wave patterns, which is essential for understanding interference and stationary waves. The diagram highlights key points where the waves reinforce (constructive interference) and cancel out (destructive interference).

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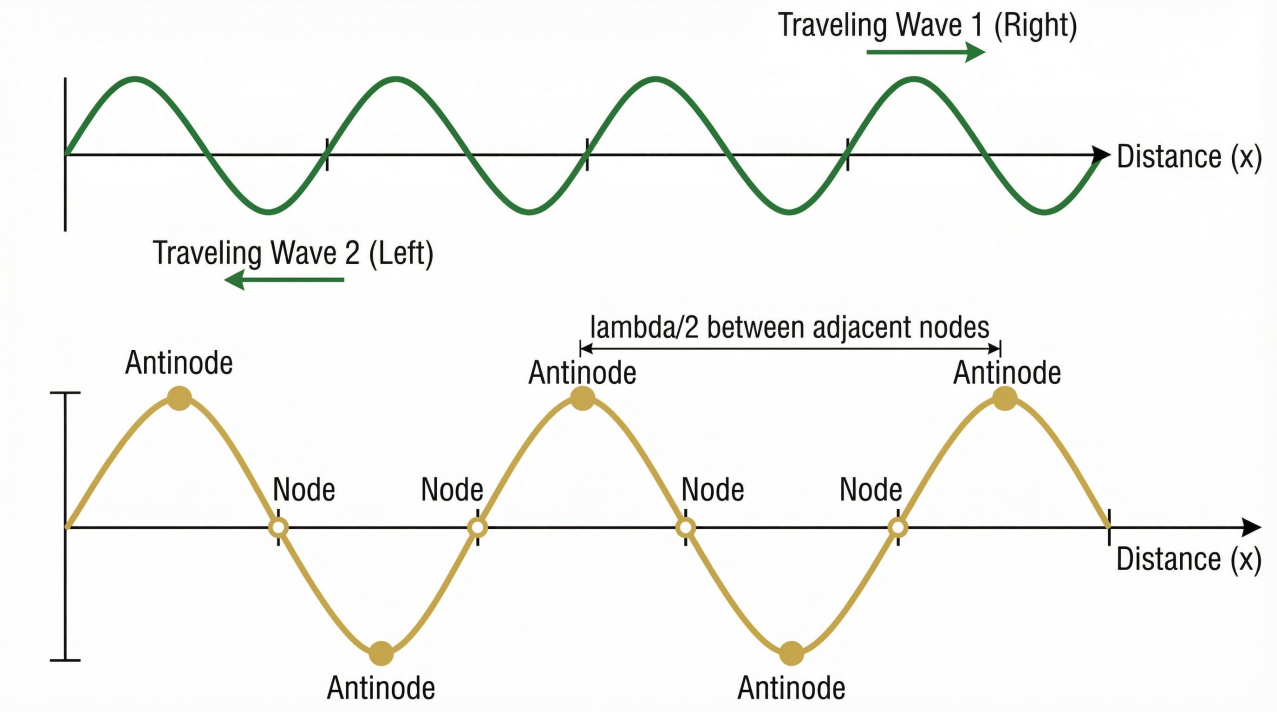
Figure 2: Formation of a Stationary Wave



This figure demonstrates how a **stationary wave** is formed by the superposition of two waves of the same frequency and amplitude traveling in opposite directions. The diagram shows two identical waves moving towards each other and their resulting stationary wave pattern, characterized by fixed points called **nodes** where there is no displacement, and points of maximum displacement called **antinodes**. Understanding stationary waves is important for topics such as resonance, musical instruments, and wave behavior in strings and air columns.

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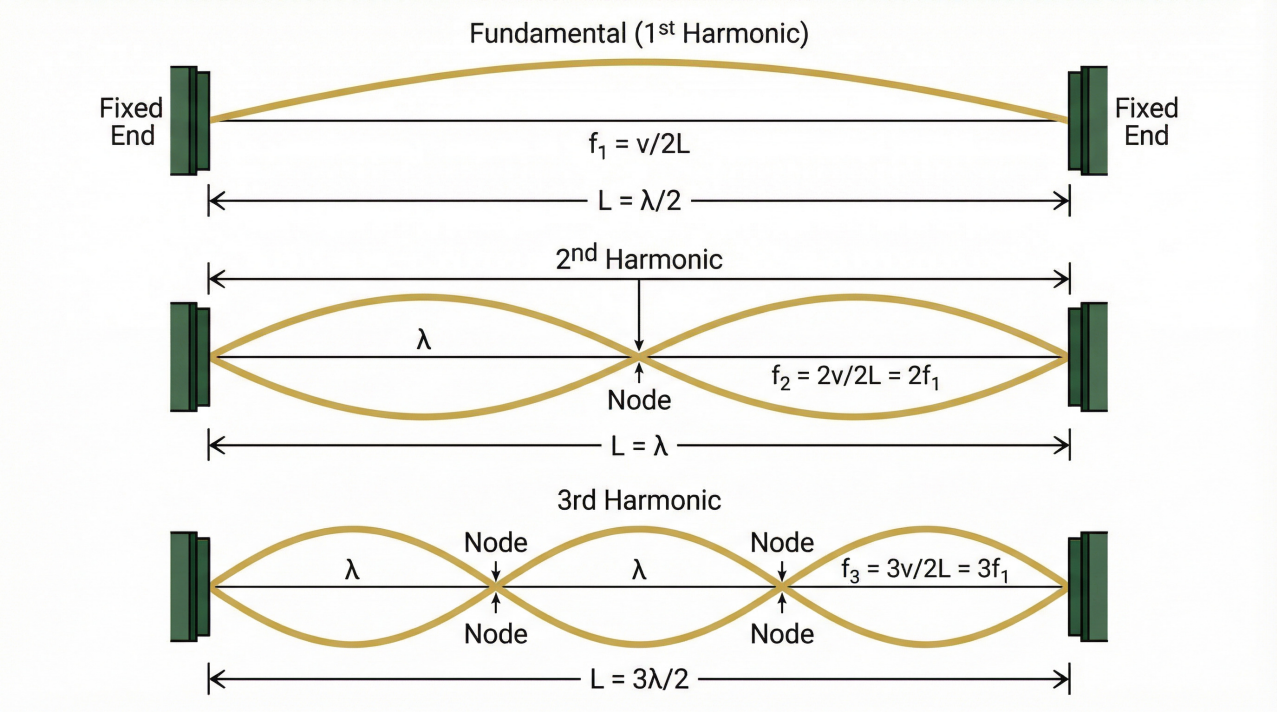
Figure 3: Stationary Wave on a String Fixed at Both Ends



This diagram depicts a stationary wave pattern on a string fixed at both ends, showing the formation of nodes at the fixed points where displacement is always zero. It highlights the fundamental frequency (first harmonic) and the positions of nodes and antinodes along the string. This visual is crucial because it explains how boundary conditions restrict wave patterns, forming harmonics that determine the pitch of stringed instruments. It also illustrates the relationship between wavelength, string length, and harmonic number.

Study Notes

Use this space to annotate the diagrams above, add your own labels, or note down exam-style questions that relate to each figure. Try covering the labels and testing yourself from memory.

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