

Waves Definitions

Learn them word for word: the highlighted words are the ones the examiner looks for.

1 Frequency	The number of oscillations (or cycles) per second .
2 (Time) period	The time taken for one complete cycle .
3 Wavelength	The distance from one peak to the adjacent peak .
4 Displacement	The distance of a point on the wave from its equilibrium position , in a stated direction.
5 Amplitude	The maximum displacement from equilibrium .
6 Longitudinal wave	A wave whose oscillation is parallel to the direction of energy transfer , with a series of rarefactions (low pressure) and compressions (high pressure).
7 Transverse wave	A wave whose oscillation is perpendicular to the direction of energy transfer .
8 Progressive wave	Net transfer of energy without the medium being transferred .
9 Plane polarisation	The electric field oscillations are in one direction only, perpendicular to the direction of energy transfer . OR: the electric field oscillates in one plane that includes the direction of energy transfer .
10 Coherent	Two waves with the same frequency and a constant phase difference .
11 Superposition	When two waves of the same type coincide , the net displacement is the sum of the individual displacements .
12 Constructive interference	Waves coincide in phase , with a path difference of a whole number of wavelengths , so they superpose giving a greater resultant amplitude , called an antinode (brighter / louder / hotter).
13 Destructive interference	Waves coincide in antiphase , with a path difference of an odd number of half wavelengths , so they superpose giving a smaller or zero resultant amplitude , called a node (darker / quieter / colder).
14 Phase	The position in a cycle , expressed as a fraction of 360 degrees or 2π radians .
15 Phase difference	The difference, expressed as an angle , between two points on a wave , or two waves which coincide .
16 Path difference	The difference in length travelled by two waves which coincide .
17 Diffraction	Diffraction is the spreading out of the wave as it passes through a gap or passes around an obstacle .
18 Standing (stationary) wave	No net transfer of energy , with a pattern of nodes and antinodes in fixed positions .
19 Node	Point in a stationary wave at which there is no displacement at any time: destructive interference .
20 Antinode	Point in a stationary wave where the displacement varies by the maximum amount: constructive interference .



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21 Fundamental frequency (first harmonic)

The **lowest frequency** at which a **stationary wave** forms on a string or in an air column. On a string fixed at both ends it has a **node at each end** and **one antinode** in the middle, so the string is **half a wavelength** long.

22 Intensity

The **radiant power** passing **at right angles** through a surface, **per unit area**. $I = P / A$, in $W\ m^{-2}$. Intensity $\propto$ (amplitude)².

23 Reflection

The **change in direction** of a wave at an **interface between two different media** so that the wave **returns into the medium from which it originated**.

24 Refraction

The **change in direction** of a wave that occurs when its **speed changes** due to a change in the **density of the medium**. The **frequency does not change**.

25 Total internal reflection

(When light strikes a boundary) the **angle of incidence is greater than the critical angle**, and **all the light is reflected**.

26 Critical angle

The **angle of incidence** where the **angle of refraction is 90 degrees**. It occurs in the **denser medium**.

27 Refractive index

The **speed of light in a vacuum** divided by the **speed of light in the medium**.



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