

# AQA A-Level Physics

## Topic 3.1 Progressive and stationary waves

### Flashcards

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Define frequency and give its units.



Define frequency and give its units.

The number of waves passing through a point per second.

(hertz) Hz



Define wavelength.



Define wavelength.

The distance between two adjacent peaks on a wave.



# Define amplitude.



Define amplitude.

The maximum displacement of the wave from its equilibrium position.



How can you find out the time period of a wave using its frequency?





How can you find out the time period of a wave using its frequency?

$$T = 1/f$$



What is phase difference and what is it measured in?



# What is phase difference and what is it measured in?

How much a particle / wave lags behind another particle / wave. Measured in radians, degrees or fractions of a cycle.



# What is a longitudinal wave?



## What is a longitudinal wave?

A wave in which the oscillation of the particles is parallel to the direction of energy transfer.

There are rarefactions (areas of low pressure) and compressions (areas of high pressure).



What is a transverse wave? Give examples.



What is a transverse wave? Give examples.

Waves where the particle oscillations are perpendicular to the direction of energy transfer.

For example: electromagnetic waves



How fast do electromagnetic waves travel in a vacuum?





How fast do electromagnetic waves travel in a vacuum?

$$3 \times 10^8 \text{ m/s}$$



True or False? The magnetic field and electric field in a electromagnetic wave are parallel to each other.



True or False? The magnetic field and electric field in a electromagnetic wave are parallel to each other.

False.

The electric and magnetic field are at right angles to each other.



# What does a polarising filter do?



What does a polarising filter do?

Only allows oscillations in one plane.



How is polarisation used as evidence of the nature of transverse waves?



How is polarisation used as evidence of the nature of transverse waves?

Polarisation can only occur if a wave's oscillations are perpendicular to its direction of travel (as they are in transverse waves).



# How is polarisation used in antennas?





## How are polarisers used in antennas?

TV and radio signals are usually plane-polarised by the orientation of the rods on the transmitting aerial, so the receiving aerial must be aligned in the same plane of polarisation to receive the signal at full strength.



# What is a stationary wave?



# What is a stationary wave?

A wave which transfers no energy and whose positions of maximum and minimum amplitude are constant.



# What is a node?



# What is a node?

A point on a stationary wave where the displacement is 0.



# What is an antinode?



# What is an antinode?

A point on a stationary wave with maximum displacement.



What are the conditions for a stationary wave to be produced?





What are the conditions for a stationary wave to be produced?

- The waves must be of the same frequency, wavelength and amplitude.
- They must be travelling in opposite directions.

These conditions are often met when a wave is reflected back onto itself.



# How are stationary waves produced?



## How are stationary waves produced?

A stationary wave is formed from the superposition of 2 progressive waves, travelling in opposite directions in the same plane, with the same frequency, wavelength and amplitude. \

- Where the waves meet in phase, constructive interference occurs so antinodes (regions of maximum amplitude) form.
- Where the waves meet completely out of phase, destructive interference occurs and nodes (regions of no displacement) form.

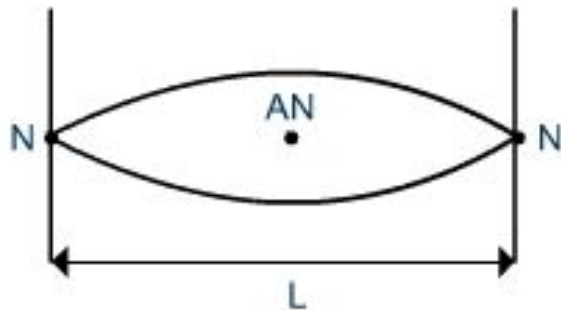


Describe the first harmonic for a stationary wave with two closed ends.



Describe the first harmonic for a stationary wave with two closed ends.

It consists of 2 nodes at either end and an antinode in the middle.



[https://www.s-cool.co.uk/assets/learn\\_its/alevel/physics/progressive-waves/standing-waves/image3.jpg](https://www.s-cool.co.uk/assets/learn_its/alevel/physics/progressive-waves/standing-waves/image3.jpg)



Describe the second harmonic for a stationary wave with one open end and one closed end.



Describe the second harmonic for a stationary wave with one open end and one closed end.

It consists of two nodes and two antinodes, with one of the nodes at the closed end and one of the antinodes at the open end.

