

OCR (B) Physics GCSE

PAG 04 - Using a ripple tank to measure the speed, wavelength and frequency of waves.

Flashcards

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Define wavelength.



Define wavelength.

The shortest distance between the same point on two consecutive waves (e.g. the distance between two consecutive peaks/troughs/compressions/rarefactions)



Define displacement.



Define displacement.

The distance from equilibrium position.

When displacement is at a maximum (peaks/troughs), this is the **amplitude**.



Define frequency.



Define frequency.

The number of complete waves passing a point per second (or the number of waves produced by the source per second).



Define period.



Define period.

The time taken for a whole wave to pass through a single point.



State the wave equation.



State the wave equation.

$$v = \lambda \times f$$

- v = velocity (m/s)
- λ = wavelength (m)
- f = frequency (Hz)



What is a ripple tank?



What is a ripple tank?

A shallow glass tank with an oscillating paddle/needle that creates waves. It is illuminated from above so the waves can be seen on the surface below the tank.



How can frequency be measured using a ripple tank?



How can frequency be measured using a ripple tank?

- Choose a point; draw it on a piece of paper placed beneath the ripple tank if necessary
- Count the number of complete waves passing this point in 10 seconds
 - Divide by 10 for the frequency in Hz



How can wavelength be worked out
using a ripple tank?



How can wavelength be worked out using a ripple tank?

Measure the length of 5 waves using a ruler and divide by 5 for the wavelength of 1 wave.



Describe how to measure the speed of water waves using a ripple tank.



Describe how to measure the speed of water waves using a ripple tank.

- Set up ripple tank with a motor, power supply, meter ruler and approx. 5cm deep water
- Adjust the frequency of the motor so low frequency waves can be observed
- Measure the length of 5 waves using a ruler (the more waves measured the better) and divide by the number of waves to calculate the wavelength of one wave
- Count the number of waves passing a point in 10 seconds and divide by 10 to get the frequency
 - Use $v = \lambda f$ to calculate speed



Where should a ripple tank be set up?



Where should a ripple tank be set up?

In a darkened room, so no other light interferes with the lamp.



What is refraction?



What is refraction?

Refraction is the change in **speed** of a wave as it reaches a boundary between two media, usually resulting in a change in direction (if it enters at an angle).



How can ripple tanks be used to show refraction?



How can ripple tanks be used to show refraction?

By placing a thick glass sheet in the ripple tank, covering part of the floor.



How does placing a glass sheet in a ripple tank cause refraction?



How does placing a glass sheet in a ripple tank cause refraction?

- The depth decreases over the tank
- Speed depends on depth, so the wave speed slows down
- This causes the same effect as refraction



How do ripple tanks show reflection?



How do ripple tanks show reflection?

Waves bouncing off the walls of the tank.

