

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.





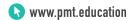




How can frequency be measured using a ripple tank?









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=λf 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.







