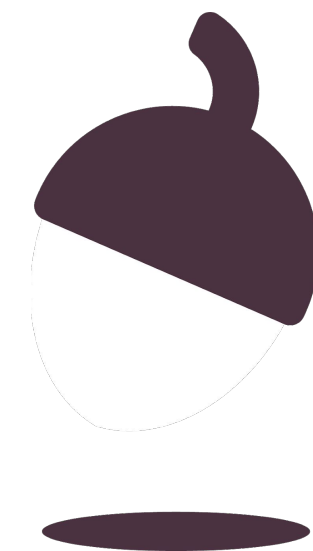


Combined Science - Physics - Key Stage 4 - Waves

Measuring the speed of waves in water

Miss Walrond



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Q1.

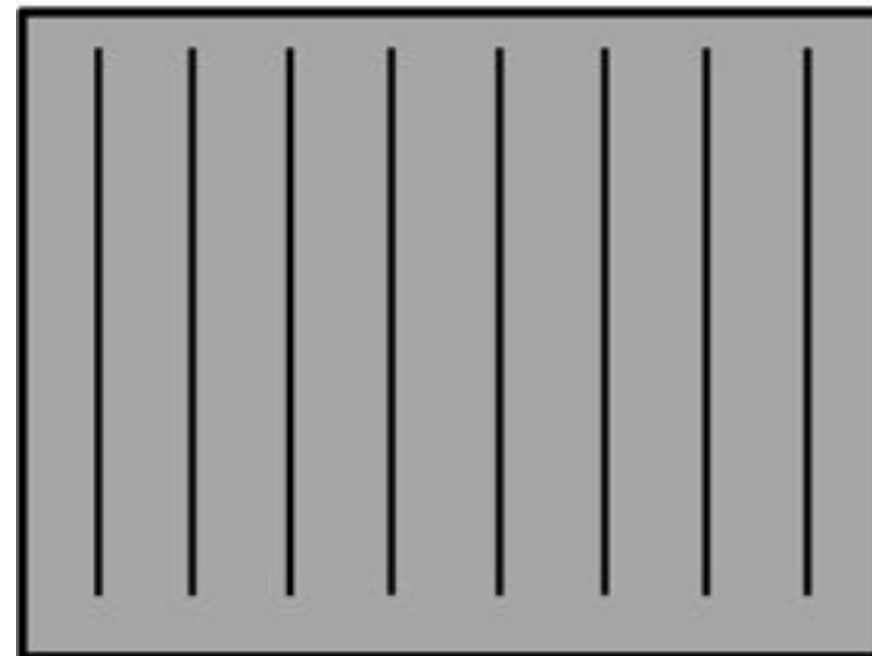
Rob is experimenting with water waves. He uses a wave generator to create waves at different wavelengths and frequencies. Below are diagrams showing the waves he produced. Each line represents a wave viewed from above.

Fill in the gaps below to explain how the wave has changed.

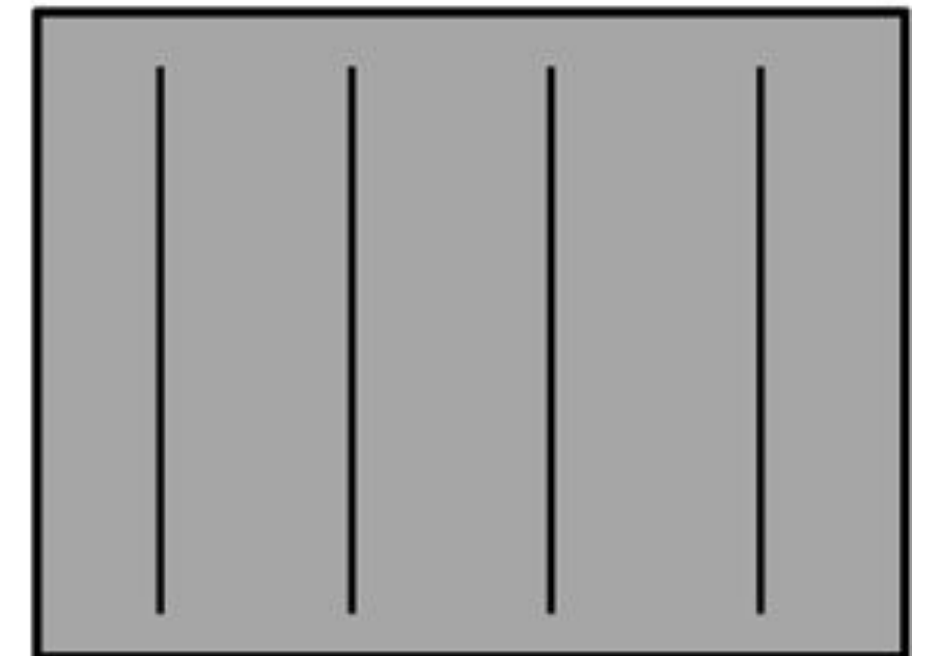
- i. The wavelength of the second wave produced is than the first wave. **[1]**
- ii. The frequency of the second wave produced is than the first wave.

[1]

First waves produced



Second waves produced



OCR, Twenty First Century Physics B, Paper J259/02, Specimen



Answers



Q1. Answers

i. larger / greater / bigger

[1]

ii. Less / smaller

[1]



In lesson questions



Water Waves

- 1) What type of wave is a water wave?
- 2) Describe a transverse wave.



Independent Task: Measuring the speed of water waves method

Complete the table below, giving the reasons for each of these steps in our method .

Method	Reason
Measure the time for 10 waves to pass a point.	
Divide this time by 10.	
Measure the length of 10 waves using a ruler.	
Divide the length by 10.	



Independent Task - Data analysis

Length of 3 waves (cm)	Wavelength (cm)	Time for 10 waves (s)	Time period (s)	Frequency (Hz)	Wave speed (cm/s)
5.8	1.9	12.28	1.228	0.8143	1.5
7.5		16.29			
8.5		18.90			
9.5		21.21			



Water Waves and depth of water

Describe how the speed of water waves varies with depth.



Independent Task - Examination question

A teacher uses water waves in a ripple tank to demonstrate transverse waves.

She makes measurements of the water waves.

The frequency of the water waves is 0.5 Hz.

- i. Calculate the number of water waves produced in 5 seconds.

Answer = **[1]**

Answers as discussed in the next slide have not been seen or verified by OCR.

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Independent Task - Examination question

- ii. The teacher **increases** the frequency of the water waves.

Describe what happens to the speed **and** the wavelength of the water waves. **[2]**.

Answers as discussed in the next slide have not been seen or verified by OCR.

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Independent Task - Examination question

iii. A student tries to describe water waves in the sea.

‘The water waves move up and down. The water particles move all the way across the surface of the sea. This means that water moves in the direction of the waves.’

Part of his explanation is **incorrect**.

Write an improved and correct description about water waves in the sea.

[2]

Answers as discussed in the next slide have not been seen or verified by OCR.

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Answers



Review - Water Waves

- 1) Water waves are **mechanical transverse** waves.
- 2) Transverse waves are waves where the oscillations are **perpendicular** to the direction of energy transfer.



Review - Independent Task: Measuring the speed of water waves method

Method	Reason
Measure the time for 10 waves to pass a point.	This improves the accuracy of our time measurement.
Divide this time by 10.	This allows us to calculate the time period for 1 wave.
Measure the length of 10 waves using a ruler.	This improves the accuracy our length measurement
Divide the length by 10.	This allows us to calculate the mean wavelength.



Review - Data analysis

Length of 3 waves (cm)	Wavelength (cm)	Time for 10 waves (s)	Time period (s)	Frequency (Hz)	Wave speed (cm/s)
5.8	1.9	12.28	1.228	0.8143	1.5
7.5	2.5	16.29	1.629	0.6139	1.5
8.5	2.8	18.90	1.890	0.591	1.5
9.5	3.2	21.21	2.121	0.4715	1.5



Review: Water Waves and depth of water

The water waves travel **faster** in deep water, and **slower** in shallow water.



Review - Independent Task - Examination question

A teacher uses water waves in a ripple tank to demonstrate transverse waves.

She makes measurements of the water waves.

The frequency of the water waves is 0.5 Hz.

- i. Calculate the number of water waves produced in 5 seconds.

Answer = **2.5 [1]**

Answers as discussed in the next slide have not been seen or verified by OCR.

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Independent Task - Examination question

- ii. The teacher **increases** the frequency of the water waves.

Describe what happens to the speed **and** the wavelength of the water waves. **[2]**.

Speed is unchanged [1]

Wavelength reduces [1]

Answers as discussed in the next slide have not been seen or verified by OCR.

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Independent Task - Examination question

iii. A student tries to describe water waves in the sea.

‘The water waves move up and down. The water particles move all the way across the surface of the sea. This means that water moves in the direction of the waves.’

Part of his explanation is **incorrect**.

Write an improved and correct description about water waves in the sea.

[2]

Water particles move up and down (or oscillate vertically) [1]

Water particles move perpendicular to the direction of the wave. [1]

Energy moves in the direction of the wave. [1]

Answers as discussed in the next slide have not been seen or verified by OCR.

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