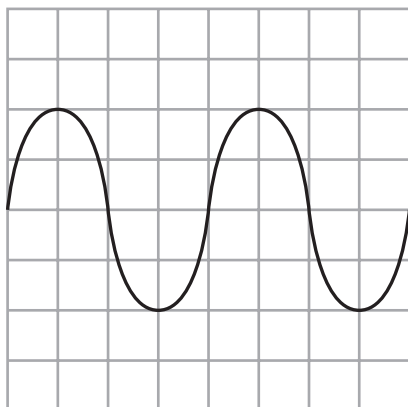


- 4 (a) A student uses an oscilloscope to determine the speed of sound.

The diagram shows the oscilloscope trace produced by the sound wave.



Oscilloscope settings

y direction: 1 square = 1 mV

x direction: 1 square = 1 ms

The student uses two microphones and a ruler to determine the wavelength of the sound wave.

He finds that the wavelength is 1.4 m.

- (i) State the formula linking the speed, frequency and wavelength of a wave.

(1)

- (ii) Use the oscilloscope trace to calculate the speed of the wave.

(5)

speed = m/s



(b) Another student uses this method to determine the speed of sound.

Step 1 The student stands 50 m away from her teacher, measuring the distance with a metre ruler.

Step 2 The teacher makes a loud sound and flashes a light at the same time.

Step 3 The student starts the stopwatch when she sees the flash of light.

Step 4 She stops the stopwatch when she hears the loud sound.

The speed of sound is calculated using the formula

$$\text{speed of sound} = \frac{\text{distance}}{\text{time taken}}$$

Evaluate whether this method could produce an accurate value for the speed of sound in air.

(5)

(Total for Question 4 = 11 marks)

