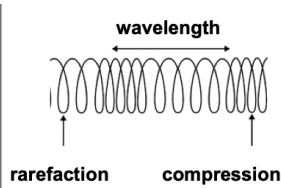


Q1. (2018)

02.1



3

AO1
6.6.1.1

Q2. (2018)

02.3

Level 2: The method would lead to the production of a valid outcome. Key steps are identified and logically sequenced.

3–4

AO2

Level 1: The method would not necessarily lead to a valid outcome. Some relevant steps are identified, but links are not made clear.

1–2

AO1

No relevant content

0

Indicative content

- measure the distance between the student with the bricks and the wall
- trundle wheel or tape measure
- measure the time taken from banging the bricks to the echo
- double the measured distance to give the distance travelled or half the time
- use:

$$\text{speed} = \frac{\text{distance travelled}}{\text{time}}$$
- repeat timings
- remove anomalies
- calculate a mean

6.6.1.2

Q3. (2019)

06.4

wave speed = frequency × wavelength

allow $v = f \lambda$

allow any correct re-arrangement

1

AO1
6.6.1.2

E

Q4. (2019)

06.5

$$300\,000\,000 = 2\,400\,000\,000 \times \lambda$$

$$\lambda = \frac{300\,000\,000}{2\,400\,000\,000}$$

$$\lambda = 0.125 \text{ (m)}$$

an answer of 0.125 (m) or 0.13 (m) scores 3 marks

allow $\lambda = 0.13 \text{ (m)}$

1

1

1

AO2
6.6.1.2

E

Q5. (2019)

a)

07.1	Level 3: The design/plan would lead to the production of a valid outcome. All key steps are identified and logically sequenced.	5–6	AO1 6.6.1.2	E
	Level 2: The design/plan would not necessarily lead to a valid outcome. Most steps are identified, but the plan is not fully logically sequenced.	3–4		
	Level 1: The design/plan would not lead to a valid outcome. Some relevant steps are identified, but links are not made clear.	1–2		
	No relevant content.	0		
	Indicative content <ul style="list-style-type: none"> if two quantities have been determined, $v = f \lambda$ can be used to find the third. Frequency <ul style="list-style-type: none"> use a stopclock count the number of waves passing a point in a fixed time period divide the time by the number of waves to determine the time for one wave, T $f = 1/T$ read the frequency off the oscillator Wavelength <ul style="list-style-type: none"> use a camera to freeze the image use a metre rule to measure the distance between two wavefronts count the number of waves between the wavefronts divide distance by the number of waves to determine λ Velocity <ul style="list-style-type: none"> determine a mean value of frequency determine a mean value of wavelength measure the time it takes one wavefront to travel the length of the screen measure the length of the screen speed = distance / time <p>To access Level 3 there must be a description of how frequency, wavelength and velocity can be determined</p>			

b)

07.3	mean maximum height = 511	an answer of 5.5 (mm) gains 3 marks	1	AO2 6.6.1.2	E
	and				
	mean minimum height = 500				
	511 – 500 = 11	allow a calculated difference from incorrect means	1		
	11 / 2 = 5.5 (mm)	allow their difference divided by 2	1		
		any correct method of determining the mean amplitude can score 3 marks			

Q6. (2020)

a)

05.1	A		1	AO1 6.6.1.2
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b)

05.2	B		1	AO1 6.6.1.2
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c)

05.3	D		1	AO1 6.6.1.2
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Q7. (2020)

05.4	$v = 1650 \times 0.200$		1	AO2 6.6.1.2
	$v = 330 \text{ (m/s)}$		1	

Q8. (2020)

a)

05.5	0.004 s		1	AO2 6.6.1.2
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b)

05.6	$0.004 = \frac{1}{\text{frequency}}$	allow ecf from question 05.5	1	AO2 6.6.1.2
	$\text{frequency} = \frac{1}{0.004}$		1	
	$F = 250 \text{ (Hz)}$		1	

Q9. (2021)

a)

04.1	Level 2: The design would lead to the production of a valid outcome. All key steps are identified and logically sequenced.		3–4	AO1 6.6.1.2
	Level 1: The design would not lead to a valid outcome. Some relevant steps are identified, but links are not made clear.		1–2	
	No relevant content		0	
	Indicative content Wavelength <ul style="list-style-type: none"> place a metre rule at the side of the screen perpendicular to the wave fronts use the metre rule to measure the length of the screen take a photograph of the shadow on the screen count the number of complete waves on the screen determine the wavelength by dividing the length of the by the number of complete waves or <ul style="list-style-type: none"> place a metre rule at the side of the screen perpendicular to the wave fronts take a photograph of the shadow on the screen use the metre rule to measure the distance between two wave front Frequency <ul style="list-style-type: none"> count the number of waves that pass a given point time how long it takes for the waves to pass that point using a stop clock frequency is number of waves divided by time taken or <ul style="list-style-type: none"> put a stop clock on the screen use a digital video camera to record the waves passing a point replay in slow motion and count the number of waves passing a point in 1 second <p>There must be a description of both frequency and wavelength measurement to access level 2</p>			
b)				
04.2	12.5 (Hz)		1	AO2 6.6.1.2
c)				
04.3	to reduce the effect of random errors		1	AO1 6.6.1.2
d)				
04.4	period = $\frac{1}{20}$		1	AO2 6.6.1.2
	period = 0.05 (s)	allow 0.050 (s)	1	
e)				
04.5	$v = 20 \times 0.012$		1	AO2 6.6.1.2
	$v = 0.24 \text{ (m/s)}$		1	

01.2	frequency	either order	1	AO1 6.6.2.1
	wavelength		1	

Q11. (2022)

06.2	$f = 4000 \text{ Hz}$		1	AO2
	$T = \frac{1}{4000}$	allow a correct substitution using an incorrectly / not converted value of f	1	AO2
	$T = 0.00025$	allow a correct calculation using an incorrectly / not converted value of f	1	AO2
	seconds or s		1	AO1 6.6.1.2

Q12. (2022)

06.3	wave speed = frequency × wavelength		1	AO1 6.6.1.2
	or $v = f \lambda$			

Q13. (2023)

a)

04.3	amplitude		1	AO2 6.6.1.2
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b)

04.4	340 (m/s)	allow answers in the range 339 to 340 (m/s)	1	AO2 6.6.1.2
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c)

04.5	$s = 340 \times 0.20$		1	AO2 6.6.1.2
	$s = 68 \text{ m}$	allow ecf from question 04.4	1	

d)

04.6	the higher the temperature the greater the speed	do not accept the greater the speed the higher the temperature	1	AO3 6.6.1.2
	(so) time taken is less		1	

Q14. (2023)

a)

06.4	wave speed = frequency × wavelength		1	AO1 6.6.1.2
	or			
	$v = f\lambda$			

b)

06.5	$3.0 \times 10^8 = f \times 5.0 \times 10^{-7}$		1	AO2 6.6.1.2
	$f = \frac{3.0 \times 10^8}{5.0 \times 10^{-7}}$	allow a correct rearrangement using incorrect powers of 10	1	
	$f = 6 \times 10^{14}$ (Hz)	allow a correct calculation of f using incorrect powers of 10	1	
		allow 6.0×10^{14} (Hz)		

Q15. (2024)

a)

03.3	frequency		1	AO1 6.6.1.2
	amplitude		1	

b)

03.4	4000 Hz		1	AO1 6.6.1.2
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c)

03.5		allow ecf from question 03.4		AO1 6.6.1.2
	$T = \frac{1}{4000}$		1	
	0.00025 (s)		1	

Q16. (2024)

a)

06.1	Level 2: The method would lead to the production of a valid outcome. The key steps are identified and logically sequenced.	3–4	AO1 6.6.1.2 RPA20
	Level 1: The method would not lead to a valid outcome. Some relevant steps are identified, but links are not made clear.	1–2	
	No relevant content	0	
	Indicative content <ul style="list-style-type: none"> • use the signal generator to adjust the frequency • keep the number of masses the same • move the wooden bridge • observe a steady / stationary wave pattern • use the metre rule to measure the wavelength • repeat using different values of frequency • repeat for different stationary wave patterns 		

b)

06.2	$v = f \times \lambda$		1	AO1 6.6.1.2
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c)

06.3

$$35.1 = 45.0 \times \lambda$$

$$\lambda = \frac{35.1}{45.0}$$

$$\lambda = 0.78$$

allow 0.780

1

AO2
6.6.1.2

1

1