

## Mark schemes

- 1.** (a) increased 1
- (b) (count) how many waves pass a point 1
- in one second
- this is dependent on the first mark point being awarded* 1
- or**
- (count) number of waves that pass a point in a given time
- allow a specific time for a given time*
- or**
- (count) number of waves that are produced in a given time (1)
- and divide by that time in seconds
- this is dependent on the first mark point being awarded*
- allow an answer in terms of measuring the frequency of the vibrating bar*
- (c)  $\text{period} = \frac{1}{5}$  1
- period = 0.2 1
- seconds / s 1
- [6]**
- 2.** (a) Regrettably, this part of the question assessed content that we had stipulated would only be assessed on the Higher tier. All students were awarded full marks for this part of the question. 1
- (b) 0.4 1
- (c) wave speed = frequency  $\times$  wavelength
- allow  $v = f \lambda$*  1

(d)  $7200 = 0.4 \times \text{wavelength}$

1

$$\text{wavelength} = \frac{7200}{0.4}$$

1

wavelength = 18 000 (m)

*allow up to full marks for ecf using their answer to part (b)*

*a method shown as  
 $7200 \times 2.5 = 18\ 000$   
scores 0 marks*

1

*an answer 18 000 scores 3 marks*

(e) Regrettably, this part of the question assessed content that we had stipulated would only be assessed on the Higher tier. All students were awarded full marks for this part of the question.

2

[8]

3.

(a) A

1

(b) 2 (%)

1

(c) black

*correct order only*

1

reflects

1

transmits

1

(d) green

1

(e) without a darkened laboratory would not be able to see reflected light

*allow would see all squares all of the time*

1

(f) so same 'amount' of light is incident on each square

*a fair test is insufficient*

*control variable is insufficient*

1

(g) two bars drawn at the correct height  
*allow 1 mark for 1 correct bar* 2

both bars correctly labelled 1

(h) orange  
*reason only scores if orange chosen* 1

can be seen from the furthest away  
*allow it reflects the most light* 1

(i) repeatable 1

[14]

4.

(a) **K** 1

(b) **L and M** 1

(c) the oscillation should be perpendicular to the direction of the stretched spring  
*allow up and down* 1

(d) timing less than five echoes 1

(e) 3 (.0) 1

(f) 750 (m) 1

(g) speed =  $\frac{750}{3}$   
*an answer of 250 (m/s) scores 2 marks* 2

speed = 250 (m/s)  
*allow ecf from parts (e) and (f)* 1

(h) any **two** from:  
• time more than 5 echoes  
• students stand further from the building  
• have 2 or more students (independently) measuring the time taken  
*use a stopwatch with a higher resolution is insufficient* 2

[10]

- 5.** (a) K 1
- (b) Decreases 1
- (c) use a metre rule / 30 cm ruler to measure across 10 (projected) waves  
*accept any practical number of waves number for 10* 1
- and then divide by 10 1
- (d) 1.2 cm = 0.012 m 1
- $18.5 \times 0.012 = 0.22(2)$  (m / s) 1
- allow 0.22(2) with no working shown for 2 marks*
- typical walking speed = 1.5m / s  
*accept any value e.g. in the range 0.7 to 2.0 m / s* 1
- so the water waves are slower (than a typical walking speed)  
*this cannot score on its own* 1

**[8]**

- 6.** (a) (i) wavelength  
*accept frequency*  
*accept speed* 1
- (ii) amplitude  
*accept energy*  
*height is insufficient* 1
- (iii) sound 1
- (b) 0.12  
*allow 1 mark for correct substitution, ie  $8 \times 0.015$  provided no subsequent step shown* 2
- metre per second **or** m/s **or** metre/second  
*do not accept mps*  
*units must be consistent with numerical answers* 1

**[6]**