Waves, Motion and Forces

Total mark – 15

Question: 1

6 Starter pistols are used in athletics events to start races. A starter pistol makes a loud bang and produces a puff of smoke.

Figure 10 shows two people who investigated the speed of sound using a starter pistol and a stopclock.

Figure 10

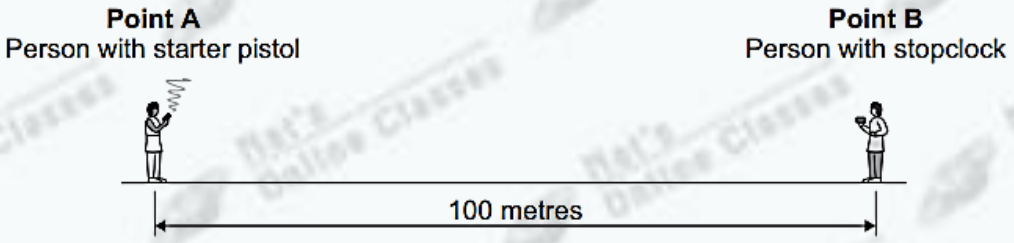


Figure 10 is not drawn to scale.

6 (a) The person at **Point B** sees the puff of smoke before hearing the bang from the starter pistol.

What does this tell you about the speed of sound compared with the speed of light?

[1 mark]

_____

_____

6 (b) The frequency of the sound wave produced by the pistol was 800 Hz

The wavelength of the sound wave was 0.42 m

Calculate the speed of the sound wave.

Use the correct equation from the Physics Equations Sheet.

Choose the correct unit.

m/s^2 **m/s** **m^2/s**

[3 marks]

_____

_____

_____

Speed =_____ unit _____

6 (c) Complete **Table 1** to show the properties of the sound wave at **Point B** compared with the sound wave at **Point A**.

[3 marks]

Tick (✓) **one** box for each property comparison.

Table 1

Properties of the sound wave at Point B compared to Point A	**greater than**	**less than**	**the same as**
amplitude			
frequency			
speed			

6 (d) A sound wave can be reflected. What name is given to a reflected sound wave?

[1 mark]

_____

6 (e) Which **two** of these statements are true for sound waves?

[2 marks]

Tick (✓) **two** properties.

	Tick (✓)
Sound waves can travel through a vacuum.	
Sound waves are transverse waves.	
Sound waves are longitudinal waves.	
Sound waves transfer energy.	
Sound waves are electromagnetic waves.	

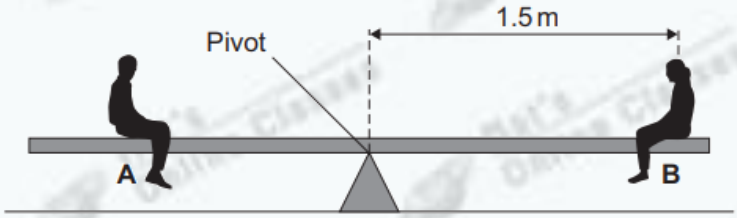
Question	Answers	Extra information	Mark	AO / Spec. Ref.
6(a)	(the speed of sound is) lower	accept converse	1	AO2 1.5
6(b)	336 m/s	accept 340 allow **1** mark for correct substitution ie 800 x 0.42 provided no subsequent step	2 1	AO1 AO2 1.5.1j
6(c)	less than same as same as		1 1 1	AO1 1.5.3b
6(d)	echo		1	AO1 1.5.3c
6(e)	Sound waves are longitudinal waves. Sound waves transfer energy.		1 1	AO1 1.5 1.1.3c
Total			**10**	

Question: 2

1 Two children visit a playground.

1 (a) **Figure 1** shows the two children, **A** and **B**, sitting on a see-saw.

Figure 1



1 (a) (i) The weight of child **A** and the weight of child **B** each create a moment about the pivot.

What is meant by 'the moment of a force'?

[1 mark]

Tick (✓) **one** box.

the direction of the force ☐

the turning effect of the force ☐

the size of the force ☐

1 (a) (ii) The see-saw is balanced.

Use the correct answer from the box to complete the sentence.

[1 mark]

smaller than	**equal to**	**greater than**

The size of the moment of child **A** is _____ the size of the moment of child **B**.

1 (a) (iii) Child **B** has a weight of 400 N and is sitting 1.5 m from the pivot.

Calculate the moment of child **B** about the pivot.

Use the correct equation from the Physics Equations Sheet.

Choose the correct unit.

[3 marks]

kilogram **newton-metre** **newton per metre**

Moment = _____ unit _____

1(a)(i)	The turning effect of the force		1	AO1 3.2.2a
1(a)(ii)	equal to		1	AO1 3.3.2c
1(a)(iii)	600 newton-metre / N m	allow **1** mark for a correct substitution ie 400 x1.5 provided no subsequent step do not accept n m	2 1	AO2 AO1 3.2.2b