Eduqas Physics GCSE
Topic 5.1: Waves in air, fluids and solids
Mark Schemes for Questions by topic

1.

(a vibrations **OR** compressions **AND** rarefactions

vibrations parallel to direction of travel (of wave energy)
OR compressions move in direction of travel (of wave energy) A1

(b) (i) (λ=)v/f **OR** 6100/7500 **OR** 6100/7.5

0.81(33333) m **OR** 813(33333) mm

(ii) 1. decreases B1

2. same answer as **1.** B1

2.

Question			Marking details	Mark
6.	(a)		15 [cm]	1
	(b)		20 [cm]	1
	(c)		$f = \frac{10}{5}$ (1) = 2 [Hz] (1)	2
	(d)		wave speed = 20 (ecf) x 2 (ecf) (1 – substitution) = 40(1) Unit cm/s (1)	3
	(e)		stay the same	1
			Question total	[8]

3.

Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
(a)	(i)		3	Scale on x-axis from 0 – 4.0 present with intervals of 0.5 and scale on y-axis from 0 – 6.0 present with intervals of 1.0 (1) Points plotted within ± ½ small square division (1) don't penalise for point (0,0) not being present Smooth curve of best fit from origin ± 1 small square division on each point (1)	If scale transposed or incorrect don't award the scale mark but if correct the plots and curve marks can be awarded		Thick, wobbly, disjointed, wispy curves
	(ii)		2	As the depth increases the wave speed increases (1) At a decreasing rate (1) No **ecf** from graph	Positive correlation (for the 1st mark) Slower rate	Non-linear	For a straight line graph they are proportional Answer for incorrect wave speed
(b)	(i)		3	5.3 (1) = $f \times$ 8.1 (1) f = 0.65 [Hz](1) N.B. **Speed value must be taken from candidate's graph** N.B. If speed is: 5.0 then f = 0.617 [Hz] 5.1 then f = 0.630 [Hz] 5.2 then f = 0.642 [Hz] 5.4 then f = 0.666 [Hz] 5.5 then f = 0.679 [Hz]			
	(ii)		2	Waves have decreasing wavelength [from A to B] (1) because speed decreases [but f remains constant] (1) **The 2nd mark can only be awarded if it is linked to the 1st mark.**		Any reference to amplitude change	

4.

(a) (i) (compression is a) region of higher pressure
OR region where air layers/particles/molecules are closer — B1

(ii) **1.** distance between (two successive / adjacent) compressions — B1

2. number of compressions (passing a point) per second / unit time
OR number of compressions emitted per second/unit time — B1

(b) (i) (f =) v/λ OR 340 / 0.0085
40 000 Hz OR 40 kHz

(ii) frequency/pitch is above the upper threshold for human hearing / 20 kHz
OR it is ultrasound — B1

(iii) (d =) vt in any form: words, symbols, numbers — C1
41 m **or** 40.8 m — A

[Total: 8]

5.

(a	speed of sound in gas: 300 m / s		B
	speed of sound in solid: 3000 m / s		B
(b)	particles / molecules / atoms oscillate / vibrate OR pressure variation / compressions / rarefactions / displacements move		B1
	in the direction of travel (of the wave / sound)		
(c)	**(i)** two complete wavelengths / cycles with shorter wavelength		B1
	wave drawn has greater amplitude		B1
	(ii) higher frequency / pitch		B1
	louder / higher volume		B1
			[Total: 8]

6. B (1)
7. D (1)
8. C (1)
9. C (1)
10. A (1)
11. D (1)