01. 0625_s23_ms_42 Q: 6

Question	Answer	Marks
(a)	P-waves: longitudinal	**B1**
	S-waves: transverse	**B1**
(b)	1600 m **OR** 1.6 km	**A3**
	$v = f\lambda$ **OR** ($\lambda =$) v/f	C1
	($\lambda =$) [7.2 × 1000] / 4.5 **OR** ($\lambda =$) 1.6 × 10^{N} **OR** ($\lambda =$) 7.2 / 4.5	C1

02. 0625_w23_ms_43 Q: 5

Question	Answer	Marks
(a)	3 wavecrests same wavelength as original	**B1**
	3 arcs	**B1**
	3 semi-circular wavecrests centred on middle of gap	**B1**
(b)	3 parallel wavecrests on left, reduced wavelength	**B1**
	angular spread must be less / reduced divergence	**B1**
	3 wavecrests on right with reduced curvature compared with **(a)** no reverse curvature anywhere	**B1**

03. 0625_w22_ms_43 Q: 6

Question	Answer	Marks
(a)(i)	correct direction, with angle made with surface correct	**B1**
(a)(ii)	three wavefronts perpendicular to their answer to **(a)(i)**	**B1**
	wavelength 1.6 cm / same as incident wave	**B1**
(b)	at least two correct arcs (after the gap in the barrier)	**B1**
	three circular arcs (after the gap on the barrier) centred on gap	**B1**
	wavelength same as wavelength of incident wavefronts	**B1**
(c)	6.4 cm / s **OR** 0.064 m / s	**A2**
	$v = f\lambda$ **OR** ($v =$) $f\lambda$ **OR** 4.0 × 1.6 **OR** 4.0 × 0.016	C1

04. 0625_m20_ms_42 Q: 6

(a)(i)	3 straight crests, to the right of A parallel to incident crests AND same λ by eye	**B1**
	curving round correct way below A	**B1**
(a)(ii)	diffraction	**B1**
(b)(i)	correct arrow perpendicular to wave fronts	**B1**
(b)(ii)	refraction	**B1**
(b)(iii)	wavelength – decreases	**B1**
	frequency – stays same	**B1**
	speed of wave – decreases	**B1**

05. 0625_w20_ms_42 Q: 6

Question	Answer	Marks
(a)(i)	**1** amplitude marked correctly	**B1**
	2 wavelength marked correctly	**B1**
(a)(ii)	trough labelled T	**B1**
(b)	$f = 15 / 60$ (= 0.25)	**B1**
	$v = f\lambda$ in any form OR (v =) $f\lambda$ words, symbols or numbers	**B1**
	(v =) 0.08×0.25 (= 0.02 m / s) OR 0.25×8 (= 2.0 cm / s)	**B1**
	Alternative route 1 : $v = d \div t$ words, symbols or numbers	**(B1)**
	distance moved in one minute = 15×8 OR 120 OR 15×0.08 OR 1.2	**(B1)**
	(v =) $120 / 60$ (= 0.02 m / s) OR $120 \div 60$ OR $15 \times 0.08 \div 60$ OR $1.2 \div 60$	**(B1)**
	Alternative route 2 : time for 1 oscillation = 4 s	**(B1)**
	distance moved in 4 s = 8 cm	**(B1)**
	so speed = $8 \div 4 = 2$ cm / s	**(B1)**
(c)	oscillation at right angles to the direction of propagation / travel / energy transfer (of the wave)	**B1**
	oscillation parallel to / in the direction of propagation / travel / energy transfer (of the wave) OR has compressions and rarefactions OR needs / must have a medium	**B1**

06. 0625_s18_ms_41 Q: 6

(a)(i)	At least 3 circular wavefronts centred on gap extending to at least half of semicircle	**1**
	Same spacing as incident wavefronts	**1**
(a)(ii)	At least 3 straight, parallel, wavefronts, approximately same length as width of gap	**1**
	Ends of straight lines curving towards but not reaching barrier	**1**
(b)	Any **four** of: Diagram to show: labelled barrier, incident straight or curved waves Diagram shows appropriately reflected waves Water surface e.g. tank of water/ripple tank/pond/acceptable alternative How waves are produced: e.g., moving end or length of solid rod dipping into surface **OR** small solid object thrown in. Detail of barrier: made of metal, glass or wood fixed in position How observed: by eye, video, film, stroboscope	**4**

07. 0625_w18_ms_43 Q: 4

(a)	(*f* =) *v* / *λ* **or** 0.15 / 0.030	**C1**
	5.0 Hz	**A1**
(b)(i)	transmission of energy (through medium) **and** no transfer of matter	**B1**
	(direction of) vibration of particles **or** (direction of) vibration of medium	**M1**
	perpendicular to direction of energy travel / wave / propagation	**A1**
(b)(ii)	wave with constant wavelength and amplitude	**B1**
	wavelength indicated **and** labelled	**B1**
	amplitude indicated **and** labelled	**B1**

08. 0625_s17_ms_42 Q: 6

(a)(i)	3.4 cm	**B1**
(a)(ii)	30 cm	**B1**
(b)	v= f λ in any form **or** (f =)v / λ	**C1**
	(f = 8.0/2.5=) 3.2 Hz	**A1**
(c)(i)	3 crests straight AND some spreading out	**B1**
	2 wavelengths same as original	**B1**
(c)(ii)1.	(wavelength) increases/ longer AND (because wave) travels further in same/periodic time or because wave has higher speed /moves faster	**B1**
(c)(i)2.	More diffraction/spreading/deflection out/more curved OR no/smaller straight part in centre	**B1**
	Total:	**8**

09. 0625_w17_ms_41 Q: 5

(a)	Tick 2nd box only	**B1**
(b)(i)	At least 3 parallel wavefronts in shallow water sloping upwards from left to right	**B1**
	Wavefronts in shallow water meet wavefronts in deep water	**B1**
(b)(ii)	Indication that frequency is same in deep and shallow water	**C1**
	In deep water *v* = *fλ* in any form OR (*f* =) *v* / *λ* OR 80 / 1.4	**C1**
	= 57.1 (Hz)	**C1**
	Wavelength in shallow water = *v* / *f* OR 60 / 57.1 = 1.05 cm	**A1**
	OR	
	speed in deep water / speed in shallow water = 0.80 / 0.60	**(C1)**
	= 1.33	**(C1)**
	(f is constant so) *λ* in deep water / *λ* in shallow water = 1.33	**(C1)**
	λ in shallow water = 1.4 / 1.33 = 1.05 cm	**(A1)**

10. 0625_w17_ms_42 Q: 6

(a)(i)	diffraction	**B1**
(a)(ii)	4 arcs between dashed lines centred vertically at centre of gap	**B1**
	any 3 wavelengths same as incident wavelengths including wavelength from wavefront in gap	**B1**
(b)(i)	wavefronts have smaller angular width OR do not extend as far as dashed lines OR less (angular) spread	**B1**
(b)(ii)	increased wavelength OR more spreading	**B1**
	use of $v=f\lambda$ OR increased wavelength	**B1**