Mark scheme

Properties of waves

Physics 0625 · Questions from Paper 3 and Paper 4

Total marks

71

MARKS FOR EACH QUESTION

1	2	3	4	5	6	7	8	9	10	Total
6	6	7	10	6	7	7	6	8	8	**71**

Question 1 [6]

1(a)(i)	(amplitude =) 15 (cm)	**B1**
1(a)(ii)	(frequency =) 0.5 (Hz)	**A2**
	(frequency =) number of waves sent out / emitted in one second OR 1 wave in 2.0 (s) OR frequency = 1 ÷ 2(0)	(C1)
1(b)	diffraction	**B1**
1(c)(i)	refraction	**B1**
1(c)(ii)	(change of) wavelength OR (wave) speed OR velocity	**B1**

Question 2 [6]

2(a)	transverse	**B1**
2(b)(i)	refraction	**B1**
2(b)(ii)	speed (of wave) changes	**B1**
2(b)(iii)	6.7 (Hz)	**A3**
	35 ÷ 5.2	(C2)
	$v = f \times \lambda$ OR (frequency =) (wave) speed ÷ wavelength	(C1)

Question 3 [7]

3(a)	longitudinal	**B1**
3(b)(i)	(at least) 3 semi-circular wavefronts after gap showing diffraction	**B1**
	wavefronts with same wavelength as before gap	**B1**
3(b)(ii)	one wavelength drawn on diagram	**B1**
3(c)	8.3 (Hz)	**A3**
	38 ÷ 4.6	(C2)
	$v = f \times \lambda$ OR (frequency =) speed ÷ wavelength OR (f =) $v \div \lambda$	(C1)

STEM | Exam Builder

Question 4 [10]

4(a)	18.2 ÷ 7	C1
	2.6 (cm)	A1
4(b)(i)	17.24 **AND** 17.14 **AND** 17.16 (s)	B1
4(b)(ii)	(17.24 + 17.14 + 17.16) ÷ 3 **OR** 51.54 ÷ 3	C1
	17.18 (s)	A1
4(b)(iii)	50 ÷ 17.18	C1
	2.9 (Hz)	A1
4(c)	(speed =) frequency × wavelength in any form	C1
	2.4 × 0.025	C1
	0.06(0) (m/s)	A1

Question 5 [6]

5(a)(i)	part of a circle, at least quarter of a circle, centred on centre of gap	B1
	waves same wavelength as incident waves	B1
5(a)(ii)	waves pass through gap remaining straight	B1
	less / no diffraction occurs	B1
5(b)	1.8 m	A2
	$\lambda = v/f$ OR 1500/850 in any form	C1

Question 6 [7]

6(a)	echo	B1
6(b)	(λ=) 7.5×10^{-4} m	A3
	(λ=) v / f OR $v = f\lambda$ in any form	C1
	(λ=) $1.5 \times 10^{3} / 2 \times 10^{6}$	C1
6(c)(i),(ii)	labelled wavelength of incident wave	B1
	3 part circles to the left of the barrier and centred to right of the barrier	B1
	wavelengths of reflected and incident waves same	B1

STEM | Exam Builder

Question 7 [7]

7 **(a)** **(i)** any value between 6 and 7 mm seen C1

26 ± 2 mm OR 2.6 ± 0.2 cm A1

(ii) $v = f\lambda$ in any form OR $(f =)\ v \div \lambda$ OR $0.39 \div 0.026$ C1
= 15 Hz ecf **(i)** A1

(b) at least 4 wavefronts showing refraction in correct direction B1
7 parallel wavefront lines continuous with those in fast region B1

(c) unchanged / nothing B1

[Total: 7]

Question 8 [6]

8(a)	3 wavecrests same wavelength as original	**B1**
	3 arcs	**B1**
	3 semi-circular wavecrests centred on middle of gap	**B1**
8(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**

Question 9 [8]

9(a)(i)	correct direction, with angle made with surface correct	**B1**
9(a)(ii)	three wavefronts perpendicular to their answer to **(a)(i)**	**B1**
	wavelength 1.6 cm / same as incident wave	**B1**
9(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**
9(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

STEM | Exam Builder

Question 10 [8]

10(a)	any **two** from: • (longitudinal) vibration / oscillation in wave parallel to propagation direction / direction of travel • transverse wave vibrates / oscillates perpendicular to propagation direction / direction of travel • (longitudinal) consists of compressions and rarefactions • transverse wave consists of crests / peaks and troughs • (longitudinal) needs a medium (to travel)	**B2**
10(b)(i)	P-wave **AND** it is longitudinal	**B1**
10(b)(ii)	1.8×10^4 m **OR** 18 km	**A2**
	1.5λ **OR** $1.5 \times 1.2 \times 10^4$ **OR** 1.8×10^N	C1
10(b)(iii)	$v = f\lambda$ **OR** $v = \lambda / t$ **OR** (t =) λ / v **OR** $f = 4600 / 1.2 \times 10^4$ **OR** (t / 5 =) $1.2 \times 10^4 / 4600$ **OR** (t =) $6(.0) \times 10^4 / 4600$	**M1**
	13 s	**A2**
	$t = 1 / f$ **OR** (time for one wave =) 2.6 (s)	C1

STEM | Exam Builder