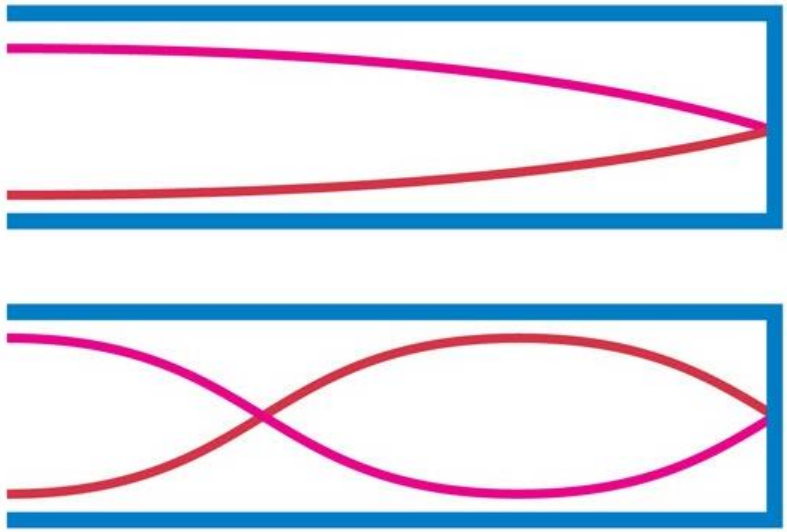
Question			Marking details	Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
7	*(a)*		 or equivalent diagrams with A & N, dots (for nodes) and double-headed arrows (for antinodes) etc.	1 1			2		2
	(b)		f = 141 [Hz] (1) λ = 2.4 [m] (1)		2		2	2	2
	(c)		Correct reference to polarised light as having vibrations (or equivalent) in one direction (1) At θ = 0 and / or 180^o polaroids aligned (1) At θ = 90^o polaroids crossed (1) Intermediate angles partial blocking or partial transmission or equivalent (1)	4			4		4

Question			Marking details	Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
	(d)	(i)	When $\theta = 0$, cos $\theta = 1$ or $(\cos\theta)^2 = 1$ so $I = I_0$ Accept substitution of I and θ for any other value of θ		1		1	1	1
		(ii)	$(\cos 140°)^2 = 0.587$ (1) predicted $I = 340 \times 0.587 = 200$ agreeing with graph point (1) [or $\frac{I}{I_0} = \frac{200}{340}$ =0.588 agreeing with $(\cos 140°)^2$]	1	1		2	2	2
	(e)		More grip for smooth rubber seems to contradict (1) 4^o difference but a resolution of 0.1^o (accept 1^o) **or** an uncertainty of <1% (1) Not random error **or** a less firm conclusion argued because more info needed about repeats (1)			3	3		3
	(f)		Valid demonstration of inverse cube, for e.g. $9.8 \times 8.0^3 = 5\,018$; $2.9 \times 12.0^3 = 5\,011$ (1) Comment: accept either "good agreement" or with reservations, such as more results needed (1)			2	2	1	2
	(g)	(i)	12.5 [m s^{-1}]		1		1		1
		(ii)	First 25 s: straight line from (0,0) to (25,12.5) **and** vertical scale (accept single label at 12.5) (1) 25 s – 30 s v continues to rise but at decreasing rate (curve) (1) 30 s – 50 s constant velocity with continuity of line at 30 s (1)		3		3	3	3
			Question 7 total	**7**	**8**	**5**	**20**	**9**	**20**