

Question 26 (Answer: **B**)

- The light reaches the first filter polarised vertically, at 50° to its axis: $8.0 \cos^2 50^\circ = 3.3 \text{ W m}^{-2}$.
- It leaves polarised along that first axis, so for the second filter the angle is the 30° between the two axes.
- $3.3 \times \cos^2 30^\circ = 3.3 \times 0.75 = 2.5 \text{ W m}^{-2}$.

Question 28 (Answer: **C**)

- Light is transverse and sound is longitudinal.
- Only a transverse wave can be polarised, since only it has a plane of oscillation to restrict.
- Diffraction, interference and reflection are all shown by both.

Question 28 (Answer: **B**)

- Only transverse waves can be polarised.
- Sound is longitudinal, so any group containing it is ruled out – that removes A, C and D.
- Visible light, microwaves and radio waves are all electromagnetic, and therefore transverse.

Question 27 (Answer: **B**)

- Malus's law: $I = I_0 \cos^2 \theta$, and here $I = I_0/3$.
- So $\cos^2 \theta = 1/3$ and $\cos \theta = 0.577$.
- $\theta = 54.7^\circ$, which rounds to 55° .

Question 25 (Answer: **C**)

- Polarisation means confining the oscillation to a single plane.
- That only has meaning when the oscillation is perpendicular to the direction of travel.
- Diffraction, interference and reflection all occur for longitudinal waves too.

Question 24 (Answer: **A**)

- Malus's law: $I = I_0 \cos^2 \theta$, with $\theta = 30^\circ$ between the polarisation and the axis.
- $\cos^2 30^\circ = 0.75$.
- $I = 24 \times 0.75 = 18 \text{ W m}^{-2}$; using sin instead would give only 6 W m^{-2} .

5(a)	sound waves are longitudinal / not transverse (and only transverse waves can be polarised)
5(b)(i)	A periodic curve of at least one period with minimum 0 and maximum I_0
	Smooth continuous $\sin^2 \alpha$ curve
	Peaks at 90° and 270° and troughs at 0, 180° and 360°
5(b)(ii)	$I \propto A^2$
	$I = I_0 \cos^2 \theta$
	At $\alpha = 20^\circ$ the angle between the planes of polarisation of light and filter is 70° (or 110°)
	$I = I_0 \cos^2 70^\circ$ or $I = I_0 \cos^2 110^\circ$
	($I = 0.12 I_0$)
	amplitude = $0.34 A_0$

Question 26 (Answer: **A**)

- Malus's law: the transmitted intensity is $I \cos^2 \theta$.
- Here $\cos^2 \theta = 0.75$, so $\cos \theta = 0.866$.
- That gives $\theta = 30^\circ$.