A-Level Physics: **w25 12**

Question 28 (Answer: **D**)

- Diffraction changes the *direction* in which the wave spreads, not the wave itself.
- The frequency is fixed by the source, so it cannot change.
- The medium is unchanged, so the speed – and hence the wavelength – stays the same.

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Question 26 (Answer: **B**)

- Diffraction is the spreading of a wave as it passes through a gap or around an obstacle.
- A describes the Doppler effect and C describes polarisation.
- D is the principle of superposition.

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4(a)	wave passing through gap / aperture
	(wave) spreads (out)
4(b)(i)	$n\lambda = d \sin\theta$
	$\theta = \sin^{-1} [(540 \times 10^{-9}) / (5.0 \times 10^{-6})] = 6.2°$
4(b)(ii)	$\theta = 12°$
4(b)(iii)	peaks / maxima shown at $\theta = 0$, ±6° and ±12°
	peaks / maxima and zero intensity in between
	central peak / maxima at intensity I_0 and the other peaks all equal to or less than I_0
4(c)	peaks / maxima all at the same angles (as before)
	intensity (of all peaks / maxima) halved

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Question 30 (Answer: **D**)

- Making the gap narrower increases the diffraction, so the wave spreads more beyond the barrier.
- The frequency and the water depth are unchanged, so the wavelength is the same on both sides.
- The right diagram therefore keeps the wavefront spacing and curves the fronts more.

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Question 26 (Answer: **A**)

- The sound bends around the edge of the building, which is diffraction.
- Speech has a wavelength comparable to the size of the obstacle, so the spreading is large.
- Interference needs two sources, sound cannot be polarised, and there is nothing here to reflect from.

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Question 28 (Answer: **C**)

- Diffraction spreads a wave most when its wavelength is comparable to the width of the gap.
- So the spreading grows if the wavelength increases or the gap narrows.
- Doing both together must increase it; changing them the same way could cancel out.