Mark scheme

Question			Answer/Indicative content	Marks	Guidance
1			Eyes can only detect a limited range of (electromagnetic) waves / wavelength is too large (to be seen) / frequency is too small (to be seen) ✓	1 (AO 1.1)	**ALLOW** (frequency/wavelength of) IR is outside of the range of EM waves that is detectable to the eye / eye is not able to see that frequency/wavelength of wave **ALLOW** eyes can only detect (visible) light **BUT IGNORE** IR is not visible to the eye / eyes cannot see/detect IR **Examiner's Comments** A significant number of candidates' explanations used ideas that basically repeated the stem of the question, e.g. infrared radiation is invisible. There were also some misconceptions, e.g. infrared cannot pass through the atmosphere.
			Total	**1**	
2			A	1 (AO 2.1)	**Examiner's Comments** Nearly all candidates were able to substitute the values into the equation provided correctly in order to calculate a distance of 0.030 m. However, the majority of candidates did not take into account that the distance they had calculated was from the emitter to the soft tissue-bone boundary and back to the receiver, and therefore they made the common error of not halving their answer.
			Total	**1**	
3			A	1 (AO 2.1)	
			Total	**1**	
4			A	1 (AO 1.1)	
			Total	**1**	
5		i	Arrow with direction vertically upwards ✓	2 (2 × AO 2.1)	

			Arrow from lowest energy level to highest energy level ✓		**ALLOW** to above the highest energy level
		ii	Excited **and** absorbed ✓ Higher than ✓	2 (2 × AO 1.1)	**BOTH** required for first mark **Examiner's Comments** The topic of energy levels (P6.1) was not well understood by candidates, with approximately half of candidates not gaining any credit in part (a). A number of candidates did not attempt part (a) (i) and, of those who did, many had the arrow pointing downwards. In part (a) (ii), few scored both marks, with various combinations of words from the list used to complete the sentences.
			Total	**4**	
6			**D**	1 (AO 1.1)	**Examiner's Comments** Just over half of candidates answered this question correctly, with many candidates incorrectly thinking that the gel amplifies the ultrasound waves.
			Total	**1**	
7			**D**	1 (AO 2.1)	**Examiner's Comments** Approximately two thirds of candidates answered this correctly, with the most common incorrect answer being option B.
			Total	**1**	
8			D ✓	1 (AO1.1)	
			Total	**1**	