Mark scheme

Question			Answer/Indicative content	Marks	Guidance
1	a	i	Increase in wavelength (of light) ✓	1 (AO 1.1)	**Examiner's Comments** Few candidates stated that red-shift referred to an increase in wavelength. Some candidates referred to the movement of planets or galaxies without really answering the question.
		ii	A ✓ greater red-shift ✓	2 (2 × AO 2.1)	dependent on first mark wavelengths are further apart / longest / wavelengths move further to the right **ALLOW** lines for wavelengths **Examiner's Comments** The majority of candidates identified galaxy A correctly. However, the reason was often vague. Candidates needed to interpret the diagram and explain how the wavelength of the lines differed in either the value of the wavelength of each line or the spacing between the adjacent lines.
		iii	Big-Bang (model / theory) or expanding Universe ✓	1 (AO 1.1)	**Examiner's Comments** This question was challenging for most candidates. Most of the correct answers were for the Big Bang theory although there were also a number who stated the expanding Universe. Some candidates incorrectly guessed red-shift (or blue-shift). Some candidates just wrote 'neutrons'.
	b	i	Electrons✓ Light✓	2 (2 × AO 1.1)	**Examiner's Comments** The majority of candidates scored 1 mark. The common errors were confusing atoms with electrons and sound with light.
		ii	**First check the answer on the answer line** **If answer = 240 (J) award 2 marks**	2 (2 × AO 2.1)	**Examiner's Comments** The majority of candidates correctly

			(E =) 0.08 x 3000 ✓ (E =) 240 (J) ✓		multiplied the potential difference by the charge.
		iii	(Risk of) an (electric) shock / electrocution / **AW** ✓	1 (AO 3.2a)	**IGNORE** dangerous / injury / death unqualified **Examiner's Comments** There were many vague answers of the power supply being dangerous or causing death. It was expected that candidates would refer to the risk of electrocution or electric shock.
			Total	**9**	
2			A	1 (AO 1.2)	**Examiner's Comments** This question was well answered, with the majority of candidates correctly indicating curve A.
			Total	**1**	
3			C	1 (AO 1.1)	**Examiner's Comments** This was very well answered.
			Total	**1**	
4			D ✓	1 (AO1.1)	**Examiner's Comments** A common distractor in this question was B. The speed of light is constant in space.
			Total	**1**	
5			D ✓	1 (AO1.1)	**Examiner's Comments** Many candidates were confused between nuclear fission in a power station and nuclear fusion occurring in the Sun. **Misconception** Understanding the difference between fission and fusion. Understanding the processes in a nuclear power station.
			Total	**1**	

6			B ✓	1 (AO1.1)	**Examiner's Comments** This question was generally answered well. Candidates had appeared to have good knowledge of the difference between a planet, moon and star. Most recalled that Mercury was the closest planet to the Sun.
			Total	**1**	