PHYSICS 1

HIGHER TIER

Question			Marking details	Marks Available
1.	(a)		Easily replaced / replenished / will not run out / sustainable Don't accept can use it again – treat this as neutral with other acceptable answer	1
	(b)	(i) (ii)	[£] 2000 Wind - variable wind speed (1) Solar - hours of sunshine / roof may not face South or intensity of Sun (1) Fuel costs could change (1) **Award a maximum of 2 marks only**	1 2
	(c)		$\dfrac{5400}{1800}$ (1) = 3 x 4 = 12 [m^2] (1)	2
	(d)		Reduces CO_2 (1) which reduces the greenhouse effect / global warming (1) **or** Less SO_2 (1) which results in less acid rain (1) **or** Use less fossil fuels (1) so less extraction needed / less CO_2 / less SO_2 (1) Don't accept less pollution. **The 2nd mark must be linked to the 1st mark**.	2
			Question total	**[8]**
2.	(a)		Subs (1) answer 2000 [W] (1)	2
	(b)		Units used = power x time $\dfrac{100 x 5 (1)}{1000 (1)}$ 0.5 **ecf** x 12 (1) 6 [p] (1) If convert to £ must be correct and no p present. If no workings shown: £0.06 (4 marks) 6000 p (3 marks), £60 (3 marks), 0.06 p (3 marks), 6 000 000 p (2 marks), 60 p (2 marks), 120 p (2 marks) If kettle used award a maximum of 2 marks	4
			Question total	**[6]**
3.	(a)	(i)	380 [units]	1
		(ii)	$\dfrac{10}{5}$ (1) = 2 [mm] (1) [$\dfrac{1}{5}$ = 0.2 Award 1 mark only]	2
	(b)	(i) (ii)	Big Bang Universe started at one point / singularity (1) [matter thrown out] by an <u>explosion</u> (1)	1 2
	(c)	(i) (ii)	Wavelength increasing / [spectral] lines or light shift to the red end How far away/ from us the galaxy is (1) how fast the galaxy is moving <u>away</u> (1) [moving away can be implied in part (i)]	1 2
			Question total	**[9]**

Physics 1 Higher Tier (Contd.)

Question			Marking details	Marks Available
4.	*(a)*		**Indicative content:** The count rate due to background radiation needs to be determined first. This is 0.5 counts per second. The paper absorber reduces the count rate showing that alpha radiation must be emitted, since it will be blocked by paper. The aluminium absorber does not affect the count rate so beta radiation cannot be present. Thick lead reduces the count rate, but it still remains above the background level, showing that gamma radiation must also be emitted. **5 – 6 marks** The candidate constructs an articulate, integrated account correctly linking relevant points, such as those in the indicative content, which shows sequential reasoning. The answer fully addresses the question with no irrelevant inclusions or significant omissions. The candidate uses appropriate scientific terminology and accurate spelling, punctuation and grammar. **3 – 4 marks** The candidate constructs an account correctly linking some relevant points, such as those in the indicative content, showing some reasoning. The answer addresses the question with some omissions. The candidate uses mainly appropriate scientific terminology and some accurate spelling, punctuation and grammar. **1 – 2 marks** The candidate makes some relevant points, such as those in the indicative content, showing limited reasoning. The answer addresses the question with significant omissions. The candidate uses limited scientific terminology and inaccuracies in spelling, punctuation and grammar. **0 marks** The candidate does not make any attempt or give a relevant answer worthy of credit.	6
	(b)		More harmful inside because alpha [particles](1) are more ionising / are unable to leave the body (1) **or** more harmful outside because gamma [rays] (1) can penetrate into the body (1) Any reference to beta only award 0 marks. **The 2nd mark must be linked to the 1st mark**.	2
			Question total	**[8]**

Physics 1 Higher Tier (Contd.)

Question			Marking details	Marks Available
5.	(a)		$P = V \times I$ (1) $190 \times 10^6 = V \times 400$ sub / manip (1) MW conversion $V = 475\,000$ [V] (1) [0.475 or 475 Award 2 marks]	3
	(b)		[Large V] gives low I (1) So less heat / energy / power losses / more efficient (1) **The 2nd mark must be linked to the 1st mark**.	2
	(c)		Steps down / decreases <u>voltage</u>	1
	(d)	(i)	Lagging of pipe / insulation (1) makes the external surface temperature lower / it reduces the effect of air being heated by the pipe (1) **The 2nd mark must be linked to the 1st mark**.	2
		(ii)	Shiny surface / painted in a light colour (1) so less heat emitted [from outer surface] / heat reflected off the [inner surface] (1) **The 2nd mark must be linked to the 1st mark**.	2
			Question total	**[10]**
6.	(a)		**Indicative content:** The advantages of nuclear are it produces no air pollution and it produces a high power output from steady and reliable sources. The advantages of gas are the supply is piped and it produces no solid waste alongside it does not contribute to acid rain. The disadvantages of nuclear are the disposal of the radioactive waste and the possibility of radioactive leaks from natural disasters occurring. Acts of terrorism are also a potential threat and the decommissioning process is long and costly. The disadvantages of gas are the supply of gas is insecure and limited and burning the gas causes air pollution. **5 – 6 marks** The candidate constructs an articulate, integrated account correctly linking relevant points, such as those in the indicative content, which shows sequential reasoning. The answer fully addresses the question with no irrelevant inclusions or significant omissions. The candidate uses appropriate scientific terminology and accurate spelling, punctuation and grammar. **3 – 4 marks** The candidate constructs an account correctly linking some relevant points, such as those in the indicative content, showing some reasoning. The answer addresses the question with some omissions. The candidate uses mainly appropriate scientific terminology and some accurate spelling, punctuation and grammar. **1 – 2 marks** The candidate makes some relevant points, such as those in the indicative content, showing limited reasoning. The answer addresses the question with significant omissions. The candidate uses limited scientific terminology and inaccuracies in spelling, punctuation and grammar. **0 marks** The candidate does not make any attempt or give a relevant answer worthy of credit.	6
	(b)		Output energy = 34 [MJ] (1) Efficiency = $\dfrac{34}{120}$ x 100% (sub) (1) = 28.3[%] / 28[%] (1)	3
			Question total	**[9]**

Physics 1 Higher Tier (Contd.)

Question			Marking details	Marks Available
7.	*(a)*		$v = f \lambda$ Substitution (1) $v = 4 \times 10^{14} \text{ x } 5 \times 10^{-7}$ Answer (1) $v = 2 \text{ x } 10^8 \text{ [m/ s]}$ $t = \dfrac{4.5x10^5}{2x10^8}$ **ecf** for v Manipulation(1) $t = 2.25 \text{ x } 10^{-3} \text{ [s]}$ Answer (1)	4
	(b)	(i)	$v = \dfrac{d}{t}$ Substitution (1) Use of 2 (or 0.5) (1) $d = \dfrac{3 \text{ x} 10^8 \text{ x } 0.24}{2}$ $= 3.6 \text{ x } 10^7 \text{ [m]}$ Answer (1)	3
		(ii)	Satellite needs to be above a **fixed point** on the Earth (1) so satellite dishes do not have to be moved (1) **The 2nd mark must be linked to the 1st mark**.	2
	(c)		Much less time taken or quicker or faster by the optical fibre / not affected by the weather	1
			Question total	**[10]**