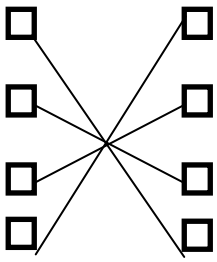
GCSE Science - Physics 1 Mark Scheme

January 2015

FOUNDATION TIER

Question			Marking details	Marks
1			 All four correct – 3 marks 2 or 3 correct - 2 marks 1 correct – 1 mark **AWARD a MAXIMUM OF 3 marks** **Question total**	3 **[3]**
2.	(a)		Ticks in boxes 1, 5 and 6 (3) 1 mark penalty for any extra tick.	3
	(b)		Has to travel back / distance travelled by the signal is double the height of the satellite above the earth. **Don't accept** travel further / take longer / double the time **Question total**	1 **[4]**
3.	(a)		lead, aluminium, beta, gamma. **Accept** symbols β and γ All four correct – 3 marks 2 or 3 correct - 2 marks 1 correct – 1 mark **AWARD a MAXIMUM OF 3 marks**	3
	(b)	(i)	[Radioactive decay is] a random (haphazard or unpredictable) [process] **Don't accept** taken at different times / not the same	1
		(ii)	mean = $\frac{30(1)}{60}$ (1)= [0.5 counts/s] **Award 1 mark** for 30 wherever it appears (if nothing else shown) **Award 1 mark** for division by 60 **Award 2 marks** for an answer only of 0.5 [counts/s]	2

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Question			Marking details	Marks
		(iii)	rocks / cosmic / radon / food / Sun / buildings **Accept** soil / ground / correctly named rocks e.g. granite Don't accept Earth / air / named foods **Question total**	1 **[7]**
4.	(a)		700 [security light] (1), 700 [microwave] (1)	2
	(b)	(i)	Watt[s] **Accept** wat	1
		(ii)	$\%\ \text{efficiency} = \frac{80}{200}(1 - \text{subs})[\text{x } 100] = 40(1)$ **Award 1 mark** for an answer of 0.4	2
	(c)	(i)	Units = 1 × 4 (1) = 4 (1) **Award 1 mark** for an answer only of 4 000 (i.e. no workings shown). Don't award any marks for an answer only of 40 or 400.	2
		(ii)	cost = 4 (**ecf**) × 15 = 60 Mark is for the answer **Accept** £0.60 **Don't accept** £0.60 p **Question total**	1 **[8]**
5.	(a)	(i)	1 000	1
		(ii)	1 000(**ecf**) × 0.7 (1 – subs) = 700 [km^2] (1-answer)	2
		(iii)	$\frac{60}{20}(1)\text{x } 1000(\textbf{ecf}) = 3\,000[1 - \text{answer}]$ Answer of 3 **award 1 mark**	2
	(b)		Wind doesn't always blow / nuclear runs all of the time / takes less ground space / fewer habitats destroyed / total commissioning cost is less / longer lifetime. **Accept** more reliable / bigger power [output] / bigger energy [output] / more electricity. **Question total**	1 **[6]**
6.	(a)		[A system of] **cables/wires** (1) **Accept** power lines from **power stations** (1) to **consumers/users** (1) (**accept** 2 named consumers e.g. schools, hospitals, factories, houses)	3
	(b)	(i)	They step up (increase) the voltage **Don't accept** increase the voltage and power / decrease the current	1

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Question			Marking details	Marks
		(ii)	To reduce energy losses / heat losses / to improve efficiency / prevent overheating **Don't accept** any reference to stopping energy / heat losses	1
	(c)	(i)	50 000 at A, 132 000 at B, 230 at C 2 marks for all 3, 1 mark for 1 or 2 correct. **AWARD a MAXIMUM OF 2 marks**	2
		(ii)	Step-up transformer	1
			Question total	**[8]**
7.	(a)		Can cause cancer / deform babies (1) because they ionise **or** damage **or** mutate **or** kill cells / ionising (1) **The 2nd mark must be linked to the 1st mark.**	2
	(b)		Abdomen [X –ray] (1) because it causes the largest received dose / highest dose or units / most days of radiation [given to the patient] (1) **The 2nd mark must be linked to the 1st mark.** **Don't accept** just a reference to 225	2
	(c)	(i)	$\frac{140}{2}$ (1 - subs) = 70 (1)	2
		(ii)	210 days (1)(**ecf**) 3 × answer to (i)) × 43 200 = 9 072 000 [counts] (1) **Award 1 mark** for [70 (**ecf**) × 43 200] = 3 024 000 **Award 1 mark** for [3 × 43 200] = 129 600	2
			Question total	**[8]**
8.	(a)	(i)	Circulation of air from the radiator inside the room (1) arrows in clockwise direction (1)	2
		(ii)	Air heated all along floor /air heated over bigger area (1) so rises at all points (everywhere) / more convection currents (1) **The 2nd mark must be linked to the 1st mark.** **Don't accept** heat rises or air in the room heats up faster	2

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Question			Marking details	Marks
	(b)	(i)	Plots (allow ± ½ small square division) (2) -1 for each error to a maximum of 2. No penalty for missing origin plot. Straight line (1) (ruler must be used) line must be extended back towards origin	3
		(ii)	**Award 2 marks** for: They're proportional **OR** As the area doubles the power doubles **OR** As the area increases the power increases at a constant rate **OR** Power = area $\times$ 150 **Award 1 mark** for: As the area increases so does the power **OR** Power α wire gird	2
		(iii)	1 800 [W]	1
	(c)		**Indicative content:** Conduction and radiation will take place in all directions from the hot wire grid. The wire grid is at a higher temperature than the bottom surface of the concrete floor. This temperature difference causes energy to flow down through the floor. The foam insulation reduces heat transfer through the concrete by conduction. The silver foil reduces heat loss because it reflects radiant heat back up into the room. **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.	6

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Question			Marking details	Marks
			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. **Question total**	**[16]**
			FOUNDATION TIER PAPER TOTAL	**[60]**

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