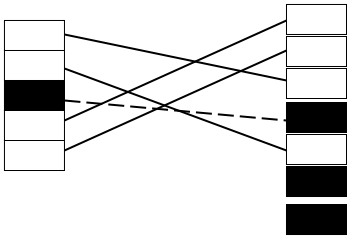
GCSE Science - Physics 1 Mark Scheme

January 2014

FOUNDATION TIER

Question				Marking details	Marks
1.	(a)			 4 lines joined or words correct = 3 marks. 2 or 3 lines or words correct = 2 marks. 1 line or word correct = 1 mark. 0 lines or words correct = 0 mark. Deduct 1 mark for each additional line.	3
	(b)	(i)		Bigger than 30 / accept bigger than 0.3 m (provided cm deleted) / alternatives.	1
		(ii)		Travel through vacuum/travel in straight lines/same speed [in a vacuum] / transverse/[they both] carry energy /[they both] carry information / reflect / refract	1
				Question total	**[5]**
2.	(a)	(i)		Radioactive decay is random (more than one tick don't award the mark)	1
		(ii)		Dividing by 5 **or** total of 175 (1) mean = 35(1) (Answer alone gets both marks) (174/5 = 35 award 1 mark only)	2
		(iii)		Take the readings with no source (must be implied source is removed rather than distance increased)	1
	(b)	(i)	(I)	Nuclear industry	1
			(II)	50[%]	1
		(ii)		Different areas have different rocks in the ground / some areas have more uranium than others / more or less granite in the ground	1
				Question total	**[7]**

Question				Marking details	Marks
3.	(a)			230 (1), 50 [Hz] (1), 1 800 (accept 1.8 with kilo or k)(1)	3
	(b)			Microwave (1), infra-red (1) Don't accept microwave power or micro	2
	(c)	(i)		3.0 [kW] (Accept 3 000 only if the k is deleted in kW)	1
		(ii)		Units = (3.0 (**ecf from (i)**) x 0.5) = 1.5 [kWh] Mark for the answer	1
		(iii)		Cost = (1.5 (**ecf from (ii)**) x 14 p) = 21 [p] Mark for the answer Do not credit £ 21 p or £0.21 p	1
				Question total	**[8]**
4.	(a)	(i)		National Grid	1
		(ii)		A - 50 000 [V], B - 400 000 [V], C – 230 [V] [2 marks for all 3 correct, 1 mark for 1 or 2 correct]	2
		(iii)		Step-down transformer	1
	(b)	(i)		06:00 (Accept 6 am)	1
		(ii)		45 000 [MW]	1
		(iii)		[pumped storage] hydroelectric - accept solar	1
		(iv)		45 000 **or** 2 400 (1) 42 600 (1) (Answer alone gets 2 marks) Unit – MW (1) Can be written alongside power value. Don't accept mW.	3
				Question total	**[10]**
5.		(i)		Helium indicated as correct (in any manner) (more than one tick don't award the mark)	1
		(ii)		Absorbed	1
		(iii)		B on answer line or selected on diagram	1
		(iv)		Galaxies are moving away from us / moving apart **or** the Universe is expanding. Don't accept red shifted.	1
		(v)		It is expanding / started at one point	1
		(vi)		Big Bang	1
				Question total	**[6]**

Question				Marking details	Marks
6.	(a)	(i)		Any 2 x (1) from: • produces a lot of energy <u>for a small mass</u> of fuel or is a concentrated energy source (accept amount for mass) • it is reliable or it can generate all of the time • produces no pollutant <u>gases</u> / doesn't contribute to global warming (accept named gas or greenhouse gases) (do not accept no pollution) • produces only a small volume of (solid) waste (accept amount for volume) • less dependence on fossil fuels / conserves fossil fuels • provides energy security	2
		(ii)		Any (1) from: • [radioactive waste] may <u>leak</u> [into the ground / environment] (don't accept radiation leaking) • geological changes (accept earthquakes etc.) • radioactive material may get into the food chain • [over time if location not correctly recorded] it may be excavated Do **not** accept answers in terms of property prices or damages the environment or cost or terrorism.	1
	(b)			Does not add to / cause global warming or greenhouse effect (1) because carbon dioxide released during burning = carbon dioxide used during growing/overall add no carbon dioxide to the environment (1) (Accept they are carbon neutral <u>or</u> they <u>just</u> release CO_2 <u>back</u> into the air) **Either mark can be awarded on its own but only award 2 marks if they are linked.**	2
	(c)	(i)		Grass (1) low<u>est</u> crop yield (accept <u>only</u> 5 tonnes ... (1) low<u>est</u> energy content (accept <u>only</u> 16 .....(1)	3
		(ii)	(I)	$\frac{50000}{10} = 5\,000\,[km^2]$ Mark for the answer	1
			(II)	50 000 x 20 = 1 000 000 [units] Mark for the answer	1
		(iii)		Less land / space used (1) so less destruction of habitats / so more land available for food production (1) (Don't credit references to CO_2 or SO_2.) **Either mark can be awarded on its own but only award 2 marks if they are linked.**	2
				Question total	**[12]**

Question				Marking details	Marks
7.	(a)			$\rho = \frac{104}{80}$ (1) = 1.3 (1) kg/m^3 (1) **Alternative:** $\rho = \frac{104000}{80000000}$ (1) = 0.0013 (1) g/cm^3 (1)	3
	(b)	(i)		A	1
		(ii)		A	1
		(iii)		Because <u>hot</u> air rises / expands (don't accept heat rises or least dense)	1
	(c)			**Indicative content** The silver sheet reflects infra-red radiation back into the radiator and reflects heat back into the room. The ridged panels / bubble wrap trap insulating pockets of air between the radiator and the wall, reducing heat lost through the wall by conduction. Plastic is also an insulator. The outside air temperature of the wall will be reduced by both factors above, so convection will be reduced. **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
				Question total	**[12]**
				FOUNDATION TIER PAPER TOTAL	**[60]**