

UNIT P1

FOUNDATION TIER

Question		Answer / Explanatory Notes	Marks Available
1.	(a)	D B A All correct → (2); Any 1 correct (1)	2
	(b)	3 reasonable points (must be clear if referring to Nuclear or Coal) from: Commissioning costs (Nuc) Nuclear - away from population Running costs (incl. fuel) Transport costs (coal) Decommissioning costs (Nuc) Coal running out Security Background radn ⁿ Pollution (Coal) Space to store rad waste (nuc)	3
			5
2.	(a)	Order of insertion: Infra-red (1) X-rays (1)	2
	(b)	(i) the same as (1) (ii) less than (1) (iii) greater than (1)	3
	(c)	(i) 3 (1) (ii) C (1) (iii) At least 1 complete cycle drawn with larger amplitude (1) and smaller wavelength (1) [accept separate diagram if clear].	4
			9
3.	(a)	Mars	1
	(b)	(i) approx - 67 (°C) [accept 0 to -100°C] (ii) CO ₂ (1) Greenhouse effect / heat trapped in Earth (1) [accept converse e.g. no atmosphere <u>on Mercury</u> (1), so no greenhouse effect (1)] 2 nd mark must link to 1 st mark.	1 2
			4

Question		Answer / Explanatory Notes	Marks Available
4.	(a)	Correct statements – 3 × (1) Burning gas in a power station adds to global warming Wind turbines produce no air pollution Oil is a non-renewable source [Additional ticks – 1 for each]	3
	(b)	(i) 20,000 (J)	1
		(ii) Heat / thermal (1), sound (1) – 1 any additional types [Light – neutral]	2
			6
5.	(a)	they get a spectrum [of the star] / splits the light up	1
	(b)	<u>absorption</u> in the star's atmosphere	1
	(c)	<u>New</u> dark lines observed – identified as new element (He) [“New” or “unknown” lines/element]	1
	(d)	(i) lines moved (1) so they have a larger wavelength / towards red end of spectrum [implies 1 st mark] (1) (“redshifted” 2 marks – but <u>not the spectrum becomes redder</u>)	2
		(ii) Because the universe is expanding / because the galaxy [accept: “Star”] is moving away	1
			6
6.	(i)	speed = $\frac{2(1) \times 98}{0.56}$ (1) = 350 (m/s) (1) [NB lack of × 2 → 2 max] [175 m/s → (2)]	3
	(ii)	$v = 260 \times 1.3 = 338$ m/s [subst in $v = f\lambda$ (1); answer (1)]	2
	(iii)	Any 1 sensible answer from: <ul style="list-style-type: none"> • air movement • inaccuracy of only doing 1 measurement • inaccuracy of timings (starting/stopping stopwatch) / reaction times • distraction from other noises 	1
			6

Question			Answer / Explanatory Notes	Marks Available
7.	(a)	(i)	22%	1
		(ii)	[Loft / roof] insulation (accept silver foil on inside of tiles, fibreglass, rockwool)	1
		(iii)	Two appropriate points: Insulator (1) because it has trapped air (1) or reflects [heat] radiation (1) back in (1) [Reference to convection (1) with linked reason, e.g. temperature at bottom of roof space is lower (1)] 2 nd mark must link to the first mark.	2
	(b)	(i)	20 (years)	1
		(ii)	Shorter payback time / Save more [per year] [or equiv] / walls lose most heat	1
				6
8.	(a)	4.4	1	
	(b)	10 (count/s) (1) Any 1× (1) from: All radiation from source stopped by paper, [so only background remains] / Graph flattens at 10 units / accept cand. showing on graph	2	
	(c)	β / beta (1) α is stopped by [thin] paper [but β is not] / γ would not show any attenuation [however expressed] [accept any correct and relevant reference to different penetration.] (1) [2 nd mark only available if 1 st mark is given.]	2	
			5	

Question		Answer / Explanatory Notes	Marks Available
9.	(a)	<p>Any 2 × (1) from</p> <ul style="list-style-type: none"> • Supply to grid can vary to match demand ✓ • all power stations connected to grid ✓ • can cope if one breaks down. ✓ 	2
	(b)	<p>Indicative content: Transformers are used to step-up voltage, resulting in decreased current so less energy loss along cables. Then step-down transformer reduces voltage to consumer, because high voltages are dangerous in the home. The use of step-up and step-down transformers makes for more-efficient energy transfer.</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>0 marks The candidate does not make any attempt or give a relevant answer worthy of credit.</p>	6
10.	(i)	<p>A = 700 kWh Conversion to kW (1) Answer (1) [700 → 2 marks; 700000 → (1)] B = [£]84 (1) [e.c.f. from A, if 8400 must be 8400 p]</p>	3
	(ii)	<p>Cost of buying 5 CFL = [£]12.50 (1) [no e.c.f.] Total cost for 5 CFLs = [£]96.50 (1) [e.c.f. from B, allow 9650]</p>	2
Total marks for Foundation Tier			8
Total marks for Foundation Tier			60