Rewarding Learning

General Certificate of Secondary Education
2017

Double Award Science: Physics

Unit P2

Foundation Tier

[GSD61]

MONDAY 19 JUNE, MORNING

MARK SCHEME

Subject-specific Instructions

In numerical problems, the marks for the intermediate steps shown in the mark scheme are for the benefit of candidates who do not obtain the final correct answer. A correct answer and unit, if obtained from a valid starting-point, gets full credit, even if all the intermediate steps are not shown. It is not necessary to quote correct units for intermediate numerical quantities.

Note that this “correct answer” rule does not apply for formal proofs and derivations, which must be valid in all stages to obtain full credit.

Do not reward wrong physics. No credit is given for consistent substitution of numerical data, or subsequent arithmetic, **in a physically incorrect equation**. However, answers to subsequent stages of questions that are consistent with an earlier incorrect numerical answer, and are based on physically correct equation, must gain full credit. Designate this by writing **ECF** (Error Carried Forward) by your text marks.

The normal penalty for an arithmetical and/or unit error is to lose the mark(s) for the answer/unit line. Substitution errors lose both the substitution and answer marks, but 10^n errors (e.g. writing 550 nm as 550×10^{-6} m) count only as arithmetical slips and lose the answer mark.

					AVAILABLE MARKS
1	(a)	Two horizontal 'legs' of Z correct [1] angled 'leg' shows correct lateral inversion [1] Same distance behind, as object is in front [1]	marked independently	[3]	
	(b) (i)	X-rays, [1] Light or Visible, [1] Microwaves [1]		[3]	
	(ii)	causes cancer/damage to DNA		[1]	
	(iii)	suntan		[1]	8
2	(a)	**electrons move** – Threshold mark [1] from balloon (dependent on first mark) [1]		[2]	
	(b) (i)	Like charges/negative charges **repel**		[1]	
	(ii)	Positive (charge)		[1]	
	(iii)	to attract the (negative) droplets/unlike charges attract		[1]	
	(c)	coulomb or C		[1]	6
3	(a)	Longitudinal		[1]	
	(b)	5 (cm)		[1]	
	(c)	Sound/ultrasound		[1]	
	(d) (i)	Speed = Frequency × Wavelength or $v = f \times \lambda$ [1] Speed = 9 × 20 [1] Speed = 180 (cm/s) [1]		[3]	
	(ii)	Frequency = Number of waves (passing a point) in 1 second [1] Number of times = 18 [1]		[2]	
	(iii)	(Distance) (=) 20 × 4 [1] = 80 (cm) [1]		[2]	10

							AVAILABLE MARKS
4	**(a)**	**(i)**	P ammeter	[1]			
			Q voltmeter	[1]			
			Correct symbols	[1]	[3]		
		(ii)	variable resistor or rheostat,	[1]			
			symbol	[1]	[2]		
		(iii)	To vary current/enable a number of readings/to allow a graph to be plotted – dependent on **(a)(ii)**		[1]		
		(iv)	Arrow from left to right in the **box**		[1]		
	(b)	**(i)**	As current increases resistance increases		[1]		
			As current decreases the resistance decreases				
		(ii)	6.2 (Ω)		[1]		
		(iii)	V = I R	[1]			
			= 0.7 × 12 [1], [1]				
			= 8.4 (V)	[1]	[4]		13
5	**(a)**	**(i)**	$I = \frac{P}{V}$ or equivalent	[1]			
			$= \frac{1920}{240}$	[1]			
			= 8 (A)	[1]	[3]		
		(ii)	13 amp fuse (e.c.f. from **(a)(i)**)		[1]		
	(b)	**(i)**	Energy = P × t or No: of kWhr = No. of kW × No. of hours	[1]			
			= 2.5 [1] × 2 [1]	[2]			
			= 5	[1]	[4]		
		(ii)	5 (ecf) from **(b)(i)**		[1]		9
6	**(a)**	**(i)**	T_2 **(ii)** T_2 **(iii)** A **(iv)** B	[1] each	[4]		
	(b)	**(i)**	LH coil is secondary,	[1]			
			RH coil is primary	[1]			
			Core	[1]	[3]		
		(ii)	iron **core**		[1]		
		(iii)	electromagnetic induction		[1]		9

						AVAILABLE MARKS
7	(a)	(i)	Neptune	[1]		
			Venus	[1]	[2]	
		(ii)	Moon		[1]	
		(iii)	Mercury, Earth, Uranus [1] each		[3]	
	(b)	(i)	man-made/launched/put into space	[1]		
		(ii)	two from communication, weather monitoring, astronomy, observation of the Earth	[2]	[3]	
	(c)	(i)	gas/hydrogen/dust		[1]	
		(ii)	hydrogen		[1]	
		(iii)	gravity/gravitational force		[1]	12
8	(i)		0.5		[1]	
	(ii)		Entry “1” circled		[1]	
	(iii)		Half graph used	[1]		
			Mass/g	[1]	[2]	
	(iv)		4 correct	[2]		
			3 correct	[1]	[2]	
	(v)		Best fit line		[1]	
	(vi)		**Yes** (no marks) If “No” forfeits [2]			
			1. Straight line/constant gradient	[1]		
			2. through origin (either order) (0,0)	[1]	[2]	
	(vii)		k = grad	[1]		
			= $\frac{2.5}{250}$ (or alt.)	[1]		
			= 0.01	[1]		
			N/g	[1]	[4]	13

AVAILABLE MARKS

9 **(a)** A Crust B Mantle C Outer core D Inner core [4]

(b) **(i)** Volcanoes:
Plates move/subduct
(Molten) magma/lava (formed)
Flows through rift/or to surface

(ii) Earthquakes:
Plates move
Plates stick, snag, catch, stuck
Plates separate suddenly or lurch apart

Response	Marks
Candidates explain **5 or 6** of the above points. They use good spelling, punctuation and grammar. The form and style are of a high standard and specialist terms are used appropriately.	[5]–[6]
Candidates explain **3 or 4** of the above points. They use satisfactory spelling, punctuation and grammar. The form and style are of a satisfactory standard and they have made use of some specialist terms.	[3]–[4]
Candidates explain **1 or 2** of the of the above points. They use limited spelling, punctuation and grammar. The form and style are of a limited standard and they have made no use of specialist terms.	[1]–[2]
Response not worthy of credit.	[0]

[6] 10

Total **90**