Rewarding Learning

General Certificate of Secondary Education
2018

Double Award Science: Physics

Unit P2

Higher Tier

[GSD62]

FRIDAY 15 JUNE, MORNING

MARK SCHEME

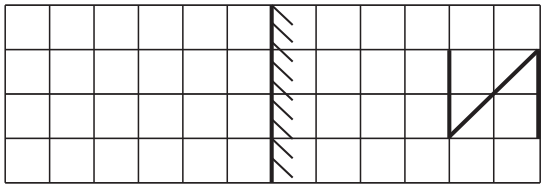
Subject-specific Instructions

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)**	**(i)**	Longitudinal	[1]	
		(ii)	Particles vibrate [1] parallel or left to right [1]	[2]	
	(b)	**(i)**	Energy [1]		
		(ii)	Transverse [1]		
		(iii)	Amplitude = 2 m [1] Wavelength = 4 m [1]	[4]	
	(c)	**(i)**	Frequency = Nº of waves in 1 second [1] f = 60/120 [1] = 0.5 (Hz) [1]	[3]	
		(ii)	$v = f \times \lambda$ [1] = 0.5 × 6 [1] ecf from **(c)(i)** = 3 m/s [1]	[3]	13
2	**(a)**	Same distance [1] same size [1] and laterally inverted [1]			
				[3]	
	(b)	**(i)**	(Speed) decreases [1]		
		(ii)	Dispersion [1]		
		(iii)	Spectrum [1]		
		(iv)	Violet [1]	[4]	
	(c)	**(i)**	See bones [1]		
		(ii)	Cancer [1]	[2]	
	(d)	dis = speed × time [1] dis = 1500 × 5 [1] dis = 7500 [1] (m) d = 3750 [1] (m)		[4]	13

AVAILABLE MARKS

3 **(a)** Heliocentric [1]
Geocentric [1]
Sun [1] linked to Heliocentric
Earth [1] linked to Geocentric
Heliocentric [1] linked to modern theory
Gravity [1] [6]

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 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]

(b) asteroids [1] comets [1] [2] 8

4 **(i)** 1 (4) 9 16 25 [$\frac{1}{2}$] each round up [2]

(ii) Scale at least half [1] Label with units [1] [2]

(iii) At least 4 points [2] 3 points [1] [2]

(iv) Best fit line [1]

(v) Yes ticked (no marks) Straight line [1], through origin [1] [2]

(vi) $v^2 = 20$ [1] [3] 12
$v = \sqrt{20}$ [1]
$v = 4.5$ [1]

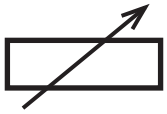
5 **(a)** **(i)** friction [1]

(ii) electrons [1] move from comb [1]
or electrons [1] move to hair [1] [2]

(b) Like charges [1]
repel [1] [2]

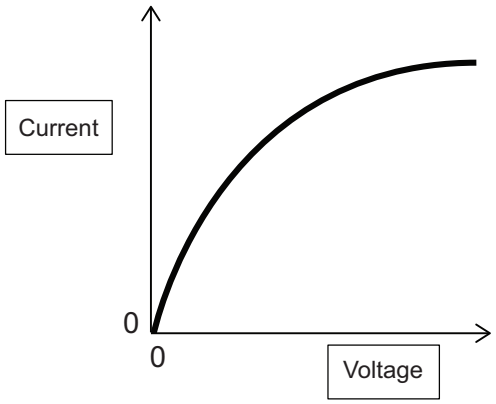
(c) Q = It [1]
= 0.4 × 300 [2]
=120 [1] C [1] [5]

(d) **(i)** Variable resistor [1]



(ii) Provide a range of readings or change the current [1]

(e) Curve of decreasing positive grad [1] through origin [1]



[2]

(f) (Resistance) increases [1]

15

AVAILABLE MARKS

AVAILABLE MARKS

6 **(a)** **(i)** R = prod/sum [1]
= 18/9 [1]
= 2 [1]
R_t = 6 (Ω) [1]

or

1/R = $1/R_1 + 1/R_2$ [1]
1/R = 1/6 + 1/3 [1]
R = 2 [1]
R_t = 6 (Ω) [1] [4]

(ii) 20 (mA) [1]
40 (mA) [1] [2]

(b) R = V/I [1]
= 3/0.2 [2]
= 15 (Ω) [1] [4]

(c) $t = \frac{E}{P}$ [1]

$t = \frac{432\,000}{2\,880}$ [2]

t = 150 s [1] [4] 14

7 **(a)**

Procedure	Observation
S pole of magnet withdrawn from the coil	(Mom) deflection to the right
Coil moved towards S pole of magnet	(Mom) deflection to the left
Coil remains at rest over the magnet	No deflection

[3]

(b) **(i)** Step-up [1]

(ii) Reduce the energy lost [1] [2]

(c) **(i)** $\frac{N_p}{N_s} = \frac{V_p}{V_s}$ [1]

$\frac{1800}{270} = \frac{240}{V_s}$ [1]

V_s = 36 V [1] [3]

(ii) Increase N_s or decrease N_p [1] [1] 9

8 crust [1] + solid portion of upper mantle [1]
outer core [1] liquid [1]
inner core [1] solid [1]

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 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] 6

Total **90**

AVAILABLE MARKS