Rewarding Learning

**General Certificate of Secondary Education
2012–2013**

Double Award Science: Physics

Unit P1

Foundation Tier

[GSD31]

THURSDAY 23 MAY 2013, 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)**	chemical	[1]	
		electrical to sound **reject** 'noise'	[2]	
		chemical to kinetic	[2]	
	(b)	kinetic/movement and potential/gravitational **reject** 'gravity'	[2]	7

2 (a) The **point** [1]   [threshold mark]
where **weight** (appears) to act [1]   [2]

(b) (i) A is more stable than B (✓)   [1]

(ii) Lower centre of gravity (dependent marking from **(i)**)   [1]   4

3 (a) (i) 2 (times)   [1]

(ii) $1\frac{1}{4}$ (hours) or 1.25   [1]

(b) (av) sp = (total) dist/(total) time [1] or s = d/t
= 20/2 [1]
= 10 (km/h) [1]   [3]   5

4 (a) 18.5 N to 1.85 kg [1]
Addition of 0.75 and 0.5 to give 1.25 kg [1]
Subtraction of 1.25 from 1.85 to get 0.6 [1]   [3]
or
0.75 + 0.5 = 1.25 (kg) [1]
18.5 − 12.5 = 6 (N) [1]
mass = 0.6 (kg) [1]

(b) (i) 18.5 (N)   [1]

(ii) 18.5 (N) ecf from **(i)**   [1]

(iii) upwards or up or ↑ but **not** NORTH   [1]   6

5 (a) (i) B   [1]

(ii) Heat added [1]
Heat removed [1]   [2]

(b)

density
1000
0.6
931

[3]   6

6 (a) (i) (mass number) 35 [1]
(atomic number) 17 [1]   [2]

(ii) P and S   [1]

(iii) same atomic number/proton number (<u>threshold mark</u>) [1]
different mass number/neutron number [1]   [2]

(b) (i) They are unstable   [1]

(ii) alpha [1]   particle [1]
beta [1]   particle [1]
gamma [1] (e.m.) wave [1] or e.m.   [6]

12

7 (a) • Timer or stop watch or stop clock, measuring tape or metre stick, scales/balance
(any 2) [1] each to max. of [2]
• Measure: height raised, time taken, weight to be lifted
(any 2) to max. of [2]

• Power = $\dfrac{\text{work}}{\text{time}}$ WRONG CONCEPT? then [2]/[6] max.

Response	Mark
Candidates mention at least **5** 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 at least **3** 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** 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]

(b) Moment = force × distance [1]
M = 20 × 45 [1]   **or**   M = 20 × 0.45 [1]
= 900 [1]   = 9 [1]
= N cm [1]   = N m [1]   [4]
i.e. consistent units of distance – must be correct for unit mark
<u>Unit can be credited on its own</u>

10

8 **(a)** 5 entries – [$\frac{1}{2}$] each round down:
0.0, 0.3, 1.0, 2.3, 6.3 [2]

(b) Choice of scale [1] and label (I^2 in A^2) [1]
Points plotted – 5 or 6 correct [2], 4 correct [1] [4]

(c) Best fit line   Curve can get e.c.f. [1]

(d) k = grad [1] or equivalent
= 8/4 (or other) [1] or picks pair of coordinates from table or graph
= 2 [1]   Tolerance ±0.1
Unit: J/A^2 [1] [4]

11

9 **(a)** **(i)** Friction/drag   **not** resistance [1]

(ii) During AB – X is less than W [1] bottom box ticked
During BC – The two forces are equal [1] middle box ticked [2]

(b) **(i)** Depth = area under line [1]   **or** A = $\frac{1}{2}$ (a+b) h
= (2 × 8)/2 + (8 × 8) [1]   **or** $\frac{1}{2}$ (8+10) 8
= 72 (cm) [1] [3]

(ii) Momentum = m × v [1]
= 0.2 × 8 [1]
= 1.6 (g cm/s) [1]   **no** ecf for v [3]

9

Total **70**