



*Rewarding Learning*

**General Certificate of Secondary Education  
2014–2015**

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**Double Award Science: Physics**

Unit P1

Higher Tier

**[GSD32]**

**FRIDAY 14 NOVEMBER 2014, MORNING**

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**MARK  
SCHEME**

## General Marking Instructions

### Introduction

Mark schemes are published to assist teachers and students in their preparation for examinations. Through the mark schemes teachers and students will be able to see what examiners are looking for in response to questions and exactly where the marks have been awarded. The publishing of the mark schemes may help to show that examiners are not concerned about finding out what a student does not know but rather with rewarding students for what they do know.

### The Purpose of Mark Schemes

Examination papers are set and revised by teams of examiners and revisers appointed by the Council. The teams of examiners and revisers include experienced teachers who are familiar with the level and standards expected of students in schools and colleges.

The job of the examiners is to set the questions and the mark schemes; and the job of the revisers is to review the questions and mark schemes commenting on a large range of issues about which they must be satisfied before the question papers and mark schemes are finalised.

The questions and the mark schemes are developed in association with each other so that the issues of differentiation and positive achievement can be addressed right from the start. Mark schemes, therefore, are regarded as part of an integral process which begins with the setting of questions and ends with the marking of the examination.

The main purpose of the mark scheme is to provide a uniform basis for the marking process so that all the markers are following exactly the same instructions and making the same judgements in so far as this is possible. Before marking begins a standardising meeting is held where all the markers are briefed using the mark scheme and samples of the students' work in the form of scripts. Consideration is also given at this stage to any comments on the operational papers received from teachers and their organisations. During this meeting, and up to and including the end of the marking, there is provision for amendments to be made to the mark scheme. What is published represents this final form of the mark scheme.

It is important to recognise that in some cases there may well be other correct responses which are equally acceptable to those published: the mark scheme can only cover those responses which emerged in the examination. There may also be instances where certain judgements may have to be left to the experience of the examiner, for example, where there is no absolute correct response – all teachers will be familiar with making such judgements.

- 1 (a) loss or gain electron(s) [1]
- (b) Any **two** from:
- shielding (e.g. use gloves/goggles/glass shield)
  - keep at a distance (e.g. use tongs/robotic arms)
  - keep exposure time small/work quickly
- Reject** radiation badge **or** store in lead boxes  
[1] × 2 [2]
- (c) (i) Mass number **or** Atomic Mass number **or** Nucleon number [1]
- (ii) 240 → 120 → 60 → 30  
One halving [1] mark,  
3 half-lives identified/halving to 30 but **no** further [1]  
15 (y) [1] [3]
- 2 (a) Weight of person measured (or mass × 10)  
with scale(s)/balance/newtonmeter  
Height of one step measured and multiplied by no. of steps/total height  
with metre rule **or** ruler **or** metre stick  
Time to run up steps **or** go up steps  
with stopwatch/stopclock timer [6]

Response	Mark
Candidates describe <b>5 or 6</b> 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 describe <b>3 or 4</b> 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 describe <b>1 or 2</b> 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) (i)  $P = w/t$  [1]  
 $= (400 \times 6)/3$  [1]  
 $= 800 (W)$  [1] [3]
- (ii) 0.8(kW) e.c.f. from (b)(i) [1]

AVAILABLE  
MARKS

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3 (i)	No. of blocks	1	2	3	4	5
	Weight/N	20	40	60	80	100
	Area/m <sup>2</sup>	1.5	1.5	1.5	1.5	1.5
	Pressure/N/m <sup>2</sup>	13	<b>27</b>	<b>40</b>	<b>53</b>	<b>67</b>

$[\frac{1}{2}] \times 4$  (round up) [2]

(ii) Scale at least half [1] axis labelled with units [1] N/m<sup>2</sup> = Pa [2]

(iii) At least four points [2] Three points [1] [2]

(iv) Best fit line [1]

(v) Evidence from graph [1] 4 blocks [1] (4 blocks get 2/2 immediately)  
Min. evidence = 1 horizontal or vertical line or point on graph [2]

(vi) Gradient =  $\Delta y/\Delta x$  or similar [1]  
= any value between 0.6–0.7 [1] [2]

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4 (i) Eff = Useful output energy/input energy [1]  
0.8 = o/p / 500 (or equivalent) [1]  
o/p = 400 (J) [1] [3]

(ii) Less (fossil) fuel consumption [1]  
Less atmospheric pollution **or** reduces carbon footprint [1]  
Resource free  
Renewable  
**Reject** economic arguments [2]

5

5 (a) 0–20 s: Acceleration **or** uniformly increasing velocity  
**Not** deceleration [1]

20–25 s: Constant (or uniform or steady) **velocity** [1]

(b) Total displacement = area under graph [1]  
=  $(0.5 \times 17 \times 20)$  [1] +  $(17 \times 5)$  [1]  
= 255(m) [1] [4]

(c) (Av.) Vel. = (total) displac./ (total time) [1]  
=  $\frac{255}{25}$  (allow e.c.f. from (b)) [1]  
= 10.2(m/s) [1] [3]

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AVAILABLE MARKS
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5
9



10 (a) K.E. =  $\frac{1}{2} m v^2$  [1]

$$72 = \frac{1}{2} 0.16 v^2 \text{ [1]}$$

Any re-arrangement  
with one unknown [1]

$$v = 30 \text{ (m/s) [1]}$$

$$\text{or } v^2 = \frac{2 \text{ K.E.}}{m} \text{ [1] or } v = \sqrt{\frac{2 \text{ K.E.}}{m}}$$

$$v^2 = \frac{2 \times 72}{0.16} \text{ [2] (1 for each sub line)}$$

$$v = 30 \text{ (m/s) [1] [4]}$$

(b) Momentum = mass  $\times$  velocity [1]

$$\text{vel} = \frac{3}{0.15} \text{ [1] or equivalent}$$

$$\text{vel} = 20 \text{ (m/s) [1] [3]}$$

**Total**

**AVAILABLE  
MARKS**

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**70**