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General Certificate of Secondary Education

Additional Science 4463 / Physics 4451

PHY2F Unit Physics 2

Final Mark Scheme

2010 Examination – June Series

Mark schemes are prepared by the Principal Examiner and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation meeting attended by all examiners and is the scheme which was used by them in this examination. The standardisation meeting ensures that the mark scheme covers the candidates' responses to questions and that every examiner understands and applies it in the same correct way. As preparation for the standardisation meeting each examiner analyses a number of candidates' scripts: alternative answers not already covered by the mark scheme are discussed at the meeting and legislated for. If, after this meeting, examiners encounter unusual answers which have not been discussed at the meeting they are required to refer these to the Principal Examiner.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of candidates' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

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Marking Guidance for Examiners

GCSE Science Papers

1. General

The mark scheme for each question shows:

- the marks available for each part of the question
- the total marks available for the question
- the typical answer or answers which are expected
- extra information to help the Examiner make his or her judgement and help to delineate what is acceptable or not worthy of credit or, in discursive answers, to give an overview of the area in which a mark or marks may be awarded.

The extra information is aligned to the appropriate answer in the left-hand part of the mark scheme and should only be applied to that item in the mark scheme.

At the beginning of a part of a question a reminder may be given, for example:

where consequential marking needs to be considered in a calculation;

or the answer may be on the diagram or at a different place on the script.

In general the right hand side of the mark scheme is there to provide those extra details which confuse the main part of the mark scheme yet may be helpful in ensuring that marking is straightforward and consistent.

2. Emboldening

2.1 In a list of acceptable answers where more than one mark is available 'any **two** from' is used, with the number of marks emboldened. Each of the following lines is a potential mark.

2.2 A bold **and** is used to indicate that both parts of the answer are required to award the mark.

2.3 Alternative answers acceptable for a mark are indicated by the use of **or**. (Different terms in the mark scheme are shown by a / ; eg allow smooth / free movement.)

3. Marking points

3.1 Marking of lists

This applies to questions requiring a set number of responses, but for which candidates have provided extra responses. The general principle to be followed in such a situation is that 'right + wrong = wrong'.

Each error/contradiction negates each correct response. So, if the number of error/contradictions equals or exceeds the number of marks available for the question, no marks can be awarded.

However, responses considered to be neutral (indicated as * in example 1) are not penalised.

Example 1: What is the pH of an acidic solution? (1 mark)

Candidate	Response	Marks awarded
1	4,8	0
2	green, 5	0
3	red*, 5	1
4	red*, 8	0

Example 2: Name two planets in the solar system. (2 marks)

Candidate	Response	Marks awarded
1	Pluto, Mars, Moon	1
2	Pluto, Sun, Mars, Moon	0

3.2 Use of chemical symbols / formulae

If a candidate writes a chemical symbol / formula instead of a required chemical name, full credit can be given if the symbol / formula is correct and if, in the context of the question, such action is appropriate.

3.3 Marking procedure for calculations

Full marks can be given for a correct numerical answer, as shown in the column 'answers', without any working shown.

However if the answer is incorrect, mark(s) can be gained by correct

substitution / working and this is shown in the 'extra information' column;

3.4 Interpretation of 'it'

Answers using the word 'it' should be given credit only if it is clear that the 'it' refers to the correct subject.

3.5 Errors carried forward

Any error in the answers to a structured question should be penalised once only.

Papers should be constructed in such a way that the number of times errors can be carried forward are kept to a minimum. Allowances for errors carried forward are most likely to be restricted to calculation questions and should be shown by the abbreviation e.c.f. in the marking scheme.

3.6 Phonetic spelling

The phonetic spelling of correct scientific terminology should be credited **unless** there is a possible confusion with another technical term.

3.7 Brackets

(…..) are used to indicate information which is not essential for the mark to be awarded but is included to help the examiner identify the sense of the answer required.

3.8 Unexpected Correct Answers not in the Mark Scheme

The Examiner should use the **?** area in the CMI+ software to forward such answers to a Senior Examiner.

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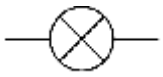
Question 1

question	answers	extra information	mark
1(a)		accept 'the humpback bridge' symbol accept circle with cross but no lines if more than one symbol drawn, no mark unless lamp is labelled	1
1(b)(i)	24	allow **1** mark for correct substitution ie $\frac{2880}{120}$ allow **1** mark for an answer 1440 ignore any unit	2
1(b)(ii)	watt		1
1(c)	larger than	accept correct indication inside the box accept an answer meaning larger than ie greater than	1
Total			**5**

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Question 2

question	answers	extra information	mark
2	**L** **N** **M** **K**	all four in the correct order **2** marks for 2 correct **1** mark for 1 correct	3
Total			**3**

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Question 3

question	answers	extra information	mark
3(a)	distance travelled under the braking force	accept braking (distance)	1
3(b)	(directly) proportional **or** increase in the same ratio	accept a correct description using figures eg if speed doubles then thinking <u>distance</u> doubles accept for **1** mark positive correlation accept for **1** mark as speed increases so does thinking <u>distance</u> accept as one increases the other increases accept as thinking <u>distance</u> increases speed increases	2
3(c)(i)	control variable		1
3(c)(ii)	experiment done, student listens to music / ipod (etc) experiment (repeated), student not listening to music	 for both marks to be awarded there must be a comparison	1 1
3(d)	increase it	accept an answer which implies reactions are slower do **not** accept answers in terms of thinking distance only	1
3(e)	**Y**		1
Total			**8**

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Question 4

question	answers	extra information	mark
4(a)(i)	negative	accept minus **or** – (ve) do **not** accept electron/s	1
4(a)(ii)	positive	accept plus **or** + (ve) allow this mark if (a)(i) and (a)(ii) are given the wrong way around	1
4(b)	Objects carrying the same type of charge **repel**. **or** Objects carrying the **opposite** type of charge attract.	do **not** accept unattract for repel accept **different** for opposite allow credit if candidates change more than one word but final statement is equivalent to one of these two.	1
4(c)	1 photoconducting 3 charge 4 attracts		1 1 1
4(d)	accept anything feasible eg paint spraying / crop spraying / (electrostatic) precipitator / making sandpaper / a printer	accept a reasonable description of a process do **not** accept scanner on its own do **not** accept paint car / paint bicycle on its own must be use, **not** demonstration of charge ie rubbing a balloon and sticking to a wall is incorrect	1
Total			**7**

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Question 5

question	answers	extra information	mark
5(a)(i)	connect the earth wire (to pin) screw cable grip (across cable)	answers must be in terms of correcting the faults accept tighten the cable grip	1 1
5(a)(ii)	earth (wire)	accept the green and yellow (wire)	1
5(a)(iii)	any **two** from: • fuse gets (very) hot • fuse melts • circuit breaks/ switches off	 accept blows for melts do **not** accept break / snap fuse / blow up accept stops current flowing	2
5(b)	any **two** from: • hairdryer is plugged into mains (electricity socket) **or** hairdryer is using 230 V • water conducts electricity • radio is low power / current / pd / voltage • (the current in / p.d. across) hairdryer more likely to give a (fatal) electric shock	it refers to hairdryer hairdryer works from the mains accept 240 for 230 do **not** accept water and electricity don't mix accept radio not connected to the mains do **not** accept radio is waterproof accept the idea of electrocution if hairdryer is wet accept the idea of radio not causing electrocution if wet	2
Total			**7**

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Question 6

question	answers	extra information	mark
6(a)(i)	75 000 newtons / N	accept correct substitution for **1** mark ie 7500 × 10 do **not** accept n full credit for using g = 9.8 **or** 9.81	2 1
6(a)(ii)	60 000 000	accept for both marks their (a)(i) × 800 correctly calculated accept correct substitution for **1** mark ie their (a)(i) × 800	2
6(b)(i)	arrow drawn parallel (to) **and** down (the) slope	accept arrow drawn anywhere on the diagram	1
6(b)(ii)	increases GPE transformed to KE **or** speed increasing	 accept is accelerating however 'speed increasing' only scores if correctly linked to increasing kinetic energy	1 1
6(c)	so more likely to wear one **or** they know wearing a helmet is likely to / will reduce (risk) head injury **or** so can make an (informed) choice (about wearing one)		1
Total			**9**

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Question 7

question	answers	extra information	mark
7(a)(i)	2.5		1
7(a)(ii)	The radiation dose from natural sources is much greater than from artificial sources.		1
7(b)(i)	other factors may be involved	accept a specific suggestion eg they may be exposed to other types of radiation accept cannot be sure (in many cases) that the cause of death is radon (poisoning)	1
7(b)(ii)	any **one** from: • different concentrations in different rooms • to average out daily fluctuations	 accept to find an average accept to make the result (more) reliable / valid do **not** accept to make more accurate on its own	1
7(b)(iii)	average level (much) higher (in **C** and **D**) some homes have very high level (in **C** and **D**) **or** maximum level in some homes (in **C** and **D**) is very high	accept converse accept maximum level in **A** and **B** is low accept higher radiation levels (in **C** and **D**) for **1** mark	1 1
Total			**6**