AQA Level 1/2 Certificate in Science: Double Award

PHYSICS PAPER 2F

SPECIMEN MARK SCHEME

MARK SCHEME

Information to Examiners

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.

4. Quality of communication and levels marking

In Question 6 candidates are required to produce extended written material in English, and will be assessed on the quality of their written communication as well as the standard of the scientific response.

Candidates will be required to:

- use good English
- organise information clearly
- use specialist vocabulary where appropriate.

The following general criteria should be used to assign marks to a level:

Level 1: basic

- Knowledge of basic information
- Simple understanding
- The answer is poorly organised, with almost no specialist terms and their use demonstrating a general lack of understanding of their meaning, little or no detail
- The spelling, punctuation and grammar are very weak.

Level 2: clear

- Knowledge of accurate information
- Clear understanding
- The answer has some structure and organisation, use of specialist terms has been attempted but not always accurately, some detail is given
- There is reasonable accuracy in spelling, punctuation and grammar, although there may still be some errors.

Level 3: detailed

- Knowledge of accurate information appropriately contextualised
- Detailed understanding, supported by relevant evidence and examples
- Answer is coherent and in an organised, logical sequence, containing a wide range of appropriate or relevant specialist terms used accurately.
- The answer shows almost faultless spelling, punctuation and grammar.

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question	answers	extra information	mark
1(a)	**C**		1
1(b)(i)	**beta**	**accept** gamma if answer alpha can still gain marks for saying why not beta or gamma	1
1(b)(ii)	any **two** from: • range in air for beta is (at least) 50 cm • count rate does not drop (much) in first 40 cm • count rate does not fall much until distance is 60 cm • alphas cannot travel more than 5 cm in air / alphas could not travel 100 cm in air • alphas would not be detected • gammas not absorbed by 100 cm of air	must have at least one quantitative statement to get **2** marks accept alphas cannot travel that far accept gammas not stopped by air accept gammas travel further than alphas and betas strength of source is neutral references to penetrating power is neutral	2

Question 1 continues on the next page . . .

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Question 1 continued . . .

question	answers	extra information	mark
1(c)	The scientists agree that: as the level of exposure increases the risk increases The scientists disagree: scientist **A** thinks that a very low level of exposure gives some risk scientist **B** thinks that a very low level of exposure gives no risk		 1 1 1
1(d)(i)	0.3		1
1(d)(ii)	The radiation dose from natural sources is much greater than from artificial sources.		1
1(e)(i)	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 1
1(e)(ii)	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			**13**

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question	answers	extra information	mark
2(a)	130 x 25 = 3250 kg m/s	accept correct substitution for **1** mark	2 1
2(b)(i)	the thicker the tile, the greater the(fall) height	accept the higher(the fall) the thicker the tile accept there is a positive correlation do **not** accept they are proportional	1
2(b)(ii)	minimum thickness = 60(mm) because (minimum thickness) needed to reduce risk of injury		1 1
2(c)(i)	the time taken (to stop)		1
2(c)(ii)	(the) force (on)		1
Total			**8**

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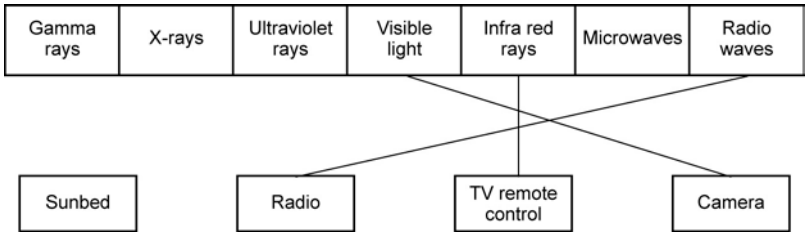
question	answers	extra information	mark
3(a)	reflection at first mirror reflection at second mirror all arrowheads drawn in the correct direction	correct reflection at mirror angle of incidence = angle of reflection judged by eye	1 1 1
3(b)	all three lines correct  allow **1** mark for each correct line if more than one line goes from a device then all lines from that device are wrong		3
3(c)(i)	<u>skin</u> cancer	do **not** accept just cancer do **not** accept sunburn correct answer only	1

Question 3 continues on the next page . . .

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Question 3 continued . . .

question	answers	extra information	mark
3(c)(ii)	because other factors may be involved	accept may have been in the Sun too long accept (over)-use of sunbeds and (over)-exposure to the Sun (both) give the same symptoms accept any other sensible factor that could lead to doubt do **not** accept irrelevant answers eg may be run over by a car do **not** accept large numbers killed by exposure to the Sun	1
3(c)(iii)	so can assess risk **or** make own decision	answers should be in terms of assessing your own health risk accept so you limit its use / don't use one do **not** accept so you don't get skin cancer do **not** accept so you don't get sunburn	1
Total			**9**

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question	answers	extra information	mark
4(a)	**D**		1
4(b)	in the event of a fault the 13 A fuse will allow too much current to flow so the fuse may not melt before the circuit is damaged	 accept appliance / wiring for circuit	1 1
4(c)	230 50		1 1
4(d)(i)	to protect the user	accept to leak a large current to Earth	1
4(d)(ii)	(because it) has a plastic case **or** does not have a metal case **or** plastic is an insulator	accept outside is plastic accept cover / handle / hair dryer is plastic / non-conductor accept is double insulated	1
4(d)(iii)	copper		1
Total			**8**

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question	answers	extra information	mark
5(a)(i)	any **one** from: • tiredness • alcohol • drugs		1
5(a)(ii)	(the speed is) directly proportional (to the thinking distance) **or** if speed doubles then thinking distance doubles	accept for **1** mark: • positive correlation • as speed increases so does thinking distance • as thinking distance increases speed increases • as one increases the other increases	2
5(a)(iii)	**Y**		1
5(b)(i)	dependent variable		1
5(b)(ii)	experiment done, with student listening to music / iPod (etc) compare result with experiment (repeated), when student not listening to music	 for both marks to be awarded there must be a comparison	1 1

Question 5 continues on the next page . . .

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Question 5 continued . . .

question	answers	extra information	mark
5(b)(iii)	any **three** from: • type of music • volume of music • distance of ruler above student's hand • use same ruler • wearing / not wearing headphones • same number of girls / boys tested or all students the same gender • listening to music for same amount of time • all students same age		3
Total			**10**

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question	answers	extra information	mark

6

Marks awarded for this answer will be determined by the quality of communication as well as the standard of the scientific response. Examiners should also refer to the information on page 4 and apply a best-fit approach to the marking.

0 marks	Level 1 (1–2 marks)	Level 2 (3–4 marks)	Level 3 (5–6 marks)
No relevant content.	There is a basic description of the method or a risk assessment.	There is a clear description of the method that includes a risk assessment.	There is a clear, balanced detailed description of the method and a risk assessment.

examples of the physics points made in the response:

- measure the length of the pendulum with a ruler
- pull the bob to one side and release
- time 10 swings / oscillations
- change the length of the pendulum and repeat
- divide each recorded time by 10
- do the experiment 5 times

examples of risk assessment points made in the response:

- ensure the mass of bob does not cause the retort stand to topple over
- ensure the angle of release does not cause the retort stand to become unstable
- ensure that movement of pendulum is away from other persons
- clamp retort stand to table / workbench

Total			6

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question	answers	extra information	mark
7(a)	metals have free electrons		1
	heating increases kinetic energy (KE) of the free electrons		1
	this kinetic energy is transferred through the metal by collisions		1
7(b)(i)	energy supplied is (very) variable / candle flickers due to draughts		1
7(b)(ii)	lead		
	because it takes the longest time for the wax to melt		1
	and so lead is the worst conductor / best insulator		1
Total			**6**