AQA Level 1/2 Certificate in Science: Double Award

PHYSICS PAPER 2H

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 4 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)	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
1(b)(i)	energy supplied is (very) variable / candle flickers due to draughts		1
1(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**

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question	answers	extra information	mark
2(a)(i)	Student **A** – incorrect – to show direct proportionality the line must be straight and go through the origin Student **B** – incorrect – to show a linear relationship the line must be straight **or** may be correct, random errors make it difficult to judge if a straight line should have been drawn		1 1
2(a)(ii)	1.4N		1
2(b)(i)	a single force that has the same effect as all the forces combined	accept all the forces added **or** the sum of the forces **or** overall force	1
2(b)(ii)	constant velocity **or** constant speed (in a straight line)	do **not** accept stationary	1
2(b)(iii)	$\frac{3600}{3}$ 1200	 correct answer with or without working gains **2** marks	1 1

Question 2 continues on the next page . . .

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Question 2 continued . . .

question	answers	extra information	mark
2(c)	both cars are travelling at the same initial velocity	accept converse throughout	1
	car **B** starts decelerating (0.8 seconds) after car **A**		1
	the thinking time for driver **B** is longer		1
	both cars decelerate at the same rate		1
	car **B** stops (0.8 seconds) after car **A**		1
	and travels (12 metres) further		1
2(d)	**Z**		1
	it gives a unique value of resistance for each force applied	accept different force values give a different resistance value accept answers in terms of why **X and Y** would not be best, eg **X** – same resistance value is obtained for 2 different force values **and** **Y** – all force values give the same resistance	1
	there is a linear relationship between resistance and force	do **not** accept force and resistance are (directly) proportional	1
Total			**16**

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question	answers	extra information	mark
3(a)(i)	curve drawn ignoring anomalous result		1
3(a)(ii)	120, 12.5 ringed		1
	thermometer / stop clock misread	allow parallax error human error is insufficient	1
3(a)(iii)	repeat the experiment twice more to obtain 3 sets of data		1
	and take a mean		1
3(a)(iv)	because the data is recorded more frequently / continuously		1
	and to a greater resolution		1
3(b)	there are attractive forces between molecules	accept particles for molecules	1
	only the fastest molecules have enough energy to break away from other molecules		1
	these molecules escape from the surface of the liquid		1
	therefore the average speed / energy of the remaining molecules goes down		1
	the lower the average speed / energy of molecules, the lower the temperature of the liquid		1

Question 3 continues on the next page . . .

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Question 3 continued . . .

question	answers	extra information	mark
3(c)	it reduces the cooling effect		1
	because the rate of evaporation of sweat / water decreases		1
Total			**14**

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question	answers	extra information	mark

4

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
5(a)	latent heat is evolved / transferred because (the substance is) changing from a liquid to a solid	 accept because (the substance is) changing state	1 1
5(b)	3.3 x 10^5 (330 000) joules of energy are needed to change 1 kg of pure ice at 0 °C to water at 0°C	accept in terms of energy evolved / transferred in changing from water to ice at 0°C	1
5(c)(i)	acts as a control allowing the amount of ice melted without the heater to be measured **or** allowing the amount of ice melted by the air temperature to be measured		1 1
5(c)(ii)	using correct mass and changing to kg, ie 0.039 4.4 × 10^5 **or** 440 000	 correct answer with or without working gains **2** marks	1 1
5(c)(iii)	accept any sensible suggestions that would lead to less ice being melted by the heater than expected, eg: because heater not totally covered by ice **or** some energy used to warm heater itself **or** some energy lost to the surroundings / funnel		2
Total			**9**

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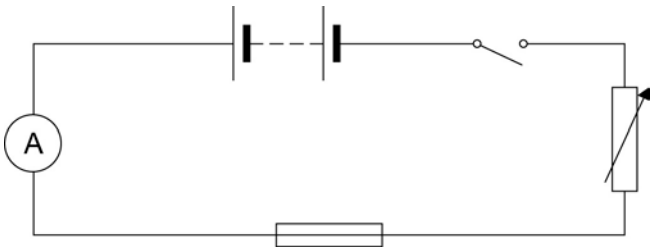
question	answers	extra information	mark
6(a)(i)	$\frac{500}{230}$ = 2.17 (A)	 or 2.2	1 1
6(a)(ii)	because if a fault occurs and the current exceeds its normal value the fuse would not melt / would not protect the wiring in the circuit		1 1
6(b)(i)	circuit correct in every detail ie all three circuit symbols correctly drawn in series with no gaps and no loose ends of wire  accept for **1** mark three correct circuit symbols but not correctly connected do **not** accept incorrect circuit symbols		2
6(b)(ii)	the current decreases as time increases and therefore the current is inversely proportional to the time		1 1
6(b)(iii)	it would not be possible to start and stop a stopwatch within 0.1 seconds		1
Total			**9**