



**General Certificate of Secondary Education
January 2013**

Additional Applied Science

AAS1FP

(Specification 4505)

Unit 1: Science at Work

FINAL

Mark Scheme

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 events which all examiners participate in and is the scheme which was used by them in this examination. The standardisation process ensures that the mark scheme covers the students' responses to questions and that every examiner understands and applies it in the same correct way. As preparation for standardisation each examiner analyses a number of students' scripts: alternative answers not already covered by the mark scheme are discussed and legislated for. If, after the standardisation process, examiners encounter unusual answers which have not been raised 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 students' 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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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. Boldening

- 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 boldened. Each of the following bullet points 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	green, 5	0
2	red*, 5	1
3	red*, 8	0

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

Candidate	Response	Marks awarded
1	Neptune, Mars, Moon	1
2	Neptune, 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, 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 or by each stage of a longer calculation.

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 Ignore / Insufficient / Do not allow

Ignore or insufficient is used when the information given is irrelevant to the question or not enough to gain the marking point. Any further correct amplification could gain the marking point.

Do **not** allow means that this is a wrong answer which, even if the correct answer is given, will still mean that the mark is not awarded.

Quality of Written Communication and levels marking

In Question 6(c) 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.

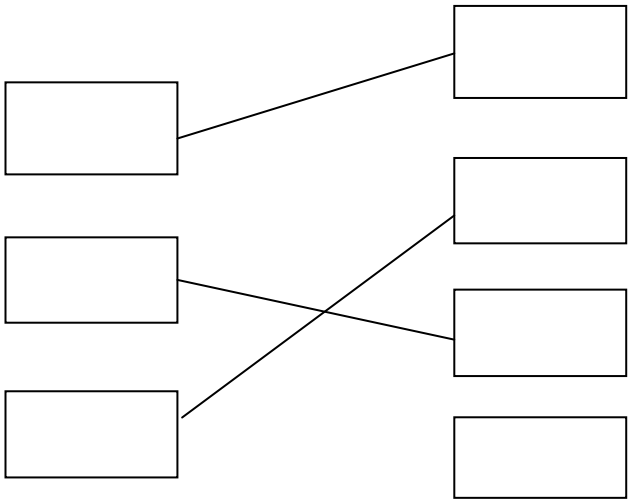
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Question 1

question	answer	extra information	mark
1(a)	foam		1
	water / foam		1
	carbon dioxide		1
1(b)	right-hand diagram ticked		1
Total			4

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Question 2

question	answer	extra information	mark
<p>2(a)</p>		<p>1 mark for each correct line extra lines drawn from equipment negate the mark</p>	<p>MAX 3</p>
<p>2(b)(i)</p>	<p>density is (too) high or cables would be (very) heavy</p> <p>copper is (too) expensive</p>	<p>accept weighs too much</p> <p>accept cost too much</p> <p>allow 'it' as a reference to copper</p> <p>allow reverse argument for aluminium</p> <p>allow comparative statements</p> <p>allow 'because of density and cost' for 1 mark if no other mark scored.</p>	<p>1</p> <p>1</p>
<p>2(b)(ii)</p>	<p>low electrical conductivity / poor conductor</p> <p>low melting point</p>	<p>allow comparative statements</p> <p>do not accept values from table</p>	<p>1</p> <p>1</p>
<p>Total</p>			<p>7</p>

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Question 3

question	answer	extra information	mark
3(a)(i)	any one from: <ul style="list-style-type: none"> • Salmonella • E. coli • Campylobacter 	accept Staphylococcus accept Listeria / Botulinum	1
3(a)(ii)	any two from: <ul style="list-style-type: none"> • vomiting / sickness / nausea / loss of appetite • diarrhoea • high temperature / fever or sweating • stomach pains 	ignore headache / dizziness / thirst ignore going to the toilet a lot accept upset stomach / stomach ache	2
3(b)	transfer of bacteria / cross contamination from raw chicken to the salad material	} accept using the same knife for the chicken and the salad for 2 marks	1 1 1
3(c)	in order from the top: <ul style="list-style-type: none"> • gently stroke the swab over the surface of the agar • put on lid (and tape / seal) • incubate / leave at 20–40°C 	accept streak or rub or put accept close the plate accept leave in a warm place	1 1 1
Total			9

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Question 4

question	answer	extra information	mark
4(a)	protein		1
	weight training		1
4(b)(i)	7700		1
4(b)(ii)	750		1
4(b)(iii)	Menu A he needs 11700kJ per day for 2 marks or because the athlete needs more than average energy per day for 1 mark and menu A provides more than average energy	accept he needs 3000kJ extra per day accept B and C do not contain enough energy	1 MAX 2 1
	4(c)(i)	points plotted correctly ($\pm \frac{1}{2}$ small square) line of best fit	4 or 5 points correct for 2 marks 2 or 3 points correct for 1 mark straight line passing through all points
4(c)(ii)	as read from candidate's graph (± 1 small square)	ignore units	1
4(c)(iii)	arm strength increases as length of training increases	accept as the months increase so does arm strength	1
Total			13

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Question 5

question	answer	extra information	mark
5(a)(i)	A = incident ray		1
	B = normal		1
	C = refracted ray	do not accept reflected	1
5(a)(ii)	both angles correctly labelled		1 1
5(b)	material is Perspex		1
	because value for refractive index is closest to the refractive index for Perspex	accept closest to 1.491 or 1.488	1
5(c)	any two from: <ul style="list-style-type: none"> • do the test again • use the same method • use the same equipment / material • get same result 	allow similar result	Max 2
Total			9

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Question 6

question	answer	extra information	mark
6(a)	any one from: <ul style="list-style-type: none">herbicide increases yield because crop is not crowded out / less competitionpesticide increases yield because crop is not eatenfungicide increases yield because crop does not die	ignore weed killer allow other sensible chemicals with reasons eg lime – plants grow better in neutral soil	MAX 2
6(b)	neutralisation	accept neutral	1

Question 6 continues on the next page

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Question 6 continued . . .

question	answer	extra information	mark
6(c)			
Marks awarded for this answer will be determined by the Quality of Written Communication (QWC) as well as the standard of the scientific response. Examiners should also refer to the information on page 5, 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 some evidence that the candidate recognises a titration as a procedure. The answer may be simplistic.	Aspects are missing, but the candidate is clearly familiar with titration as a procedure and is aware of aspects which affect the accuracy.	The candidate covers all the stages in the titration, including the measurements to be taken and the factors affecting accuracy.
examples of the points made in the response: <ul style="list-style-type: none"> • Add an indicator to the alkali in the flask • Put the water / acid in the burette • Take the burette reading before you start adding the water / acid (or make sure the water / acid level in the burette is set to zero) • Add the water / acid in small amounts at a time • As you approach the approximate titration value add the water / acid more slowly • Swirl the flask between each addition • Stop adding the water / acid when you see the first permanent colour change • Take the burette reading at the end 		extra information	
Total			9

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Question 7

question	answer	extra information	mark
7(a)(i)	$R_f = 0.4$	correct answer with or without working gains 2 marks if answer incorrect allow 3.6 / 9 for 1 mark	2
7(a)(ii)	spot drawn in correct position on chromatogram	allow ecf	1
7(b)	toy D (should not be sold to public) because one of the dyes in the paint on toy D has the same R_f value as the harmful dye	allow ecf accept has one dot / spot in the same place or on same level / line	1 1
7(c)	different solvents separate different dyes more data can be collected about which dyes are on the toys		1 1
7(d)	solvent paper		1 1
Total			9

UMS Conversion Calculator – <http://web.aqa.org.uk/UMS/index.php>