



**General Certificate of Secondary Education
January 2011**

Additional Applied Science

AASC/2H

Science at Work

Unit 2

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 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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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.

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Question 1

Question	Answers	Extra information	Mark
1(a)(i)	34.1		1
1(a)(ii)	1.9		1
1(a)(iii)	<p>any two from:</p> <ul style="list-style-type: none"> • accurate / reliable / avoid human error • precise / sensitive • can take more readings / continuous readings • can record while exercising or do not have to stop / write it down 	allow efficient	2
1(b)	<p>B</p> <p>any two from:</p> <ul style="list-style-type: none"> • capillary (loop) / blood vessel is wider or vasodilation • blood carried nearer to the surface of the skin or increased blood flow • <u>more</u> heat lost / radiated or heat lost quicker 	<p>no mark</p> <p>ignore blood vessel comes closer to the surface</p> <p>do not allow reference to sweating</p>	2

Question 1 continues on the next page

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Question	Answers	Extra information	Mark
1(c)	breath bar higher than normal day	1 mark for each bar	1
	sweat bar higher than breath bar and higher than normal day		1
	urine bar lower than normal day		1
Total			9

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Question 2

Question	Answers	Extra information	Mark
2(a)	ethanol	must be in correct order	1
	potassium (ions)		1
	carbon dioxide		1
	copper (ions)		1
2(b)(i)	NaCl		1
2(b)(ii)	(strong) forces of attraction / bonds	do not allow mark for bonds if single / double / hydrogen bonds mentioned	1
	between oppositely charged ions	accept positive and negative ions / charges / particles do not accept atoms / molecules	1
2(b)(iii)	lots of energy / heat needed	allow bonds hard to break ignore reference to single / double bonds	1
	<u>strong</u> forces / bonds (between the ions need to be broken)		1
Total			9

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Question 3

Question	Answers	Extra information	Mark
3(a)(i)	(to make) <u>red</u> blood cells / haemoglobin or to prevent anaemia or carry oxygen around the body	allow to give the body energy ignore blood	1
3(a)(ii)	C		1
3(a)(iii)	(to make strong) teeth / bones	allow to prevent rickets ignore nails	1
3(b)(i)	6.9		1
3(b)(ii)	(any named) <u>red</u> meat / cereals / black pudding / bread / oily fish	accept steak ignore nuts	1
3(b)(iii)	1.3	correct answer alone for 2 marks $\frac{100 \times 13}{1000}$ for 1 mark	2
3(b)(iv)	milk / cheese / dairy products / bony fish / soya products	ignore nuts	1

AASC/2H**Question 3 continued**

Question	Answers	Extra information	Mark
3(c)	any two from: <ul style="list-style-type: none">• fills you up and stops you snacking on sugar and fat / feeling hungry• prevents colon / bowel disease / cancer• helps food move through the (digestive) system / clears digestive system• adds bulk to the food• prevents constipation / softer stools	ignore clears waste / keeps you regular / breaks down food / aids digestion / makes it easier to excrete / pushes it through the system / gets rid of toxins	2
Total			10

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Question 4

Question	Answers	Extra information	Mark
4(a)(i)	dissolve ink in a (named) solvent	allow water	1 1
4(a)(ii)	<p>any four from:</p> <ul style="list-style-type: none"> • draw a <u>pencil</u> line at bottom of paper (for the ink) • place a small dot of ink near the bottom of the paper / on line • allow the sample to dry and add another drop in the same place • suspend the chromatography paper in a beaker of solvent (allow water) so that the solvent is <u>below</u> the ink / line • (cover) and leave to develop / chemicals / ink move up the paper / solvent rises up the paper • ink separates • measure from (reference) line to spot(s) • compare to known sample / use rf values 	allow any reference to separation	4

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Question 4 continued

Question	Answers	Extra information	Mark
4(a)(iii)	any two from: <ul style="list-style-type: none"> • dust / powder • carbon powder for light surfaces / aluminium for dark surfaces • brush away excess powder or <ul style="list-style-type: none"> • quasar illumination / UV light • oils in fingerprint glow / fluoresce or <ul style="list-style-type: none"> • blow superglue fumes over fingerprint • super glue will condense / stick on print / grease • fingerprint turns white or <ul style="list-style-type: none"> • spray with ninhydrin • fingerprints turn purple or <ul style="list-style-type: none"> • use iodine fumes • fingerprint turns brown 	ignore reflect fumes must be implied	2
4(a)(iv)	no, could have been handed the note by someone else	owtte	1

Question 4 continues on the next page

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Question 4 continued

Question	Answers	Extra information	Mark
4(b)	any two from: <ul style="list-style-type: none"> • make / model of car • age of car • engine size • fuel type • number under the bonnet • colour of car • owner of the car / previous owners • when the car was bought • address of owner • tax details • MOT details • insurance details • whether car has been written off 	do not accept name and address of driver allow where bought	2
Total			11

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Question 5

Question	Answers	Extra information	Mark
5(a)(i)	anaerobic / fermentation		1
5(a)(ii)	yeast	allow fungus any other answers negates the mark	1
5(a)(iii)	C ₆ H ₁₂ O ₆ C ₂ H ₅ OH		1 1
5(b)(i)	cleaning fluid		1
5(b)(ii)	any three from: <ul style="list-style-type: none"> • would not cause illness • not a contamination with a microorganism / infection • to stop the customers worrying • (fear of) loss of reputation • (fear of) loss of sales • (fear of) closure • (fear of) litigation / being sued 	accept not harmful	3
5(b)(iii)	publicity / integrity of the brewery or make brewery improve cleaning procedures	owtte	1
Total			9

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Question 6

Question	Answers	Extra information	Mark
6(a)	extra muscle	do not accept fat turns into muscle ignore toned / strong muscles	1
6(b)	4180.7	3 marks for correct answer accept $1.3 \times 97 \times 24 = (3026.4)$ for 1 mark accept $8.5 \times 97 \times 1.4 = (1154.3)$ for 1 mark or accept $9.8 \times 97 \times 1.4 = 1330.84$ for 1 mark accept $1.3 \times 97 \times 22.6 = 2849.86$ for 1 mark	3
6(c)(i)	any two from: <ul style="list-style-type: none"> (pasta / cereal) contains carbohydrates to increase energy stores (glycogen) (giving) slow release of energy 		2
6(c)(ii)	any two from: <ul style="list-style-type: none"> sports drink contains glucose is quickly / easily absorbed (into the bloodstream) or does not need to be broken down to give instant energy 	ignore sugar allow burst of energy ignore references to hydration	2

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Question 6 continued

Question	Answers	Extra information	Mark
6(d)	when biceps contract, triceps relax (to bring the arm up)	<p>answers can be accepted in a diagram eg biceps short and fat, triceps long and thin</p> <p>allow biceps and triceps labelled correctly for 1 mark</p> <p>allow correct shape of muscles for 1 mark</p> <p>accept work antagonistically for 1 mark even if muscles labelled wrongly (eg biceps extending the arm)</p> <p>or</p> <p>when one contracts the other relaxes for 1 mark</p>	2
6(e)	any two from: <ul style="list-style-type: none"> • produce / make / build up of lactic acid • oxygen debt • cramp / <u>muscle fatigue</u> 	allow releases extra energy	2
Total			12
Overall mark = 60			