



**General Certificate of Secondary Education
January 2013**

Additional Science

AS1FP

(Specification 4409)

Unit 5: Additional Science 1

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.

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Quality of Written Communication and levels marking

In Question 11(a) 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	answers	extra information	mark
1(a)	A liver		1
	B pancreas		1
	C small intestine	do not accept intestine unqualified or large intestine	1
1(b)(i)	organ		1
1(b)(ii)	ref to muscle		1
	contract(ing)		1
1(b)(iii)	epithelial tissue		1
1(b)(iv)	produce digestive juices / enzymes / protease / pepsin	allow produces (hydrochloric) acid / mucus	1
Total			8

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Question 2

question	answers	extra information	mark
2(a)	water		1
2(b)(i)	any one from: <ul style="list-style-type: none"> • changed distance between lamp and plant / tube • changed power rating / wattage of bulb • change voltage (of power supply to bulb) 	allow move lamp / plant / tube do not allow 'change bulb' alone	1
2(b)(ii)	any two from: <ul style="list-style-type: none"> • (same) temperature • (same) carbon dioxide (concentration) • (same) piece of pondweed • (same) size of pondweed • (same) species/type of pondweed • (same) bulb (if different bulb not given in (b)(i)) • (same) volume / amount of water 	} if no other mark for reference to pond weed awarded allow '(same) pondweed' for 1 mark ignore 'time/1minute'	2
2(c)(i)	increases	allow the more light the more bubbles	1
	any one of: <ul style="list-style-type: none"> • up to 15 000 (lux) • then levels off 	allow up to 43 bubbles (per minute)	1
2(c)(ii)	same effect as 15 000 / 20 000 (lux) or cheaper to use 15 000 / 20 000	allow waste of energy / money	1
Total			7

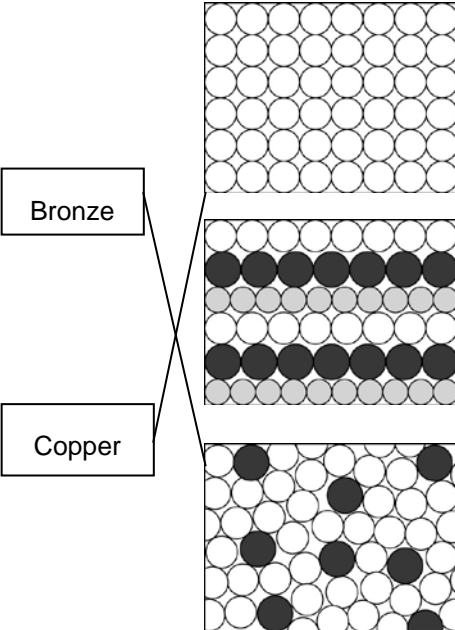
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Question 3

question	answers	extra information	mark
3(a)	<pre> graph LR V[Vacuole] --- C1[Contains cell sap] CW[Cell wall] --- P[Protein synthesis] CW --- S1[Strengthens the cell] CM[Cell membrane] --- C2[Controls the passage of substances...] CM --- S2[Strengthens the cell] </pre>	<p>1 mark for each line do not award mark for part if more than one line is drawn from that part</p>	3
3(b)	In the nucleus		1
3(c)(i)	(has) no chloroplasts	allow (has) no chlorophyll	1
3(c)(ii)	diffusion	allow active transport ignore absorption	1
3(c)(iii)	mitochondria		1
Total			7

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Question 4

question	answers	extra information	mark
4(a)	an alloy		1
4(b)		<p>1 mark for each correct line more than one line from a substance negates the mark</p>	<p>1</p> <p>1</p>
Total			3

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Question 5

question	answers	extra information	mark
5(a)	gas		1
5(b)	are faster		1
	are more accurate		1
5(c)(i)	90		1
5(c)(ii)	mole		1
Total			5

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Question 6

question	answers	extra information	mark
6(a)	conduct electricity when dissolved in water		1
	have a high melting point		1
6(b)	(2 electrons on inner shell), 8 on outer	accept dots, crosses or e for electrons	1
6(c)(i)	gains		1
	1		1
6(c)(ii)	negative	ignore numbers	1
6(d)	any two from: <ul style="list-style-type: none">• opposite charges / electrostatic• (opposite charges) attract / (electrostatic) attraction• ionic bonds• giant lattice		2
6(e)	halogens		1
Total			9

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Question 7

question	answers	extra information	mark
7(a)	80/80.2	correct answer with or without working = 2 marks ignore units if no answer or incorrect answer then evidence of <u>65</u> gains 1 mark 81 or allow 0.8 for 1 mark	2
7(b)(i)	accept (nanoparticles are) smaller.	accept (nanoparticles are) 1-100nm in size accept (nanoparticles) contain a few hundred atoms/molecules	1
7(b)(ii)	any one from: <ul style="list-style-type: none"> • cover larger area • need less sun cream/less zinc oxide in sun cream 	ignore absorb into skin quickly	1
Total			4

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Question 8

question	answers	extra information	Mark
8(a)	<div style="display: flex; flex-direction: column; align-items: center; gap: 20px;"> <div style="border: 1px solid black; padding: 5px; text-align: center;">Resistor (at a constant temperature)</div> <div style="border: 1px solid black; padding: 5px; text-align: center;">Filament bulb</div> </div> <p style="text-align: center; margin-top: 20px;">1 mark for each correct line more than one line from a component negates the mark</p>		2
8(b)(i)	12		1
8 (b)(ii)	6 the potential difference / pd is shared (between the lamps)	allow half of the answer from 8(b)(i) accept voltage for pd	1 1
8(b)(iii)	12		1
8(b)(iv)	if one lamp breaks the other will stay on		1
Total			7

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Question 9

question	answers	extra information	Mark
9(a)(i)	positive		1
9(a)(ii)	electrons		1
9(b) mark with 9(a)(i)	the hairs have the same charge or the hairs are (all) positive	ecf accept hairs are all negative from 9(a)(i) do not accept positive electrons	1
	like charges <u>repe!</u> (and hair stands on end)	accept (positive hair) attracted to <u>negative</u> balloon	1
Total			4

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Question 10

question	answers	extra information	Mark
10(a)(i)	500	correct answer with or without working = 2 marks allow 1 mark for 50 x 10	2
10(a)(ii)	3000	correct answer with or without working = 2 marks allow 1 mark for 600 x 5	2
10(b)	friction / drag/ upthrust or water resistance (work against the motion)	allow energy transferred to the water as heat allow reference to change in density	1
10(c)(i)	increases		1
10(c)(ii)	(depth) greater than 4m or any number greater than 4 (reason) some divers will go deeper than 4m / 4m is the mean depth depth of pool needs to be greater for safety reasons	if a depth of 4m is given allow 1 mark for the diver reaches a depth of 4m (for a 5m platform) and/or 1 mark for a consequence of it being less than 4m in terms of safety	1 1 1
Total			9

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Question 11

question				mark
11(a)	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 2 and apply a 'best-fit' approach to the marking.			6
0 marks	Level 1 (1-2 marks)	Level 2 (3-4 marks)	Level 3 (5-6 marks)	
No relevant content	There is a basic statement of how the plan is invalid and / or how the plan might be improved.	There are clear statements of how the plan is invalid and / or how the plan might be improved.	There are detailed statements of how the plan is invalid and how the plan might be improved.	
<p>examples of biology points made in the response:</p> <p>invalidity issues:</p> <ul style="list-style-type: none"> insufficient data eg quadrat only used once does not consider change between crop and hedge not considered different species eg only counted (total number of) plants has not considered how to deal with plants overlapping edge of quadrat quadrat too small <p>improvements:</p> <ul style="list-style-type: none"> use of transect (eg tape measure / string) positioning of transect (from crop to hedge) regular placement of quadrat (eg 1 metre apart) identification of species (eg text book or key) method of data collection (eg count each species / % cover / abundance scale) repeat at different points use a larger quadrat method of dealing with plants overlapping edge (eg count only if $> \frac{1}{2}$) 		<p>extra information:</p> <p>allow random use of quadrats</p> <p>allow method of achieving randomness</p> <p>allow record position of quadrats</p>		

Question 11 continues on the next page . . .

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Question 11 continued . . .

<p>11(b)</p>	<p>any 2 from:</p> <ul style="list-style-type: none"> • more mice closer to crop • closer to crop more (wild plant) seeds eaten • (so) fewer seeds grow / germinate 	<p>accept reference to competition between wild plants and wheat (1)</p> <p>so fewer wild plants grow (1)</p> <p>or</p> <p>use of (selective) weed killers on crop (1)</p> <p>so wild plants killed closer to crop (1)</p> <p>or</p> <p>(named) condition closer to hedge (1)</p> <p>so more suitable for wild plants (1)</p>	<p>2</p>
<p>Total</p>			<p>8</p>

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Question 12

question	answers	extra information	mark
<p>12</p>	<p>any 3 from:</p> <ul style="list-style-type: none"> • <u>atoms</u> of the same element • with the same atomic number / same number of protons • different mass number / different number of neutrons • with the same number of electrons 	<p>accept both have 6 protons</p> <p>accept C-12 has 6 neutrons and C-14 has 8 neutrons accept C-12 has 2 fewer neutrons accept C-12 has a mass number of 12 and C-14 has a mass number of 14</p> <p>accept both have 6 electrons</p> <p>allow correct reference to numbers of protons / neutrons / electrons in isotopes of other named elements</p>	<p>3</p>
<p>Total</p>			<p>3</p>

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Question 13

question	answers	extra information	mark
13 (a)	<p>any four from:</p> <ul style="list-style-type: none"> • made from carbon • <u>giant</u> structure <p>or</p> <p>macromolecular</p> <ul style="list-style-type: none"> • strong bonds • covalent (bonds) • each carbon / atom forms 4 bonds <p>or</p> <p>each (carbon) atom bonded / joined to four other (carbon) atoms</p>	<p>maximum of 3 marks if refer to ionic bonding and / or having delocalised electrons</p> <p>ignore crystal allow <u>giant</u> molecule allow <u>giant</u> lattice</p> <p>allow correct description of bond formed by sharing of electrons</p>	4
13(b)	<p>are hard(er) (than other substances)</p> <p>(so) don't wear away (quickly) / need replacing</p>	<p>ignore reference to price or cost allow high melting point ignore strong (so) lasts for a long time</p>	1 1
Total			6

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Question 14

question	answers	extra information	mark
14(a)(i)	11.75	accept 11.8 or 12 1 mark for 470/40 (provided no subsequent working)	2
	m/s ²	ms ⁻² or m/s/s	1
14(a)(ii)	any three from: <ul style="list-style-type: none"> • length of road • straightness of road • smooth / flat (surface) • level / horizontal (surface) • type of surface • appropriate weather conditions • nearby obstructions 	allow any sensible description of points eg a distance greater than 10km allow idea of road for acceleration / deceleration allow the 'surface' if no other marks are given for surface factors allow climate allow altitude	3
14(b)	as the car goes faster / accelerates the drag (force) increases	allow (air) resistance / friction as an alternative to drag	1
	(until) drag force is the same as the <u>maximum</u> forward force	accept drag force = maximum thrust	1
	(therefore) no resultant force / no further acceleration (and therefore terminal velocity)	ignore balances out ignore forces balanced ignore cannot go any faster	1

Question 14 continues on the next page . . .

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Question 14 continued. . .

14(c)	<p>any one from:</p> <p>yes answers</p> <ul style="list-style-type: none"> • the total emissions produced are small (compared with family cars / other sources) • other technologies will be developed (outweighing the negatives) <p>no answers</p> <ul style="list-style-type: none"> • (more) air pollution or (more) pollution just for the sake of the record 	<p>no mark for yes or no</p> <p>allow the description of the consequences of air pollution eg global warming</p>	1
Total			10

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