

GCSE ADDITIONAL SCIENCE COMBINED (ROUTE 2)

AS1FP Paper 5 Foundation Tier
Mark scheme

4409
June 2014

Version: 1.0 Final

Mark schemes are prepared by the Lead Assessment Writer 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 associates 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 associate understands and applies it in the same correct way. As preparation for standardisation each associate 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, associates encounter unusual answers which have not been raised they are required to refer these to the Lead Assessment Writer.

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.

Further copies of this Mark Scheme are available from aqa.org.uk

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 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 / ; e.g. 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 students 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)

Student	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)

Student	Response	Marks awarded
1	Pluto, Mars, Moon	1
2	Pluto, Sun, Mars, Moon	0

3.2 Use of chemical symbols / formulae

If a student 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 13 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.

Question 1

question	answers	extra information	mark	spec ref	I.D.
1(a)(i)	any two from: (both have) <ul style="list-style-type: none"> • nucleus • cell wall • (cell) membrane • cytoplasm 	accept plurals allow (both have) ribosomes allow (both have) mitochondria	2	B2.1.1b/d	E
1(a)(ii)	A yeast cell has a nucleus		1	B2.1.1c/d	A
1(b)		1 mark for each correct line. Do not award a mark if there are two lines from a level of organisation	3	B2.1.1b/c/d	G
1(c)	differentiation. functions.		1 1	B2.2.1a	G
Total			8		

Question 2

Question	Answers	extra information	mark	spec ref	I.D.
2(a)(i)	light	allow solar / <i>sunlight</i>	1	B2.3.1a/b	G
2(a)(ii)	water	allow H ₂ O / H2O	1	B2.3.1	G
2(a)(iii)	oxygen	allow O ₂ / O2	1	B2.3.1e	G
2(b)(i)	0.002 or 2 x10 ⁻³	allow 1 mark for 1/500 accept correct alternatives with correctly amended units, eg 0.02 mm for 2 marks	2	B2.3.1	E
2(b)(ii)	For storage.		1	B2.3.1e	A
2(c)(i)			1	B2.3.1b/e	G
2(c)(ii)	less photosynthesis or less glucose / starch (made)	<i>allow no photosynthesis /glucose/starch in white area</i> allow absorbs less light ignore reference to less chlorophyll	1	B2.3.1b/e	E
Total			8		

Question 3

question	answers	extra information	mark	spec ref	I.D.
3(a)	any two from: <ul style="list-style-type: none"> • 20 cm³ / volume of glucose solution (used) • (left for) 30 minutes / (same) time • (same) volume of water • <i>size / surface area / type of bag / membrane</i> 	allow amount of glucose allow amount of water <i>allow same bag</i> ignore concentration of glucose (solution) do not accept temperature	2	B2.1.2	E
3(b)	<i>(concentration of glucose) increases</i> ref to quantitative figures	<i>accept any 2 sets of temperature and concentration to show increase (units not required)</i> accept description in terms of rate of diffusion accept it doubles for a 10 °C rise for 2 marks	1 1	B2.1.2	E
Total			4		

Question 4

question	answers	extra information	mark	spec ref	I.D.
4(a)(i)	(A) copper (<i>atoms</i>) (B) nickel (<i>atoms</i>)		1	C2.2.4b/c	G
4(a)(ii)	harder		1	C2.2.4c	A
4(b)	shape memory alloy		1	C2.2.4d	A
Total			3		

Question 5

question	answers	extra information	mark	spec ref	I.D.
5(a)(i)	(LD poly(ethene))	accept converse answers for HD		C2.2.5a	E
	less dense	allow similar density ignore lighter	1		
	more flexible	<i>allow bends more easily</i>	1		
	less strong	<i>allow easier to break</i> <i>allow weaker</i>	1		
5(a)(ii)	any two from <ul style="list-style-type: none"> • strong • rigid • <i>waterproof</i> • <i>does not rust / corrode / rot</i> • <i>low density</i> • <i>can be moulded / shaped</i> • <i>can be coloured</i> 	allow <i>unlikely</i> to break allow will keep its shape <i>allow light weight</i>	2	C2.2.5a	E
5(b)	are made at different pressures.		1	C2.2.5a	A
	are made using different catalysts.		1		
Total			7		

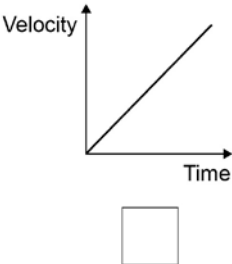
Question 6

question	answers	extra information	mark	spec ref	I.D.
6(a)	a compound.		1	C2.1.1a	A
6(b)(i)	<p>magnesium atom loses electrons</p> <p>(magnesium atom loses) <u>two</u> electrons</p> <p>oxygen atom gains electrons</p> <p>(oxygen atom gains) <u>two</u> electrons</p>	<p>any reference to incorrect bonding such as covalent/ metallic/ <i>intermolecular</i> max 3 marks</p> <p>accept (<i>positive</i>) magnesium ion is formed</p> <p>accept (magnesium atom loses) its outer shell / highest energy level electrons accept magnesium / magnesium ion has a 2⁺ <u>charge</u> allow <u>Mg²⁺</u> is formed</p> <p>accept (<i>negative</i>) oxide ion formed</p> <p>accept (oxygen gains electrons) to give a full shell or stable structure accept oxygen has a 2⁻ <u>charge</u> allow <u>O²⁻</u> is formed</p> <p><i>if no other mark awarded allow for 1 mark (in magnesium oxide) magnesium and oxygen have full outer shells</i></p> <p><i>if no other mark awarded allow for 1 mark for idea of two electrons moving</i></p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p>	C2.1.1b/c/f	E
6(b)(ii)	it has strong bonds.		1	C2.2.2a	A
Total			6		

Question 7

question	answers	extra information	mark	spec ref	I.D.
7(a)	(mass number) (6) 7		1	C2.3.1a/c	G
	(protons) 3 (3)		1		
	(neutrons) 3 (4)		1		
7(b)	isotopes.		1	C2.3.1d	A
Total			4		

Question 8

question	answers	extra information	mark	spec ref	I.D.
8(a)	equal. decrease.		1	P2.1.1a/b/e	A
			1		
8(b)	increase		1	P2.4a	A
8(c)(i)	3 m/s ²	allow 1 mark for correct substitution, i.e. $a = \frac{18-0}{6}$ or $a = \frac{18}{6}$	2	P2.1.2e	E
			1		
8(c)(ii)			1	P2.1.2f	A
8(d)	any two from: <ul style="list-style-type: none"> • unfair (on the other cyclists) / cheating • illegal • possible harmful side affects • may encourage drug taking amongst (younger) people 	<i>allow health risks</i>	2	HSW	E
Total			9		

Question 9

question	answers	extra information	mark	spec ref	I.D.
9(a)	momentum		1	P2.2.2b	A
9(b)(i)	horizontal arrow drawn pointing to the left	horizontal judged by eye arrow can be drawn anywhere on the diagram	1	P2.2.2b	E
9(b)(ii)	-5 kgm/s		1	P2.2.2b	A
9(b)(iii)	she will continue moving at a steady speed.		1	P2.2.2b	A
Total			4		

Question 10

question	answers	extra information	mark	spec ref	I.D.
10(a)(i)	F: (closed) switch		1	P2.3.2c	E
	G: (fixed) resistor		1		
10(a)(ii)	the same through each component.		1	P2.3.2k	G
	less than 9 V.		1		
	adding		1		
10(b)	decreases		1	P2.3.2p	E
10(c)	any one from: <ul style="list-style-type: none"> • dangerous • so it is fair • need to see the ball to hit it / catch it / play the game 		1	P2.1	E
			7		

Question 11

question	answers	extra information	mark	spec ref	I.D.
11(a)	any four from: <ul style="list-style-type: none"> ref to transect (transect) from sea to trees or trees to sea ref to use of quadrat ref to a suitable interval along transect record presence / absence (<i>in quadrat</i>) <i>repeat to check results or repeat to calculate a mean</i> 	eg tape / string allow across the habitat accept description of quadrat eg every 1 – 10 metres or continuous allow eg % cover / number <i>ignore repeat unqualified</i>	4	B2.4.1b	E
11(b)(i)	sea rocket	<i>accept rocket</i>	1	B2.4.1	G
11(b)(ii)	marram grass	<i>accept marram</i>	1	B2.4.1	G
11(b)(iii)	(as age increases number of species) increases then decreases		1 1	B2.4.1	E
11(c)	insufficient / low light (intensity) so little / not much photosynthesis	accept too dark or only 52 / 27 (%) light allow these species need less light do not accept no light accept no (net) photosynthesis allow other species need more light (to grow) <i>accept insufficient nutrients / water (1) because of competition from pine trees (1)</i>	1 1	B2.4.1	E
Total			10		

Question 12

question	answers	extra information	mark	spec ref	I.D.
12(a)	ammonia + hydrogen chloride (\rightleftharpoons) ammonium chloride	accept hydrogen chloride + ammonia <i>accept NH₃ for ammonia</i> <i>accept HCl for hydrogen chloride</i> <i>accept NH₄Cl for ammonium chloride</i>	1	C2.3.3f	E
	\rightleftharpoons		1		
12(b)(i)	107 (g)		1	C2.3.3e	G
12(b)(ii)	any one from: <ul style="list-style-type: none"> • some (product) left in apparatus • reversible reaction 	<i>ignore weighing errors</i> <i>ignore references to evaporation</i> <i>accept reaction does not go to completion</i> <i>allow loss of (reactant) gas</i>	1	C2.3.3d	E
Total			4		

Question 13

question	answers	extra information	mark	Spec ref	I.D.
13			6	C2.1.1g C2.2.3a/c	E
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 information	<i>A relevant statement is made about the structure of graphite or at least one property of graphite is given.</i>	<i>There is a description of the structure and a description of at least one property of graphite or an attempt at explaining how at least one property is linked to the structure.</i>	<i>There is a good description of the structure and properties of graphite and an attempt at explaining how at least one property is linked to the structure.</i>		
examples of the points made in the response Structure: <ul style="list-style-type: none"> • (only) carbon atoms • giant structure • hexagonal rings • layers • covalent bonds (between carbon atoms) • strong bonds (between carbon atoms) • each (carbon) bonds to three others • no (covalent) bonds between layers Property: <ul style="list-style-type: none"> • soft • slippery • high melting point • does not decompose when heated • conducts electricity Explanation: <ul style="list-style-type: none"> • layers are free to slide • (high melting point due to) strong / many bonds within layers • because no covalent / strong bonds between layers 		extra information allow macromolecular accept weak (intermolecular) forces (between layers) accept delocalised electrons accept streaking or leaves a mark allow high boiling point accept there are weak (intermolecular) forces between layers accept parts break off because the layers are so thin accept delocalised electrons are free to move			

Question 14

question	answers	extra information	mark	spec ref	I.D.
14(a)	any one from: <ul style="list-style-type: none"> • make sure no one is looking over the ball • ensure everyone is beyond the area it will fall. • watch the ball during its entire flight. • wear safety spectacles / goggles 	<i>ignore reference to finger injuries</i> <i>allow aim away from people</i>	1	P2.1	E
14(b)	elastic potential (energy)		1	P2.1.5b	G
14(c)(i)	any two from: <ul style="list-style-type: none"> • meter rules not being <i>vertical</i> • parallax • difficult to see where ball stops • ball not close to ruler • can measure from top or bottom of ball 	<i>allow eyes not being in line with ball and ruler</i> <i>allow ball only stops for a short time</i> <i>allow ball does not travel straight (up)</i> <i>ignore ball moves too fast</i> <i>ignore reference to reaction time</i> if no other mark awarded allow one mark for misreading ruler	2	P2.1	E

Question 14

14(c)(ii)	0.36	allow 1 mark for correct substitution, i.e. $E_p = 0.02 \times 10 \times 1.8$	2	P2.2.1f	E
	J or joules	allow 1 mark for an answer of 360 do not accept j allow mJ or millijoules if an answer of 360 is given	1		
14(d)(i)	(A) drag / air resistance / friction	<i>allow upthrust</i>	1	P2.1.4b	E
	(B) weight / gravity		1		
14(d)(ii)	increases		1	P2.2	A
Total			10		