AQA

GCSE
COMBINED SCIENCE: SYNERGY
8465/1H

Higher Tier Paper 1 Life and environmental sciences

Mark scheme

June 2019

Version: 1.0 Final

196G8465/1H/MS

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 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.

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
- the Assessment Objectives, level of demand and specification content that each question is intended to cover.

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 and underlining

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.

2.4 Any wording that is underlined is essential for the marking point to be awarded.

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	Neptune, Mars, Moon	1
2	Neptune, 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

Marks should be awarded for each stage of the calculation completed correctly, as students are instructed to show their working. Full marks can, however, be given for a correct numerical answer, without any working shown.

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 is 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 ecf 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 Allow

In the mark scheme additional information, 'allow' is used to indicate creditworthy alternative answers.

3.9 Ignore

Ignore 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.

3.10 Do <u>not</u> accept

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

4. Level of response marking instructions

Extended response questions are marked on level of response mark schemes.

- Level of response mark schemes are broken down into levels, each of which has a descriptor.
- The descriptor for the level shows the average performance for the level.
- There are two marks in each level.

Before you apply the mark scheme to a student's answer, read through the answer and annotate it (as instructed) to show the qualities that are being looked for. You can then apply the mark scheme.

Step 1: Determine a level

Start at the lowest level of the mark scheme and use it as a ladder to see whether the answer meets the descriptor for that level. The descriptor for the level indicates the different qualities that might be seen in the student's answer for that level. If it meets the lowest level then go to the next one and decide if it meets this level, and so on, until you have a match between the level descriptor and the answer.

When assigning a level you should look at the overall quality of the answer. Do **not** look to penalise small and specific parts of the answer where the student has not performed quite as well as the rest. If the answer covers different aspects of different levels of the mark scheme you should use a best fit approach for defining the level.

Use the variability of the response to help decide the mark within the level, i.e. if the response is predominantly level 2 with a small amount of level 3 material it would be placed in level 2 but be awarded a mark near the top of the level because of the level 3 content.

Step 2: Determine a mark

Once you have assigned a level you need to decide on the mark. The descriptors on how to allocate marks can help with this.

The exemplar materials used during standardisation will help. There will be an answer in the standardising materials which will correspond with each level of the mark scheme. This answer will have been awarded a mark by the Lead Examiner. You can compare the student's answer with the example to determine if it is the same standard, better or worse than the example. You can then use this to allocate a mark for the answer based on the Lead Examiner's mark on the example.

You may well need to read back through the answer as you apply the mark scheme to clarify points and assure yourself that the level and the mark are appropriate.

Indicative content in the mark scheme is provided as a guide for examiners. It is not intended to be exhaustive and you must credit other valid points. Students do **not** have to cover all of the points mentioned in the indicative content to reach the highest level of the mark scheme.

You should ignore any irrelevant points made. However, full marks can be awarded only if there are no incorrect statements that contradict a correct response.

An answer which contains nothing of relevance to the question must be awarded no marks.

Question 1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.1	Canis	ignore italics ignore capitalisation	1	AO2 4.4.4.4

Question	Answers	Mark	AO / Spec. Ref.
01.2	**Level 2:** Scientifically relevant facts, events or processes are identified and given in detail to form an accurate account.	3–4	AO1 4.4.4.4
	Level 1: Facts, events or processes are identified and simply stated but their relevance is not clear.	1–2	AO1 4.4.4.4
	No relevant content	0	
	Indicative content (originally) • organisms placed in groups based on similar structures • or characteristics • influenced by where organisms are found • classification by Carl Linnaeus (more recent) • organisms with similar internal structures grouped together • because of development of microscopes • organisms with similar biochemical processes grouped together • organisms with similar DNA grouped together • more fossils / species have been found / studied • the three domain system • classification by Carl Woese for full marks answers must refer to both original and more recent classification		

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.3	population is the number of one species (in the area / habitat) (whereas a) community is all the individuals / populations of the different species (living in the area / habitat)	 allow (whereas a) community is all the different organisms (living in the area / habitat) ignore reference to time	1 1	AO1 4.4.2.1

Question	Answers	Mark	AO / Spec. Ref.
01.4	**Level 3:** Relevant points (reasons / causes) are identified, given in detail and logically linked to form a clear account.	5–6	AO3 4.4.2.1 4.4.2.2 4.4.2.3
	Level 2: Relevant points (reasons / causes) are identified, and there are attempts at logical linking. The resulting account is not fully clear.	3–4	AO2 4.4.2.1 4.4.2.2 4.4.2.3
	Level 1: Points are identified and stated simply, but their relevance is not clear and there is no attempt at logical linking.	1–2	AO2 4.4.2.1 4.4.2.2 4.4.2.3
	No relevant content	0	
	Indicative content • no / fewer wolves means more food for (Brown) bears • so less competition • so population of bears may increase • therefore elk / bison population may decrease • less predation of elk / bison by wolves • and / or Brown bears unable to control populations of herbivores • would increase populations of elk / bison • rabbits predated less • therefore rabbit population may increase • grass decreases due to more rabbits • grass decreases due to more elk / bison • grass increases due to fewer elk / bison • decline in all herbivores due to over-grazing		

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.5	to reduce the effect of inbreeding		1	AO2 4.4.2.7 4.4.4.5
01.6	7.5	allow 6.93 to 8.15 if clearly calculated from graph values ± ½ square	1	AO2 4.4.2.1
01.7	population has been stable	allow population has increased (slightly) ignore population increased in 2014	1	AO3 4.4.2.2
Total			**16**	

Question 2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.1	the number of neutrons		1	AO1 4.1.2.4
02.2	neutrons protons		1 1	AO1 4.3.2.2
02.3	206 Pb 82	 allow correct symbol from incorrectly calculated atomic number	1 1 1	AO2 4.3.2.2
02.4	138 (days)	allow 135 to 140	1	AO2 4.3.2.3
02.5	 (8.8 days is) 5 (half lives) (mass after 44 days =) 0.15625 (mg)	an answer of 0.15625 (mg) correctly rounded scores **2** marks $\left(\frac{44}{8.8} = \right) 5$ allow evidence of dividing 5 (mg) by 2 five times $\left(\frac{3.125 \times 5}{100} = \right)$ 0.15625 (mg)	 1 1	AO2 4.3.2.3
02.6	(alpha radiation) is highly ionising **or** (alpha radiation) is absorbed by cells any **one** from: • can cause (DNA) mutations • can cause cell death	 allow (alpha radiation) cannot leave the body allow can cause cancer / tumour allow can damage DNA / chromosomes	1 1	AO1 4.3.2.6 4.4.4.1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.7	alpha radiation stopped by glass	allow alpha radiation cannot pass through glass reference to alpha radiation being stopped by paper is insufficient	1	AO2 4.3.2.4
Total			**12**	

Question 3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.1	(mix food with) ethanol **and** add (distilled) water **or** rub food on paper (and allow to dry)		1	AO1 4.2.1.5
	milky / white (if lipid is present) **or** greasy mark (if lipid is present)	result must correspond with test allow apply Sudan Red / III / Black stain to food (1) red / black (if lipid is present) (1)	1	
03.2	statin(s)	allow named statin, e.g. simvastatin allow aspirin / ezetimibe	1	AO1 4.3.1.3
03.3		an answer of 0.231 scores **4** marks an answer of 0.23073753 scores **3** marks		AO2 4.3.1.3
	$\left(\frac{636}{12\,562} \times 100 =\right)$ 5.06288808		1	
	$\left(\frac{606}{12\,541} \times 100 =\right)$ 4.83215055		1	
	(subtraction =) 0.23073753		1	
	(answer to 3 significant figures =) 0.231		1	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.4	(lower cholesterol leads to slower / less) build up of fatty material in (coronary) arteries	(lower cholesterol leads to slower / less) build up of plaque(s) in (coronary) arteries	1	AO1 4.3.1.3 4.2.1.3
	(therefore less) narrowing of coronary arteries	allow less (coronary arteries) blocked once for either mp2 or mp3	1	AO2 4.3.1.3
	(that prevents) reduced blood flow (through coronary arteries)		1	AO1 4.3.1.3
	(that prevents) reduced oxygen supply to heart muscle		1	AO1 4.3.1.3
		if no reference to effect of drugs lowering cholesterol allow max **3** marks		
03.5	any **three** from: • side effects • efficacy • interactions with other drugs • other treatments available • patient's age / mass • patient's health / allergies / (medical) history • pregnancy • patient choice • dosage	allow toxicity allow effectiveness allow availability	3	AO3 4.3.1.3
Total			**14**	

Question 4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.1		in either order		AO1 4.4.1.8
	screening	allow removes solid objects **or** removes named example eg twigs or cotton buds or wet wipes ignore filtration	1	
	sedimentation	allow grit removal	1	
04.2	oxygen (from air bubbles)		1	AO1 4.4.1.8
	(which is used for aerobic) respiration		1	AO1 4.2.1.1
	by microorganisms	allow (by) bacteria / microbes ignore pathogens	1	AO1 4.4.1.2 4.4.1.8
	which digest waste	allow which break down waste allow which decay waste	1	AO1 4.4.1.2 4.4.1.8
04.3	to kill bacteria / microorganisms / microbes / pathogens		1	AO2 4.4.1.8
04.4	reverse osmosis		1	AO1 4.4.1.8

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.5	weigh evaporating dish (before)	allow suitable container for evaporating dish	1	AO1 4.4.1.8
	add measured volume of (sample of) water		1	
	heat to evaporate water		1	
	re-weigh		1	
	subtract mass before from mass after	allow calculate the difference in mass before and after	1	
	divide mass by volume to determine concentration **or** repeatedly heat and weigh until constant mass		1	
Total			**14**	

Question 5

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.1	all points correct	allow a tolerance of +/− ½ small square allow **1** mark for at least 3 plots correct	2	AO2 4.1.1.5
	plots correctly joined		1	AO2 4.1.1.5
05.2	(substance **B**) melts / boils / freezes / condenses at one / specific temperature **or** (substance **B**) changes state at one / specific temperature	allow the graph is horizontal as (substance **B**) melts / boils / freezes / condenses allow the graph is horizontal as (substance **B**) changes state	1	AO2 4.1.1.5

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.3	43 (ºC)	allow 41 to 45 (ºC)	1	AO3 4.1.1.5
05.4		allow ecf from question **05.3** an answer of −1.08 (ºC per second) scores **3** marks an answer of 1.08 (ºC per second) scores **2** marks		AO2 4.1.1.5
	43 – 173 = (–) 130 **and** 240 – 120 = 120	allow values in the range 41 to 45 for 43 allow correct temperatures for times between 120 and 240 seconds	1	
	$\left(\frac{\text{change in temp}}{\text{change in time}}\right) = \frac{(-)130}{120}$	allow 1.083 correctly rounded to at least 2 significant figures allow correct calculation from incorrect values of temperature	1	
	−1.08 (ºC per second)	allow −1.083 (ºC per second) correctly rounded to at least 2 significant figures	1	
Total			**8**	

Question 6

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.1	(Abundance) number of organisms / individuals (of a species) in an area **or** percentage cover in an area (Distribution) where the organisms (of a species) are found (in an area)	allow the population (of a species) in an area	1 1	AO1 4.4.2.4
06.2	place tape measure from school building **or** use a transect from the school building place (point) quadrat at regular / known intervals (along the line) record / count the number of each plant species (touching pins) repeat along different transects / lines (from school building)	allow place line / string from school building allow a description of certain distances	1 1 1 1	AO1 4.4.2.4
06.3	$6.25 = \frac{n}{30 \times 80} \times 100$ $n = \frac{6.25}{100} \times 2\,400$ n = 150	an answer of 150 scores **3** marks allow $n = \frac{6.25}{100} \times 80$ allow correct calculation using 80 as the total number of pins	1 1 1	AO2 4.4.2.4
06.4	only a sample of data was collected	allow the percentage cover was not measured for the whole field ignore not all the dandelion plants were counted unqualified	1	AO3 4.4.2.4
06.5	rare species are less likely to be sampled		1	AO3 4.4.2.4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.6	(genetic variation in plants arising from) mutation for a beneficial characteristic	allow a named beneficial characteristic	1	AO1 4.4.4.1 4.4.4.2
	such as to be flatter to withstand trampling / nibbling **or** to grow again quickly from the roots **or** poisons / thorns / taste to deter herbivores		1	AO2 4.4.4.1 4.4.4.2
	those with gene(s) for named adaptation more likely to survive and breed		1	AO1 4.4.4.1 4.4.4.2
	to pass on (favourable) genes repeated over many generations until the characteristic is in all / most of the population		1	AO1 4.4.4.1 4.4.4.2
Total			**15**	

Question 7

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.1	(density) increases		1	AO2 4.1.1.2
07.2		an answer of 0.00252 (kg) **or** 0.0025 (kg) scores **4** marks		AO2 4.1.1.2
	(14 000 cm^3 =) 0.014 (m^3)	conversion of cm^3 to m^3	1	
	$0.180 = \frac{m}{0.014}$		1	
	mass = 0.180 × 0.014		1	
	mass = 0.00252 (kg)	allow correct answer in standard form 2.5(2) x 10^{-3} (kg) allow a maximum **3** marks for using an incorrectly / not converted volume	1	
07.3	decrease in kinetic energy of particles **or** decrease in speed / velocity of particles		1	AO1 4.1.1.3
	(therefore) inside wall is hit less frequently **or** inside wall is hit with less force		1	
	(which) decreases pressure inside		1	
	(but) outside pressure remains constant so decreases the volume inside the balloon		1	
Total			**9**	

Question 8

Question	Answers	Extra information	Mark	AO / Spec. Ref.
08.1	endocrine (system)		1	AO1 4.2.1.7
08.2	in the blood(stream)	allow in plasma	1	AO1 4.2.1.7
08.3		allow correct sequence of steps starting with low oestrogen / progesterone		AO2 4.3.1.6 4.2.1.7
	(when oestrogen / progesterone are released from the ovaries negative feedback to the pituitary)			
	inhibits / prevents / stops / reduces the production / release of FSH / LH	allow causes less FSH / LH to be produced / released	1	
	(so) less stimulation of ovaries		1	
	(so) less oestrogen / progesterone released		1	
08.4	(when negative feedback stops) oestrogen / progesterone do not inhibit release of LH	allow (when negative feedback stops) oestrogen / progesterone stimulates release of LH ignore references to FSH	1	AO2 4.3.1.6
	(so) there is an increase in LH	ignore references to FSH	1	AO1 4.3.1.6
	LH causes the release of an egg **or** LH causes ovulation	do **not** accept FSH causes release of an egg	1	AO1 4.3.1.6

Question	Answers	Extra information	Mark	AO / Spec. Ref.
08.5	body reacts as though progesterone levels are increased		1	AO2 4.3.1.7 4.3.1.6
	(which has) negative feedback effect on the pituitary gland	allow decreased production (of hormones) from pituitary gland	1	AO2 4.3.1.6
	(so) decreased production / release of FSH	allow (so) decreased production / release of LH	1	AO2 4.3.1.6
	(decreased FSH) prevents maturation of egg	allow (decreased LH) so no egg released mp3 and mp4 must correspond if no other mark awarded allow progesterone / progestin thickens mucus in cervix for **1** mark **and** thicker mucus makes it difficult for sperm to enter uterus for **1** mark	1	AO1 4.3.1.6
Total			**12**	