GCSE
BIOLOGY

8461/2F - PAPER 2 FOUNDATION TIER

Mark scheme

8461

June 2018

Version/Stage: 1.1 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

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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 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 / ; eg 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 mark 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, ie 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.

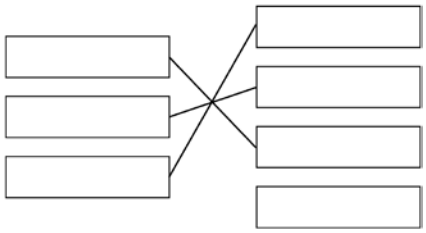
The exemplar materials used during standardisation will help. There will be an answer in the standardising materials which will correspond with each level of the mark scheme. This answer will have been awarded a mark by the Lead Examiner. You can compare the student's answer with the example to determine 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.

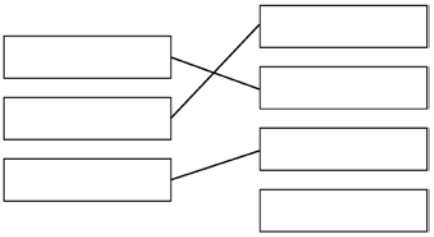
You may well need to read back through the answer as you apply the mark scheme to clarify points and assure yourself that the level and the mark are appropriate.

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.

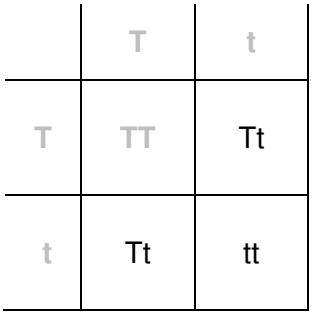
An answer which contains nothing of relevance to the question must be awarded no marks.

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.1		extra line from a scientific term cancels the mark	1 1 1	AO2 4.7.4.1
01.2	$\frac{10}{200} \times 100$ 5 / 5.0	an answer of 5 / 5.0 scores **2** marks	1 1	AO2 4.7.4.3
01.3	digestion respiration excretion	in this order only	1 1 1	AO2 4.5.3.3 4.7.4.3
01.4	fewer are eaten (by small fish)	allow there are fewer (small) fish eating them do **not** accept none are eaten	1	AO2 4.7.4.1
Total			**9**	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.1	to allow implantation of the embryo		1	AO1 4.5.3.4
02.2	oestrogen		1	AO1 4.5.3.4
02.3	13 / 14 / 15 / 16	allow any number in range 13 to 16 allow any range within these values eg 14–16	1	AO3 4.5.3.5
02.4		extra line from a method cancels the mark	1 1 1	AO1 4.5.3.5
02.5	more reliable than diaphragm / spermicidal cream low chance of pregnancy no side effects	allow fewer pregnancies than diaphragm / spermicidal cream allow only 1 more pregnancy than the pill (per 100 women per year) allow almost as good as the pill allow reference to one named example allow easy to get / buy allow easy to use allow prevent / reduce spread of STDs / gonorrhoea / HIV ignore cost	1 1 1	AO3 4.5.3.5
Total			**9**	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.1	(organism) soft-bodied **or** (fossil) destroyed	allow lack hard parts / skeleton / shell allow (organism) eaten / decayed allow buried (very) deep allow they are (very) small	1	AO1 4.6.3.5
03.2	any **two** from: • the fish (dies) buried in sediment / sand / mud • (only) the soft parts decayed / eaten **or** the hard parts / bones did not decay or were not eaten • mineralisation occurred	allow other examples of sediments do **not** accept rock(s) allow description of mineralisation eg bones turned to stone allow imprinted (in the sediment)	2	AO2 4.6.3.5
03.3	any **two** from: • drought • ice age / global warming • volcanic activity • asteroid / meteor collision • (new) predators • (new) disease / named pathogen • competition for food • competition for mates • lack of habitat or habitat change	ignore pollution allow earthquakes / tsunami allow hunters / poachers allow eaten allow lack of food allow isolation or lack of mates if no other marks awarded allow natural disaster / climate change / weather change / catastrophic event / environmental change for **1** mark	2	AO1 4.6.3.6

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.4	a change in a gene		1	AO1 4.6.2.1
03.5		allow in terms of an example		AO1 4.6
	there is variation (between members of a species)	allow mutation	1	4.6.2.2 4.6.3.1
	better adapted survive	allow 'survival of the fittest'	1	
	(reproduce and) pass on (favourable) allele(s) / gene(s) / mutation(s) / DNA / genetic material	ignore pass on characteristic(s)	1	
Total			**9**	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.1	Gregor Mendel		1	AO1 4.6.3.3
04.2	DNA		1	AO1 4.6.3.3
04.3	when the dominant allele is not present		1	AO1 4.6.1.6
04.4	tt	allow homozygous recessive	1	AO2 4.6.1.6
04.5		all 3 correct = **2** marks 2 correct = **1** mark 0 or 1 correct = **0** marks allow tT for Tt	2	AO2 4.6.1.6
04.6	circle drawn around either TT or tt on Figure 5	allow circles drawn round both	1	AO2 4.6.1.6
04.7	correct ratio from question **04.5** eg 3 : 1	allow multiples of stated ratio allow 3 : 1 if no answer to question **04.5**	1	AO3 4.6.1.6
Total			**8**	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.1	pancreas		1	AO1 4.5.3.2
05.2	liver glycogen	in this order	1 1	AO1 4.5.3.2
05.3	would be digested / broken down (by enzymes / protease / pepsin / acid or to amino acids)	allow denatured (by acid)	1	AO2 4.2.2.1 4.5.3.2
05.4	use of 14.2 **and** 6.8 7.4	an answer of 7.4 scores **2** marks allow an answer of 7.2 or 7.3 (using 14.1 and / or 6.9) for **1** mark	1 1	AO2 4.5.3.2 AO3 4.5.3.2
05.5	any **one** from: • (person A's) results are higher • (A) increases for a longer time **or** peaks later • (A) takes longer to decrease **or** takes longer to return to normal	allow converse comparisons with person B as the subject ignore A peaks at a higher level than B allow other correct comparisons allow a description using pairs of figures from graph at a given time	1	AO2 4.5.3.2

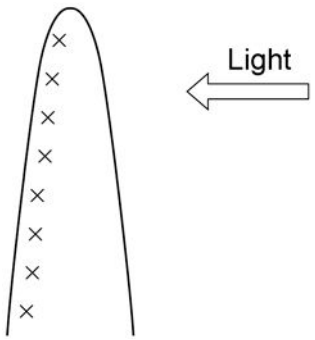
Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.6	a negative correlation		1	AO2 4.5.3.2
05.7	less carbohydrate / sugar / fat in diet **or** lose weight **or** maintain a healthy weight	allow go on a diet allow eat less allow balanced / healthy diet ignore diet unqualified	1	AO1 4.5.3.2
	(more) exercise	allow examples of exercise	1	
Total			**10**	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.1	description of a method to achieve random placement	examples could include random number generator or random coordinates allow throw over the shoulder **or** with eyes shut ignore throw unqualified	1	AO1 4.7.2.1
06.2	any **one** from: • random (location) • avoid bias • obtain valid / representative results	allow by chance allow more accurate / precise mean ignore fair test / accurate / precise unqualified	1	AO1 4.7.2.1
06.3	as a control / comparison **or** B varies from A in only one factor (to) show results (in A) are due to weed killer	allow see the difference do **not** accept a control variable allow to see the effect of the weed killer allow so the results are valid	1 1	AO2 4.7.2.1 AO3 4.7.2.1
06.4	11	allow eleven	1	AO2 4.7.2.1
06.5	$\frac{10 - 2}{10} \times 100$ 80	an answer of 80 scores **2** marks	1 1	AO2 4.7.2.1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.6	use more quadrats	allow use larger quadrats allow repeat	1	AO3 4.7.2.1
	original may not be representative **or** reference to weeds being distributed unevenly	allow mean is more reliable / accurate / precise ignore more valid	1	
	or leave for more than two weeks (1) original may not be representative (1)	allow mean is more reliable / accurate / precise allow weed killer may take longer than two weeks to work (fully) ignore more valid		
Total			**9**	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.1	kills microorganisms / bacteria / fungi / viruses / microbes	allow to remove microorganisms / bacteria / fungi / viruses / microbes ignore germs allow so mycoprotein is not contaminated	1	AO2 4.7.5.4
	(which) compete for food / oxygen **or** which make toxins **or** which are pathogens **or** which might kill the fungus / *Fusarium*	allow so mycoprotein is safe to eat	1	
07.2	30 °C		1	AO2 4.1.1.6 4.2.2.1 4.7.5.4
07.3	for (aerobic) respiration	do **not** accept anaerobic	1	AO2 4.4.2.1 4.7.5.4
	(which) releases energy (for growth)	do **not** accept produces energy allow glucose is used to make other organic substances eg protein	1	AO1 4.4.2.1 4.7.5.4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.4	any **two** from: so *Fusarium* can • grow faster / better • get sufficient food / glucose / minerals • get sufficient oxygen • get rid of sufficient carbon dioxide • be kept at a (suitable) temperature	 allow more / enough allow more / enough allow more / enough allow waste allow to avoid 'clumping'	2	AO2 AO3 4.7.5.4
07.5	200 grams		1	AO2 4.7.5.4
Total			**8**	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
08.1	the temperature the volume of water added to the soil		1 1	AO3 4.5.4.1
08.2	to stop light reaching the shoot		1	AO2 4.5.4.1
08.3	piece of thread (along shoot and mark length) transfer to ruler / mm-scale	allow straighten the shoot allow use of (flexible) tape measure for **2** marks	1 1	AO3 4.5.4.1
08.4	tip covered / B / removed / C grows straight up **or** does not bend (towards light) tip exposed / A / not covered / D bends (towards light)	allow tip covered / B / removed / C does not respond (to light) tip exposed / A / not covered / D does respond (to light) allow only the ones with exposed tips or only A **and** D bend towards the light for **2** marks	1 1	AO3 4.5.4.1
08.5			1	AO2 4.5.4.1
Total			**8**	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
09.1	releasing saliva when food enters the mouth withdrawing the hand from a sharp object		1 1	AO2 4.5.2.1
09.2	bright light	allow described method of increasing light ignore light unqualified allow correctly named drug eg morphine / heroin	1	AO1 4.5.2.3
09.3	iris		1	AO1 4.5.2.3
09.4	muscle contraction	allow muscles shorten ignore radial / circular ignore muscles relax / constrict do **not** accept muscles expand do **not** accept ciliary muscle contracts	1	AO1 4.5.2.3

Question	Answers	Mark	AO / Spec. Ref.
09.5	**Level 2:** Scientifically relevant facts, events or processes are identified and given in detail to form an accurate account.	4–6	AO1 4.5.2.1
	Level 1: Facts, events or processes are identified and simply stated but their relevance is not clear.	1–3	
	No relevant content	0	
	Indicative content • receptor detects stimulus • eg receptor detects pressure • receptor generates impulses / electrical signals • neurones conduct impulses / electrical signals • neurone A conducts impulses to spinal cord • neurone A = sensory neurone • synapse between neurones • chemical (/ neurotransmitter) crosses synapse • chemical stimulates impulse(s) in neurone B • neurone B = relay neurone • neurone C = motor neurone • effector carries out response • eg muscles of the arm / leg contract • muscles contract **or** gland secretes chemicals to access **level 2**, candidates need to consider, in terms of the indicative content, the receptor, the neurones and the effector in the correct sequence		
Total		**11**	

<table>
<tr><th>Question</th><th>Answers</th><th>Extra information</th><th>Mark</th><th>AO / Spec. Ref.</th></tr>
<tr><td>10.1</td><td>
<table>
<tr><th></th><th>1960–1977</th><th>1977–2003</th><th>2003–2015</th></tr>
<tr><td>trend in carbon dioxide concentration</td><td></td><td>increasing</td><td>increasing</td></tr>
<tr><td>trend in air temperature</td><td>decreasing</td><td>increasing</td><td>constant / decreasing</td></tr>
</table>
allow synonyms eg level / goes up / goes down
</td><td></td><td>1

1</td><td>AO3
4.7.3.5</td></tr>
<tr><td>10.2</td><td>traps heat / energy or (long-wavelength / IR) radiation
or
less loss of heat

or
insulates</td><td>do not accept light / UV

allow stops (some) heat escaping
do not accept stops all heat escaping

ignore greenhouse effect
ignore reference to ozone layer</td><td>1</td><td>AO1
4.7.3.5</td></tr>
</table>

Question	Answers	Mark	AO / Spec. Ref.
10.3	**Level 2**: Some logically linked reasons are given. There may also be a simple judgement.	3–4	AO3 4.7.3.5
	Level 1: Relevant points are made. They are not logically linked.	1–2	
	No relevant content	0	
	Indicative content **for the theory:** • (overall increased CO_2 parallels) overall increased temperature (eg by 0.4 (°C)) • CO_2 traps (long-wave) radiation / IR / heat **against the theory:** • in some years (eg 1960–1977) temperature falls (while CO_2 is rising) • many (large and small) erratic rises and falls in temperature • overall correlation does not necessarily mean a causal link • other (unknown) factors may be involved in temperature change to access level 2 there must be evidence both for and against the theory **and** use of data from the graph		

10.4	burning of (fossil) fuels	allow eg coal / oil / gas allow driving cars allow any activity which leads to burning fuels – eg using central heating ignore power stations unqualified ignore burning / fires unqualified ignore deforestation	1	AO2 4.7 4.7.2.2 4.7.3.5

10.5	photosynthesis	allow full description or full equation allow a symbol equation which is not balanced	1	AO2 4.4.1.2 4.7 4.7.2.2 4.7.3.5

Question	Answers	Extra information	Mark	AO / Spec. Ref.
10.6	any **two** from: • (some) plants grow faster / higher yield • loss of habitat • migration **or** change in distribution • extinction	allow points made using examples if neither is given allow alters biodiversity for **1** mark allow (in terms of extinction) death due to eg lack of water / food or increased disease ignore death unqualified	2	AO1 4.7.3.1 4.7.3.5
Total			**11**	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
11.1	2400 **and** 2280 **or** 500 **and** 380 120	an answer of 120 scores **2** marks	1 1	AO2 4.5.3.3
11.2	respiration of glucose		1	AO1 4.4.2.1 4.4.2.3
11.3	(more) sweating (because) exercise releases heat **or** need to cool the body **or** need to lose heat **or** need to maintain body temperature	ignore reference to vasodilation / vasoconstriction do **not** accept energy being produced	1 1	AO2 4.5.2.4 4.5.3.3
11.4	more energy needed (so) more (aerobic) respiration (so) increased breathing (rate / depth) (to supply oxygen **or** remove carbon dioxide / water)	‘more’ does not need to be stated a second time to gain marking point 1 and marking point 2 do **not** accept energy production do **not** accept energy needed for respiration	1 1 1	AO2 4.5.2.4 4.5.3.3
Total			**8**	