GCSE
COMBINED SCIENCE: TRILOGY
8464/B/2F

Biology Paper 2F

Mark scheme

June 2020

Version: 1.0 Final Mark Scheme

206g8464b2f/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

Copyright information

AQA retains the copyright on all its publications. However, registered schools/colleges for AQA are permitted to copy material from this booklet for their own internal use, with the following important exception: AQA cannot give permission to schools/colleges to photocopy any material that is acknowledged to a third party even for internal use within the centre.

Copyright © 2020 AQA and its licensors. All rights reserved.

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 / ; 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 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, 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.

<table>
<tr><th>Question</th><th>Answers</th><th>Extra information</th><th>Mark</th><th>AO / Spec. Ref.</th></tr>
<tr><td>01.1</td><td>gametes are formed

sperm and egg fuse</td><td></td><td>1

1</td><td>AO1
4.6.1.1</td></tr>
<tr><td>01.2</td><td>Y gamete for father

Mother
<table><tr><td></td><td></td><td>X</td><td>X</td></tr><tr><td>Father</td><td>X</td><td>XX</td><td>XX</td></tr><tr><td></td><td>Y</td><td>XY</td><td>XY</td></tr></table></td><td>all derivations correct = 2 marks
1 or 2 correct = 1 mark

allow correct derivations from incorrect gamete</td><td>1

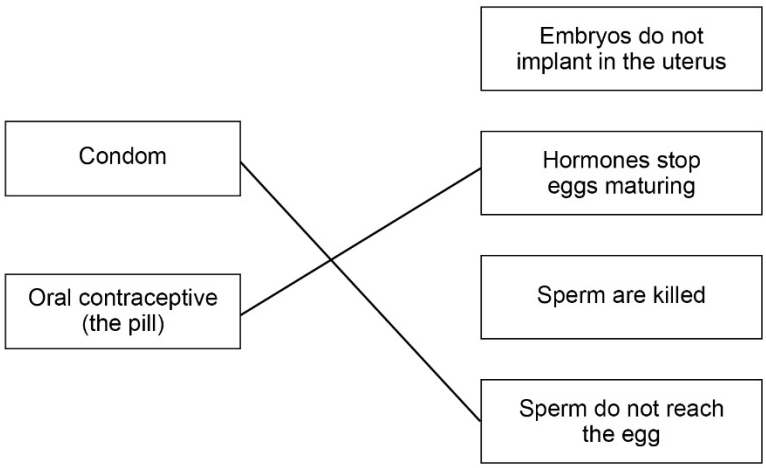
2</td><td>AO2
4.6.1.6</td></tr>
<tr><td>01.3</td><td>rings drawn around all XY</td><td>allow one ring drawn around both XY
ignore ring drawn around father’s genotype

ecf any letter for Y, except X</td><td>1</td><td>AO2
4.6.1.6</td></tr>
<tr><td>01.4</td><td>Hormone / Change that hormone causes at puberty

Oestrogen → Breasts develop
Oestrogen → Skin turns lighter
Testosterone → Voice becomes deeper
Wisdom teeth appear

If more than one line from a hormone no mark for that hormone</td><td></td><td>1

1</td><td>AO2
4.5.3.3</td></tr>
</table>

01.5	**Method of contraception** / **How the method prevents pregnancy**  If more than one line from a method of contraception no mark for that method		1 1	AO1 4.5.3.4
01.6	advantage – any **one** from: • very reliable • easy to take • do not have to rely on partner • helps to treat acne or period pain disadvantage – any **one** from: • may cause side effects • may affect her fertility later • have to remember to take it (every day) • does not protect against STIs	ignore you do not get pregnant allow described eg headaches, nausea, putting on weight allow you have to take it every day	1 1	AO3 4.5.3.4
Total			**12**	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.1	the ammonite shell was replaced by minerals		1	AO2 4.6.3.2
02.2	any **one** from: • no living ones around now or during human times • all the soft parts have decayed • the soft parts did not mineralise / fossilise.	allow there were no humans living then	1	AO3 4.6.3.2
02.3	60 (million years)		1	AO2 4.6.3.3
02.4	(ammonites) 420 - 60 = 360 360 - 270 = 90 (million years)	 allow ecf from question **02.3**	1 1	AO2 4.6.3.3
02.5	any **two** from: • drought • ice age / global warming • volcanic activity • asteroid / meteor collision • (new) predators • (new) diseases / pathogens • competition for food • competition for mates • lack of habitat **or** habitat change	ignore pollution ignore temperature change unqualified allow earthquake / tsunami allow hunted / eaten by other animals allow lack of food allow isolation **o**r lack of mates if no other mark awarded allow natural disaster **or** climate change **or** catastrophic event for **1** mark	2	AO1 4.6.3.3
02.6	Charles Darwin		1 (1-3)	AO1 4.6.3.1

02.7	older fossils are more simple		1	AO3 4.6.3.2
Total			**9**	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.1	root (hairs)		1	AO1 4.7.2.2 4.2.3.2
03.2	carbon water	in either order allow carbon dioxide if no other mark awarded allow oxygen for 1 mark	 1 1	AO1 4.7.2.2
03.3	**Level 2:** Scientifically relevant facts, events or processes are identified and given in detail to form an accurate account.		4–6	AO1 4.7.2.2 4.4.1.1 4.4.2.1
	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 • microorganisms decay (the dead plant) • microorganisms respire • using carbon compounds / glucose • releasing carbon dioxide • into the atmosphere • new plants take in carbon dioxide • (carbon dioxide) for photosynthesis • making glucose • converted into correctly named cell materials (when plants are decayed) Nitrate / mineral ions • are released into soil • to be taken up by new growing plants Water • plants dehydrate or water evaporates when they die • recycled as rain needed by growing plants			
Total			**9**	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.1	controlling water output in urine keeping cool on a hot day		1 1	AO2 4.5.1
04.2	pituitary		1	AO1 4.5.3.1
04.3	(8.4 – 5.2 =) 3.2 (mmol/dm^3)		1	AO2 4.5.3.2
04.4	diabetes	ignore type of diabetes	1	AO3 4.5.3.2
04.5	the pancreas is not releasing insulin		1	AO3 4.5.3.2
04.6	change diet take more exercise	allow description of suitable diet change e.g. use sweetener in hot chocolate, eat less sugary / starchy food or stop eating sugar-coated cereal allow description e.g. go to gym instead of reading and TV, walk / cycle to work allow change to an active job if no other marks awarded allow 1 mark for lose weight.	1 1	AO3 4.5.3.2
Total			**8**	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.1	plant hedgerows around his fields plant many different crops in his fields		1 1	AO3 4.7.3.6
05.2	any **one** from: • repeat in each area • do more quadrats (to take more readings) • count the number of individuals of each species • remove leaf litter and search in tray • do a timed search of the leaf litter • do on the same day or time of day		1	AO3 4.7.2.1 RPA 7
05.3	the trees provide habitat(s) or shelter so (more) food / camouflage / shade available	allow described allow places to hide or cooler or wetter environment	1 1	AO2 4.7.2.1 RPA 7
05.4	ring drawn around 20		1	AO3 4.7.2.1 RPA 7
05.5	(removing trees) decreases the number of invertebrate species		1	AO3 4.7.2.1 RPA 7

05.6	(less trees means) more light (and) more water / minerals in soil (so) reduced competition **OR** (less trees means) more light (1) (so) (more) photosynthesis (1) (so) (more) glucose (for growth) (1)		1 1 1	AO2 4.7.1.2 4.4.1.1 4.4.1.3
Total			**10**	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.1			1	AO2 4.6.1.3
06.2	any **one** from: • 2 strands / chains that are twisted / coiled / spiralled • double helix • (long) polymer	allow cross links between 2 strands / chains allow reference to nucleotides or sugars, phosphates and bases	1	AO1 4.6.1.3
06.3	amino acids protein	in this order only allow polypeptide	1 1	AO1 4.6.1.3
06.4	all the genetic material (of an organism)	allow DNA / genes for genetic material ignore chromosomes	1	AO1 4.6.1.3
06.5	tracing how aboriginal people spread across Australia		1	AO2 4.6.1.3
06.6	variation	ignore genetic/environmental	1	AO1 4.6.2.1

06.7	stronger / larger (shell) (so) more likely to (survive and) breed **or** (so) more likely to (survive and) pass on genes **OR** (better) camouflaged (1) (so) less likely to be eaten and will breed more (1)		1 1	AO2 4.6.2.2
Total			**9**	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.1	any **four** from: • (stimulus is) detected by the receptor • (initiates) an electrical impulse • (impulse) travels via the neurones • sensory, relay and motor • crosses synapses • (crosses synapses) as a chemical	allow in this order only	4	AO1 AO2 4.5.2
07.2	**Level 2:** The method would lead to the production of a valid outcome. All key steps are identified and logically sequenced.		3–4	AO2
	Level 1: The method would not lead to a valid outcome. Some relevant steps are identified, but links are not made clear.		1–2	AO1
	No relevant content		0	4.5.2 RPA 6
	Indicative content • select at least 3 people • do reaction time test at least 3 times using right hand • details on how to do test in valid manner • find a mean • remove anomalous readings • repeat for each person for left hand • select people of same age • select people of same gender • same time of day • other control such as amount of coffee, sleep. To access level 2 the right hand and left hand of each person must be compared			
07.3	$\frac{(0.2 + 0.4 + 0.3 + 0.4 + 0.2 + 0.3)}{6}$ **or** $\frac{1.8}{6}$ 0.3		1 1	AO2 4.5.2 RPA 6

07.4	reaction time	allow time	1	AO2 4.5.2 RPA 6
07.5	students who play tennis (regularly) had shorter / faster (mean) reaction time(s)		1	AO3 4.5.2 RPA 6
07.6	any **one** from: • overlap in times between two groups • small difference in (mean) times • small sample used	allow correctly described as comparative data allow students who did not play tennis may have played other (ball) games	1	AO3 4.5.2 RPA 6
Total			**13**	