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**GCSE**  
**COMBINED SCIENCE: TRILOGY**  
**8464/B/1F**

Biology Paper 1F

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**Mark scheme**

June 2019

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Version: Final 1.0

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](http://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 not 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	Answers	Extra information	Mark	AO / Spec. Ref.
01.1	oxygen	name takes precedence allow O <sub>2</sub> ignore O <sup>2</sup> / O / O <sub>2</sub>	1	AO1 4.4.1.1 4.4.1.2
01.2	(use) a lamp / light (source)  (and) move away and / or towards pondweed	allow use different power ratings <b>or</b> use a dimmer switch  allow change the opacity of the beaker for <b>2</b> marks	1  1	AO1 4.4.1.2
01.3	count the number of bubbles  in a given time	allow measure the volume of gas collected  allow for <b>2</b> marks measure time taken to collect a specific number of bubbles	1  1	AO1 4.4.1.2  AO2/2 4-5 RPA5 WS2.3
01.4	34 (arbitrary units)	allow a value in the range 33.5 – 34.5 (arbitrary units)	1	AO2 4.4.1.2
01.5	200 lumens		1	AO3 4.4.1.2
01.6	any <b>one</b> from: <ul style="list-style-type: none"> <li>• temperature</li> <li>• carbon dioxide (concentration)</li> <li>• amount of chlorophyll</li> </ul>	ignore light (intensity)  ignore heat ignore oxygen  allow light colour / wavelength allow water  ignore pH	1	AO1 4.4.1.2
<b>Total</b>			<b>8</b>	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.1	diffusion		1	AO1/1 4.1.3.1
02.2	(SA of one face = $2 \times 2$ ) =4 (Total SA = $4 \times 6$ ) = 24 (Volume = $2 \times 2 \times 2$ ) =8 (SA:volume ratio =) 24:8 <b>or</b> 3:1	ignore units  allow correct calculation using their calculated SA of 1 face x 6  ratio must be consistent with their figures	1  1  1  1	AO2 4.1.3.1
02.3	red (blood) cell(s)	allow erythrocyte(s)	1	AO1 4.2.2.3
02.4	carbon dioxide	name takes precedence  allow CO <sub>2</sub> ignore CO <sup>2</sup> / CO2 ignore water (vapour)	1	AO2 4.2.2.2 4.2.2.3 4.4.2.1
02.5	any <b>two</b> from: <ul style="list-style-type: none"> <li>• wall of alveolus (only) one cell thick</li> <li>• wall of capillary (only) one cell thick</li> <li>• cells of alveolus / capillary wall are flattened / thin</li> <li>• good blood supply</li> <li>• (well) ventilated</li> </ul>	ignore large surface area ignore many alveoli ignore moist lining  if none of these mentioned allow <b>1</b> mark for idea of short distance between (air in) alveolus and blood	2	AO1 4.1.3.1 4.2.2.2
<b>Total</b>			<b>9</b>	



Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.1	nucleus cell tissue organ	all in correct order  allow 1 mark for each consecutive pair of structures	3	AO2 4.1.1.1 4.1.1.2 4.2.1
03.2	any <b>one</b> from: <ul style="list-style-type: none"> <li>• bladder</li> <li>• brain</li> <li>• heart</li> <li>• (small <b>or</b> large) intestine</li> <li>• kidney</li> <li>• liver</li> <li>• lung</li> <li>• pancreas</li> <li>• skin</li> <li>• stomach</li> </ul>	allow any organ found in an animal ignore blood	1	AO1 4.2.1
03.3	phloem		1	AO1 4.2.3.1
03.4	large surface area  (so) it can absorb (a lot of) water / minerals / (mineral) ions	allow long  allow 1 mark for (many) mitochondria allow for 2 marks (many) mitochondria for active transport	1  1	AO1 4.1.1.3 4.2.3.2
03.5	any <b>one</b> from: <ul style="list-style-type: none"> <li>• biggest / widest field of view</li> <li>• easier to focus</li> </ul>		1	AO3 4.1.1.2
03.6	to avoid damage to lens / slide	ignore references to focussing	1	AO3 4.1.1.2

<b>03.7</b>	(x)5		1	AO2 4.1.1.2
<b>03.8</b>	any <b>one</b> from: (root hair cells) <ul style="list-style-type: none"> <li>• are not exposed to light</li> <li>• do not photosynthesise</li> </ul>	allow are underground	1	AO2 4.1.1.2 4.1.1.3 4.2.3.2 4.4.1.1
<b>Total</b>			<b>11</b>	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.1	transpiration		1	AO1 4.2.3.2
04.2	guard cell		1	AO1 4.2.3.1 4.2.3.2
04.3	(real length of cell =) $\frac{25}{800}$ 0.03125 31.25 (µm)	an answer of 31.25 (µm) scores 3 marks allow 2 marks for $\frac{25\ 000}{800}$  allow 31 or 31.3 allow correct unit conversion of incorrect answer	1  1  1	AO2 4.1.1.5
04.4	temperature of the room		1	AO2 4.2.3.2
04.5	any water / mass lost was from the leaves / plant	allow so no water was lost (directly) from the soil	1	AO3 4.2.3.2
04.6	0.1 g		1	AO2 4.2.3.2
04.7 View with Table 1	511.2 (g)	answer line takes precedence	1	AO2 4.2.3.2
04.8	the higher the temperature the more water lost	cause and effect must be the correct way round	1	AO3 4.2.3.2

<b>04.9</b>	<p>any <b>two</b> from:</p> <ul style="list-style-type: none"> <li>• humidity</li> <li>• air movement</li> <li>• light (intensity)</li> <li>• water availability</li> <li>• rate of photosynthesis</li> </ul>	<p>allow wind allow time of day</p> <p>allow number / size of leaves / allow number of stomata on plant ignore type of plant ignore time plant left for</p>	2	AO1 4.2.3.2
<b>Total</b>			<b>12</b>	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.1	840 000 – 440 000	an answer of 400 000 scores 2 marks allow tolerance of +/- half a small square allow 840 – 440 = 400	1	AO2 4.3.1.5
	400 000		1	
05.2	2005 to 2010		1	AO3 4.3.1.5
05.3	any <b>one</b> from: <ul style="list-style-type: none"> <li>• data not collected (for 2002)</li> <li>• only shows a trend line</li> <li>• not all deaths reported / recorded</li> </ul>	allow no data plotted for 2002	1	AO3 4.3.1.5
05.4	protist		1	AO1 4.3.1.5
05.5	makes people immune <b>or</b> they do not develop the disease	allow ecf from 05.4  allow correct description of immunity	1	AO1 AO2 4.3.1.5
	(so) fewer (infected) people to pass pathogen on (to mosquitos)	allow idea of disrupting life cycle of parasite	1	
05.6	any <b>one</b> from: <ul style="list-style-type: none"> <li>• (mosquito) nets / long clothing</li> <li>• prevent mosquitos breeding</li> <li>• insecticides</li> <li>• insect repellents</li> <li>• anti-malarial tablets</li> <li>• kill mosquitos</li> </ul>	allow specific method e.g. drain swamps, release GM mosquitos  allow DEET / mosquito band  allow names e.g. Larium / Malarone  allow antibiotics	1	AO1 4.3.1.5 4.3.1.7
<b>Total</b>			<b>8</b>	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.1	B		1	AO2 4.2.2.2
06.2	right atrium		1	AO1 4.2.2.2
06.3	foxgloves		1	AO1 4.3.1.9
06.4	$X = 2800 / 52$  53.846153  54 (cm <sup>3</sup> )	an answer of 54 (cm <sup>3</sup> ) scores 3 marks   allow correct rounding of an incorrectly calculated value of stroke volume	1  1  1	AO2 4.2.2.2

Question	Answers	Mark	AO / Spec. Ref.
06.5	<p><b>Level 3:</b> Relevant points (reasons / causes) are identified, given in detail and logically linked to form a clear account.</p>	5–6	AO3 4.2.2.2 4.2.2.4 4.4.2.1 4.4.2.2
	<p><b>Level 2:</b> Relevant points (reasons / causes) are identified, and there are attempts at logical linking. The resulting account is not fully clear.</p>	3–4	AO2 AO1
	<p><b>Level 1:</b> Points are identified and stated simply, but their relevance is not clear and there is no attempt at logical linking.</p>	1–2	AO1
	<p>No relevant content</p>	0	
	<p><b>Indicative content</b></p> <p>effect of exercise</p> <ul style="list-style-type: none"> <li>• during exercise body needs to transfer (more) energy</li> <li>• energy transferred during respiration</li> <li>• rate of respiration increases during exercise</li> <li>• (so) more oxygen is needed</li> </ul> <p>effect of beta blockers</p> <ul style="list-style-type: none"> <li>• beta blockers reduce (the increase in) heart rate (during exercise)</li> <li>• beta blockers reduce stroke volume (or described)</li> <li>• beta blockers reduce cardiac output</li> <li>• (so) heart cannot supply oxygen fast enough / in sufficient quantity to muscle cells</li> </ul> <p>effect on breathing rate</p> <ul style="list-style-type: none"> <li>• breathing rate increases to increase rate / amount of oxygen absorbed</li> <li>• breathing rate increases to increase rate / amount of carbon dioxide removed from body</li> <li>• (but) increased breathing rate cannot fully compensate for changes in heart function</li> </ul> <p>A level 3 response should make links between all three sections of indicative content</p> <p>A level 2 response should attempt to link effect of exercise with oxygen / energy requirement <b>and</b> beta blockers to effect on heart function.</p>		
<b>Total</b>		<b>12</b>	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.1	amylase	allow phonetic spelling allow carbohydrase ignore references to source of enzyme e.g. salivary / pancreatic do <b>not</b> accept amylose	1	AO1 4.2.2.1
07.2	(partially permeable tubing) small intestine  (water in test tube) blood	allow stomach ignore intestine unqualified do <b>not</b> accept large intestine  allow plasma	1  1	AO3 4.2.2.1
07.3	(Starch): Iodine (solution)  (Sugar): Benedict's (solution)	all allow phonetic spelling  ignore iodide unqualified	1  1	AO1 4.2.2.1
07.4	enzyme had not started to work <b>or</b> none of the starch had been digested / broken down	allow idea of not enough time (for digestion)	1	AO2 4.2.2.1
07.5	(enzyme) digested / broke down starch to form sugar  (however) not all the starch was digested / broken down		1  1	AO2  AO3 4.2.2.1
07.6	sugar molecules formed are small enough to pass through tubing  (but) starch molecules too large (to pass through tubing)		1  1	AO3 4.2.2.1  AO2 4.2.2.1
<b>Total</b>			<b>10</b>	