
GCSE

COMBINED SCIENCE: TRILOGY

8464/B/2H

Biology Paper 2H

Mark scheme

Specimen (set 2)

Version: 1.1

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Please be aware that not all schools and colleges will be using these tests at the same time.

Help us to maintain the security of these papers by ensuring they are not distributed on social media or other platforms.

Important – please note

Mark schemes are prepared by the Lead Assessment Writer and considered, together with the relevant questions, by a panel of subject teachers.

It must be stressed that a mark scheme is a working document. This mark scheme has **not** been through the full standardisation process. 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.

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.

The Information to Examiners is included as a guide to how the mark scheme will function as an operational document.

The layout has been kept consistent so that future operational mark schemes do not appear different from these test materials.

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 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, 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.

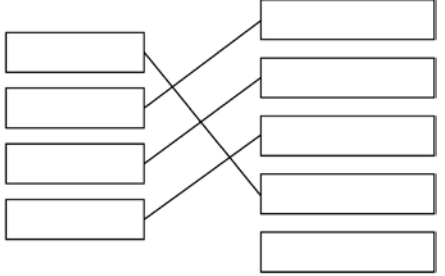
You may well need to read back through the answer as you apply the mark scheme to clarify points and assure yourself that the level and the mark are appropriate.

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. / Demand
01.1	remains / traces of organisms from millions of years ago		1 1	AO1 4.6.3.2 Standard
01.2	no individuals of a species still alive		1	AO1 4.6.3.3 Standard
01.3	microorganisms have a more simple structure than a trilobite stromatolites are found in older rock than trilobites		1 1	AO2 4.6.3.2 Standard
01.4	Marginocephalia		1	AO2 4.6.3.2 Standard
01.5	Protoceratops and Triceratops (in either order)	allow Coronosaurus and Triceratops or Coronosaurus and Protoceratops or Marginocephalia and Pachycephalosaurus	1	AO2 4.6.3.2 Standard
01.6	any one from: <ul style="list-style-type: none"> • the fossil record is not complete • new fossils may have been found since 1970s • DNA / chemical analysis may have given new information 		1	AO3 4.6.3.2 Std./High
Total			8	

Question	Answers	Extra information	Mark	AO / Spec. Ref. / Demand
02.1		4 correct = 3 marks 3 correct = 2 marks 2 correct = 1 mark (4-5)	3	AO2 4.5.2 Standard
02.2	time awake		1	AO2 4.5.2 Standard
02.3	description of how to do a 'ruler drop' how to measure length in cm a control measure taken or how to use a conversion chart to get reaction time		1 1 1	AO1 4.5.2 Standard
02.4	any one sensible reason: for ruler drop test: <ul style="list-style-type: none"> • have lots of equipment • inexpensive equipment • many students can do it at same time for computer test: <ul style="list-style-type: none"> • more accurate • more repeatable • students can cheat on ruler drop test 		1	AO3 4.5.2 Standard
02.5	0.556..... or (0.44+0.49+0.83+0.27+0.75)/5 0.56	an answer of 0.56 scores 2 marks	1 1	AO2 4.5.2 Standard

02.6	<p>at first stays same / has slight dip (until 12 hours)</p> <p>increases from 12 hours awake</p>	<p>12 hours only needed once</p> <p>ignore 'increases' alone</p>	<p>1</p> <p>1</p>	<p>AO3 4.5.2 Standard</p>
02.7	<p>does support, because overall goes up or does not support, because it goes down / stays the same at first and only goes up after 12 hours</p>		<p>1</p>	<p>AO3 4.5.2 Standard</p>
02.8	<p>any two from:</p> <ul style="list-style-type: none"> • use more volunteers • make sure they all do the same activities at the same time • give them the same food and coffee/tea at the same time • control the age / gender of volunteers • make sure they all had a good night's sleep the night before the investigation began 		<p>2</p>	<p>AO3 4.5.2 Standard</p>
Total			15	

Question	Answers	Extra information	Mark	AO / Spec. Ref. / Demand
03	Level 3: Relevant adaptations are identified, given in detail and logically linked to form a clear account.		5–6	AO1 4.7.1.1 Standard
	Level 2: Relevant adaptations are identified, and there are attempts at logical linking. The resulting account is not fully clear		3–4	
	Level 1: Adaptations are identified and stated simply, but their relevance is not clear and there is no attempt at logical linking.		1–2	
	No relevant content.		0	
	Indicative content <ul style="list-style-type: none"> • a small SA:V ratio • means less thermal energy transferred to surroundings • thick fur or hollow hair shafts • traps a layer of air which acts as an insulating layer stopping transfer of thermal energy • a layer of fat or blubber under the skin • acts as an insulating layer or as a food store for respiration when food is in short supply • small ears • reduces surface area for thermal energy transfer • white colour • camouflage in the snow so prey do not see them coming and they get more to eat or so predators do not see them and they can escape • large feet • to spread weight over snow so they can run faster • hibernate in winter • to conserve energy stores allow 'heat loss' for transfer of thermal energy			
Total			6	

Question	Answers	Extra information	Mark	AO / Spec. Ref. / Demand
04.1	(hormonal uses chemicals / synthetic) hormones to prevent an egg being released	allow 'to prevent maturation of eggs'	1	AO1 4.5.3.4 Std./High
	(non-hormonal has a barrier which) prevents the sperm reaching an egg or prevents implantation		1	
	a correct example of each type		1	
04.2	suitable scales and axes labels correct	allow a bar chart for max 3 marks	1	AO2 4.5.3.4 Std./High
	all points plotted accurately	allow 1 mark for 5 accurate points	2	
	line of best fit		1	
04.3	decrease egg production		1	AO2 4.5.3.4 Standard High
	by between 6–10 times	allow ecf from their graph	1	
Total			9	

Question	Answers	Extra information	Mark	AO / Spec. Ref. / Demand
05.1	glucagon	correct spelling only	1	AO1 4.5.3.2 Std./High
05.2	<p>if glucose too high (insulin causes) glucose to enter liver / muscle cells</p> <p>or</p> <p>glucose to be converted to glycogen</p> <p>so blood glucose levels fall</p> <p>when glucose gets too low (glucagon causes) glycogen breakdown in liver / muscle cells</p> <p>so glucose enters blood and raises level again</p> <p>this is called negative feedback</p>	allow ecf from 05.1	<p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p>	AO1 4.5.3.2 Std./High High
05.3	<p>any two from:</p> <ul style="list-style-type: none"> • polymer • made of two strands • (twisted) in a double helix 	<p>allow:</p> <ul style="list-style-type: none"> • backbone of strands contains sugar and phosphate groups • (cross) linked by pairs of bases • correct names of four bases or base pairs 	2	AO1 4.6.1.3 Std./High
05.4	<p>contains a code</p> <p>for a sequence of amino acids which forms a specific protein</p>		<p>1</p> <p>1</p>	AO1 4.6.1.3 Std./High

05.5	<p>mother A (polydactyly)</p> <p>50% / half of children will have polydactyly if parent is heterozygous as it only takes one allele to show the disorder and half the sperm / ova / gametes will have faulty allele.</p> <p>(and) all / 100% will have polydactyly if parent is homozygous as faulty gene will always be passed on</p> <p>(but) for mother B (cystic fibrosis) none / 0% of children will have cystic fibrosis as it would need a second allele from the other parent before the disorder would be present</p>	<p>allow genetic diagram(s) if correct and offspring ratio clearly indicated.</p>	<p>1</p> <p>1</p> <p>1</p>	<p>AO1 AO3. 4.6.1.5 Std./High High</p>
Total			13	

06.4	Level 2: Relevant points (reasons/causes) are identified, given in detail and logically linked to form a clear account.	3–4	AO2 AO3 4.5.3.4 Std./High High
	Level 1: Relevant points (reasons/causes) are identified, and there are attempts at logical linking. The resulting account is not fully clear.	1–2	
	No relevant content	0	
	Indicative content advantages <ul style="list-style-type: none"> • killing worms will mean more corn / food for African people • so food security or no famine • it will stop the spread of the worms • so stop it reaching other countries and causing food shortages there • it will remove an invasive species • and so restore the natural ecosystem balance in the area disadvantages <ul style="list-style-type: none"> • insecticide will kill other (pollinating) insects • so will stop fertilisation of crops and lead to poor yields • insecticide will kill other insects • and upset the ecological balance in the area or reduce biodiversity in the area • insecticide may be toxic to humans • causing illness if they ingest it • insecticide may build up in the food chain • and poison / kill organisms further up the chain (ignore cost as it could be argued either way)		
Total		8	

Question	Answers	Extra information	Mark	AO / Spec. Ref. / Demand
07.1	2 640 000 (in remaining 24 years) 110 000 in each remaining year or 2.64×10^6 in remaining 24 years 1.1×10^5	an answer of 1.1×10^5 scores 3 marks	1 1 1	AO2 4.7.1.1 Std./High
07.2	(area of woodland =) 21 600 518 400 (bluebells)	an answer 518 400 (bluebells) scores 2 marks allow 16 800 + 4 800 or 9 000 + 12 600 or 4 800 + 4 200 + 12 600 allow their area $\times 4 \times 6$	1 1	AO2 4.7.2.1 Std./High

07.3	Level 3: Relevant points are identified, given in detail and logically linked to form a clear account.	5–6	AO3 AO2
	Level 2: Relevant points are identified, and there are attempts at logically linking. The resulting account is not fully clear.	3–4	AO1 4.4.1.1 4.7.2.1
	Level 1: Relevant points are identified and stated simply, but their relevance is not clear and there is no attempt at logical linking.	1–2	4.7.3.1 4.7.3.2
	No relevant content	0	4.7.3.5 Std./High
	Indicative content reducing pollution <ul style="list-style-type: none"> • trees take in carbon dioxide • which will lower atmospheric greenhouse gases and reduce global warming (allow consequences of global warming) • trees act as noise absorbers • which will reduce noise pollution in the city • roots of trees will bind the soil • which will reduce local flooding and soil erosion • leaves on trees will trap PM_{2.5} / tiny particulates • which will reduce asthma/breathing difficulties of people increasing biodiversity <ul style="list-style-type: none"> • new woodlands or new trees in parks / gardens will provide new habitats • for new species of plants and animals • linking woodlands • will allow animals to move into new areas • planting many new species of trees • will provide food and shelter for new species of insects/birds • could extend the scheme • to reintroduce species of plants or animals which no longer live in that area • could protect wildlife in the area • by legislation or community projects 		High
Total		11	