AQA GCSE Combined Science - Trilogy | 8464

SPECIFICATION POINT 4.7.3.1

# Biodiversity

## Mark schemes and examiner comments

| | |
|---|---|
| Tier | **Higher** |
| Question groups | **3** |
| Available paper years | **2020–2025** |

## Using this booklet

1. Booklet answer numbers match the question booklet.
2. Use the original question number within marking tables.
3. Examiner comments are included where available.

**Name:** _____ **Date:** _____

Where a precise marking extract is unavailable, the full source document is included in an appendix. Any missing mark scheme is explicitly identified.

4.7.3.1 Biodiversity

Answer 01 · Mark scheme

November 2020 | 8464/B/2H | Original Q3

| Question | Answers | Extra information | Mark | AO / Spec. Ref. |
|---|---|---|---|---|
| 03.1 | the variety of all the different <u>species</u> (of organisms) on Earth<br>**or**<br>the variety of all the different <u>species</u> (of organisms) in a habitat / area / ecosystem | | 1 | AO1<br>4.7.3.1 |
| 03.2 | any **one** from:<br>• compost<br>• burning<br>**or**<br>as a fuel | allow to improve soil (texture / drainage / quality)<br>allow to grow food / crops / plants<br>ignore farming unqualified<br>ignore as fertiliser | 1 | AO1<br>4.7.3.3 |
| 03.3 | decay / burning of peat releases carbon dioxide (into the atmosphere)<br><br>which is increasing global warming | do **not** accept peat bogs release carbon dioxide into the atmosphere<br><br>allow a description of global warming or consequences<br><br>if no other mark awarded allow removal of a carbon sink / store for 1 mark | 1<br><br>1 | AO1<br>4.7.3.3<br>4.7.3.5 |

4.7.3.1 Biodiversity

Answer 01 · Mark scheme

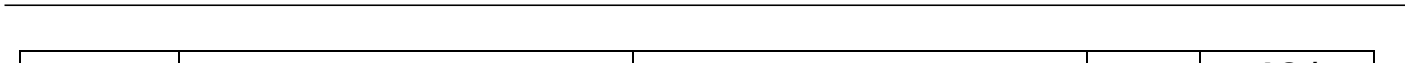


| | | | | |
|---|---|---|---|---|
| **03.4** | any **two** from:<br>• takes minerals from the soil as crops are harvested / removed<br>• leads to soil erosion<br>• farmers have to use fertilisers which pollute water / streams / lakes<br>• burning crop waste produces carbon dioxide<br>• using large farm machinery causes soil compaction | ignore nutrients<br><br>allow burning crop waste causes global warming<br>allow using large farm machinery releases carbon dioxide | 2 | AO3<br>4.7.3.2<br>4.7.3.3<br>4.7.3.5<br>4.7.3.6 |
| **03.5** | antibiotic passed into the environment in animal faeces / urine / sewage<br>**or**<br>antibiotic in animal faeces / urine / sewage flows into rivers | | 1 | AO2 |
| | bacteria in water / land become antibiotic resistant | allow named water or land pathogen such as typhoid / cholera / E coli | 1 | AO2 |
| | some of these bacteria are human pathogens | | 1 | AO3 |
| | (so) cause (human) diseases which now cannot be cured because they are antibiotic resistant | If no other marks awarded allow 1 mark for mention of antibiotics in milk / meat being consumed by humans. | 1 | AO3<br>4.6.3.4<br>4.7.3.2 |
| **Total** | | | **10** | |

### 4.7.3.1 Biodiversity

**Answer 01 · Mark scheme**

November 2020 | 8464/B/2H | Original Q3



4.7.3.1 Biodiversity

Answer 02 · Mark scheme

November 2021 | 8464/B/2H | Original Q2

| Question | Answers | Extra information | Mark | AO / Spec. Ref. |
|---|---|---|---|---|
| 02.1 | increases (from 2005) to 690 million **or** increases to 2008 | allow peak in 2008<br>allow peak at 690 million | 1 | AO2<br>4.7.3.1<br>4.7.3.6 |
| | decreases (from 2008) to 630 million | | 1 | |
| | | if no other mark awarded, allow overall increase from 470 million<br>**or**<br>overall increase to 630 million<br>**or**<br>(overall) increase of 160 million<br>**or**<br>increases to 690 and decreases to 630 (without units)<br>for **1** mark | | |
| 02.2 | $\frac{690(\text{million}) - 460(\text{million})}{690(\text{million})} \times 100$ | allow $\frac{230(\text{million})}{690(\text{million})} \times 100$ | 1 | AO2<br>4.7.3.1<br>4.7.3.6 |
| | 33.3 (%) | ignore number of decimal places<br>allow calculated value from incorrect graph readings | 1 | |
| | 33 (%) | allow calculated answer correctly given to 2 significant figures | 1 | |
| 02.3 | compost | allow improving soil (texture / drainage / quality)<br>ignore farming unqualified<br>ignore as fertiliser | 1 | AO1<br>4.7.3.3 |
| | burning<br>**or**<br>as a fuel | | 1 | |

4.7.3.1 Biodiversity

Answer 02 · Mark scheme

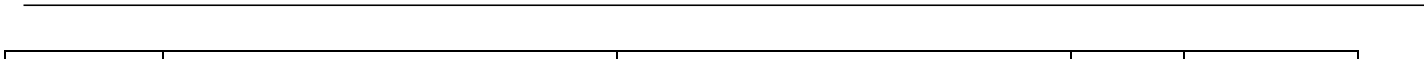


| | | | | |
|---|---|---|---|---|
| **02.4** | any **two** from:<br>• reduce pollution<br><br>• plant trees<br><br>• breeding programmes (for endangered species)<br><br>• rewilding / regeneration of habitats / hedgerows / meadows<br><br>• (reintroducing) wider field margins<br><br>• plant a variety of crops<br><br>• reduce use of pesticide / herbicide / insecticide | ignore references to carbon dioxide, greenhouse gases or global warming<br><br>allow reduce named example of pollution, eg smoke **or** acidic gases **or** sewage **or** fertiliser<br>allow reduce toxic waste dumping<br><br>allow afforestation<br>allow reforestation<br>ignore reduce / stop deforestation<br><br>allow planting wild flower seeds<br><br>allow reduce monoculture<br><br>ignore recycling<br><br>ignore protect / conserve habitat(s) / areas | 2 | AO1<br>4.7.3.1<br>4.7.3.2<br>4.7.3.4<br>4.7.3.6 |
| **Total** | | | **9** | |

### 4.7.3.1 Biodiversity

**Answer 02 · Mark scheme**

November 2021 | 8464/B/2H | Original Q2



4.7.3.1 Biodiversity



## Question 4

| Question | Answers | Extra information | Mark | AO / Spec. Ref. |
|---|---|---|---|---|
| 04.1 | herbicide is added / sprayed (on soil / land / field / crop / maize) | | 1 | AO1 |
| | (so) weeds killed **and** (GM) maize / crop not killed | allow (so) unwanted plants killed **and** (GM) maize / crop not killed<br>allow **only** the weeds are killed | 1 | AO2 |
| | (so) (GM) maize / crop has less competition for light / water / minerals / ions / space | allow (so) (GM) maize / crop has more light / water / minerals / ions / space<br><br>ignore reference to nutrients<br>ignore (GM) maize / crop has less competition unqualified | 1 | AO2 |
| | (so more) photosynthesis to produce glucose which produces protein / cellulose / starch / fat (for growth) | allow (so more) photosynthesis to produce glucose which produces amino acids (for growth) | 1 | AO2<br><br>4.4.1.1<br>4.6.2.4<br>4.7.1.1 |

| Question | Answers | Extra information | Mark | AO / Spec. Ref. |
|---|---|---|---|---|
| 04.2 | use of herbicide kills weeds / wildflowers / plants (that are not the crop) | allow increased use of herbicide / weedkiller<br><br>ignore (more) use of pesticides<br>ignore herbicide kills animals / insects | 1 | AO3<br>4.6.2.4<br>4.7.3.1 |
| | (causes) fewer weeds **or** fewer other plants therefore less food for animals / insects | allow fewer wildflowers therefore less food for animals / insects<br><br>allow less variety of food therefore lower number of species of animals / insects<br><br>allow fewer weeds / wildflowers **or** fewer other plants therefore more competition for food | 1 | |

4.7.3.1 Biodiversity

Answer 03 · Mark scheme



| Question | Answers | Extra information | Mark | AO / Spec. Ref. |
|---|---|---|---|---|
| 04.3 | crops / plants may be insect / bee pollinated<br><br>insects may be predators of (crop) pests | allow for pollination<br><br>allow a description eg insects eat crop pests<br>allow bees may be predators of (crop) pests | 1<br><br>1 | AO2<br>4.7.1.1<br>4.7.2.1 |

| Question | Answers | Extra information | Mark | AO / Spec. Ref. |
|---|---|---|---|---|
| 04.4 | provides source of food / shelter (for insects / bees / pollinators) | allow protection / hiding from predators | 1 | AO2<br>4.7.3.6 |

| Question | Answers | Extra information | Mark | AO / Spec. Ref. |
|---|---|---|---|---|
| 04.5 | (as oxygen level increases decay increases due to aerobic) respiration of microorganisms<br><br>(which) releases carbon dioxide causing global warming | allow (aerobic) respiration of bacteria / fungi / decomposers<br><br>allow (which) releases carbon dioxide which is a greenhouse gas<br><br>allow (which) releases carbon dioxide causing the greenhouse effect<br><br>ignore (which) releases carbon dioxide causing climate change | 1<br><br>1 | AO2<br><br>AO1<br><br>4.7.3.3<br>4.7.3.5<br>4.7.2.2<br>4.4.2.1 |

| Total Question 4 | 11 |
|---|---|

4.7.3.1 Biodiversity

Answer 02 · Examiner comments

November 2021 | 8464/B/2H | Original Q2

**Question 2 (standard demand)**

Generally, students could interpret the graph and describe the trends between 2008 and 2011 in terms of years, such as 'it increases to 2008'. However, fewer could correctly extract relevant data, such as the money spent in millions of pounds in 2008 or 2011. References to trends beyond 2011 were ignored. Some students tried to give economic or levels of concern reasons for the trends which did not answer the question. When 'describe' is used as a command word the answer does not require an explanation.

In **02.2** students were given the equation and asked to calculate the percentage change. Some students could not read the appropriate figures from the graph. The most common error was not giving the answer to two significant figures. This is prompted in the question and on the answer line. There were indications that some students are confused between decimal places and significant figures.

Knowledge of uses of peat was very weak, with most students not being able to give one use of peat taken from peat bogs. The most common correct answer related to peat in compost. Misconceptions of the term biodiversity were frequently seen in **02.4**, with answers referring to diversity in the human population or vague answers relating to recycling or climate change that would not directly increase biodiversity. Suggestions that would maintain, or decrease the rate of biodiversity decline, such as 'stop hunting' may maintain, but not increase biodiversity, and therefore were considered to be insufficient at this level.

Answer 03 · Examiner comments

June 2025 | 8464/B/2H | Original Q4

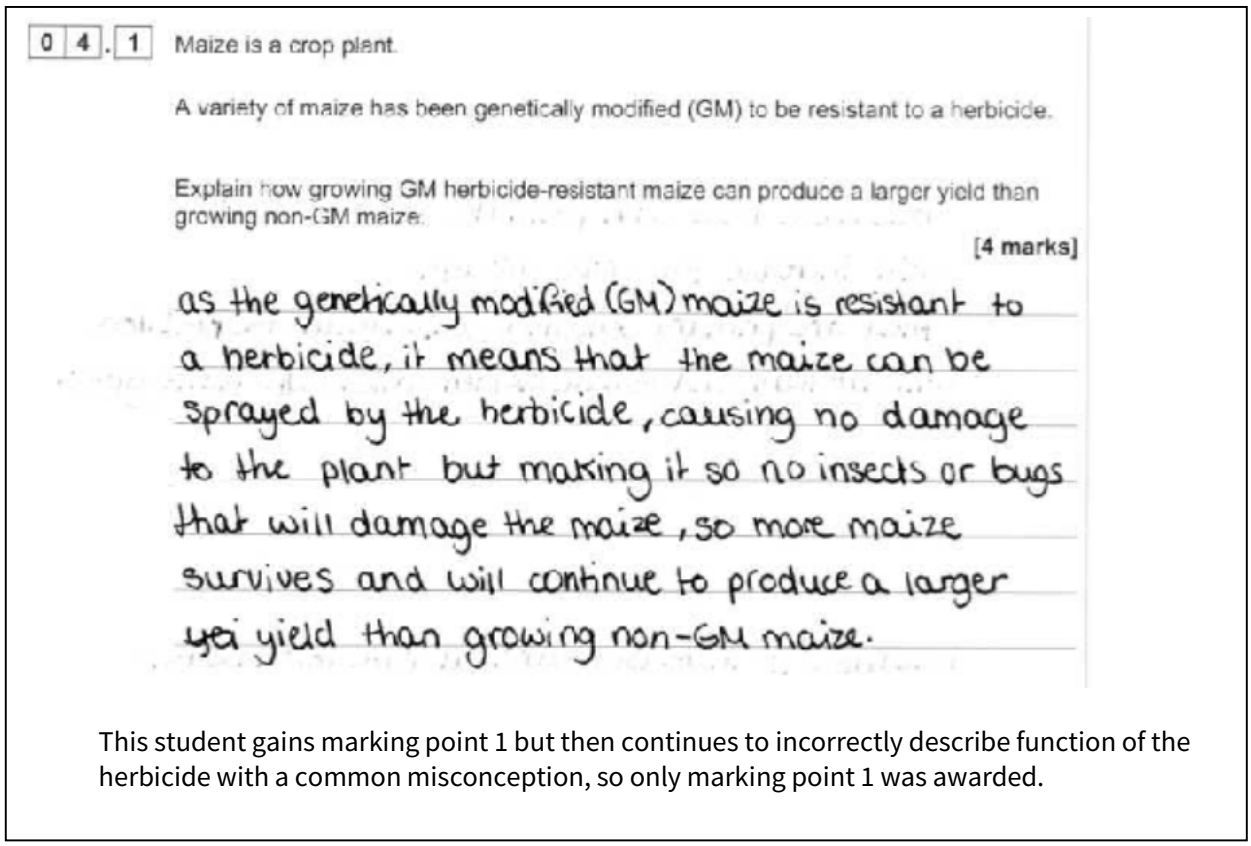
# Question 4 (Standard/high and High demand)

**04.1** Many students understood the term 'resistant'. However, it was clear that some students did not understand the term 'herbicide'. Some students confused herbicides with herbivores. Misconceptions surrounding herbicides were evident in statements such as 'herbicides can no longer eat the crops' and 'GM crops that are herbicide resistant cannot be eaten by herbivores' and some students confused herbicides with pesticides. Very few students were awarded marking point 1 as they often overlooked the idea that herbicide would be applied (to the crops).

For marking point 2, many students were seen to write that 'GM crops are less likely to be killed by herbicides' but did not then go on to state that the other plants / weeds would be killed. Many students incorrectly believed that maize and GM maize are grown simultaneously in the same field by the same farmer. This demonstrates a fundamental misunderstanding of how GM crops are used. Students need to be careful in their use of the word 'affected' as this was too vague for this marking point. For example, 'weeds are affected'.

Where students described the idea of competition in marking point 3, most were able to name a factor that would be competed for. However, it was very rare to see marking point 4.

Accounts of the steps involved in the process of producing GM plants were not relevant in this question but were seen in answers. In these instances, the students filled the answer space with their description before concluding with a short statement such as GM crops won't be killed. A small number of students went down the route of describing selective breeding instead of answering the question.



0 4 . 1 Maize is a crop plant.

A variety of maize has been genetically modified (GM) to be resistant to a herbicide.

Explain how growing GM herbicide-resistant maize can produce a larger yield than growing non-GM maize.

[4 marks]

as the genetically modified (GM) maize is resistant to a herbicide, it means that the maize can be sprayed by the herbicide, causing no damage to the plant but making it so no insects or bugs that will damage the maize, so more maize survives and will continue to produce a larger yei yield than growing non-GM maize.

This student gains marking point 1 but then continues to incorrectly describe function of the herbicide with a common misconception, so only marking point 1 was awarded.

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### 4.7.3.1 Biodiversity

**Answer 03 · Examiner comments** June 2025 | 8464/B/2H | Original Q4

**04.2** This question asked students how growing GM crops decreases the biodiversity of animals. Some students made no reference to animals in their answers at all. Either they did not read the question properly or did not understand what they were being asked. A commonly seen insufficient response was 'the GM crops are genetically identical' and some students wrote about monoculture.

Many students failed to use the word herbicide correctly in this answer and as in question **04.1**, a lack of understanding of the word herbicide proved problematic. It was common for students to state that animals would not be able to eat the GM herbicide resistant crop after herbicide had been applied or that if animals ate the crop they would die. A frequently seen insufficient idea was that growing GM crops would take up more land leaving less habitat space for animals. The most frequent marking point here was marking point 2 with the idea of fewer other plants meaning less food for animals.

**04.3** Very few students were awarded 2 marks for this question. Some students did not understand the term yield in the question. The most commonly awarded mark was for marking point 1, for the idea of insects as pollinators. However, there were a lot of misconceptions surrounding pollen and pollination. Commonly seen misconceptions regarding pollination included:

- bees making pollen or being a source of pollen
- bees collecting pollen for nectar
- pollination being where seeds get stuck to a bee's body
- pollen being needed by crops for photosynthesis / respiration
- the idea that bees themselves fertilise the plants, rather than facilitating pollination as a step leading to fertilisation.

Where insufficient attempts at marking point 2 was seen, some students were not clear about insects eating or destroying pests, instead suggesting insects simply deter or scare crop pests.

The idea of insects dying and decomposing and therefore providing minerals for the crops was insufficient. Some students repeated information from the question, giving answers such as 'insects increase crop yields'.

**04.4** The most common correct answer for this question was 'hedgerows provide places for insects to reproduce / breed'. 'Hedgerows provide a source of food' or 'hedgerows provide a source of shelter' were also commonly seen correct answers.

The most common insufficient response was 'more hedgerows provide more habitats / places to live' as this was repeating the information given. Students must take care not to simply repeat information given to them in the question stem. Many students made vague references to increased biodiversity without linking this to the context of the question or wrote about the hedgerow providing 'ideal living conditions' for the insects without specifying what those conditions are.

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### 4.7.3.1 Biodiversity

**Answer 03 · Examiner comments** June 2025 | 8464/B/2H | Original Q4

**04.5** This was a challenging question for many students as they failed to link microorganisms with respiration, instead writing answers implying the peat itself respired. It also appeared to be quite challenging to keep to the topic of the question, instead students frequently mentioned combustion rather than decay. There was a lot of repetition from the wording of the question, which didn't gain any marks. Very few students attained both marks available on this question, with marking point 1 rarely seen. Students who gained 1 mark, commonly gained the mark for stating that the released carbon dioxide is a greenhouse gas or that the release of carbon dioxide leads to global warming. Some students had the correct idea for marking point 2 but wrote the symbol for carbon dioxide incorrectly (e.g. 'CO2' or 'Co2', or with the 2 written superscript to the letters) and so were not awarded the mark. Refer to page 4 of the mark scheme for guidance on the use of formulae.

Most of the students achieving marking point 2 had not made the link to the source of the carbon dioxide being decomposers or respiration, with many stating that oxygen reacted with the peat to form carbon dioxide. There were not many students who could link the idea to increase oxygen enabling the microbes to respire, which produces carbon dioxide. Of the students who were not awarded marking point 2 it was frequently because the students identified that carbon dioxide would be released but did not go on to state the effect of this or simply reiterated the phrasing from the question stem (i.e. that carbon dioxide causes climate change). Several students made irrelevant references to methane or the ozone layer or stated that the process of cutting the peat released stored carbon dioxide. Another common error was stating that carbon is released into the atmosphere as opposed to carbon dioxide.

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