AQA GCSE Combined Science - Trilogy | 8464

SPECIFICATION POINT 4.7.2.2

How materials are cycled

Mark schemes and examiner comments

Tier	**Higher**
Question groups	**2**
Available paper years	**2019–2022**

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.

4.7.2.2 How materials are cycled

Answer 01 · Mark scheme

June 2019 | 8464/B/2H | Original Q2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.1	methane	allow CH_4 **or** water (vapour) **or** H_2O allow correct example such as CFCs, nitrous oxide, ozone	1	AO1 4.7.3.5
02.2	any **two** from: • ice caps melting • rise in sea levels • desertification • extreme weather • change in species distribution • change in migration patterns • loss of biodiversity • coral bleaching • crop failure **or** food insecurity • loss of habitat qualified	ignore references to increased temperature and greenhouse gas / effect allow storms **or** droughts **or** flooding allow some species become extinct / endangered allow correct examples such as polar bears losing ice ignore forest fires	2	AO1 4.7.3.5

4.7.2.2 How materials are cycled

Answer 01 · Mark scheme

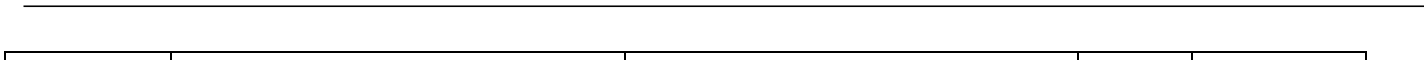
June 2019 | 8464/B/2H | Original Q2

Question	Answers	Mark	AO/ Spec. Ref
02.3	**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 4.4.1.3 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 Photosynthesis • (carbon dioxide is) taken in through stomata / leaves • (carbon dioxide is) used in photosynthesis • to make glucose / carbohydrate • (glucose used) to make other carbon compounds or named example such as proteins, lipids • (glucose) stored as starch Feeding • plants are eaten / consumed by animals • which use the carbon compounds to make other carbon compounds Decay • when plants / animals die they are decomposed / decayed • by microorganisms • which use the carbon compounds to make other carbon compounds Respiration • plants / animals / microorganisms respire • (respiration) releases carbon dioxide back into the atmosphere Level 2 answers must consider photosynthesis and at least one other process in the carbon cycle. Level 2 answers must include some accurate detail.		
Total		**9**	

4.7.2.2 How materials are cycled

Answer 01 · Mark scheme

June 2019 | 8464/B/2H | Original Q2



4.7.2.2 How materials are cycled

Answer 02 · Mark scheme

June 2022 | 8464/B/2H | Original Q1

Question 1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.1	aerobic respiration		1	AO1 4.4.2.1 4.8

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.2	1. evaporation	allow evaporate(s) / evaporating	1	AO1 4.7.2.2
	2. condensation	allow condense(s) / condensing	1	
	3. precipitation	allow rain(ing) / rainfall allow named precipitation ignore precipitates	1	
	4. draining / drainage	allow run-off / percolation / infiltration allow groundwater / underground flow	1	
	5. transpiration		1	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.3	$6\,000\,000\,000 \times \frac{4.5}{100}$	allow $6\,000\,000\,000 \times 0.045$	1	AO2 4.7.2.2
	270 000 000		1	
	2.7×10^8	allow an incorrectly calculated number of people given in correct standard form	1	

4.7.2.2 How materials are cycled

Answer 02 · Mark scheme

June 2022 | 8464/B/2H | Original Q1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.4	climate change has increased the area of deserts more water is used to grow crops		1 1	AO3 4.7.2.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.5	decay / decomposition of leaves	allow leaves are broken down	1	AO2
	respiration (by microorganisms / decomposers)	ignore aerobic / anaerobic ignore respiration by worms / detritivores / insects / leaves	1	AO1
	respiration releases carbon dioxide **or** microorganisms release carbon dioxide		1	AO1
	carbon dioxide is used in photosynthesis (for new plant growth)	do **not** accept carbon dioxide absorbed in the roots	1	AO1 4.7.2.2 4.4.1.1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.6	nitrates are released into the soil		1	AO2 4.7.2.2 4.4.1.3

Total Question 1		16

4.7.2.2 How materials are cycled

Answer 01 · Examiner comments — June 2019 | 8464/B/2H | Original Q2

Question 2 (standard demand)

02.1 Approximately three quarters of students were able to name another greenhouse gas. Methane was the most common correct answer, but water vapour was also seen. The most common incorrect answers were carbon monoxide and nitrogen.

02.2 Two effects of climate change were required, and many students gained both marks for stating 'polar ice caps melt and sea levels rise.' Ice caps melting was often described in vague ways that did not gain credit including 'ice melting' and 'icebergs melting.' The most common insufficient responses were 'hotter summers' or 'changes in weather.' As global warming was given in the stem of the question rising temperatures did not gain a mark.

Loss of habitat was insufficient without qualification as much habitat loss is due to human activity. Many students referred to 'animals/plants' becoming extinct which gained credit although 'species becoming extinct' was preferable. Misconceptions included that acid rain, earthquakes and volcanoes were effects of climate change.

Answer 01 · Examiner comments — June 2019 | 8464/B/2H | Original Q2

40% of students gave two effects and a further half of students gave one effect.

02.3 This question differentiated well between students. Almost all students answered this extended response question with 43% giving answers matching the Level 2 descriptor. The students scoring in Level 1 were able to name processes but did not give details or they did not mention photosynthesis. Confusion between photosynthesis and respiration also limited some students to Level 1.

Those students who recognised and named the processes of respiration and decay often gave better linked detail. Many referred to the decay process releasing carbon dioxide rather than the respiration of the microorganisms releasing the carbon dioxide. The passing on of carbon between levels of consumers was often overlooked.

Common inaccuracies which prevented the award of a full six marks included the passing on of carbon dioxide rather than carbon and the idea that carbon is stored in the soil when organisms decay.

4.7.2.2 How materials are cycled

Answer 02 · Examiner comments — June 2022 | 8464/B/2H | Original Q1

Question 1 (standard demand)

01.1 57% of students knew that aerobic respiration produces water.

01.2 Many students could name three/four of the five parts of the water cycle shown on the figure. The most common marks awarded were for evaporation, condensation and precipitation. Fewer students gave correct answers for processes 4 or 5. Some students gave descriptions rather than the name of each process, which did not gain the mark unless the process was named within the description. Some confusion was seen between transpiration and translocation.

01.3 Some students only got as far as the second marking point and stopped, or then made errors in writing the answer in standard form. Two marks were awarded in either instance.

The third marking point was not awarded for incorrect use of standard form, so 27×10^7 was frequently seen and was incorrect. Note the allow statement in the extra information column for this marking point. Students gained one mark only if they attempted an incorrect calculation using numbers from the question, and then gave that answer in standard form.

Answer 02 · Examiner comments — June 2022 | 8464/B/2H | Original Q1

01.4 62% of students could identify two reasons why more people have severe water shortage now than in 2007.

01.5 Students found this aspect of the carbon cycle challenging to explain. Many students repeated information given in the stem of the question, which is never creditworthy.

The most common mark awarded was for the idea of leaves decaying. Some students incorrectly suggested microorganisms eat the leaves. References to respiration were rare, and often incorrect, such as trees using carbon dioxide for respiration. The third and fourth marking points both required reference to carbon dioxide, not simply carbon, which was far more frequently seen. Although chemical formulae are generally acceptable as alternatives to the names of substances, they need to be correct, for example CO_2 is an acceptable alternative to carbon dioxide but CO2 and CO^2 are not.

01.6 64% of students could identify that nitrates released into the soil is a benefit of fallen leaves for living plants.