AQA GCSE Combined Science - Trilogy | 8464

SPECIFICATION POINT 4.7.3.2

Waste management

Mark schemes and examiner comments

Tier	**Foundation**
Question groups	**4**
Available paper years	**2018–2024**

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.

4.7.3.2 Waste management

Answer 01 · Mark scheme June 2018 | 8464/B/2F | Original Q4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.1	any **two** from: • (same) number of scoops / sweeps each time • scoop / sweep (at same) distance from the edge of pond • scoop (at same) depth • (same) size of net • (same) gauge / mesh size of net	allow any idea of controlling sweeps eg for same time allow scoop / sweep at the same place	2	AO2 4.7.2.1
04.2	64		1	AO2 4.7.2.1
04.3	19 to 122	allow 122 to19 **or** 103	1	AO2 4.7.2.1
04.4	water fleas were not evenly spread (around the edge of the pond)	allow any description of this such as more water fleas near the vegetation	1	AO3 4.7.2.1
04.5	more water fleas live near the edge of the pond	allow more water fleas live where there is vegetation allow converse if student's calculated answer to question **04.2** was less than 12	1	AO3 4.7.2.1
04.6	35		1	AO2 4.7.2.1
04.7	37.5 (%)	allow 38 (%)	1	AO2 4.7.2.1

4.7.3.2 Waste management

Answer 01 · Mark scheme

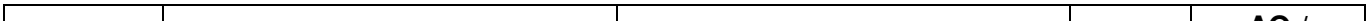
June 2018 | 8464/B/2F | Original Q4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.8	there was a high(er) level of pollution (in the pond in 2016)	allow converse for 2014	1	AO3 4.7.2.1
	because there are no / fewer mayfly nymphs **or** because there are fewer freshwater shrimps	data must be comparative	1	
04.9	any **two** from: • famine / food insecurity • water shortage • landfill sites filling up • acid rain • deforestation / habitat destruction • extinction of species **or** reducing biodiversity • natural resources running out	ignore global warming and any water pollution references such as sewage or eutrophication	2	AO3 4.7.3.2 4.7.3.3 4.7.3.4 4.7.3.5 4.7.3.1
Total			**12**	

4.7.3.2 Waste management

Answer 01 · Mark scheme

June 2018 | 8464/B/2F | Original Q4



4.7.3.2 Waste management

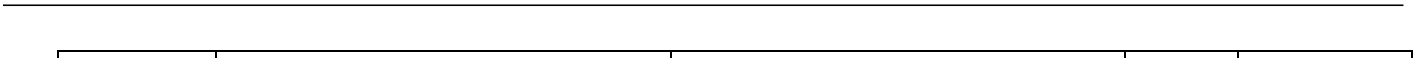
Answer 02 · Mark scheme

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	

4.7.3.2 Waste management

Answer 02 · Mark scheme

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



4.7.3.2 Waste management

Answer 03 · Mark scheme

June 2022 | 8464/B/2F | Original Q6

Question 6

Question	Answers	Mark	AO / Spec. Ref.
06	**Level 3:** Relevant points (reasons/causes) are identified, given in detail and logically linked to form a clear account.	5–6	AO3
	Level 2: Relevant points (reasons/causes) are identified, and there are attempts at logical linking. The resulting account is not fully clear.	3–4	AO3 AO1
	Level 1: Points are identified and stated simply, but their relevance is not clear and there is no attempt at logical linking.	1–2	AO1
	No relevant content	0	

06 cont.	**Indicative content**
	Increase in world population
	• sewage (released into rivers / lakes / seas)
	  ○ causes algae to grow
	  ○ algae block light
	  ○ causing plants to die and decompose
	  ○ leading to lack of oxygen in the water
	  ○ (sewage) could contain pathogens
	
	Need to produce more food for world's population
	• fertilisers (used on farms to increase crop yield, leach into rivers / lakes / seas)
	  ○ causes algae to grow
	  ○ leading to lack of oxygen in the water
	• herbicides / pesticides (used on farms to increase crop yield, run into rivers / lakes / seas)
	  ○ build-up in food chains
	
	Increasing demand for products / energy
	• toxic chemicals **or** named toxic chemicals (run into rivers / lakes / seas)
	  ○ from factories / industry **or** power stations
	  ○ build-up in food chains
	  ○ chemicals may cause mutations **or** chemicals may act as hormones
	  ○ radiation leaks from nuclear (power stations)
	  ○ (oil) spills from extraction / rigs / tankers in oceans
	  ○ acid rain formation
	  ○ acidification of lakes
	  ○ increased carbon dioxide emissions causes acidification of oceans
	
	Buildup of waste products
	• litter / plastics (thrown in rivers / lakes / seas)
	  ○ example of effect on living organisms, such as plastics consumed or plastics build up in stomach or plastics get stuck around beaks
	  ○ (most) plastics are not biodegradable
	  ○ build-up of microplastics in water animals
	
	Consequence of the above is that organisms living in rivers / lakes / seas are harmed / die
	
	For **Level 3** students need to consider different types of pollution
			4.7.3.2
			4.7.2.1

Total Question 6		**6**

4.7.3.2 Waste management

Answer 04 · Mark scheme

June 2024 | 8464/B/2F | Original Q5

Question 5

Question	Answers	Mark	AO / Spec. Ref.
05.1	alga(e) → limpet(s) → crab(s) direction of arrows must be correct	1	AO2 4.7.2.1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.2	(50 (cm) × 50 (cm) =) 2500 (cm^2)	allow conversion cm to m (50 ÷ 100 =) 0.5 (m)	1	AO2 4.7.2.1 RPA7
	$(\frac{2500}{100 \times 100}$ =) 0.25 (m^2)	allow ¼ (m^2) allow (0.5 × 0.5 =) 0.25 (m^2) for **2** marks allow (½ × ½ =) ¼ (m^2) for **2** marks	1	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.3	(1800 × $\frac{2}{100}$ =) 36 (m^2)	allow (1800 × 0.02 =) 36 (m^2)	1	AO2 4.7.2.1 RPA7
	$(\frac{36}{0.25}$ =) 144 (quadrats)	allow (36 × 4 =) 144 (quadrats) allow a correct calculation of number of quadrats with an incorrect calculation of 2% of 1800 allow ecf from question **05.2**	1	

4.7.3.2 Waste management

Answer 04 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.4	(location of sample will be) biased / chosen **or** (location of sample will be) limited by how far students can throw	allow students may aim for limpets allow students may aim to avoid limpets allow students may stand / start near groups of limpets	1	AO1 4.7.2.1 RPA7
	(therefore) results will not be representative (of (actual) abundance)	allow population size will be too high / low	1	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.5	tape measure along two (perpendicular) sides (of sea shore) **or** allocate co-ordinates (to sea shore) **or** divide area into a grid		1	AO1 4.7.2.1 RPA7
	use random number generator	allow description of generating random number(s) for example pulling numbers from container do **not** accept throwing quadrats	1	

4.7.3.2 Waste management

Answer 04 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.6	any **one** from: • water • tide • rocks • quicksand • named hazardous material on the sea shore eg needles, glass • sewage • animals	allow named example of a hazard allow sea allow waves allow slippery / uneven surfaces allow appropriate named animal for example crab / jellyfish	1	AO3 4.7.2.1 RPA7

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.7	any **one** from: • fertiliser • sewage • toxic chemicals	allow named toxic chemical eg herbicide / pesticide / insecticide / DDT / (crude) oil allow (micro)plastics allow (dissolved) carbon dioxide allow heavy metals allow thermal pollution	1	AO2 4.7.3.2

Total Question 5	11

4.7.3.2 Waste management

Answer 03 · Examiner comments

June 2022 | 8464/B/2F | Original Q6

Question 6 (standard demand)

In this question, students had to explain how human activities are polluting rivers, lakes and seas.

This was an 'extended response' style of question. Such questions are marked holistically. There are overall generic descriptions for the three levels of response at the top of the scheme, giving a hierarchy of response. Within each level there are two marks.

Many students correctly referred to a type of water pollution and explained the source of the pollution or detailed consequence of the pollution. References to plastic/litter were common. Many students knew that sewage is an issue for pollution of rivers, lakes and seas and could give more information as to why this is a problem.

Within Level 1 (1–2 marks) responses students gave types of water pollution or consequences but made no links.

To access Level 2 (3–4 marks), students needed to link a type of pollution with a cause or detailed explanation. The indicative content on the mark scheme gives an indication of the types of detailed explanation required. However, with such a broad subject matter, not all possible examples could be given on the mark scheme. Other examples that were seen and gained credit as linked relevant content were 'noise pollution from boats disrupts the communication of whales' and references to thermal pollution (of water) from factories or power stations would be a type of pollution linked to a source.

For Level 3 (5–6 marks), students needed to give logically linked explanations relating to different types of pollution.

References to carbon dioxide emissions and climate change were frequent, but often did not answer the question to relate to water pollution.

Around half of the responses were within Level 1, or zero, indicating students had not made linked explanations. The most common responses involved stating one or two types of pollution, usually plastics (or litter) and oil.

4.7.3.2 Waste management

Use of statistics

Statistics used in this report may be taken from incomplete processing data. However, this data still gives a true account on how students have performed for each question.

Mark Ranges and Award of Grades

Grade boundaries and cumulative percentage grades are available on the Results Statistics page of the AQA Website.

4.7.3.2 Waste management

Answer 04 · Examiner comments

June 2024 | 8464/B/2F | Original Q5

Question 5 (standard demand)

05.1 Many students could give the food chain in the correct order with appropriate arrows showing the flow of energy. Responses that used commas or hyphens, rather than arrows, did not gain the mark. Some students tried to give extra information, such as identifying the producer and primary consumer, but this was not required.

05.2 Students demonstrated problems converting from centimetres to metres. Responses often stated that 50 cm = 5 m.

Calculation of area was sometimes a challenge, with frequently seen responses such as 50 + 50 + 50 + 50 = 200, indicating confusion between area and perimeter.

Students were most frequently awarded just the first mark, for (50 × 50 =) 2500. Most then divided 2500 by 100 or 1000 to give an incorrect answer.

05.3 Marks were often awarded for allowing error carried forward from the previous question.

Many students only calculated 2% of the area of the shore and then stopped. Therefore, only the first mark was awarded.

Some students who did not gain marks had attempted to calculate 2% of their answer to the previous question, indicating they had not understood the context.

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4.7.3.2 Waste management

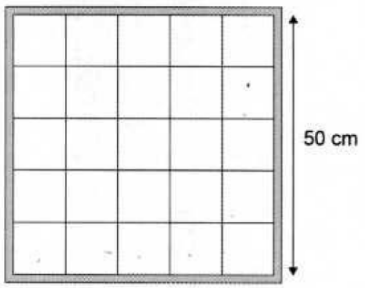
Answer 04 · Examiner comments June 2024 | 8464/B/2F | Original Q5

Students estimated the population of limpets on a sea shore.

The students were given a square quadrat.

Figure 10 shows the quadrat.

Figure 10



0 5 . 2 Calculate the area of the quadrat in m².

[2 marks]

50 × 50 cm

Area of quadrat = 2500 m²

0 5 . 3 The total area of the sea shore was 1800 m².

The students sampled 2% of the total area of the sea shore.

Calculate the number of times the students needed to use the quadrat for the 2% sample.

Use your answer from Question **05.2**

[2 marks]

2% of 2500 500

1% = 250

Number of times = 50

For question 05.2, marking point 1 was awarded.

For question 05.3, the student has attempted to calculate 2% of the quadrat area, which is not a logical approach, therefore no marks can be given.

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4.7.3.2 Waste management

Answer 04 · Examiner comments June 2024 | 8464/B/2F | Original Q5

05.4 Most students could give a reason for not throwing the quadrat and gain the first mark. Usually, students stated throwing could be biased. Very few could explain why this was a problem. References to the effect it would have on the population estimate were rare.

Some students demonstrated the misconception that throwing quadrats is an appropriate sampling method. Others stated that the issue is that the quadrat could sample the same area twice, which was not correct, because that could also occur with a random method.

05.5 Some students had knowledge of using a random number generator on their calculator or phone and could describe the use of coordinates on the shore.

Many students incorrectly referred to throwing in random directions or being blindfolded. These are never appropriate methods for sampling. Others demonstrated the misconception that choosing locations with the most limpets would be appropriate. Some confusion between quadrats and transects was seen.

05.6 On the Foundation tier, many students gave a risk, such as drowning, rather than a hazard. Common incorrect answers referred to the quadrat being washed away, or gave descriptions of ways to reduce risk, such as ‘wear sensible shoes’.

05.7 Most students could name one type of pollution that may affect the population of limpets. The most frequently seen answers were plastic and sewage. Common responses that were not awarded the mark were chemicals, crabs and waste.