AQA GCSE Combined Science - Trilogy | 8464

SPECIFICATION POINT 5.10.1.2

Potable water

Mark schemes and examiner comments

Tier	**Foundation**
Question groups	**7**
Available paper years	**2018–2025**

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.

5.10.1.2 Potable water

Answer 01 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.1	watch glass		1	AO1 5.10.1.2
03.2	identify 0.29 as anomaly	an answer of 0.14 (g) scores **3** marks	1	AO3 5.10.1.2
	$\frac{0.12 + 0.14 + 0.15}{3}$ **or** $\frac{0.41}{3}$	allow $\frac{0.12 + 0.29 + 0.14 + 0.15}{4}$ **or** $\frac{0.70}{4}$	1	AO2 5.10.1.2
	(=) 0.14 (g)	allow 0.18 (g) if first marking point not awarded	1	AO2 5.10.1.2
03.3	evaporating **or** vaporisation	allow from liquid to vapour / gas do **not** accept boiling	1	AO1 5.1.1.2 5.2.2.1
03.4	pure **or** no salt	allow converse answers relating to seawater allow not a mixture allow desalinated do **not** accept less salt do **not** accept filtered	1	AO1 5.1.1.2 5.10.1.2
03.5	uses (a lot of) energy	allow needs heating allow needs electricity allow needs fuel **or** any suitable fuel ignore references to equipment ignore references to time	1	AO1 5.10.1.2

5.10.1.2 Potable water

Answer 01 · Mark scheme

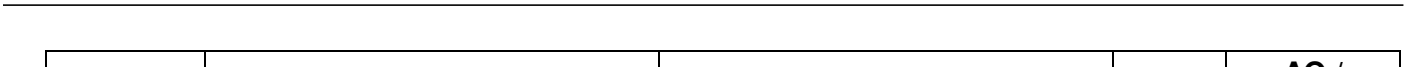
June 2018 | 8464/C/2F | Original Q3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.6	filtering removes particles	allow solids **or** suitable named solids	1	AO1 5.10.1.2
	sterilising kills bacteria / microbes	allow destroys viruses allow kills viruses	1	
Total			**9**	

5.10.1.2 Potable water

Answer 01 · Mark scheme

June 2018 | 8464/C/2F | Original Q3



5.10.1.2 Potable water

Answer 02 · Mark scheme

06.1	potable		1	AO1 5.10.1.2

06.2		allow boils at 100°C for **2** marks		AO2 5.8.1.1
	boil (water)	ignore heat do **not** accept filter do **not** accept incorrect test	1	
	(boils) at 100°C		1	
		alternative approach freeze (water) (1) (freezes) at 0°C (1) if no other mark awarded, allow 1 mark for evaporate or distil water **and** no solid left		

06.3	**Level 2:** The design/plan would lead to the production of a valid outcome. All key steps are identified and logically sequenced.	3–4	AO1 5.10.1.2 10.2.13
	Level 1: The design/plan would not necessarily lead to a valid outcome. Some steps are identified, but the plan may not be logically sequenced.	1–2	
	No relevant content	0	
	Indicative content • weigh container. • measure volume (100 cm^3) of water into container. • evaporate / heat until dry. • weigh container and remaining solids. • determine mass of dissolved solids to access Level 2 there should be an indication of using a known volume of water, heating until dry and determining the mass of solid.		

5.10.1.2 Potable water

Answer 02 · Mark scheme June 2019 | 8464/C/2F | Original Q6

06.4	(conversion of cm^3 to dm^3) (250 cm^3 =) $\frac{250}{1000}$ or 0.25 (dm^3)	an answer of 0.031 (g) scores **4** marks	1	AO2 5.3.2.5 10.2.13
	(conversion of mg to g) (125 mg =) $\frac{125}{1000}$ or 0.125 (g)		1	
	(0.25 × 0.125) = 0.03125	allow correct calculation from incorrect attempt(s) at conversion	1	
	=0.031 (g)	allow an answer correctly rounded to 2 significant figures from an incorrect calculation that uses the values in the question	1	

06.5	$\frac{44}{500} \times 100$	an answer of 8.8 (%) or 9 (%) scores **2** marks	1	AO2 5.10.1.2 10.2.13
	= 8.8 (%)	allow 9 (%)	1	

Total			**13**

5.10.1.2 Potable water

Answer 02 · Mark scheme

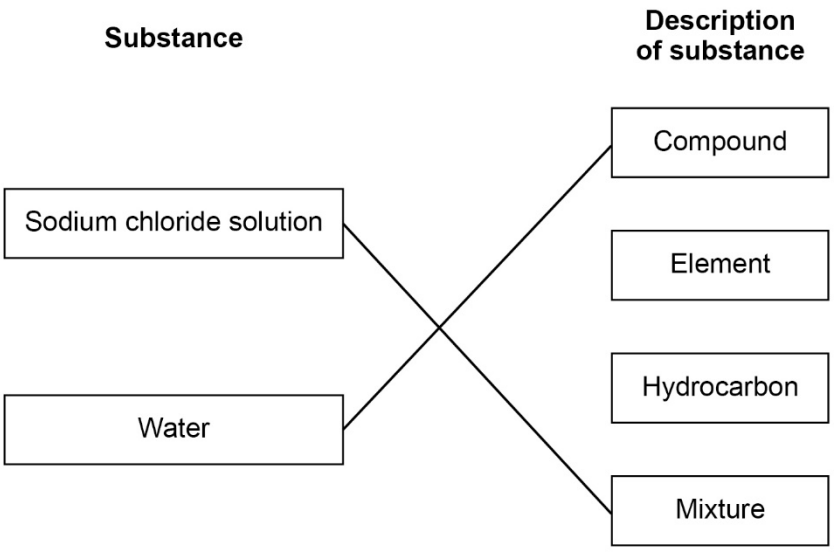
June 2019 | 8464/C/2F | Original Q6

Question	Answers	Extra information	Mark	AO / Spec. Ref.

5.10.1.2 Potable water

Answer 03 · Mark scheme

November 2021 | 8464/C/2F | Original Q1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.1	(the symbol) ⇌	allow description of reversible sign	1	AO1 5.6.2.1
01.2	white blue	must be in this order	1 1	AO1 5.6.2.2
01.3	to prevent reaction with water vapour (in the air)	allow to prevent reaction with moisture allow to keep water out	1	AO3 5.6.2.2
01.4	 do **not** accept more than one line from a box on the left		1 1	AO2 5.1.1.2
01.5	evaporation **or** crystallisation		1	AO1 RPA 13
01.6	(filtering) to remove solids (sterilising) to kill bacteria	 allow to kill microbes	1 1	AO1 5.10.1.2

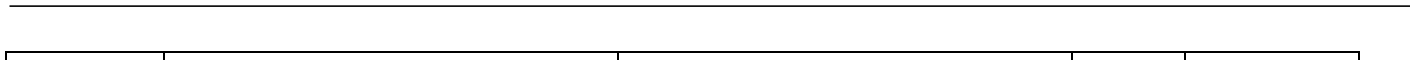
5.10.1.2 Potable water

01.7	ground water		1	AO1 5.10.1.3
01.8	screening and removal of grit		1	AO1 5.10.1.3
Total			**11**	

5.10.1.2 Potable water

Answer 03 · Mark scheme

November 2021 | 8464/C/2F | Original Q1



5.10.1.2 Potable water

Answer 04 · Mark scheme

June 2022 | 8464/C/2F | Original Q7

Question 7

<table>
<tr><th>Question</th><th>Answers</th><th>Mark</th><th>AO / Spec. Ref.</th></tr>
<tr><td rowspan="4">07.1</td><td>Level 2: Scientifically relevant features are identified, the way(s) in which they are similar / different is made clear and (where appropriate) the magnitude of the similarity / difference is noted.</td><td>4–6</td><td rowspan="4">AO1
5.10.1.3</td></tr>
<tr><td>Level 1: Relevant features are identified and differences noted.</td><td>1–3</td></tr>
<tr><td>No relevant content</td><td>0</td></tr>
<tr><td>Indicative content
<table>
<tr><th>ground water</th><th>waste water</th></tr>
<tr><td>easier to obtain</td><td>more difficult to obtain</td></tr>
<tr><td>fewer processes</td><td>more processes</td></tr>
<tr><td>takes less time</td><td>takes more time</td></tr>
<tr><td>filtered through filter beds

to remove insoluble particles</td><td>screening and grit removal

to remove large particles</td></tr>
<tr><td></td><td>sedimentation

to produce sewage sludge and effluent</td></tr>
<tr><td></td><td>aerobic biological treatment of effluent

to reduce solid waste</td></tr>
<tr><td>sterilised

using chlorine, ozone or uv light

to kill bacteria</td><td>and then sterilised

using chlorine, ozone or uv light

to kill bacteria</td></tr>
<tr><td></td><td>sludge is anaerobically digested

by specific bacteria

to remove organic matter</td></tr>
</table></td><td></td></tr>
</table>

5.10.1.2 Potable water

Answer 04 · Mark scheme

June 2022 | 8464/C/2F | Original Q7

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.2	distillation		1	AO1 5.10.1.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.3	(conversion) ($\frac{150}{1000}$ =) 0.15 (dm^3) (concentration =) $\frac{2.40}{0.15}$ = 16 (g/dm^3) **OR** (conversion) $\frac{1000}{150}$ (1) = 6.67 (1) (6.67 × 2.4) = 16 (g/dm^3) (1) **OR** (concentration =) $\frac{2.4}{150}$ (1) = 0.016 (1) (conversion) (0.016 × 1000) = 16 (g/dm^3) (1)	allow correct use of incorrect / no conversion	1 1 1	AO2 5.3.2.5

Total Question 7		**10**

5.10.1.2 Potable water

Answer 05 · Mark scheme

June 2023 | 8464/C/2F | Original Q3

Question 3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.1	wear safety glasses / goggles	allow tie hair back	1	AO3 5.10.1.2 RPA13

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.2	heat until the mass of the evaporating basin and contents does not change use 25 cm^3 of water for each experiment		1 1	AO3 5.10.1.2 RPA13

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.3	no dissolved solids (in distilled water)		1	AO3 5.10.1.2 RPA13

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.4	to kill bacteria		1	AO1 5.10.1.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.5	rate		1	AO1 5.6.2.3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.6	white		1	AO1 5.8.2.4

Question	Answers	Mark	AO / Spec. Ref.
03.7	**Level 2:** Scientifically relevant features are identified; the way(s) in which they are similar / different is made clear and (where appropriate) the magnitude of the similarity / difference is noted.	3–4	AO3
	Level 1: Relevant features are identified and differences noted.	1–2	AO2
	No relevant content	0	
	Indicative content **relevant features** • fluoride reduces tooth decay (in all age groups) • the reduction in tooth decay using fluoride generally increases with age • tooth decay increases in 25-54 age groups • tooth decay decreases in 55-64 age group • tooth decay increases in 65-74 age group **magnitude** • fluoride has the least effect in the 25-34 age group • fluoride has the greatest effect in the 55-64 age group • using fluoride decreases tooth decay by 2% in 25-34 age group • using fluoride decreases tooth decay by 3% in 35-44 age group • using fluoride decreases tooth decay by 9% in 45-54 age group • using fluoride decreases tooth decay by 10% in 55-64 age group • using fluoride decreases tooth decay by 7% in 65-74 age group		5.10.1.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.8	any **one** from: • could be a risk to health • could have side effects • could discolour teeth • people should be able to decide for themselves		1	AO2 5.10.1.2

Total Question 3	**12**

5.10.1.2 Potable water

Answer 06 · Mark scheme

June 2024 | 8464/C/2F | Original Q4

Question 4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.1	potable water		1	AO1 5.10.1.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.2	ozone ultraviolet light		1 1	AO1 5.10.1.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.3	measuring cylinder		1	AO3 5.10.1.2 RPA13

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.4	3.5 (g)		1	AO2 5.10.1.2 RPA13

5.10.1.2 Potable water

Answer 06 · Mark scheme

June 2024 | 8464/C/2F | Original Q4

Question	Answers	Mark	AO / Spec. Ref.
04.5	**Variable** → Control; Dependent **Example of variable**: Mass of dissolved solids; Mass of evaporating basin; Room temperature; Type of water; Volume of water do **not** accept more than one line from a box on the left	1 1	AO1 5.10.1.2 RPA13

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.6	complete the scale on the *y*-axis at 2.0, 2.5, 3.0	ignore intermediate values	1	AO2 5.10.1.2 RPA13
	plotting and labelling magnesium ion	allow **1** mark if magnesium ion and sulfate ion plotted correctly but not labelled	1	
	plotting and labelling sulfate ion		1	
		allow a tolerance of ± ½ a small square throughout		

Total Question 4	10

5.10.1.2 Potable water

Answer 07 · Mark scheme

June 2025 | 8464/C/2F | Original Q4

Question 4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.1	water that is safe to drink		1	AO1 5.10.1.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.2	to remove large solid objects		1	AO1 5.10.1.3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.3	(conversion 4.5 kg =) 4500 (g)		1	AO2 5.10.1.1
	(number of hats =) $\frac{4500}{50}$	allow correct use of incorrect / no conversion	1	
	= 90		1	
	alternative approach			
	(conversion 50 g =) 0.05 (kg) (1)			
	(number of hats =) $\frac{4.5}{0.05}$ (1)	allow correct use of incorrect / no conversion		
	= 90 (1)			

5.10.1.2 Potable water

Answer 07 · Mark scheme

Question	Answers	Mark	AO / Spec. Ref.
04.4	**Level 2:** Relevant points (reasons / causes) are identified, given in detail and logically linked to form a clear account	3–4	AO3 5.10.1.1
	Level 1: Points 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
	
	(poly(propene) has)
	• higher level of insulation
	  ○ (so) keeps the wearer warmer
	
	• lower cost
	  ○ (so) the clothes are cheaper
	
	• higher durability
	  ○ (so) the clothes last longer
	
	(wool is)
	• sheep are a renewable resource
	  ○ so are sustainable
	
	for **Level 2** there must be an advantage for both poly(propene) and wool plus a linked explanation		

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.5	reused	must be in this order	1	AO2 5.10.2.2
	recycled		1	

5.10.1.2 Potable water

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.6	a catalyst steam		1 1	AO1 5.7.1.4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.7	bromine water		1	AO1 5.7.1.4

Total Question 4	14

5.10.1.2 Potable water

Answer 03 · Examiner comments November 2021 | 8464/C/2F | Original Q1

Question 1 (low and standard demand)

The reversible symbol was well known, but many students did not recognise that the starting point for the reaction was the anhydrous form of copper sulfate, so were unable to identify the colours of the salts. They did not appreciate the link between the reversible reaction and the storage of the anhydrous salt. Most students referred incorrectly to the toxicity of the salt.

The topic of water treatment was not well understood. Credit was given for the idea of filtering removing large insoluble solid material from the water and sterilising removing bacteria and pathogens, but not germs.

Answer 04 · Examiner comments June 2022 | 8464/C/2F | Original Q7

Question 7

The topic of water purification was generally not well known.

07.1 Over 60% of students were able to score at least 1 mark comparing the methods of treatment of ground and wastewater to make potable water. This was usually for a simple statement that both waters need to be filtered. Responses were lacking in specific detail in this recall question. The idea that both waters need to be distilled was very commonly seen, mistaking this with sea water.

07.2 About one third of students were able to identify distillation to desalinate sea water. The most common incorrect response was filtration.

07.3 About a quarter of students were able to score two of the three marks on this item, the conversion of cm^3 to dm^3 being the most likely mark missed.

5.10.1.2 Potable water

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.

5.10.1.2 Potable water

Answer 05 · Examiner comments June 2023 | 8464/C/2F | Original Q3

Question 3

03.1 Around six in ten students gained the mark here. The most common answer was for goggles, which was allowed on its own. However, glasses were not as safety was required. Tie hair back was the only other acceptable answer, as many responses were vague and were general laboratory care.

03.2 Only one in five students identified both improvements to the method. However, a further six in ten did gain one mark. All the distractors were seen in the responses. It is important that students read the question carefully as there was a significant number of students who ticked only one box rather than the two requested.

5.10.1.2 Potable water

Answer 05 · Examiner comments

03.3 Fewer than a third of students gained this mark. This is an example where taking the heading from the table was essential, and students needed to talk about dissolved solids, rather than vague statements about ‘nothing in it’.

03.4 Just over 85% of students identified why water is sterilised.

03.5 Fewer than one in five students gained the mark here. Most thought that the reactions occur at the same time, rather than the same rate.

03.6 Students did not know the tests for gases very well. Only one quarter were able to give the correct answer here.

03.7 Three quarters of students were able to gain at least one mark on this question by making one simple statement. The most common creditworthy statement was that of ‘adding fluoride ions reduces tooth decay’. ‘Tooth decay increases as you get older’ was also common. As there is a lot of data available within the graph and there are many ways of making statements, many students were prepared to give more than one statement and so by making three simple statements, 2 marks were obtained by a quarter of students.

Students who compared the effects of with and without fluoride ions, for example ‘fluoride works best in the 55-64 age group’ (a higher level magnitude statement) in conjunction with one other simple statement gained 2 marks. Some students made a creditworthy magnitude statement by including more than one age group, for example ‘fluoride works best in the 45-64 age group’ or ‘fluoride is not as good at ages 25-44’, which incorporate 2 age groups and are correct statements.

The majority of students were restricted to 1 or 2 marks (level 1) since they failed to fulfil the command word of ‘compare’, and made only simple statements of data from within the graph without comparing the effects of with and without fluoride ions. Where students did state the differences between with and without fluoride and carried out the correct arithmetic, by selecting at least two age groups they were able to gain full marks. Fewer than one in ten students made creditworthy comparative statements by comparing the total percentage across all age groups with and without fluoride ions, or even working out the mean percentage difference across all age groups.

Generally, there were very few incorrect statements made, but the commonest errors were giving incorrect percentage values from the graph which were not creditworthy, or giving an age group which was contradictory to their statement.

03.8 A quarter of students gained credit here by referring to possible ‘health effects’, ‘allergies’, or ‘side effects’. A few pointed out that there should be ‘a choice’. Of the uncreditworthy responses seen, vague and unfounded statements such as ‘it causes cancer’, ‘it can kill you’ or ‘not suitable for children’ were the most common.

5.10.1.2 Potable water

Answer 06 · Examiner comments — June 2024 | 8464/C/2F | Original Q4

Question 4 (low demand)

04.1 This question proved very accessible, with 90% of students correctly identifying potable water.

04.2 Over half of students gained at least 1 mark on this question: electrolysis and filtration were the most common incorrect responses given.

04.3 Most students correctly identified the measuring cylinder.

04.4 The majority of students achieved this mark. Those who did not, had not understood that the answer was achieved by subtracting the mass of the evaporating basin from the basin plus solids, even though they had been given two examples in the table.

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Answer 06 · Examiner comments — June 2024 | 8464/C/2F | Original Q4

04.5 This AO1 question based on a Required Practical Activity was not well answered, with a third of students gaining 1 mark and 20% gaining both. Many students were either not clear about what control and dependent variables are or did not relate this question back to the method on the previous page. This lack of going back to information given earlier in a question continues to be a limiting factor for many students who simply focus on the information directly above the question.

04.6 Only 40% of students achieved the full 3 marks here. The most common mark awarded was for correctly numbering the *y*-axis. However, quite a few students only labelled 2 and 2.5, missing out 3, whilst others did not follow the scale given lower down the axis.

Most students remembered to label the two bars but many of them did not plot to the scale. The most common mistake was taking one small square to equal 0.1 g and therefore plotting magnesium too low (at 1.15). Many students then went on to plot sulfate too high (2.85), seeming to count down from 3 rather than up from 2.5.

5.10.1.2 Potable water

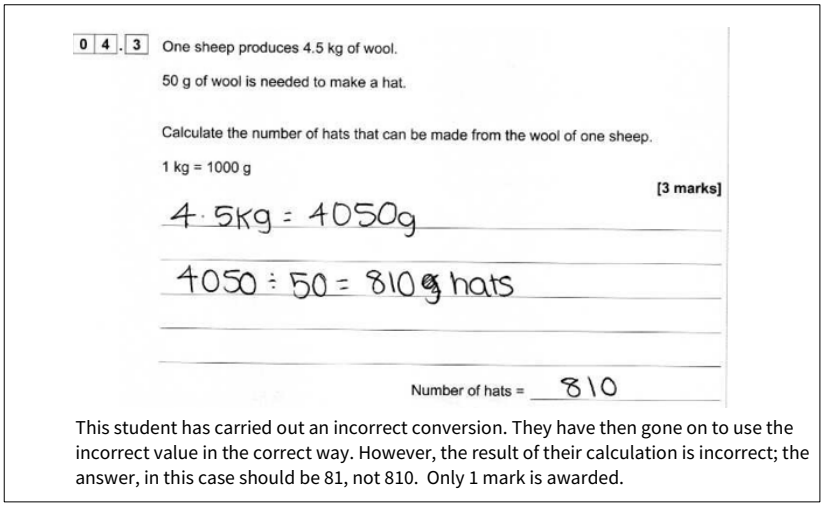
Answer 07 · Examiner comments June 2025 | 8464/C/2F | Original Q4

Question 4 (Low and Standard demand)

04.1 Almost 70% of students correctly selected 'water that is safe to drink'.

04.2 Nearly three quarters of students knew that the metal grids in water treatment were to 'remove large solid objects'.

04.3 This question was answered well. Most students used the first approach where they converted 45 kg to 4500 g and then divided that number by 50 to arrive at 90 hats.
Some students who did the conversion incorrectly, usually by multiplying by 100 instead of 1000, could still access 2 marks providing the calculation was carried out correctly.



0 4 . 3 One sheep produces 4.5 kg of wool.

50 g of wool is needed to make a hat.

Calculate the number of hats that can be made from the wool of one sheep.

1 kg = 1000 g

[3 marks]

4·5kg = 4050g

4050 ÷ 50 = 810 hats

Number of hats = 810

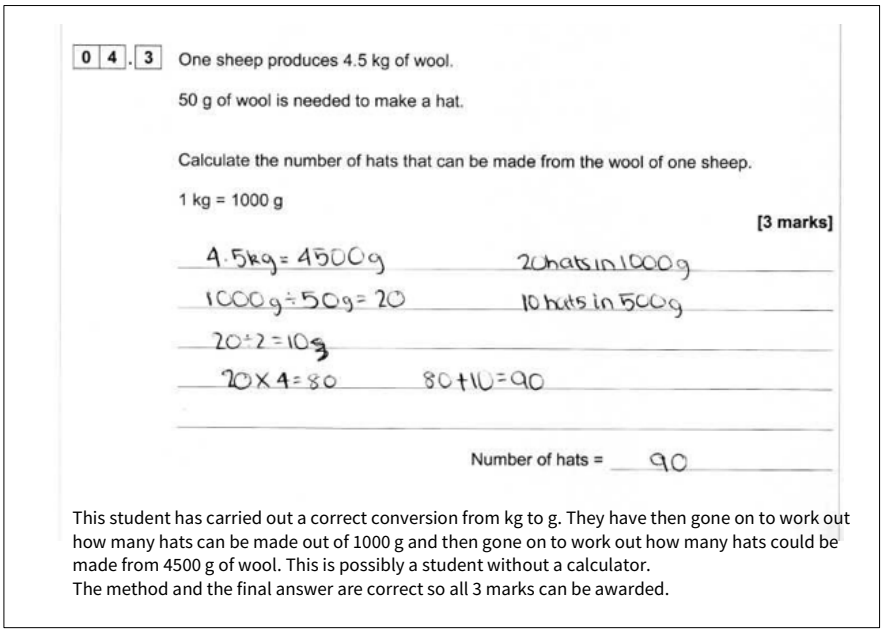
This student has carried out an incorrect conversion. They have then gone on to use the incorrect value in the correct way. However, the result of their calculation is incorrect; the answer, in this case should be 81, not 810. Only 1 mark is awarded.

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5.10.1.2 Potable water

Answer 07 · Examiner comments

June 2025 | 8464/C/2F | Original Q4



0 4 . 3 One sheep produces 4.5 kg of wool.

50 g of wool is needed to make a hat.

Calculate the number of hats that can be made from the wool of one sheep.

1 kg = 1000 g

[3 marks]

4.5kg = 4500g
1000g ÷ 50g = 20
20 ÷ 2 = 10g
20 × 4 = 80
20 hats in 1000g
10 hats in 500g
80 + 10 = 90

Number of hats = 90

This student has carried out a correct conversion from kg to g. They have then gone on to work out how many hats can be made out of 1000 g and then gone on to work out how many hats could be made from 4500 g of wool. This is possibly a student without a calculator.
The method and the final answer are correct so all 3 marks can be awarded.

04.4 This was an 'extended response' style of question. Such questions are marked holistically. There are overall generic descriptions for the two levels of response at the top of the mark scheme, giving a hierarchy of response. Within each level there are 2 marks.

Level 1 could be accessed simply by offering any relevant comparison of either poly(propene) or wool, and over half of all students were able to do this. A large number of responses however merely offered a repetition of the information given and consequently could not gain credit.

For Level 2 there needed to be an advantage of both poly(propene) and wool, with a linked explanation. The table offered more information on poly(propene) than wool and consequently very few students were able to access Level 2, as they focussed purely on poly(propene) and did not mention any advantages of using wool.

Many students abbreviated poly(propene) to either poly or propene. Poly was credited, however propene was not, which resulted in some responses which were otherwise good not accessing either Level.

There appeared to be a common misconception that we would 'run out of sheep' therefore making wool a non-renewable source. This limited students to Level 1.

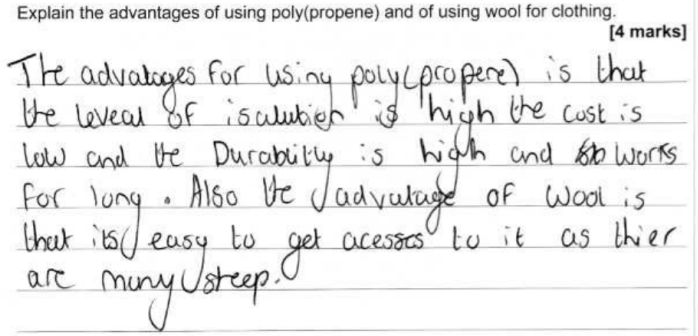
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5.10.1.2 Potable water

Answer 07 · Examiner comments

June 2025 | 8464/C/2F | Original Q4

Explain the advantages of using poly(propene) and of using wool for clothing.
[4 marks]



This student has not used any comparative terminology and has only copied information from the table. The question is looking for durability being 'higher' and therefore lasting 'longer' for example. No marks can be awarded.

04.5 This was well answered. All options were used by students, and over three quarters of all students gained both marks.

04.6 Less than a quarter of all students gained both marks in this question. A catalyst was the most common response, but it was often paired with sulfuric acid rather than with steam.

04.7 Half of all students were able to recall bromine water as the test for alkenes with all other answers being equally spread between the other 3 options.