AQA GCSE Chemistry | 8462

SPECIFICATION POINT 4.8.3.3

Carbonates

Mark schemes and examiner comments

Tier	**Foundation**
Question groups	**23**
Available paper years	**2007–2024**

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.

4.8.3.3 Carbonates

Answer 01 · Mark scheme June 2007 | CHY1A | Original Q7 | Legacy

Five	**A**	one	**2**
	B	four	**3**
	C	five	**1**
	D	seven	**4**
Six	**A**	hard	**3**
	B	resistant to corrosion	**4**
	C	easily shaped	**2**
	D	brittle	**1**

	A	B	C	D
Seven	**2**	**4**	**3**	**2**

Answer 02 · Mark scheme November 2007 | CHY1A | Original Q7 | Legacy

Seven	**2**	**3**	**4**	**1**

4.8.3.3 Carbonates

Answer 03 · Mark scheme

Question 8

question	answers	extra information	mark
(a)(i)	oxygen / O / O_2	do **not** accept oxide	1
(a)(ii)	sodium **and** carbon **and** oxygen	do **not** allow symbols alone do **not** allow oxide	1
	all correct numbers linked to correct elements ie 2 (sodium), a / 1 (carbon), 3 (oxygen)	accept statement 'the number **and** type of atoms' for **1** mark only ignore types of particles	1
(b)(i)	calcium carbonate →	allow $CaCO_3$	1
	calcium oxide + carbon dioxide	either way round allow CaO + CO_2 do **not** allow quick lime maximum **1** mark for unbalanced symbol equation	1
(b)(ii)	thermal decomposition	accept endothermic do **not** accept reversible / equilibrium	1
(c)	any **one** from: • lowers energy / temperature needed **or** conserves energy • decreases the amount of fuel needed • no / less glass going to landfill	do **not** accept no energy ignore cheaper / easier ignore conserves raw materials **or** more quarries needed	1
total			7

4.8.3.3 Carbonates

Answer 04 · Mark scheme January 2008 | CHY3F | Original Q2 | Legacy

Question 2

question	answers	extra information	mark
(a)(i)	get wrong coloured flame/result owtte **or** to get the correct result	allow contaminated	1
(a)(ii)	high melting point unreactive		1 1
(a)(iii)	yellow-orange		1
(b)(i)	bubbles / fizz / effervescence	ignore any named gas	1
(b)(ii)	milky		1
(b)(c)	fast(er) small(er) amount		1 1
total			8

4.8.3.3 Carbonates

Answer 04 · Mark scheme

January 2008 | CHY3F | Original Q2 | Legacy

CHY3F

Answer 05 · Mark scheme

June 2008 | CHY1AP | Original Q1 | Legacy

One	**A**	calcium carbonate	**1**
	B	carbon dioxide	**3**
	C	calcium oxide	**2**
	D	slaked lime	**4**

4.8.3.3 Carbonates

Answer 06 · Mark scheme

June 2008 | CHY3F | Original Q3 | Legacy

question	answers	extra information	mark
3(a)(i)	(hydrochloric) acid carbon dioxide limewater		1 1 1
3(a)(ii)	sodium hydroxide ammonia litmus		1 1 1
3(b)	no distinctive colour (flame) owtte	allow: not a metal (ion) accept flame tests only identify single elements	1
Total			**7**

4.8.3.3 Carbonates

Answer 06 · Mark scheme June 2008 | CHY3F | Original Q3 | Legacy

COMPONENT NUMBER: CHY3F

COMPONENT NAME: Chemistry

STATUS: Final

DATE: June 2008

Answer 07 · Mark scheme March 2009 | CHY1AP | Original Q7 | Legacy

Seven	**2**	**4**	**4**	**1**

Answer 08 · Mark scheme June 2009 | CHY1AP | Original Q1 | Legacy

One	**A**	calcium carbonate	**2**
	B	carbon dioxide	**1**
	C	calcium oxide	**4**
	D	calcium hydroxide	**3**

4.8.3.3 Carbonates

Answer 09 · Mark scheme

June 2010 | CHY1F | Original Q1 | Legacy

Question 1

question	answers	extra information	mark
1(a)	building		1
1(b)	provides jobs		1
1(c)	any **two** from: • noise • dust / visual pollution • air / atmospheric • exhaust gases • (more) traffic	ignore references to water allow sound pollution accept global dimming ignore smoke accept acid rain / global warming / named gaseous pollutants accept more lorries	2
1(d)	O 3 / three	ignore any numbers	1 1
1(e)	calcium oxide	accept quicklime do **not** accept calcium dioxide	1
Total			**7**

4.8.3.3 Carbonates

Answer 09 · Mark scheme

June 2010 | CHY1F | Original Q1 | Legacy

CHY1F

Answer 10 · Mark scheme

November 2010 | CHY1AP | Original Q6 | Legacy

Six	**2**	**3**	**2**	**3**

4.8.3.3 Carbonates

Answer 11 · Mark scheme

Question 2

question	answers	extra information	mark
2(a)	stop them reacting	owtte	1
2(b)(i)	fizzing / bubbles / effervescence	owtte	1
2(b)(ii)	(g)		1
2(b)(iii)	limewater		1
2(c)	yellow		1
2(d)(i)	barium chloride		1
2(d)(ii)	white		1
2(d)(iii)	eg don't see what is being bought **or** a comment about quality / purity eg may be impure / contaminated	ignore references to cost	1
Total			**8**

4.8.3.3 Carbonates

Answer 11 · Mark scheme

January 2011 | CHY3F | Original Q2 | Legacy

CHY3F

4.8.3.3 Carbonates

Answer 12 · Mark scheme

June 2011 | CHY1F | Original Q4 | Legacy

Question 4

question	answers	extra information	mark
4(a)	(carbon =) 1 (oxygen =) 3		1 1
4(b)(i)	heated		1
4(b)(ii)	carbon dioxide		1
4(c)(i)	combustion		1
4(c)(ii)	carbon is more reactive than zinc		1
4(c)(iii)	zinc boils (in the furnace / below 1300°C) lead does not boil / (only) melts in the furnace / boils above 1300°C	ignore melting point / changes of state if no other mark awarded allow zinc has a lower boiling point **or** lead has a higher boiling point **or** they / zinc **and** lead have different boiling points for **1** mark	1 1
Total			**8**

4.8.3.3 Carbonates

Answer 12 · Mark scheme

June 2011 | CHY1F | Original Q4 | Legacy

CHY1F

4.8.3.3 Carbonates

Answer 13 · Mark scheme

June 2011 | CHY3F | Original Q5 | Legacy

Question 5

question	answers	extra information	mark
5(a)(i)	Mountain View: (65+35 =)100		1
	Valley Croft: (16+14 =) 30 **OR** Mountain View Ca (65) is about 4 times Valley Croft (Ca 16) (1) Mountain View Mg (35) is about twice Valley Croft (Mg 14) (1)		1
		ignore other ions unless used in another calculation or calculations. In this case the list principle applies if no other mark awarded either: Ca 65 compared with Ca 16 **and** Mg 35 compared with Mg 14 gains **1** mark **or** difference in Ca (65 – 16) = 49 **and** Mg (35 – 14) = 21 gains **1** mark	
5(a)(ii)	shake / stir / swirl (water with soap)	allow mix ignore add / use soap / titrate	1
	(about) 3 × the scum / precipitate / solid (compared with Valley Croft)	accept (about) 3 × volume / drops / amount / quantity of soap solution for (permanent) lather (compared with Valley Croft) ignore scale / time	1
	fair test: eg same volume / amount of water **or** shake for same amount of time **or** use same type / concentration of soap	allow same temperature do **not** accept same volume of soap ignore repeat the experiment	1

Question 5 continues on the next page . . .

CHY3F

Question 5 continued . . .

question	answers	extra information	mark
5(b)	strong(er) teeth / bones **or** good for heart	allow contains calcium (ions / compounds) ignore magnesium **or** charge on the calcium ion do **not** accept any other ions	1
5(c)	any **one** from: • produces scale / limescale / calcium carbonate / magnesium carbonate • produces scum • more soap needed • costs more to soften water • (scale) lowers efficiency of appliances	ignore health effects allow fur for scale allow doesn't lather easily ignore detergent allow costs if qualified ignore just damage to pipes	1
5(d)(i)	water / everything is made of / contains chemicals **or** water contains named ion from the label	accept company (probably) means water contains no added substances ignore water has not been treated	1
5(d)(ii)	Valley Croft scientists may be biased / vested interest	accept Food Standards Agency / independent scientists (more likely to be) unbiased allow Valley Croft scientists may falsify results ignore accuracy / reliability / fairness / validity	1
Total			**9**

4.8.3.3 Carbonates

Answer 13 · Mark scheme

June 2011 | CHY3F | Original Q5 | Legacy

CHY3F

4.8.3.3 Carbonates

Answer 14 · Mark scheme

January 2012 | CH1FP | Original Q5 | Legacy

Question 5

question	answers	extra information	mark
5(a)	• one / 1 (molecule of) methane (reacts with) two / 2 (molecules of) oxygen • two / 2 (molecules of) water / steam / hydrogen oxide and one / 1 (molecule of) carbon dioxide (are produced)	if no other marks awarded all four names correct **or** correct number **and** name for two molecules **or** 4 correct numbers gains **1** mark allow all four names correct **and** correct number of atoms in each substance for **2** marks	1 1

Question 5(b) continues on the next page

CH1FP

Question 5(b) cont'd……

5(b)	Marks awarded for this answer will be determined by the Quality of Written Communication (QWC) as well as the standard of the scientific response. Examiners should also refer to the information on page 2, and apply a 'best-fit' approach to the marking.	6

0 marks	**Level 1 (1-2 marks)**	**Level 2 (3-4 marks)**	**Level 3 (5-6 marks)**
No relevant content.	There is a simple description of a positive **and / or** a negative impact caused by the plan to quarry limestone and / or make cement.	There is a clear description of both a positive **and** a negative impact caused by the plan to quarry limestone and / or make cement.	There is a detailed description of both positive impacts **and** negative impacts caused by the plan to quarry limestone and / or make cement.

examples of the chemistry points made in the response

Positive impacts:

- Limestone / cement is used for building
- Limestone needed for industrial processes
- Company landscapes / provides recreation facilities in the quarry after use
- Provides employment
- Improves local economy
- Improved transport links

Negative impacts:

- Destruction of habitats
- Fewer plants / trees to absorb carbon dioxide
- Example of visual pollution
- Example of noise pollution
- Example of atmospheric pollution
- More traffic

Total			**8**

4.8.3.3 Carbonates

Answer 14 · Mark scheme

January 2012 | CH1FP | Original Q5 | Legacy

CH1FP

4.8.3.3 Carbonates

Answer 15 · Mark scheme

June 2012 | CH1FP | Original Q4 | Legacy

Question 4

question	answers	extra information	mark
4(a)(i)	react	allow neutralise allow bubbles / fizzes accept produces gas / CO_2 ignore rises	1
4(a)(ii)	stop reacting / producing the (hydrochloric) acid / (calcium) carbonate is used up **OR** have been used up (1) the graph line becomes horizontal / levels out (1) **OR** stays the same / no change (1) no further reaction (1)	stops on its own is insufficient allow stop working / bubbling / fizzing accept because the (calcium) carbonate has neutralised the (hydrochloric) acid ignore reference to graph line	1 1
4(a)(iii)	bubble the gas through limewater / calcium hydroxide solution (the solution) goes cloudy	allow (add) limewater test must be correct to gain result mark allow milky	1 1
4(b)	advantage > Quarrying limestone provides building materials, employment and new road links disadvantage > Quarrying limestone releases dust, and lorries release carbon dioxide from burning diesel fuel		1 1
Total			**7**

4.8.3.3 Carbonates

Answer 15 · Mark scheme

June 2012 | CH1FP | Original Q4 | Legacy

CH1FP

4.8.3.3 Carbonates

Answer 16 · Mark scheme

question	answers	extra information	mark
6(a)	time from when the heating is started until		1
	the limewater turns cloudy / milky		1
6(b)(i)	the temperature was not high enough	accept the copper carbonate had not started to decompose / react accept it takes time to heat up the copper carbonate	1
	the bubbles of gas were air	accept no carbon dioxide produced	1
6(b)(ii)	the copper carbonate was decomposing / reacting	accept the temperature was high enough to cause decomposition / a reaction	1
	so carbon dioxide was produced	allow correct word / symbol equation	1
6(b)(iii)	copper oxide was produced	allow correct word / symbol equation	1
	because the copper carbonate had completely decomposed / reacted	ignore all of the carbon dioxide had been given off	1
Total			**8**

4.8.3.3 Carbonates

Answer 16 · Mark scheme

January 2013 | CH1FP | Original Q6 | Legacy

CH1FP

4.8.3.3 Carbonates

Answer 17 · Mark scheme

June 2013 | CH1FP | Original Q3 | Legacy

Question 3

question	answers	extra information	Mark
3(a)(i)	magnesium oxide		1
3(a)(ii)	decomposition		1
3(b)(i)	bar chart		1
3(b)(ii)	more		1
3(b)(iii)	limewater turns cloudy / milky	 accept forms a white precipitate	1 1
Total			**6**

4.8.3.3 Carbonates

Answer 18 · Mark scheme

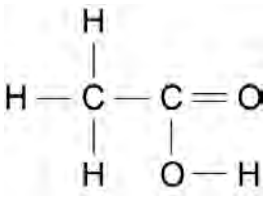
June 2013 | CH3FP | Original Q2 | Legacy

Question 2

question	Answers	extra information	Mark
2(a)(i)	yellow		1
2(a)(ii)	lilac		1
2(b)	(bubble through) limewater cloudy	 allow white / milky	1 1
2(c)(i)	silver nitrate solution		1
2(c)(ii)	white		1
Total			6

4.8.3.3 Carbonates

Answer 19 · Mark scheme June 2016 | CH3FP | Original Q5 | Legacy

Question	Answers	Extra information	Mark	AO / SpecRef
5(a)(i)	fizz / effervescence / bubbles	allow calcium carbonate decreases in size or dissolves	1	AO2/AO3 3.4.1d, 3.6.2b
	because carbon dioxide produced / released	allow because gas produced / released	1	
	limewater turns cloudy / milky / white		1	
	because (a precipitate of or solid) calcium carbonate forms	allow because of carbon dioxide if not already credited	1	
5(a)(ii)		allow –OH do not allow lower case 'h'	1	AO1 3.6.2a
5(a)(iii)	acid	must be in this order ignore any name of an acid	1	AO1 3.6.2b
	ester(s)		1	
5(b)	white (precipitate) no change no change no change	all four correct 2 marks any two correct 1 mark	2	AO2 3.4.1e,f
5(c)(i)	lilac red	must be in this order allow purple	1 1	AO1 3.4.1a
5(c)(ii)	colours are masked / changed by each flame colour		1	AO3 3.4.1a
Total			12	

4.8.3.3 Carbonates

Answer 19 · Mark scheme

June 2016 | CH3FP | Original Q5 | Legacy

<table>
<tr><th>Question</th><th>Answers</th><th>Extra information</th><th>Mark</th><th>AO / SpecRef</th></tr>
<tr><td>6</td><td></td><td></td><td>6</td><td rowspan="6">2AO1 / 3AO2 / 1AO3 3.4.1g</td></tr>
<tr><td colspan="4">Marks awarded for this answer will be determined by the Quality of Written Communication (QWC) as well as the standard of the scientific response. Examiners should also refer to the information on page 5 and apply a ‘best-fit’ approach to the marking.</td></tr>
<tr><td colspan="4"><table>
<tr><th>0 marks</th><th>Level 1 (1–2 marks)</th><th>Level 2 (3–4 marks)</th><th>Level 3 (5–6 marks)</th></tr>
<tr><td>No relevant content.</td><td>There is a simple description of using some of the apparatus.</td><td>There is a description of an experimental method including addition of acid to alkali which may include an indicator or colour change and may include a measurement of volume.</td><td>There is a description of titrations that would allow a comparison to be made between the two solutions of hydrochloric acid.</td></tr>
</table></td></tr>
<tr><td colspan="4">examples of chemistry points made in the response could include:
• acid in burette or flask
• alkali/sodium hydroxide or acid in burette or flask
• volume of acid or alkali measured using the pipette
• indicator in flask
• white tile under the flask
• slow addition
• swirling/mixing
• colour change of indicator
• burette volume measured</td></tr>
<tr><td colspan="4"></td></tr>
<tr><td>Total</td><td></td><td></td><td>6</td><td></td></tr>
</table>

4.8.3.3 Carbonates

Answer 20 · Mark scheme

June 2018 | 8462/1F | Original Q5

The full source mark scheme begins on page 35. Follow original question 5 in that document.

4.8.3.3 Carbonates

Answer 21 · Mark scheme

June 2019 | 8462/2F | Original Q9

Question 9

Question	Answers	Mark	AO/ Spec. Ref
09.1	**Level 3**: The design/plan would lead to the production of a valid outcome. All key steps are identified and logically sequenced.	5–6	AO1 4.8.2.3 4.8.3.1 4.8.3.3
	Level 2: The design/plan would not necessarily lead to a valid outcome. Most steps are identified, but the plan is not fully logically sequenced.	3–4	
	Level 1: The design/plan would not lead to a valid outcome. Some relevant steps are identified, but links are not made clear.	1–2	
	No relevant content	0	
	Indicative content lithium: • crush tablets or dissolve tablet (in water or acid) • clean wire • place on wire • place in (roaring / blue / non-luminous) flame • observe flame colour • crimson flame carbonate: • add hydrochloric acid • effervescence / fizzing • bubble gas through limewater • limewater becomes cloudy		
09.2	formulation(s)	1	AO1 4.8.1.2

4.8.3.3 Carbonates

Answer 21 · Mark scheme

June 2019 | 8462/2F | Original Q9

09.3		an answer of 58.3333333 (%) correctly rounded to at least 2 significant figures scores **3** marks		AO2 4.8.1.2
	1.20 g = 1200 mg **or** 700 mg = 0.700 g		1	
	$\frac{700}{1200} \times 100$ **or** $\frac{0.700}{1.20} \times 100$	allow correct use of incorrectly or not converted values from step 1	1	
	= 58.3 (%)	allow 58.3333333 (%) correctly rounded to at least 2 significant figures	1	
Total			**10**	

4.8.3.3 Carbonates

Answer 22 · Mark scheme

November 2020 | 8462/2F | Original Q3

Question 3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.1	measuring cylinder	allow pipette / burette	1	AO3 4.6.1.1
03.2	limewater turns milky		1	AO1 4.8.2.3
03.3	all six points plotted correctly line of best fit	allow a tolerance of ± ½ a small square allow **1** mark for four or five points plotted correctly	2 1	AO2 4.6.1.1
03.4	(volume =) 48 (cm^3) (rate=) $\frac{48}{60}$ = 0.8 (cm^3/s)	 allow correct use of an incorrectly determined value for volume	1 1 1	AO2 4.6.1.1
03.5	(between 0 and 20 seconds) (volume of gas) increases (between 80 and 100 seconds) no change (in volume of gas)	 allow reaction stops	1 1	AO2 4.6.1.1

Question 3 (continued)

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.6	systematic error		1	AO3 4.6.1.1
03.7	(area of one face = 2 x 2 =) 4 (mm^2) (total surface area =) 4 x 6 = 24 (mm^2)	 allow correct use of an incorrectly calculated area of one face 	1 1 1	AO2 4.6.1.2
03.8	faster		1	AO1 4.6.1.3
Total			**15**	

4.8.3.3 Carbonates

Answer 23 · Mark scheme

June 2024 | 8462/2F | Original Q7

Question 7

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.1	alloy		1	AO1
	reinforcement		1	AO2 4.10.3.2 4.10.3.3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.2	burning (of methane) releases carbon dioxide	allow burning methane ignore methane is a greenhouse gas	1	AO2 4.9.2.2 4.9.3.1
	decomposition (of limestone) releases carbon dioxide	allow decomposition of limestone	1	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.3	hydrochloric acid		1	AO1 4.8.3.3
	limewater		1	RPA7

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.4		allow converse for plain concrete		AO3 4.10.3.3
	(pre-stressed concrete) can bear the weight of (heavy) traffic	allow (pre-stressed concrete) bridge is less likely to collapse	1	
	(because pre-stressed concrete is) stronger	do **not** accept (because pre-stressed concrete is) more dense	1	

4.8.3.3 Carbonates

Answer 23 · Mark scheme

June 2024 | 8462/2F | Original Q7

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.5	any **two** from: (plain concrete slabs) • are cheaper • will be lighter (to transport / lay) • do not need to carry vehicles	allow converse for pre-stressed concrete	2	AO3 4.10.3.3

Total Question 7	**10**

4.8.3.3 Carbonates

AQA

GCSE
CHEMISTRY

8462/1F - PAPER 1 FOUNDATION TIER

Mark scheme

8462

June 2018

Version/Stage: 1.0 Final

4.8.3.3 Carbonates

Mark schemes are prepared by the Lead Assessment Writer and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation events which all associates participate in and is the scheme which was used by them in this examination. 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. As preparation for standardisation each associate analyses a number of students' scripts. Alternative answers not already covered by the mark scheme are discussed and legislated for. If, after the standardisation process, associates encounter unusual answers which have not been raised they are required to refer these to the Lead Assessment Writer.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of students' reactions to a particular paper. 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.

Further copies of this mark scheme are available from aqa.org.uk

Copyright © 2018 AQA and its licensors. All rights reserved.
AQA retains the copyright on all its publications. However, registered schools/colleges for AQA are permitted to copy material from this booklet for their own internal use, with the following important exception: AQA cannot give permission to schools/colleges to photocopy any material that is acknowledged to a third party even for internal use within the centre.

MARK SCHEME – GCSE CHEMISTRY – 8462/1F – JUNE 2018

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 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.

MARK SCHEME – GCSE CHEMISTRY – 8462/1F – JUNE 2018

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.

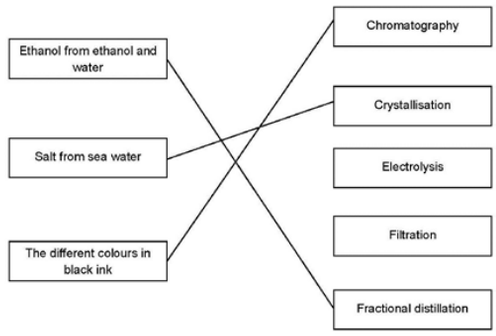
Indicative content in the mark scheme is provided as a guide for examiners. It is not intended to be exhaustive and you must credit other valid points. Students do **not** have to cover all of the points mentioned in the indicative content to reach the highest level of the mark scheme.

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.

4.8.3.3 Carbonates

MARK SCHEME – GCSE CHEMISTRY – 8462/1F – JUNE 2018

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.1			1 1 1	AO1 4.1.1.2
01.2	include a (filter) funnel	allow funnel drawn on the diagram ignore clamp stand	1	AO3 4.1.1.2
01.3	evaporate condense	must be this order	1 1	AO1 4.1.1.2
01.4	$\frac{2}{20} \times 100$ = 10 (%)	an answer of 10 (%) scores **2** marks an answer of 11.1(%) **or** 90 (%) scores **1** mark	1 1	AO2 4.2.2.7
01.5	an alloy		1	AO1 4.2.2.7
01.6	the layers in the mixture are distorted		1	AO1 4.2.2.7

4.8.3.3 Carbonates

MARK SCHEME – GCSE CHEMISTRY – 8462/1F – JUNE 2018

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.7	8000 nm^3		1	AO2 4.2.4.1
Total			**11**	

4.8.3.3 Carbonates

MARK SCHEME – GCSE CHEMISTRY – 8462/1F – JUNE 2018

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.1	7		1	AO1 4.1.2.6
02.2	small molecule		1	AO2 4.1.2.6 4.2.2.4
02.3	F_2		1	AO1 4.1.1.1 4.1.2.6
02.4	the reactivity decreases (going down Group 7)	allow the reactivity decreases from chlorine to iodine	1	AO1 4.1.2.6
	(because) chlorine displaces bromine and iodine	allow (because) chlorine has two reactions allow (because) neither bromine nor iodine can displace chlorine	1	AO3 4.1.2.6
	(and) bromine displaces iodine **or** iodine does not react	allow (and) bromine has one reaction **or** iodine has no reactions allow (and) iodine cannot displace bromine	1	AO3 4.1.2.6
02.5	80		1	AO2 4.3.1.2

4.8.3.3 Carbonates

MARK SCHEME – GCSE CHEMISTRY – 8462/1F – JUNE 2018

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.6	(1.2 kg =) 1200 (g) **or** (900 g =) 0.9 (kg)	an answer of 75 (%) scores **2** marks	1	AO2 4.3.3.1
	$(\frac{900}{1200} \times 100) = 75(\%)$ **or** $(\frac{0.9}{1.2} \times 100) = 75(\%)$	allow an answer correctly calculated from: $(\frac{900}{\text{incorrect attempt at conversion of 1.2}} \times 100)$ **or** $(\frac{\text{incorrect attempt at conversion of 900}}{1.2} \times 100)$	1	
Total			**9**	

4.8.3.3 Carbonates

MARK SCHEME – GCSE CHEMISTRY – 8462/1F – JUNE 2018

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.1	nucleus neutron neutron electron proton	must be in this order	1 1 1 1 1	AO1 4.1.1.3 4.1.1.4 4.1.1.5
03.2	(A_r) $\frac{(63 \times 70) + (65 \times 30)}{100}$ = 63.6	an answer of 63.6 scores **2** marks	1 1	AO2 4.1.1.6
03.3	copper / Cu	allow ecf from answer to question **03.2**	1	AO2 4.1.1.1
03.4	$\frac{1.2 \times 10^{-10}}{10\,000}$ **or** $1.2 \times 10^{-10} \times 1 \times 10^{-4}$ $= 1.2 \times 10^{-14}$ (m)	an answer of 1.2×10^{-14} (m) scores **2** marks a correct answer not in standard form scores **1** mark	1 1	AO2 4.1.1.5
Total			**10**	

4.8.3.3 Carbonates

MARK SCHEME – GCSE CHEMISTRY – 8462/1F – JUNE 2018

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.1	3.6 (cm^3)		1	AO2 4.4.3.4
04.2	hydrogen line only		1	AO3 4.4.3.4
04.3	both lines		1	AO3 4.4.3.4
04.4	graphite has delocalised electrons		1	AO1 4.2.3.2
04.5	**cathode** zinc (1) **anode** chlorine (1) hydrogen (1) bromine (1)	do **not** accept chloride allow **1** mark if chlorine and zinc the wrong way around do **not** accept bromide allow **1** mark if bromine and hydrogen the wrong way around	1+1 1+1	AO2 4.4.3.2 4.4.3.4
Total			**8**	

4.8.3.3 Carbonates

MARK SCHEME – GCSE CHEMISTRY – 8462/1F – JUNE 2018

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.1	gas		1	AO1 4.2.2.2
05.2	the gas escapes	allow carbon dioxide escapes do **not** accept references to evaporation	1	AO1 4.3.1.3
05.3	5.12 (g)		1	AO2 4.3.1.3
05.4	4.00 (g) trial 1	allow 2.89 written in either space, or ringed in the table, unless contradicted by mass of copper carbonate or trial number	1	AO3 4.3.1.3
05.5	reheat (and reweigh) until constant mass	 an answer of heat to constant mass scores **2** marks if no other mark scored allow for **1** mark heat for longer **or** (heat at a) higher temperature **alternative approach**: (1) continue heating and pass gas through limewater (1) until the (lime)water stops bubbling **or** until the limewater no longer turns cloudy	1 1	AO3 4.3.1.3

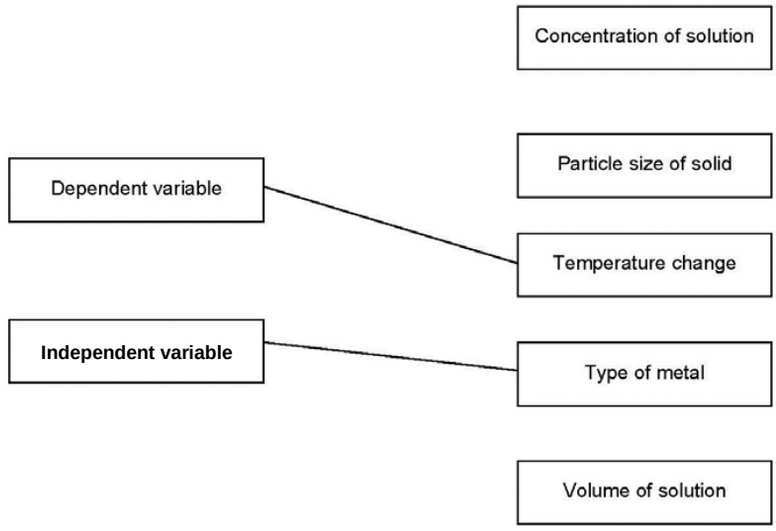
4.8.3.3 Carbonates

MARK SCHEME – GCSE CHEMISTRY – 8462/1F – JUNE 2018

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.6	straight line of best fit	must touch at least 5 of the 6 plots	1	AO2 4.3.1.3
05.7	correct value read from line of best fit in Figure 8	allow tolerance of ± ½ small square	1	AO2 4.3.1.3
05.8	(mass =) $168 \times \frac{\text{answer from question } \mathbf{05.7}}{8.4}$	a correctly calculated value from their answer to question **05.7** scores **2** marks allow (mass =) answer from question **05.7** × 20	1	AO2 4.3.1.3
	correctly calculated value (g)		1	
Total			**10**	

4.8.3.3 Carbonates

MARK SCHEME – GCSE CHEMISTRY – 8462/1F – JUNE 2018

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.1	 allow **one** mark if answers are reversed		1 1	AO1 4.5.1.1
06.2	polystyrene is a better insulator		1	AO3 4.5.1.1
06.3	both bars labelled both bars correctly plotted	 allow tolerance of ± ½ small square ignore width and spacing of bars if no other mark scored, allow **1** mark for any one bar correctly plotted and labelled	1 1	AO2 4.5.1.1

4.8.3.3 Carbonates

MARK SCHEME – GCSE CHEMISTRY – 8462/1F – JUNE 2018

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.4	temperature increases **or** temperature does not decrease	ignore because it is exothermic allow (because) energy / 'heat' is transferred to the surroundings energy / 'heat' is not taken in from the surroundings allow the energy of the products is less than the energy of the reactants	1	AO3 4.5.1.1
06.5	(most reactive) magnesium (zinc) nickel	this order only	1	AO3 4.5.1.1 4.4.1.2
06.6	suitable method described the observations / measurements required to place in order an indication of how results would be used to place the unknown metal in the reactivity series **approaches that could be used:** **approach 1:** add the unknown metal to copper sulfate solution (1) measure temperature change (1) place the metals in order of temperature change (1)		1 1 1	AO3 4.4.1.2 4.5.1.1

4.8.3.3 Carbonates

MARK SCHEME – GCSE CHEMISTRY – 8462/1F – JUNE 2018

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.6 cont.	**approach 2:** add the metal to salt solutions of the other metals **or** heat the metal with oxides of the other metals (1) measure temperature change (only if salt solutions used) **or** observe whether a chemical change occurs (1) compare temperature change or whether there is a reaction to place in correct order (1) **approach 3:** add all of the metals to an acid (1) measure temperature change or means of comparing rate of reaction (1) place the metals in order of temperature change or rate of reaction (1) **approach 4:** set up electrochemical cells with the unknown metal as one electrode and each of the other metals as the other electrode (1) measure the voltage of the cell (1) place the metals in order of voltage (1)			
06.7	D		1	AO1 4.5.1.2
06.8	C		1	AO1 4.5.1.2
Total			**12**	

4.8.3.3 Carbonates

MARK SCHEME – GCSE CHEMISTRY – 8462/1F – JUNE 2018

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.1	sodium oxide	allow Na_2O	1	AO2 4.1.1.1 4.1.2.5 4.4.1.1
07.2	oxidation		1	AO1 4.4.1.1
07.3	13		1	AO1 4.4.2.4
07.4	sodium hydroxide		1	AO2 4.1.1.1
07.5	OH^-		1	AO1 4.4.2.4
07.6	(volume =) $\frac{250}{1000}$ or ¼ or 0.25 (dm^3) **or** (mass per cm^3 =) $\frac{40}{1000}$ (g) or 0.04 (g) ($\frac{250}{1000}$ × 40 =) 10 (g)	an answer of 10 (g) scores **2** marks	1 1	AO2 4.3.2.5

4.8.3.3 Carbonates

MARK SCHEME – GCSE CHEMISTRY – 8462/1F – JUNE 2018

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.7	all points correct	allow a tolerance of ± ½ a small square allow **1** mark for 3 points correct ignore any attempt at a line of best fit	2	AO2 4.1.2.5
07.8	39 (°C)	allow any value from 34 to 46 (°C)	1	AO2 4.1.2.5
Total			**10**	

4.8.3.3 Carbonates

MARK SCHEME – GCSE CHEMISTRY – 8462/1F – JUNE 2018

Question	Answers	Extra information	Mark	AO / Spec. Ref.
08.1	any **one** from: • metal • (metal) hydroxide • (metal) carbonate • alkali	allow named example allow correct formula ignore base allow ammonium hydroxide allow ammonium carbonate allow soluble base allow ammonia	1	AO1 4.4.2.1 4.4.2.2 4.4.2.3
08.2	$Ca(NO_3)_2$	allow $Ca^{2+}(NO_3^-)_2$	1	AO2 4.4.2.2

4.8.3.3 Carbonates

MARK SCHEME – GCSE CHEMISTRY – 8462/1F – JUNE 2018

Question	Answers	Mark	AO / Spec. Ref.
01.3	**Level 3:** The method would lead to the production of a valid outcome. All key steps are identified and logically sequenced.	5–6	AO1 4.4.2.3
	Level 2: The method would not necessarily lead to a valid outcome. Most steps are identified, but the method is not fully logically sequenced.	3–4	
	Level 1: The method would not lead to a valid outcome. Some relevant steps are identified, but links are not made clear.	1–2	
	No relevant content	0	
	Indicative content • use magnesium oxide and sulfuric acid • add sulfuric acid to a beaker • warm sulfuric acid • add magnesium oxide • stir • continue adding until magnesium oxide is in excess • filter • using a filter paper and funnel • to remove excess magnesium oxide • heat solution in an evaporating basin • to crystallisation point • leave to crystallise • pat dry with filter paper credit may be given for diagrams		
Total			**8**

4.8.3.3 Carbonates

MARK SCHEME – GCSE CHEMISTRY – 8462/1F – JUNE 2018

Question	Answers	Extra information	Mark	AO / Spec. Ref.
09.1	FeS_2	do **not** accept equations	1	AO2 4.2.1.3
09.2	26 30 26	must be this order	1 1 1	AO2 4.1.1.4 4.1.1.5
09.3	any **two** from: • iron has a high(er) melting / boiling point • iron is dense(r) • iron is hard(er) • iron is strong(er) • iron is less reactive • iron has ions with different charges • iron forms coloured compounds • iron can be a catalyst	allow the converse statements for sodium allow transition metal for iron allow Group 1 metal for sodium ignore references to atomic structure ignore iron rusts allow iron is less malleable / ductile allow specific reactions showing difference in reactivity allow iron is magnetic	2	AO1 4.1.2.5 4.1.3.1 4.1.3.2

4.8.3.3 Carbonates

MARK SCHEME – GCSE CHEMISTRY – 8462/1F – JUNE 2018

Question	Answers	Extra information	Mark	AO / Spec. Ref.
09.4	carbon is more reactive (than nickel)	allow converse	1	AO1 4.4.1.2 4.4.1.3
	(so) carbon will displace / replace nickel (from nickel oxide) **or** (so) carbon will remove oxygen (from nickel oxide)	allow (so) nickel ions gain electrons allow (so) carbon transfers electrons to nickel (ions)	1	
09.5		an answer of 67.8 (%) scores **3** marks an answer of 67.8160919 (%) or correctly rounded answer to 2, 4 or more sig figs scores **2** marks an incorrect answer for one step does **not** prevent allocation of marks for subsequent steps		AO2 4.3.3.2
	(total M_r of reactants =) 87		1	
	(percentage atom economy) $= \frac{59}{87} \times 100$	allow (percentage atom economy) $= \frac{59}{\text{incorrectly calculated } M_r} \times 100$	1	
	= 67.8 (%)	allow an answer from an incorrect calculation to 3 sig figs	1	
Total			**11**	

4.8.3.3 Carbonates

MARK SCHEME – GCSE CHEMISTRY – 8462/1F – JUNE 2018

Question	Answers	Extra information	Mark	AO / Spec. Ref.
10.1	copper, zinc, sodium chloride solution		1	AO2 4.5.2.1
10.2	a reactant is used up	allow the reaction stops allow electrolyte / electrode / ions / metal / metal hydroxide / alkali for reactant	1	AO1 4.5.2.1
10.3	the reaction is not reversible		1	AO1 4.5.2.1
10.4	$2H_2 + O_2 \rightarrow 2H_2O$	allow fractions / multiples allow **1** mark for O_2	2	AO1 AO2 4.1.1.1 4.5.2.2

4.8.3.3 Carbonates

MARK SCHEME – GCSE CHEMISTRY – 8462/1F – JUNE 2018

<table>
<tr><th>Question</th><th>Answers</th><th>Mark</th><th>AO / Spec. Ref.</th></tr>
<tr><td rowspan="5">10.5</td><td>Level 3: A judgement, strongly linked and logically supported by a sufficient range of correct reasons, is given.</td><td>5–6</td><td>AO3</td></tr>
<tr><td>Level 2: Some logically linked reasons are given. There may also be a simple judgement.</td><td>3–4</td><td>AO3</td></tr>
<tr><td>Level 1: Relevant points are made. This is not logically linked.</td><td>1–2</td><td>AO2</td></tr>
<tr><td>No relevant content</td><td>0</td><td></td></tr>
<tr><td>Indicative content

reasons why fuel cells could be judged as better
<table>
<tr><th>from the table</th><th>from other knowledge</th></tr>
<tr><td>• time for refuelling a fuel cell is faster than recharging
or
a fuel cell does not need to be recharged
• a fuel cell has a greater range</td><td>• hydrogen can be renewable if made by electrolysis using renewable energy
• lithium-ion batteries can catch fire
• produces only water
or
no pollutants produced
• lithium-ion batteries may release toxic chemicals on disposal
• lithium-ion batteries (eventually cannot be recharged so) have a finite life</td></tr>
</table>
reasons why the lithium-ion battery could be judged as better
<table>
<tr><th>from the table</th><th>from other knowledge</th></tr>
<tr><td>• lithium-ion uses energy more efficiently
• cost of lithium-ion car much less
• cost of recharging much less than refuelling with hydrogen</td><td>• hydrogen is often made from fossil fuels so is not renewable
• charging points are more widely available than hydrogen filling stations
• hydrogen takes up a lot of space
or
is difficult to store
• hydrogen can be highly flammable / explosive
• no emissions produced
• (catalyst in the hydrogen fuel-cell eventually becomes poisoned so) have a finite life</td></tr>
</table></td><td></td><td>4.4.3.4
4.5.2.1
4.5.2.2</td></tr>
<tr><td>Total</td><td></td><td></td><td>11</td></tr>
</table>

Answer 20 · Examiner comments

June 2018 | 8462/1F | Original Q5

Question 5 (low and standard demand)

05.1 This was well answered, with 73% of students knowing the state symbol for a gas.

05.2 This question was difficult to answer with 81% of students not achieving a mark. The idea of a gas leaving the test tube was required. Many referred incorrectly to evaporation. Some students correctly said that a gas was produced, but did not say that it escaped, so did not gain the mark. Many thought the loss in mass was due to energy being lost.

05.3 This was very well answered, with 83% of students achieving the mark.

05.4 74% of students could correctly identify the anomalous result. The most popular incorrect answer was Trial 3 for 8 g of copper carbonate, which is exactly midway between the other two values.

05.5 This was not answered very well with 0.6% of students achieving both marks here. 12% of students achieved a single mark, usually for eating for longer'. 10% of students did not attempt an answer at all.

A lack of precision of expression proved costly, for example, 'leave it for longer' does not mean the same thing as 'heat it for longer'. Some students suggested putting in a bung to prevent any gas escaping, missing the entire reason for the investigation.

Some students suggested heating until no more gas was given off, with no indication as to how they would know when that was the case. Credit was given to those who could do so, for example by testing with lime water until it no longer turned cloudy or no more bubbles were seen. No credit was given for stating the test for carbon dioxide.

05.6 77% of students could draw a straight line touching five of the points. Errors occurred where a student had bent the line to touch the point at (12.0, 5.6), or where there was a discontinuity in the line. Some students used a pen and were then unable to correct their first attempt. Graphs should always be plotted and drawn with a sharp pencil and a long enough ruler.

4.8.3.3 Carbonates

Answer 20 · Examiner comments June 2018 | 8462/1F | Original Q5

05.7 50% of students achieved the mark here. Of the incorrect responses, many misread the scale on the *x*-axis and reading the value at 8.8 g instead of 8.4 g.

05.8 There were some very good answers, with 48% of students achieving both marks. An incorrect answer to the previous question did not prevent access to both marks. However, a significant number of students did not use their answer from question **05.7** as instructed (which would have entailed scaling up by multiplying by 20). Instead, they used a different point on the graph, which almost always led to an incorrect answer.

Answer 23 · Examiner comments June 2024 | 8462/2F | Original Q7

Question 7 (low and standard demand)

07.1 Approximately two out of five students gained both marks with a one in two gaining one mark. It is important that students read the question carefully as there was a significant number of students who ticked one box instead of two.

07.2 This question asked for two ways in which a greenhouse gas is released in the process described. Less than 25% of students gained both marks with just over 35% more gaining one mark. Incorrect or insufficient responses included 'heating the limestone' and general references to the equation, or that methane might escape during its combustion.

07.3 The carbonate test is poorly understood with less than 15% of students correctly identifying the substance added to the limestone and the test for carbon dioxide. Two in five students gained one mark. The most frequent incorrect response was to mistakenly identify the test as universal indicator.

07.4 Less than 35% of students gained one mark in this question, with less than 15% gaining two marks. Responses which did not gain credit included those referring to carrying heavy weights in general rather than the weight being from lorries or vehicles, responses in terms of the incorrect property from the table or failing to make a valid comparison.

© 2024 AQA and its licensors. All rights reserved.

4.8.3.3 Carbonates

Answer 23 · Examiner comments June 2024 | 8462/2F | Original Q7

07.5 This question proved to be easier than that for the concrete bridge with over 50% of students gaining one mark and over 35% gaining both marks. Responses which did not gain credit again included those that failed to make a valid comparison or those that simply quoted data from the table.