AQA GCSE Chemistry | 8462

SPECIFICATION POINT 4.9.1.4

How carbon dioxide decreased

Mark schemes and examiner comments

Tier	**Foundation**
Question groups	**33**
Available paper years	**2007–2025**

Using this booklet

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

Name: _____ **Date:** _____

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

4.9.1.4 How carbon dioxide decreased

Answer 01 · Mark scheme January 2007 | CHY1F | Original Q7 | Legacy

Question 7

	answers	extra information	mark
(a)	oxygen **and** nitrogen 20 – 21% **and** 78 – 80%	 accept any two correct responses in the correct space for **one** mark	1 1
(b)(i)	acid rain	accept toxic gas or consequence of acid rain	1
(ii)	idea of the removal or use of sulfur dioxide gas (from the waste gases)	do **not** accept remove sulfur from coal	1
(iii)	oxygen water	accept O_2 accept H_2O accept hydrogen oxide / steam	1 1
(c)	any **two** from: • it's a 'greenhouse gas' or increase greenhouse effect • causes global warming or increase in the Earth's temperature • sea-levels rise or flooding • climate change • (polar) ice-caps melt • extension of deserts	 accept action of a 'greenhouse gas' mention of ozone / acid rain / global dimming = max **1** mark	2
(d)	idea trap / store / lock the carbon dioxide in the oil reservoir **or** under the sea <u>bed</u>	 do **not** accept 'into the oil' / 'under the sea'	1 1
total			10

4.9.1.4 How carbon dioxide decreased

Answer 02 · Mark scheme March 2007 | CHY1A | Original Q8 | Legacy

Eight	**3**	**2**	**3**	**3**

Answer 03 · Mark scheme March 2007 | CHY1B | Original Q5 | Legacy

Five	**A**	analysis	**2**
	B	combustion	**4**
	C	condensation	**3**
	D	convection	**1**

Answer 04 · Mark scheme June 2007 | CHY1A | Original Q8 | Legacy

Eight	**1**	**2**	**2**	**3**

Answer 05 · Mark scheme November 2007 | CHY1A | Original Q8 | Legacy

Eight	**1**	**4**	**2**	**3**

Answer 06 · Mark scheme November 2007 | CHY1B | Original Q9 | Legacy

Nine	**1**	**2**	**1**	**2**

4.9.1.4 How carbon dioxide decreased

Answer 07 · Mark scheme

Question 5

question	answers	extra information	mark
(a)	curve of best fit drawn through **or** close to all of the points		1
(b)(i)	313		1
(b)(ii)	1989 +/– 1		1
(c)	concentration / amount of carbon dioxide has <u>increased</u> recently the rate of increase is <u>increasing</u>		1 1
total			5

4.9.1.4 How carbon dioxide decreased

Answer 07 · Mark scheme January 2008 | CHY1F | Original Q5 | Legacy

CHY1F

Answer 08 · Mark scheme March 2008 | CHY1BP | Original Q1 | Legacy

One	**A**	argon (noble gas)	**2**
	B	carbon dioxide	**3**
	C	nitrogen	**1**
	D	oxygen	**4**

Answer 09 · Mark scheme March 2008 | CHY1BP | Original Q9 | Legacy

Nine	**2**	**1**	**2**	**3**

Answer 10 · Mark scheme June 2008 | CHY1AP | Original Q9 | Legacy

Nine	**2**	**4**	**2**	**2**

Answer 11 · Mark scheme June 2008 | CHY1BP | Original Q6 | Legacy

Six	**A**	catalysis	**2**
	B	polymerisation	**3**
	C	combustion	**4**
	D	thermal decomposition	**1**

	A	**B**	**C**	**D**

Answer 12 · Mark scheme November 2008 | CHY1BP | Original Q9 | Legacy

Nine	**3**	**4**	**2**	**1**

Answer 13 · Mark scheme June 2009 | CHY1AP | Original Q6 | Legacy

Six	**4**	**2**	**1**	**3**

4.9.1.4 How carbon dioxide decreased

Answer 14 · Mark scheme

June 2009 | CHY1F | Original Q4 | Legacy

Question 4

question	answers	extra information	mark
4(a)(i)	nitrogen / N_2		1
4(a)(ii)	carbon dioxide / CO_2		1
4(b)(i)	humans / scientists had not evolved	accept it was billions / millions of years ago allow too long ago	1
4(b)(ii)	temperature is above 100°C **or** any water would evaporate / boil	accept Venus is too hot	1
4(c)	any **three** from: • used by plants • used for photosynthesis • dissolves in oceans / seas • used to form the shells / skeletons of marine organisms • locked up as limestone / carbonates • locked up as fossil fuels / oil / coal	accept plants take in carbon dioxide and give out oxygen for the first two bullet points ie **2** marks allow absorbs into oceans / seas	3
Total			**7**

4.9.1.4 How carbon dioxide decreased

Answer 14 · Mark scheme

June 2009 | CHY1F | Original Q4 | Legacy

CHY1F

4.9.1.4 How carbon dioxide decreased

Answer 15 · Mark scheme June 2019 | CHY1F | Original Q6 | Legacy

Question 6

question	answers	extra information	mark
6(a)(i)	condensed	it = water vapour accept temperature went below 100°C / boiling point of water allow cooled to form liquid / water / rain do **not** accept evaporated	1
	formed the oceans / seas	ignore rain accept (water vapour) cooled and formed the ocean / sea for **2** marks	1
6(a)(ii)	any **two** from: • used by (green) plants / *algae* • changed into oxygen • dissolved in oceans / seas • (locked up) in carbonates / sedimentary rocks • (locked up) in fossil fuels / named fossil fuel	ignore oxygen / nitrogen increased ignore reference to volcanoes / respiration accept photosynthesis / plants give out oxygen accept (locked up) in shells / skeletons (of animals)	2
6(b)(i)	cannot get to / reach / drill to / see the core	accept the core is (too) far down (into the Earth) / do not know what happens under the crust / Earth's surface accept it is (too) hot / radioactive ignore lack of evidence unqualified	1
6(b)(ii)	any **three** from: • heat / *energy* released • from radioactive decay / processes • (causing) convection currents • in the mantle	accept radioactivity / nuclear reactions	3
Total			**8**

4.9.1.4 How carbon dioxide decreased

Answer 16 · Mark scheme

Question 3

question	answers	extra information	mark
3(a)	crust	ignore Earth's	1
	core	ignore inner and/or outer	1
3(b)	bar chart		1
	all heights are correct	accept correctly plotted points	1
	all labels are correct for nitrogen, oxygen and other / argon		1
3(c)(i)	decomposed		1
3(c)(ii)	global warming		1
Total			7

4.9.1.4 How carbon dioxide decreased

Answer 16 · Mark scheme

January 2011 | CHY1F | Original Q3 | Legacy

CHY1F

Answer 17 · Mark scheme

June 2011 | CHY1AP | Original Q7 | Legacy

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

4.9.1.4 How carbon dioxide decreased

Answer 18 · Mark scheme January 2012 | CH1FP | Original Q6 | Legacy

Question 6

question	answers	extra information	mark
6(a)(i)	C_7H_{16}	mark answer line first answer may be given in the table	1
6(a)(ii)	C_nH_{2n+2}		1
6(b)(i)	carbon monoxide	do **not** accept carbon oxide do **not** accept water ignore CO	1
6(b)(ii)	because of partial / incomplete combustion (in reaction 2) **or** complete combustion (in reaction 1)	allow because there is less / insufficient oxygen (in reaction 2) **or** sufficient oxygen (in reaction 1) allow different amounts of oxygen used (in the reactions) **or** $19O_2$ (in reaction 1) **and** $13O_2$ (in reaction 2) ignore air	1
6(c)(i)	15 (%)	ignore units	1
6(c)(ii)	water (vapour)/steam	allow H_2O / OH_2 / hydrogen oxide	1

Question 6 continues on the next page…….

4.9.1.4 How carbon dioxide decreased

CH1FP

Question 6 cont'd…..

question	answers	extra information	mark
6(c)(iii)	sulfur in petrol / crude oil (reacts with oxygen)	it = sulfur dioxide	1
6(c)(iv)	because nitrogen **and** oxygen (are in the air and) react	allow nitrogen **and** oxygen burn accept nitrogen + oxygen → nitrogen oxide **or** symbol equation ignore air	1
	at high temperature (inside a petrol engine)	allow heat / hot (engine)	1
6(d)	because carbon dioxide / it causes global warming **or** because carbon dioxide / it has an impact on oceans	allow because carbon dioxide / it causes greenhouse effect / climate change	1
	because this carbon dioxide / carbon / it was 'locked up' (in fossil fuels) **or** because the percentage/amount of carbon dioxide / it in the atmosphere is increasing		1
Total			**11**

4.9.1.4 How carbon dioxide decreased

Answer 18 · Mark scheme

January 2012 | CH1FP | Original Q6 | Legacy

CH1FP

4.9.1.4 How carbon dioxide decreased

Answer 19 · Mark scheme June 2012 | CH1FP | Original Q2 | Legacy

Question 2

question	answers	extra information	mark
2(a)	A – core B – mantle C – crust		1 1 1
2(b)	any **two** from: • carbon dioxide dissolves / absorbs in water / oceans • plants / algae photosynthesise / absorb / use carbon dioxide • marine organisms use (dissolved) carbon dioxide to form their shells / skeletons **or** limestone was formed from the shells / skeletons of marine organisms	 allow reacts with water accept remains of plants / algae / marine organisms contain locked up carbon dioxide / carbon in the form of fossil fuels do **not** accept plants use carbon dioxide for respiration accept carbon dioxide became locked up in sedimentary rocks / carbonates / limestone **or** precipitation or formation of insoluble carbonates	2
Total			**5**

4.9.1.4 How carbon dioxide decreased

Answer 19 · Mark scheme

June 2012 | CH1FP | Original Q2 | Legacy

CH1FP

4.9.1.4 How carbon dioxide decreased

Answer 20 · 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	stops on its own is insufficient allow stop working / bubbling / fizzing	1
	the (hydrochloric) acid / (calcium) carbonate is used up	accept because the (calcium) carbonate has neutralised the (hydrochloric) acid	1
	OR have been used up (1) the graph line becomes horizontal / levels out (1)		
	OR stays the same / no change (1)	ignore reference to graph line	
	no further reaction (1)		
4(a)(iii)	bubble the gas through limewater / calcium hydroxide solution	allow (add) limewater test must be correct to gain result mark	1
	(the solution) goes cloudy	allow milky	1
4(b)	advantage > Quarrying limestone provides building materials, employment and new road links		1
	disadvantage > Quarrying limestone releases dust, and lorries release carbon dioxide from burning diesel fuel		1
Total			7

4.9.1.4 How carbon dioxide decreased

Answer 20 · Mark scheme

June 2012 | CH1FP | Original Q4 | Legacy

CH1FP

4.9.1.4 How carbon dioxide decreased

Answer 21 · Mark scheme

January 2013 | CH1FP | Original Q6 | Legacy

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**

4.9.1.4 How carbon dioxide decreased

Answer 21 · Mark scheme

January 2013 | CH1FP | Original Q6 | Legacy

CH1FP

4.9.1.4 How carbon dioxide decreased

Answer 22 · Mark scheme

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**

4.9.1.4 How carbon dioxide decreased

Answer 23 · Mark scheme

June 2014 | CH1FP | Original Q2 | Legacy

Question	Answers	Extra information	Mark	AO / Spec. Ref.	ID
2(a)	argon / Ar		1	1 / 1.1.2b	G
2(b)(i)	0		1	1 / 1.1.2b	A
2(b)(ii)	unreactive		1	1 / 1.1.2b	A
2(c)(i)	94.96(%)		1	2 / 1.7.2c	E
2(c)(ii)	any **two** from: • plants or photosynthesis • absorbed in oceans / *seas* • locked up in *(*sedimentary*)* rocks • locked up in fossil fuels	allow oceans store **or** take in **or** dissolve carbon dioxide	2	2 / 1.7.2f/g/h	E
Total			**6**		

4.9.1.4 How carbon dioxide decreased

Answer 23 · Mark scheme

June 2014 | CH1FP | Original Q2 | Legacy



4.9.1.4 How carbon dioxide decreased

Answer 24 · Mark scheme

June 2015 | CH1FP | Original Q4 | Legacy

Question	Answers	Extra information	Mark	AO / Spec. Ref.
4(a)(i)	the polymer is not biodegradable the polymer is waterproof		1 1	2 / 1.5.2b/c
4(a)(ii)	any **one** from: • made from a renewable/sustainable resource • is biodegradable	ignore releases less carbon dioxide allow decomposes	1	3 / 1.5.2c/d
4(b)(i)	crushing filtering	in the correct order	1 1	1 / 1.6.1a
4(b)(ii)	open the tap to allow only water to flow out **or** close the tap to leave the oil in the funnel	allow close tap then allow oil to flow out into a separate container	1 1	2 / 1.6.1a
4(c)(i)	They provide a lot of energy		1	1 / 1.6.1b
4(c)(ii)	because the vegetable/plant absorbs / uses carbon dioxide which is released when the biofuel burns	second marking point is dependent on first marking point allow a fossil fuel releases locked up carbon dioxide/carbon if no other mark awarded allow carbon neutral for **one** mark	1 1	1 / 1.5.2a
Total			**10**	

4.9.1.4 How carbon dioxide decreased

Answer 24 · Mark scheme

June 2015 | CH1FP | Original Q4 | Legacy



4.9.1.4 How carbon dioxide decreased

Answer 25 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec. Ref.	
6(a)	any **one** from: • not enough evidence or proof • (life and the Earth were created) billions of years ago	allow no evidence or no proof allow a long time ago ignore different beliefs or no one was there	1	2 / 1.7.2d	

6(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 5, and apply a 'best-fit' approach to the marking.

1+2+3 / 1.7.1a/b/c / 1.7.2a/b/c/f/g/h

0 marks	Level 1 (1–2 marks)	Level 2 (3–4 marks)	Level 3 (5–6 marks)
No relevant content	Statements based on diagrams	Description of how one change occurred	Descriptions of how at least two changes occurred

Examples of chemistry points made in the response could include:

Main changes

- oxygen increased because plants / algae developed and used carbon dioxide for photosynthesis / growth producing oxygen; carbon dioxide decreased because of this
- carbon dioxide decreased because oceans formed and dissolved / absorbed carbon dioxide; carbon dioxide became locked up in sedimentary / carbonate rocks and / or fossil fuels
- oceans formed because the Earth / water vapour cooled and water vapour in the atmosphere condensed
- continents formed because the Earth cooled forming a supercontinent / Pangaea which formed the separate continents
- volcanoes reduced because the Earth cooled forming a crust

Other changes

- nitrogen has formed because ammonia in the Earth's early atmosphere reacted with oxygen / denitrifying bacteria

Total			7

4.9.1.4 How carbon dioxide decreased

Answer 26 · Mark scheme June 2016 | CH1FP | Original Q2 | Legacy

Question 2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
2(a)(i)	the Earth's (surface) temperature was high **or** at/above 100 °C	allow the Earth's (surface) temperature was too/very hot **or** water evaporated/ boiled **or** turned to steam/gas allow because of heat from volcanoes ignore the Earth's (surface) was covered by volcanoes ignore water turned to water vapour	1	AO3 1.7.2b
2(a)(ii)	plates	allow plate	1	AO1 1.7.1d
2(b)(i)	air ——— mixture carbon dioxide ——— compound argon ——— element	allow only one line from each substance	1 1 1	AO1 1.1.1a; 1.1.3a; 1.7.2a
2(b)(ii)	oxygen		1	AO1 1.4.3b
2(b)(iii)	about 80 %		1	AO1 1.7.2a
2(c)(i)	0.03(0) (%)		1	AO2 1.7.2 c
2(c)(ii)	increased slowly then rapidly	allow figures from graph to indicate increase	1 1	AO2 1.7.2i
2(c)(iii)	any **two** from: • use of fossil fuels • deforestation • cars/transport • industry/factories	ignore more people allow less trees / plants	2	AO3 1.7.2i
Total			**12**	

4.9.1.4 How carbon dioxide decreased

Answer 27 · Mark scheme

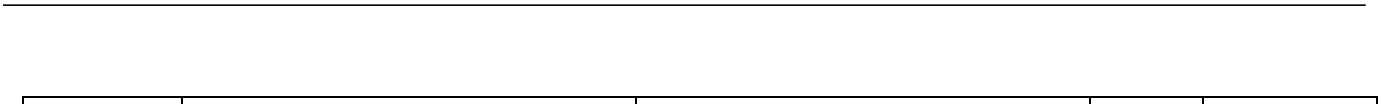
June 2017 | CH1FP | Original Q1 | Legacy

Question	Answers	Extra information	Mark	AO / Spec. Ref.
1(a)(i)	dissolved locked up		1 1	**AO1** 1.7.2g;h
1(a)(ii)	photosynthesis		1	**AO1** 1.7.2f
1(b)(i)	argon - 1 nitrogen - 80 oxygen - 20	each mark is awarded for <u>one</u> line from each gas to the correct percentage	1 1 1	**AO1** **AO3** 1.7.2a
1(b)(ii)	(burning) fossil fuels	allow deforestation **or** a description allow (increase in) transport / factories ignore more people **or** population (increase)	1	**AO1** 1.7.2i
Total			**7**	

4.9.1.4 How carbon dioxide decreased

Answer 27 · Mark scheme

June 2017 | CH1FP | Original Q1 | Legacy



4.9.1.4 How carbon dioxide decreased

Answer 28 · Mark scheme June 2018 | 8462/2F | Original Q10

Question	Answers	Extra information	Mark	AO / Spec. Ref.
10.1	hydrogen	allow H_2	1	AO1 4.10.4.1
10.2	450 °C 200 atm / atmospheres	allow values in the range 400– 500 °C allow values in the range 150– 250 atm / atmospheres allow **1** mark if both values within range but no units given	1 1	AO1 4.10.4.1
10.3	ammonia has a higher boiling point	allow the other gases have lower boiling points ignore references to melting point	1	AO3 4.10.4.1

4.9.1.4 How carbon dioxide decreased

Answer 28 · Mark scheme

June 2018 | 8462/2F | Original Q10

Question	Answers		Mark	AO / Spec. Ref.
10.4	**Level 3:** Relevant points (reasons / causes) are identified, given in detail and logically linked to form a clear account.		5–6	AO2
	Level 2: Relevant points (reasons / causes) are identified, and there are attempts at logical linking. The resulting account is not fully clear.		3–4	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	
	Indicative content **changes** • carbon dioxide has decreased • oxygen has increased **processes** • volcanic activity released water vapour • the water vapour condensed to form oceans • carbon dioxide dissolved in oceans • carbonates produce sediments • carbon locked up in sedimentary rocks • algae and plants evolved / appeared • algae / plants absorbed carbon dioxide • by photosynthesis • which also released oxygen • carbon locked up in fossil fuels			4.9.1.2 4.9.1.3 4.9.1.4
10.5	any **one** from: • occurred 4.6 billion years ago • limited or no evidence	allow any indication of billions of years allow limited or no proof ignore there was nobody there	1	AO1 4.9.1.2
Total			**11**	

4.9.1.4 How carbon dioxide decreased

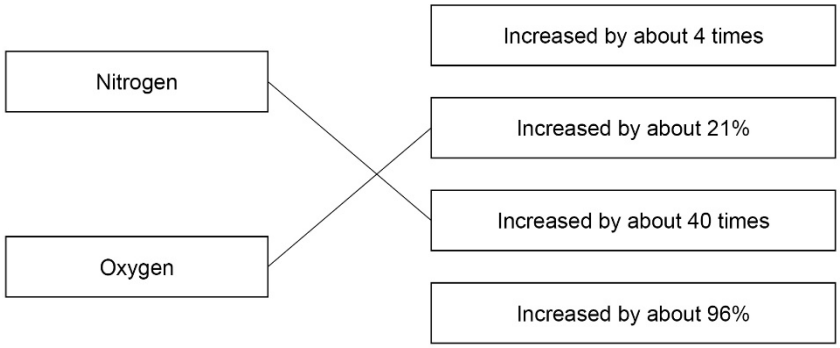
Answer 29 · Mark scheme

November 2021 | 8462/2F | Original Q1

Question 1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.1	4.6 billion years ago		1	AO1 4.9.1.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.2	0.92 (%)		1	AO2 4.9.1.1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.3	 do **not** accept more than one line from a box on the left		1 1	AO1 AO2 4.9.1.1 4.9.1.3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.4	carbon dioxide dissolving in sea water formation of sedimentary rocks		1 1	AO1 4.9.1.2 4.9.1.4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.5	carbon dioxide (+ water →) (→ glucose +) oxygen	allow CO_2 allow O_2	1 1	AO1 4.9.1.3

4.9.1.4 How carbon dioxide decreased

Question 1 continued

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.6	evidence / proof		1	AO1 4.9.1.2

Total			**9**

4.9.1.4 How carbon dioxide decreased

Answer 30 · Mark scheme

June 2022 | 8462/2F | Original Q3

Question 3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.1	78.09 (%)		1	AO2 4.9.1.1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.2	ammonia methane		1 1	AO1 4.9.1.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.3	photosynthesis		1	AO1 4.9.1.3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.4	dissolving carbon dioxide in oceans formation of sedimentary rocks		1 1	AO1 4.9.1.2 4.9.1.4

4.9.1.4 How carbon dioxide decreased

Answer 30 · Mark scheme June 2022 | 8462/2F | Original Q3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.5	1500 (millions of years ago)		1	AO2 4.9.1.3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.6	2500 (millions of years ago)	allow a value in the range 2500 to 2700 (millions of years ago)	1	AO3 4.9.1.3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.7	plankton		1	AO1 4.7.1.1 4.9.1.4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.8	(there is) limited evidence	allow the timescale was millions / billions of years	1	AO2 4.9.1.2

Total Question 3		**10**

4.9.1.4 How carbon dioxide decreased

Answer 31 · Mark scheme

June 2024 | 8462/2F | Original Q2

Question 2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.1	increases		1	AO3 4.9.3.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.2	(mass =) $\frac{7000}{3000}$ = 2.33 (kg)	 allow 2.333333 correctly rounded to at least 2 significant figures	1 1	AO2 4.9.3.1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.3	rain		1	AO1 4.9.3.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.4	five points plotted correctly line of best fit	allow a tolerance of ± ½ a small square allow three or four points plotted correctly for **1** mark	2 1	AO2 4.9.3.1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.5	increases		1	AO3 4.9.3.2

4.9.1.4 How carbon dioxide decreased

Answer 31 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.6	dimming		1	AO1 4.9.3.2

Total Question 2	**9**

4.9.1.4 How carbon dioxide decreased

Answer 32 · Mark scheme

June 2024 | 8462/2F | Original Q4

Question 4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.1	percentage of nitrogen increases until 2.3 billion years then remains constant	 allow a value in the range 2.1 to 2.4 billion years allow until 80%	1 1 1	AO2 4.9.1.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.2	the percentage of carbon dioxide decreased		1	AO1 4.9.1.4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.3	light		1	AO1 4.9.1.3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.4	algae plants		1 1	AO1 4.9.1.3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.5	cellulose starch		1 1	AO1 4.7.3.4

4.9.1.4 How carbon dioxide decreased

Answer 32 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.6	1.4×10^{11}		1	AO2 4.3.1.2 4.7.3.4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.7	70 000 000 000		1	AO2 4.7.3.4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.8	helix		1	AO1 4.7.3.4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.9	4		1	AO1 4.7.3.4

Total Question 4	**13**

4.9.1.4 How carbon dioxide decreased

Answer 33 · Mark scheme

June 2025 | 8462/2F | Original Q6

Question 6

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.1	line of best fit		1	AO2 4.9.1.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.2	40 (%)		1	AO2 4.9.1.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.3	carbon dioxide was dissolved in oceans		1	AO3 4.9.1.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.4	nitrogen was released during volcanic activity		1	AO3 4.9.1.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.5	2.5 billion years ago		1	AO3 4.9.1.1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.6	ammonia methane		1 1	AO1 4.9.1.2

4.9.1.4 How carbon dioxide decreased

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.7	photosynthesis		1	AO1 4.9.1.3

Total Question 6	**8**

4.9.1.4 How carbon dioxide decreased

Answer 28 · Examiner comments

Question 10 (standard demand)

10.1 27% of students realised that the other gas used in the Haber process is hydrogen.

10.2 Few knew the temperature and pressure used in the process. This was made even more challenging as they had to give the correct units as well. 12% of students achieved any marks for this question.

10.3 7% of students could explain why only the ammonia, and not the other gases, turn into a liquid because its boiling point is higher.

10.4 This was another 'extended response', 'level marked' question. This time there were three levels and the command word was 'explain'. Again, the question was marked holistically. Students were given information about the current atmosphere of Venus, believed to be similar to that on the early Earth, and the Earth's atmosphere today. Generally, a level 1 response used the percentages given to say in which direction the amounts of these gases had moved. Level 2 moved beyond this, giving an explanation in terms of one process, such as photosynthesis or dissolving in oceans. Level 3 responses usually gave more than one process, for example both of the processes mentioned above. Many students talked only about the changes in the last few centuries, which was not what the question was asking. 47% of students were able to reach level 2 or 3.

10.5 Few students seemed aware of the timescale under consideration here, namely the atmosphere of billions of years ago. A lack of evidence or proof was also accepted.

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.

4.9.1.4 How carbon dioxide decreased

Answer 30 · Examiner comments June 2022 | 8462/2F | Original Q3

Question 3 (Low and standard demand)

03.1 Just over half of the students correctly worked out the percentage of nitrogen.

03.2 Nearly 60% of the students gained two marks, with methane being well known but ammonia less so.

03.3 Photosynthesis was correctly identified by nearly 90% of the students.

03.4 Nearly 50% of the students gained two marks, with carbon dioxide dissolving in oceans better known than formation of sedimentary rocks.

03.5 Nearly four fifths of the students could correctly read the value from the graph.

03.6 Even though the numerical scale was increasing in the backwards direction, more than 90% of the students scored this mark.

03.7 Plankton was identified by nearly 60% of the students.

03.8 The answer required the idea of limited evidence or that it was billions (or millions) of years ago. Lack of proof or data or that it was a long time ago were insufficient. Just over 20% of the students answered this question correctly.

Answer 31 · Examiner comments June 2024 | 8462/2F | Original Q2

Question 2 (low demand)

02.1 This was well answered with nearly all students identifying the effect on the rate of global warming.

02.2 Over 70% of students gained both marks for this calculation with less than 3% obtaining just one mark. The most common incorrect response was to invert the expression or to include additional steps in their calculation neither of which allowed access to either marking point.

02.3 Over 75% of students correctly identified acid rain. A frequently seen incorrect response was acid reflux.

02.4 This was well answered with more than 80% of students obtaining two or three marks. The most common reason for gaining two marks was having omitted to plot the point at (0,0). The majority of students drew a correct line of best fit, but a few had doubled or feathered lines, or had clearly not used a ruler.

02.5 Over 90% of students correctly identified that the mass of sulfur dioxide increases.

02.6 This question assessed a little-known part of the specification with fewer than one in ten students correctly identifying that particulates cause global dimming. By far the most common incorrect response was global warming.

4.9.1.4 How carbon dioxide decreased

Answer 32 · Examiner comments June 2024 | 8462/2F | Original Q4

Question 4 (low and standard demand)

04.1 One in four students obtained all three marks in this question with two out of five obtaining two marks. The most frequently seen reason for not obtaining full marks was to incorrectly determine the date in billions of years at which the percentage of nitrogen in the atmosphere became constant. Students need to be exposed to as many examples as possible of explaining trends as some struggled to express the percentage of nitrogen becoming constant, describing the line as becoming, steady, calm, stable, stopping or going at a constant speed or using vague statements about 'it.'

04.2 Almost 80% of students correctly identified that the percentage of carbon dioxide decreased.

04.3 Well over 80% of students correctly identified light as being the energy source for photosynthesis.

04.4 Nearly 80% of students identified the two organisms that produce oxygen. A further 15% correctly identified one organism, usually plants.

04.5 Less than 30% of students could correctly identify the two natural polymers produced from glucose. 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.

04.6 Well over 75% of students correctly expressed the relative formula mass of DNA in standard form.

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Answer 32 · Examiner comments June 2024 | 8462/2F | Original Q4

04.7 Only one in two students were able to correctly calculate the relative formula mass of each polymer chain in DNA. The most popular incorrect distractor was 140 000 000 000 where the student had failed to realise that the DNA molecule was comprised of two chains.

04.8 Just under 75% of students correctly described the shape of a DNA molecule as a double helix. The most common incorrect response was double bond.

04.9 Less than 35% of students were able to correctly identify the number of different nucleotides present in a molecule of DNA.

4.9.1.4 How carbon dioxide decreased

Answer 33 · Examiner comments June 2025 | 8462/2F | Original Q6

Question 6

06.1 Nearly 80% of students completed the line of best fit.

06.2 Two thirds of students correctly read 40% from the graph. The most common incorrect response was 24%, which corresponds to 3.25 billion years ago.

06.3 3 in 5 students correctly identified that carbon dioxide dissolving in water caused the concentration to drop initially.

06.4 Over half of students knew that the percentage of nitrogen increasing in the atmosphere was caused by volcanic action.

06.5 Knowledge of the changes of the atmosphere over time was known by fewer than half of the students.

06.6 Fewer than 20% of students identified both gases in the Earth's early atmosphere. Hydrogen and helium were the two distractors that were seen most.

06.7 Over half of students correctly identified the process as photosynthesis. Respiration and combustion were the two most common incorrect answers.