AQA
Questions matter

Summer results 2024: GCSE sciences

Stacy Thurston and Frank Lowor

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GCSE sciences

Outcomes: GCSE

- Last year we returned to pre-pandemic grading, with **protection** built into the grading process to recognise the disruption students have faced
- The protection meant that a typical student who would have achieved, for example, a Grade 5 in GCSE Biology in 2019 would be just as likely to get a Grade 5 in GCSE Biology in 2023
- The protection built in last year is included in any comparisons going forward as all students have been affected by the pandemic. All awarding processes this year were compared to the outcomes achieved in 2023
- 2023 is now considered the benchmark for any future examination comparison

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Outcomes: Combined Science

AQA GCSE statistics **2024**, with data from **2023** and **2019** for comparison. The table shows cumulative percentages at each grade.
These are AQA only data; AQA outcomes are very similar to the national outcomes published by JCQ for all GCSE sciences in England.

Intermediate grades (1-2, 2-3 etc) are not included in this table.

		Total entries	Grade 1-1	Grade 2-2	Grade 3-3	Grade 4-4	Grade 5-5	Grade 6-6	Grade 7-7	Grade 8-8	Grade 9-9
Combined Trilogy*	2024	375 840	97.5	91.6	79.0	57.5	36.0	18.7	9.0	3.8	1.1
	2023	354 678	97.3	91.4	76.8	56.9	35.8	18.6	8.8	3.6	1.1
	2019	303 207	98.1	92.1	77.7	56.0	34.9	16.8	7.6	3.1	0.9
Combined Synergy*	2024	6047	96.2	86.4	68.1	40.3	21.1	9.5	4.0	1.3	0.3
	2023	6351	95.8	85.1	67.1	42.0	22.0	9.4	3.7	1.2	0.3
	2019	6138	96.6	86.7	67.4	41.4	21.5	8.2	3.7	1.2	0.3

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Outcomes: separate sciences

AQA GCSE statistics **2024**, with data from **2023** and **2019** for comparison. The table shows cumulative percentages at each grade.
These are AQA only data; AQA outcomes are very similar to the national outcomes published by JCQ for all GCSE sciences in England.

		Total entries	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8	Grade 9
Biology	2024	149 786	99.4	97.8	95.1	89.1	79.1	62.7	41.7	26.7	12.5
	2023	146 118	98.8	98.0	95.6	89.2	78.9	62.4	41.7	25.4	12.3
	2019	130 938	99.4	98.3	96.0	90.1	80.4	63.7	42.8	26.9	12.5
Chemistry	2024	142 967	99.5	98.5	96.3	90.5	79.5	62.8	44.7	29.0	14.0
	2023	140 513	99.2	98.2	95.8	89.7	79.1	62.4	43.5	27.5	13.0
	2019	126 276	99.5	98.8	96.9	90.3	79.0	62.2	44.5	28.0	13.2
Physics	2024	143 043	99.3	98.7	97.2	90.1	80.0	63.8	43.9	28.2	13.3
	2023	140 347	98.8	98.9	96.8	90.0	80.0	62.9	42.9	27.6	13.2
	2019	125 656	99.5	98.9	97.4	91.1	79.3	62.5	44.2	27.7	12.6

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The Foundation/Higher tier split: Combined sciences

Trilogy	2019	2020 (CAGs)	2021 (TAGs)	2022	2023	2024
Foundation	63%	61%	58%	59%	61%	61%
Higher	37%	38%	42%	41%	39%	39%

Synergy	2019	2020 (CAGs)	2021 (TAGs)	2022	2023	2024
Foundation	77%	78%	72%	73%	75%	75%
Higher	23%	22%	28%	27%	25%	25%

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The Foundation/Higher tier split: separate sciences

Biology	2019	2020 (CAGs)	2021 (TAGs)	2022	2023	2024
Foundation	15%	14%	12%	14%	15%	15%
Higher	85%	84%	88%	86%	85%	85%

Chemistry	2019	2020 (CAGs)	2021 (TAGs)	2022	2023	2024
Foundation	15%	13%	11%	14%	15%	15%
Higher	85%	87%	89%	86%	85%	85%

Physics	2019	2020 (CAGs)	2021 (TAGs)	2022	2023	2024
Foundation	15%	12%	10%	13%	13%	13%
Higher	85%	87%	90%	87%	87%	87%

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Grade boundaries

Grade boundaries

Normal awarding process was followed to set the grade boundaries

- Statistically directed judgemental grade boundaries
- Followed by review of student work to confirm/change
- Interim boundaries set statistically at regular intervals
- Grade boundaries are set to reflect the demand of the question papers. It is not unusual for them to be different from one year to the next or between exam boards
- Reference year used for awarding to achieve outcomes was 2023
- In this presentation we consider the overall award grade boundaries
- There are estimated component grade boundaries available on the website

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Areas of Challenge

Centre concerns

Queries raised by teachers:

- Q8.3 Enthalpy – use of negative values in the calculation (not on the specification)

Queries raised by students and exams officers:

- Too much plant biology
- Wording of calculation question
- Errors with the graph interpretation
- Disease caused by a virus

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General points

Working scientifically:

- correctly identifying variables
- control variables
- graph interpretation
- valid outcomes when describing a method
- evidence that they had completed the required practicals - chromatography (again), wave in a solid

Extended response questions:

- across the suite about 17% (on average) of students on Foundation tier didn't attempt
- higher tier and separates the engagement is higher, non-attempt rate of 2-5%

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Physics

Combined Physics: skills

Physics equations:

- students' performance on calculations was generally good and credited with the access to the full equation sheet again in 2024
- students able to substitute and rearrange equations

Challenges:

- units: especially those with squares or cubes e.g. kg/m^3
- unnecessary unit conversions
- rearranging some equations
- describing instead of explaining
- extended responses – all differentiated well but 20% didn't attempt

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Challenging topics - Physics P1 and P2

Challenges on foundation tier:

- Understanding Electrical circuits (1FQ1)

Challenges on both papers:

- Understanding radiation (1F Q3 and 1H Q5)
- Forces and energy transfers (2F Q7 and 2H Q2)

Challenges on higher tier:

- Electromagnetic waves (2H Q3)
- Speed and braking (2H Q5)

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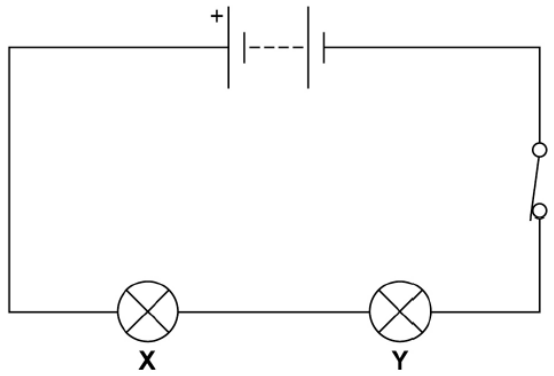
Fundamental knowledge: electrical circuits

0 1 **Figure 1** shows a circuit diagram. The circuit contains a battery and two lamps, **X** and **Y**.

Figure 1



0 1 . 1 How does the current in lamp **X** compare with the current in lamp **Y**?

Tick (✓) **one** box.

The current in lamp **X** is smaller. ☐

The current in both lamps is the same. ☐

The current in lamp **X** is greater. ☐

49% 0 marks [F]

0 1 . 2 Lamp **X** and lamp **Y** are **not** identical.

The potential difference across the battery is 4.5 V.

The potential difference across lamp **X** is 1.5 V.

Calculate the potential difference across lamp **Y**.

[1 mark]

Potential difference across lamp **Y** = _____ V

43% 0 marks 3% N/A [F]

[1 mark] **0 3 . 2** The potential difference across the battery was +2.6 V.

The student varied the potential difference across the LED between –2.6 V and +2.6 V.

Describe how the student should have adjusted the circuit to vary the potential difference across this range.

[2 marks]

67% 0 marks 5% N/A [H]

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Suggested activity

What mark would you award for each response?

- Student responses 2, 3 and 4 (page 10)
- Using the mark scheme and examiners' report for question 3.2 (page 12)

0 3 . 2 The potential difference across the battery was +2.6 V.

The student varied the potential difference across the LED between –2.6 V and +2.6 V.

Describe how the student should have adjusted the circuit to vary the potential difference across this range.

[2 marks]

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.2	change the number of cells in the battery	allow use batteries with different potential differences allow adjust the variable resistor allow adjust the potential difference across the power supply	1	AO1 6.2.1.4 RPA16
	reverse the connections to the LED / battery	allow reverse the connections to the power supply	1	

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Fundamental knowledge: radiation (F)

Figure 3 shows the symbols for these isotopes.

Figure 3

$^{228}_{88}Ra$ $^{226}_{88}Ra$

0 3 . 1 How are atoms of radium-228 different from atoms of radium-226?

[1 mark]

Tick (✓) **one** box.

- Radium-228 atoms have one more neutron and one more proton. ☐
- Radium-228 atoms have two more neutrons and two more protons. ☐
- Radium-228 atoms have two more neutrons. ☐
- Radium-228 atoms have two more protons. ☐

64% 0 marks 1% N/A [F]

0 3 . 7 When the toothpaste was new, it caused a risk to health because of the nuclear radiation emitted.

What happened to the risk to health from the toothpaste after 100 years?

[1 mark]

48% 0 marks 6% N/A [F]

0 3 . 8 Which property makes nuclear radiation hazardous?

[1 mark]

Tick (✓) **one** box.

- Nuclear radiation is ionising. ☐
- Nuclear radiation is penetrating. ☐
- Nuclear radiation is too small to see. ☐
- Nuclear radiation makes objects radioactive. ☐

62% 0 marks 1% N/A [F]

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Higher tier

6.4.2.4 Radioactive contamination

Content	Key opportunities for skills development
Radioactive contamination is the unwanted presence of materials containing radioactive atoms on other materials. The hazard from contamination is due to the decay of the contaminating atoms. The type of radiation emitted affects the level of hazard. Irradiation is the process of exposing an object to nuclear radiation. The irradiated object does not become radioactive.	WS 1.5
Students should be able to compare the hazards associated with contamination and irradiation.	WS 1.5
Suitable precautions must be taken to protect against any hazard that the radioactive source used in the process of irradiation may present.	WS 1.5
Students should understand that it is important for the findings of studies into the effects of radiation on humans to be published and shared with other scientists so that the findings can be checked by peer review.	WS 1.6

0 5 . 1 The water was irradiated and contaminated by the radioactive isotopes in the walls of the revigator.

Explain how irradiating and contaminating the water affected the hazard caused by drinking the water.

[4 marks]

56% 0 marks 3% N/A

0 5 . 2 Vanadium-52 (V) decays by emitting beta particles.

What is the correct nuclear equation for this process?

[1 mark]

Tick (✓) **one** box.

- $^{52}_{23}V - {}^{0}_{-1}\beta \rightarrow {}^{52}_{22}Ti$ ☐
- $^{52}_{23}V - {}^{0}_{-1}\beta \rightarrow {}^{52}_{24}Cr$ ☐
- $^{52}_{23}V \rightarrow {}^{52}_{22}Ti + {}^{0}_{-1}\beta$ ☐
- $^{52}_{23}V \rightarrow {}^{52}_{24}Cr + {}^{0}_{-1}\beta$ ☐

48% 0 marks 6% N/A

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Suggested activity: higher tier content

What mark would you award for each response?

- Student responses 8, 9 and 10 (page 15-16)
- Using the mark scheme and examiners' report for question 5.1 (page 17)

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.1		allow risk for hazard throughout		AO1 6.4.2.4
	Irradiating **EITHER** radiation enters the water	allow alpha / beta / gamma enters the water allow the water does not become radioactive	1	
	(which) does not affect the hazard	dependent on MP1	1	
	OR because radiation can kill pathogens (1)	allow named pathogens e.g. bacteria, viruses		
	(irradiating) decreases the hazard (1)	dependent on MP1		
	contaminating because radioactive isotopes will enter the water / body		1	
	(contaminating) increases the hazard	dependent on MP3	1	

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Practical skills

0 3 . 5 What was the independent variable in the investigation?

[1 mark]

Tick (✓) **one** box.

- The activity of the toothpaste ☐
- The mass of toothpaste used ☐
- The temperature of the toothpaste ☐
- The tube of toothpaste used ☐

64% 0 marks 1% N/A [F]

0 3 . 6 What was the dependent variable in the investigation?

[1 mark]

Tick (✓) **one** box.

- The activity of the toothpaste ☐
- The mass of toothpaste used ☐
- The temperature of the toothpaste ☐
- The tube of toothpaste used ☐

61% 0 marks 1% N/A [F]

0 3 . 5 A second student did the investigation using a blue LED.

The results for both the red LED and the blue LED showed the same pattern.

What conclusion can be made about the investigation?

[1 mark]

Tick (✓) **one** box.

- The investigation is repeatable. ☐
- The investigation is reproducible. ☐
- The results were accurate. ☐

64% 0 marks [H]

0 5 . 4 Scientists monitored the effects of drinking the water from a revigator.

Their methods and results were checked by other scientists.

What name is given to the process of other scientists checking work before it is published?

[1 mark]

62% 0 marks 5% N/A [H]

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Chemistry

Chemistry: skills

Maths skills:

- The questions assessing maths skills and graph plotting were generally answered well , even unfamiliar calculations were well attempted

Challenges:

- AO2 and AO3 proved more challenging for students
- Practical techniques and Required practical context questions particular those describing a valid method, interpreting results and suggesting improvements
- Electrolysis still seems to be a difficult subject area for students

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Challenging topics - Chemistry P1 and P2

Challenges on foundation tier:

- Atomic structure (1F Q2)
- Investigating temperature change (1F Q3)
- Separating Techniques (1F Q4)

Challenges on both papers:

- Chemical reactions(1F Q7 and 1H Q2)
- Understanding Hydrocarbons (2F Q6 and 2H Q1)

Challenges on higher tier:

- Understanding acid reactions (1H Q4)
- Reactivity of metals / Electrolysis (1H Q6)
- Chromatography (2H Q4)
- Potable water (2H Q6)

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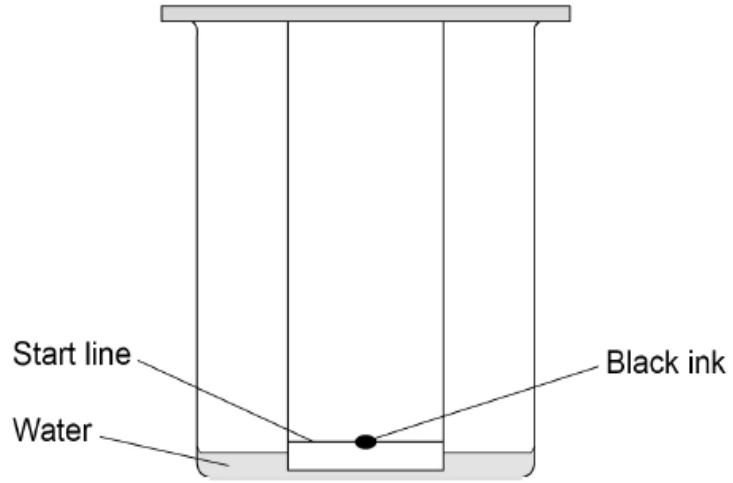
C1F Q4 RP Separation techniques

0 4 . 1 **Figure 7** shows the apparatus used to separate the dyes in a black ink.

Figure 7



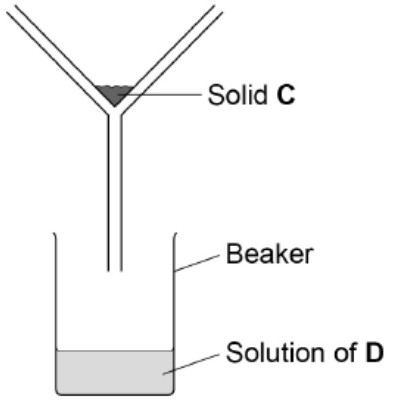
What is the name of this method?

(paper) chromatography

Some water was added to a mixture of two solids, **C** and **D**.

The mixture was stirred and then poured into the apparatus shown in **Figure 8**.

Figure 8



0 4 . 3 Explain why solid **C** separated from the mixture of **C** and **D**.

Use **Figure 8**.

(because) C is insoluble or (because) C does not dissolve (in water)

(whereas) D is soluble or

(whereas) D dissolves (in water)

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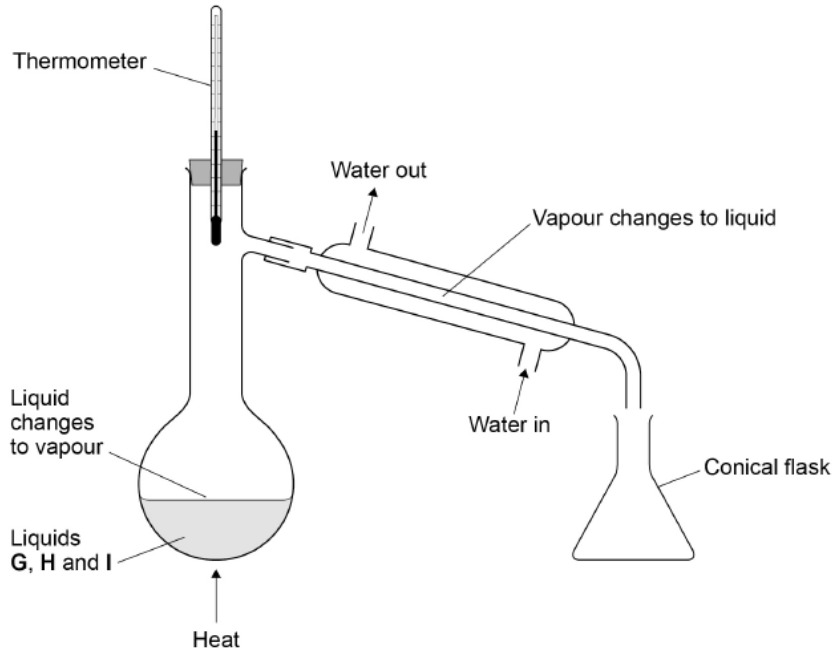
C1F Q4 RP Separation techniques

A student separated a mixture of three liquids, **G**, **H** and **I**.

Figure 9 shows the apparatus.

Figure 9



(fractional) distillation

0 4 . 4 Name the separation method shown in **Figure 9**.

[1

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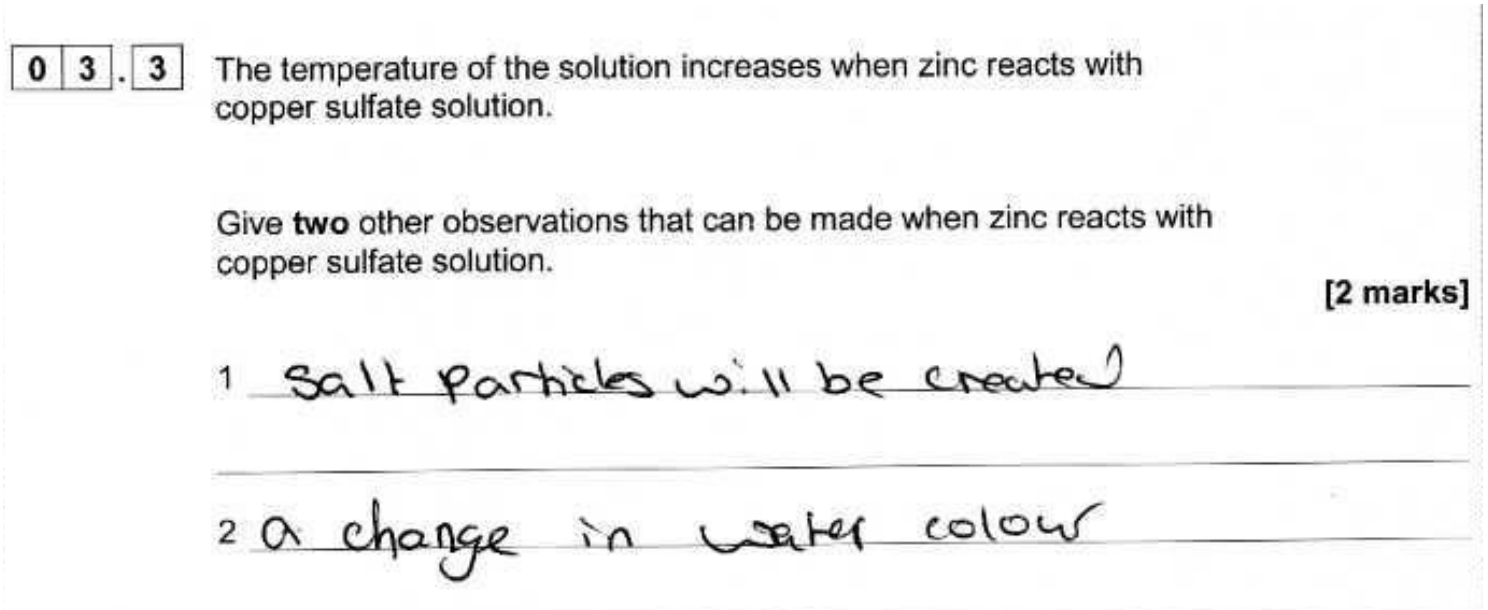
Suggested activity: additional practical skills

What mark would you award for each response?

- Student responses 20, 21 and 22 (page 27)
- Using the mark scheme and examiners' report for question 3.3 (page 28)



0 3 . 3 The temperature of the solution increases when zinc reacts with copper sulfate solution.

Give **two** other observations that can be made when zinc reacts with copper sulfate solution.

[2 marks]

1 Salt particles will be created

2 A change in water colour

What are pupils going to 'see, say and write' in the rates required practicals?

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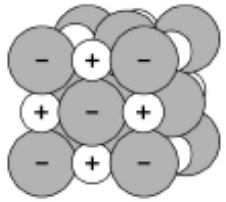
Extended response

0 8 **Table 8** shows diagrams which represent the structures of two substances.

Table 8

Substance	Structure
Sodium chloride NaCl	
Oxygen O_2	

Compare the structure and bonding of sodium chloride and oxygen.

[6 marks]

57% 0 marks 16% N/A [F]
24% 0 marks or N/A [H]

Compare the structure and bonding of sodium chloride and oxygen.

[6 marks]

NaCl :
- Ionic bonding
- strong electrostatic forces between oppositely charged ions
- high melting and boiling points

O_2 :
- simple covalent molecule
- weak intermolecular forces of attraction

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Suggested activity: higher tier content

Looking at the topic potable water. Why do think students struggle with this content?

Student responses 30, 31, 32 and 33 (page 27)

How could you use students' personal experience?

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Biology

Biology : Combined

Maths skills:

- The questions assessing maths skills including graph plotting were generally answered well and the use of Punnett squares has improved.

Challenges:

- Some subject knowledge was not secure e.g. Transpiration (unfamiliar context?)
- **Suggest** questions
- Imprecise language – lack of clarity to some answers e.g GM and selective breeding
- Applying knowledge to an unfamiliar context e.g. cell cycle
- **Explain** questions – significant number of students describing answers
- Mathematical skills including unit conversions and area calculations were common errors

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Challenging topics – Biology P1 and P2

Challenges on foundation tier:

- Digestion, Food tests and enzymes (1F Q6)

Challenges on both papers:

- Sampling techniques (2F Q5 and 2H Q1)
- Reproduction and GM crops (2F Q6 and 2H Q2)

Challenges on higher tier:

- Photosynthesis (1H Q4)
- Hormones (2H Q6)

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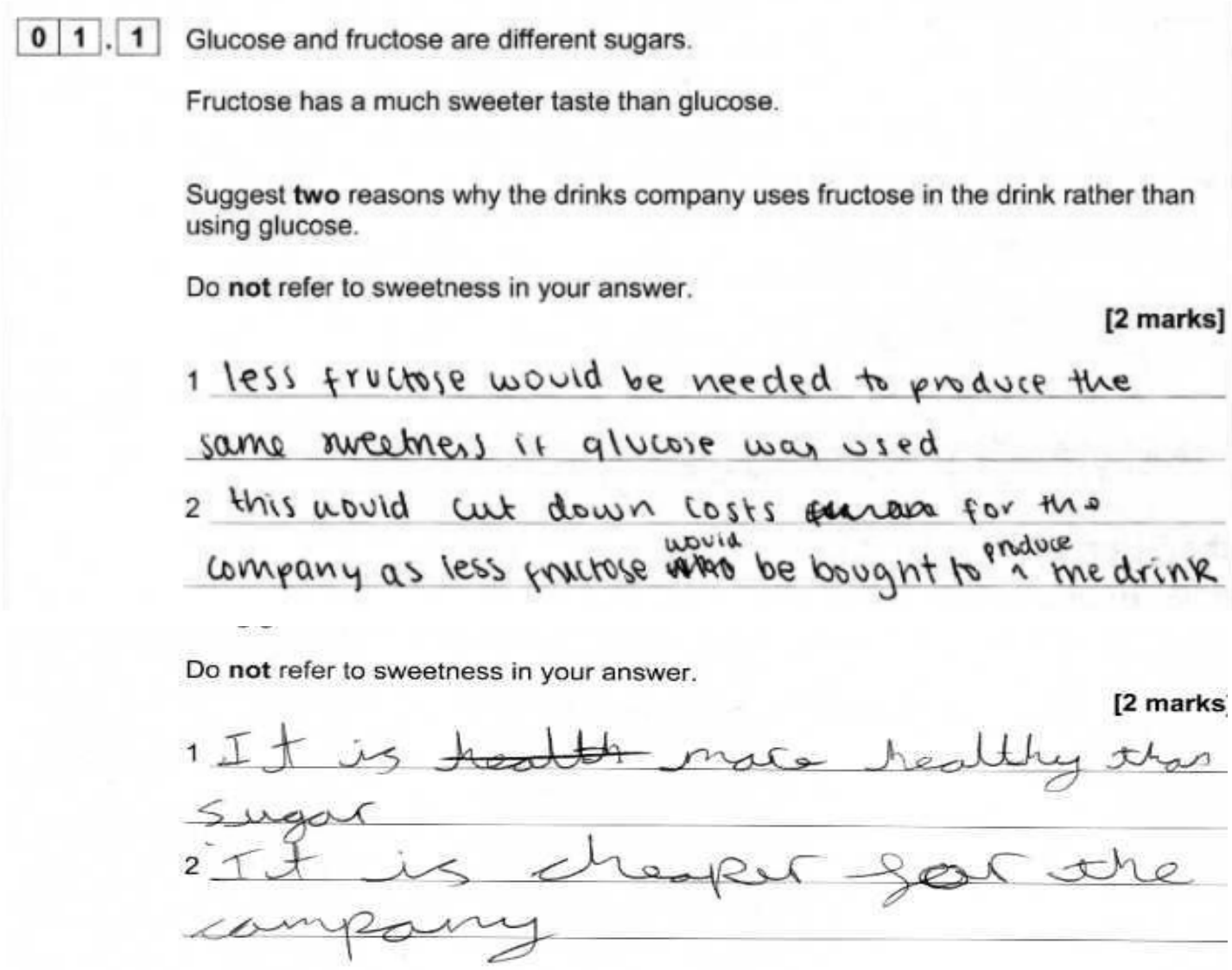
Suggest question: common

P1 Q6.1 (F) and Q1.1 (H)

Foundation examiners report

- Nearly all students attempted this question with 82% unable to gain any marks.
- Many made the link to fructose being cheaper but simply stated that ‘it’ or ‘the fructose’ would be cheaper or easier to get without stating why fructose would have been cheaper.
- It was very rare to see the suggestion that the consumer would pay less sugar tax



0 1 . 1 Glucose and fructose are different sugars.

Fructose has a much sweeter taste than glucose.

Suggest **two** reasons why the drinks company uses fructose in the drink rather than using glucose.

Do **not** refer to sweetness in your answer.

[2 marks]

1 less fructose would be needed to produce the same sweetness if glucose was used

2 this would cut down costs for the company as less fructose would be bought to produce the drink

Do **not** refer to sweetness in your answer.

[2 marks]

1 It is more healthy than sugar

2 It is cheaper for the company

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Suggested activity: suggest questions

What mark would you award for each response?

Student response for higher tier ‘suggest’ question response 41 and 42 (page 46)

Could you write one suggest question for a unit you are moving onto after half term?

How would you expect students to respond?

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Practical skills F + H

0 2 . 1 Why did the student do one experiment with the fan off?

[1 mark]

72% 0 marks	[F]

0 5 . 4 Explain why throwing a quadrat is **not** a random method to estimate population size.

Do **not** refer to safety in your answer.

[2 marks]

67% 0 marks	15% N/A	[F]
48% 0 marks	2% N/A	[H]

0 5 . 5 Describe **one** method the students could use to plan where the quadrat should be randomly placed each time.

[2 marks]

62% 0 marks	16% N/A	[F]
41% 2 marks	36% 0 + N/A mark	[H]

0 4 . 2 Describe the effect of increasing temperature on the **rate** of photosynthesis.

Use data from **Table 2**.

[3 marks]

37% 1 mark , 55 % 0 marks [H]

0 4 . 4 How could the student increase the accuracy of the results?

[1 mark]

Tick (✓) **one** box.

- Repeat the investigation, collecting the gas for 24 hours. ☐
- Repeat the investigation, measuring the volume of gas to 0.5 cm^3. ☐
- Repeat the investigation using a different aquatic plant. ☐
- Repeat the investigation, using temperatures of 5 °C and 50 °C. ☐

60% 0 marks [H]

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Suggested activity: sampling

What barriers are the for students accessing the two parts of this question (5.4 and 5.5?)

- Student responses 37, 38, 39 and 40 (page 39)
- Using the mark scheme and examiners' report for question 1.4 /6.4 (page 44)

How do you deliver this content in your classroom?

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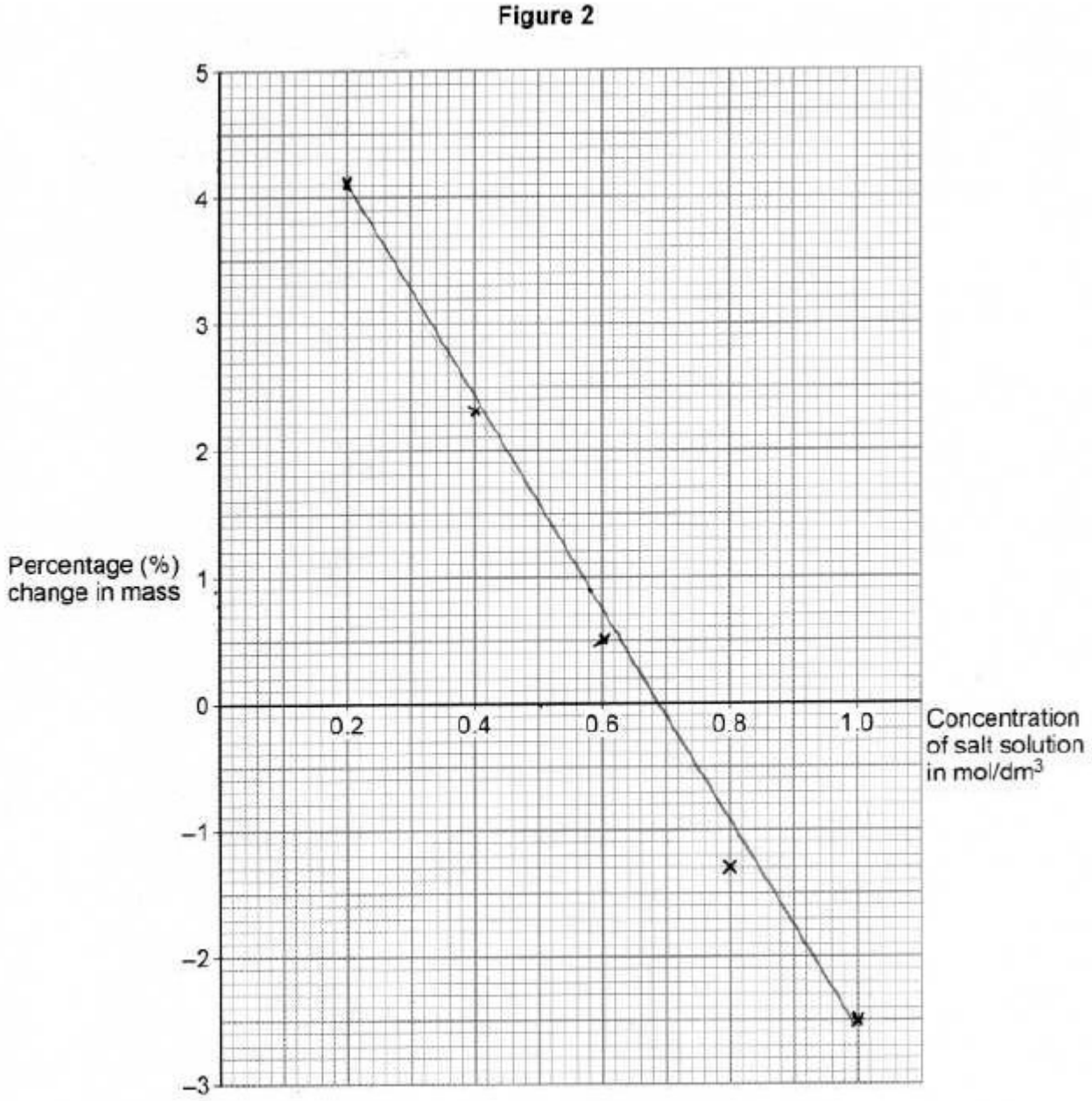
Practical skills F + H

New style Examiners report:

Question 7.4 – Standard Demand

- 10% of students did not attempt the graph;
- 60% of students gained 2 or 3 marks. Those that gained 2 marks were able to plot the correct points but not gain credit for the line of best fit.



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Resources/Support

Preparing for 2025:	Replacement for the Feedback meetings. We will reflect on specific outcomes of summer 24 by examining student responses to identify areas for improvement. We will explore teaching and learning activities that can be implemented in the classroom to aid preparation for 2025 **AQA | Professional development | Course finder**
Getting started:	AQA | Professional development | Course details e-learning introduction to AQA GCSE science qualifications. Suitable for ECT and new teachers
Transition resources:	AQA | AS and A-level | Biology | Planning resources

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Evaluation

We kindly ask you to scan the QR code and complete the questions

https://forms.office.com/e/ewVkMWi882

AQA Science Training (2024-25)

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Tel: 01483 477 756

Email: gcsescience@aqa.org.uk

alevelscience@aqa.org.uk

X: @Science_AQA

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Thank you