Earth & Environmental Science subject report

2025 cohort

January 2026

Queensland Government | QCAA Queensland Curriculum & Assessment Authority

260035

For all Queensland schools

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Introduction

The annual subject reports seek to identify strengths and opportunities for improvement of internal and external assessment processes for all Queensland schools. The 2025 subject report is the culmination of the partnership between schools and the QCAA. It addresses school-based assessment design and judgments, and student responses to external assessment for General and General (Extension) subjects. In acknowledging effective practices and areas for refinement, it offers schools timely and evidence-based guidance to further develop student learning and assessment experiences for 2026.

The report also includes information about:

- how schools have applied syllabus objectives in the design and marking of internal assessments
- how syllabus objectives have been applied in the marking of external assessments
- patterns of student achievement
- important considerations to note related to the revised 2025 syllabus (where relevant).

The report promotes continuous improvement by:

- identifying effective practices in the design and marking of valid, accessible and reliable assessments
- recommending where and how to enhance the design and marking of valid, accessible and reliable assessment instruments
- providing examples that demonstrate best practice.

Schools are encouraged to reflect on the effective practices identified for each assessment, consider the recommendations to strengthen assessment design and explore the authentic student work samples provided.

Audience and use

This report should be read by school leaders, subject leaders, and teachers to:

- inform teaching and learning and assessment preparation
- assist in assessment design practice
- assist in making assessment decisions
- help prepare students for internal and external assessment.

The report is publicly available to promote transparency and accountability. Students, parents, community members and other education stakeholders can use it to learn about the assessment practices and outcomes for senior subjects.

Subject highlights

20
schools offered Earth and Environmental Science

85.54%
of students completed 4 units

100%
of students received a C or higher

Subject data summary

Unit completion

The following data shows students who completed the General subject.

Note: All data is correct as at January 2026. Where percentages are provided, these are rounded to two decimal places and, therefore, may not add up to 100%.

Number of schools that offered Earth & Environmental Science: 20.

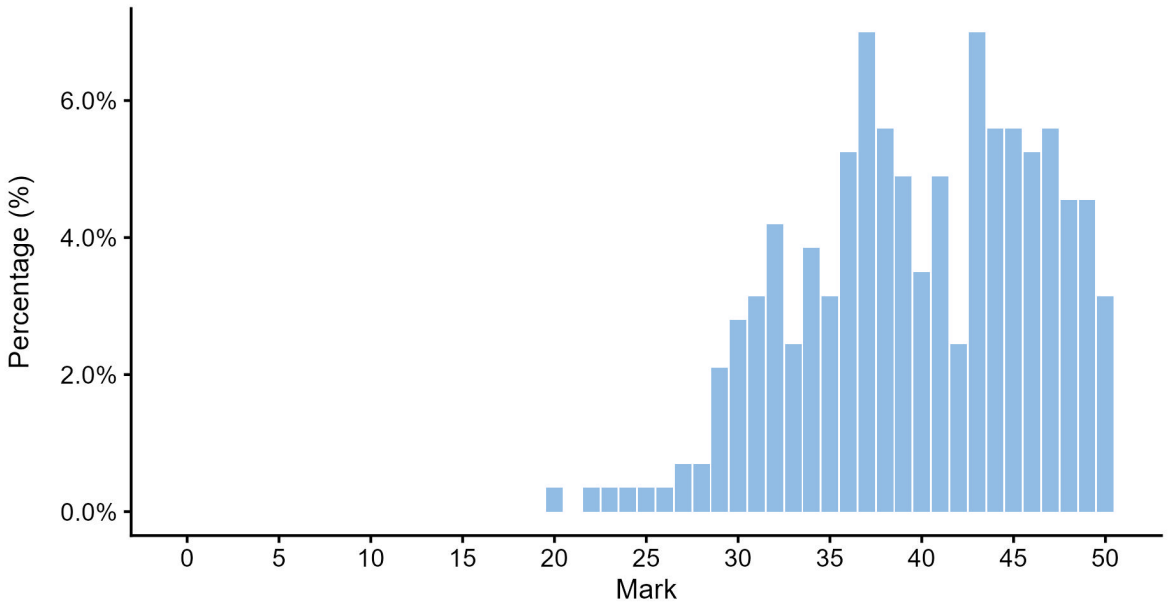
Completion of units	Unit 1	Unit 2	Units 3 and 4
Number of students completed	332	315	284

Units 1 and 2 results

Number of students	Unit 1	Unit 2
Satisfactory	313	300
Unsatisfactory	19	15

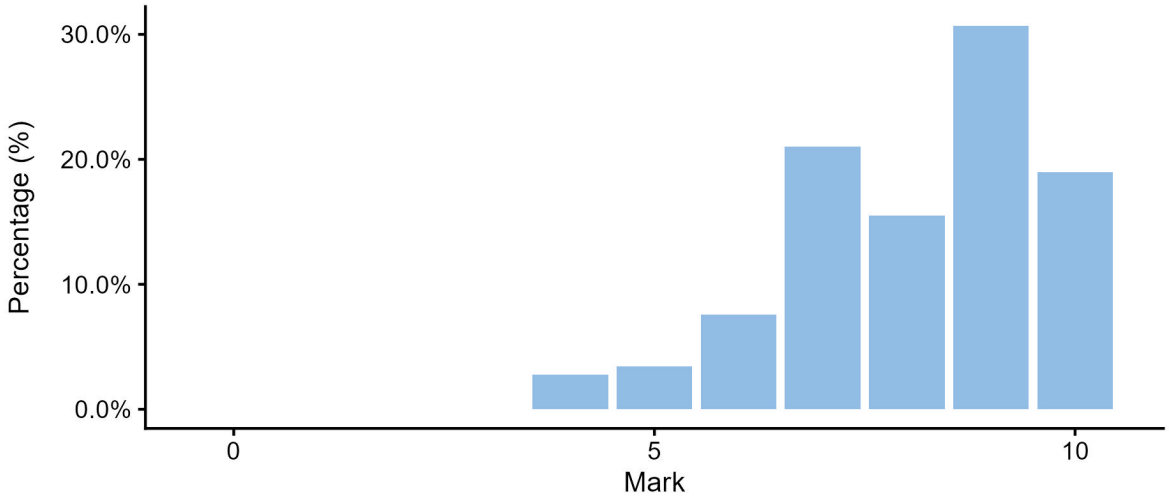
Units 3 and 4 internal assessment (IA) results

Total marks for IA

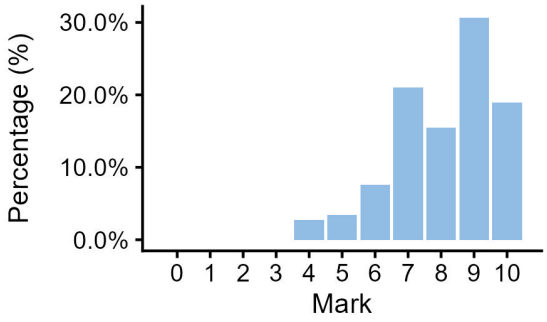


IA1 marks

IA1 total

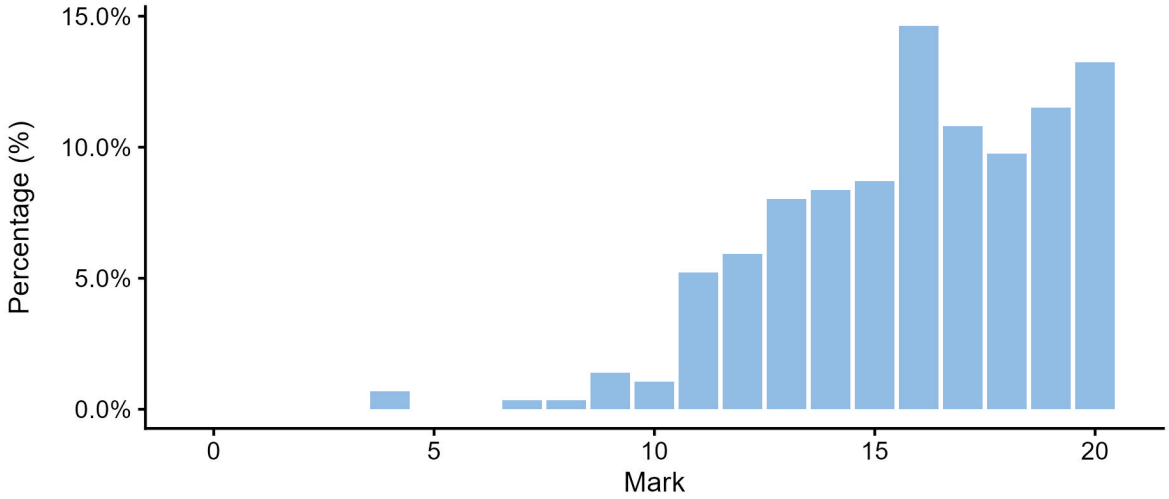


IA1 Criterion: Data test

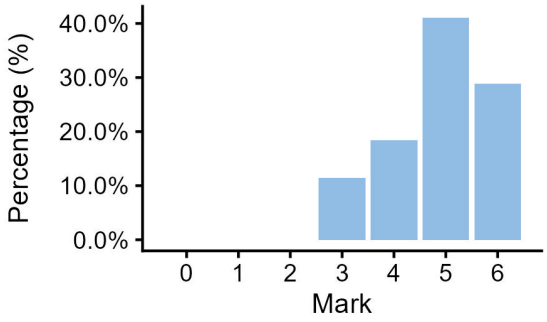


IA2 marks

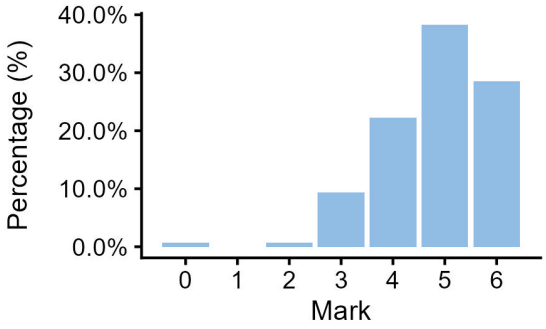
IA2 total



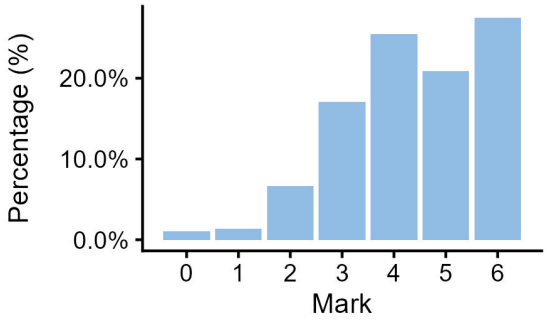
IA2 Criterion: Research and planning



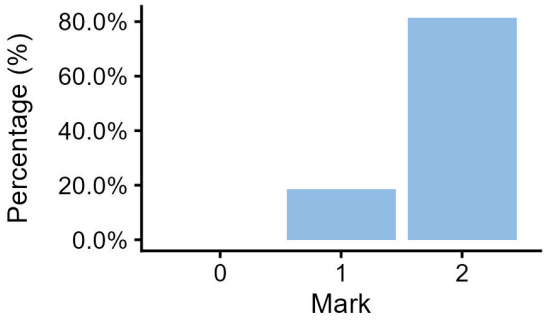
IA2 Criterion: Analysis of evidence



IA2 Criterion: Interpretation and evaluation

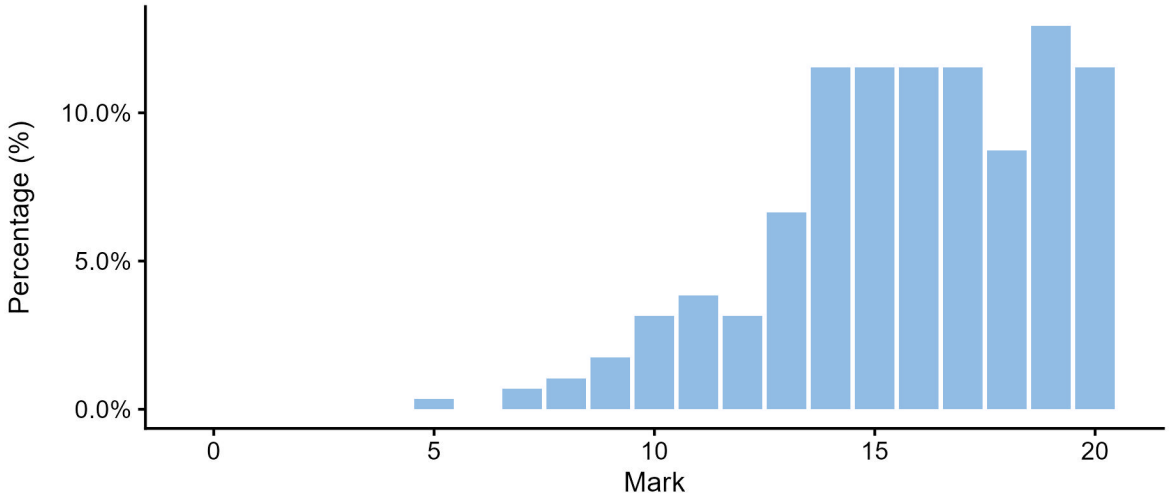


IA2 Criterion: Communication

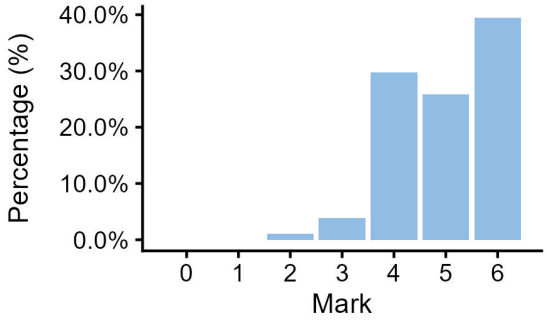


IA3 marks

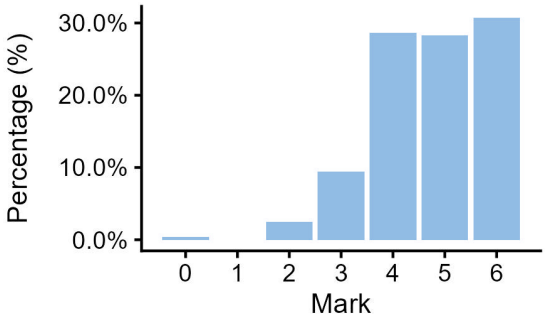
IA3 total



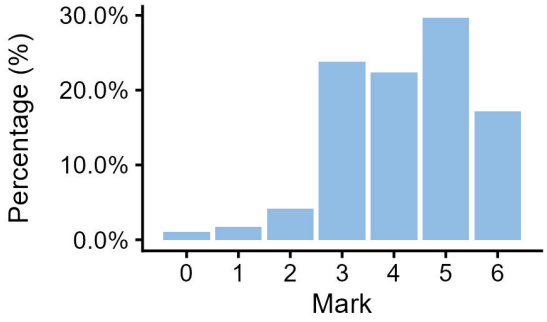
IA3 Criterion: Research and planning



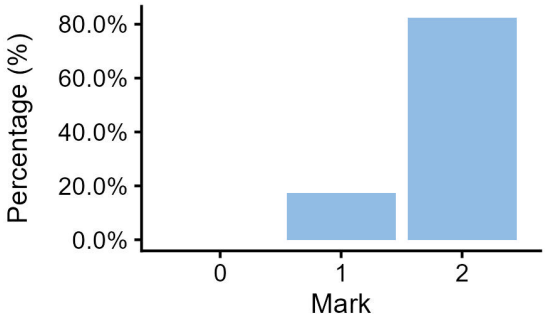
IA3 Criterion: Analysis and interpretation



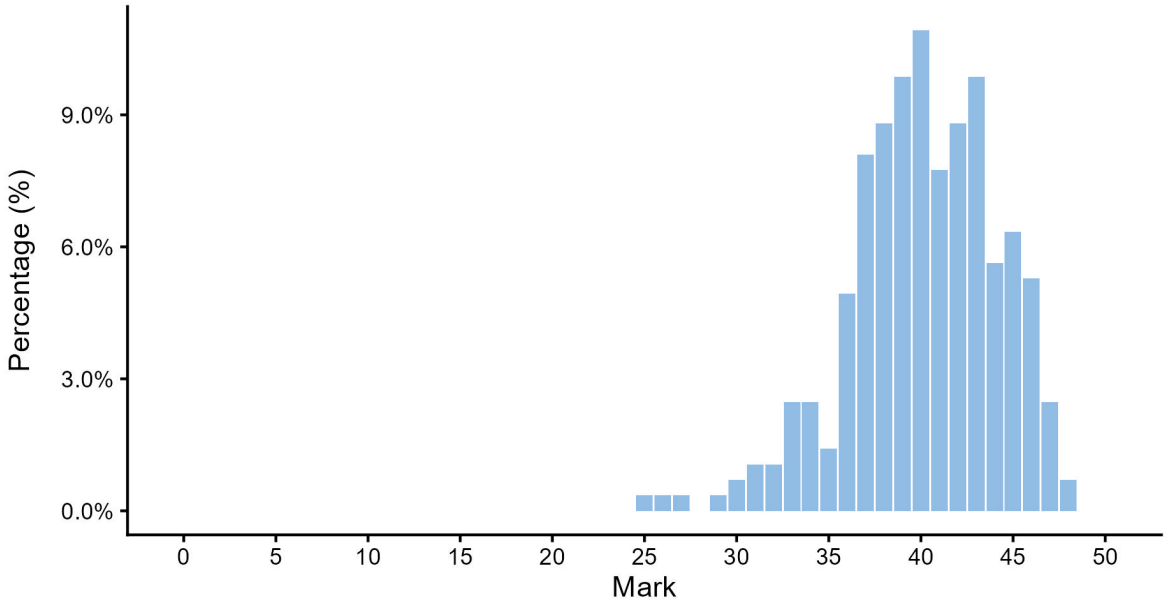
IA3 Criterion: Conclusion and evaluation



IA3 Criterion: Communication

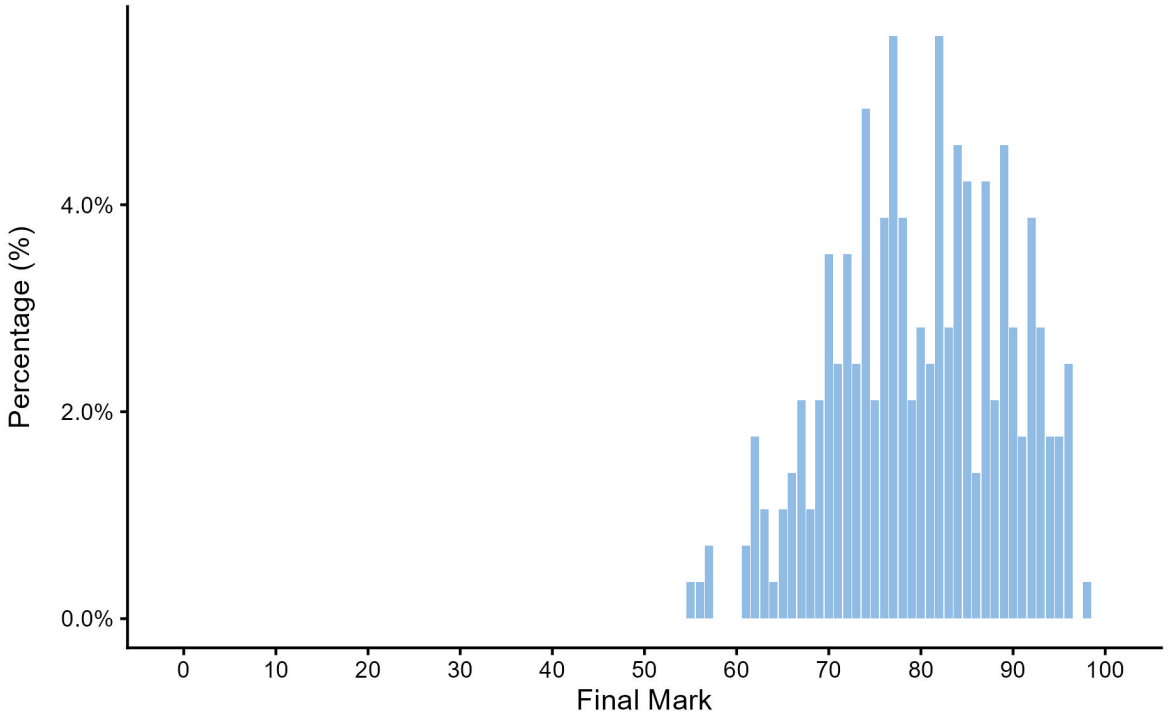


External assessment (EA) marks



Final subject results

Final marks for IA and EA



Grade boundaries

The grade boundaries are determined using a process to compare results on a numeric scale to the reporting standards.

Standard	A	B	C	D	E
Marks achieved	100–84	83–69	68–49	48–20	19–0

Distribution of standards

Number of students who achieved each standard across the state.

Standard	A	B	C	D	E
Number of students	110	143	31	0	0
Percentage of students	38.73	50.35	10.92	0.00	0.00

Internal assessment

This information and advice relate to the assessment design and assessment decisions for each IA in Units 3 and 4. These instruments have undergone quality assurance processes informed by the attributes of quality assessment (validity, accessibility and reliability).

Endorsement

Endorsement is the quality assurance process based on the attributes of validity and accessibility. These attributes are categorised further as priorities for assessment, and each priority can be further broken down into assessment practices.

Data presented in the Assessment design section identifies the reasons why IA instruments were not endorsed at Application 1, by the priority for assessment. An IA may have been identified more than once for a priority for assessment, e.g. it may have demonstrated a misalignment to both the subject matter and the assessment objective/s.

Refer to *QCE and QCIA policy and procedures handbook v7.0*, Section 9.5.

Percentage of instruments endorsed in Application 1

Internal assessment	IA1	IA2	IA3
Number of instruments	20	20	20
Percentage endorsed in Application 1	50	95	65

Confirmation

Confirmation is the quality assurance process based on the attribute of reliability. The QCAA uses provisional criterion marks determined by teachers to identify the samples of student responses that schools are required to submit for confirmation.

Confirmation samples are representative of the school's decisions about the quality of student work in relation to the instrument-specific marking guide (ISMG) and are used to make decisions about the cohort's results.

Refer to *QCE and QCIA policy and procedures handbook v7.0*, Section 9.6.

The following table includes the percentage agreement between the provisional marks and confirmed marks by assessment instrument. The Assessment decisions section for each assessment instrument identifies the agreement trends between provisional and confirmed marks by criterion.

Number of samples reviewed and percentage agreement

IA	Number of schools	Number of samples requested	Number of additional samples requested	Percentage agreement with provisional marks
1	19	128	0	100.00
2	19	129	0	78.95
3	19	128	0	68.42

Internal assessment 1 (IA1)

Data test (10%)

This assessment focuses on the application of a range of cognitions to multiple provided items.

Student responses must be completed individually, under supervised conditions, and in a set timeframe.

Assessment design

Validity

Validity in assessment design considers the extent to which an assessment item accurately measures what it is intended to measure and that the evidence of student learning collected from an assessment can be legitimately used for the purpose specified in the syllabus.

Reasons for non-endorsement by priority of assessment

Validity priority	Number of times priority was identified in decisions
Alignment	7
Authentication	0
Authenticity	0
Item construction	2
Scope and scale	1

Effective practices

Validity priorities were effectively demonstrated in assessment instruments that:

- provided two to four datasets
  - derived from Unit 3 subject matter, and from mandatory or suggested practicals
  - of a scope and scale to allow students to analyse them within 60 minutes
- used a single cognitive verb in each question to cue students about which cognition they were required to demonstrate.

Practices to strengthen

It is recommended that assessment instruments:

- align the cognitive verb in the question to the nature of the student response, e.g. questions categorised as Assessment objective 2 using the cognitive verb identify require students to identify unknown scientific quantities of features, rather than draw conclusions based on the analysis of datasets
- only include questions that require analysis of the datasets to develop a response, rather than describing or explaining subject-specific knowledge.

Accessibility

Accessibility in assessment design ensures that no student or group of students is disadvantaged in their capacity to access an assessment.

Reasons for non-endorsement by priority of assessment

Accessibility priority	Number of times priority was identified in decisions
Bias avoidance	1
Language	0
Layout	3
Transparency	1

Effective practices

Accessibility priorities were effectively demonstrated in assessment instruments that:

- included clearly labelled datasets, e.g. Figure 2: Copper recovery from an ore sample over time at different pH levels
- used an appropriate key to differentiate between sets of data shown on the same graph
- were free from jargon and unnecessarily long or complex preamble that would not enhance students' ability to address the questions or interpret the data.

Practices to strengthen

There were no significant issues identified for improvement.

Additional advice

When developing an assessment instrument for this IA, it is essential to consider the following key differences between the 2019 and 2025 syllabuses:

- Perusal time has changed to 5 minutes.
- The question specifications table has been revised (2025 syllabus, p. 46). Instruments should be written in line with the revised specifications so the focus of each question aligns to the relevant objective, e.g. the cognitive verb *compare* now aligns to Assessment objective 3 as it relates to the similarities and differences.

Assessment decisions

Reliability

Reliability refers to the extent to which the results of assessments are consistent, replicable and free from error.

Agreement trends between provisional and confirmed marks

Criterion number	Criterion name	Percentage agreement with provisional	Percentage less than provisional	Percentage greater than provisional	Percentage both less and greater than provisional
1	Data test	100.00	0.00	0.00	0.00

Effective practices

Reliable judgments were made using the ISMG for this IA when:

- the student response was clearly annotated (e.g. ticks and crosses) to indicate where evidence matched the marking scheme, including when awarding follow-through marks
- the marking guide was consistently applied across all assessment responses
- marks were awarded when student responses clearly aligned with the assigned cognition and when evidence used to support a response was clearly derived from the dataset.

Practices to strengthen

To further ensure reliable judgments are made using the ISMG for this IA, it is recommended that:

- uploaded marking schemes are accurate and clearly demonstrate an example of the expected response, a match of allocated marks to evidence in the response, and guidance on how other valid alternative student responses were marked.

Additional advice

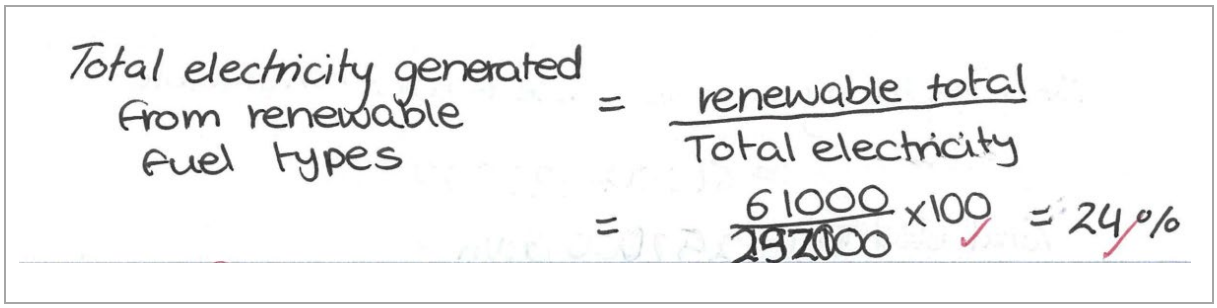
Schools should:

- update marking schemes prior to confirmation to ensure alternative student responses are accounted for and errors are corrected.

Samples

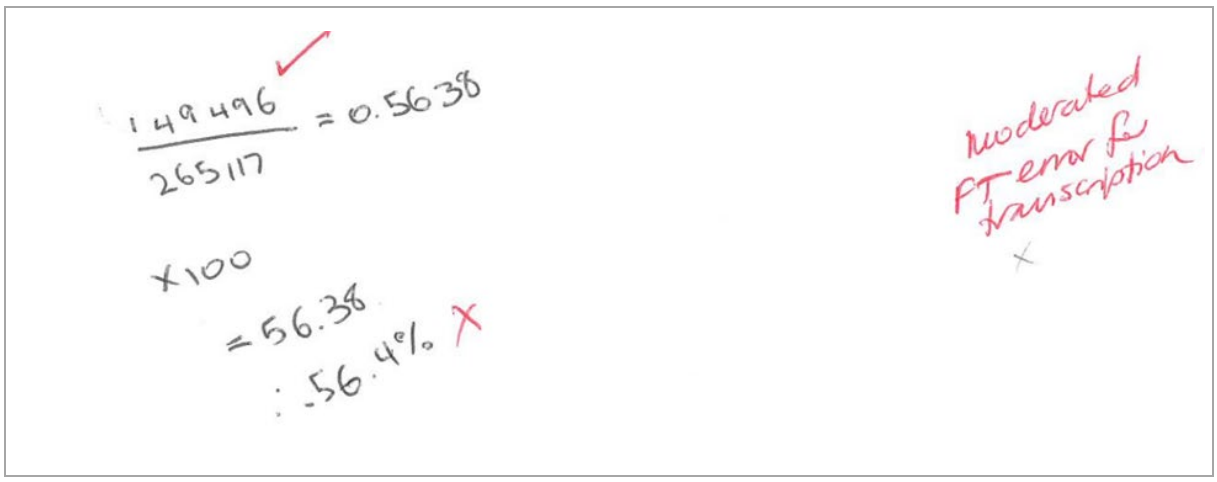
The following excerpt demonstrates the effective use of annotations on a student response to indicate where evidence matches the marking scheme. The marking scheme allocates 2 marks for this Assessment objective 2 question, which requires students to calculate the percentage of renewable energy for a given time period. The student response demonstrates clear reasoning and annotations clearly indicate where marks are awarded.

Note: The characteristic/s identified may not be the only time the characteristic/s occurred throughout a response.



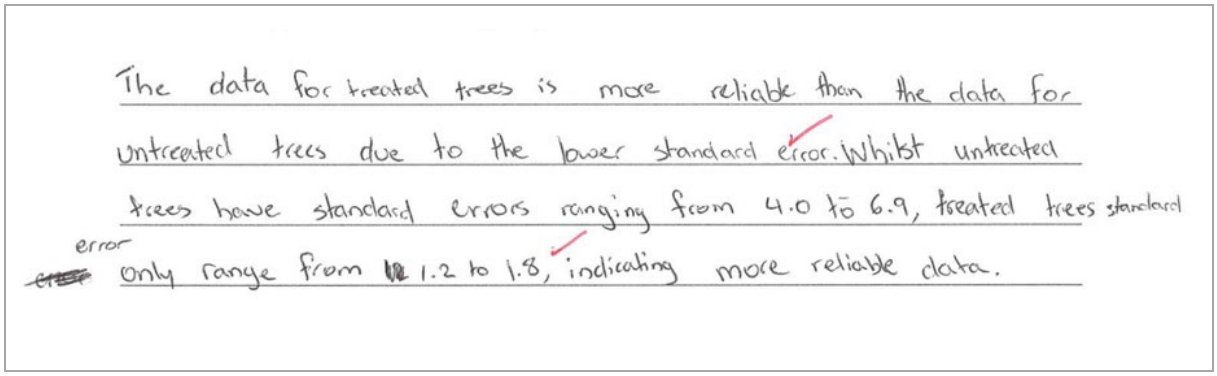
The following excerpt illustrates the use of annotations on a student response to indicate where evidence matches the marking scheme. The marking scheme allocates 2 marks for this Assessment objective 2 question, which requires students to calculate a percentage of non-renewable energy for a calendar year from a graph. The annotations clearly indicate where marks are awarded, where moderation has occurred, and the application of follow-through error.

Note: The characteristic/s identified may not be the only time the characteristic/s occurred throughout a response.



The following excerpt demonstrates the use of annotations on a student response to indicate where evidence matches the marking scheme. The marking scheme allocates 2 marks for this Assessment objective 3 question, which requires students to use evidence from the dataset to contrast the reliabiliity of measurements. The student response clearly aligns to the cognition and uses evidence from the datatset to support the response.

Note: The characteristic/s identified may not be the only time the characteristic/s occurred throughout a response.



The following excerpt demonstrates the effective use of annotations on a student response to indicate where evidence matches the marking scheme. The marking scheme allocates 2 marks for this Assessment objective 4 question, which asks students to interpret the data to predict the location with the highest likelihood of algal blooms. The annotation clearly denotes where the marks have been awarded for the prediction and where they are awarded for the evidence used to justify the prediction.

Note: The characteristic/s identified may not be the only time the characteristic/s occurred throughout a response.

Area C would have ~~algal~~ the highest likelihood of algal blooms because it had the highest amount of run-off at 38mm as well as the highest run-off percentage at 70%. Area C also had the most phosphores removed at 4.3 kg/ha. Figure 6 shows a relationship where as the amount of phosphorus increased, the amount of chloropgll-~~A~~ increased. Since a lot ~~most~~ of the phosphores ~~came from~~ was found at area C. It could be said that the phosphorus went over area C as run-off and deposited some there, leaving it as the highest chance of algal blooms.

justification

Internal assessment 2 (IA2)

Student experiment (20%)

This assessment requires students to research a question or hypothesis through collection, analysis and synthesis of primary data. A student experiment uses investigative practices to assess a range of cognitions in a particular context. Investigative practices include locating and using information beyond students' own knowledge and the data they have been given.

Research conventions must be adhered to. This assessment occurs over an extended and defined period of time. Students may use class time and their own time to develop a response.

Assessment design

Validity

Validity in assessment design considers the extent to which an assessment item accurately measures what it is intended to measure and that the evidence of student learning collected from an assessment can be legitimately used for the purpose specified in the syllabus.

Reasons for non-endorsement by priority of assessment

Validity priority	Number of times priority was identified in decisions
Alignment	1
Authentication	0
Authenticity	0
Item construction	0
Scope and scale	0

Effective practices

Validity priorities were effectively demonstrated in assessment instruments that:

- directed students to modify practicals linked to Unit 3 subject matter, e.g. comparing the efficiency of renewable energies, the effect of slope and topsoil on erosion or modelling turbidity management strategies
- included the complete set of task specifications from the syllabus (2019 syllabus section 4.5.2; 2025 syllabus, p. 49)
- provided scaffolding in a logical sequence that would not limit students' ability to complete the task.

Practices to strengthen

There were no significant issues identified for improvement.

Accessibility

Accessibility in assessment design ensures that no student or group of students is disadvantaged in their capacity to access an assessment.

Reasons for non-endorsement by priority of assessment

Accessibility priority	Number of times priority was identified in decisions
Bias avoidance	0
Language	0
Layout	0
Transparency	0

Effective practices

Accessibility priorities were effectively demonstrated in assessment instruments that:

- provided clear instructions to students, that aligned to the task specifications in the syllabus
- were free from unnecessary jargon and grammatical or spelling errors.

Practices to strengthen

There were no significant issues identified for improvement.

Additional advice

When developing an assessment instrument for this IA, it is essential to consider the following key differences between the 2019 and 2025 syllabuses:

- The task specifications language has been revised to align with the mid performance-level descriptor in the ISMG, i.e. what students need to do in order to complete this task successfully.

Assessment decisions

Reliability

Reliability refers to the extent to which the results of assessments are consistent, replicable and free from error.

Agreement trends between provisional and confirmed marks

Criterion number	Criterion name	Percentage agreement with provisional	Percentage less than provisional	Percentage greater than provisional	Percentage both less and greater than provisional
1	Research and planning	94.74	5.26	0.00	0.00
2	Analysis of evidence	84.21	15.79	0.00	0.00
3	Interpretation and evaluation	100.00	0.00	0.00	0.00
4	Communication	100.00	0.00	0.00	0.00

Effective practices

Reliable judgments were made using the ISMG for this IA when:

- for the Research and planning criterion
  - management of risks were *considered* when they included both mitigation of the risk and the management of the effects of each risk identified
  - *justified* modifications clearly outlined how the original experiment was modified, and the student response addressed how these modifications to improve validity and reliability
- for the Interpretation and evaluation criterion
  - improvements and extensions were found to be *logically derived* when students made explicit links between the suggested improvements and extensions and the data collected and analysed in the response.

Practices to strengthen

To further ensure reliable judgments are made using the ISMG for this IA, it is recommended that:

- for the Analysing criterion
  - *correct* and *relevant* processing of data includes the accurate application of statistical analyses, e.g. R^2 should not be applied to mean values or categorical data and should only be used on raw continuous data.

Additional advice

When making judgments for this IA for the 2025 syllabus, it is essential to consider the following key differences between the 2019 and 2025 syllabuses:

- The alignment between criteria and characteristics of evidence within the student response has changed; however, teachers' judgments when determining the appropriate performance level for each characteristic remain the same.

Schools should also:

- ensure ISMGs are downloaded from the Endorsement application (app) and not modified in any way
- ensure response length is managed in line with the *QCE and QCIA policy and procedures handbook v7.0*, Section 8.2.6. When a response exceeds the word limit, ensure the student work is annotated to indicate that processes have been followed by the school to address response length.

Samples

The following excerpts demonstrate justified modifications to the original experimental methodology by explaining how each modification would impact the validity and reliability of the data collected.

Note: The characteristic/s identified may not be the only time the characteristic/s occurred throughout a response.

Excerpt 1

The original experiment measured the volume of water remaining after flowing the water through a bottle with different materials. Modifications were made to this original experiment to provide relevant data to the research question.

Table 1: Modifications to the original experiment

Modification	Justification
Clay, gravel and leaf litter were tested in addition to sand and dirt; grass and woodchips were removed.	This modification provided relevant data as these materials are more commonly found in riverbeds whereas woodchips and grass are not usually found in water body beds.
The turbidity was measured for each trial in addition to volume.	This enabled the collection of relevant data as the experiment was extended to research how turbidity would affect the clarity of the water.
Three trials were conducted instead of one.	Three trials allowed sufficient data to be collected to deduce outliers using the IQR rule and reliability through standard error calculations.

R&P1b - justified

R&P2b sufficient & relevant

Excerpt 2

Modifications

Modification	Justification
Redirection: Investigating the angle of incidence of incoming wind and the power output.	Allow for greater reach into understanding the design choices for turbines.
Refinement: investigating 5 angles	Will extend the understanding of the relationship between the angle due to the unsymmetrical nature of turbine blades.
Refinement: 5 trials for each angle	By performing 5 trials each angle the average can be calculated allowing for a value closer to the theoretical. It also allows the calculation of uncertainty allowing assessment of the accuracy of the values, therefore providing a trustworthy conclusion.

The following excerpt demonstrates logically derived improvements and extensions. The response explicitly links improvements and extensions to the analysis of experimental data. The response also outlines how improvements and extensions address limitations in the data.

Note: The characteristic/s identified may not be the only time the characteristic/s occurred throughout a response.

1. Using a digital turbidity measuring device with a higher range than 400 provides exact values as the analogue turbidity instrument had a logarithmic scale, the determined values are not exact and were estimated based on distance between markings on the measuring tube. A higher range would provide more reliable data as *Figure 4* demonstrates most materials exceeded the 400 NTU maximum.
2. The experiment could be improved by collecting more trials. 3 trials does not provide sufficient information to effectively determine outliers within the data using the IQR rule, demonstrated by standard error calculations in *Table 5*. Completing at least 8 trials will provide more reliable data to determine quartiles and outliers.
3. The experiment could be extended to include more materials such as different types of loam (sandy loam, silty clay loam, etc), silt, and chalky soils to conclude a more valid conclusion. Utilising materials where an exact particle size is known would provide a more reliable scatterplot, such as *Figure 4*.

I&E2b - improvement logically derived

I&E2b - improvement logically derived.

I&E2b - extension

Internal assessment 3 (IA3)

Research investigation (20%)

This assessment requires students to evaluate a claim. They will do this by researching, analysing and interpreting secondary evidence from scientific texts to form the basis for a justified conclusion about the claim. A research investigation uses research practices to assess a range of cognitions in a particular context. Research practices include locating and using information beyond students' own knowledge and the data they have been given.

Research conventions must be adhered to. This assessment occurs over an extended and defined period of time. Students may use class time and their own time to develop a response.

Assessment design

Validity

Validity in assessment design considers the extent to which an assessment item accurately measures what it is intended to measure and that the evidence of student learning collected from an assessment can be legitimately used for the purpose specified in the syllabus.

Reasons for non-endorsement by priority of assessment

Validity priority	Number of times priority was identified in decisions
Alignment	0
Authentication	2
Authenticity	0
Item construction	0
Scope and scale	6

Effective practices

Validity priorities were effectively demonstrated in assessment instruments that:

- included claims that would allow students to develop a research question within the scope of Unit 4 subject matter, e.g. the relationship between fossil fuels and effects of climate change, the ability to predict natural disasters such as volcanic eruptions or tsunamis
- included appropriate strategies for authenticating student work
- included the complete set of task specifications from the syllabus (2019 syllabus section 5.5.1; 2025 syllabus, p. 53).

Practices to strengthen

There were no significant issues identified for improvement.

Accessibility

Accessibility in assessment design ensures that no student or group of students is disadvantaged in their capacity to access an assessment.

Reasons for non-endorsement by priority of assessment

Accessibility priority	Number of times priority was identified in decisions
Bias avoidance	0
Language	0
Layout	0
Transparency	0

Effective practices

Accessibility priorities were effectively demonstrated in assessment instruments that:

- provided clear instructions to students, that aligned to the task specifications in the syllabus
- were free from unnecessary jargon and grammatical or spelling errors.

Practices to strengthen

There were no significant issues identified for improvement.

Additional advice

When developing an assessment instrument for this IA, it is essential to consider the following key differences between the 2019 and 2025 syllabuses:

- The task specifications language has been revised to align with the mid performance-level descriptors in the ISMG, i.e. what students need to do in order to complete this task successfully.
- Examples of scientifically credible sources have been provided in the specifications to direct students to a wider variety of student-accessible sources.
- Group elements have been added to several Forming and Finding criterion activities of the task.

Assessment decisions

Reliability

Reliability refers to the extent to which the results of assessments are consistent, replicable and free from error.

Agreement trends between provisional and confirmed marks

Criterion number	Criterion name	Percentage agreement with provisional	Percentage less than provisional	Percentage greater than provisional	Percentage both less and greater than provisional
1	Research and planning	89.47	10.53	0.00	0.00
2	Analysis and interpretation	84.21	15.79	0.00	0.00
3	Conclusion and evaluation	84.21	15.79	0.00	0.00

Criterion number	Criterion name	Percentage agreement with provisional	Percentage less than provisional	Percentage greater than provisional	Percentage both less and greater than provisional
4	Communication	100.00	0.00	0.00	0.00

Effective practices

Reliable judgments were made using the ISMG for this IA when:

- for the Analysis and interpretation criterion
  - *sufficient and relevant* evidence directly related to the research question and was from credible academic sources
- for the Communication criterion
  - genre conventions *appropriately* used descriptive figure and table legends.

Practices to strengthen

To further ensure reliable judgments are made using the ISMG for this IA, it is recommended that:

- for the Evaluating criterion
  - *considered* improvements and extensions address the how they may overcome the limitations identified in the investigation
  - *extrapolation of credible findings* to the claim is demonstrated through discussion of how valid findings from the investigation provide a response to the original claim.

Additional advice

It is essential to consider the following key differences between the 2019 and 2025 syllabuses:

- The alignment between criteria and characteristics of evidence within the student response has changed; however, teachers' judgments when determining the appropriate performance level for each characteristic remain the same.

Schools should also:

- annotate student work to show where authentication strategies have been applied when plagiarism is suspected.

Samples

The following excerpt illustrates the use of descriptive figure and table legends in line with *appropriate* use of genre conventions. The student response addresses a claim relating to hazard severity and plate tectonics, and a research question relating to subduction and earthquake severity. In the legend, the student response clearly describes the features of the figure, and how the figure provides evidence to address elements of their research question.

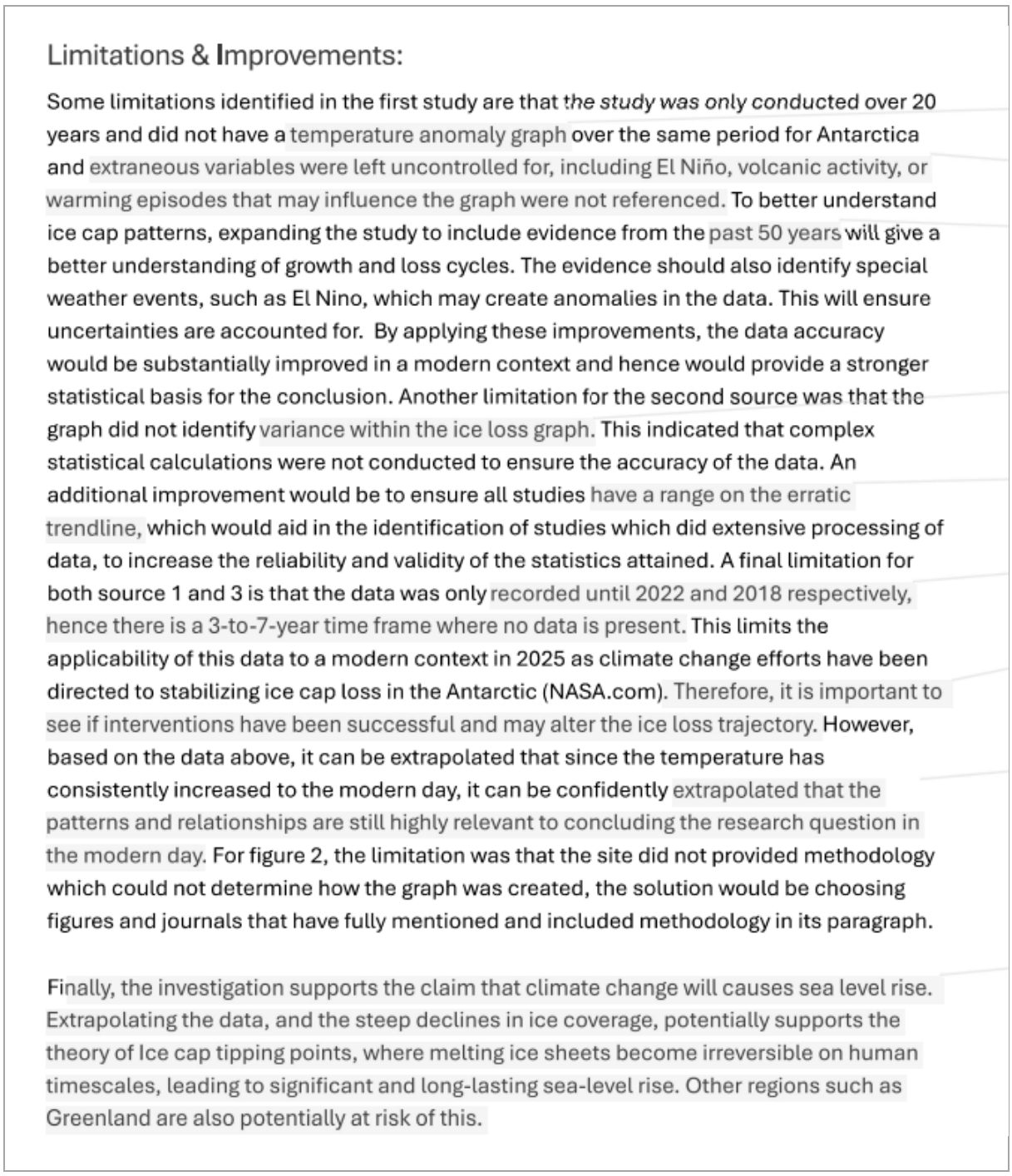
Note: The characteristic/s identified may not be the only time the characteristic/s occurred throughout a response.

Figure 1: A world map displaying the positioning of subduction zones and their likelihood of producing an earthquake with a magnitude of 8.5 *(Staff, 2014)*.

Figure 1 displays the positioning of subduction zones, showing their likelihood of producing earthquakes with a magnitude of 8.5, represented through the key where red is the highest chance. The map reveals a strong positive trend, indicating that subduction zones, on average, produce earthquakes with high magnitudes, however suggesting it may only be with particular geometric characteristics and states of stress. This becomes evident where between the Nazca plate and South American plate, the subduction segment ranking is a 6, showing there are potential or current earthquakes which produce magnitudes of 8.5 or higher. In comparison, between the Philippine plate and Pacific plate, there is evidence of an anomaly with the subduction segment ranking where it shows it sits between 2-4. This is a result as because oceanic plates are relatively cold with respect to surrounding mantle in deeper subduction zone environments, faults with the core of these slabs can remain brittle, generating earthquakes to only depths of 700km, hence why it would be lower *(USGS, 2024)*. The relationship between subduction zones and the magnitude of earthquakes can be supported where at subduction zones earthquakes have magnitudes of 5 or above. Showing that earthquakes with higher magnitudes are a result of their proximity to subduction zones.

The following excerpt demonstrates *considered* improvements that are *relevant* to the claim. The response provides a clear link between the limitations identified and the proposed improvements. The response also indicates how the proposed improvements address these limitations.

Note: The characteristic/s identified may not be the only time the characteristic/s occurred throughout a response.



Limitations & Improvements:

Some limitations identified in the first study are that the study was only conducted over 20 years and did not have a temperature anomaly graph over the same period for Antarctica and extraneous variables were left uncontrolled for, including El Niño, volcanic activity, or warming episodes that may influence the graph were not referenced. To better understand ice cap patterns, expanding the study to include evidence from the past 50 years will give a better understanding of growth and loss cycles. The evidence should also identify special weather events, such as El Nino, which may create anomalies in the data. This will ensure uncertainties are accounted for. By applying these improvements, the data accuracy would be substantially improved in a modern context and hence would provide a stronger statistical basis for the conclusion. Another limitation for the second source was that the graph did not identify variance within the ice loss graph. This indicated that complex statistical calculations were not conducted to ensure the accuracy of the data. An additional improvement would be to ensure all studies have a range on the erratic trendline, which would aid in the identification of studies which did extensive processing of data, to increase the reliability and validity of the statistics attained. A final limitation for both source 1 and 3 is that the data was only recorded until 2022 and 2018 respectively, hence there is a 3-to-7-year time frame where no data is present. This limits the applicability of this data to a modern context in 2025 as climate change efforts have been directed to stabilizing ice cap loss in the Antarctic (NASA.com). Therefore, it is important to see if interventions have been successful and may alter the ice loss trajectory. However, based on the data above, it can be extrapolated that since the temperature has consistently increased to the modern day, it can be confidently extrapolated that the patterns and relationships are still highly relevant to concluding the research question in the modern day. For figure 2, the limitation was that the site did not provided methodology which could not determine how the graph was created, the solution would be choosing figures and journals that have fully mentioned and included methodology in its paragraph.

Finally, the investigation supports the claim that climate change will causes sea level rise. Extrapolating the data, and the steep declines in ice coverage, potentially supports the theory of Ice cap tipping points, where melting ice sheets become irreversible on human timescales, leading to significant and long-lasting sea-level rise. Other regions such as Greenland are also potentially at risk of this.

The following excerpts demonstrate *extrapolation of credible findings* of the research back to the claim.

- Excerpt 1 extrapolates back to the broader claim by using *justified* scientific arguments from the evidence collected, to infer information about the impact on broader species distribution.
- Excerpt 2 demonstrates application of the findings of the investigation to the broader claim.

Note: The characteristic/s identified may not be the only time the characteristic/s occurred throughout a response.

Excerpt 1

Conclusion

In conclusion, the findings supported the claim that ocean acidification, driven by increased carbon dioxide levels, is having a significant impact the Sydney Rock Oyster. As this species is a key ecosystem engineer (McAfee, 2017), this would likely affect broader marine diversity. In addition, other shell building organisms would likely be directly affected in the same way by decreased pH.

The data demonstrated that elevated pCO_2 levels and decreasing pH levels significantly impacted the growth, survival and reproduction of The Sydney rock oyster, leading to slower growth, decreased survival rates and decreased reproductive success at predicted 2100 levels (Bennett, 2024). Critically, selectively bred lines were shown to be less impacted by elevated pCO_2 levels.

Extrapolating these findings, it was reasonable to infer that continued development of selectively bred lines of The Sydney Rock Oyster will be increasingly necessary to ensure the protection of marine ecosystems and aquacultural industries in Australia, especially in response to climate change. The combined impact of increasing ocean acidification and rising sea temperatures may further intensify the vulnerably of oyster populations making strategies like selective breeding critical to the survival of marine biodiversity and ecosystems.

Excerpt 2

4.2 Extrapolation

Based on current modelling, tsunami detection systems are expected to continue improving as GNSS integration and AI-enhanced forecasting tools become standard. Projections from Figure 1 suggest that by 2030, source uncertainty could be reduced to near zero within 10-15 minutes of a seismic event. This would significantly enhance response time and forecasting precision, particularly for densely populated Asia-Pacific coastlines. Such improvements would reduce false alarms, increase public trust in alerts, and enable more targeted evacuations.

Extrapolating back to the claim, these advancements confirm that tsunami early warning systems save lives, but only when supported by consistent data transmission, algorithmic accuracy, and reliable communication to at-risk regions.

External assessment

External assessment (EA) is developed and marked by the QCAA. The external assessment for a subject is common to all schools and administered under the same conditions, at the same time, on the same day. The external assessment papers and the EAMG are published in the year after they are administered.

Examination (50%)

Assessment design

The assessment instrument was designed using the specifications, conditions and assessment objectives described in the summative external assessment section of the syllabus.
The examination consisted of two papers:

- Paper 1, Section 1 consisted of multiple choice questions (20 marks)
- Paper 1, Section 2 consisted of short response questions (29 marks)
- Paper 2, Section 1 consisted of short response questions (40 marks)
- Paper 2, Section 2 consisted of an extended response question (13 marks).

Assessment decisions

Assessment decisions are made by markers by matching student responses to the external assessment marking guide (EAMG).

Multiple choice question responses

There were 20 multiple choice questions in Paper 1.

Percentage of student responses to each option

Note:

- The correct answer is **bold** and in a blue shaded table cell.
- Some students may not have responded to every question.

Question	A	B	C	D
1	8.48	7.42	**12.01**	71.38
2	**55.12**	4.24	14.49	25.80
3	**73.85**	20.85	3.18	1.77
4	1.41	**91.52**	2.12	4.59
5	**57.24**	10.95	15.55	14.84
6	1.41	2.12	**95.41**	0.71
7	6.71	5.65	**75.97**	11.31
8	15.55	**32.16**	28.27	23.32
9	**32.86**	22.26	15.90	28.27
10	0.00	56.89	1.41	**41.34**

Question	A	B	C	D
11	3.53	**58.30**	34.28	3.18
12	6.71	3.89	**83.04**	6.01
13	10.25	6.01	11.66	**71.38**
14	**92.93**	2.83	2.47	1.06
15	2.83	7.07	**79.15**	9.89
16	9.54	**55.12**	7.77	27.21
17	7.77	**71.38**	9.54	10.95
18	**44.17**	2.83	19.08	33.57
19	7.77	**62.19**	26.15	3.53
20	31.10	15.19	15.19	**37.81**

Effective practices

Overall, students responded well when they:

- predicted and justified viable resource deposits using a gravity anomaly map
- contrasted the characteristics of bauxite and gold
- calculated the mean size of sediment samples
- were required to provide a prediction and justification using evidence from datasets or valid reasoning
- used the correct language to show the similarities, differences and significances, when asked to compare, e.g. ‘however’, ‘more than’, ‘less than’, ‘same as’, ‘compared to’.

Practices to strengthen

When preparing students for external assessment, it is recommended that:

- students reference current remote sensing techniques and their benefits
- students review the meaning of ‘coefficients’ and how to calculate them
- teachers provide advice on how to unpack an external examination question before developing a response, e.g. look for the key words ‘total solar energy for New South Wales and Queensland’ to calculate the total proportion of electricity generated and infer a reason for the difference
- students read the variables in *compare* questions for clarity; is the question asking ‘compare with’ to ‘without’ or is it comparing two different variables, e.g. ‘flocculation versus baffles’ or ‘with baffles versus without baffles’.

Additional advice

When preparing for external assessment, it is essential to consider the following key differences between the 2019 and 2025 syllabuses:

- the extended response section has been removed.

Samples

Short response

Question 21b) from Paper 1

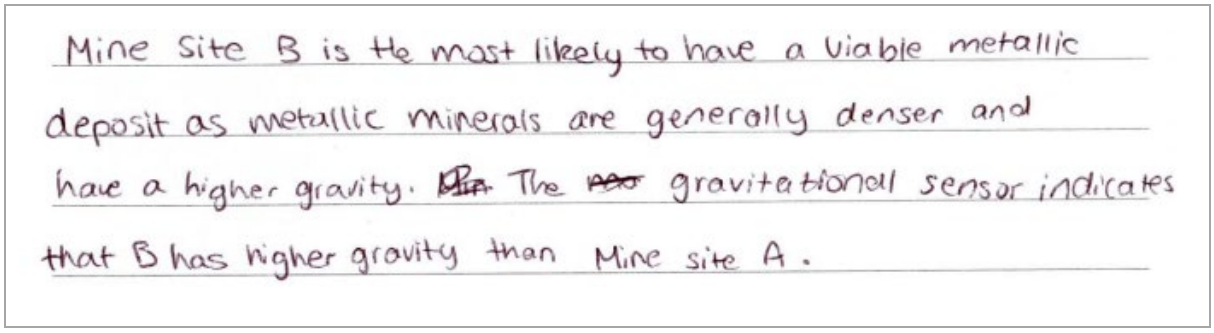
This question required students to predict which mine site is most likely to have a viable metallic resource deposit and justify their response using evidence from the data.

Effective student responses:

- predicted and identified the correct site
- justified the prediction using stimulus data
- predicted where the viable resource deposits occurred
- justified their prediction using data from the dataset.

This excerpt has been included:

- to demonstrate a typical student response that identifies the correct site and justifies the prediction with the correct stimulus data.



Questions 22c) and 22d) from Paper 1

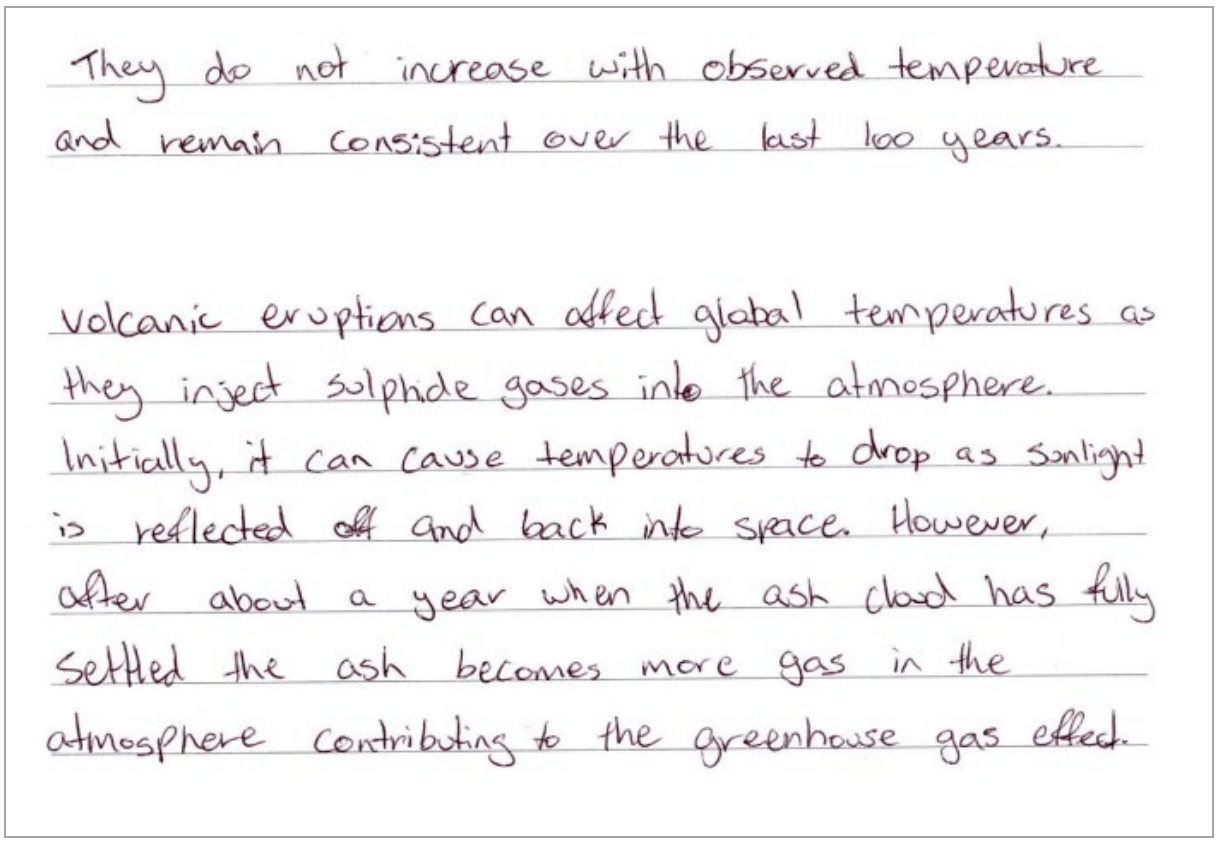
Question 22c) required students to describe why natural drivers cannot explain the observed temperature changes in the last 100 years. Question 22d) required students to identify a natural driver and explain two ways it could potentially influence global temperatures.

Effective student responses:

- described the long-term influence of natural drivers
- explained the influence of the identified natural driver.

This excerpt has been included:

- to demonstrate
  - a valid response that explicitly describes how natural drivers change over extended timeframes
  - a valid response that describes why natural drivers cannot explain the temperature changes and does so without referring to the long timeframe of cycles
  - a high-level response that explains the influence of volcanic eruptions as the identified natural driver.


They do not increase with observed temperature and remain consistent over the last 100 years.

Volcanic eruptions can affect global temperatures as they inject sulphide gases into the atmosphere. Initially, it can cause temperatures to drop as sunlight is reflected off and back into space. However, after about a year when the ash cloud has fully settled the ash becomes more gas in the atmosphere contributing to the greenhouse gas effect.

Question 24a) from Paper 1

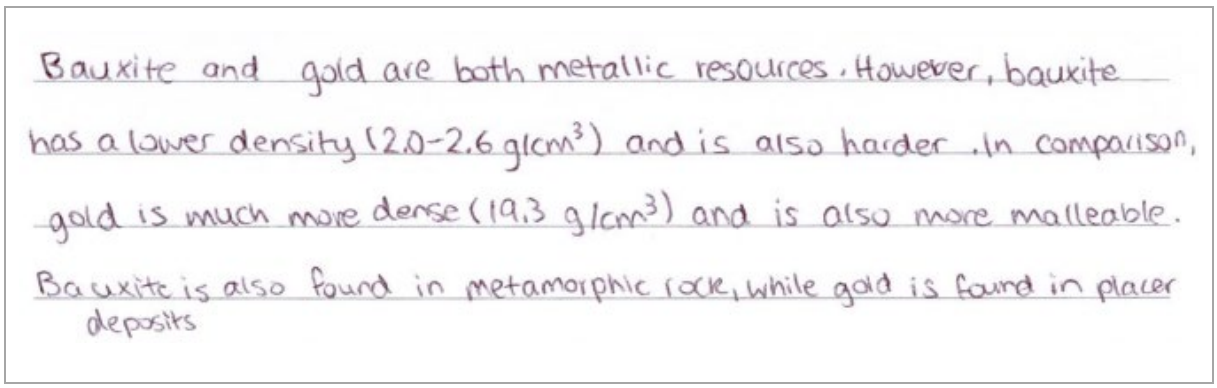
This question required students to contrast the characteristics of bauxite and gold.

Effective student responses:

- contrasted the numerical density data
- contrasted using place of origin and physical property (‘hard’ versus ‘malleable’).

This excerpt has been included:

- to demonstrate a clear understanding of the differences between bauxite and gold.


Bauxite and gold are both metallic resources. However, bauxite has a lower density (2.0–2.6 g/cm^3) and is also harder. In comparison, gold is much more dense (19.3 g/cm^3) and is also more malleable. Bauxite is also found in metamorphic rock, while gold is found in placer deposits

Question 1a) from Paper 2

This question required students to use data to contrast the atmospheric carbon dioxide concentrations before and after the Industrial Revolution.

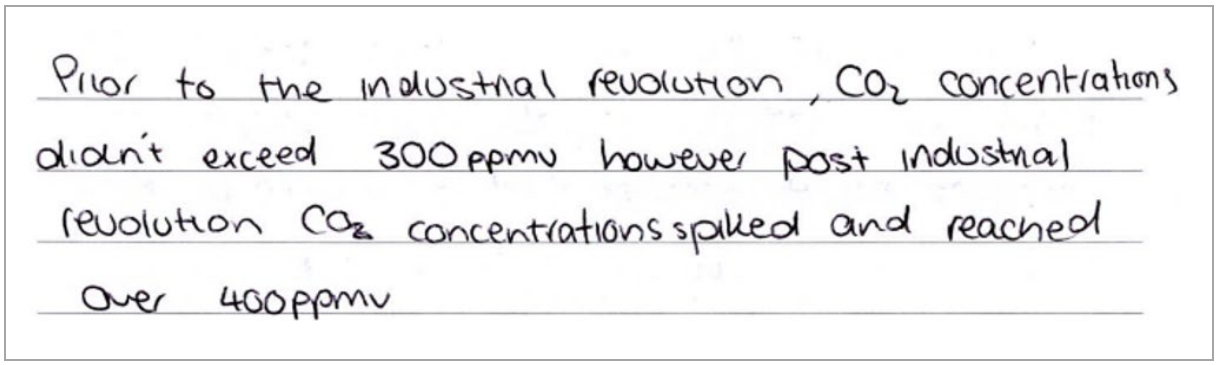
Effective student responses:

- identified the level concentration level before and after the Industrial Revolution

- used numerical data from the dataset to support the changes.

This excerpt has been included:

- to demonstrate a typical response that identifies the features before and after the Industrial Revolution using a valid description of the change in carbon dioxide concentration.


Prior to the industrial revolution, CO_2 concentrations didn't exceed 300 ppmv however post industrial revolution CO_2 concentrations spiked and reached over 400ppmv

Question 5a) from Paper 2

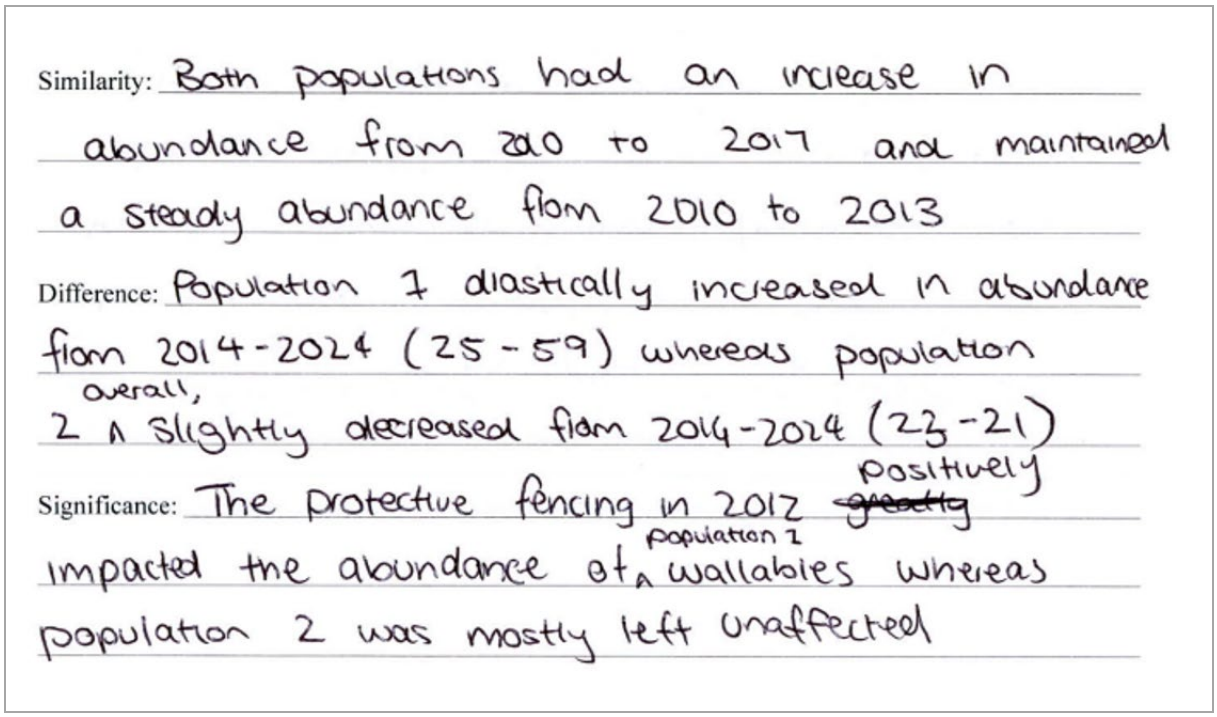
This question required students to compare the change in abundance of population 1 and population 2.

Effective student responses:

- identified the similarity, difference and significance of the change in abundance
- used data to support the comparison.

This excerpt has been included:

- to demonstrate a response that identifies the similarity, difference and significance as cued in the response space.


Similarity: Both populations had an increase in abundance from 2010 to 2017 and maintained a steady abundance from 2010 to 2013

Difference: Population 1 drastically increased in abundance from 2014-2024 (25-59) whereas population 2 overall, slightly decreased from 2014-2024 (23-21)

Significance: The protective fencing in 2012 positively impacted the abundance of population 1 wallabies whereas population 2 was mostly left unaffected

Extended response

The following excerpt is from the extended response question. It required students to respond to stimulus material providing information about sediment size and management at a mine site. As a component of the response, students were required to calculate the mean particle size of the sediment samples and compare the effect of introducing a flocculation process to the creation of baffles in the settling ponds.

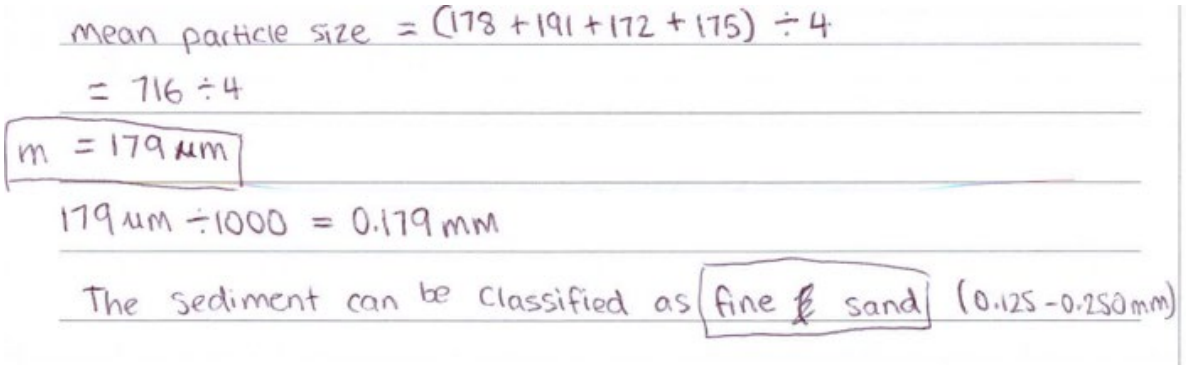
Effective student responses:

- calculated and determined sediment classification correctly
- accurately described trends and used thickness and time data to justify the response
- predicted the effect using thickness and time data
- identified a similarity, difference and significance when comparing flocculation with baffles
- predicted an impact on the hydrosphere and biosphere and identified a valid monitoring strategy for both.

These excerpts have been included:

- to demonstrate a typical response that calculates the mean particle size correctly with clear working out, and determines the appropriate sediment classification
- to demonstrate the identification of a similarity and difference.

Excerpt 1



Excerpt 2