2022 Earth and Environmental Science Subject Assessment Advice

Overview

Subject assessment advice, based on the 2022 assessment cycle, gives an overview of how students performed in their school and external assessments in relation to the learning requirements, assessment design criteria, and performance standards set out in the relevant subject outline. They provide information and advice regarding the assessment types, the application of the performance standards in school and external assessments, and the quality of student performance.

Teachers should refer to the subject outline for specifications on content and learning requirements, and to the subject operational information for operational matters and key dates.

School Assessment

Assessment Type 1: Investigations Folio

The Investigations Folio contains at least two practical investigations and one investigation with a focus on science as a human endeavour.

Both assessment design criteria, Investigation, Analysis and Evaluation, and Knowledge and Application, are used for this assessment type. Student evidence in the Investigations Folio should focus on the science inquiry skills, explain connections with science as a human endeavour and apply science understandings. In at least one practical investigation, students deconstruct a problem and design a method to investigate one aspect of the problem. Students should be encouraged to trial and/or research aspects of their proposed design before they write their final method.

The more successful responses commonly:

* deconstructed open-ended problems that had several possible aspects to explore that allowed opportunities for individual design and investigation of an uncertain outcome
* clearly communicated EES terminology succinctly and demonstrated strong evidence of research breadth/depth
* provided a clear, considered, individual design of an experimental investigation that included a testable hypothesis, one independent variable and one dependent variable
* explained why other variables were controlled and identified uncontrolled variables
* used research and/or trials to help justify the proposed method for an investigation
* graphical analysis was discerning and targeted highlighting results
* discussed trends and errors specifically in terms of the data collected in practical investigations
* had clear and succinct analysis and evaluation contained within the word count
* demonstrated capability of integrating qualitative observation data with quantitative data
* were able to justify results that did not show a clear trend in terms of sources of uncertainty
* discussed the validity and limitations of the conclusion in reference to the parameters of the investigation
* used contemporary examples of how science interacts with society in the SHE investigation
* supported the discussion in the SHE investigation with substantial, well-referenced research
* specifically linked key SHE concepts to examples in the SHE investigation.

The less successful responses commonly:

* were limited by too much scaffolding in the task
* had little opportunity to develop an individual design and very little evidence of the deconstruction of a problem
* had limited justification of the design procedure
* had little opportunity to collect data in field work
* had little opportunity to display data in appropriate formats or constructed graphs that were difficult to interpret
* graphical analysis was repetitive and redundant, rather than highlighting key results from project
* graph/charts presented were not tailored for the data under consideration
* responded more to theoretical questions rather than discussing the data collected in practical investigations
* significantly exceeded the word count (assuming words in tables and the design of the investigation did not go towards the word count when it does) resulting in whole sections of the report not included in their final grade
* discussed theoretical errors without acknowledging the significance of these on the data collected and hence on the conclusion
* displayed a poor understanding of errors, mistakes, precision and reliability of results
* had limited justification of the conclusion
* did not identify key SHE concepts in the examples chosen for the SHE investigation
* did not explain the interaction between science and society in the SHE investigation
* had limited discussion of EES concepts that linked to the SHE topic
* displayed little higher-order thinking due to very simple tasks that were not at a Stage 2 standard.

Assessment Type 2: Skills and Applications Tasks

This year teachers were able to reduce one SAT through using the Covid adjustments offered in the subject. It is important to remember that where this has been applied, it should have been the same task for all students in the assessment group. More information can be found at the following link: [Stage 2 Earth and Environmental Science — Subject adjustments 2023](https://www.sace.sa.edu.au/documents/652891/3697789/Earth+and+Environmental+Science+-+subject+adjustments+2023.pdf/281672b2-4d2c-9371-024a-e1b2dfcf7053?version=1.0)

A minimum of three tasks is required for this assessment type. These tasks must be done under direct teacher supervision within a maximum time frame of 90 minutes.

Both assessment design criteria, Investigation, Analysis and Evaluation, and Knowledge and Application, are used for this assessment type. Student evidence in the Skills and Applications Tasks should focus on the science understandings, apply science inquiry skills, and explain connections with science as a human endeavour.

The more successful responses commonly:

* used opportunities to present knowledge, understanding, application and analysis in a variety of tasks such as a viva with the teacher, a practical activity, or an oral/multimedia presentation
* demonstrated high level understanding of Earth Sphere interactions in relation to questions
* responded to different question types of varying complexity in new and familiar contexts, thus being able to demonstrate deep understanding
* succinctly analysed and explained data from graphs, diagrams, and unfamiliar information sources
* selected and explained SHE concepts from information provided.

The less successful responses commonly:

* responded to questions requiring predominately recall of learned facts. This was particularly noticeable in multiple-choice questions requiring no application of EES concepts or considered analysis of information
* showed little understanding of the integration between the spheres
* did not mention specific SHE concepts and contained very basic mention of the interaction between science and society
* responded to questions on concepts/content not covered in this course, such as rock and mineral identification.

Operational Advice

If students, in either Assessment Type 1 or Type 2, present their responses in oral or multimodal form, 6 minutes is the equivalent of 1000 words. Students should not speed-up the recording of their videos excessively in an attempt to condense more content into the maximum time limit.

From 2023, if a video is flagged by moderators as impacted by speed, schools will be requested to provide a transcript and moderators will be advised to moderate based on the evidence in the transcript, only considering evidence up to the maximum word limit.

If the speed of the recording makes the speech incomprehensible, it affects the accuracy of transcriptions and it also impacts the ability of moderators to find evidence of student achievement against the performance standards.

External Assessment

Assessment Type 3: Earth System Study

The Earth System Study is a major fieldwork investigation. A unique aspect of the study is to examine one environmental aspect in terms of the interactions between and within the Earth’s spheres. Secondary data must also be included for comparison with the student’s primary data. This can enable a discussion of long-term effects of an issue or provide a larger data set for analysis. Students need to spend time researching to find useful secondary data that they can link to an investigation question before they decide on their final question. The question should be quite specific and testable. Teachers should provide feedback to students about these requirements when they check their proposals.

Students should visit their field site and check how their procedure would work before they begin data collection. This will allow the procedure to be modified if necessary before they begin data collection. Longer term investigations in a readily accessible location (even the back yard) will allow collection of more data than a one-off visit to a field site. Teachers provide students with the relevant opportunities to develop the skills required for this task during their study of Topic 1.

Students and teachers should be aware that words written beyond the word limit are not assessed and that material put into an appendix is not assessed.

The more successful responses commonly:

* presented a final proposal with details of variables that matched the actual study
* provided clear linkage between the field data being acquired and the overarching research question
* Included a succinct hypothesis directly linked to the research question
* used only one independent variable and one dependent variable
* clearly outlined independent, dependent and controlled variables, with justification
* included a detailed rationale for the research approach and provided clear justification for the selection of equipment, number of trials, choice of locations etc.
* collected data over a longer period of time (weeks to months) rather than a single lesson and/or day
* selected a project that took into account seasonality of specific data acquired
* considered legal and ethical factors, as well as safety, when studies were conducted in locations where permission should be sought to enter or risk in damaging the natural environment
* clearly described replicable sampling methods, including quantities of materials, with justification
* included labelled photographs that provided useful information about the procedure (for example specialised equipment and maps that show locations)
* analysed primary data together with secondary data, and where possible, clearly analysed trend(s) in appropriate graphical and/or statistical approaches
* graphical analysis was discerning and targeted highlighting results
* demonstrated capability of integrating qualitative observation data with quantitative data
* clearly communicated EES terminology succinctly and demonstrated strong evidence of research breadth/depth directly linked to the research question
* investigated the student’s own topic rather than a topic specified by the teacher
* discussed sphere interactions in relation to the data collected rather than a general definition of Earth’s spheres
* identified and explained limitations to the design of the investigation and suggested specific improvements.

The less successful responses commonly:

* were not much more than a simple practical investigation with tenuous links to the course topics
* significantly exceeded the word count (assuming words in tables and the design of the investigation did not go towards the word count when it does) resulting in whole sections of the report not included in their final grade
* investigated topics that were not related to the subject outline, which limited opportunities to demonstrate appropriate EES concepts
* collected data occurring in one sphere therefore not meeting the subject outline requirements
* proposed very broad questions that could not be answered with a simple investigation
* measured too many variables that were not directly linked to the hypothesis or question
* nebulous linkage between the research question and the project investigation, whereby the data acquired/analysed would not answer the research question cited in the proposal
* appearance of selecting a project investigation based on available equipment/data, rather than designing a project investigation with a tailored approach (note – does not necessarily require expensive equipment)
* simply described data rather than trends in the data
* included data points that were outliers, or clearly incorrect measurements, in averages; did not include any discussion on the reasoning for the exclusion of outliers
* used the same graphs as others in the class rather than formatting their own graphs
* graphical analysis was repetitive and redundant, rather than highlighting key results from project; in addition, graph/charts presented were not tailored for the data under consideration
* wrote ideas for different investigations, rather than evaluating their own procedures, as if these were improvements to their procedure
* had little evidence of understanding how to apply information about interactions between Earth’s spheres to the topic. Many were very superficial statements about the transfer of energy and matter with no in depth discussion of the significance to the topic. Many included a paragraph in the proposal which bore no relevance to the actual data, or a generic diagram was provided showing the four systems interacting with no relevance to the data collected
* wasted words by including requirements of the task in the introduction and discussing aspects of the topic that were not directly related to the hypothesis or question.