# Government of South Australia LogoSACE Board Logo2023 Earth and Environmental Science Subject Assessment Advice

Overview

Subject assessment advice, based on the 2023 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

Teachers can improve the moderation process and the online process by:

* thoroughly checking that all grades entered in school online are correct
* ensuring the uploaded tasks are legible, all facing up (and all the same way), and remove blank pages and merge multiple PDFs into one single file
* ensuring the uploaded responses have pages the same size and in colour so teacher marking, and comments are clear
* keeping original marking rubrics and teacher comments/feedback for each assessment to help the moderator understand the teacher marking process.

Assessment Type 1: Investigations Folio

Teachers can elicit more successful responses by:

* not heavily scaffolding student work which can disadvantage student’s ability to demonstrate their skills and understanding
* conducting different field investigations to ensure KA1 is addressed thoroughly throughout the folio. For example, teachers should avoid both field investigations focusing on water quality as this limits the students ability to demonstrate breadth of EES concepts.

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
* featured graphical analysis that 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
* justified 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
* included the language from the Science Inquiry Skills of the Subject Outline and integrates this accurately into their analysis and evaluation of procedures
* 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
* linked specific SHE key concepts to examples in the SHE investigation.

The less successful responses commonly:

* were limited by too much scaffolding in the task
* provided little opportunity to develop an individual design and very little evidence of the deconstruction of a problem
* provided limited justification of the design procedure
* provided little opportunity to collect data in field work
* provided little opportunity to display data in appropriate formats or constructed graphs that were difficult to interpret
* featured graphical analysis that was repetitive and redundant, rather than highlighting key results from project
* presented graph/charts that were not tailored for the data under consideration
* responded more to theoretical questions rather than discussing the data collected in practical investigations
* exceeded the word count significantly (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
* provided limited justification of the conclusion with no reference to their data
* 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

Teachers can elicit more successful responses by:

* ensuring students are provided with the opportunity to answer a range of questions which will allow them to demonstrate their knowledge and analysis in familiar and unfamiliar contexts
* using the full 90 minutes to design a test that meets them to meet KA1 performance standard.

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
* fully justified conclusions that were made with reference to data presented.

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
* contained very basic or limited mention of the interaction between science and society and did not identify specific SHE concepts
* responded to questions on concepts/content not covered in this course, such as rock and mineral identification
* obtained most marks in timed tests in tasks that were in a familiar context
* provided limited depth in posters
* were short and did not provide depth of knowledge or understanding.

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.

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: Investigation - 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 and thus provide the student with the opportunity to demonstrate depth of understanding. 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:

* selected topics (in the proposal) which had a strong connection to the EES course with obvious sphere interactions and where the outcome of their investigation was more open and unknown, rather than a simplistic lab investigation where the results were easily predicted
* defined a manageable investigable question or hypothesis
* investigated the student’s own topic rather than a topic specified by the teacher
* identified one independent variable and one dependent variable, or clearly described how they were using a range of variables to derive a measure of a phenomenon, such as water quality
* provided clear linkage between the field data being acquired and the overarching research question
* included a concise, relevant rationale for the research approach and provided clear justification for the selection of equipment, number of trials, choice of locations etc
* included specific details of the equipment being used so the study could be repeated
* described both primary data and secondary data and justified the inclusion of the secondary data
* presented a final proposal with details of variables that matched the actual study or provided justification of why there was a difference
* collected data over a longer period of time (weeks to months) rather than a single lesson and/or day
* selected a study approach 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)
* included relevant, contemporary research on the topic and used correct referencing protocols in the report
* clearly separated their rationale for research approach and methodology from background concepts by presenting their rationale in the proposal and introduction in the report
* included aggregated data and averages in the results
* used their data to drive the analysis of the interactions of the Earth sphere with specific references to particular observations
* evaluated procedures using correct scientific inquiry terms
* improvements complemented the evaluation of random and systematic errors
* presented a final proposal with details of variables that matched the actual study or provided justification of why there was a difference
* 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
* clearly connected processes in Earth spheres or interactions between them to the data they obtained to analyse their results
* justified improvements and outlined how they would improve the reliability or validity of their investigation.
* identified and explained limitations to the design of the investigation and suggested specific improvements
* conclusions were related to the data collected.

The less successful responses commonly:

* were not much more than a simple practical investigation with tenuous links to the course topics
* did not allow sufficient time in their study design to collect meaningful data
* 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
* significantly exceeded the word count through using tables for the risk assessment and providing detailed justification of their research approach in the proposal (more in line with the deconstruction process) which do go towards the word count, resulting in whole sections of the report not included in their final mark
* included irrelevant items in the risk assessment adding unnecessarily to the word limit
* investigated topics that were not related to the subject outline, which limited opportunities to demonstrate a knowledge and understanding of EES concepts
* collected data involving 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
* selected a research question whereby the data acquired/analysed could not answer the research question cited in the proposal
* selected a study based on available equipment/data, rather than designing a study with a tailored approach (note – does not necessarily require expensive equipment)
* included sphere interactions in the proposal bearing no relevance to the data, or a generic diagram showing the four systems interacting with no relevance to the data collected or topic
* included data points that were outliers, or clearly incorrect measurements in averages and did not include any discussion on the reasoning for the exclusion of outliers
* included all raw data in result tables and graphs
* featured graphical analysis that was repetitive and redundant, rather than highlighting key results from the study; in addition, graph/charts presented were not tailored for the data under consideration
* simply described data rather than trends in the data
* provided superficial and generalised statements defining the sphere(s), with no reference to the data collected.