Science Stage 5 – scientific report marking rubric

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# Overview

**Stage and Learning Area**: Science Stage 5

**Description**: this resource has been designed for teachers to use in tasks that require a scientific report. It contains a marking rubric that can be used to give explicit and detailed feedback to students.

# Information for teachers

## Introduction

The detailed marking rubric can be used to assess scientific report writing through formative or summative assessment. It is written with students in mind and they should be encouraged to use the rubric to self-assess their scientific report prior to submission.

Although all components of a scientific report have been included in the marking rubric, assessing all these components in one task is not always appropriate or manageable. It is recommended that you consider modifying this rubric to concentrate on specific sections of the report for a particular task. This approach enables students to delve deeper into the required sections, surpassing the level of depth they might achieve when they are required to write an entire report.

The ‘Science Stage 5 learning sequence: Metal and acid investigation’ and ‘Science Stage 5 assessment task: Temperature and reaction rate’ are resources available on the [Planning, programming and assessing science 7–10](https://education.nsw.gov.au/teaching-and-learning/curriculum/science/planning-programming-and-assessing-science-7-10) webpage. They demonstrate how focusing on sections of a scientific report can build students’ skills in this form of communication.

The [iSTEM – Writing Scientific Reports: Teacher Guide [DOCX 574KB]](https://education.nsw.gov.au/content/dam/main-education/teaching-and-learning/curriculum/elective-courses/media/documents/istem-s5-writing-scientific-reports-teacher-guide.docx) outlines the requirements for each component of a scientific report in detail. This resource is targeted at a Stage 5 level and supports the teaching of writing scientific reports.

Effective feedback provides students with relevant, explicit, ongoing, constructive and actionable information about their performance against learning outcomes from the syllabus. Explicit teaching practices involve teachers clearly showing students what to do and how to do it, rather than having students discover that information themselves. Students who experience explicit teaching practices make greater learning gains than students who do not experience these practices (CESE 2020a).

## Outcomes

* **SC5-4WS** develops questions or hypotheses to be investigated scientifically
* **SC5-5WS** produces a plan to investigate identified questions, hypotheses or problems, individually and collaboratively
* **SC5-7WS** processes, analyses and evaluates data from first-hand investigations and secondary sources to develop evidence-based arguments and conclusions
* **SC5-9WS** presents science ideas and evidence for a particular purpose and to a specific audience, using appropriate scientific language, conventions and representations

[Science Years 7–10 Syllabus](https://educationstandards.nsw.edu.au/wps/portal/nesa/k-10/learning-areas/science/science-7-10-2018) © NSW Education Standards Authority (NESA) for and on behalf of the Crown in right of the State of New South Wales, 2018.

**Note**: although each component of the report has been aligned with an outcome, teachers may use their professional judgement and the syllabus to select the outcomes for a task. It may be suitable to include additional outcomes or remove outcomes in a task, for example, include a content outcome in the introduction component.

## Marking rubric

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Component | 0 Marks | 1 Mark | 2 Marks | 3 Marks | 4 Marks |
| Title/Aim  SC5-4WS | The title/aim is not included or provides no information on the investigation. | The title/aim identifies what is being tested in the investigation. |  |  |  |
| Introduction  SC5-5WS | The introduction is not included. | The introduction is very brief and provides limited background information. | The introduction provides some relevant background information such as defining relevant terms. | The introduction:   * outlines the scope of the investigation and provides informative background information * demonstrates a sound understanding of the scientific concepts underpinning the investigation. | The introduction:   * provides a detailed and clear explanation of the scope of the investigation and provides informative background information * demonstrates an excellent understanding of the scientific concepts underpinning the investigation. |
| Hypothesis  SC5-4WS | The hypothesis is poorly structured.  Does not relate to the aim. | The hypothesis makes a prediction for the investigation.  The relationship between the independent and dependent variables is not clear. | The hypothesis is logically structured in an ‘if… then…because’ format, making a prediction of the relationship between the independent and dependent variables. |  |  |
| Method: Variables  SC5-5WS | Variables are not included or have been identified incorrectly. | Correctly identifies one or 2 of the following:   * dependent * independent * controlled variables. | Correctly identifies the dependent and independent variables. Controlled variables have been identified, but the strategies used to keep them constant are not outlined or may be unsuitable. | Correctly identifies the dependent and independent variables.  All controlled variables have been identified and strategies to keep the controlled variables constant are valid. |  |
| Method  SC5-5WS | The method is not included or is not representative of the investigation undertaken. | The method lists some steps involved in the investigation.  Information is missing or vague. | The method:   * is written step-by-step and could be repeated with some clarification * addresses the aim of the investigation * outlines how the dependent variable is being measured. | The method:   * is written step-by-step and could be repeated * outlines strategies to ensure reliable or accurate collection of data that addresses the aim * outlines how the dependent variable is measured. | The method:   * is written step-by-step and could be repeated * outlines strategies to ensure reliable and accurate collection of data that addresses the aim * outlines how the dependent variable is measured accurately * outlines the changes or range of values that will be tested for the independent variable. |
| Risk assessment  SC5-5WS | Hazards are not identified. | Identifies some potential hazards. | Identifies some hazards and proposes measures to mitigate the identified risk. | Identifies all potential hazards and proposes appropriate control measures to mitigate the identified risks. |  |
| Scientific diagram  SC5-9WS | The diagram is not scientifically correct. For example, the diagram is not drawn in 2D or has significant errors. | The diagram is:   * scientifically correct and appropriately labelled * contains minor errors. | The diagram is:   * scientifically correct and accurately describes the equipment set-up * labelled appropriately and neatly drawn in 2D. * appropriately captioned. |  |  |
| Results: Table  SC5-7WS | Data is not presented in a table.  Limited data has been recorded. | Data is displayed in a table with correct headings. Averages or other descriptive statistics have not been used to summarise data or have been used incorrectly. Limited data has been recorded. | Data is displayed in an organised table with correct headings.  Units may be missing in column headings and placed in the body of the table.  Sufficient data are recorded to support the investigation. | Data is displayed in a well-organised table which includes appropriate headings.  Units are correct and appear in the column heading.  A correctly calculated appropriate average is included where relevant. Sufficient data are recorded to support the investigation. |  |
| Results: Graph  SC5-9WS | A graph has not been included, or the graph may contain significant omissions or errors such as incorrect plotting of data or scale. | Results are presented in a graph, however, some components may be missing, for example, an axis label or key. | Results are presented in an appropriate graph, however, some minor components may be missing, for example, axis label, heading. | Results are presented in an appropriate graph that is easy to understand.  The graph has correctly labelled axes, headings, units and a key if relevant. | Results are accurately presented in an appropriate graph that is easy to understand.  The graph has correctly labelled axes, heading, units and a key if relevant. Information on data variability, such as standard deviation, may be included in the graph. |
| Discussion: Analysis of results  SC5-7WS | Results are repeated in the discussion. Ideas are not clearly expressed, or an incorrect interpretation of the results is provided. | Makes simple statements about the data. | Results are correctly interpreted. Identifies trends in the data. | Results have been correctly interpreted. Includes a thorough analysis of trends, patterns and relationships in the data and information. | Results have been correctly interpreted. Includes a thorough analysis of trends, patterns and relationships in the data and information. Compares findings of the investigation to the work of others. |
| Discussion: Sources of error and further research  SC5-7WS | Sources of error have not been identified and there are no suggestions for improving the investigation. | A source of error has been identified. Inadequate or no improvements have been suggested. | Some sources of error have been identified and improvements have been suggested, however, they may be inadequate. | Some sources of error have been identified and suggests adequate ways of improving the data or investigation. | Possible sources of error have been identified and adequate improvements have been suggested. Describes the limitations of the study, going beyond accuracy, reliability and validity. |
| Conclusion  SC5-7WS | The conclusion does not state if the hypothesis was supported or refuted. Alternatively, the conclusion drawn is not supported by the results. | The conclusion lacks detail. It states if the hypothesis is supported or refuted. however, limited reasons are given. | The conclusion drawn is consistent with the data and information gathered. Correctly states how the hypothesis has been supported or refuted. | The conclusion correctly relates evidence to support or refute the hypothesis. Provides justification for inferences and conclusions. |  |
| References  SC5-7WS | No reference list has been included. | Sources referenced are not reliable and information may be missing. | Several reliable sources are referenced in the correct format, however, there may be minor errors. | The reference list is comprehensive. All references are reliable and in the correct format. In-text referencing is used where relevant. |  |
| Report structure  SC5-9WS | Report is unstructured. Sections may be missing. | The report is set out with headings and subheadings. Sections may be missing. | Report formatting is excellent and is set out in a clear and logical order with headings and subheadings. |  |  |
| Writing cohesion  SC5-9WS | Limited use of subject-specific terminology. There is a lack of cohesion between sentences and/or paragraphs. | Sound use of subject-specific terminology. Attempts to create cohesion between sentences and paragraphs have been made. | Excellent use of relevant subject-specific terminology. Effective use of text connectives to signal connection between sentences. Uses ‘given and new’ sentence structure to create cohesion. |  |  |

# Support and alignment

**Resource evaluation and support**: all curriculum resources are prepared through a rigorous process. Resources are periodically reviewed as part of our ongoing evaluation plan to ensure currency, relevance and effectiveness. For additional support or advice, or to provide feedback, contact the Science Curriculum team by emailing [Science7-12@det.nsw.edu.au](mailto:Science7-12@det.nsw.edu.au).

**Differentiation**: further advice to support Aboriginal and/or Torres Strait Islander students, EALD students, students with a disability and/or additional needs, and High Potential and gifted students can be found on the [Planning, programming and assessing 7-12](https://education.nsw.gov.au/teaching-and-learning/curriculum/planning-programming-and-assessing-k-12/planning-programming-and-assessing-7-12) webpage.

**Assessment**: further advice to support formative assessment is available on the [Planning, programming and assessing 7-12](https://education.nsw.gov.au/teaching-and-learning/curriculum/planning-programming-and-assessing-k-12/planning-programming-and-assessing-7-12) webpage.

**Professional learning**: relevant professional learning is available on the [Science statewide staffroom](https://education.nsw.gov.au/teaching-and-learning/curriculum/statewide-staffrooms). [Stage 6 Literacy in context](https://education.nsw.gov.au/teaching-and-learning/curriculum/literacy-and-numeracy/teaching-and-learning-resources/literacy/stage-6-literacy-in-context-writing) provides further advice to teachers to improve student writing

**Related resources**: further resources to support Science Stage 5 be found on the [Science Curriculum page](https://education.nsw.gov.au/teaching-and-learning/curriculum/science) and on the [Science statewide staffroom website](https://schoolsnsw.sharepoint.com/sites/NSWDoEScienceCurriculumTeam/SitePages/Science%20Extension.aspx).

**Consulted with**: Aboriginal Outcomes and Partnerships and subject matter experts

**Alignment to system priorities and/or needs**: [School Excellence Policy](https://education.nsw.gov.au/policy-library/policies/pd-2016-0468), [School Success Model](https://education.nsw.gov.au/public-schools/school-success-model/school-success-model-explained)

**Alignment to the School Excellence Framework**: this resource supports the [School Excellence Framework](https://education.nsw.gov.au/policy-library/policies/pd-2016-0468) elements of curriculum (curriculum provision) and assessment (consistency of judgement).

**Alignment to Australian Professional Teaching Standards**: this resource supports teachers to address [Australian Professional Teaching Standards](https://educationstandards.nsw.edu.au/wps/portal/nesa/teacher-accreditation/meeting-requirements/the-standards/proficient-teacher) 3.3.2, 5.1.2, 5.2.2.

**Author**: Science 7-12 Curriculum Team

**Resource**: Assessment marking rubric

**Creation date**: 30 July 2023

# References

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CESE (Centre for Education Statistics and Evaluation) (2020a) [*What works best: 2020 update*](https://education.nsw.gov.au/about-us/education-data-and-research/cese/publications/research-reports/what-works-best-2020-update), NSW Department of Education, accessed 07 June 2023.

CESE (Centre for Education Statistics and Evaluation) (2020b) [*What works best in practice*](https://education.nsw.gov.au/about-us/education-data-and-research/cese/publications/practical-guides-for-educators-/what-works-best-in-practice), NSW Department of Education, accessed 07 June 2023.

NESA (NSW Education Standards Authority) (2022) ‘[Proficient Teacher: Standard descriptors](https://educationstandards.nsw.edu.au/wps/portal/nesa/teacher-accreditation/meeting-requirements/the-standards/proficient-teacher)’, *The Standards*, NESA website, accessed 07 June 2023.

## Further reading

State of New South Wales (Department of Education) (2022) [*Literacy and numeracy*](https://education.nsw.gov.au/teaching-and-learning/curriculum/literacy-and-numeracy), NSW Department of Education, accessed 24 February 2023.

State of New South Wales (Department of Education) (2022) [*Literacy and numeracy priorities*](https://education.nsw.gov.au/teaching-and-learning/curriculum/literacy-and-numeracy/priorities), NSW Department of Education, accessed 24 February 2023.

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