 Marking guidelines

A support document for science teachers

When creating assessments it is important to create marking guidelines which best reflect the task and a student’s ability to fulfil outcomes. It is similarly important to differentiate assessment tasks to meet the diverse and individual needs of students.

Assessment tasks should be:

* **Valid** – engages students in tasks aligned with learning outcomes and measures student’s achievement of those learning outcomes. Valid assessments require explicit alignment between intended learning outcomes and the assessment task used to measure achievement of outcomes.
* **Reliable** – refers to consistency of marking between multiple markers and across different cohorts of students. A reliable assessment articulates the teacher’s expectations of what students will achieve in the assessment task.
* **Fair** – students are given equitable opportunities to demonstrate their learning, whereby the task is achievable within the timeframe allocated, the resources available and the transparency of the assessment process and criteria.

Marking guidelines support the process of gathering specific information about student achievement. It is important because

* it is linked to standards, with reference to the outcomes and content of syllabuses
* it supports consistent marking
* it distinguishes different levels of achievement
* it provides feedback to students and teachers

This document provides examples of holistic and analytical marking guidelines which can be implemented for assessment tasks in Science 7-10 and Stage 6 Science courses.

| Analytical | Holistic |
| --- | --- |
| * Useful for task which contains discrete areas of achievement, such as knowledge and skills * Useful for showing students specific strengths and areas of improvement * Moderates marks across a cohort of students | * useful for tasks that contain inter-related skills and knowledge * useful for holistic tasks such as creative tasks, design projects, project based learning * Presents an authentic context |

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Analytical

An analytical approach to marking considers the individual parts of a task. Analytical rubrics are common and are used when the judgement of the assessment task can be broken up into discrete elements or criteria, each of which can be assessed individually. Individual elements can be assigned a mark or achievement criteria, such as basic, sound etc. The results are then aggregated to provide an overall mark or achievement for the task.

Analytical rubrics divide the available marks between different criteria, with weightings according to their relative importance. Each criteria is then assigned a portion of the available mark according to the standard reach on that criteria. Analytical marking guidelines are usually presented in a matrix of elements and distributes marks for each element.

Although more difficult to develop, the use of multiple guidelines or scales for some questions can make teacher judgements about performance easier. The model suits tasks where the marks are allocated to different parts of the task.

Separate criteria marking are utilised in BOSTES written HSC examinations.

Example 1

This example breaks down the response into separate parts, each of which is allocated a mark.

| Criterion | Mark |
| --- | --- |
| States that the phenotype results from an interaction between genes and the environment | 1 |
| States that rabbit has the gene, but it is switched off (e.g. White hair) | 1 |
| States that an aspect of the environment switches on the gene | 1 |

Example 2

This example breaks down the response to produce a diagram into separate explicit criteria, each of which is allocated a mark.

| Criterion | Mark |
| --- | --- |
| Diagram drawn with ruler | 1 |
| Correct circuit symbols used symbols and | 1 |
| Battery and light globe correctly placed | 1 |
| Voltmeter and ammeter correctly placed | 1 |

Example 3

This example uses sets of criteria which is allocated a number of marks. The range of marks in some criteria allows for achievement to be distinguished as high and low, corresponding to the top and bottom mark allocated. Limiting the number of levels and marks per level, will help teachers in making valid judgements.

| Criterion | Mark |
| --- | --- |
| * Demonstrates an extensive knowledge of polymers * Identifies and describes the properties of **two** names natural and **two** named synthetic polymers * Links these properties to their use * Makes an assessment of the impact on society of each one * Communicates complex ideas and information using correct terminology | 7 |
| * Demonstrates thorough knowledge of polymers * Identifies and describes the properties of at least **one** natural and **one** synthetic polymer * Links these properties to their use * Attempts to assess the impact or value of each on society **or** describes the impact on society in general of natural or synthetic polymers * Clearly communicates ideas | 5-6 |
| * Demonstrates a sound knowledge of polymers * Identifies and describes **two** polymers   **And/or**   * Makes some link to their use   **And/or**   * Describes an impact on society of each **or** outlines a general impact | 3-4 |
| * Demonstrates a basic knowledge of polymers * Identifies and describes **ones** or more polymers   **or**   * Describes a use or impact of polymers   **or**   * Some correct information about polymers | 1-2 |
| * Non-attempt | 0 |

Example 4

This example partitions the task into separate section and allocates a number of marks for each explicit criterion.

| Task component | 4 | 3 | 2 | 1 | 0 |
| --- | --- | --- | --- | --- | --- |
| Car safety features | All 4 identified and explained with additional support to the investigation | 3-4 identified and explained in detail | 2 of the 4 identified and explained in detail or all identified but only 2 explained well | 1 of the 4 detailed and explained in detail or all identified but only 1 is explained well | No attempt |
| Speed limits | Links the social and economic cost of road deaths to the reason why governments introduce strict speed limits | Supplies data on how such changes in speed limits of drivers contributed to the decline in road fatalities | Links speed limits of drivers to road fatalities | States the law for speed limits | No attempt |
| Blood alcohol concentration (BAC) | Links the social and economic cost of road deaths to the reason why governments introduce BAC levels. | Supplies data on how such changes in BAC levels of drivers contributed to the decline in road fatalities | Links the BAC of drivers to road fatalities | States the law for BAC. | No attempt |
| References | More than THREE references cited in correct format. All text in own words. | THREE references cited in correct format. Most information in own words | TWO references cited in correct format. Attempt to put information in own words | ONE reference cited. Errors in formatting.  Evidence of plagiarism | No references  Plagiarism |

Example 5

This example partitions each section of the assessment task (writing and presenting a scientific report) into a set of criteria and allocates a number of marks to each. This model allows for teacher judgement of marks.

| Section | Criteria | Mark |
| --- | --- | --- |
| Scientific process | * Clear Aim and Hypothesis * Evidence of background research * Method based on the aim of the investigation * Sufficient sample size * Independent & dependent variables identified * Fair test i.e. one variable tested * All other variables controlled * Discussion of problems/challenges discussed * Solutions for improvement suggested * Ideas for future research suggested * References & acknowledgements cited | 10 |
| Written communication | * Student has expressed ideas in written form * Layout is easy to read and follow * Few grammatical and spelling errors | 5 |
| Project creativity | * Student has presented an investigation that is creative * Student has developed their investigation in an original way | 5 |
| Project presentation | * The project has been presented in an appealing way | 5 |

Holistic

Holistic rubrics utilise broad statements and are developed using syllabus outcomes. Holistic marking uses different levels of performance; the greater the number, the more difficult it is to find the words to differentiate performance from one level to the next. It is recommended that blooms taxonomy be used when differentiated between different levels of performance.

Holistic rubrics are used when it is not feasible to partition as task into separate criteria, and can be assigned to project based work or creative tasks.

Achievement within each level of performance can vary. The final score can be adjusted to the allocated weighting of the task. Holistic criteria statements allow for single judgements of student performance but require teachers to keep all the criteria in mind when marking.

Example 1

This example uses holistic statements about a task and indicates a set level of achievement for each statement.

| Grade | The student |
| --- | --- |
| A | Acquires, constructs and represent qualitative and quantitative complex and challenging ideas and concepts. Compares, classifies and explain concepts, theories and information about processes and phenomena, in complex situations. Adapts, translates and reconstructs understandings of concepts, theories and principles |
| B | Acquires and presents qualitative and quantitative complex and challenging ideas about concepts. Compares classifies and explains concepts, theories and information about processes and phenomena. Adapts and translates understanding of concepts, theories and principles |
| C | Acquires and presents qualitative and quantitative ideas and concepts. Classifies and explains concepts, theories and information about processes and phenomena. Interprets concepts, theories and principles |
| D | Recalls and present qualitative and quantitative ideas and concepts. Describes concepts and information in processes and phenomena |
| E | Restates facts and makes statements about data and information. |

Example 2

This example uses holistic statements to partition different levels of achievements for different sections of the task. While the marking rubric has been broken up, achievement is judged holistically. The marking guideline considers how the criteria contributes to the quality of the whole task.

| Success criteria | High | Medium | Low |
| --- | --- | --- | --- |
| Science concepts and understandings | * Demonstrates comprehensive and accurate knowledge and understanding of properties of rocks * Distinguishes clearly and accurately between the physical and chemical breakdown of rocks | * Demonstrates some knowledge and understanding of properties of rocks, which might not always be accurate * Distinguishes clearly between the physical and chemical breakdown of rocks but might not always do so accurately | * Demonstrates misconceptions; limited or no evidence of knowledge and understanding of the properties of rocks * Does not distinguish clearly between the physical and chemical breakdown of rocks. |
| Applying understandings | Demonstrates clearly and effectively the relationship between properties of rock materials and their use in building and construction | Establishes some connections between the properties of rock materials and their use in building and construction | Makes loose or inaccurate connections between properties of rock materials and their use in building and construction |
| Communicating information | * Communicates information clearly, logically and accurately * Uses appropriate terminology consistently | * Generally communicates information clearly, but not always accurately * Generally uses terminology appropriately | * Communicates information with difficulty * Demonstrates limited or inappropriate use of terminology |