



# Biology Advice for teachers

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## The importance of instrument-specific criteria and standards: Moving on from marks

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The Biology (2004) syllabus requires that each assessment task be accompanied by an instrument-specific criteria sheet that is derived from, and consistent with, the standards associated with exit criteria, as defined in Section 7.7 of the amended syllabus. Instrument-specific criteria sheets are usually presented as a matrix that sets out the requirements of the task in terms of the syllabus exit criteria and also defines five standards in each aspect of the criteria to be assessed. The extent to which the syllabus standards are reflected in an instrument-specific criteria sheet will vary according to the general objectives associated with the task and according to the stage in the course. Instrument-specific criteria sheets must be provided to students before they undertake an assessment task. These instrument-specific criteria sheets:

- clearly specify each of the five standards (A–E)
- inform teaching and learning practice
- are annotated to indicate student achievement
- provide the basis for teacher judgment about student achievement
- provide students with the opportunity to develop self-evaluative expertise.

An analysis of the standards associated with exit criteria quickly reveals that the discrimination between each standard is on the basis of quality, not quantity (see table following page). For example, the difference (in part) between the B and C standards in the first element of Understanding biology (UB) is in explaining (as opposed to simply defining and describing) concepts, theories and principles. This means that B-standard evidence is different to (not just more than) C-standard evidence. The excerpt from the syllabus on the following page highlights the aspects of the standards that discriminate at the various levels of achievement.

Instrument-specific criteria sheets support teacher judgments on the quality of student work, rather than the quantity. The syllabus standards discriminate on the basis of quality. For example, numerous correct responses to “recall” and “describe” type questions may yield many numerical marks (high quantity), but may still only provide evidence of a C-standard when matched to the syllabus descriptors (a qualitative decision).

Instrument-specific criteria sheets provide students with powerful feedback and feed-forward devices. They preserve the relationship between syllabus standards and teacher judgment. Students can be taught to interrogate instrument-specific criteria sheets in order to make informed judgments about their areas of weakness with respect to the syllabus criteria. Teaching students this skill allows the formative potential of criteria-based assessment to be more fully realised. The syllabus requires that criteria sheets be annotated to support teacher decisions about the quality of the student work. The more specific and extensive this annotation is, the more useful it is to students. Attempting to encode syllabus standards in numerical grading systems, by definition, separates the criteria and standards from which the marks were derived. Not only is such practice inconsistent with syllabus intent, but it may also disadvantage students because they may not be well informed about the specific areas of their strengths and weaknesses.

Instrument-specific criteria sheets have greater capacity than numerical marks to preserve the strengths and weaknesses of students' responses with respect to the syllabus criteria and standards. A student's folio of work (be it for any interim semester, monitoring, verification or exit) is a collection of individual instruments, and is to be judged as a whole, rather than as the sum of its parts. Although the total folio must demonstrate a student's achievements in all three general objectives (UB, IB, EBI), the emphasis on each criterion may vary from instrument to instrument. Judgments on a student's achievement in a particular criterion must be based on the extent to which the pattern of evidence, from a suite of assessment tasks, matches with the syllabus standards for that criterion. An on-balance judgment can then be made in each criterion. It is not an appropriate practice to “add-up” or aggregate grades to arrive at an overall judgment about a student's level of achievement within each criterion. The aggregation of marks and application of pre-specified, arbitrary numerical cut-offs for level of achievement decisions tends to disguise the strengths and weaknesses of a student's work.

	A	B	C	D	E
Understanding biology	<p>The student communicates their understanding by:</p> <ul style="list-style-type: none"> <li>• <b>making links between related</b> ideas, concepts, principles and theories to <b>reveal meaningful</b> interrelationships</li> <li>• applying knowledge and understanding to a range of complex <b>and challenging</b> tasks.</li> </ul>	<p>The student communicates their understanding by:</p> <ul style="list-style-type: none"> <li>• <b>explaining</b> ideas, concepts, principles and theories and <b>describing</b> interrelationships between them</li> <li>• applying knowledge and understanding to a range of <b>complex</b> tasks.</li> </ul>	<p>The student communicates their understanding by:</p> <ul style="list-style-type: none"> <li>• <b>defining and describing</b> ideas, concepts, principles and theories, and <b>identifying</b> interrelationships</li> <li>• applying knowledge and understanding to a <b>range of tasks</b>.</li> </ul>	<p>The student communicates their understanding by <b>stating ideas</b> and <b>using</b> terminology relevant to concepts and <b>recalling interrelationships</b>.</p>	<p>The student <b>states terminology and ideas relevant</b> to concepts.</p>
Investigating biology	<p>The student communicates investigative processes by:</p> <ul style="list-style-type: none"> <li>• <b>formulating justified</b> researchable questions</li> <li>• <b>designing</b>, modifying and implementing investigations</li> <li>• collecting and organising data to <b>identify</b> trends and <b>interrelationships</b></li> <li>• interpreting and <b>critically analysing</b> results <b>with links to theoretical concepts</b> to draw conclusions relating to the question(s)</li> <li>• evaluating the design of the investigation and <b>reflecting</b> on the adequacy of the data collected and <b>proposing refinements</b>.</li> </ul>	<p>The student communicates investigative processes by:</p> <ul style="list-style-type: none"> <li>• <b>formulating</b> researchable questions</li> <li>• selecting, <b>modifying</b> and implementing investigations</li> <li>• collecting and organising data to <b>identify trends</b></li> <li>• <b>interpreting</b> results and drawing conclusions <b>relating to the question(s)</b></li> <li>• <b>evaluating the design</b> of the investigation and the <b>adequacy of the data</b> collected.</li> </ul>	<p>The student communicates investigative processes by:</p> <ul style="list-style-type: none"> <li>• <b>identifying</b> researchable questions</li> <li>• <b>selecting and implementing</b> investigations</li> <li>• <b>collecting and organising</b> data</li> <li>• <b>discussing results</b> and <b>drawing conclusions</b>.</li> </ul>	<p>The student communicates investigative processes by:</p> <ul style="list-style-type: none"> <li>• <b>following instructions</b> to collect and organise data</li> <li>• <b>using</b> data to answer questions.</li> </ul>	<p>The student communicates investigative processes by <b>following instructions</b> to collect and organise data.</p>
Evaluating biological issues	<p>The student communicates by:</p> <ul style="list-style-type: none"> <li>• gathering, <b>critically</b> analysing and evaluating information and data from a variety of valid and reliable sources</li> <li>• integrating the information and data to make <b>justified</b> and <b>responsible decisions</b></li> <li>• <b>considering</b> alternatives and predictions relevant in <b>past</b>, present and <b>future</b> biological contexts.</li> </ul>	<p>The student communicates by:</p> <ul style="list-style-type: none"> <li>• gathering, <b>analysing</b> and <b>evaluating</b> information and data from a variety of <b>valid</b> and <b>reliable</b> sources</li> <li>• <b>integrating</b> the information and data to <b>make supported decisions</b></li> <li>• <b>recognising alternatives</b> and predictions that are relevant in a range of <b>present-day</b> biological contexts.</li> </ul>	<p>The student communicates by:</p> <ul style="list-style-type: none"> <li>• <b>gathering</b> information and <b>data</b> from a <b>variety of</b> sources</li> <li>• <b>selecting relevant information</b> and data to make <b>plausible decisions</b> and <b>predictions</b> in a range of biological contexts</li> <li>• <b>recognising</b> concepts that form the basis of present-day biological issues.</li> </ul>	<p>The student communicates by:</p> <ul style="list-style-type: none"> <li>• <b>gathering and using</b> biological information to make statements</li> <li>• <b>recognising that a given</b> issue has <b>biological implications</b>.</li> </ul>	<p>The student communicates by <b>using supplied information</b> to make statements.</p>

Instrument-specific criteria sheets support the school's ability to uphold the principles of assessment, in particular:

- **Balance.** The syllabus requires “a suitable balance ... across the criteria” (Section 7.1), among other aspects. Importantly, balance is required *over the course of study* and not necessarily within a semester or between semesters, and certainly not in an individual assessment instrument. It is only by mapping assessment opportunities against the elements of the exit criteria that such balance becomes apparent. The principle of balance is more complex than simply an equal aggregation of marks across the criteria.
- **Fullest and latest.** The syllabus requires (Section 7.1) that “judgments about student achievement made at exit from a school course of study must be based on the fullest and latest information available”, where “fullest” refers to information about student achievement gathered across the range of general objectives and “latest” refers to information about student achievement gathered from the most recent period in which the general objectives are assessed. In this context, consideration must be given to the breadth and depth of treatment of the exit criteria in any individual assessment task. This may be disguised by the use of marks since the attribution of more marks to later assessment tasks does not necessarily appropriately value the “fullest” or “latest” information, nor does the aggregation of marks recognise the developmental nature of a course.

Decisions about levels of achievement need to be made in the context of a folio of evidence and the extent to which that evidence matches with the syllabus standards at a certain level. The syllabus requires each assessment instrument to be accompanied by a task-specific criteria sheet that is derived from, and is consistent with, the syllabus exit criteria and standards. Attempts to encode these standards in numerical marks are not consistent with the syllabus intent. Moreover, the use of instrument-specific criteria and standards offers many important advantages outlined above and further discussed in *The Place of Numerical Marks in Criteria-based Assessment* (p. 6)<sup>1</sup>, which concludes that:

An analysis of the underlying assumptions shows that numerical marking systems enjoy a status that is higher than they strictly deserve. The use of marks in criteria-based assessment is inappropriate for two sets of reasons. Firstly, the assumptions are not generally satisfied in any form of school-based assessment, and secondly, the use of marks as currency in grade-exchange transactions diverts attention away from criteria, standards, and the processes of qualitative appraisals, and to that extent is educationally counterproductive.

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<sup>1</sup> Paper 21 of the ROSBA discussion papers, available from the QSA website: <[www.qsa.qld.edu.au](http://www.qsa.qld.edu.au)> then select Publications > Reports and papers > QBSSSS>.