Sciences assessment criteria

Please note that the assessment criteria in this guide are for first use in final assessment in the year 2006. For final assessment in 2005, please use the assessment criteria as published in the previous MYP *Sciences* guide (August 2000).

The following assessment criteria have been established by the IBO for sciences in the Middle Years Programme. The final assessment required for IBO-validated grades and certification at the end of the MYP must be based on these assessment criteria.

Criterion A	One world	Maximum 6
Criterion B	Communication in science	Maximum 6
Criterion C	Knowledge and understanding of science	Maximum 6
Criterion D	Scientific inquiry	Maximum 6
Criterion E	Processing data	Maximum 6
Criterion F	Attitudes in science	Maximum 6

For each assessment criterion, a number of band descriptors are defined. These describe a range of achievement levels with the lowest represented as 0.

The descriptors concentrate on positive achievement, although failure to achieve may be included in the description for the lower levels.

Detailed descriptions of the assessment criteria and band descriptors appear on the following pages.

Criterion A: one world

Maximum 6

Students should understand the interdependence of science and society. Students are expected to discuss how science is applied and used to solve specific problems in life and society. Students should be given the opportunity to explore local and global scientific issues and evaluate the interaction between science and scientific developments with social, economic, political, environmental, cultural and ethical factors.

Assessment tasks should allow students to demonstrate their understanding of the role of science in society through the development of analysis and critical thinking. Suitable assessment tasks to assess this criterion include essays, case studies and research projects, but also debates and oral presentations.

Achievement level	Descriptor
0	The student does not reach a standard described by any of the descriptors given below.
1–2	The student **describes** how science is applied to addressing a specific local or global issue. The student **states some** of the benefits **or** limitations of science in addressing the issue.
3–4	The student describes how science is applied to addressing a specific local or global issue. The student **describes some** of the benefits **or** limitations of science in addressing the issue. The student **describes** how science and its applications interact with at least **one** of the following factors: social, economic, political, environmental, cultural and ethical.
5–6	The student **explains** how science is applied to addressing a specific local or global issue. The student **explains some** of the benefits **and** limitations of science in solving the issue. The student **discusses** how science and its applications interact with **some** of the following factors: social, economic, political, environmental, cultural and ethical.

Criterion B: communication in science

Maximum 6

Students should be able to demonstrate understanding when communicating scientific information. Students should use appropriate scientific language, a range of communication modes and the most appropriate communication format.

Suitable assessment tasks to assess this criterion include scientific investigation reports, research essays, case studies, interdisciplinary projects, and media presentations.

Depending on the tasks, students will be expected to acknowledge the sources of information and document these appropriately.

Achievement level	Descriptor
0	The student does not reach a standard described by any of the descriptors given below.
1–2	The student **attempts** to communicate scientific information using **some scientific language**. The student presents some of the information in an appropriate form using some symbolic or visual representation when appropriate. The student attempts to acknowledge sources of information but this is **inaccurate**.
3–4	The student communicates scientific information using **scientific language**. The student presents most of the information appropriately using symbolic and/or visual representation according to the task. The student acknowledges sources of information **with occasional errors**.
5–6	The student communicates scientific information **effectively** using **scientific language correctly**. The student presents all the information appropriately using symbolic and/or visual representation accurately according to the task. The student acknowledges sources of information **appropriately**.

Criterion C: knowledge and understanding of science

Maximum 6

Students should show their understanding of the main scientific ideas and concepts of science, by applying these to solve problems in familiar and unfamiliar situations. Students should develop critical-thinking skills to analyse and evaluate scientific information.

Suitable assessment tasks to assess this criterion include complex questions in tests, critical analysis of case studies, research projects or media articles on scientific issues. Assessment tasks should provide opportunities for students to demonstrate their understanding by solving problems in familiar and unfamiliar situations, and by analysing and evaluating scientific information presented to them.

Achievement level	Descriptor
0	The student does not reach a standard described by any of the descriptors given below.
1–2	The student **recalls** some scientific ideas and concepts and applies these to solve **simple problems**.
3–4	The student **explains** scientific ideas and concepts and applies scientific understanding to solve **problems in familiar situations**. The student **analyses** scientific information by identifying parts, relationships or causes. The student provides an **explanation** that shows understanding.
5–6	The student explains scientific ideas and concepts and applies scientific understanding to solve **problems in familiar and unfamiliar situations**. The student **analyses** and **evaluates** scientific information by making **scientifically supported judgments** about the information, the validity of the ideas or the quality of the work.

Unfamiliar situation: Refers to a problem/situation where the context or the application is modified to be considered unfamiliar for the student.

Criterion D: scientific inquiry

Maximum 6

Students are expected to design and carry out scientific investigations independently.

Students should be able to (i) state a problem that can be tested by an investigation; (ii) formulate a suitable hypothesis; (iii) identify and manipulate variables; (iv) plan an appropriate investigation including the method and materials; (v) evaluate the method.

Assessment tasks for scientific inquiry should provide students with the opportunity to design, plan and carry out scientific investigations independently. Suitable assessment tasks to assess this criterion include laboratory experiments and field studies.

Achievement level	Descriptor
0	The student does not reach a standard described by any of the descriptors given below.
1–2	The student **attempts to define** the purpose of the investigation and makes references to variables but these are **incomplete** or not fully developed. The method suggested is **partially complete**. The **evaluation** of the method **is either absent or incomplete**.
3–4	The student **defines** the purpose of the investigation and provides an **explanation/prediction** but this is not fully developed. The student acknowledges **some of the variables** involved and describes how to manipulate them. The method suggested is **complete** and includes appropriate materials/equipment. The **evaluation** of the method **is partially developed**.
5–6	The student **defines** the purpose of the investigation, **formulates a testable hypothesis** and **explains** the hypothesis using scientific reasoning. The student identifies the relevant variables and **explains how to manipulate** them. The student **evaluates** the method commenting on its **reliability** and/or **validity**. The student suggests improvements to the method and makes suggestions for further inquiry when relevant.

Reliability: Refers to measurement of the data. This depends upon the selection of the measuring instrument, the precision and accuracy of the measurements, errors associated with the measurement, the size of the sample, the sampling techniques used, the number of readings.

Validity: Refers to the success of the method at measuring what the investigator wishes to measure. This includes factors such as the choice of the measuring instrument and whether this measures what it is supposed to measure, the conditions of the experiment, and variable manipulation (fair testing).

Criterion E: processing data

Maximum 6

Processing data refers to enabling students to organize and process data. Students should be able to organize and transform data by numerical calculations into diagrammatic form (tables, graphs and charts) and draw and explain appropriate conclusions.

Suitable assessment tasks to assess this criterion include scientific investigations carried out by students, or by others, as well as laboratory reports and studies that provide students with raw data for further processing and analysis.

Achievement level	Descriptor
0	The student does not reach a standard described by any of the descriptors given below.
1–2	The student **organizes** and presents data using **simple numerical or diagrammatic forms** and draws an **obvious conclusion**.
3–4	The student organizes and **transforms** data into **numerical and diagrammatic forms** and presents it using **appropriate communication modes**. The student draws a **conclusion consistent with the data**.
5–6	The student organizes and transforms data into numerical and diagrammatic forms and presents it logically and clearly, using appropriate communication modes. The student **explains trends, patterns or relationships** in the data, comments on the reliability of the data, draws **a clear conclusion** based on the correct interpretation of the data, and explains it using **scientific reasoning**.

Criterion F: attitudes in science

Maximum 6

This criterion refers to encouraging students' attitudes of safety, respect and collaboration. Students are expected to:

- carry out scientific investigations using materials and techniques skillfully and safely and showing respect for the living and non-living environment
- work effectively as a member of a team, collaborating, acknowledging and respecting the views of others as well as ensuring a safe working environment.

Evidence of performance of this criterion should be collected from the observation of students when working in science, individually and in groups. This criterion should be internally assessed but it is not externally moderated.

Achievement level	Descriptor
0	The student does not reach a standard described by any of the descriptors given below.
1–2	The student requires **guidance** and **supervision** when using laboratory equipment. The student can work safely and cooperate with others but may **need reminders**.
3–4	The student uses most equipment competently but might require occasional guidance; on most occasions **pays attention to safety** and works responsibly with the living and non-living environment. The student **generally cooperates** well with other students.
5–6	The student **works largely independently**; uses equipment with precision and skill; **pays close attention to safety** and deals responsibly with the living and non-living environment. The student consistently **works effectively as part of a team**, collaborating with others and respecting their views.