Further guidance for MYP mathematics and sciences

Global contexts

Example explorations for global contexts across the programme can be found in *MYP: From principles into practice* (May 2014). Below are further possible explorations that create additional contexts for teaching and learning in mathematics and sciences. These explorations also invite inquiry from other subject groups into scientific and mathematical contexts. All teachers can develop additional global contexts and authentic explorations that explore subject-specific settings, events or circumstances.

Global context	Example explorations
Identities and relationships	Possible explorations to develop • Mathematical identities, modelling versus reality, equations and variations, the mathematics of epidemics on social media • Relationships—causation and correlation (including spurious correlations) • Data management, what “big data” tells us about ourselves • Financial literacy • Anthropometry
Personal and cultural expression	Possible explorations to develop • Science in national communities; science and communities of faith and personal beliefs • The historic development of the periodic table • Calendars and timekeeping
Scientific and technical innovation	Possible explorations to develop • Rapid prototyping and 3D printing • Genetic mutation and modification • Human microbiomes and personalized medicine • Citizen science and crowd-sourced data
Globalization and sustainability	Possible explorations to develop • Design and scale • Food—ethics, access, printing, security, synthetics and counterfeiting • Scarcity of resources (rare earth metals, helium, resource scares) and green technology
Fairness and development	Possible explorations to develop • Land management, resource allocation and access • Ecology and impact • Fairness in games of chance, data-driven decisions • Mathematical indices of development and human capabilities

Global context	Example explorations
Orientation in space and time	Possible explorations to develop • Indigenous understanding—astronomy, biodiversity erosion • Mensuration and standardization, gravity maps • The geometry of “unbuilt” cities, crowd-sourced cartography, the role/reliability of simulations

Frequently asked questions

MYP *Mathematics guide* (2014)

Mathematics skills framework

Schools can use the framework for mathematics as a tool for curriculum mapping when designing and planning their mathematics courses. **Schools are not expected to address all the branches of the framework in each year of the programme, nor are they required to teach every topic or skill suggested in the framework.** However, over the five years (or complete duration) of the programme, students should experience learning in all four branches of the framework for mathematics.

The subject group guide presents the MYP mathematics skills framework as optional for schools, but is that the case for schools pursuing MYP eAssessment?

For schools not engaging with eAssessment, the framework remains optional. For MYP eAssessment, the skills framework outlines mathematical skills and understanding that students need in order to be prepared for the on-screen examination. Schools can structure courses in mathematics to meet local requirements, adding content and depth of study as best fits the needs of their students.

Objective A: Knowing and understanding

In order to reach the aims of mathematics, students should be able to:

i. select appropriate mathematics when solving problems in both familiar and unfamiliar situations

ii. apply the selected mathematics successfully when solving problems

iii. solve problems correctly in a variety of contexts.

Why don’t strands (ii) and (iii) change at all in the objectives or criteria in years 1, 3 or 5?

As strand (i) increases in difficulty throughout the achievement levels, from “simple problems in familiar situations” (level 1–2) to “challenging problems in both familiar and unfamiliar situations” (level 7–8), strands (ii) and (iii) also implicitly increase in complexity. Success in strands (ii) and (iii) are determined in relation to the difficulty of the problems, that is, strand (i), in objectives and criteria for all year groups.

Objective D: Applying mathematics in real-life contexts

In order to reach the aims of mathematics, students should be able to:

i. identify relevant elements of authentic real-life situations

ii. select appropriate mathematical strategies when solving authentic real-life situations

iii. apply the selected mathematical strategies successfully to reach a solution

iv. justify the degree of accuracy of a solution

v. justify whether a solution makes sense in the context of the authentic real-life situation.

What is meant by the “degree of accuracy” of a solution?

The degree of accuracy refers to the “trueness” or “closeness of agreement” of the solution in real-life contexts. Students should give valid reasons supporting their solution; for example, this may include the range of values found or the significant figures or decimal places in a solution.

MYP *Sciences guide* (2014)

Criterion C: Processing and evaluating

Year 5
Achievement level 7–8: Extract
The student is able to:
• correctly collect, organize, transform and present data in numerical and/ or visual forms

In criterion C, what is meant by "numerical"? Should students show working of averages here?

The term "numerical" here relates to all stages of the data handling—students can collect and present data numerically, as well as visually, by using tables, dataloggers or similar methods. Data can be transformed by averaging, determining the standard deviation, or other appropriate transformations.

Mathematical requirements

On page 25 in the list of mathematical requirements for sciences, the following is listed: "represent arithmetic mean using x-bar notation". Is this really necessary in all reports and labs?

No, this notation can often be difficult to input in typed laboratory reports or when drawing graphs and processing data. Students must be able to represent mean in this way by the end of their MYP sciences course but it is not essential in all reports or presentations. It would be appropriate to incorporate this in the final year of MYP to prepare for the Diploma Programme or further studies.

Practical work

In every year of MYP sciences, all students must independently complete a scientific investigation that is assessed against criterion B (inquiring and designing) and criterion C (processing and evaluating).

What does "independently" mean? Can students share equipment? Can teachers give students formative feedback?

The purpose of this requirement is to ensure that students carry out one complete laboratory-based investigation (from initial design to final evaluation) in every year of the programme. Students should develop independent hypotheses and methods to investigate an appropriately open-ended problem identified in collaboration with their teacher. Students can share equipment, and teachers can provide feedback to ensure sufficient data can be collected. It may be appropriate, particularly in the earlier years of the programme, for students to collaborate and share data, but each student should process data and evaluate results independently. Practicals (laboratory experiments) led entirely by the teacher are not sufficiently open-ended, and therefore do not meet this requirement. In the independent investigation required each year in MYP sciences, criterion B and criterion C must be used together to assess student work. For other investigations, it is possible to assess criterion B and criterion C separately, depending on the structure and purpose of the relevant unit's summative assessment task.

Can simulations be used to collect data in practical investigations?

Yes, although the importance of real-life demonstration, experimentation and inquiry through practical work in teaching and learning should also feature in MYP sciences classes.

Do the *IB Animal experimentation guidelines* apply to the Middle Years Programme as well as the Diploma Programme?

Yes. The guidelines cover all experimental work, anywhere where MYP students may be working. These guidelines can be found on the online curriculum centre (OCC).

Modular sciences courses include two or more discrete sciences taught in rotation. This structure can also include interdisciplinary science units, provided that schools:
• clearly identify student achievement of MYP sciences objectives for each discipline
• provide a balanced selection of science disciplines.

What is the difference between "modular sciences" and "integrated sciences"?

"Modular sciences" refers to the course structure for teaching in schools, see page 16 of the MYP *Sciences guide* (May 2014). "Integrated sciences" denotes the MYP eAssessment subject in which selected topics and related concepts from biology, chemistry and physics are integrated into a single on-screen examination.

The MYP requires at least 50 hours of teaching time for each subject group in each year of the programme.

Does the minimum requirement for 50 teaching hours each year apply to sciences as a whole, or are schools obliged to teach 50 hours in every science discipline taught over the course of an academic year?

50 hours is the requirement for the **subject group**. However, if a school engages in MYP eAssessment, the recommended minimum is 70 teaching hours in each of the final two years of the programme (MYP years 4–5) for **each science course in which the candidate is registered**.