

## **Position Statement on School Mathematics Curriculum in Canada**

(Drafted by a Canadian Mathematics Education Study Group Working group, for discussion with the Canadian Mathematics Society Mathematics Education Forum).

The CMS endorses the general aims of the current K–12 commonly found at the beginning of mathematics curriculum documents across Canada. However, we believe that the structure of these curricula is an obstacle to student learning of mathematics. Over-specified and fragmented lists of expectations misrepresent what mathematics is and militate against deep and authentic engagement with the subject—which, in turn, reduces recruitment and retention of people into the mathematical sciences.

The aim of this document is to describe the necessary preparation for the student who intends to study mathematics in university. We are aware that this statement also implies that change is necessary in undergraduate mathematics programs, including the mathematics programs offered to pre-service teachers.

The practice of mathematics is constantly evolving. Important new approaches include modeling, and numerical and symbolic work with computers. Student needs in such a changing environment cannot be met by adding more topics (or substituting new content for old) within an already overstuffed curriculum. They must be addressed in a more fundamental way.

We find that:

- students coming out of high school mathematics must be able to engage effectively with complex problems; they require the ability to ‘think mathematically’—that is, to investigate the mathematics in a situation, to refine, to expand, and to generalize;
- students’ mathematics concepts must be woven into a connected set of relationships;
- students must be able to independently encounter and make sense out of new mathematics.

These aims should have priority over any specific selection of content; and it is our judgment that it is impossible to achieve these objectives if teachers are required to cover each item on a curriculum list.

In support of our view, we point out that:

- the need for detailed lists of prerequisites in mathematics has been exaggerated. While there is some hierarchy of concepts, a more appropriate image of mathematics centers on the rich problems themselves with their relationships among concepts and that highlights both multiple entrance points into topics and multiple directions for expanding one’s practice.
- a mathematical topic that appears isolated to the students and the teacher reveals a problem of placement and/or selection. Choose topics that offer opportunities to generalize and to connect.
- there are diverse modes of mathematical practice, ranging from established paths and practices of logical reasoning to modeling, investigation, and technology-supported experimentation.

Although a de-emphasis on checklists would result in variations between schools, we believe that the approach to mathematics described herein would not increase problems connected to student movement among schools and educational jurisdictions because it focuses on a central goal of mathematics education—namely, teaching students to think mathematically about a broad range of situations.

While we have not yet made explicit recommendations, we hope that, in the list of this statement, ministries and boards of education will re-examine the following:

- the structures of curriculum documents and the designs of resource materials;
- support for teachers’ initial and on-going development of professional knowledge;
- assessment and reporting of students’ abilities to engage with mathematically rich problems, to think mathematically, and to make sense of mathematics.

The CMS is committed to supporting teachers and curriculum developers in these difficult and important tasks.