



## **SCHOOL ACHIEVEMENT INDICATORS PROGRAM (SAIP)**

**An insert to the SAIP *Report on Mathematics III Assessment, 2001***

### **Highlights from the Public Report**

#### **The Mathematics III Assessment**

SAIP is a cyclical program of pan-Canadian assessments of student achievement in mathematics, reading and writing, and science that has been conducted by the Council of Ministers of Education, Canada since 1993.

Mathematics is the first of the three SAIP subjects to be assessed for the third time. The assessment used a mix of anchor questions drawn from the previous mathematics assessments, along with newly developed items reflecting current pedagogical practices and curricular content. Approximately 41,000 13- and 16-year-old students, English- and French-speaking, were administered the Mathematics III assessment instruments which were designed, developed, and reviewed by representatives of the provinces and territories. As before, half of the students responded to a mathematics content assessment, and half responded to a problem-solving assessment.

The results of these assessments make it possible to measure and document with reliable statistics the growth in achievement in mathematics knowledge and skills for these two age groups across Canada.

#### **Levels of Achievement**

Achievement was described over five levels, representing a continuum of mathematics knowledge and problem-solving skills acquired by students over the entire elementary and secondary school experience. Level 1 describes the very early stages of mathematical knowledge, typical of early elementary education. Level 5 describes the knowledge and skills acquired by a student who has completed a full range of specialized mathematics courses at or near the end of secondary school. Levels of achievement were described separately for knowledge of mathematics concepts and for the demonstration of mathematics problem solving.

Chart One provides a small sample of the criteria used for each level in each assessment. A more complete listing of the criteria for each level may be found in the public report, available on the web at [www.cmec.ca](http://www.cmec.ca).

<b>CHART 1</b> <b>Examples of Level criteria</b>		
<b>Level of Performance</b>	<b>Content</b>	<b>Problem Solving</b>
Level 1	Adds, subtracts and multiplies, using a limited range of natural numbers	Finds single solutions to one-step problems using obvious algorithms and a limited range of whole numbers
Level 2	Extracts and represents data using tables and diagrams	Makes a choice of algorithms to find a solution to one-step problems, using rational numbers
Level 3	Uses length, angle measure, and area involving various plane geometric figures and repetitions of the same geometric transformation	Chooses from two algorithms to find a solution to multi-step problems using a limited range of rational numbers
Level 4	Organizes data, uses measures of central tendency, and calculates the probability of a single event	Adapts one or more algorithms to find solutions to multi-step problems, using the full range of rational numbers
Level 5	Calculates statistical information and the probability of combined events	Creates original algorithms to find solutions to multi-step problems, using the full range of real numbers

### Comparisons for Canada and individual jurisdictions

The following charts compare the results of individual jurisdictions with the results of Canadian students overall.

**NOTE:** For each result, the confidence interval (or statistical uncertainty) is given. For example, a result of  $65.5\% \pm 0.8\%$  indicates a result between  $64.7\%$  and  $66.3\%$ . Therefore, two results are statistically different **ONLY** if their confidence intervals do not overlap.

<b>CHART 2</b> <b>Mathematics content</b> <b>Percentages of 13-year-old students at or above Level 2</b>		
<i>Overall Canada result</i> $64.4\% (\pm 0.8\%)$ of 13-year-old students achieved Level 2 or above		
<b>Above Canada result</b>	<b>Same as Canada result</b>	<b>Below Canada result</b>
Quebec (F) $74.9\% \pm 2.9\%$ Alberta $70.6\% \pm 3.0\%$	Quebec (E) $66.6\% \pm 3.1\%$ Ontario (E) $63.4\% \pm 3.3\%$ British Columbia $60.7\% \pm 2.9\%$	Manitoba (F) $59.2\% \pm 4.0\%$ New Brunswick (F) $57.6\% \pm 3.4\%$ Manitoba (E) $57.2\% \pm 3.0\%$ Newfoundland and Labrador $57.1\% \pm 3.7\%$ Ontario (F) $56.3\% \pm 4.3\%$ Prince Edward Island $52.7\% \pm 3.8\%$ Yukon $52.5\% \pm 7.0\%$ Saskatchewan $52.1\% \pm 3.1\%$ New Brunswick (E) $51.9\% \pm 3.2\%$ Nova Scotia (F) $48.5\% \pm 8.6\%$ Nova Scotia (E) $47.7\% \pm 3.3\%$ Northwest Territories $40.5\% \pm 4.2\%$ Nunavut $8.0\% \pm 2.9\%$

<p align="center"><b>CHART 3</b>  <b>Mathematics content</b>  <b>Percentages of 16-year-old students at or above Level 3</b>  <i>NOTE: Quebec 16-year-olds did not participate in the assessment</i></p> <p align="center"><i>Overall Canada result</i>  49.7 % (± 1.0 %) of 16-year-old students achieved Level 3 or above</p>		
<i>Above Canada result</i>	<i>Same as Canada result</i>	<i>Below Canada result</i>
Manitoba (F) 63.2% ±4.8% Alberta 60.5% ±3.9%	Nova Scotia (F) 55.7% ±9.5% New Brunswick (F) 50.6% ±3.6% Ontario (E) 50.6% ±3.7% Manitoba (E) 48.9% ±3.3% British Columbia 46.4% ±3.3% Yukon 44.5% ±7.6%	Nova Scotia (E) 43.2% ±3.5% Prince Edward Island 43.2% ±4.1% New Brunswick (E) 42.9% ±3.4% Saskatchewan 42.4% ±3.2% Ontario (F) 41.7% ±4.1% Newfoundland and Labrador 36.0% ±3.7% Northwest Territories 35.9% ±5.3% Nunavut 11.8% ±5.1%

<p align="center"><b>CHART 4</b>  <b>Problem solving</b>  <b>Percentages of 13-year-old students at or above Level 2</b></p> <p align="center"><i>Overall Canada result</i>  67.6% (± 0.9 %) of 13-year-old students achieved Level 2 or above</p>		
<i>Above Canada result</i>	<i>Same as Canada result</i>	<i>Below Canada result</i>
Alberta 76.5% ±2.9%	Manitoba (F) 71.1% ±4.0% Quebec (F) 71.0% ±3.6% Quebec (E) 69.2% ±3.3% Ontario (F) 68.8% ±4.5% Ontario (E) 68.7 %±3.3% New Brunswick (F) 65.5% ±3.6% Yukon 63.7% ±7.8% Nova Scotia (F) 57.8% ±10.6%	British Columbia 63.3% ±2.9% Saskatchewan 60.8% ±3.2% Manitoba (E) 60.4% ±3.0% Newfoundland and Labrador 58.2% ±3.9% New Brunswick (E) 57.9% ±3.3% Prince Edward Island 51.8% ±4.2% Nova Scotia (E) 50.9% ±3.4% Northwest Territories 32.9% ±5.1% Nunavut 2.3% ±2.3%

**CHART 5**  
**Problem solving**  
**Percentages of 16-year-old students at or above Level 3**  
*NOTE: Quebec 16-year-olds did not participate in the assessment*

*Overall Canada result*  
*47.1% (" 1.1) of 16-year-old students achieved Level 3 or above*

<i><b>Above Canada result</b></i>	<i><b>Same as Canada result</b></i>	<i><b>Below Canada result</b></i>
Manitoba (F) 59.2% ±5.2% Alberta 59.0% ±4.1% New Brunswick (F) 53.2% ±4.0%	Nova Scotia (F) 49.2% ±12.5% Manitoba (E) 47.6% ±3.4% Ontario (E) 46.5% ±3.9% Saskatchewan 45.3% ±3.4% British Columbia 45.1% ±3.4%	New Brunswick (E) 41.8% ±3.5% Nova Scotia (E) 40.3% ±3.4% Prince Edward Island 39.2% ±4.1% Ontario (F) 38.9% ±4.5% Newfoundland and Labrador 37.4% ±3.9% Yukon 31.5% ±8.1% Northwest Territories 20.0% ±6.9% Nunavut 5.2% ±5.7%

**Gender and Mathematics achievement**

There were small differences in achievement between boys and girls in mathematics content. In mathematics content, for 13-year-old students, slightly more boys than girls achieved levels 4 and 5. For 16-year-old students, slightly more boys than girls achieved levels 3, 4, and 5.

In mathematics problem solving, for 13-year-old students, a higher percentage of girls achieved level 2 than boys. For 16-year-olds, slightly more boys than girls achieved level 5. There were no other differences in achievement between boys and girls.

**Comparisons between 1997 and 2001**

In mathematics content, in 2001, more 13-year-olds and 16-year-olds achieved level 2, than in 1997, but fewer 16-year-olds reached level 3. In problem solving, in 2001, for both age groups, more students achieved levels 2, 3, 4, and 5 than in 1997. This change was particularly marked for 13-year-old students. It should be noted that Quebec 16-year-olds did not participate in the 2001 assessment.

**Pan-Canadian expectations**

In 2001, a pan-Canadian panel of representatives drawn from various sectors of society established a set of expectations to help interpret the results actually achieved by students. This panel of educators and non-educators met jointly in the fall of 2001 to assess whether the student performance results met expectations.

Results of Canadian students of both age groups in both mathematics content and problem solving did not meet the levels expected by the Expectations Panel. Details of these results may be found in the public report.

### **Context for learning**

To better understand the personal and school contexts in which Canadian students learn mathematics, students, their teachers, and their principals completed specific questionnaires. Preliminary observations on apparent links between this data and student achievement are found in the public report. A more complete description of the data collected may be found in the supplementary document to the public report, *Mathematics Learning: The Canadian Context*, which will be released later this year. An even more detailed analysis of the data will be found in the *Mathematics III Technical Report*, also to be released later.