TABLE OF CONTENTS

INTRODUCTION

SCHOOL ACHIEVEMENT INDICATORS PROGRAM (SAIP)

As the year 2000 approaches, Canada, like many other countries, is giving increased attention to its education systems and their performance. Parents, members of the business and industrial communities, concerned taxpayers, and others have asked the question: "How well are our schools preparing students for a global economy and for lifelong learning?"

Attempting to answer this question, ministries[1] of education have participated, since the mid-eighties, in a variety of studies. At the international level, through the Council of Ministers of Education, Canada (CMEC), they took part in the International Educational Indicators Program of the Organisation for Economic Co-operation and Development (OECD); individually, they participated in various achievement studies such as those of the International Assessment of Educational Progress (IAEP) and the International Association for the Evaluation of Educational Achievement (IEA). In addition, in most jurisdictions, the ministries undertook or enhanced measures to assess students at different stages in their schooling.

Since all the ministers of education wished to bring the highest degree of effectiveness and quality to their systems, they recognized a need for collective action to assess these systems. Mindful that achievement in school subjects is generally considered a worthwhile indicator of an education system's performance, the ministers wanted to answer as clearly as possible the following question: "How well are our students doing in mathematics, language, and science?"

It is in that context that, in 1989, CMEC initiated the School Achievement Indicators Program (SAIP), the first-ever attempt by the ministers of education of all provinces and territories to arrive at a consensus on the elements of a national assessment. In December 1991, in a memorandum of understanding, the ministers agreed to assess the achievement of 13-year-olds and 16-year-olds in reading, writing, and mathematics. In September 1993, the ministers further agreed to include the assessment of achievement in science. They decided to administer the same assessment instruments to the two age groups to study the change in student knowledge and skills due to the additional years of instruction. The information collected through the SAIP assessments would be used by each jurisdiction to set educational priorities and plan program improvements.

It was decided that the assessments would be administered in the spring of each year according to the following schedule:

Mathematics	Reading and Writing	Science
1993	1994	1996
1997	1998	1999
2000	2001	2002

The assessments in mathematics, reading and writing, and science took place as scheduled and the results were published in December 1993, December 1994, and January 1997, respectively. The 1997 mathematics assessment administered last April and May brings SAIP into its second cycle.

1. In this report, "ministry" means "department" as well, and "jurisdiction" means both "province" and "territory."

The specific questions posed by the 1997 SAIP mathematics assessment are: “How well do Canadian 13- and 16-year-old students do in mathematics in 1997?” and “Has the achievement of Canadian 13- and 16-year-old students in mathematics changed since 1993?”

Because school curricula differ from one part of the country to another, comparing test data resulting from these diverse curricula is a complex and delicate task. Young Canadians in different jurisdictions, however, do learn many similar skills in reading and writing, mathematics, and science. The SAIP assessments should help determine whether these students attain similar levels of performance at about the same age.

In the SAIP assessments, the achievement of individual students is not identified, and no attempt is made to relate an individual’s achievement to that of other students. The SAIP assessments essentially measure how well each jurisdiction’s education system is doing in teaching the assessed subjects: they do not replace individual student assessments, which are the responsibility of teachers, schools, boards, and ministries of education. Similarly, no attempt is made to compare schools or school districts. The results are reported at the Canadian and jurisdictional levels only.

IMPORTANT ASSUMPTIONS FOR THIS ASSESSMENT

The primary assumption for this assessment is that the five levels of performance represent the potential progression of all students in the sample. However, not all students continue in formal mathematics programs throughout their secondary school career. Since the sample included 13-year-olds and 16-year-olds, some participants, particularly in the older population, may not have taken mathematics courses for two years or more. The sequence of mathematics courses is also not the same for all students in all jurisdictions. The number of required courses, their degree of specialization in the traditional areas of mathematics, and the stress on particular topics vary from jurisdiction to jurisdiction. For example, more time is devoted to algebra and functions in some jurisdictions, and courses in other jurisdictions emphasize measurement and geometry to a greater extent than others. In addition, concepts and mathematical procedures are introduced in different grades in the various jurisdictions. For these reasons, the *SAIP Mathematics Assessment Criteria* was originally drafted to reflect the breadth of what students should know and be able to do in the four areas of the assessment framework.

A second assumption was that the 1997 SAIP mathematics assessment results would be comparable with the 1993 results. It was extremely important that full equivalency of instruments be established, or that any differences be documented. Therefore, through new field testing and data analysis, updated materials were examined to ensure that they measured the same concepts and skills in the same manner as in 1993.

OVERVIEW OF THE 1997 MATHEMATICS ASSESSMENT

In April and May 1997, the SAIP mathematics assessment was administered to a random sample of students drawn from all jurisdictions. Approximately 48,000 students made up the total sample—26,000 13-year-olds and 22,000 16-year-olds. About 36,000 completed the mathematics assessment in English, and 12,000 in French. Detailed breakdowns of the numbers of students assessed in each jurisdiction are presented in the appendix.

Students’ understanding of mathematics content and their ability in mathematics problem-solving were assessed. Students were randomly assigned to an assessment of either content or of problem solving. The content component focused on their knowledge of numbers and operations, algebra and functions, measurement and geometry, and data management and statistics. The problem-solving component covered their skills with regard to a range of problems and solutions including the use of numbers and symbols; the ability to reason and to construct proofs; providing information and making inferences from databases; pursuing evaluation strategies; and demonstrating communication skills.

DEVELOPMENT OF THE ASSESSMENT MATERIALS

The 1997 SAIP mathematics assessment materials were essentially those developed for the 1993 assessment in the same subject. The development of the 1993 SAIP mathematics assessment began in 1991 and was led by a consortium of Alberta, Quebec, and Ontario representatives who worked in cooperation with representatives of other ministries of education. These specialists were asked to develop mathematics material that would describe and assess the achievement of Canadian 13- and 16-year-olds. Criteria were developed for five performance levels based on the National Council of Teachers of Mathematics document entitled *Curriculum and Evaluation Standards for School Mathematics*. Two types of instruments were developed, the first for mathematics content instruments, and the second for mathematics problem-solving instruments.

The instruments were field-tested three times between October 1991 and November 1992. Comments by teachers whose students took part in the field tests were very useful in the revision process. These comprehensive critiques included comments on the instructions, administrative procedures, time allotments, scoring criteria, and student questionnaire. The assessment developers also considered students' comments about the questions, problems, and administrative procedures. Field-test scorers' comments and test results attested to the appropriateness and range of difficulty of the questions, problems, instructions, and administrative procedures. In the case of the problem-solving assessment, deliberations at the marking session also confirmed the effectiveness of the criteria and the procedures for scoring so that students would be placed at the appropriate skill level. For the field-tested items, statistical analyses, which ensure an optimum measure of predictability, were used in the process of selecting the items that would be included in the final test booklets.

The consortium responsible for the 1997 SAIP mathematics assessment was formed in April 1996 and included representatives from British Columbia, Ontario, Quebec, and New Brunswick (F). Its task was to examine and update the assessment materials and, where necessary, take into account the data and comments from the 1993 administration, while making sure the modified materials would measure the same concepts and skills in the same manner as in 1993.

For mathematics content, criteria remained the same but, following an analysis of the 1993 data, four multiple-choice items were replaced and about 20 other items had very minor changes, mostly aiming at clearer language. Although the items were essentially the same as those used in 1993, the test booklets were packaged in a different manner; the background questionnaire, placement test, and 125 questions were all included in the same booklet. Following these modifications, all the instruments were field-tested in the fall of 1996. Further statistical analyses of the results were done to determine whether the changed items altered the measuring characteristics of the instruments. Analysis showed that no changes in the test instruments would account for observed differences between the results of the 1993 and 1997 assessments.

In problem solving, the assessment comprised fewer mathematical problems: six rather than nine. Four problems were identical, but the other two were modified from their 1993 formulation. All students completed the same test booklet, which contained all the problems. The problems were field-tested, and 1997 data were compared with 1993 data.

Changes to packaging and administration may have effects on the observed results of any assessment. A replication of the 1993 content administration on a separate national sample of 13- and 16-year-olds was carried out at the same time as the 1997 administration. It was concluded that changes made to the 1997 administration procedures did not result in major changes in the measurement characteristics of the assessment. It should be noted that detailed analyses done in the course of developing and modifying the instruments used in this assessment will be included in the technical report, which will be available in the spring of 1998.

COMPARABILITY OF 1993 AND 1997 ASSESSMENTS

The 1997 mathematics content assessment, as already mentioned, was essentially the same as the one used in 1993 except for the following changes. Only four questions out of 125 were replaced and they affected solely level 4. Minor language changes were also made in about 20 questions to enhance clarity. The assessment developers feel that, even though the administration of the assessment was simplified, it is possible to compare with a reasonable degree of confidence the results of both years in mathematics content.

In the case of the problem-solving assessment, the analysis of data from the 1993 administration indicated that some problems did not measure achievement as optimally as they could. Also, the two test booklets used for that administration, as well as the number of problems, were judged to be too onerous for the allotted time period. It was suggested that a single booklet and a reduced number of problems be used for 1997. So, instead of the nine problems of 1993, there were only six problems in 1997. Of those six problems, only four were the same as those used in 1993. Given the magnitude of the changes, the assessment developers feel that it would not be wise to compare both assessments in their entirety. However, they believe that comparing performance relative to the four common problems is quite legitimate. Consequently, for problem solving, only this comparison of the performance on the four common problems is presented in the charts showing change over time in this report.

In the sampling procedure, student selection was modified slightly. In 1997, students were selected without any exclusions while, in 1993, schools could exclude students before the final sample was drawn. It is likely that more marginal students were included in the 1997 sample, which would mean that more students would not meet the criteria for level 1. This change would also reduce the proportion of students in the overall sample that met the criteria for each of the levels, such that minor declines would be anticipated for 1997 compared with 1993.

LIMITATIONS OF THE ASSESSMENT

Although the content of the 1997 SAIP mathematics assessment was consistent with that of mathematics programs across Canada, there are some limitations that should be noted. The assessment focuses on knowledge and skills that can be measured by a paper-and-pencil test. The following dimensions of mathematics, which are important elements of some mathematics programs, were not assessed: the ability to work with manipulatives to solve problems, group problem-solving skills, and the exploration of complex mathematical issues. These dimensions of mathematics programs often represent important outcomes and also reflect critical processes in the teaching of mathematics. These complex skills and processes are more appropriately measured through a variety of techniques such as interviews, portfolios, and performance-based assessments using manipulatives.

HARMONIZATION OF ENGLISH AND FRENCH ASSESSMENT INSTRUMENTS AND PROCEDURES

From the outset, the content instruments used in the 1997 SAIP mathematics assessment were developed by anglophone and francophone educators working together for the purpose of minimizing any possible linguistic bias. Whether they wrote in French or in English, the students were asked to respond to the same questions and solve the same problem tasks. A linguistic analysis of each question and problem was also conducted to make sure French and English items functioned in the same manner. For the marking sessions, francophone and anglophone coders were jointly trained and did the marking together in teams working in the same rooms. Consequently, the statistical results presented for each language group in this report can be compared with reasonable confidence.

ASSESSMENT FRAMEWORKS AND CRITERIA

FRAMEWORK FOR THE WRITTEN ASSESSMENT

There were two test booklets for students who wrote the mathematics content assessment. Booklet 1 contained 27 background questions, 15 multiple-choice placement questions (from level 3) and 110 questions grouped in five sections according to levels of performance. Booklet 2 contained space for recording answers.

All students began with the background questions and then moved on to the placement test. When the 15-question placement test was completed, students raised their hands to indicate this, and their responses were immediately scored by the supervising teacher, using a template over the appropriate section. Students who scored 0 to 10 were to begin the 110 questions at question 16 (section A). Students who scored 11 to 13 were to begin at question 41 (section B). Students who scored 14 or 15 were to begin at question 66 (section C). Students were to carefully complete as many questions as possible in the remainder of the two and one-half hours.

The mathematics content questions assessed student achievement in these areas:

- numbers and operations
- algebra and functions
- measurement and geometry
- data management and statistics

Approximately 40% of the questions in each section assessed the student's understanding of major concepts. A student could be asked to:

- label, explain, or define concepts
- identify suitable true and false examples of concepts
- suggest new ways of representing concepts

Approximately 30% of the questions in each section assessed the student's knowledge of procedures. A student could be asked to:

- recognize when a particular procedure should be used
- carry out procedures to solve particular questions
- modify familiar procedures to solve new problems

Approximately 30% of the questions in each section assessed the student's ability to solve problems. A student could be asked to:

- formulate problems
- apply a variety of strategies to solve problems
- produce solutions to problems
- verify that particular solutions are valid

SUMMARY CRITERIA FOR THE MATHEMATICS CONTENT ASSESSMENT

The student's performance in mathematics content was measured based on five levels of achievement. The test questions were developed so that a student's performance could be classified at one of the five levels. Summary criteria for the mathematics content assessment are given below. It is important to realize that these are only samples taken from each strand from the more detailed *SAIP Mathematics Assessment Criteria*, which will appear in the technical report. These summary criteria may be used to gain a general impression of their difficulty, but are by no means a complete list.

A student at LEVEL 1 can:

- add, subtract, divide, and multiply, using a limited range of natural numbers
- use concrete materials and diagrams to represent simple relations
- determine linear dimensions of recognizable simple plane figures
- read information from very simple tables

7. The points at a sporting competition are awarded as follows:

First Place:	100 points
Second Place:	10 points
Third Place:	1 points

Juan finished first, second, or third in eight events. His total was 251 points.

How many first place results did Juan win?

* A. 2 B. 8 C. 15 D. 111

19. Akiko has to travel a total of 802 km from Quebec City to Toronto for a business meeting. When she reaches Montreal, Akiko has travelled 256 km.

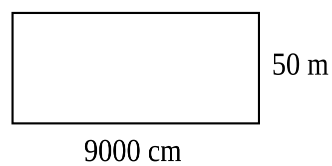
What further distance must Akiko travel in order to get to Toronto?

answer = 546 km

A student at LEVEL 2 can:

- use the four basic operations with natural numbers
- use patterns and classifications in real-life situations and plot points on a grid
- calculate dimensions and areas of plane figures, classify solid forms, and use single geometric transformations
- extract and represent data using tables and diagrams

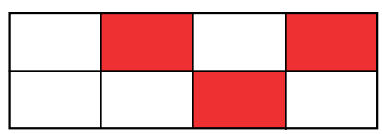
13. James wants to run the perimeter of a playing field, the dimensions of which are marked in centimetres and metres.



What distance will James cover by running once around this field?

A. 280 cm   * B. 280 m   C. 18 100 cm   D. 18 100 m

17. Parts of the figure below are shaded.



What fraction of the figure is represented by the shaded parts?

Answer = 3/8

A student at LEVEL 3 can:

- use the four basic operations with integers
- use monomial algebraic expressions and plot points on a Cartesian grid
- use length, angle measure, area, and volume involving various plane geometric figures and repetitions of the same geometric transformation
- use information from various sources and calculate arithmetic mean and simple probabilities

4. The weekly salary for a part-time job selling shoes in a shoe store is calculated using the formula

$$\text{Salary} = 5h + \frac{v}{15}$$

where h represents the number of hours worked and v represents the dollar value of the shoes sold in a particular week. A salesperson worked 18 hours and sold $885 worth of shoes that week.

What was that week's salary for this salesperson?

A. $65.00   B. $90.00   * C. $149.00   D. $296.20

7. Francis decides to calculate his net worth to see if he can buy rollerblades that cost $89.95, including tax. Francis has:

- 12 dollars and 3 quarters in his coat
- $25.75 in his wallet
- a cheque for $20 from babysitting
- a debt of $3.25 that he owes to his brother

After paying his debt, how much more money does Francis need to buy the rollerblades?

A. $28.20   * B. $34.70   C. $55.25   D. $61.75

A student at LEVEL 4 can:

- use the four basic operations with the full range of rational numbers
- use and graph polynomial algebraic expressions and simple functions
- use the characteristics of solid forms, congruence and similarity in polygons, and compositions of plane transformations
- organize data, use measures of central tendency, and calculate the probability of a single event

2. You are asked to find the numerical value of the following expression:

$$\frac{2x^4z + 4x^3y^2z}{4z}$$

where x = -2, y = $\frac{1}{2}$ and z = -1

What is the numerical value of this expression?

A. -4   * B. 6   C. 16   D. 28

16. The Drake Auditorium has seating for 2000 people. The tickets for a concert are $11.50 for adults and $6.25 for students. All seats in the auditorium are sold for the concert. Three-quarters of the tickets are sold to students and the remaining tickets are sold to adults.

How much money is collected from the sale of tickets for this concert?

answer = $15 125

A student at LEVEL 5 can:

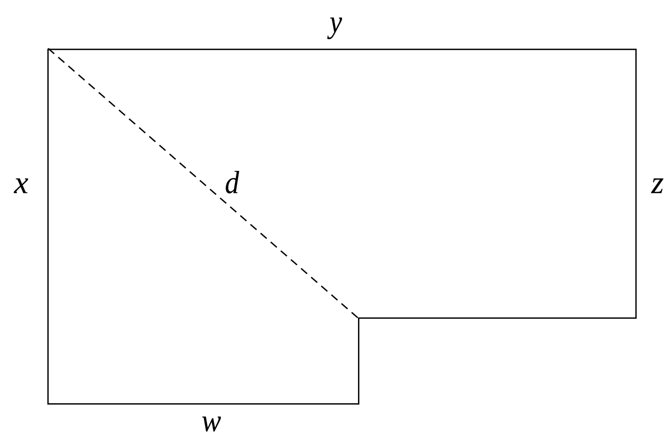
- use the four basic operations with the full range of real numbers
- use and graph algebraic expressions with two variables and various functions
- use the properties of circles and right-angle triangles
- calculate statistical information and the probability of combined events

10. A drafting student must construct a symbol. The symbol consists of a circle of radius 30 cm and an inscribed equilateral triangle. A metallic wire is used to outline the perimeter of the triangle.

To the nearest centimetre, what is the length of metallic wire needed?

A. 90 cm   * B. 156 cm   C. 180 cm   D. 188 cm

8. The following diagram is a house plan. All corners are square.



What is the length of a diagonal *d* in terms of variables given in the diagram?

A. $d = \sqrt{x^2 + y^2}$ * B. $d = \sqrt{w^2 + z^2}$ C. $d = \sqrt{x^2 + w^2}$ D. $d = \sqrt{y^2 + z^2}$

There were two booklets for students who wrote the assessment of problem solving. Booklet 3 contained 27 background questions and 15 multiple-choice mathematics content items. Booklet 4 contained space for recording answers to the background questions and the 15 multiple-choice items, as well as 6 extended-response problems. The first problem was made up of three parts; one problem had four parts, while the remaining four problems had five parts each. Students were to attempt as many parts of one problem as possible before going on to the next problem. When a difficulty was encountered in a problem, the student was advised to go to the next problem and come back to the impasse only when all six problems had been attempted. Students had the remainder of the two and one-half hours to complete the assessment.

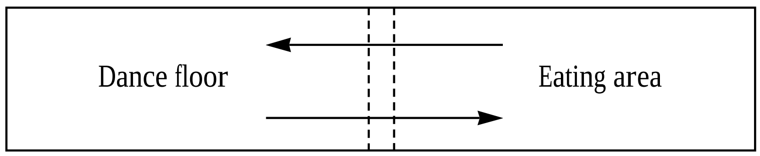
The mathematics problem-solving problems assessed different aspects of a student's ability to solve problems. The student could be asked to:

- formulate problems
- apply a variety of strategies to solve problems
- construct mathematical models that correspond to verbal statements or problems
- produce both accurate and approximate solutions to problems
- verify that particular solutions are valid
- communicate solutions to problems and problem-solving methods
- evaluate the validity of mathematical models and solutions to problems

As in the assessment of mathematics content, student performance in mathematics problem solving was measured based on five levels. Level 1 represents a very limited ability in problem solving, while level 5 represents the highest achievement in problem solving. Summary criteria for the mathematics problem-solving assessment are given below. It is important to realize that these are only samples taken from each strand from the more detailed *SAIP Mathematics Assessment Criteria*, which will appear in the technical report. These summary criteria may be used to gain a general impression of their difficulty, but are by no means a complete list.

Sample Question:

4. A total of 1500 people attended a wedding party. The area used for the wedding party was divided into a dance floor and an eating area, as shown in the diagram below.



a. At 7:00 p.m., there were 375 people on the dance floor.

How many people were in the eating area at 7:00 p.m.?

b. Every half hour, one-fifth of the people on the dance floor move to the eating area and two-fifths of the people in the eating area move to the dance floor.

How many people were in the eating area after the 7:30 p.m. move?
Show all your work.

c. There were 900 people on the dance floor after the 8:00 p.m. move.

Using the rules given in part b, how many people were on the dance floor after the 9:00 p.m. move?
Show all your work.

d. Eventually the number of people on the dance floor and the number of people in the eating area will remain fixed.

How many people will be on the dance floor and how many people will be in the eating area when the numbers reach this fixed state?
Show all your work.

A student at LEVEL 1 can:

- find single solutions to one-step problem using obvious algorithms and a limited range of whole numbers
- use one case to establish a proof

a.

$1500 - 375 = \underline{\underline{1125}}$ (people)

A student at LEVEL 2 can:

- make a choice of algorithms to find a solution to a) multi-step problems, using a limited range of whole numbers or b) one-step problems, using rational numbers
- use more than one particular case to establish a proof
- use common vocabulary to present solutions

b.

$\frac{2}{5}(1125)$
= 450 moved from eating

$\frac{1}{5}(375)$
= 75 people moved

A student at LEVEL 3 can:

- choose from two algorithms to find solutions to multi-step problems, using a limited range of rational numbers
- use necessary and sufficient cases to establish proof
- use mathematical vocabulary, imprecisely, to present solutions

b.

dance floor

$D = 375 - (375)(\frac{1}{5}) + (1125)(\frac{2}{5})$

$D = 750$ people in dance area

eating area

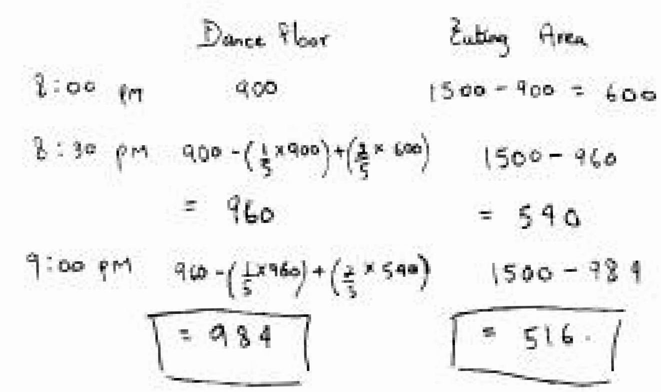
$E = 1125 - (1125)(\frac{2}{5}) + 375(\frac{1}{5})$

$E = 750$ people in eating area

A student at LEVEL 4 can:

- adapt one or more algorithms to find solutions to multi-step problems, using the full range of rational numbers
- construct structured proofs that may lack some detail
- use mathematical and common vocabulary correctly, but solutions may lack clarity for the external reader

c.



	Dance Floor	Eating Area
8:00 pm	900	$1500 - 900 = 600$
8:30 pm	$900 - (\frac{1}{5} \times 900) + (\frac{2}{5} \times 600)$	$1500 - 960$
	$= 960$	$= 540$
9:00 pm	$960 - (\frac{1}{5} \times 960) + (\frac{2}{5} \times 540)$	$1500 - 984$
	$\boxed{= 984}$	$\boxed{= 516.}$

A student at LEVEL 5 can:

- create original algorithms to find solutions to multi-step problems, using the full range of real numbers
- construct structured proofs that provide full justification of each step
- use mathematical and common vocabulary correctly, and provide clear and precise solutions

d.

The # of people on the dance floor and the # of people in the dining area will be fixed when:

Let x rep. the # in dining area
Let $1500-x$ rep the # on dance floor

$\frac{1}{5}$(# on dance floor) = $\frac{2}{5}$(# eating area)

$$\frac{1}{5}(1500-x) = \frac{2}{5}x$$

$$300 - \frac{x}{5} = \frac{2}{5}x$$

$$300 = \frac{2x}{5} + \frac{x}{5}$$

$$1500 = 2x + x$$

$$\frac{1500}{3} = x$$

$$500 = x$$

∴ when there will be 500 people in the dining area, and 1000 people on the dance floor when it reaches the fixed state

RESULTS OF THE 1997 MATHEMATICS ASSESSMENT

In this report, performance by level charts are based on **cumulative results** and actually show percentages of students at or above each level. The inference here is that students performing, for example, at level 5 have also satisfied the criteria for levels 1, 2, 3, and 4.

NOTES ON STATISTICAL INFORMATION

Confidence Intervals

In this study, the percentages calculated by the researchers were based on samples of students and are only estimates of the actual achievement students would have demonstrated had all students in the population taken the assessment. Because an estimate based on a sample is rarely exact, it is common practice to provide a range of percentages within which the actual achievement level might fall. This range of percentage values is called a confidence interval and represents the high- and low-end points between which the actual achievement level should fall 95% of the time. In other words, one can be confident that the actual achievement level of all students would fall somewhere into the established range 19 times out of 20, if the assessment were repeated with different samples of the same student population.

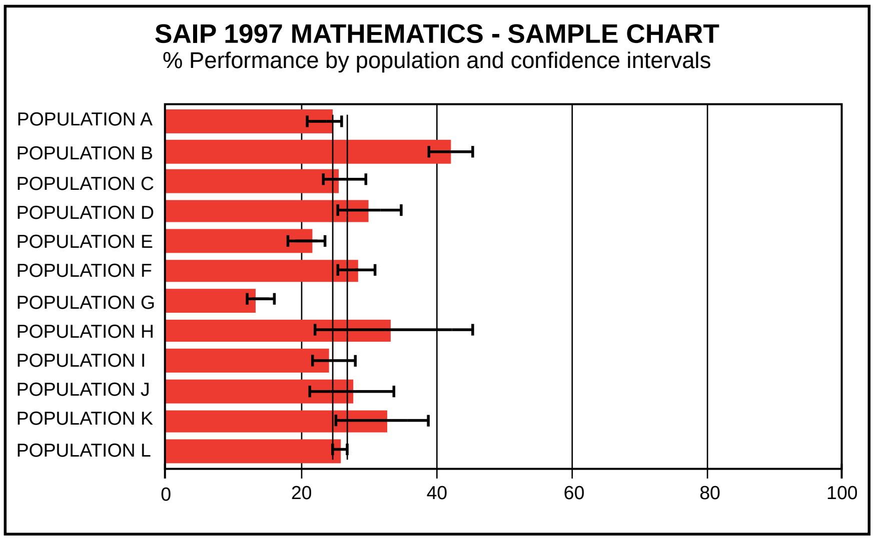
In the charts in this report, confidence intervals are represented by |—|. If the confidence intervals overlap, the differences are not statistically significant. It should be noted that the size of the confidence interval depends upon the size of the sample. In smaller jurisdictions, a large interval may indicate difficulties in achieving a large sample, and does not necessarily reflect on the competency of the students who were administered the assessment. Note that no confidence interval is shown for Nova Scotia (F) because all students in both age groups took part in both assessment components.

Differences

In this report the terms “difference” or “different”, used in the context of performance levels and percentages, refer to a difference that is not due to chance. In a technical sense, they refer to a **statistically significant difference**.

SAMPLE CHART

The following chart is provided to help readers interpret the confidence intervals used in this report. For example, there is no significant difference between population L and populations A, C, D, F, H, I, J, and K, but there is a significant difference between population L and populations B, E, and G because their confidence intervals do not overlap.



RESULTS FOR CANADA

In both components of the 1997 SAIP mathematics assessment, there is a significant difference between the performances of the 13-year-old group and those of the 16-year-old group at each of the five levels. The following charts, based on frequency tables included in the appendix, show a greater percentage of older students at the higher levels (3 to 5) and a smaller percentage of these students at the lower levels (1 and 2). It was, of course, anticipated that older students would attain higher levels. However, these results, which are obtained through the administration of validated mathematics instruments to the largest samples of Canadian students ever, provide useful statistical evidence on the difference in knowledge of mathematics content and in problem-solving skills between the two age groups. No comparison should be made between performances in mathematics content and those in problem solving, as the assessment instruments for each component were based on different and not comparable criteria.

CHART 1

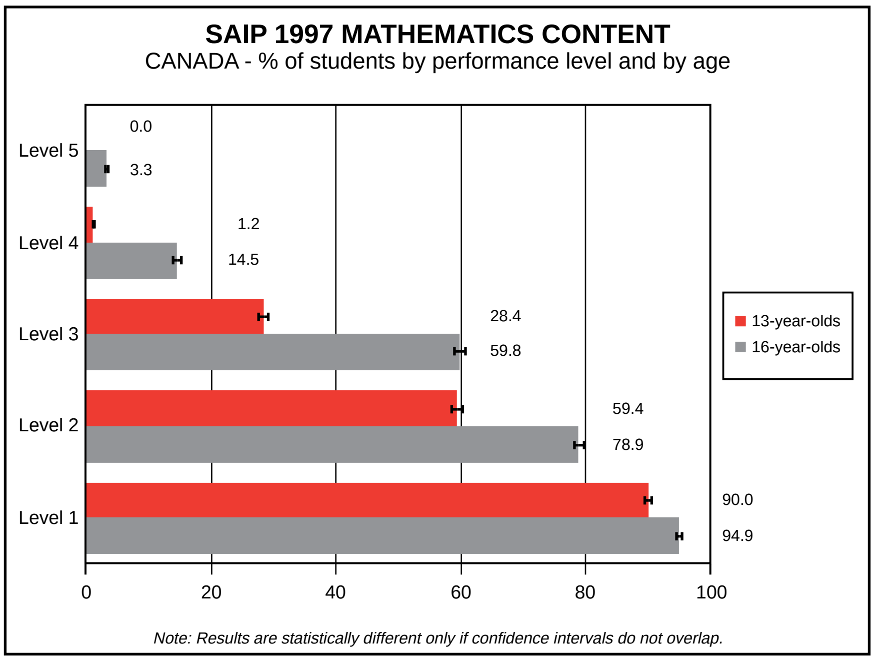
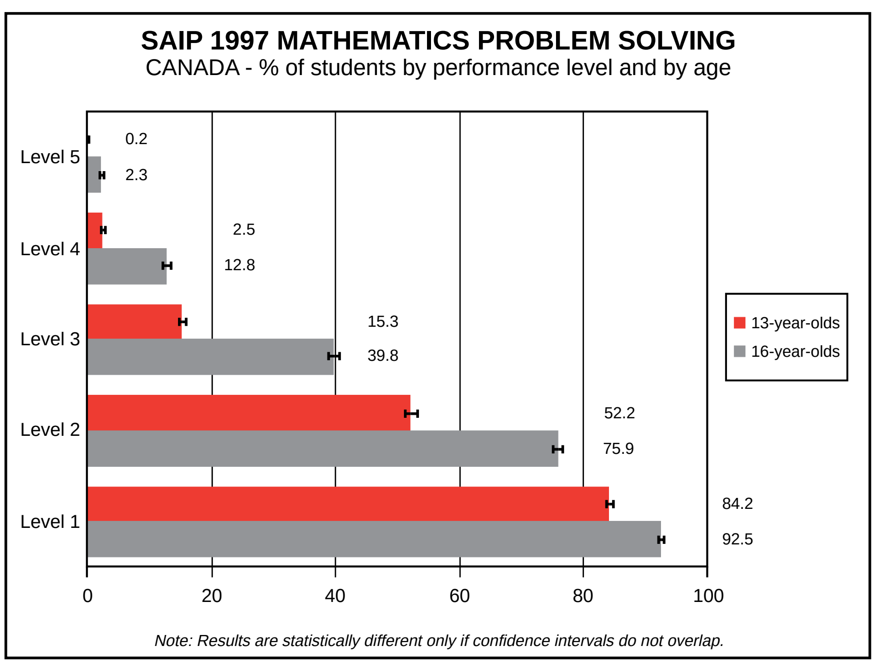


CHART 2



Achievement Differences in Mathematics Content between 1993 and 1997

In mathematics content, there is no significant difference in the performance of 13-year-olds at the higher levels between the 1993 and the 1997 administrations, but percentages at levels 1 and 2 are significantly lower in 1997. The 16-year-olds show a significantly higher percentage at level 5 and significantly lower percentages at levels 1 and 2 in 1997 than in 1993. Caution must be used in drawing conclusions from the comparison, particularly at lower levels, of 1993 and 1997 performances. In 1997, all students in each school were included for sampling in order to get a complete picture of the student population. In 1993, certain students were excluded prior to the sample being drawn.

CHART 3

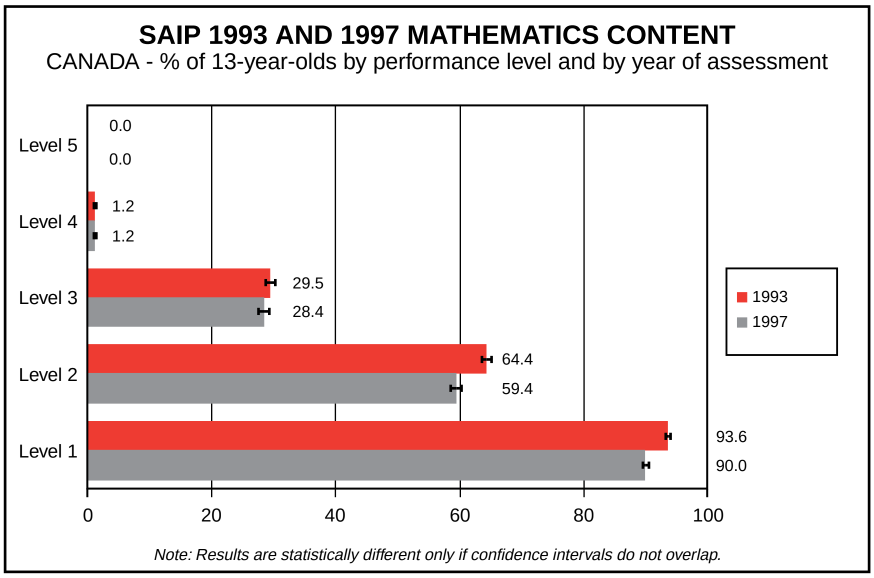
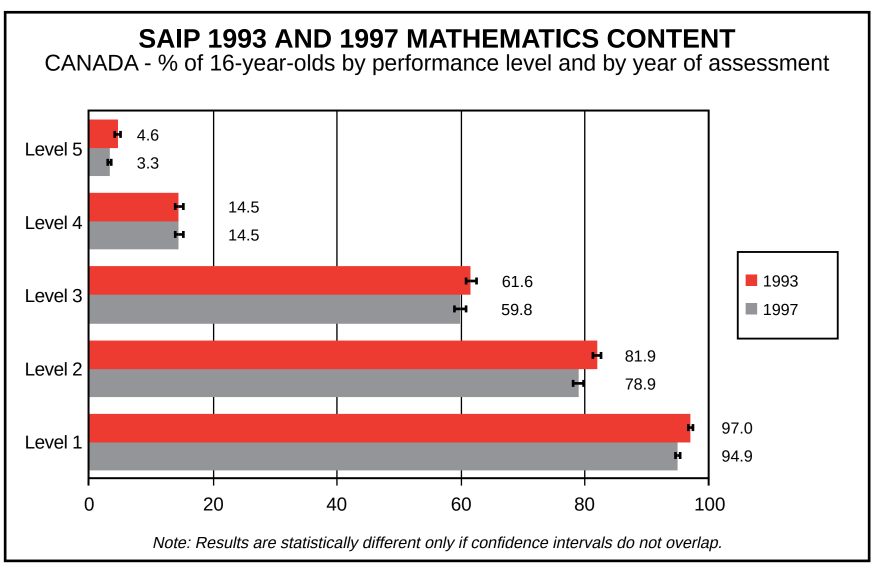


CHART 4



Achievement Differences between 1993 and 1997 in the Four Problem-solving Questions Common to both Administrations

These charts show the results of the four mathematical problems that were administered without modifications in both 1993 and 1997. To permit comparison, a new set of rules was used to assign levels in marking students' answers for both years. Levels are indicated by letters A to E, and level assignment rules are indicated in brackets (i.e., at level C, the student had to successfully answer two out of the four parts included in the problems corresponding to that level). For 13-year-olds, 1997 percentages are significantly lower at all levels, except level D. For 16-year-olds, 1997 percentages are significantly lower at levels A and B, and significantly higher at levels D and E. Again, caution must be used in drawing conclusions from the comparison, particularly at lower levels, of 1993 and 1997 performances. In 1997, all students in each selected school were included for sampling in order to get a complete picture of the student population. In 1993, certain students were excluded prior to the sample being drawn.

CHART 5

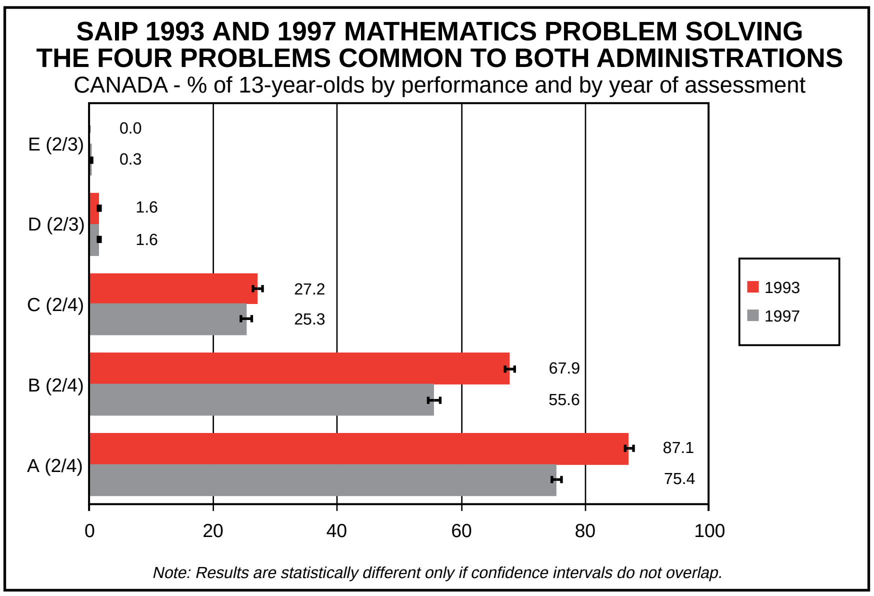
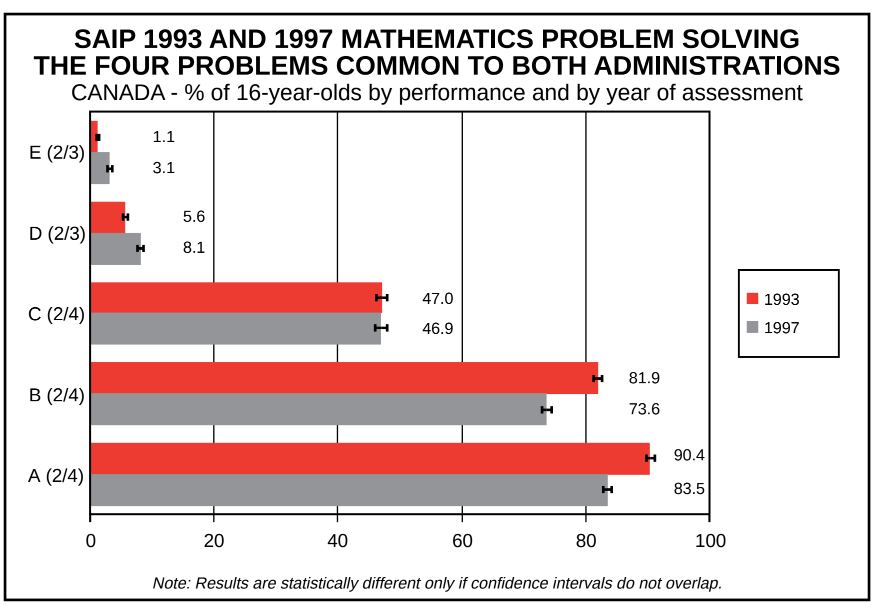


CHART 6



Pan-Canadian Expectations and Results in Mathematics Content

For mathematics content, 13-year-old student achievement closely matches the expectations at level 1 and level 5. Performance is short of expectations at level 3. Smaller gaps between expected and actual performance are evident at levels 2 and 4. Sixteen-year-olds meet expectations for level 1 but are well short of them at level 4. Smaller gaps are evident at levels 2, 3, and 5. The process used to define pan-Canadian expectations is described in the appendix.

CHART 7

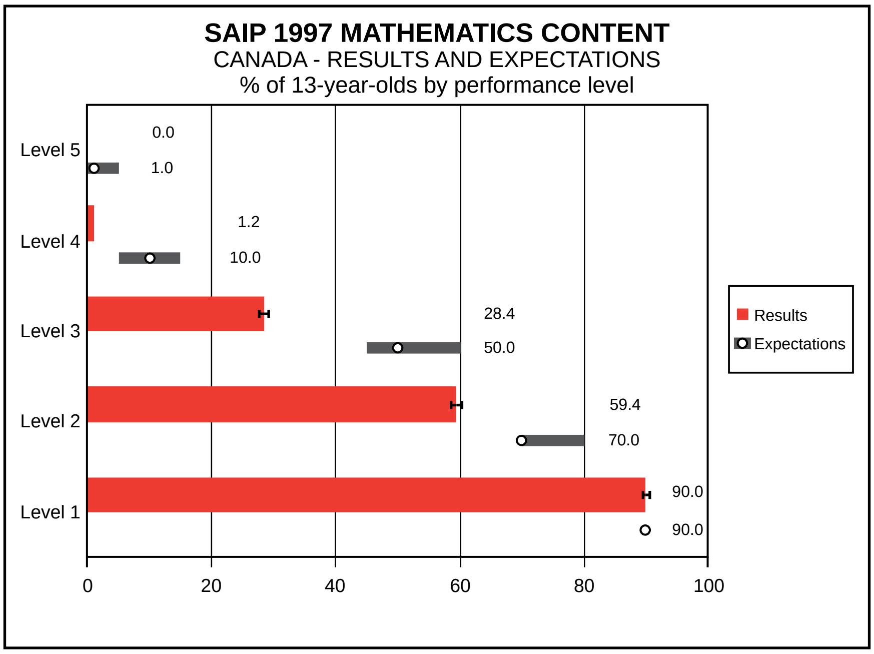
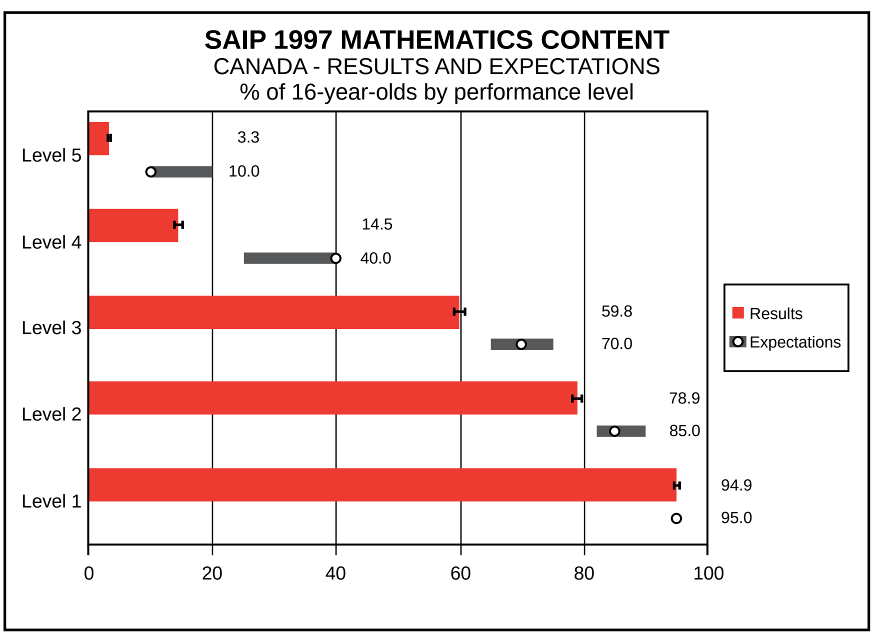


CHART 8



Note that “Expectations” are represented by medians with the 25th to 75th percentile range. For “Results,” confidence intervals are based on sampling error, as is the case for all other charts in this report.

For problem solving, 13-year-old student achievement closely matches the expectations at level 1 but is well short of them at level 3. Smaller gaps between expected and actual performance are evident at levels 2 and 4. Sixteen-year-olds generally match expectations for level 1, but are well short of them at level 3. Smaller gaps are evident at levels 2, 4, and 5. The process used to define pan-Canadian expectations is described in the appendix.

CHART 9

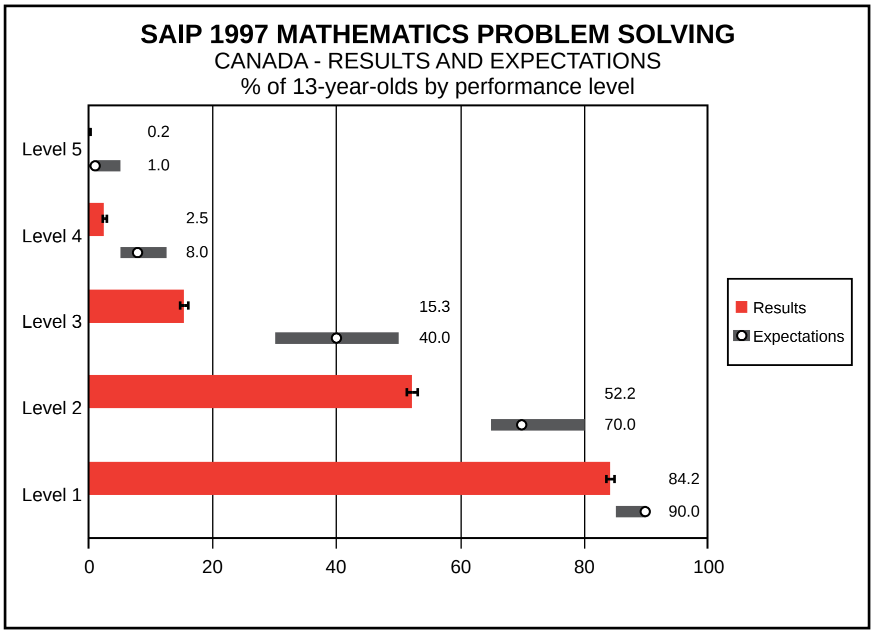
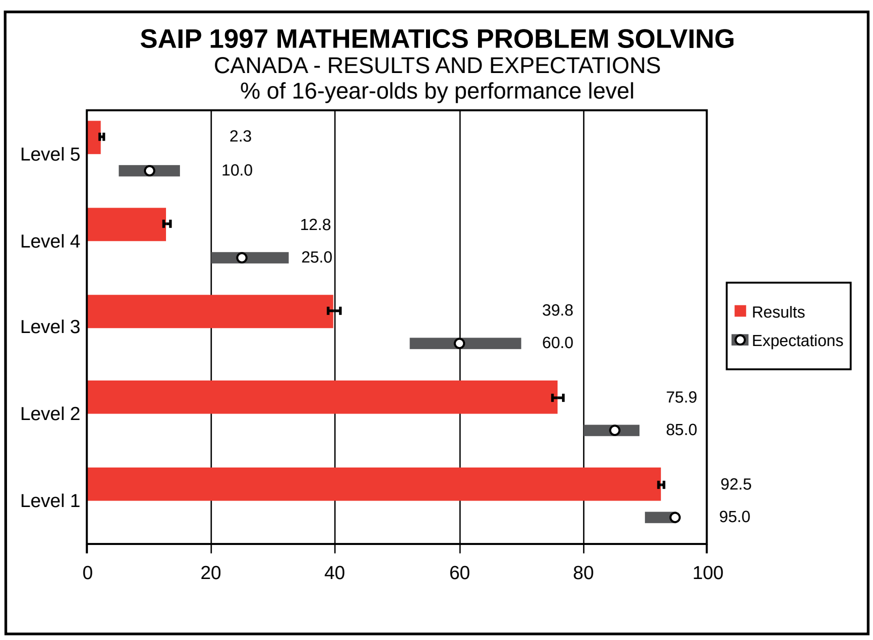


CHART 10



Note that “Expectations” are represented by medians with the 25th to 75th percentile range. For “Results,” confidence intervals are based on sampling error, as is the case for all other charts in this report.

Achievement Differences in Mathematics Content by Gender

The following charts show that there is no significant difference in performance between 13-year-old females and males in the mathematics content assessment, except at level 1. However, 16-year-old males show significantly higher percentages at levels 3, 4, and 5, and a significantly lower percentage at level 1 than females of the same age.

CHART 11

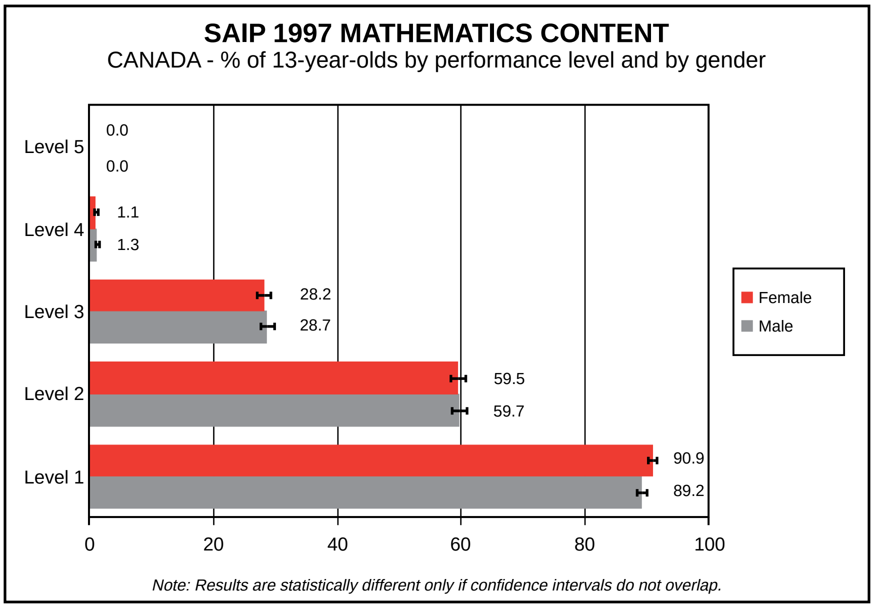
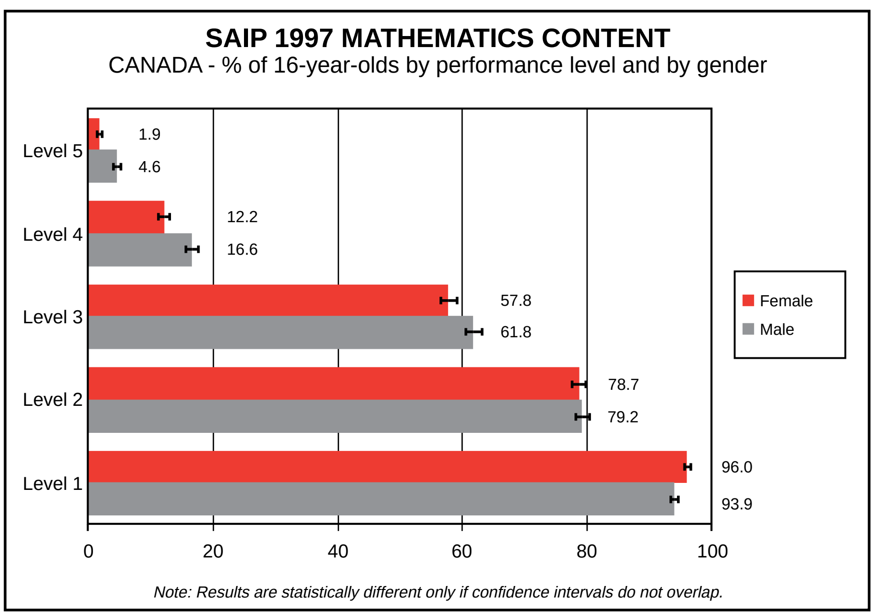


CHART 12



Achievement Differences in Mathematics Problem Solving by Gender

In mathematics problem solving, 13-year-old males show significantly higher percentages at levels 3 and 4 and significantly lower percentages at levels 1 and 2. Sixteen-year-old males show significantly higher percentages at levels 4 and 5, and significantly lower percentages at levels 1 and 2 than females of the same age.

CHART 13

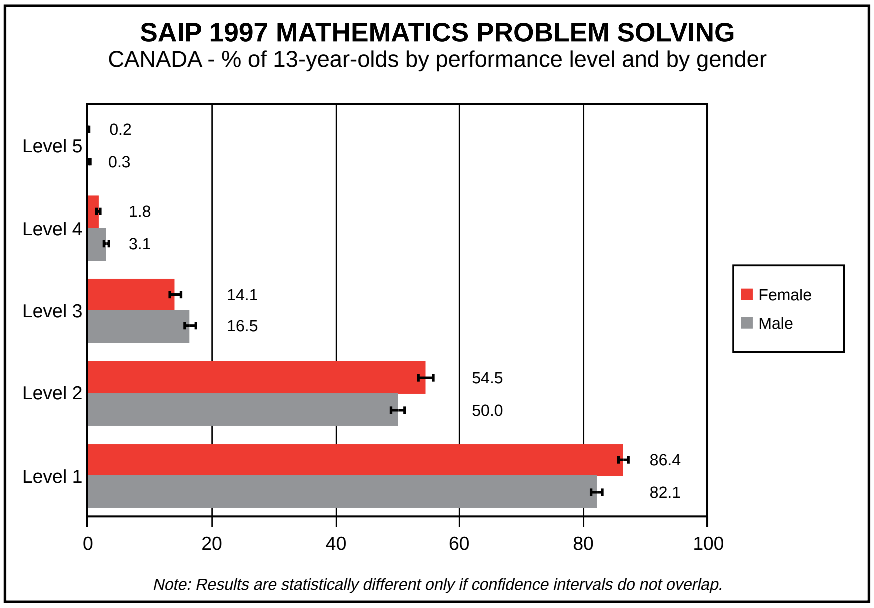
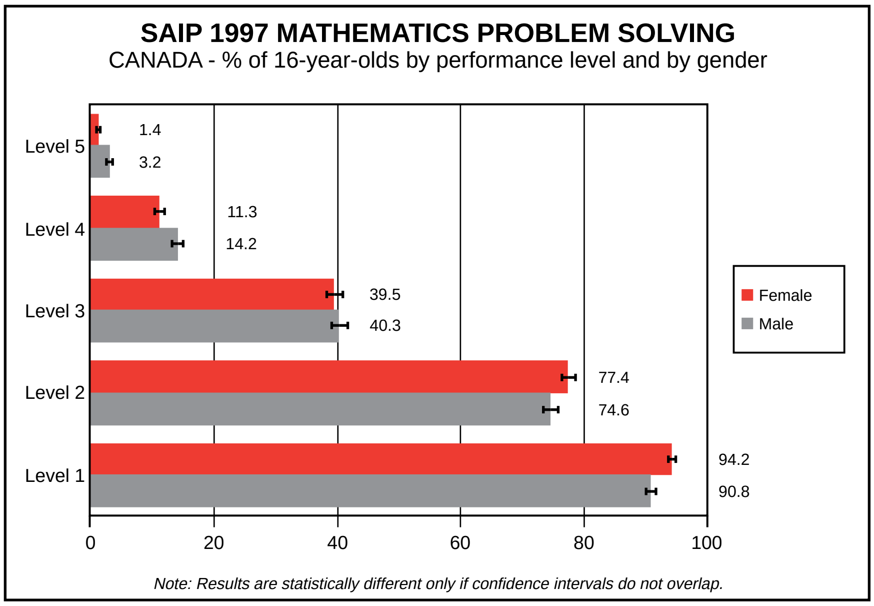


CHART 14



RESULTS FOR THE JURISDICTIONS

This section of the report presents the charts entitled "Overview of Achievement by Level". Results are then shown for each participating jurisdiction.

Overview of Achievement by Level

The following charts present the **cumulative achievement levels** for all jurisdictions, together with the overall Canadian results. The data shown are an overview, and display the percentage of students at or above a particular level. Results do vary from jurisdiction to jurisdiction. In some cases, achievement in one is significantly different from another, or from Canada as a whole.

CHART 15

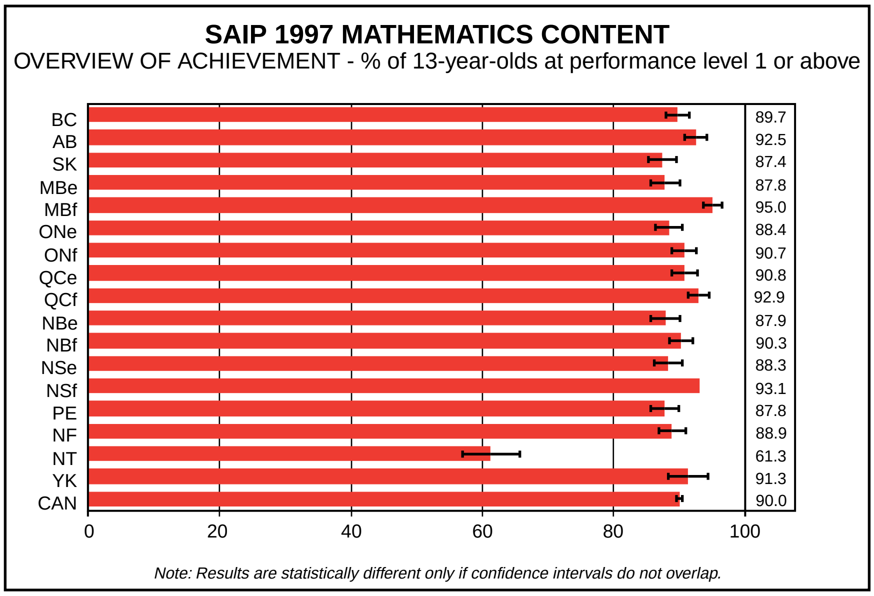


CHART 16

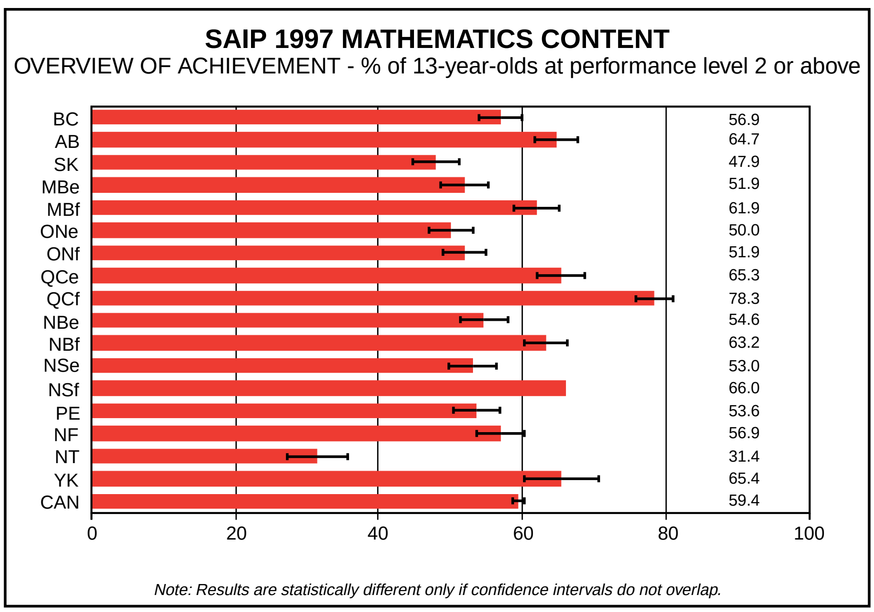


CHART 17

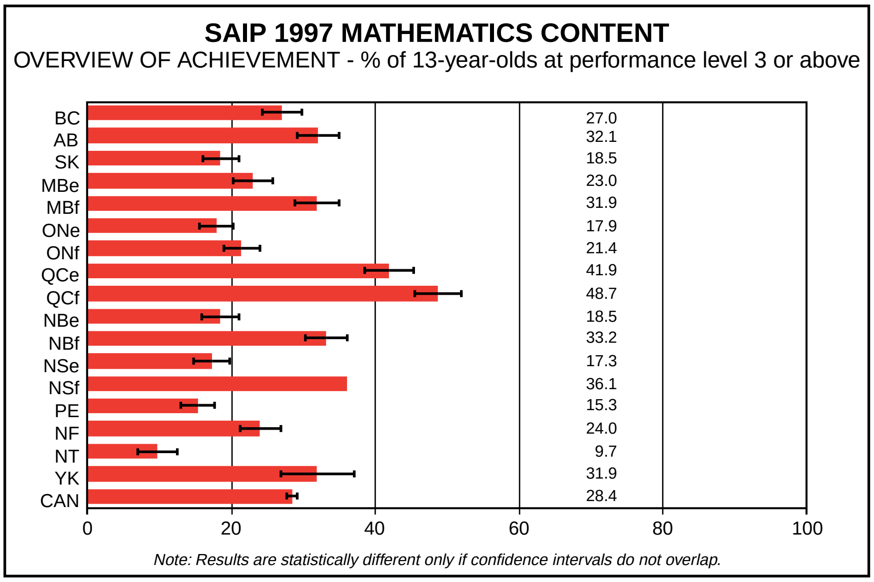


CHART 18

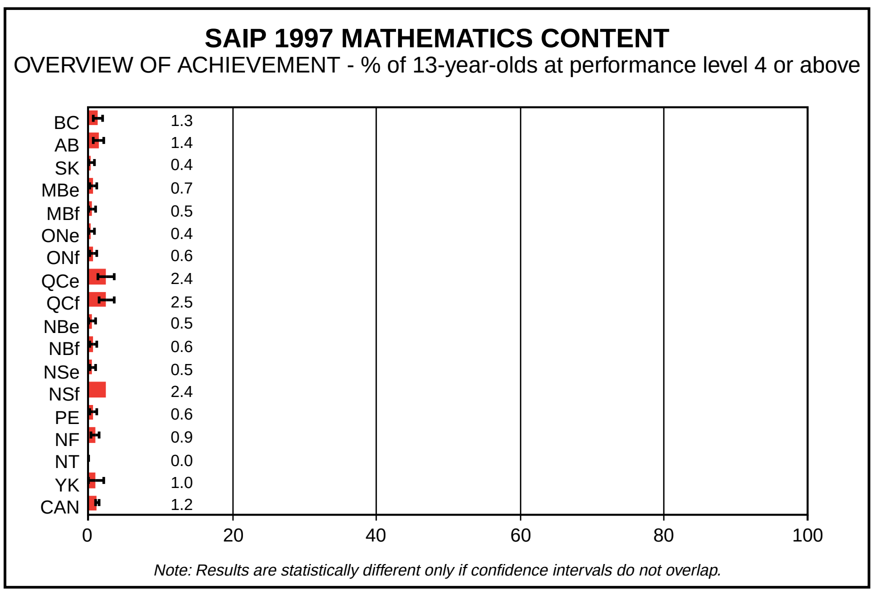


CHART 19

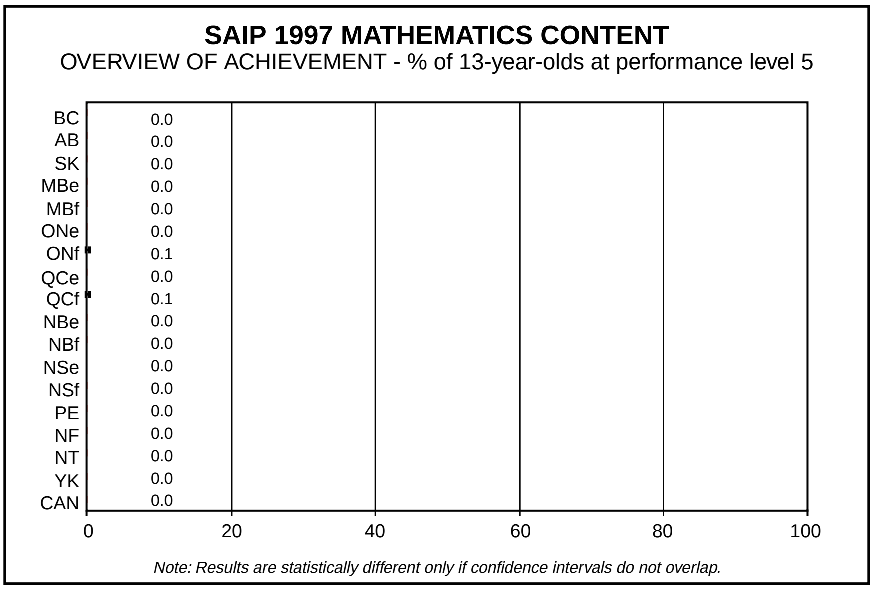


CHART 20

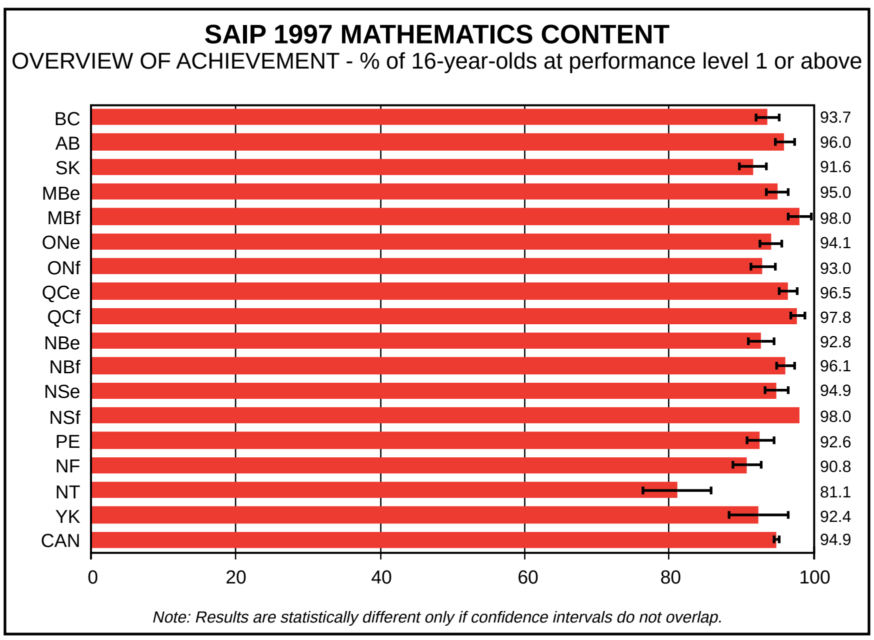


CHART 21

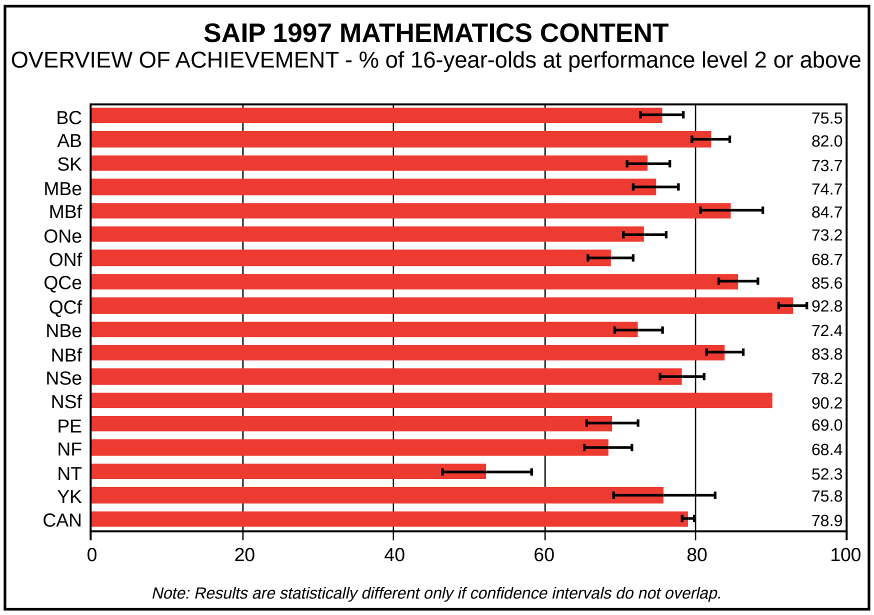


CHART 22

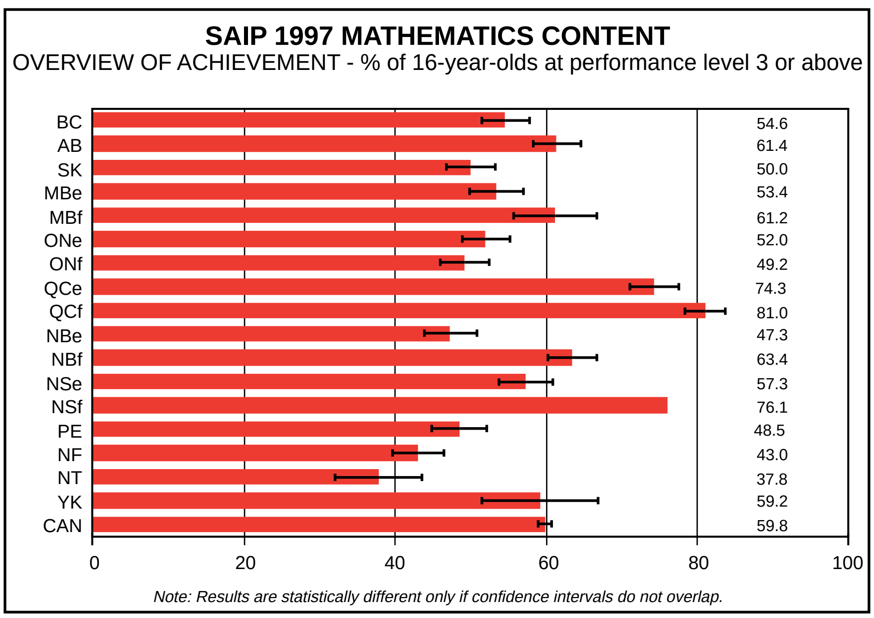


CHART 23

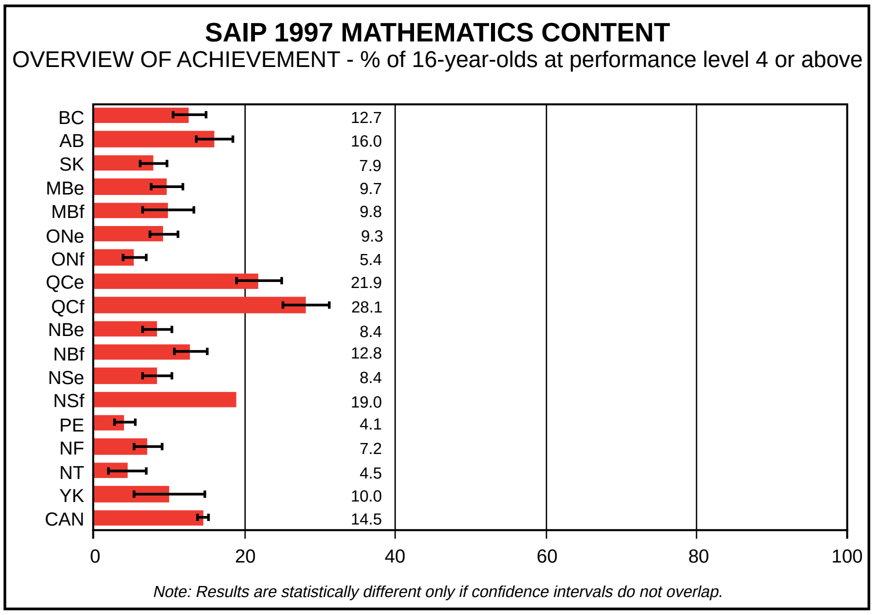


CHART 24

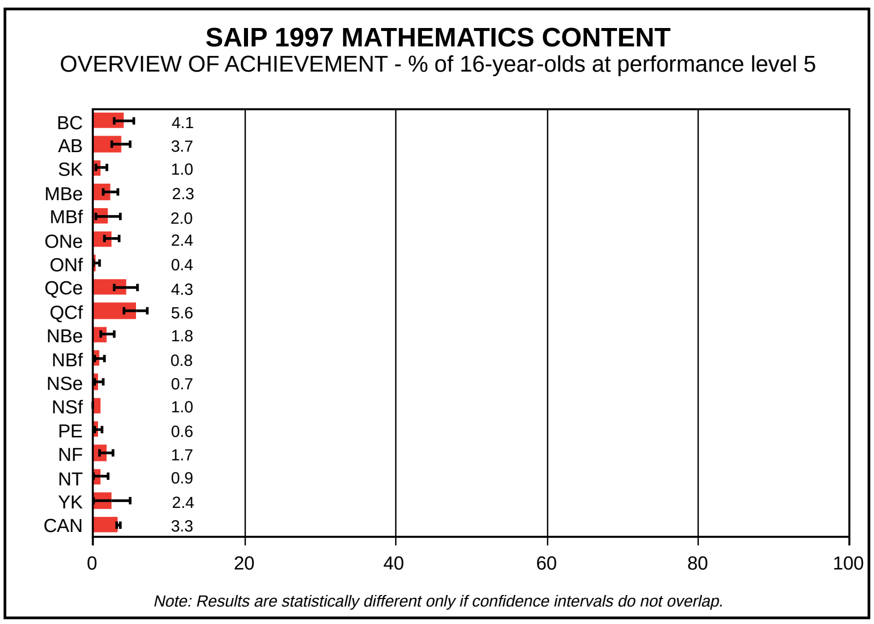


CHART 25

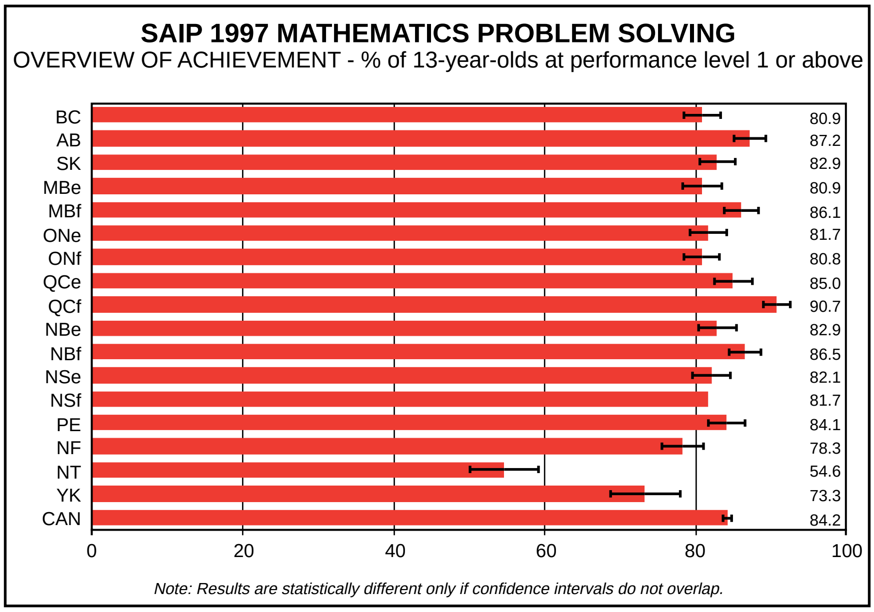


CHART 26

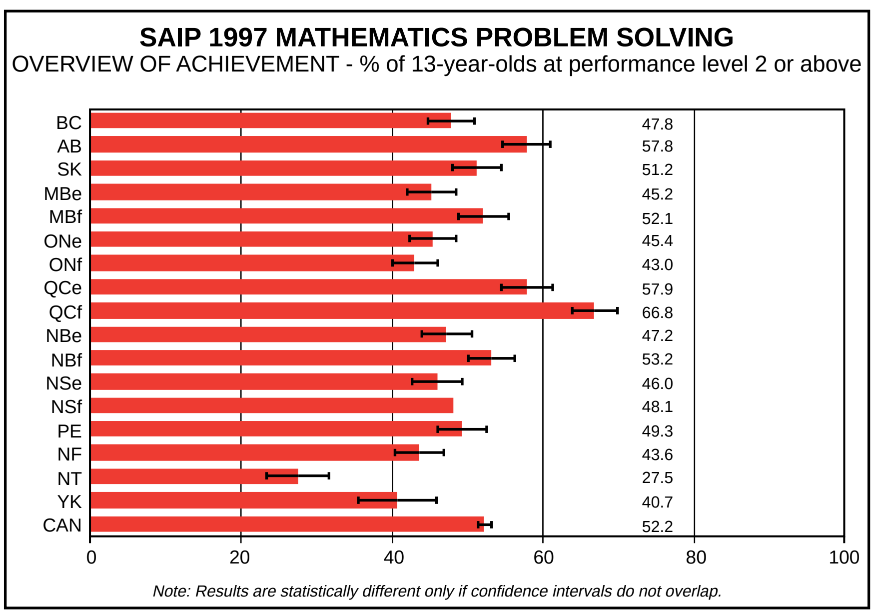


CHART 27

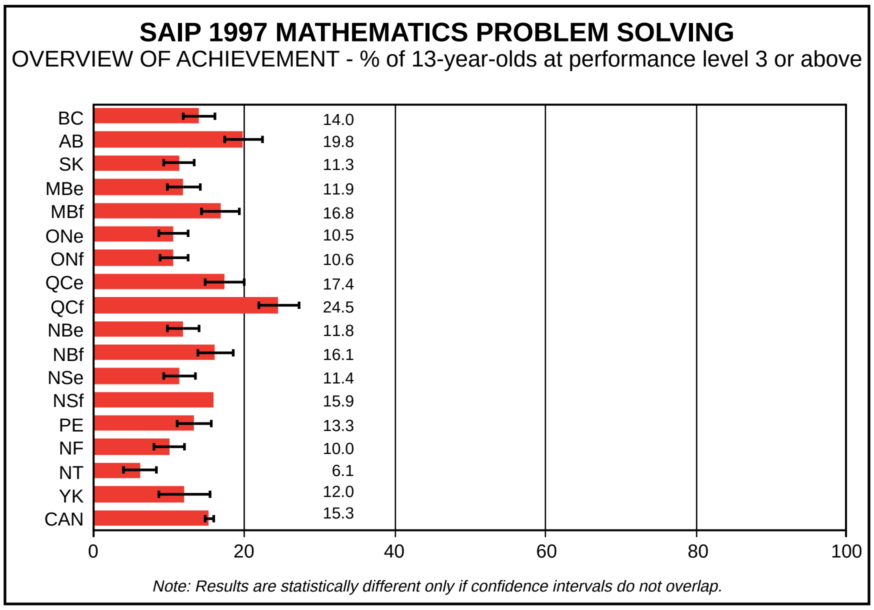


CHART 28

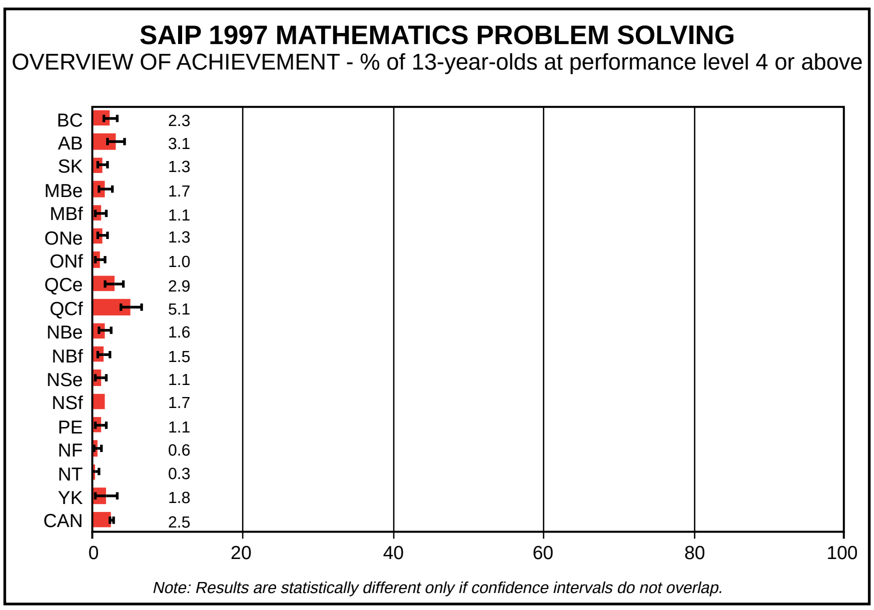


CHART 29

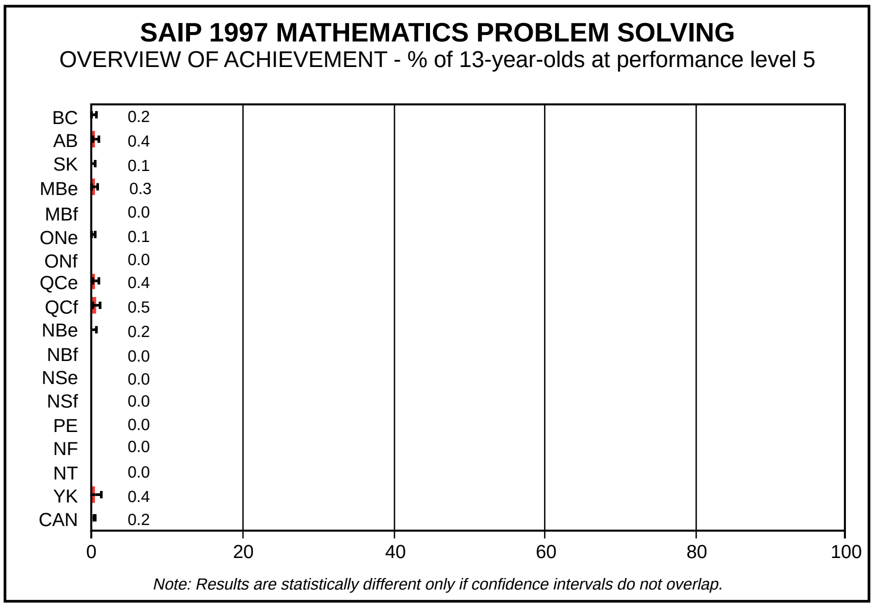


CHART 30

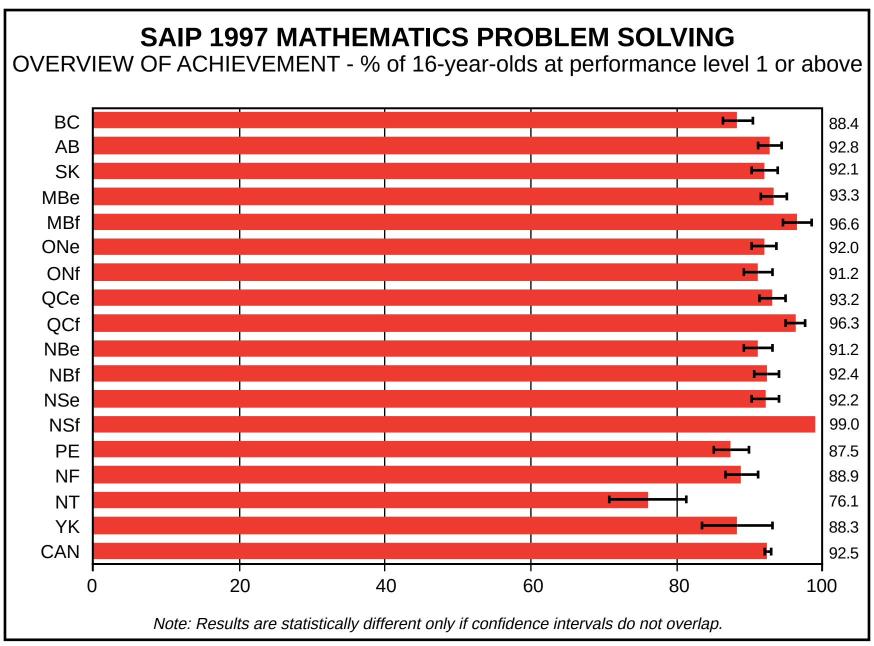


CHART 31

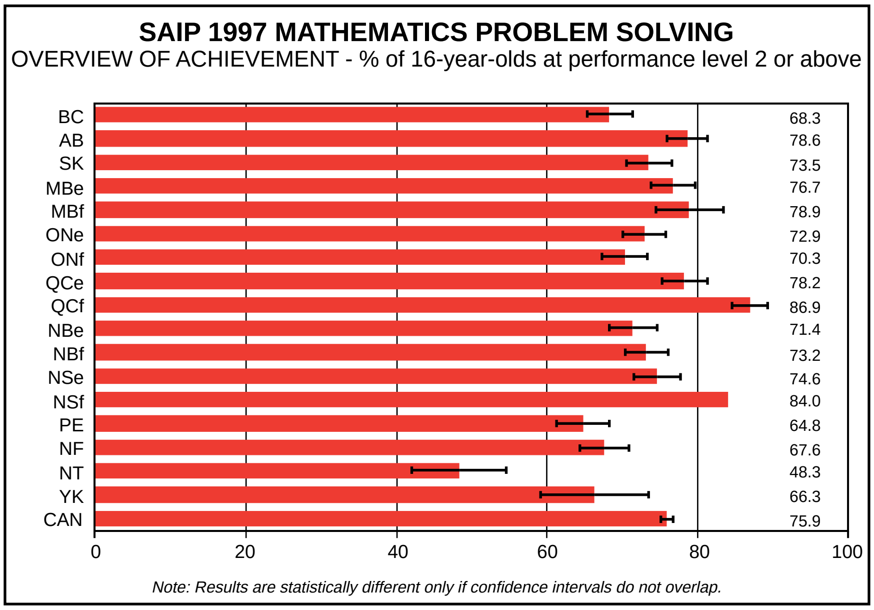


CHART 32

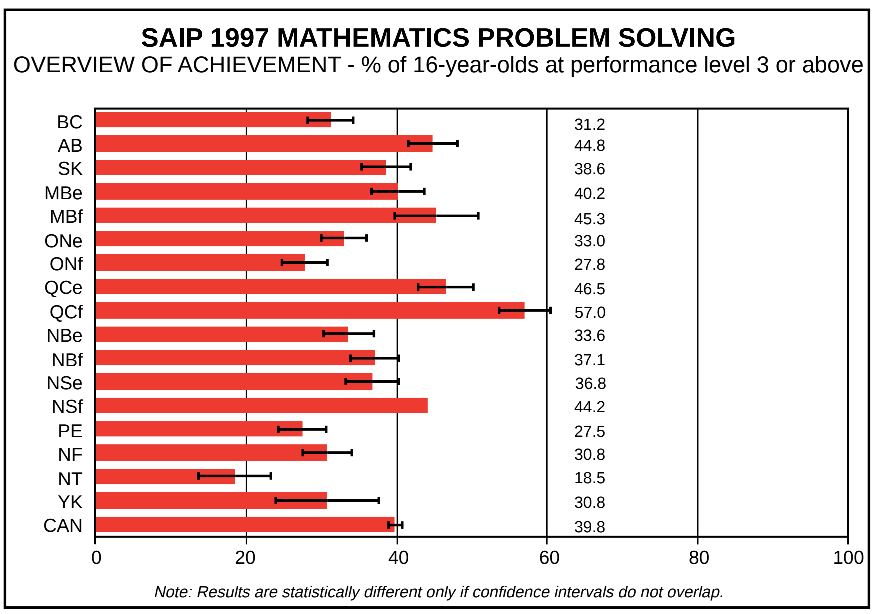


CHART 33

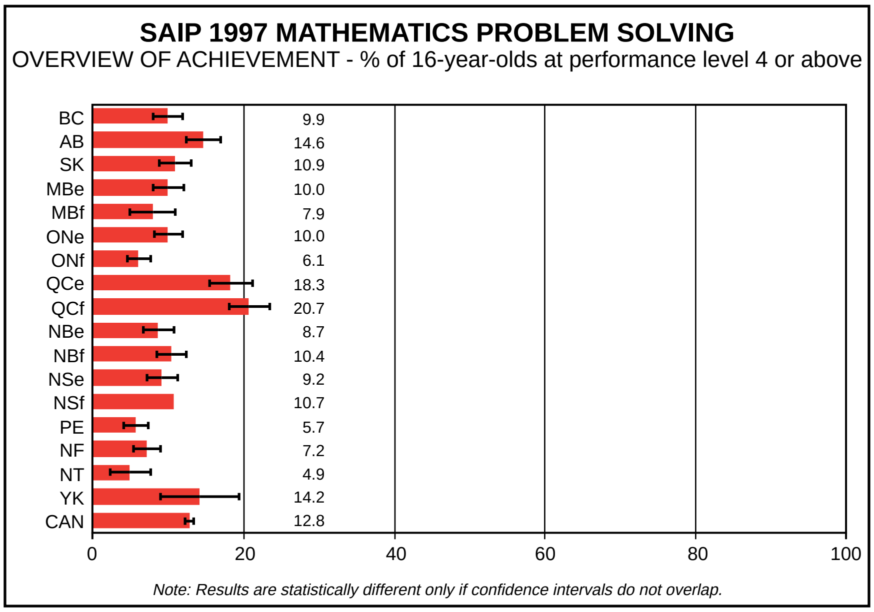
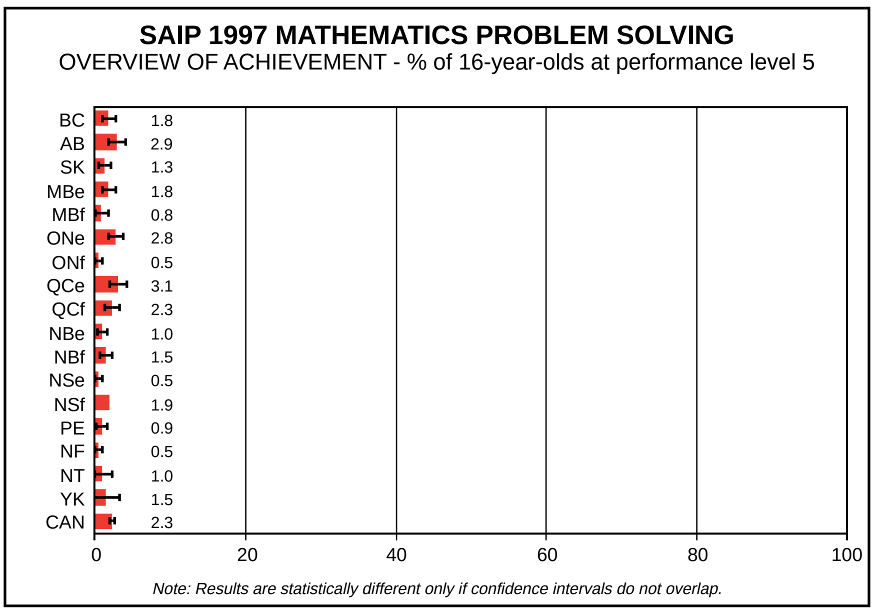


CHART 34



CONTEXT STATEMENT

Social Context

British Columbia has Canada's fastest growing population of any province or territory—approximately 3.9 million—with 82% of people living in urban areas. An issue of current interest is the provision of educational services to an increasing number of students from immigrant families, three-quarters of whom are from Asian countries. Approximately 12% of the student population are enrolled in English-as-a-Second-Language (ESL) instruction. Enrolment in ESL has increased by 330% in the last 10 years. Ninety per cent of ESL enrolment is in the Greater Vancouver Area. This influx has placed heavy demands on schools in the province to provide ESL instruction. A further 11% of the student population is enrolled in Special Education programs, an increase of 100% in the last 10 years.

Organization of the School System

The public school system enrols about 620,000 students and employs almost 38,000 educators. The public school system has been reorganized into 59 school districts that are highly diverse in both population and geography. Approximately 8% of the students attend independent schools. Almost all 13-year-olds are in grade 8 or 9 where mathematics is one of the subjects taught. Most 16-year-olds are in programs at the grade 11 or 12 level. Students are required to take at least one grade 11 level mathematics or accounting course for graduation.

Mathematics Teaching

British Columbia has recently reviewed its mathematics curriculum, and revisions have been incorporated into Integrated Resource Packages (IRPs), which are being implemented in schools across the province. The learning outcome statements contained in the IRPs are content standards for the provincial education system. They are statements of what students are expected to know and do at an indicated grade, and comprise the prescribed curriculum, which is mandated by the Minister of Education, Skills and Training.

The provincial mathematics curriculum emphasizes the practical applications of learning and the skills needed in the workplace. The new curriculum places emphasis on probability and statistics, reasoning and communication, measurement, and problem solving. To ensure that students are prepared for the demands of both further education and the workplace, the secondary years of the mathematics curriculum help students develop mathematical literacy as well as inform them about career and educational choices.

Mathematics Assessment

In addition to participating in national and international assessments, British Columbia has, since 1976, assessed students in grades 4, 7, and 10 in mathematics, reading and writing, science, and social studies approximately every four years. The province has recently announced that, beginning in 1999, there will be an annual assessment of reading, writing, and mathematics for all students in grades 4, 7, and 10. Assessments in science, social studies, and other subject areas will be conducted periodically as required, and these assessments will be on a sample basis.

British Columbia

For mathematics content, there is no significant difference between this jurisdiction's performance and Canadian performance at all levels, except at level 3 for 16-year-olds.

CHART 35

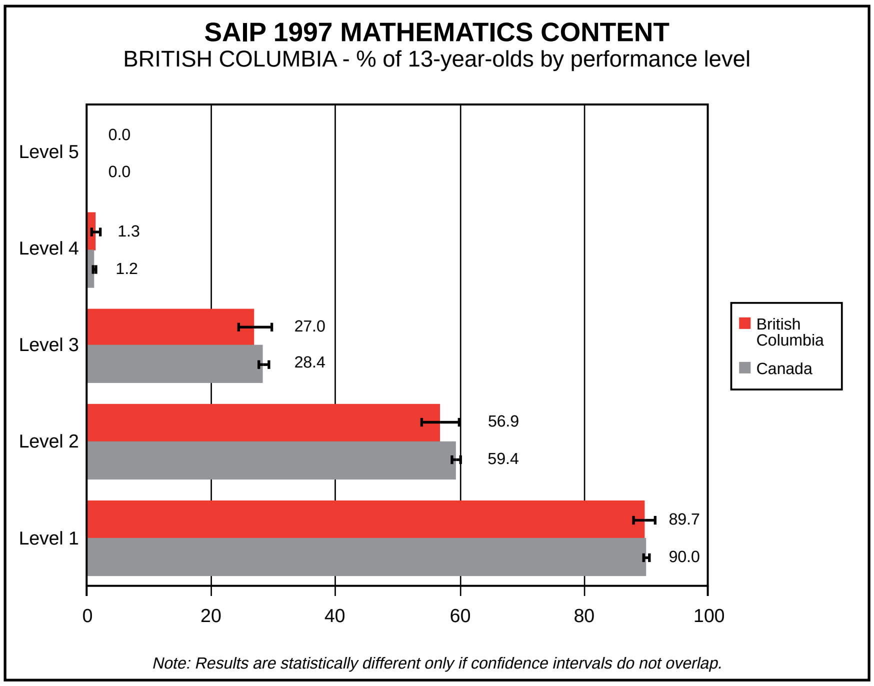
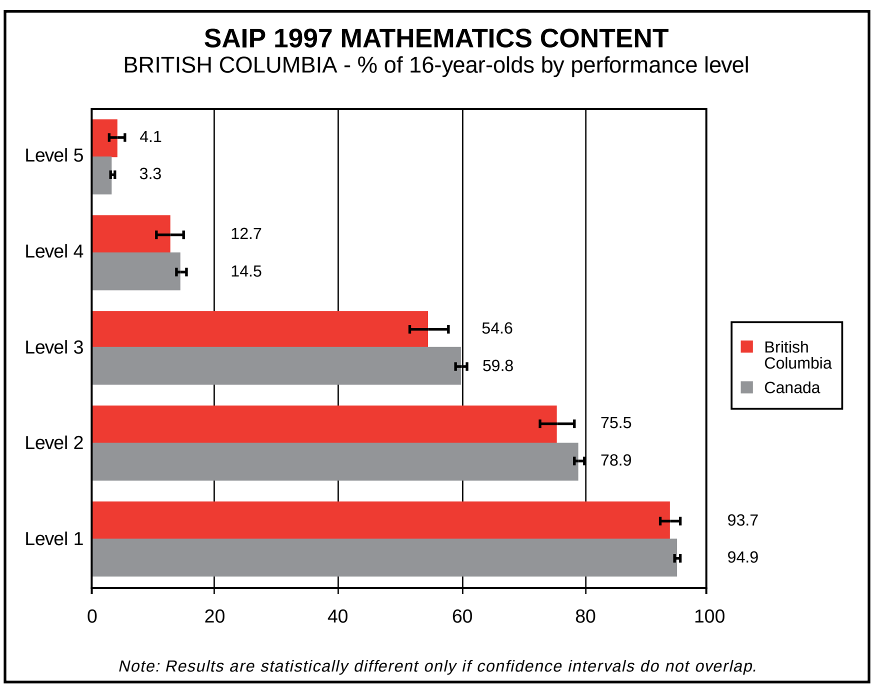


CHART 36



For mathematics problem solving, there are significant differences between this jurisdiction's performance and Canadian performance at levels 1 and 2 for 13-year-olds, and at all levels except level 5 for 16-year-olds.

CHART 37

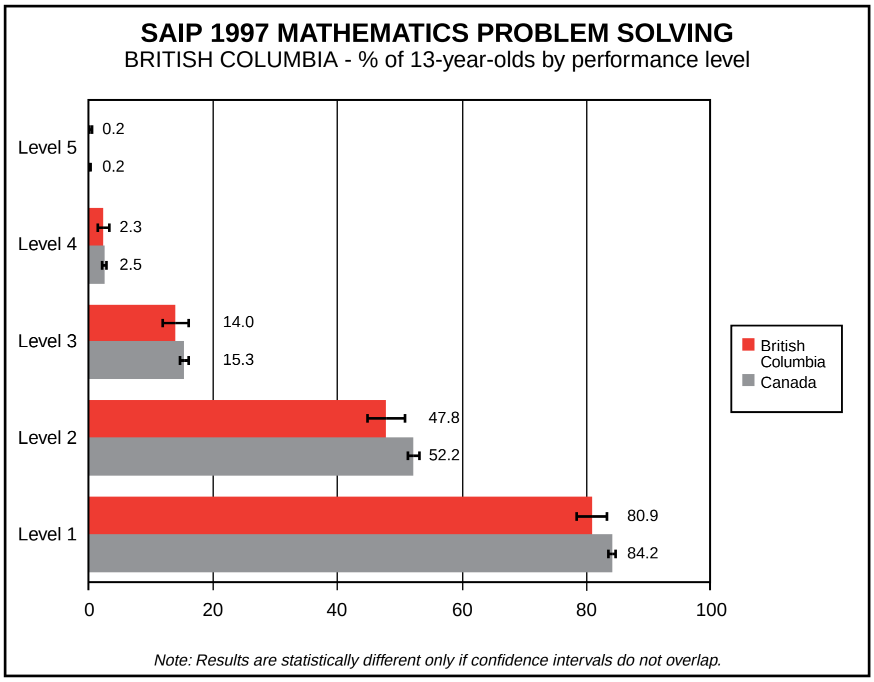
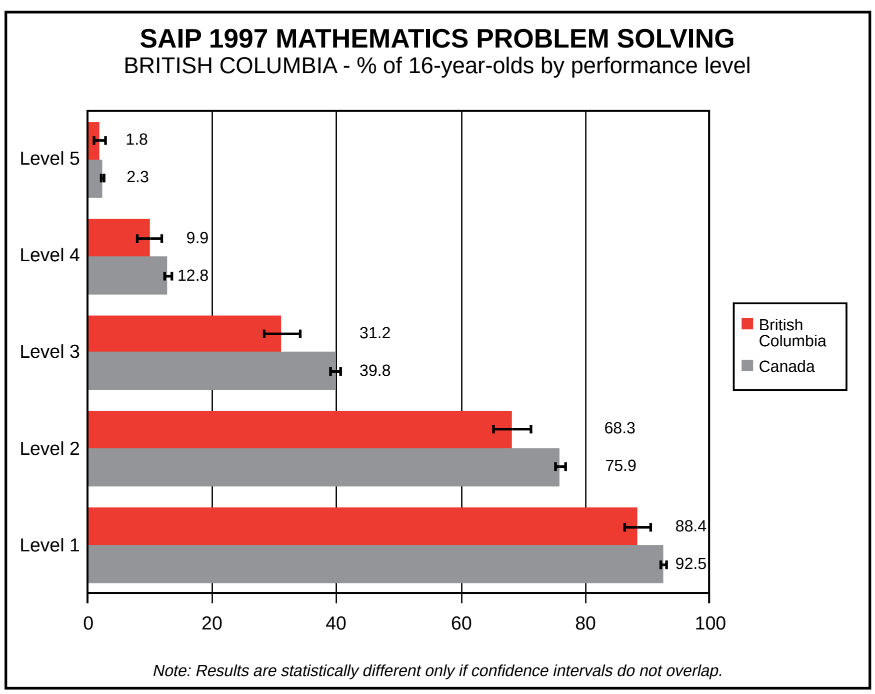


CHART 38



CONTEXT STATEMENT

Social Context

Alberta has a multicultural population of approximately 2.8 million. All children are required to attend school from the age of 6 to 16. The provincial government has the primary responsibility for education and curriculum, but shares this responsibility with local boards.

Organization of the School System

Nearly all 13-year-old students (98.6%) are enrolled in junior high school. There are 8.9% in grade 7, 64.8% in grade 8, and 25% in grade 9. Seven per cent are in French immersion programs, and 0.9% are enrolled in the francophone program. All students, regardless of program, are enrolled in mathematics in each grade.

Nearly all 16-year-old students (98.4%) are enrolled in senior high school. The senior high school mathematics program has four course sequences:

mathematics 10-20-30-31, mathematics 13-23-33, mathematics 14-24, and mathematics 16-26.

For the 1996–97 school year, 16-year-old students completed the following mathematics courses (the bracketed figure is completion as a percentage of the 16-year-old student population):

mathematics 10 (5.6%)	mathematics 13 (9.8%)	mathematics 14 (5.1%)	mathematics 16 (1.1%)
mathematics 20 (31.7%)	mathematics 23 (19.2%)	mathematics 24 (5.2%)	mathematics 26 (0.7%)
mathematics 30 (17%)	mathematics 33 (7.4%)		
mathematics 31 (5%)			
mathematics 35 (0.08%)			

Mathematics Teaching

Alberta, along with its partners in Western Canada, has been doing considerable curriculum development in mathematics. This development is being done to address initiatives identified by the National Council of Teachers of Mathematics. The new program incorporates communication, connections, estimation and mental mathematics, problem solving, reasoning, technology, and visualization processes as an integral part of the mathematics program. Consideration of the cognitive development of students strongly influenced the selection of outcomes and their grade placement. There has been a significant effort to remove unnecessary repetition of outcomes as they appear in grade statements, and also to reduce the number of outcomes. The organization of the outcomes is in a kindergarten to grade 12 context. The outcomes are organized into four strands that have outcomes across the 13 years. The four strands are numbers, patterns and relations, shape and space, and statistics and probability.

Alberta Education believes that the main goals of mathematics education are to prepare students to:

- use mathematics confidently to solve problems
- communicate and reason mathematically
- appreciate and value mathematics
- commit to lifelong learning
- become mathematically literate adults, using mathematics to contribute to society

Students should also:

- exhibit a positive attitude towards mathematics
- engage and persevere in mathematical tasks and projects
- contribute to mathematical discussions
- take risks in performing mathematical tasks
- exhibit curiosity
- show some enjoyment of mathematical experiences

All students should receive a level of mathematics education appropriate to their needs and abilities.

For the 1996–97 school year, all students in grades 7 and 9 acquired new curricular outcomes and used new resources. Approximately 40% of grade 8 students were also in the new program. All students in grades 1 to 6 and grade 8 are in the new program in the 1997–98 school year.

High school changes will not be implemented until the 1998–99 school year.

The mathematics 10-20-30-31 course sequence is designed for students with an interest and aptitude in mathematics, those who are intending to pursue postsecondary studies at a university or in a mathematics intensive program at a technical school or college. The mathematics 10-20-30 courses emphasize the theoretical development of topics in algebra, geometry, trigonometry, statistics, and consumer mathematics.

The mathematics 13-23-33 course sequence is designed for students who require mathematics to prepare them for many postsecondary programs and employment. This sequence emphasizes an inductive development of topics in algebra, geometry, trigonometry, statistics, and consumer mathematics.

The mathematics 14-24 course sequence focuses on basic mathematical understanding. The emphasis is on the acquisition of practical life skills.

The mathematics 16-26 course sequence emphasizes effective computation and problem solving. This sequence is designed for students in the Integrated Occupational program. It is activity-based and addresses the need for students to be able to transfer and apply specific mathematics concepts and skills to more generalized situations in everyday life and the world of work. Completion of the mathematics 16-26 course sequence is equivalent to completion of the mathematics 14 course.

Mathematics Assessment

Since 1982, student learning has been monitored through a provincial assessment program for students in grades 3, 6, and 9. As well, provincial examinations, which count for 50% of a student's final grade in selected grade 12 courses, have been in place since 1984. Mathematics 30 has been evaluated as a grade 12 course since 1984. Mathematics 33 was included in the provincial examination program during the 1995–96 school year.

In the spring of 1997, Alberta Education published a set of comprehensive Classroom Assessment Materials for all high school mathematics courses. Similar materials for grades 7 and 8 will be published in 1998. These materials are designed to help teachers recognize students' accomplishments. Of significance is the inclusion of samples of student work, which reflect different levels of success on written work and identify overall acceptable standards of performance and standards of excellence.

Alberta

For mathematics content, there is no significant difference between this jurisdiction's performance and Canadian performance at all levels, except at levels 1 and 2 for 13-year-olds.

CHART 39

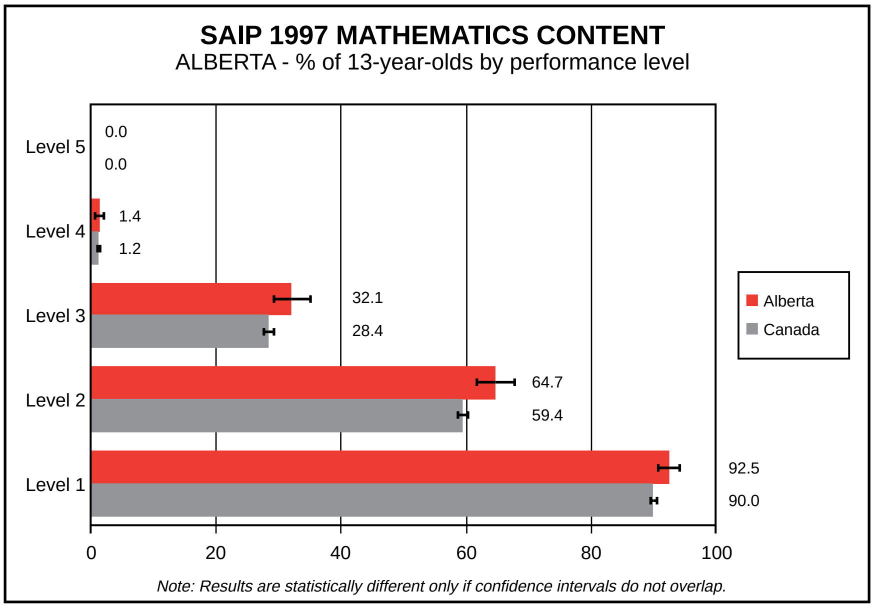
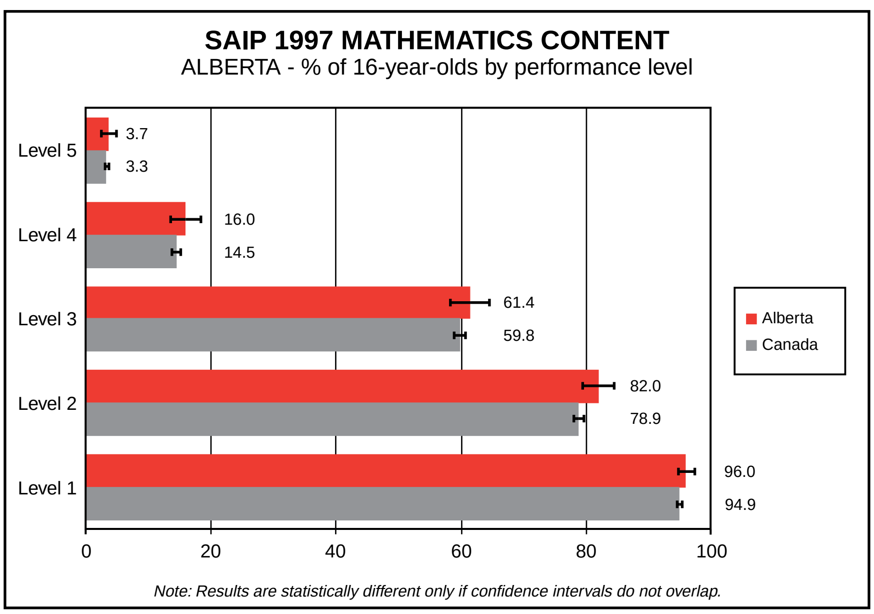


CHART 40



For mathematics problem solving, there are significant differences between this jurisdiction's performance and Canadian performance at levels 1, 2, and 3 for 13-year-olds, and at level 3 for 16-year-olds.

CHART 41

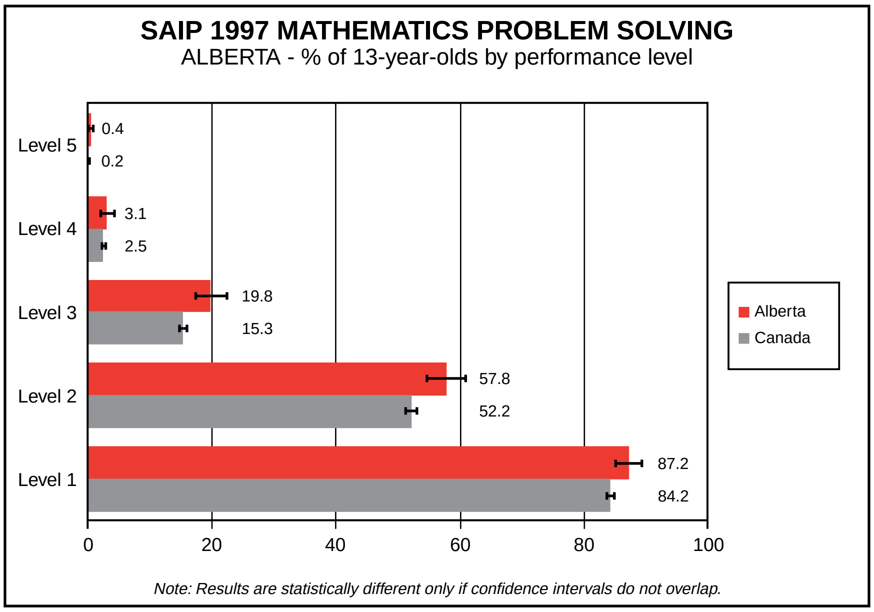
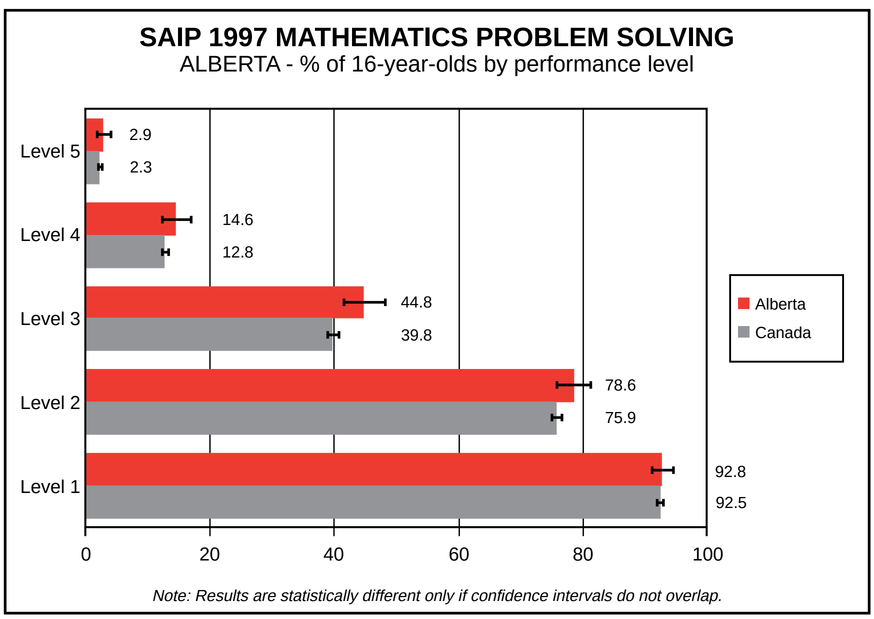


CHART 42



CONTEXT STATEMENT

Social Context

Saskatchewan has a population of approximately one million spread throughout a vast geographic area. The setting is predominately rural; about half the population lives in towns, villages, and rural municipalities, or on Indian reserves. Agriculture, potash and uranium mining, oil production, and forestry are major industries. Saskatchewan has a diverse cultural and ethnic heritage, including a large and growing Indian and Métis population.

Organization of the School System

Saskatchewan has approximately 194,000 students in kindergarten to grade 12 classrooms in its 807 provincially funded schools.

Over the past decade, the province has devoted considerable effort to reforming its curricula. Specifically in mathematics, new courses consistent with the *Curriculum and Evaluation Standards for School Mathematics* (National Council of Teachers of Mathematics, 1989) have been designed and are at various stages of implementation across the elementary, middle, and secondary levels. Saskatchewan has participated in the Western Protocol Agreement to develop a common curriculum framework in several areas, including mathematics. Saskatchewan's current curriculum alignment with this framework is 85% or greater.

Mathematics Teaching

The aim of the mathematics program in Saskatchewan is to graduate individuals who value mathematics and appreciate its role in society. The program seeks to actively engage students in exploring, communicating, and extending mathematical concepts through the use of manipulatives, technology that includes calculators and computers, and cooperative learning experiences. Students experience mathematics through various strands: measurement; data management and analysis; consumer issues and problems; numbers and operations; geometry; algebra; equations; functions; and trigonometry. Introduction to the learning and application of these mathematics concepts and skills occurs best in the context of solving problems relevant to students' life experiences.

Experiencing broad-based mathematics through exploration and interaction in interesting and relevant situations provides all students with the mathematical preparation essential to:

- develop the skills and knowledge of concepts necessary to meet the needs of the average worker and consumer
- develop the ability to analyse and interpret quantitative information as informed citizens
- develop logical thinking skills, effective work habits, and an appreciation for mathematics
- develop the desire, confidence, and ability to solve problems
- communicate mathematically
- pursue further studies in mathematics and mathematically related areas

Mathematics Assessment

Classroom teachers in Saskatchewan are responsible for assessment, evaluation, and promotion of students from kindergarten through grade 11. At the grade 12 level, teachers are responsible for at least 60% of each student's final mark, and those teachers accredited in mathematics are responsible for assigning 100% of the grade 12 final mark.

Students are assessed on the full range of knowledge, skills, attitudes, and values they have been using and developing during instruction. Teachers are encouraged to develop diversified evaluation plans that reflect the various instructional methods they use in adapting instruction to each class and to each student.

In 1995 and 1997, student learning in mathematics was provincially assessed at grades 5, 8, and 11. Randomly selected schools participated in either a written component or a performance-based component of the assessment. The results of these assessments are interpreted against provincial standards to provide information on how well students in the province are performing in mathematics.

Saskatchewan

For mathematics content, there are significant differences between this jurisdiction's performance and Canadian performance at all levels, except at levels 1 and 5 for 13-year-olds.

CHART 43

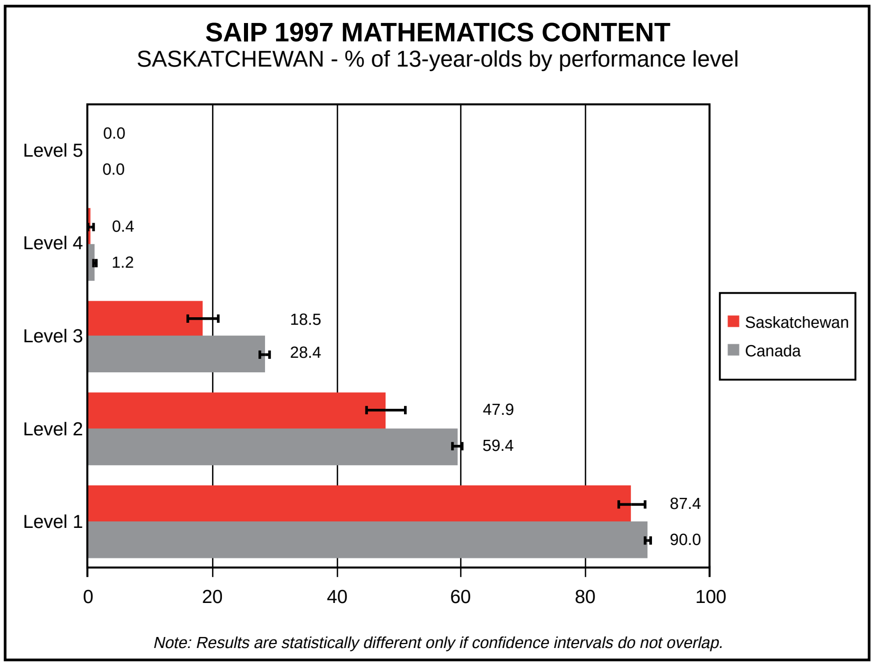
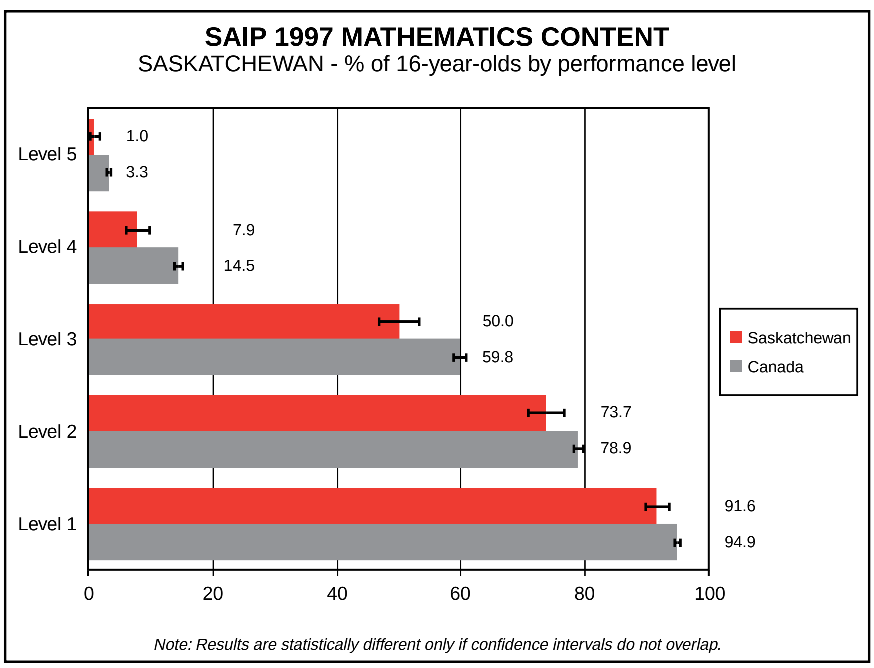


CHART 44



For mathematics problem solving, there is no significant difference between this jurisdiction's performance and Canadian performance at all levels, except at levels 3 and 4 for 13-year-olds.

CHART 45

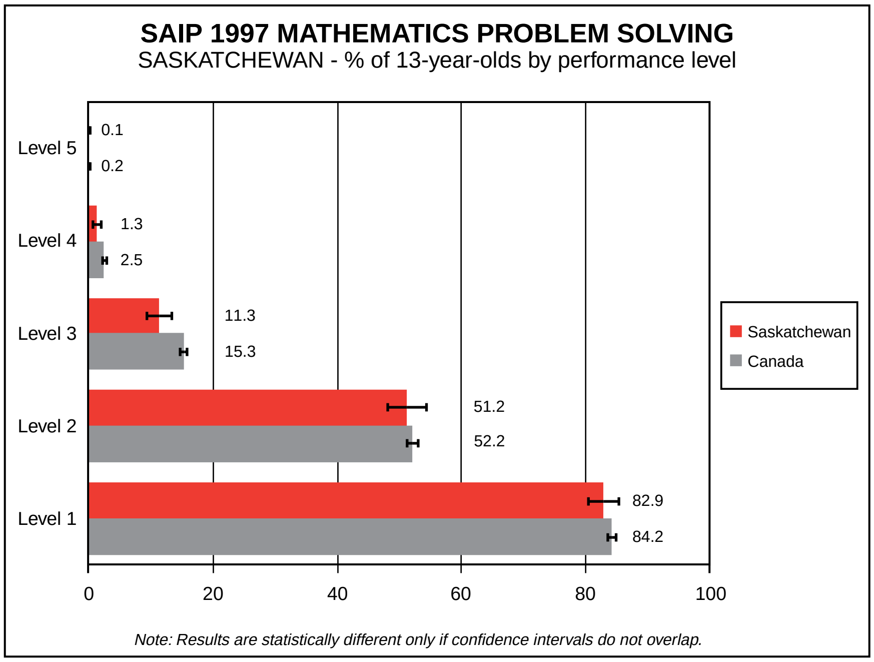
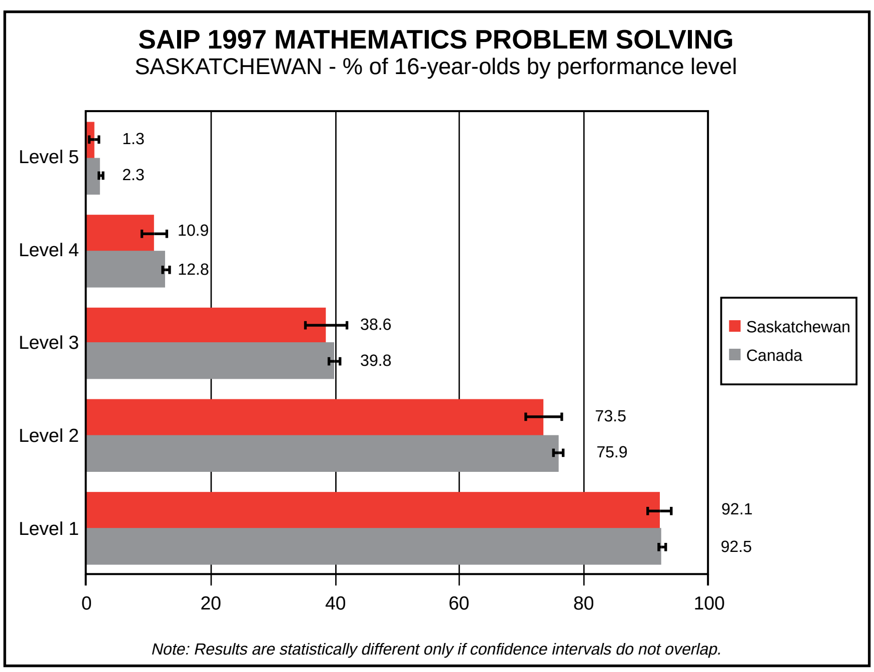


CHART 46



CONTEXT STATEMENT

Social Context

Manitoba has a population of approximately one million, 60% of whom reside in the capital city of Winnipeg. Manitoba must meet the educational needs of a wide range of ethnic and cultural groups. English-as-a-Second-Language (ESL) instruction is provided for immigrant students. There is a strong Franco-Manitoban community in the province with students enrolled in the Français program. In addition, the French immersion program has become an option for about 10% of students. Manitoba has a broad economic base, with agriculture being the main economic activity. At the end of April 1997, the Red River Valley was evacuated because of severe flooding. Fifteen schools, involving a total of 412 students, were unable to write the assessment. Sixty-five per cent of these students were in the Français program.

Organization of the School System

Manitoba's school system enrols approximately 200,000 students in kindergarten to senior 4 (grade 12). It employs about 13,000 teachers in 48 school divisions and eight districts. For program delivery purposes, schools are encouraged to group grades according to early years (kindergarten to grade 4), middle years (grades 5 to 8), and senior years (senior 1 to 4). Students may choose courses from four school programs—English language, Français, French immersion, and in senior years, technology education. The students selected to participate in the 1997 SAIP mathematics assessment were either 13 or 16 years of age. Most 13-year-old students were in grade 8 or in grade 9 (senior 1), and most 16-year-old students were in senior 3 or senior 4.

Mathematics Teaching

In July 1994, the Manitoba government released *Renewing Education: NEW DIRECTIONS, A Blueprint for Action*, a comprehensive plan designed to renew the kindergarten to senior 4 educational system through a partnership approach with stakeholders. This plan identified four foundation skill areas—literacy and communication, problem solving, human relations, and technology—to be included in teaching and learning within all subject areas.

In 1995, as part of the Western Canadian Protocol for Collaboration in Basic Education, Manitoba, with the other western provinces and two territories, developed the document *Common Mathematics/Mathématiques Outcomes from Kindergarten to Senior 4*. This initiative led Manitoba Education and Training to publish *Manitoba Curriculum Frameworks of Outcomes and Standards* in mathematics. This new curriculum emphasizes creative thinking, logical thinking, problem-solving skills, data analysis skills, and cooperative interaction in kindergarten to senior 4 mathematics. Although mathematics should be viewed as a connected whole of concepts, skills, and procedures, the curriculum is divided into four strands: patterns and relations; statistics and probability; shape and space; and numbers (each of which is further divided into sub-strands). For each sub-strand, general and specific learning outcomes describe the knowledge and skills that students are expected to learn at each grade in mathematics.

Mathematics Assessment

Following the introduction of the *Manitoba Curriculum Frameworks of Outcomes and Standards*, province-wide standards tests were implemented in 1997 at the grade 3 level. Standards tests in mathematics will be implemented starting in June 1999 at grade 6 and senior 1 levels, and in 2002 at the senior 4 level. These tests assess student performance in relation to the established standards at the grade levels tested. Individual profiles of students' test results in relation to the standards provide information to improve programs and student performance. Test results do not count towards a student's final mark at grade 3, but will count for 25%, 35%, and 50% at grade 6, senior 1, and senior 4, respectively.

Until standards tests are introduced at senior 4, provincial examinations are administered to students according to the course in which they are enrolled and count for 30% of a student's final mark. The 40S course covers the areas of polynomial and rational functions, circular functions and trigonometry, analytic geometry, exponents and logarithms, and sequences and series. The core objectives for the 40G course are consumer mathematics, algebra, trigonometry, and statistics.

For the 1997 SAIP mathematics assessment, students were tested in the language of instruction. Francophone and French immersion students wrote the Français version of the assessment and anglophone students wrote the English version. In Manitoba, standards tests and provincial examinations are developed in both official languages.

Manitoba (English)

For mathematics content, there are significant differences between the performance of this jurisdiction's anglophone students and Canadian performance at levels 2 and 3 for 13-year-olds, and at levels 2, 3, and 4 for 16-year-olds.

CHART 47

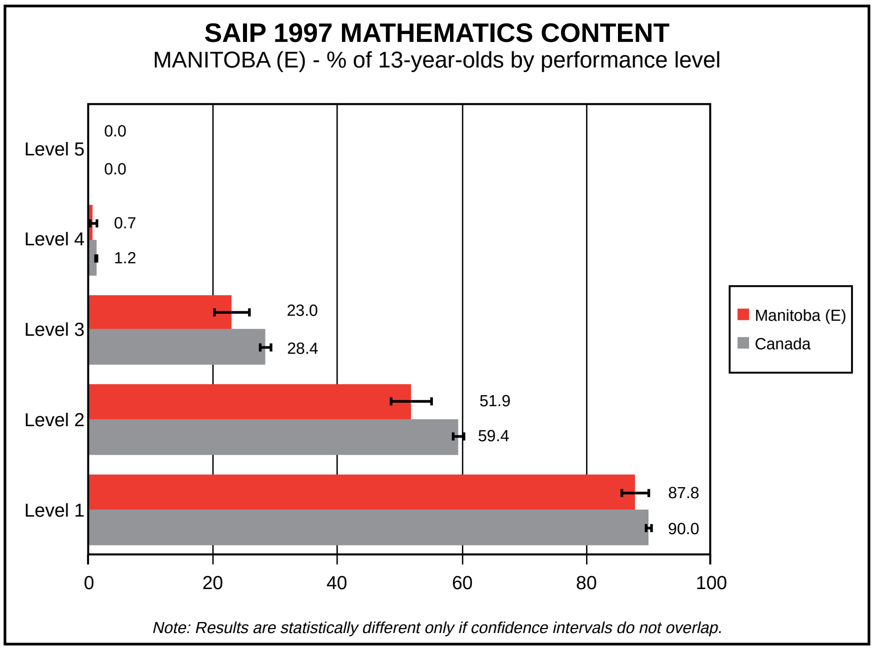
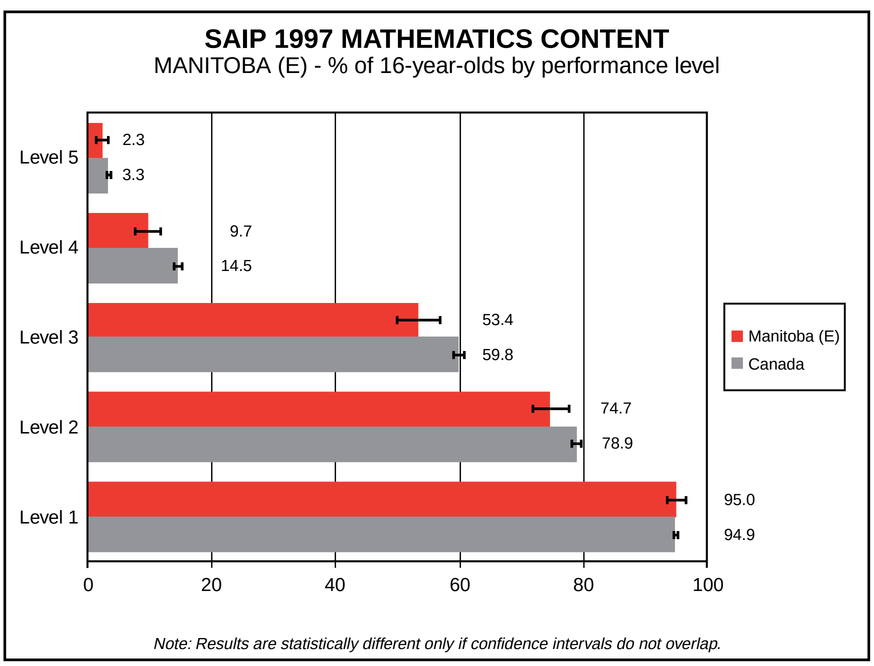


CHART 48



For mathematics problem solving, there are significant differences between the performance of this jurisdiction's anglophone students and Canadian performance at levels 2 and 3 for l3-year-olds, and at level 4 for 16-year-olds.

CHART 49

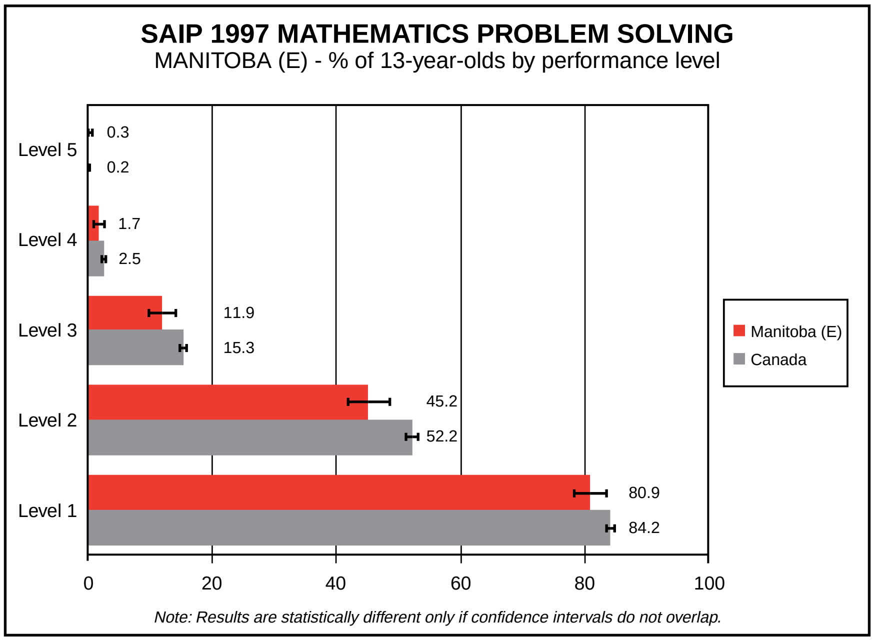
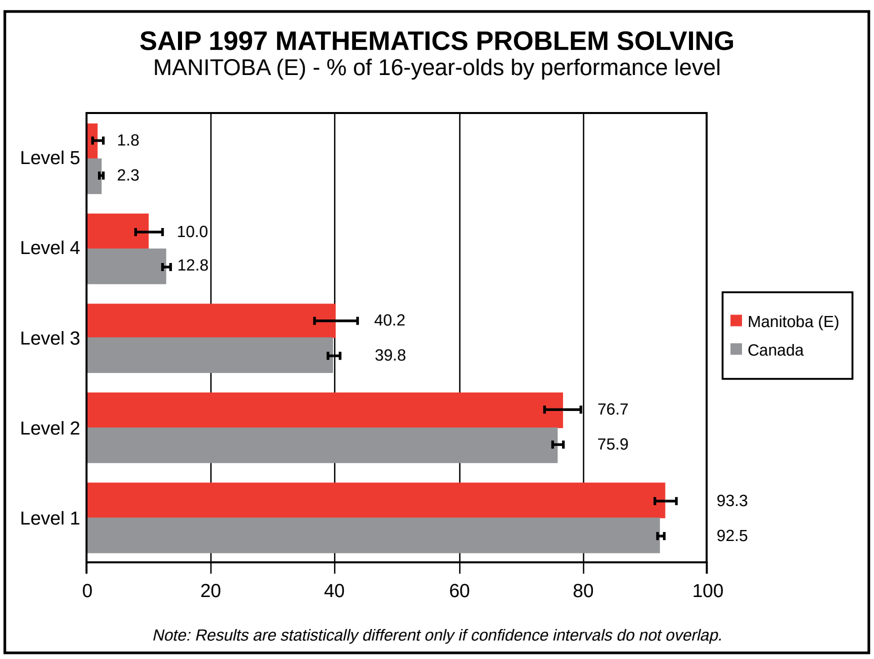


CHART 50



Manitoba (French)

For mathematics content, there are significant differences between the performance of this jurisdiction's francophone students and Canadian performance at level 1 for 13-year-olds, and at levels 1, 2, and 4 for 16-year-olds.

CHART 51

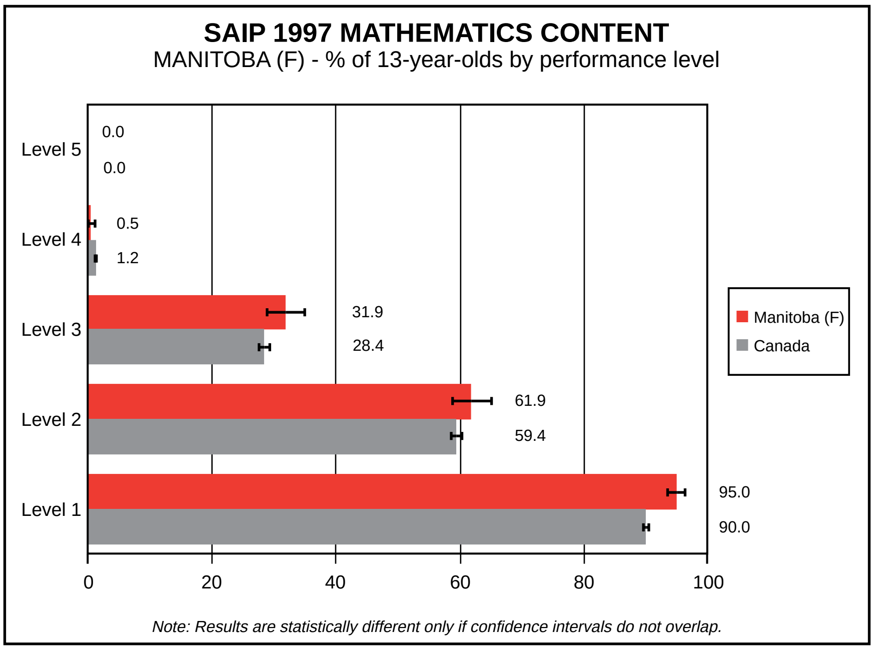
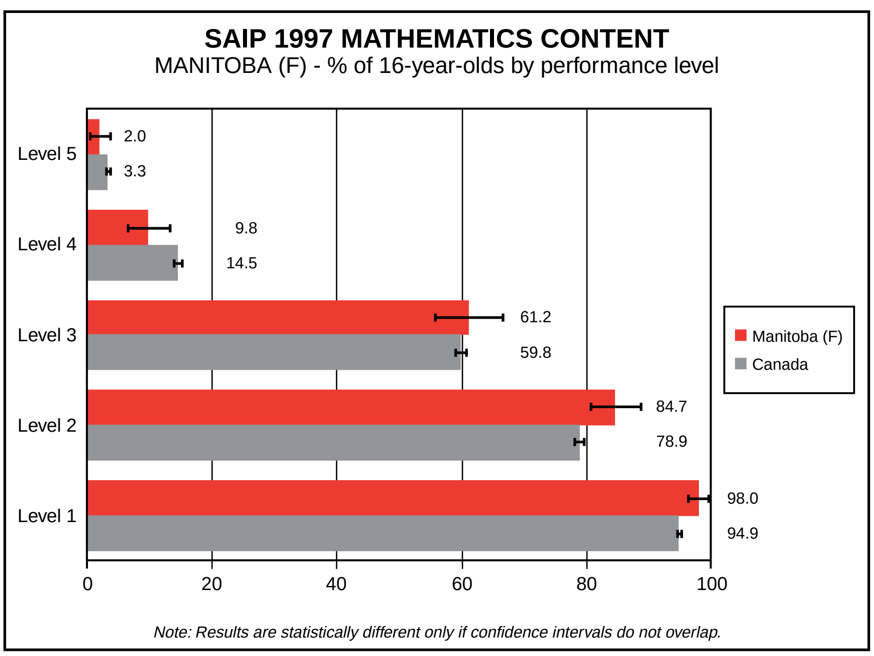


CHART 52



For mathematics problem solving, there are significant differences between the performance of this jurisdiction's francophone students and Canadian performance at levels 4 and 5 for 13-year-olds, and at levels 1, 4, and 5 for 16-year-olds.

CHART 53

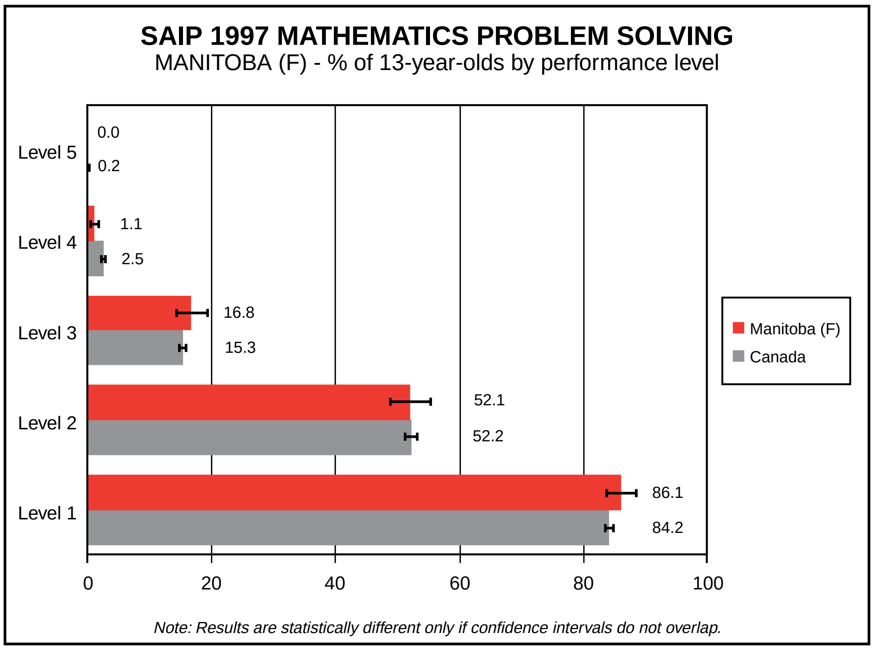
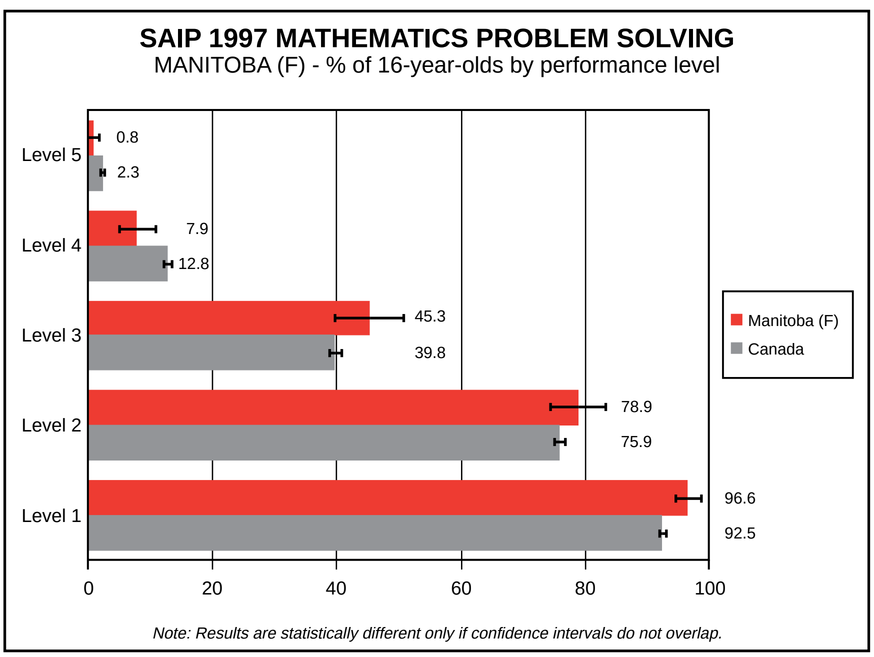


CHART 054



CONTEXT STATEMENT

Social Context

Ontario is characterized by a range of boards, from large urban school boards serving densely populated communities, to northern district school boards serving small numbers of students spread over wide geographic areas. About half the school boards have minority-language sections, mainly French-language, whose schools provide parallel elementary and secondary education. There are also four French-language boards in the province. A critical issue in the provision of education programs and services relates to the diverse ethnocultural composition of Ontario's student population and the large number of children and youth from immigrant families. Especially in urban areas, there are heavy demands on schools to provide English- and French-as-a-Second-Language instruction and community outreach services to overcome language and cultural barriers between schools and families that could affect student achievement.

Organization of the School System

In 1996–97, there were 2,072,322 students in 168 school boards and 117,452 full-time teachers in Ontario. Seventy per cent of the boards offer French-language education. The school program can extend from junior kindergarten (age 4) to the Ontario Academic Courses (OACs), usually taken in the final year of secondary school, which are designed for university-bound students.

There are two types of publicly funded school boards in Ontario: public boards, which enrol 70% of the student population, and separate (usually Roman Catholic) boards, which enrol 30% of the student population. Of the 5% of students enrolled in French-language school programs, 80% are enrolled in Catholic separate schools.

Major restructuring of school boards will take place in January 1998 with the consolidation of up to half of all English-language boards and the creation of 12 French-language district boards. A redefinition of the duties for the boards and a revision of the financing structure assuring an equitable distribution of funds will also occur.

Mathematics Teaching

The Ontario Ministry of Education and Training has restructured its programs at the elementary level over the past five years. Mathematics programs have undergone two revisions. The first, released in 1993, provided standards of performance in the context of a broad, cross-curricular, integrated approach in mathematics, science, and technology program areas. The integration of these disciplines was designed to help students understand that mathematics is a powerful and flexible tool used to learn in other subjects and to function in daily life. These outcomes-based standards were specific for the end of grades 3, 6, and 9. The new curriculum, released in June 1997, describes knowledge and skill-based curriculum expectations and assessment criteria for each grade level from grades 1 to 8 in five mathematics strands (number sense and numeration, measurement, geometry and spatial sense, patterning and algebra, and data management and probability) and competencies. This latest curriculum assures province-wide consistency, eliminates the need for school boards to write their own expectations, and facilitates province-wide testing. Province-wide consistency will be helpful to students who change schools, and will help parents in all regions of the province gain a clear understanding of their children's progress.

The mathematics programs at the secondary level have not undergone any revisions since 1985, but the ministry is presently in the process of restructuring secondary school education. All mathematics courses in secondary schools are currently being provided at three levels of difficulty (basic, general, and advanced) for grade 10 through to graduation. At the time of the 1997 SAIP mathematics assessment, students in grade 9 were destreamed. Students and parents, in consultation with teachers, select the level at which students will take the mathematics program in secondary school. OACs, usually taken in the final year of secondary school, are at the advanced level of difficulty only and are intended for university-bound students.

Most 13-year-old students in this assessment are enrolled in either grade 7 or 8 mathematics, both of which are mandatory. The mathematics experiences of 16-year-old students are extremely varied, some having taken only two mathematics courses up to grade 10, others having completed one or more specialized programs at the senior level.

Mathematics Assessment

Classroom teachers are responsible for student evaluation and promotion. Ontario does not conduct province-wide examinations for these purposes. The Education Quality and Accountability Office (EQAO) was established in 1996 to ensure greater accountability and to contribute to the enhancement of the quality of education in Ontario. In 1997, the EQAO conducted the first test for all grade 3 students in reading, writing, and mathematics. It also held a test for a sample of grade 6 schools in mathematics. These tests assessed student achievement according to the outcomes in the provincial curriculum documents in use at the time of the assessment. The province-wide testing of all grade 3 students in these subject areas will take place every year. Testing of grade 6 and grade 9 schools will alternate and so too will the subjects tested. Decisions about the assessment of secondary school students will be made after the Secondary School Reform project is completed. The following chart indicates the provincial assessment plan for grades 3, 6, and 9.

Grade/Year	1997	1998	1999	2000
All grade 3 students	Reading, writing, mathematics	Reading, writing, mathematics	Reading, writing, mathematics	Reading, writing, mathematics
Sample of grade 6 schools	Mathematics		Reading, writing	
Sample of grade 9 schools	Mathematics		Reading, writing	

Ontario (English)

For mathematics content, there are significant differences between the performance of this jurisdiction's anglophone students and Canadian performance at level 2, 3, and 4 for 13-year-olds and for 16-year-olds.

CHART 55

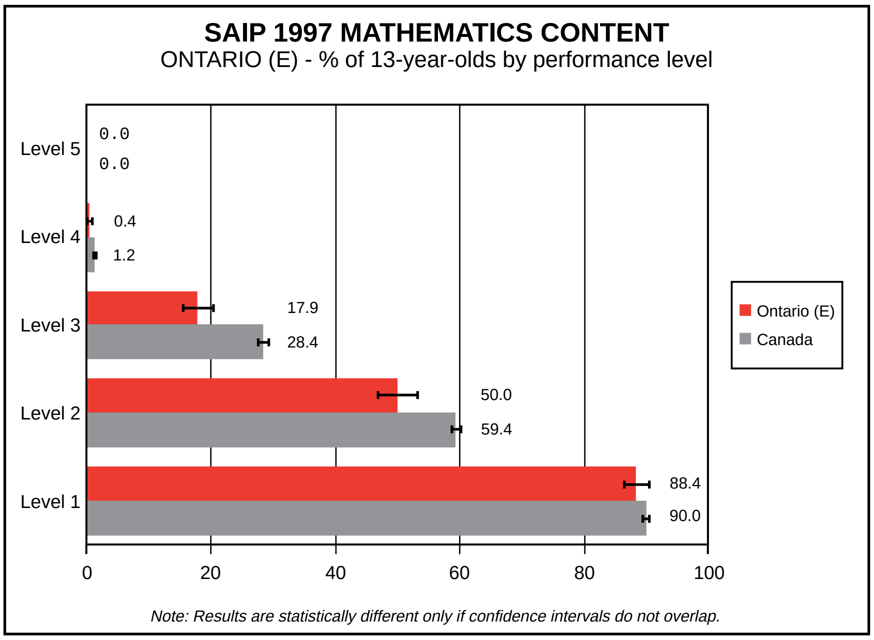
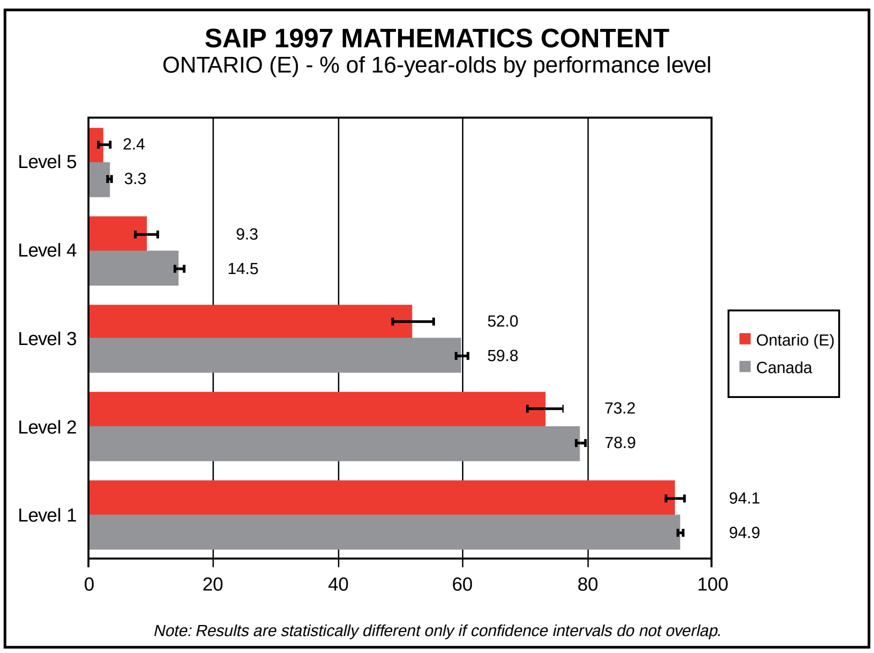


CHART 56



For mathematics problem solving, there are significant differences between the performance of this jurisdiction's anglophone students and Canadian performance at levels 2, 3, and 4 for 13-year-olds, and at levels 3 and 4 for 16-year-olds.

CHART 57

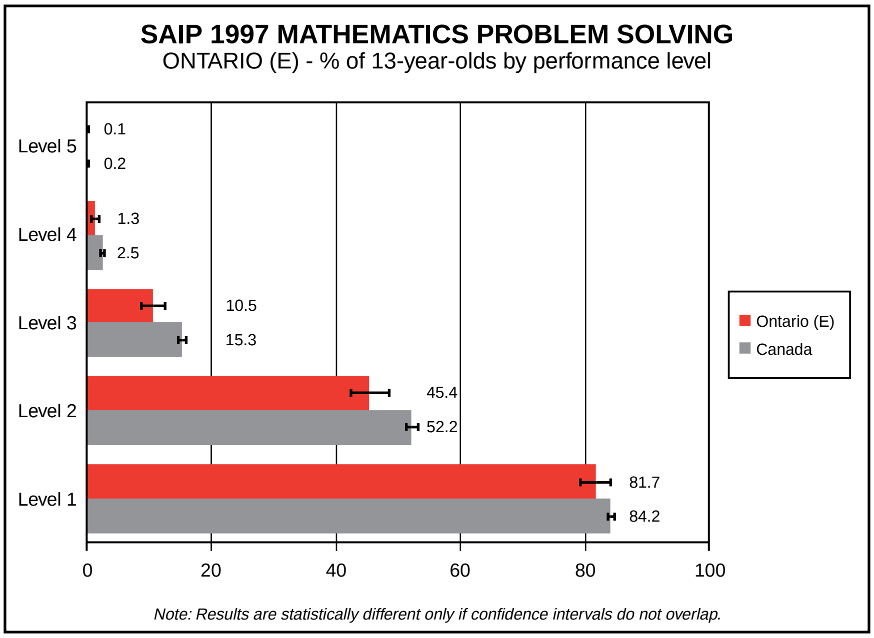
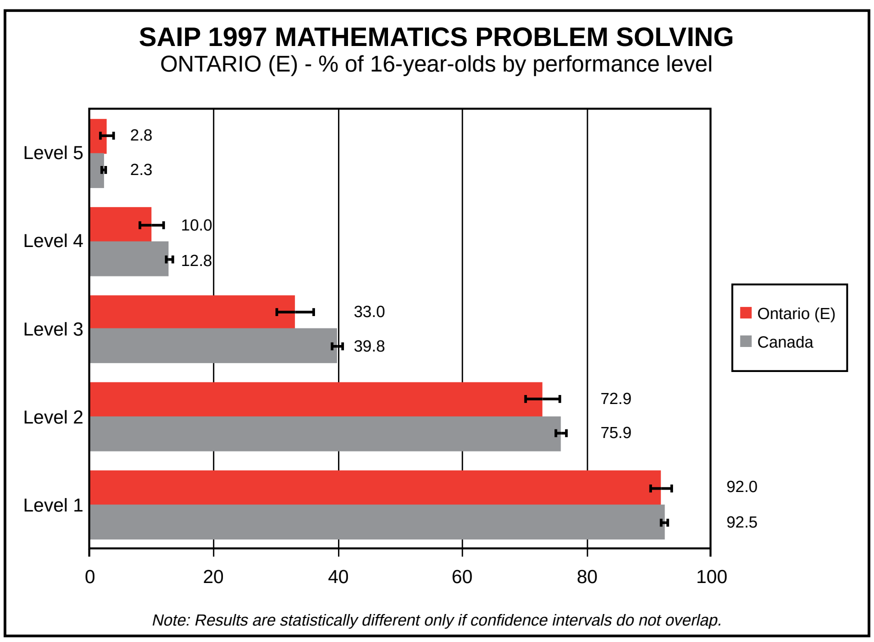


CHART 58



Ontario (French)

For mathematics content, there are significant differences between the performance of this jurisdiction's francophone students and Canadian performance at levels 2 and 3 for 13-year-olds, and at all levels except level 1 for 16-year-olds.

CHART 59

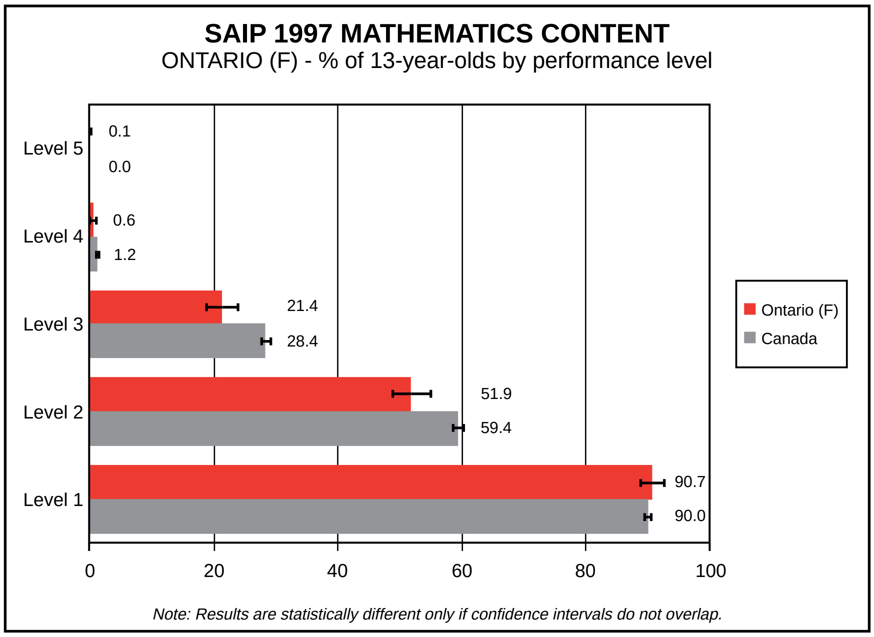
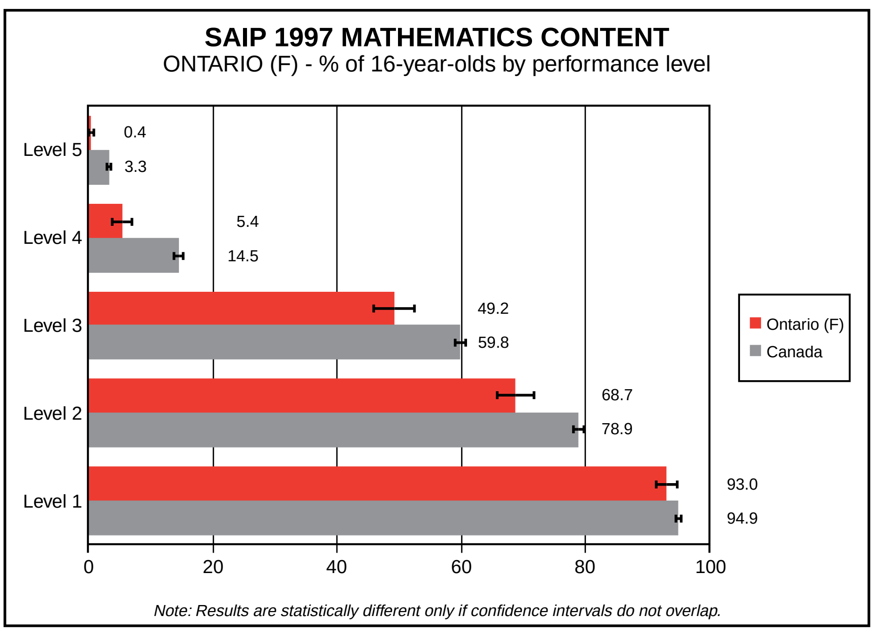


CHART 60



For mathematics problem solving, there are significant differences between the performance of this jurisdiction's francophone students and Canadian performance at all levels, except at level 1 for 16-year-olds.

CHART 61

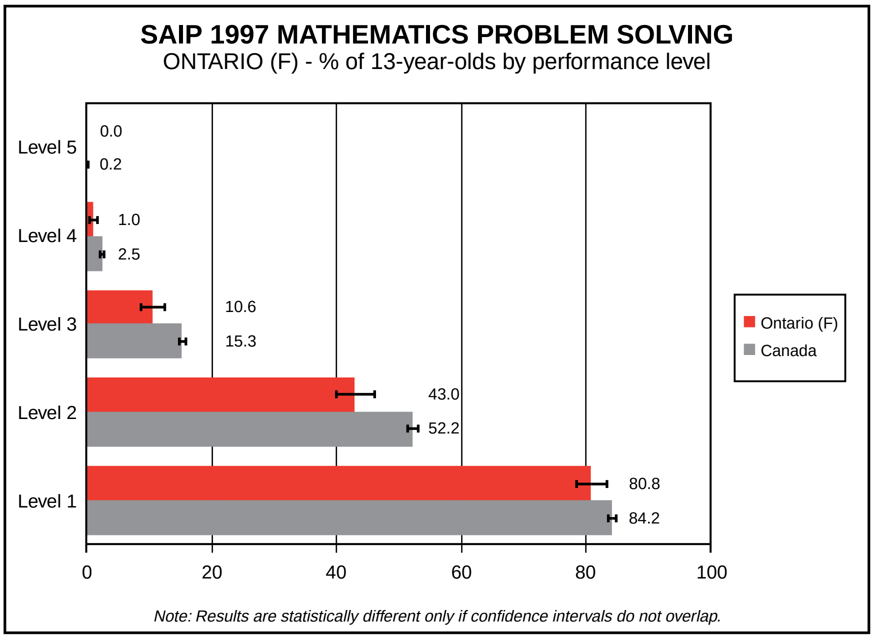
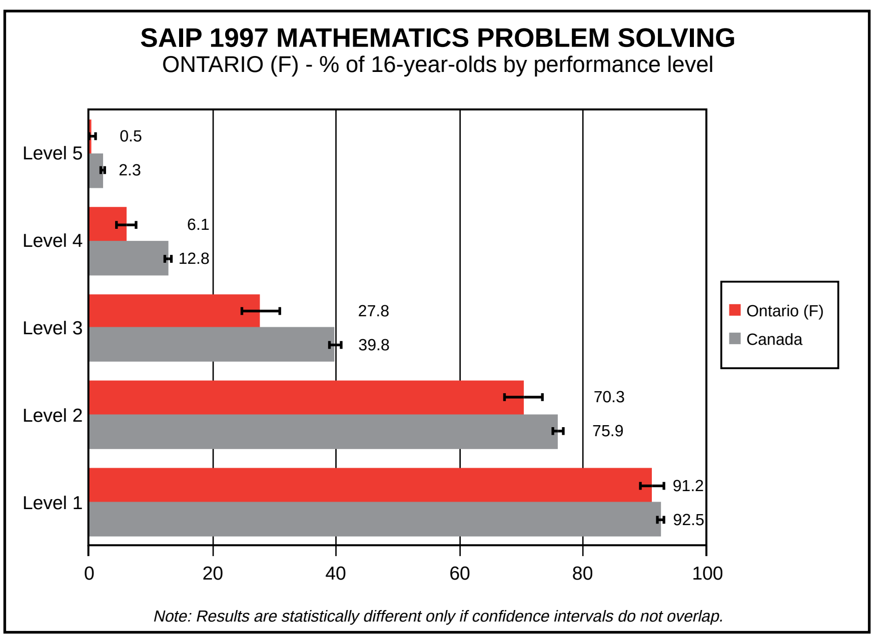


CHART 62



CONTEXT STATEMENT

Social Context

For some time now, Quebec has been modifying its education system in order to meet future educational requirements. While the majority of young Quebeckers have attended school over the last few years, the challenge for the future is to increase the number of graduates and, equally, to provide quality education. Therefore, school authorities are increasingly trying to identify the factors that contribute to the success of youth.

If young people are to be prepared to fully embrace the 21st century, they must master the basic skills. Over the last few months, these basic skills have been closely examined, resulting in changes at the primary and secondary school levels.

Some of the changes at the primary and secondary levels relate to the teaching of mathematics. In this regard, Quebec must be innovative in order to continue its tradition of quality education.

The majority of Quebec's population is composed of francophones, with an anglophone minority. In addition, an increase in immigration has resulted, at least in Montreal's metropolitan area, in a massive influx of school-aged children whose mother tongue is neither French nor English. Fully aware of the needs of this new client group, schools have implemented special measures, which include welcome and francization programs.

Organization of the School System

In Quebec, children who turn 6 years old before October 1 of the current school year are admitted into primary school. Students must attend school until they are 16. The school year runs for 180 days of classes.

Children who turn 5 years old before October 1 of the current school year may attend kindergarten, which is optional. Most 5-year-olds go to kindergarten. Kindergarten was a half-day program until September 1997. Since then, children in kindergarten attend a full-day, one-year program, like other primary school students.

Kindergarten is followed by primary school. A normal school week consists of five full days and 23.5 hours of teaching. Primary school lasts six years, and is followed by secondary school. A seventh grade is available for those students who experience learning difficulties.

Secondary school lasts five years and is divided into two levels. The school week has five full days and must consist of a minimum of 25 hours of teaching. The first secondary level focuses on the teaching of basic skills. At the second level, students continue with general education. They also have the opportunity to take optional classes that allow them to explore other avenues of learning before reaching the CEGEP level or undertaking vocational training that will lead to a trade. The academic conditions of the program determine whether the student will obtain a secondary school or a vocational school diploma.

Consequently, the majority of 13-year-old students are enrolled in the second year of secondary school and the majority of 16-year-olds attend the fifth and last year of the secondary level, with a few starting their CEGEP program.

In 1995–96, 1,037,845 students were enrolled in the general program in 2,700 primary and secondary public schools managed by the 158 school boards. More than 90% of students were enrolled in French schools, and 9.7% in English schools. In addition, 91,786 students attended 184 primary and secondary subsidized private schools. The Quebec government provides 82.6% of the school board's operational revenues, and 54.5% of subsidized private school revenues.

Mathematics Teaching

In Quebec, all primary and secondary school students must study mathematics. At the second level of secondary school (i.e., from the fourth year on), students can elect to enrol in a basic general course or in an advanced optional course. The latter is a prerequisite to attending a scientific program in CEGEP. Since September 1996, mathematics has become a prerequisite to admission into the CEGEP program.

The Department of Education determines the curriculum content for mathematics, as it does for most other programs. The mathematics curriculum is designed to develop secondary school students' knowledge and know-how in concepts, application, and problem solving. These programs also encourage the development of such universal skills as establishing relationships, communicating, problem management, and reasoning.

Mathematics Assessment

During secondary school, students' knowledge is regularly evaluated by schools through their own assessments or those provided by the Department of Education. The department offers a mixed assessment package; i.e., it includes sections of recognition response questions, as well as sections of short-answer and essay-type questions. During exams, students are allowed to use calculators (scientific or with graphic display).

As with other subject areas, the passing score is 60%. The score obtained in the school assessments accounts for half of the final score. The other half comes from the score derived from departmental assessments.

Quebec (English)

For mathematics content, there are significant differences between the performance of this jurisdiction's anglophone students and Canadian performance at levels 2 and 3 for 13-year-olds, and at levels 2, 3, and 4 for 16-year-olds.

CHART 63

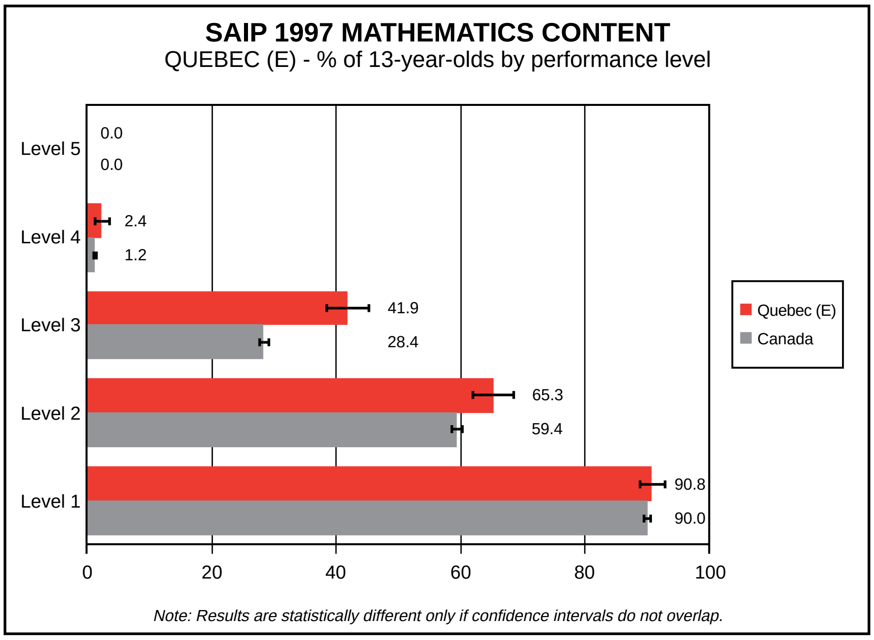
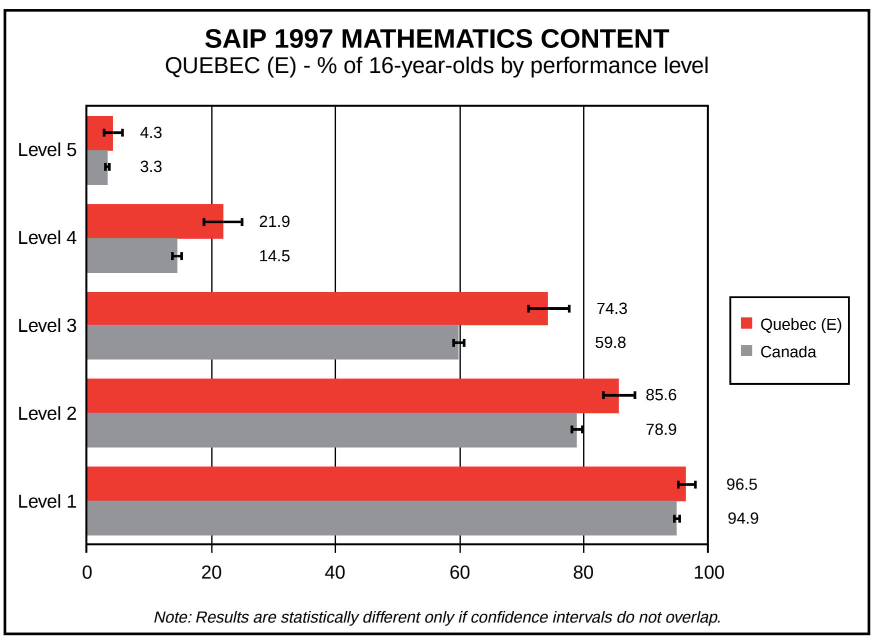


CHART 64



For mathematics problem solving, there are significant differences between the performance of this jurisdiction's anglophone students and Canadian performance at level 2 for 13-year-olds, and at levels 3 and 4 for 16-year-olds.

CHART 65

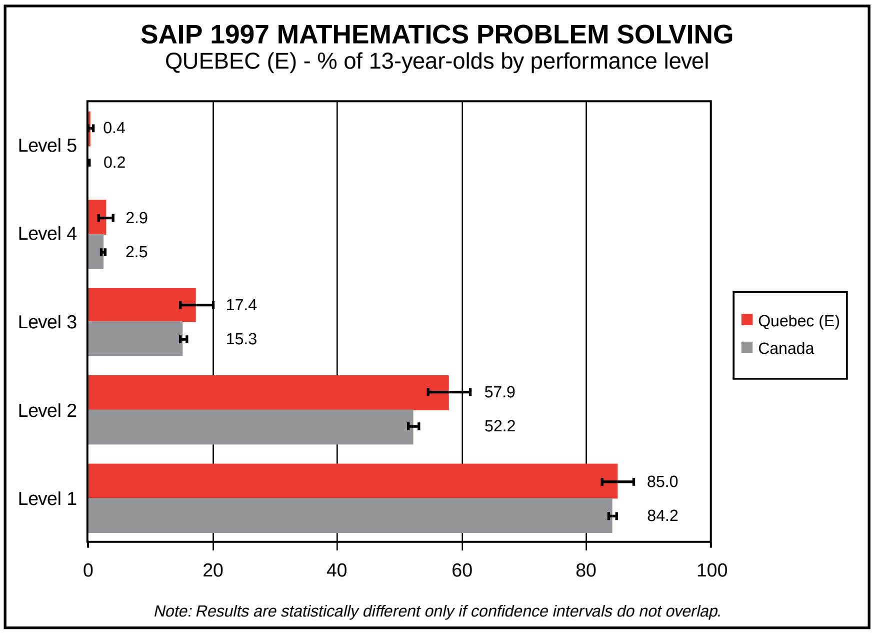
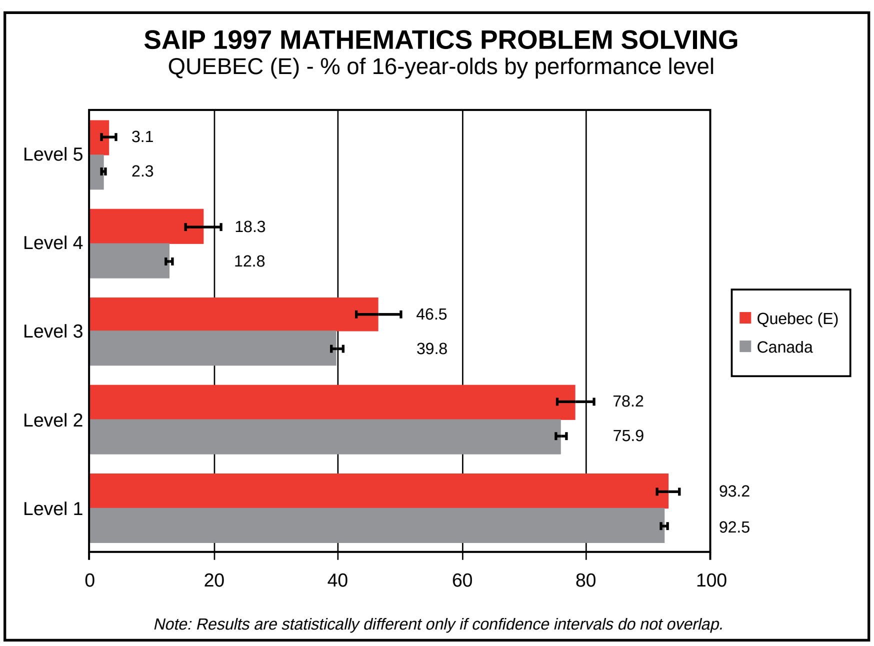


CHART 66



Quebec (French)

For mathematics content, there are significant differences between the performance of this jurisdiction's francophone students and Canadian performance at all levels, except at level 5 for 13-year-olds.

CHART 67

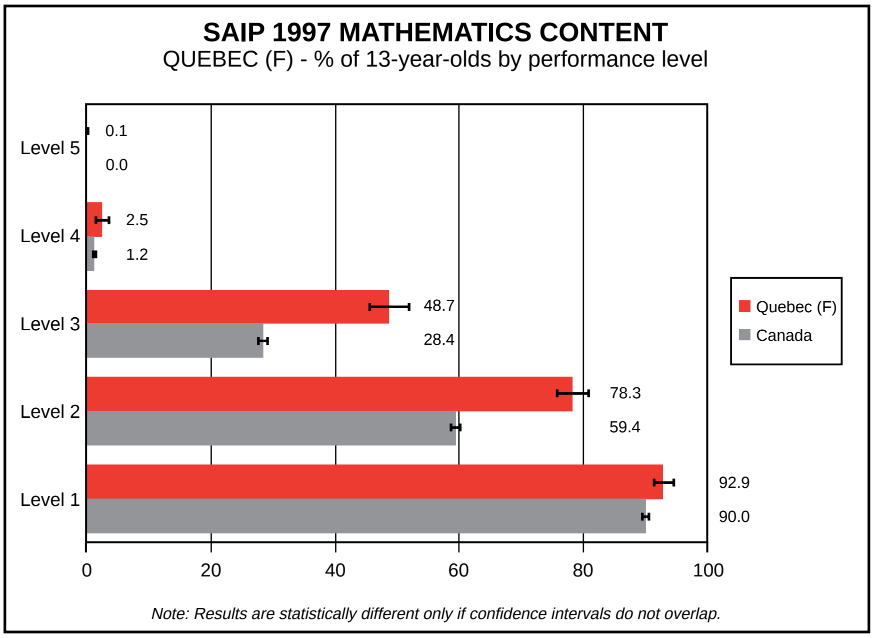
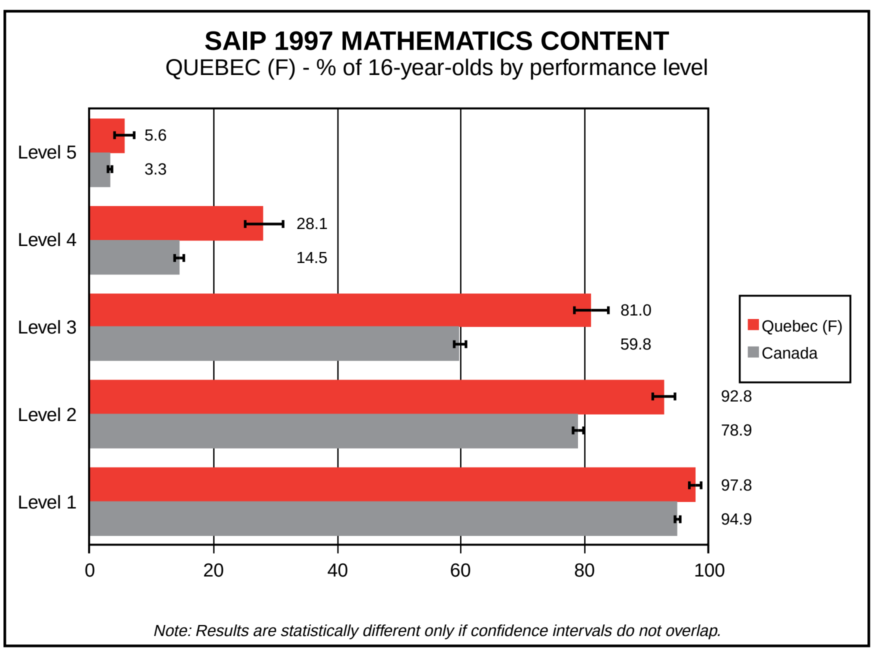


CHART 68



For mathematics problem solving, there are significant differences between the performance of this jurisdiction's francophone students and Canadian performance at all levels, except level 5 for both age groups.

CHART 69

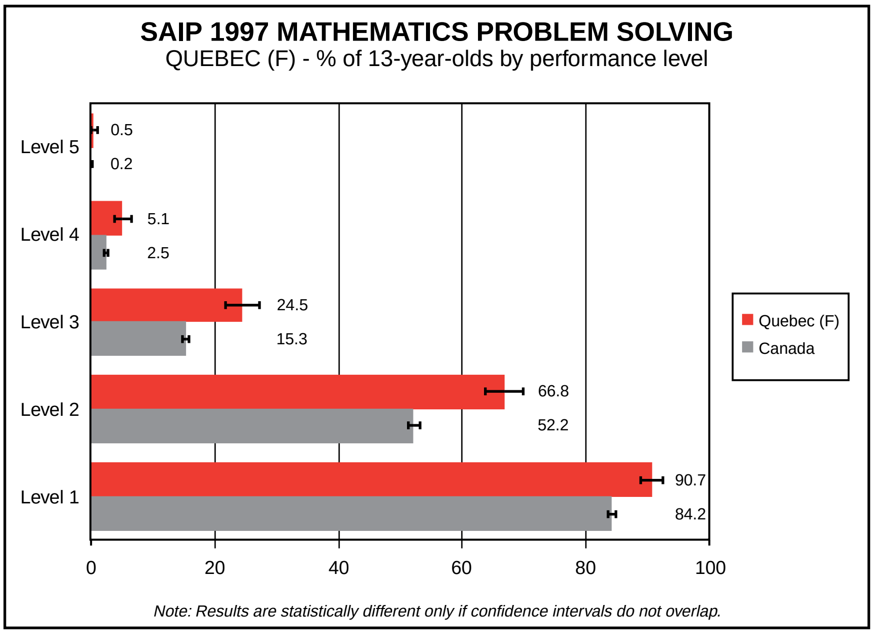
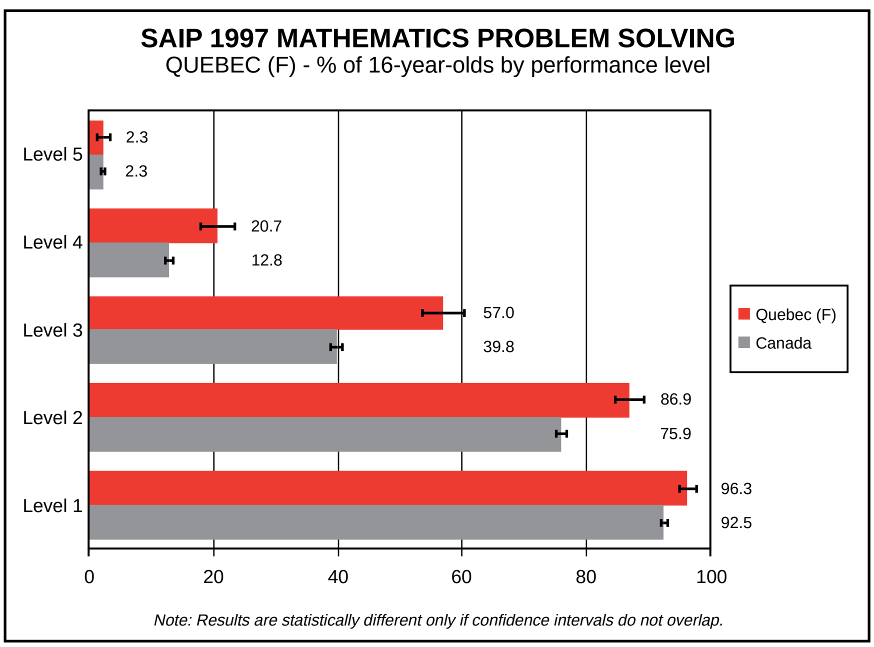


CHART 70



CONTEXT STATEMENT

Social Context

New Brunswick's population of 762,049 is 49% urban and 51% rural. The population distribution, together with a commitment to equal opportunity for all students, places a heavy demand on the Department of Education to provide an equitable level of educational programs and services throughout the province.

Over the past few years, the department has made a considerable effort to develop a school system that will meet the needs of all students. It has put in place programs to reduce school-leaving by identifying potential dropouts, to enable disabled students to attend school, and to facilitate the integration into the school system of as many students as possible. As a result, the province has high rates of retention (students who stay in school) within an educational system that is committed to the principles of inclusion for students with special needs.

Organization of the School System

Since 1967, the provincial government has had sole responsibility for financing public schools. The minister of education has the authority to prescribe curriculum and assess the degree to which goals are attained by students.

In 1969, New Brunswick became officially bilingual. In 1974, in recognition of its linguistic duality, the province established two parallel but separate education systems.

In 1992, New Brunswick amalgamated school districts, reducing the number from 42 to 18 (12 anglophone, six francophone).

In 1996, the province unveiled plans for a "Renewed Education System for New Brunswick," which addressed structural as well as quality issues. In this reform, the 18 existing school districts were maintained, but were grouped into eight administrative units (five anglophone, three francophone). As well, school boards were abolished, to be replaced by a parent-driven structure at the school, district, and provincial levels.

Each linguistic division of the Department of Education is responsible for its own curriculum and assessment. Educational programs and services are delivered in both official languages. In 1997, New Brunswick introduced the new *Education Act,* which respects the province's principles of equality, duality, and equity, and has quality as its underlying theme. This Act helps prepare students for the 21st century, by clearly defining roles and responsibilities, and by focusing on learning and teaching, rather than on administration.

In the 1996–97 school year, enrolment for kindergarten through grade 12 totalled 133,276. This includes 90,017 students in anglophone districts, and 43,259 students in francophone districts. The starting age for school is five, and students attend classes for 187 days per year.

Mathematics Teaching

Mathematics teaching is currently undergoing a significant transition at all levels, with emphasis being placed on "student-active" instruction. Curriculum and instruction are being focused around four main areas: mathematical problem solving, mathematical reasoning, communication in mathematics, and mathematical connections. Curriculum and resources are being developed to emphasize the relevance of mathematics, and to highlight its relationship to today's technology.

Currently, revisions to the curriculum and updating of resources are taking place at all levels. Piloting is under way and implementation will take place from 1996 through 2001.

Bettering student achievement in mathematics is a high priority. Currently, a committee composed of senior Department of Education officials, university administrators, mathematics professors, and researchers as well as classroom teachers meets on a regular basis in a collective effort to improve the teaching and learning of mathematics in New Brunswick.

Mathematics Assessment

The Department of Education administers a comprehensive Provincial Evaluation Program to monitor student achievement at particular points in the system. This provides important feedback at provincial, local, and individual levels about the knowledge and skills students are expected to learn.

Currently, we are in our last year of a program of grades 3 and 6 cyclical assessments, which have tested outcomes identified in the provincial mathematics, science, and language arts curriculum documents. These were designed as program assessments with a focus on reporting group data rather than individual student achievement. In the 1998–99 school year, assessments in mathematics, science, and language arts will be administered to all grades 3 and 5 students with individual student achievement being assessed and reported.

This year will also see the first administration of the Middle Level Mathematics Assessment to be written by all grade 8 students. This assessment is based on grade 8 outcomes, but is viewed more comprehensively as an assessment of student achievement at the end of middle school (grades 6, 7, and 8).

Since 1993, the Department of Education has administered provincial examinations in mathematics at the grade 11 level, which account for 30% of a student's final mark.

New Brunswick (English)

For mathematics content, there are significant differences between the performance of this jurisdiction's anglophone students and Canadian performance at levels 2 and 3 for 13-year-olds, and at all levels except level 1 for 16-year-olds.

CHART 71

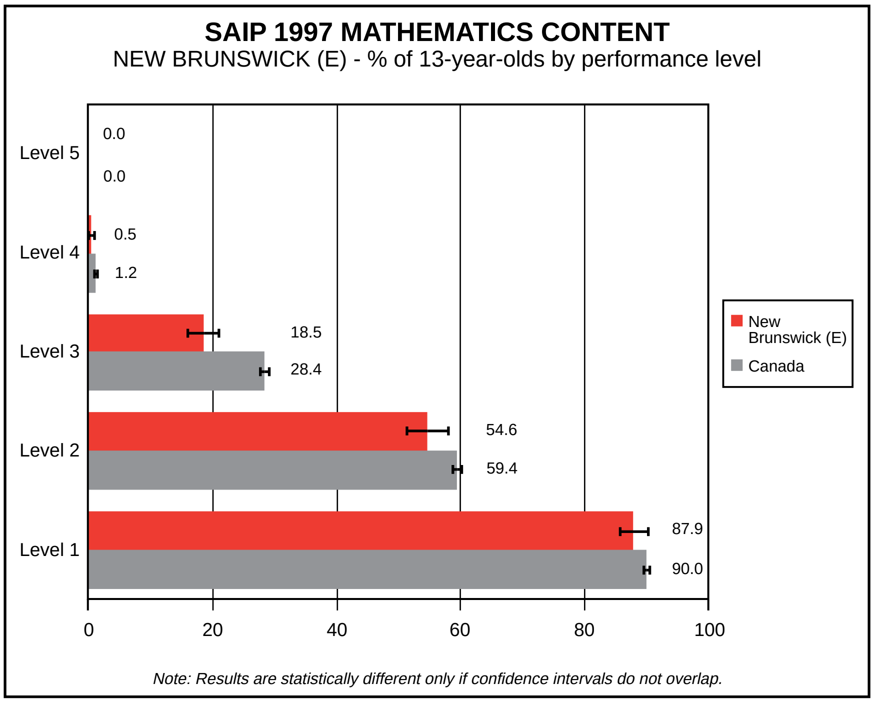
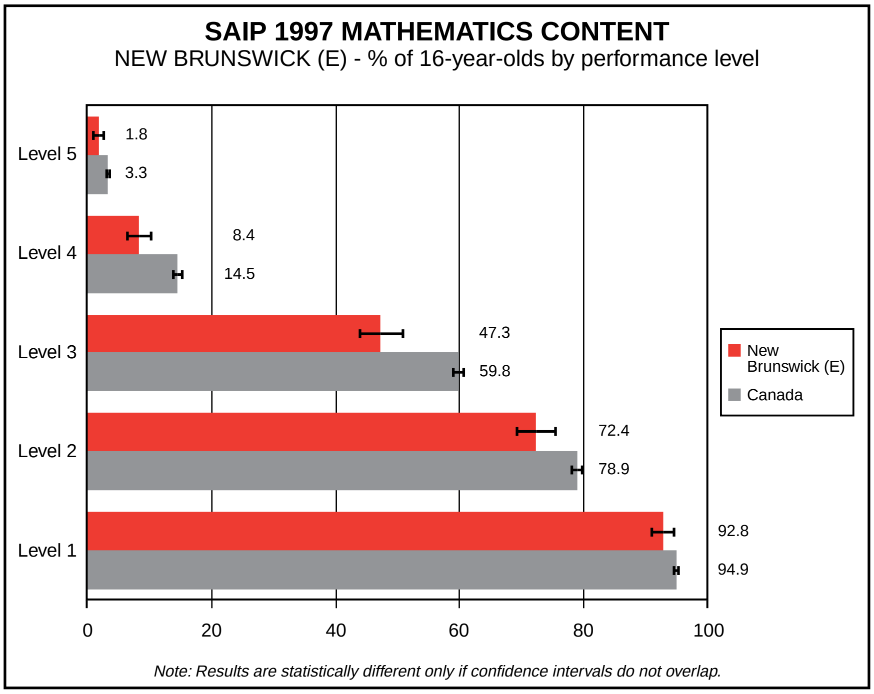


CHART 72



For mathematics problem solving, there are significant differences between the performance of this jurisdiction’s anglophone students and Canadian performance at levels 2 and 3 for 13-year-olds, and at levels 3, 4, and 5 for 16-year-olds.

CHART 73

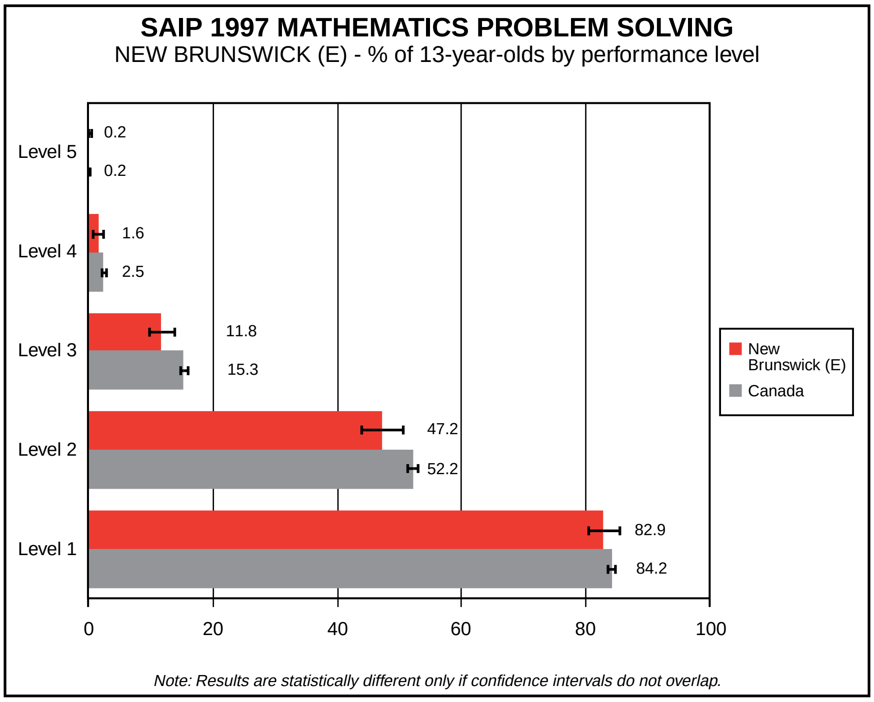
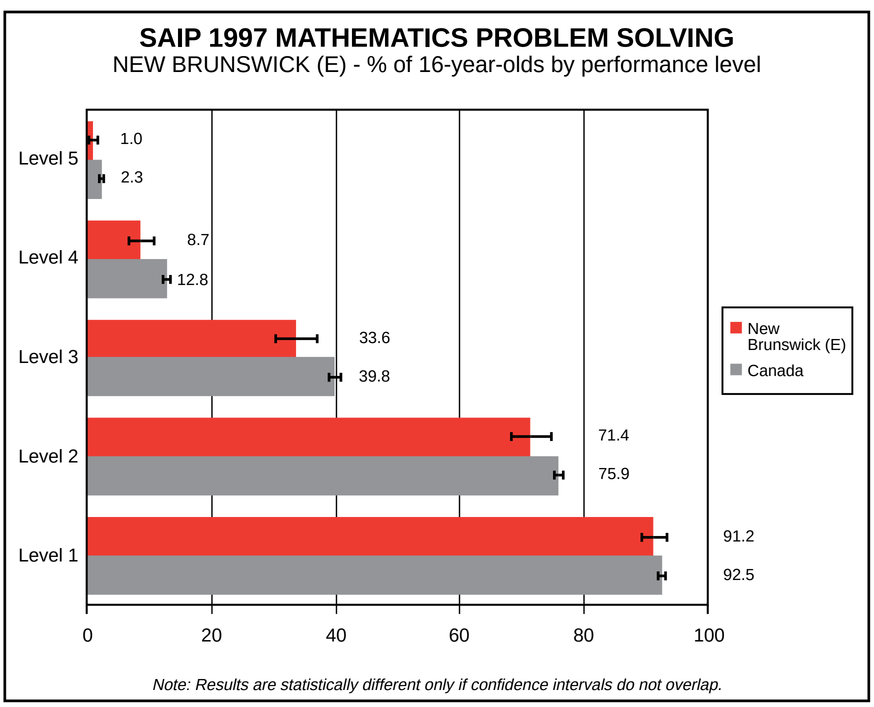


CHART 74



CONTEXT STATEMENT

Social Context

Despite improvements in New Brunswick's socio-economic development, the province's unemployment rate is above the Canadian average, and even higher in New Brunswick's French-speaking regions. As of July 1, 1997, New Brunswick had a population of 762,049, 51.2% of whom live in rural areas, representing one of the highest rural concentrations in Canada.

New Brunswick became officially bilingual in 1969, and more than a third of its population is French speaking. Total school enrolment is 133,276, and 32.5% of students attend school in French. Almost half of students enrolled in French-speaking schools live in predominantly English-speaking areas.

Organization of the School System

In 1974, in recognition of its linguistic duality, the province established two parallel but separate education systems. The French division of the Department of Education is responsible for the development of curriculum and assessment to meet the francophone community's needs. New Brunswick has six French school districts (administered by three directorates) and serves 43,314 students. New Brunswick's school system comprises 12 years of schooling, from grades 1 to 12. Admission is open to grade 1 for children who turn 6 years old before December 31. A public kindergarten system was implemented in 1992 for 5-year-olds.

Over the past few years, the department has made considerable efforts to develop a school system that meets the needs of all students. These efforts have resulted in a very high retention rate as well as one of the lowest dropout rates in the country.

Under the *New Brunswick Schools Act*, school authorities must place gifted students in regular programs, as long as all students' educational needs are met. From kindergarten to grade 8, the majority of gifted students attend regular classes, compared to 80% from grades 9 to 12. In addition, the province has implemented programs to reduce the incidence of school-leaving by identifying potential dropouts. In the 1995–96 school year, French-speaking schools had a school-leaving rate of 3.3%.

Currently, there is no provincial guideline on passing students in grades 1 through 8. Most school districts, however, demand an average passing grade of 60% to 65%. As for grades 9 to 12, the passing grade is 55%. Since 1991, provincial assessments given to all secondary school students account for 40% of the final score in seven compulsory subjects. A provincial formative assessment program has also been implemented for grades 4 and 8.

Mathematics Teaching

Mathematics is an important subject within the basic curriculum in the New Brunswick academic system. By age 13, each student has received approximately 1,300 hours of mathematics instruction, and 16-year-olds have received approximately 500 hours more. At the secondary school level, from grades 9 to 12, the French-speaking student must obtain four mathematics credits out of a total of 32.

The mathematics curriculum emphasizes an interactive approach, where students receive instruction in the following subjects: numerical algebra; measurement; statistics and probability; transformational geometry; euclidean geometry; analytical geometry; linear programming; vectors and matrices; sequences; trigonometry; and financial mathematics.

A program focusing mainly on problem solving is in place in primary school, and is currently being implemented at the secondary level. The primary school program introduced in grade 1 in 1986 is supported by a pedagogical approach and curriculum better suited to the program's objectives. For the 1997 SAIP mathematics assessment, all 13-year-olds and almost three-quarters of 16-year-olds had been following the new mathematics curriculum during primary school. It is interesting to compare the results of 1997 and 1993, since in the 1993 assessment, students had received instruction under the previous curriculum.

Mathematics Assessment

Since 1987, at the provincial level, the Department of Education has administered a mathematics evaluation program in grade 11, the last year of a mandatory mathematics course in secondary school. The results of these evaluations, of which about a third consist of constructed-response questions, are returned to the schools within five days. In addition, a few weeks following the evaluation, a comprehensive statistical report is distributed to school districts as well as schools. In 1993, a formative mathematics assessment program was first introduced in primary school for grades 4 and 8. The results serve as benchmarks indicating students' strengths and weaknesses very early in the school year. This data, intended for teachers and parents, also lets students know where they are at strategic points in their educational development.

New Brunswick (French)

For mathematics content, there are significant differences between the performance of this jurisdiction's francophone students and Canadian performance at level 3 for 13-year-olds, and at levels 2 and 5 for 16-year-olds.

CHART 75

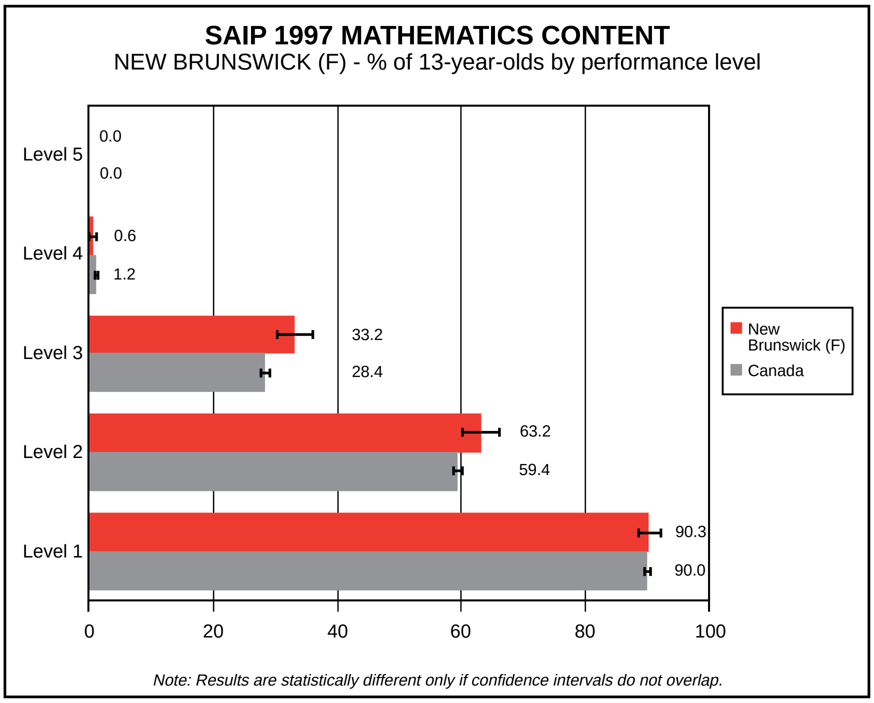
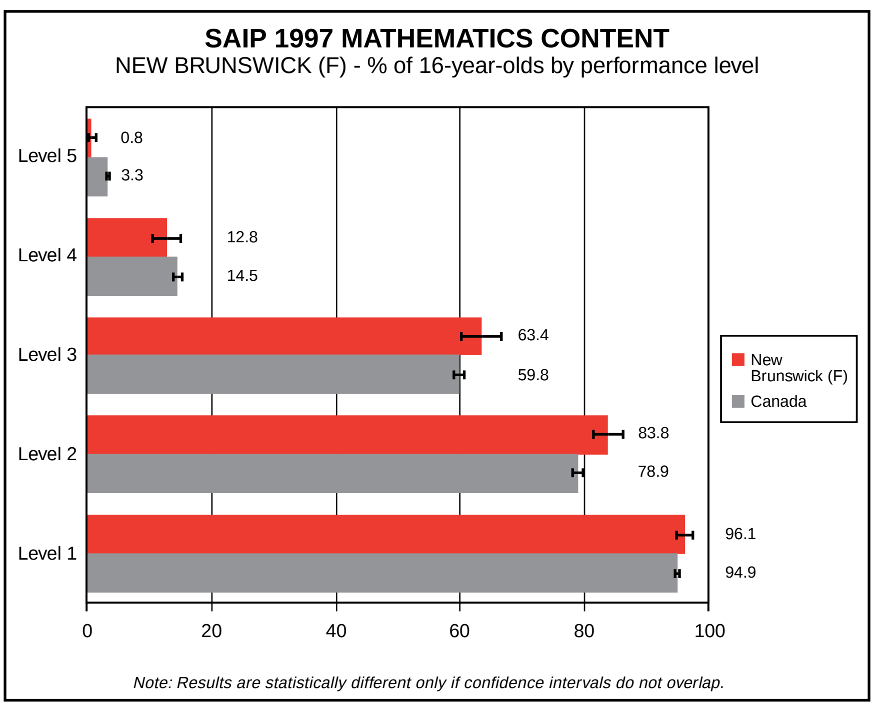


CHART 76



For mathematics problem solving, there is no significant difference between the performance of this jurisdiction's francophone students and Canadian performance at all levels, except at level 5 for 13-year-olds.

CHART 77

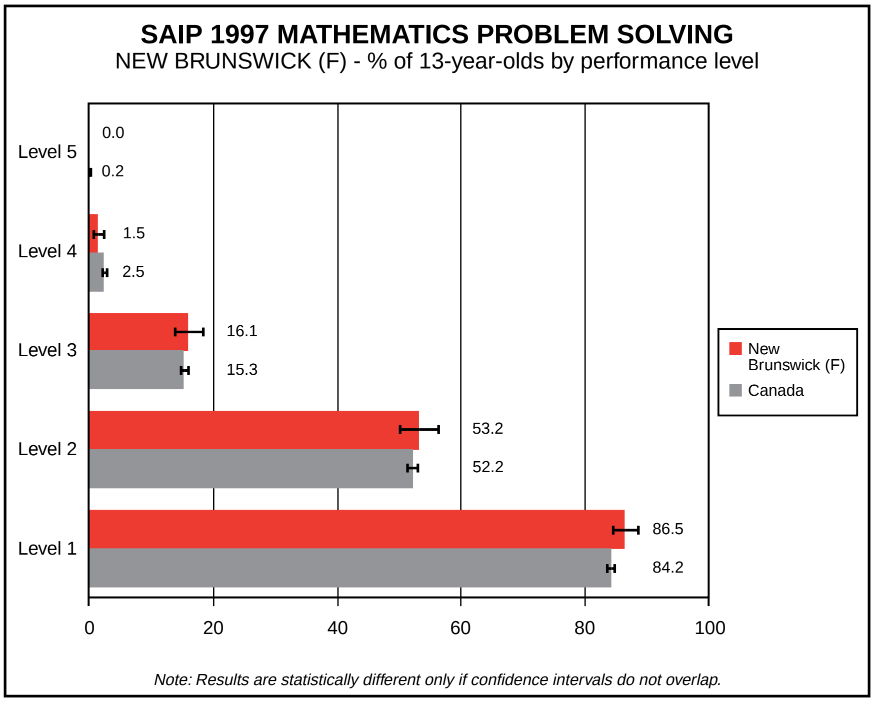
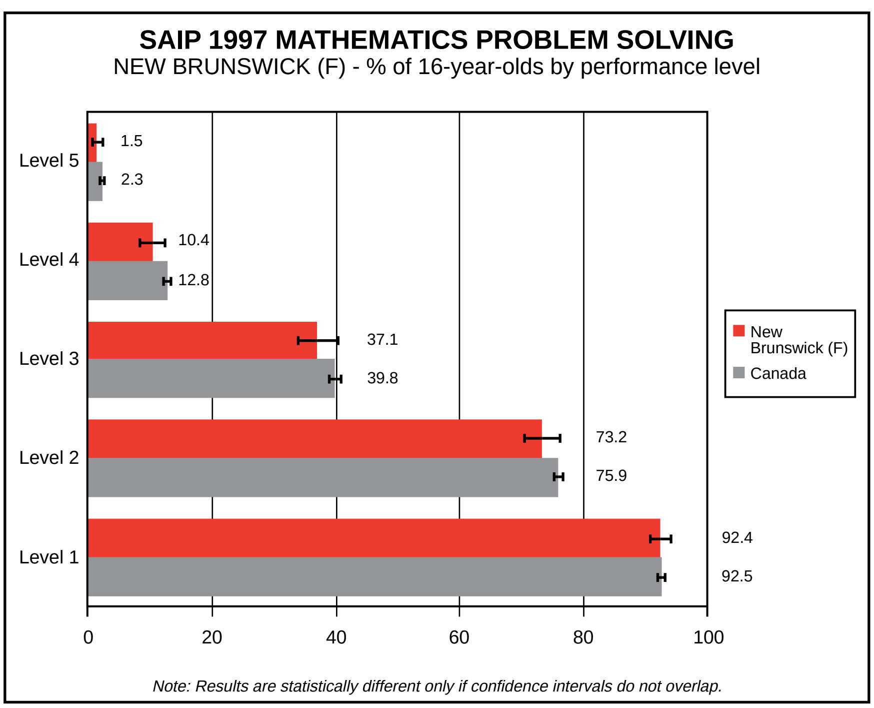


CHART 78



CONTEXT STATEMENT

Social Context

Nova Scotia is a small province with a population of 947,917, and a higher rural population than the Canadian average. Population growth is currently about 1% annually. Immigration is low both in absolute numbers and compared to immigration in Canada as a whole. About 9% of the population speaks both English and French, or French only. Among the total population, about 2% is African Canadian, over 2% is Aboriginal, and over 1% consists of other visible minorities. Unemployment rates in Nova Scotia are typically above the Canadian average.

Organization of the School System

Nova Scotia's total school population is 163,941 from kindergarten to grade 12. The province has a teaching force of 9,400 and is divided into seven school boards. About 97% of the students are enrolled in anglophone school boards, and about 3% of the students are enrolled in the *Conseil scolaire acadien provincial*. School enrolment is expected to decrease over the next few years.

Children who are 5 years old on or before October 1 of the current school year are admitted to primary school. Students must attend school until they are 16 years old. For the most part, 13-year-old students are in grades 7 and 8, and 16-year-old students are in grades 10 and 11.

Mathematics Teaching

Nova Scotia has been working in collaboration with the other three provinces in Atlantic Canada in the development of an Atlantic Canada mathematics curriculum for kindergarten to grade 12. The philosophy and outcomes of this mathematics curriculum are stated in *the Foundation for the Atlantic Canada Mathematics Curriculum* document and based on the National Council of Teachers of Mathematics (NCTM) in its *Curriculum and Evaluation Standards for School Mathematics* (1989).

Nova Scotia firmly believes that a mathematics curriculum must be shaped by a vision that fosters the development of mathematically literate students who can extend and apply their learning and who are effective participants in an increasingly technological society.

The mathematically literate student will:

I appreciate the utility and value of mathematics
II demonstrate mathematical power (i.e., display confidence and competence in his or her ability to do mathematics)
III be a mathematical problem solver
IV communicate mathematically
V reason mathematically

Further, Nova Scotia believes that a mathematics curriculum should reflect the following realities about the nature of mathematics itself:

I students must take an active role in their study of mathematics
II mathematics must be regularly connected to meaningful applications
III mathematics and mathematics instruction are greatly affected by changes in technology

Nova Scotia believes that students, teachers, and parents each play a significant role in creating a learning environment. Students have a responsibility with regard to participation, behaviour, and work ethic. Teachers convey their attitude towards, and their value of, mathematics through their classroom presentation and facilitation, response to students' ideas and solutions, and in their assessment practices. The positive attitude of parents also encourages students to pursue and persist at studies in mathematics. The entire climate must be conducive to the fostering of mathematically thinking students.

Mathematics Assessment

Nova Scotia is continuing to work with the other Atlantic provinces to develop regional assessment instruments that will be congruent with the new regional mathematics program. The mathematics assessments are designed to match the key stage outcomes at grades 3, 6, and 9, and the course outcomes for grade 12. The process to develop the assessments is based on a teacher involvement model with committees of mathematics teachers and the Ministry of Education and Culture staff working together at all stages.

Nova Scotia (English)

For mathematics content, there are significant differences between the performance of this jurisdiction's anglophone students and Canadian performance at levels 2, 3, and 4 for 13-year-olds, and at levels 4 and 5 for 16-year-olds.

CHART 79

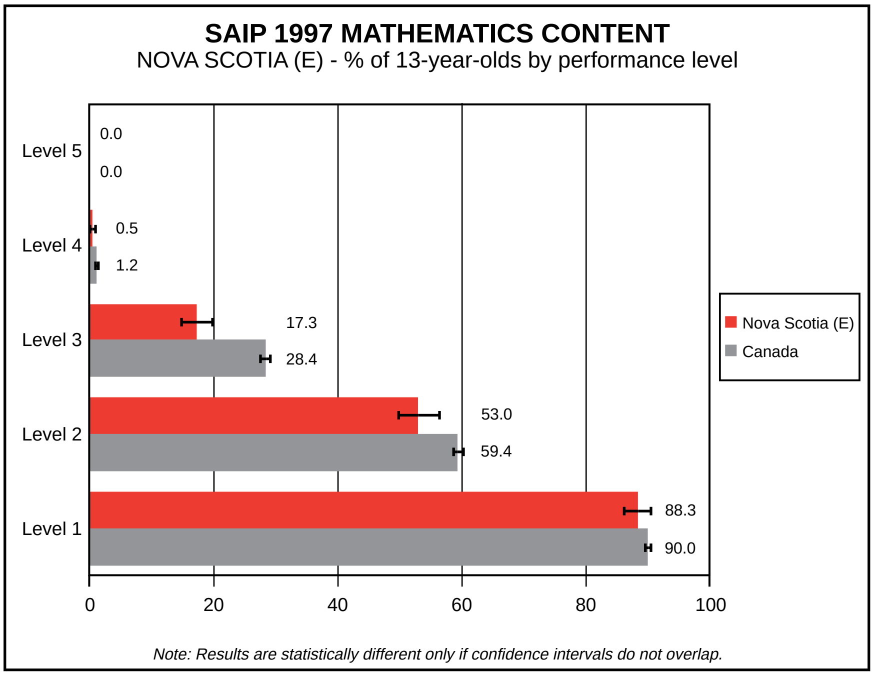
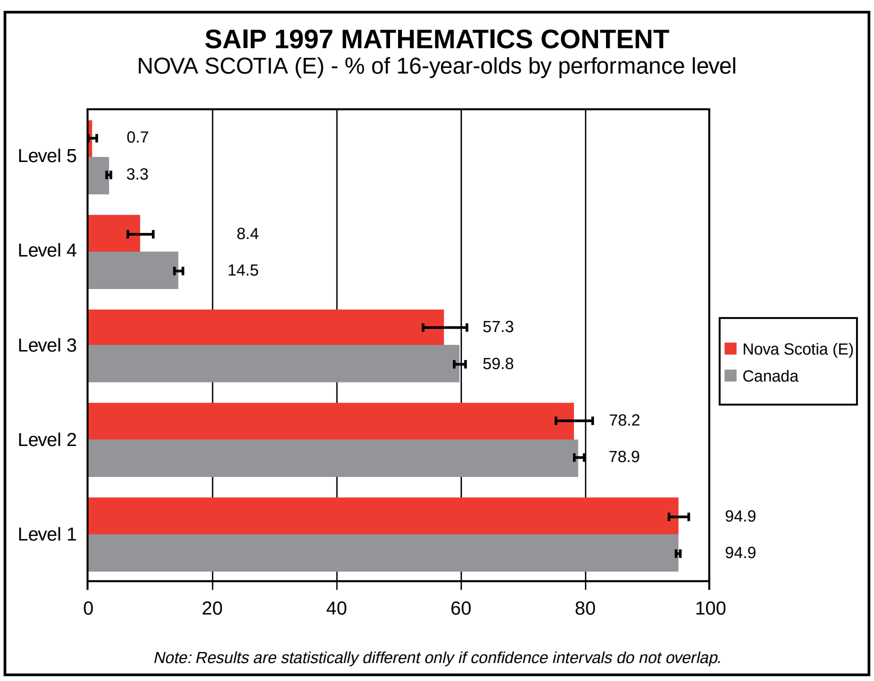


CHART 80



For mathematics problem solving, there are significant differences between the performance of this jurisdiction's anglophone students and Canadian performance at levels 2, 3, 4, and 5 for 13-year-olds, and at levels 4 and 5 for 16-year-olds.

CHART 81

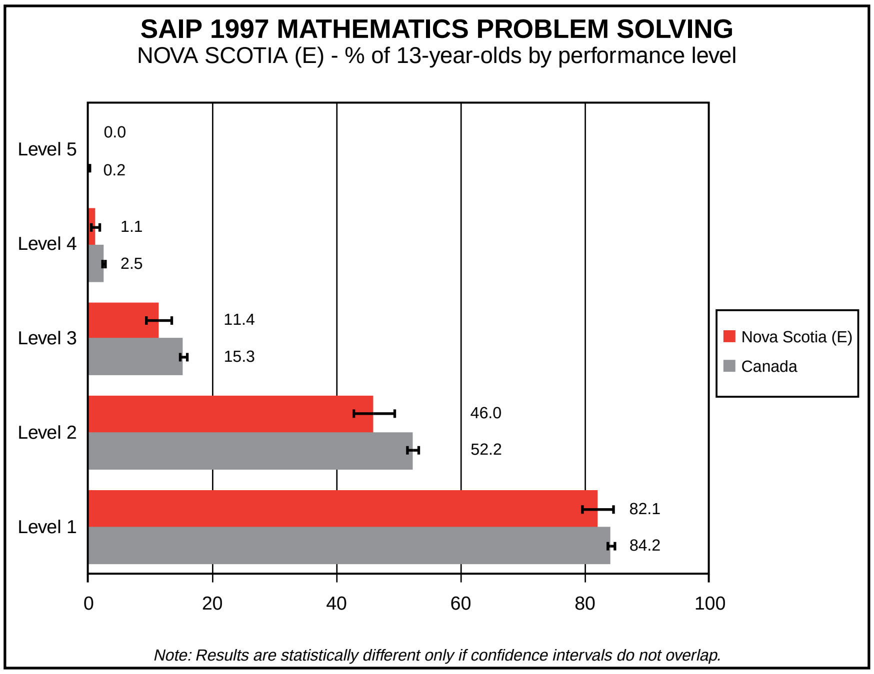
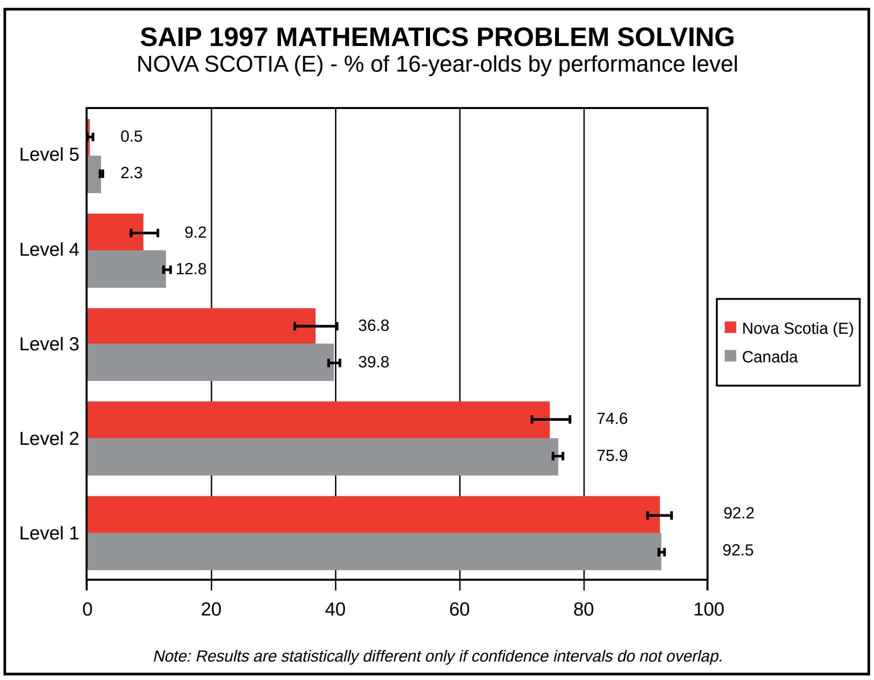


CHART 82



CONTEXT STATEMENT

Social Context

Nova Scotia is a small province with a population of 947,917, and a higher rural population than the Canadian average. Population growth is currently about 1% annually. Immigration is low both in absolute numbers and compared to immigration in Canada as a whole. About 9% of the population speaks both English and French, or French only. Among the total population, about 2% is African Canadian, 2.5% is Aboriginal, and about 1.5% consists of other visible minorities. Unemployment rates in Nova Scotia are typically above the Canadian average.

Organization of the School System

Nova Scotia has a total enrolment of 163,941 students, from kindergarten to grade 12. It employs 9,400 teachers in seven school boards. Approximately 97% of students are enrolled in English school boards and 3% in the Acadian school board, *Conseil scolaire acadien provincial*. The only Acadian school board comprises 16 elected members, employing managers led by a director general who also manages the schools. The 18 Acadian schools are spread throughout Nova Scotia. Although the *Conseil scolaire acadien provincial* makes every effort to establish a homogeneous school system, a few secondary schools currently serve both linguistic communities.

The kindergarten to grade 12 curriculum is developed by the staff of the Acadian and French Language Services of the Department of Education and Culture. The managers of the *Conseil scolaire acadien provincial* ensure that the learning outcomes curriculum is implemented. The Acadian and French Language Services are currently developing a learning outcomes evaluation program jointly with the other Atlantic provinces and the Atlantic Provinces Education Foundation.

Students who are 5 years old on or before October 1 of the current school year are admitted to primary school, and attendance is mandatory until the age of 16. The majority of 13-year-old students are in grade 8, and most 16-year-olds are in grade 11.

Mathematics Teaching

French-language mathematics teachers have reached different levels in the implementation of the new mathematics curriculum for the first level of high school. Pilot mathematics programs for high school's second level, namely grade 10, are now under way.

Nova Scotia's mathematics curriculum, which has been jointly developed with the other Atlantic provinces and the Atlantic Provinces Education Foundation, is centred on learning outcomes. These programs are organized around the following four main areas of mathematics education from kindergarten to grade 12: numbers; patterns and relations; shape and space; and statistics and probability.

Specific learning outcomes for each level comprise the knowledge, skills, and abilities necessary for mathematical and technological literacy, which are based on the following mathematical processes:

- communication
- problem solving
- relations
- reasoning
- mental arithmetic and estimation
- technology
- visualization

In order to obtain these results, the programs emphasize that the learning of mathematics is a dynamic process; it is best taught through real and practical everyday life situations that students can relate to. Students are responsible for participating actively in their learning and that of their partners in a context of cooperation and positive inter-relationship. Coached by their teachers, students learn in an environment where they can feel safe and think freely. Each student:

- believes that he/she can learn
- believes that what he/she is learning is relevant and important
- believes that he/she belongs in this environment
- believes that he/she is responsible for his/her learning and behaviour
- uses a large number of educational resources
- actively participates in his/her evaluation, which is an integral part of his/her learning

Mathematics Assessment

A provincial evaluation in mathematics was first tested on grade 4 students during September 1997. The *Conseil scolaire acadien provincial*, school management, and teachers are responsible for the testing of learning outcomes in mathematics for high school levels. The Acadian and French Language Services have not developed a provincial testing program for mathematics at the high school level, and use the one prescribed by the general curriculum.

Nova Scotia (French)

For mathematics content, there are significant differences between the performance of this jurisdiction's francophone students and Canadian performance at all levels for both age groups, except at level 5 for 13-year-olds. Since all students of both age groups were assessed in each component, no confidence interval was calculated.

CHART 83

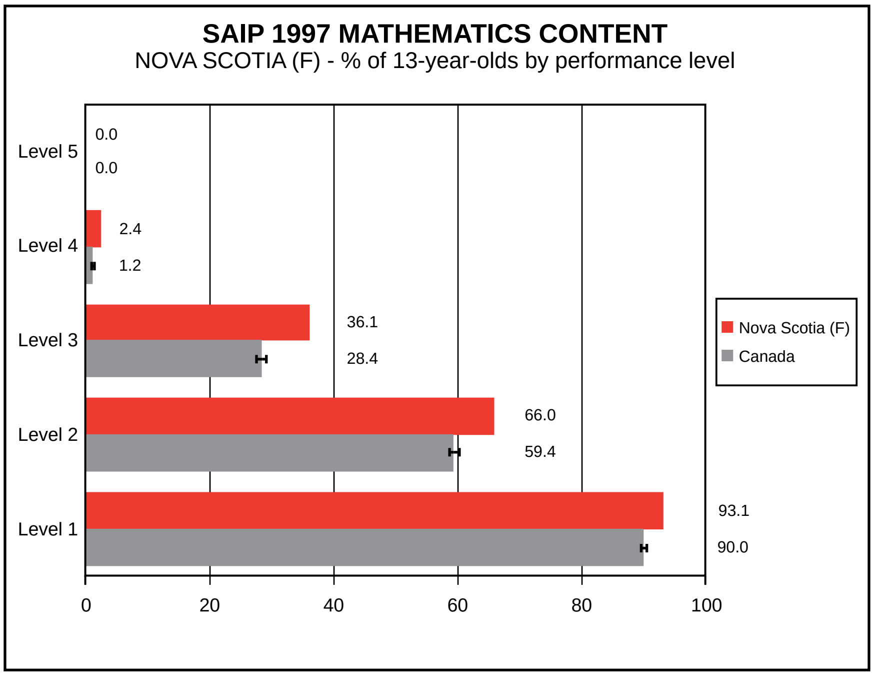
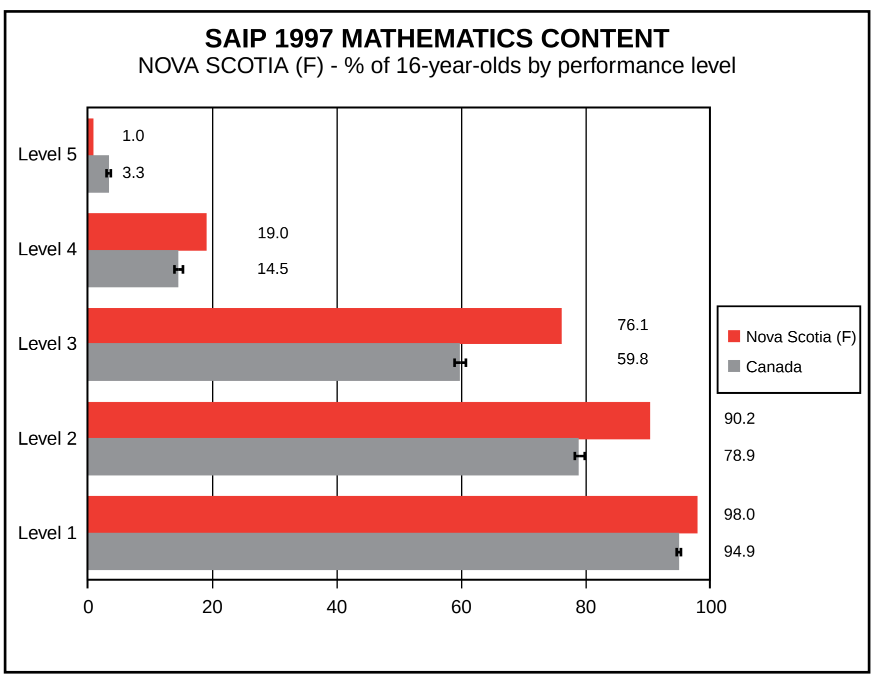


CHART 84



For mathematics problem solving, there are significant differences between the performance of this jurisdiction's francophone students and Canadian performance at all levels, for both age groups, except at level 3 for 13-year-olds. Since all students of both age groups were assessed in each component, no confidence interval was calculated.

CHART 85

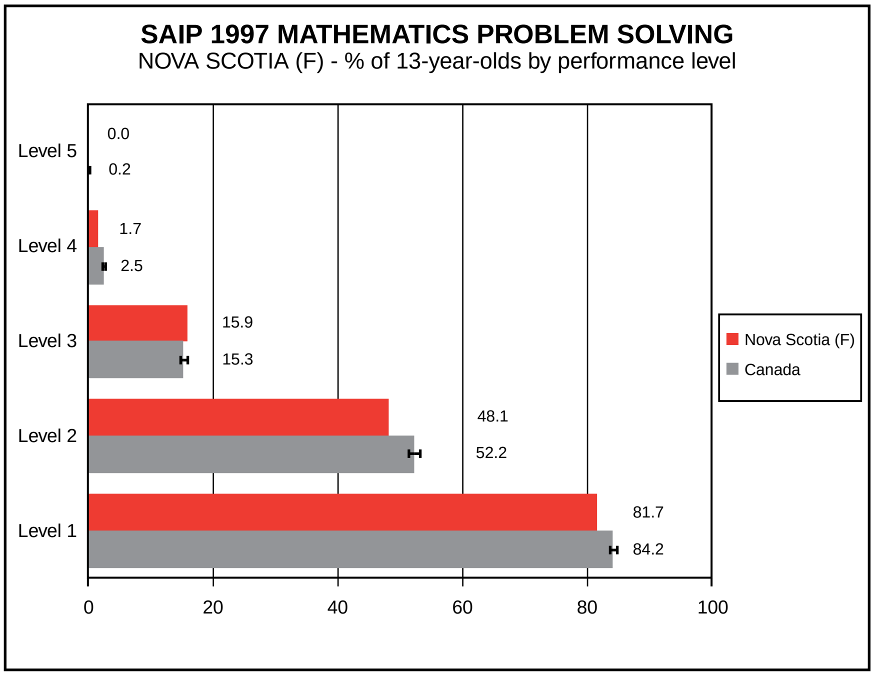
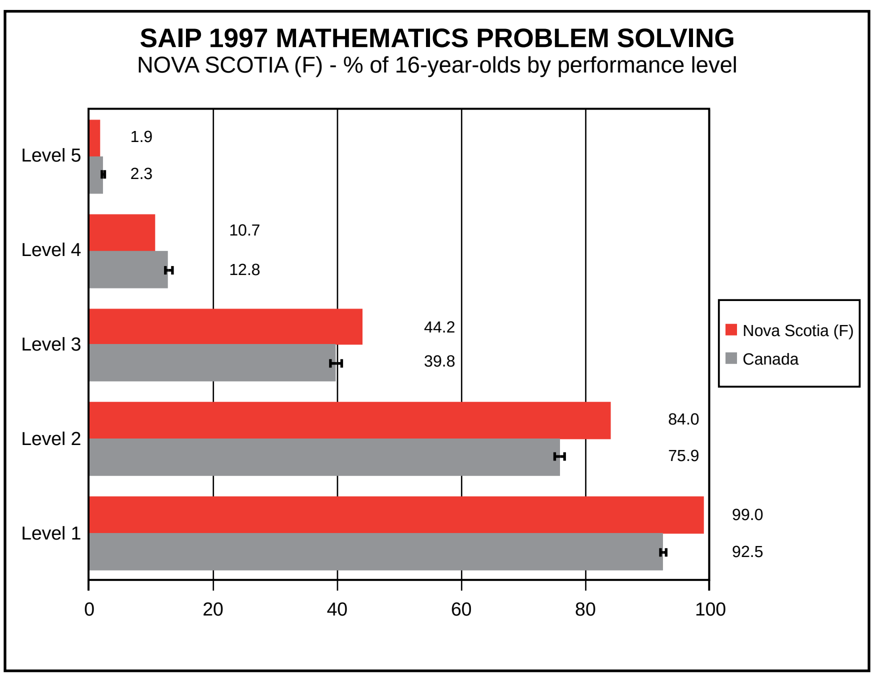


CHART 86



CONTEXT STATEMENT

Social Context

Prince Edward Island has a population of 135,500. Ninety-five per cent of the population speaks English. Sixty per cent of the population is rural and about 7% live on farms. The Island is crescent shaped with a land area of 5660 square kilometres. The three main industries are agriculture, tourism, and fishery. In 1997, the world's longest continuous multi-span bridge connected Prince Edward Island to the mainland. Confederation Bridge represents one of the most important construction projects in modern Canadian history.

Organization of the School System

Prince Edward Island has three school boards, 65 public schools, and 24,000 students. Of the total student population, about 15% are enrolled in French immersion classes.

There is no kindergarten program in the public education system. However, kindergarten is available through the private sector.

Children who start school must be 6 years of age by the end of January of the current school year. The school system consists of grades 1 to 12.

Outside the public system, there are three private schools and one band-operated school.

Mathematics Teaching

Prince Edward Island is a working partner with the Atlantic Provinces Education Foundation in developing foundations for the Atlantic Canada mathematics curriculum. The Atlantic Canada mathematics curriculum is shaped by a vision that fosters the development of mathematically literate students who can extend and apply their learning and who are effective participants in an increasingly technological society.

Mathematics Assessment

Prince Edward Island does not have large-scale provincial assessment programs. However, as assessment instruments are developed by the Atlantic Provinces Education Foundation, consideration will be given to their use by the province for program evaluation and professional development for teachers.

Teachers are encouraged to use a variety of assessment strategies that are aligned with the curriculum outcomes and integrate assessment with instruction, and to use this information to inform students, parents, and other school personnel about student progress.

Prince Edward Island

For mathematics content, there are significant differences between this jurisdiction's performance and Canadian performance at levels 2 and 3 for 13-year-olds, and at all levels for 16-year-olds.

CHART 87

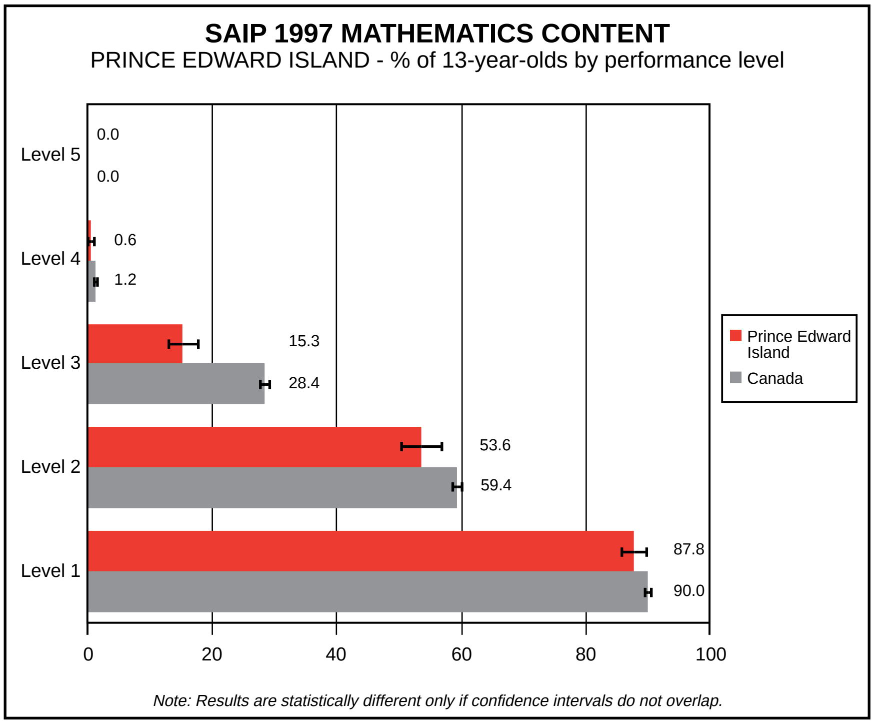
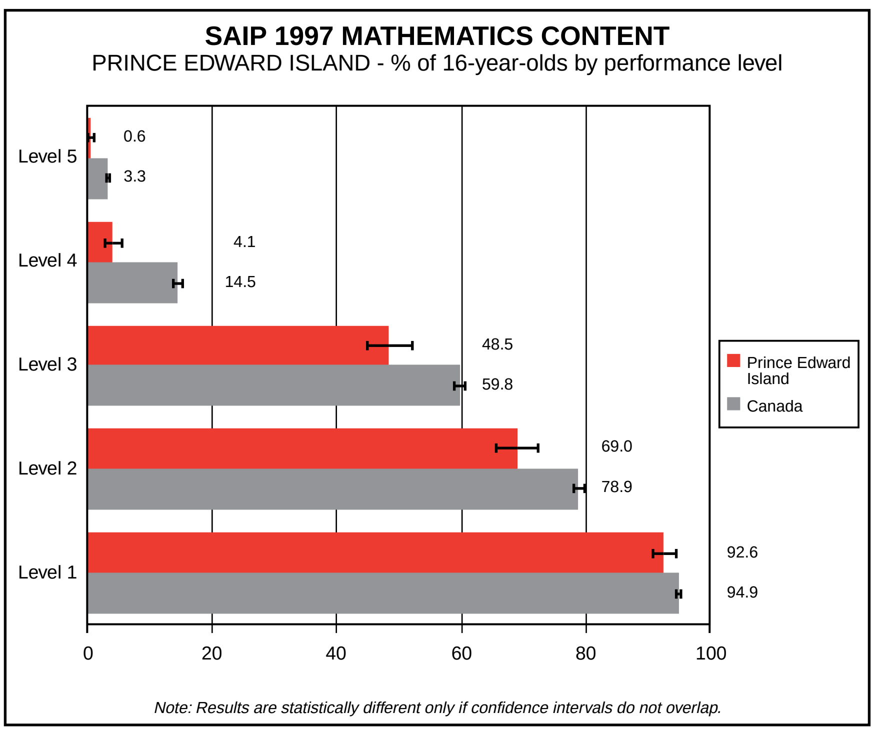


CHART 88



For mathematics problem solving, there are significant differences between this jurisdiction's performance and Canadian performance at levels 4 and 5 for 13-year-olds, and at all levels for 16-year-olds.

CHART 89

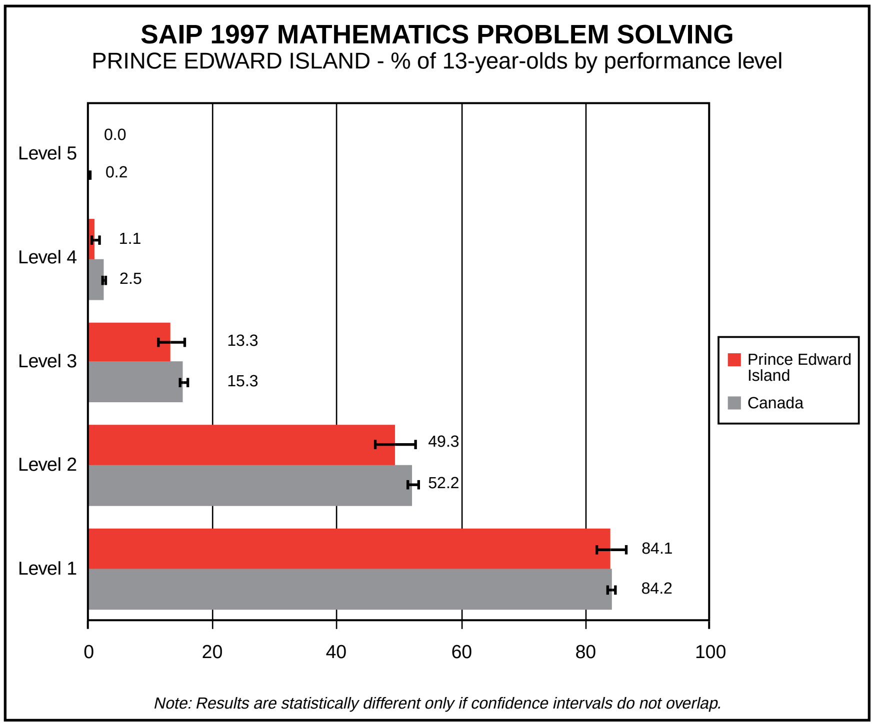
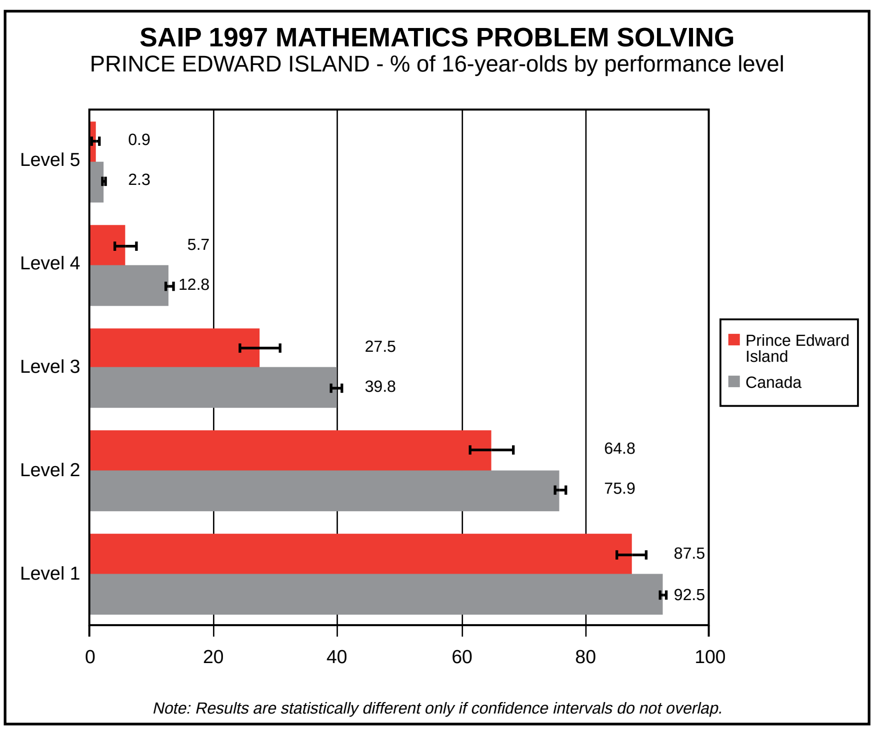


CHART 90



CONTEXT STATEMENT

Social Context

In Newfoundland and Labrador, there are more than half a million people spread over an area of about 150,000 square kilometres. The small population and large size of the province make it difficult and expensive for the government to provide educational programs and services. In addition, enrolments have been declining since 1972. The province's economy has been affected negatively in recent years as a result of the closure of the cod fishery. At the same time, however, alternative fisheries have expanded. The economy is expected to grow significantly over the next few years as a result of activity in the mining sector, growth in tourism, and increased fisheries output. Employment is expected to increase by 2.5% over the next two years.

Organization of the School System

For most of its educational history, the province has operated a denominational education system. In this system, responsibility for education has been shared between the provincial government through the Department of Education and the major Christian churches through Denominational Education Councils. As of September 30, 1997, there were 391 schools in the province with a combined enrolment of 101,602, comprising 10 school districts. There were 6,943 educators assigned to the system.

Mathematics Teaching

Over the past few years, major changes in the secondary mathematics curriculum have been driven by significant events at the provincial, national, and international levels. Many changes to the provincial curriculum took place during the first half of this decade as a result of the report of the provincial Task Force on Mathematics and Science Education (*Towards an Achieving Society*, 1989). At the national and international levels, new directions in mathematics education have been put forward in such documents as *Curriculum and Evaluation Standards for School Mathematics* (National Council of Teachers of Mathematics [NCTM], 1989) and *Professional Standards for Teaching Mathematics* (NCTM, 1991). These publications have had a significant impact on the nature of changes to the mathematics curriculum and instruction.

Currently, all students from kindergarten to grade 9 are required to take mathematics as part of their education program. The mathematics curriculum for these grades is a common curriculum. All students do the same program at a particular grade level unless they are identified as having special needs, in which case they are placed on an Individual Program Plan. To graduate, high school students must complete two two-credit courses as part of their required program. Each of these courses represents 110 to 120 instructional hours. Programming in mathematics at the high school level provides three possible pathways for students: practical, academic, and advanced. Approximately one-quarter of the students take the practical program, one-half the academic, and one-quarter the advanced program. Some students take such optional courses as statistics, calculus readiness, and advanced placement calculus. The vast majority of students study mathematics in all years of their high school program.

The mathematics curriculum is currently under review from kindergarten to grade 12. This review is based on a new framework described in *Foundation for the Atlantic Canada Mathematics Curriculum*. As part of an Atlantic Canada Common Core Curriculum Initiative, a new curriculum is being developed according to this framework. In this province, piloting of the new Atlantic curriculum is occurring in kindergarten, and in grades 1, 2, 3, and 10, with subsequent piloting to follow in other grade levels during the next two to three years.

Mathematics Assessment

In recent years, there has been an increased emphasis on criterion-referenced testing. Criterion-referenced tests in mathematics were administered to grade 3 students in 1993 and 1996, to grade 6 students in 1994 and 1995, and to grade 9 students in 1997. Until 1996, examinations were written in all exit-level mathematics courses. Presently, curricula and examinations are being developed under the auspices of the Atlantic Provinces Education Foundation, and exit-level examinations will be available to be administered in all mathematics courses. Norm-referenced measures are obtained through administration of the *Canadian Tests of Basic Skills*. Each year, students are tested in either grades 4, 7, 10, or 12.

Newfoundland and Labrador

For mathematics content, there are significant differences between this jurisdiction's performance and Canadian performance at level 3 for 13-year-olds, and at all levels for 16-year-olds.

CHART 91

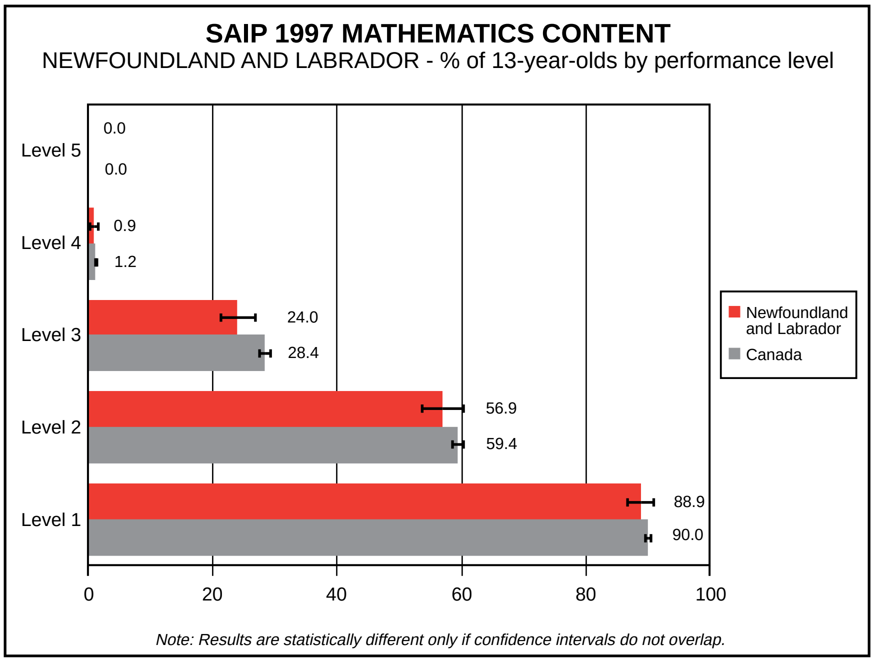
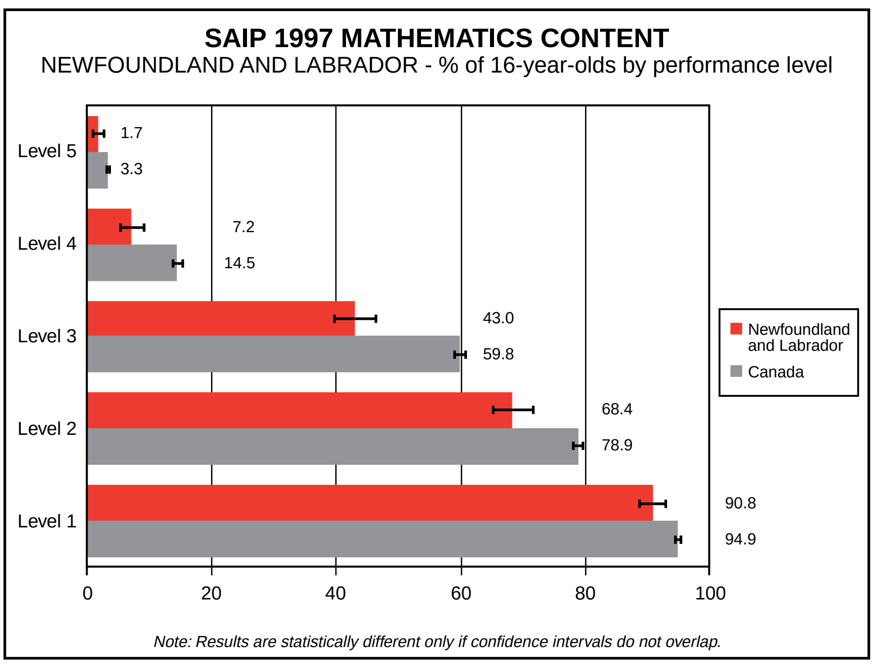


CHART 92



For mathematics problem solving, there are significant differences between this jurisdiction's performance and Canadian performance at all levels for both age groups.

CHART 93

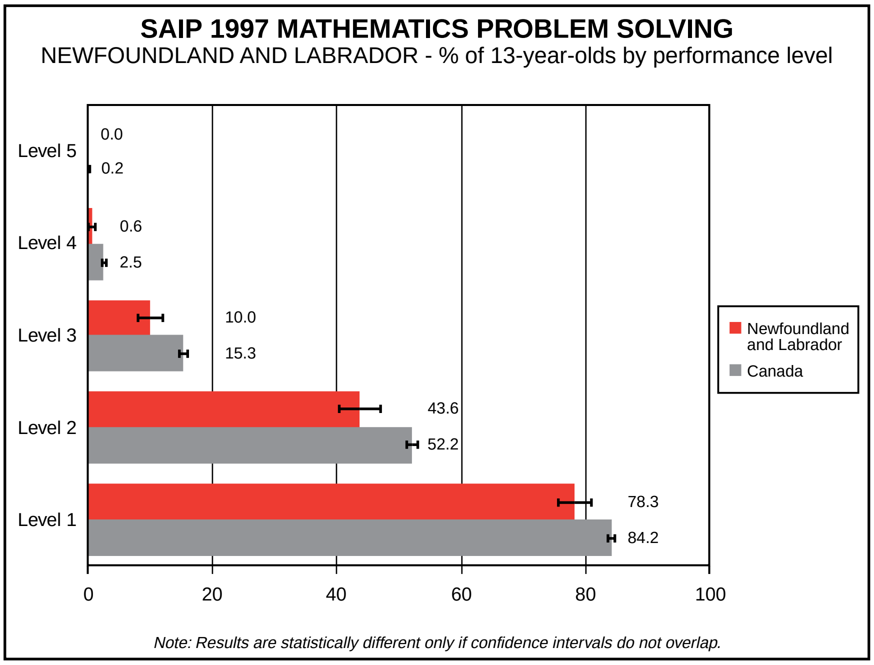
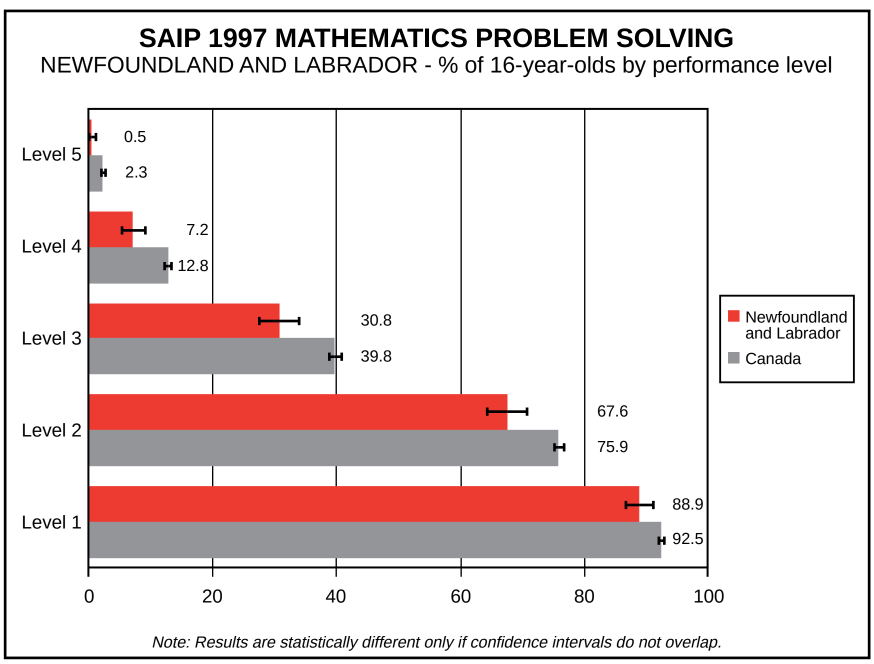


CHART 94



CONTEXT STATEMENT

Social Context

The Northwest Territories' population of 65,000 is 61% Aboriginal and 39% non-Aboriginal. The Aboriginal population is 37% Inuit, 17% Dene, and 7% Métis. The non-Aboriginal population is 37% anglophone and 2% francophone. Along with English and French, our unique language legislation recognizes nine Aboriginal official languages: Chipewyan, Cree, Dogrib, Gwich'in, Inuinnaqtun, Inuktitut, Inuvialuktun, North Slavey, and South Slavey.

Populations are concentrated in 59 communities dispersed across a geographic area approximately one-third the total size of Canada. The birth rate in the Northwest Territories is about twice the national average, which means that the school system must constantly accommodate rising numbers of students.

Organization of the School System

The Government of the Northwest Territories assumed responsibility for education in 1970. Primarily a centralized system, this included the two existing boards of education in Yellowknife. Amendments to the *Education Act* in 1983 resulted in the formation of eight new divisional boards of education between 1985 and 1991.

Through our new *Education Ac*t (1996) the Department of Education, Culture and Employment now provides policy and curriculum direction to two district educational authorities and eight divisional education councils. The Teacher Qualification Service of the department certifies teachers to work in the Northwest Territories. The department develops curricula, directives, and guidelines to meet the unique cultural and language needs of students in the Northwest Territories. The education councils and educational authorities implement and adapt curricula and develop programs to meet the needs of students in each of their regions. Local education authorities, representing parents and the public in each community, provide guidance and direction to the schools.

The majority of the 16,000 students in the school system are Aboriginal. In the three eastern regions, Inuktitut, Inuinnaqtun, English, and French are offered as languages of instruction. In the seven western regions, North Slavey, Dogrib, English, and French are offered as languages of instruction. Some specialized curricula have been developed to address the language and cultural needs of the students.

The Northwest Territories is part of the Western Protocol Agreement for common curriculum. Over the next few years, these curricula will replace most Northwest Territories curricula currently in use from kindergarten to grade 9, and Alberta curricula from grades 10 to 12.

On April 1, 1999, the Northwest Territories will be divided to create two new territories. The Nunavut Government will assume jurisdiction over the education system in the east, while the existing structures will be modified to meet the needs in the Western Northwest Territories.

Mathematics Teaching

Prior to implementation of the Western Canadian Mathematics Curriculum in September 1997, students from kindergarten through grade 9 followed the revised Northwest Territories Mathematics Curricula (1990).

One of the most important goals for the teaching of mathematics in the Northwest Territories is to develop students' ability to think and reason numerically, quantitatively, and spatially. In the early years of education, the relationship to the physical world is emphasized. Problem solving and the use of concrete manipulatives are encouraged to address diverse learning styles and to focus on aspects of language learning in mathematics, as well as to ensure that mathematics is taught in a culturally relevant way.

At the junior secondary level (grades 7 to 9), the aim is to develop an understanding of mathematical concepts by making mathematics relevant and concrete. The content of the program is divided into six strands: problem solving; number systems and operations; ratios and proportion; measurement and geometry; data management; and algebra. Each strand is sequenced through three grades.

Senior secondary students (grades 10 to 12) may enrol in one or more of four course sequences in mathematics and may transfer between sequences. Sequences are designed to meet the diverse needs of students, including differing interests and aptitudes in mathematics, and to prepare students for a range of postsecondary choices.

Mathematics Assessment

There is currently no territorial-wide assessment done, other than grade 12 diploma examinations and SAIP. A Student Evaluation Handbook was developed in 1993 to assist teachers in developing classroom assessment practices based on instruction and student learning. Currently, the Northwest Territories is piloting the Classroom Assessment Materials Project in Mathematics, developed by Alberta Education, to introduce the strategies of performance-based assessment and the use of scoring rubrics.

Northwest Territories

For mathematics content, there are significant differences between this jurisdiction's performance and Canadian performance at all levels, except at level 5 for 13-year-olds.

CHART 95

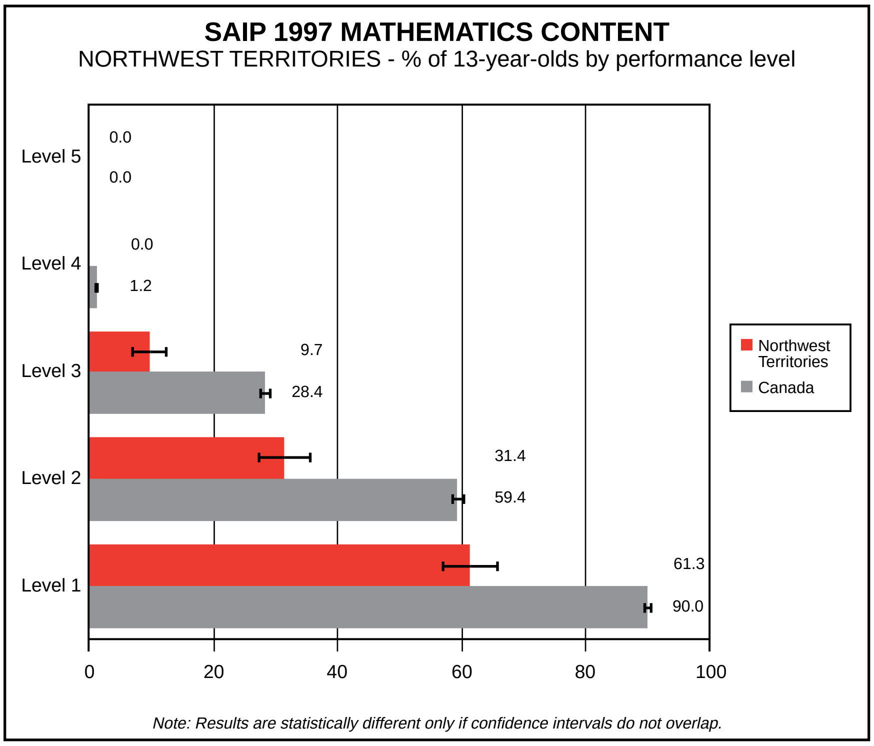
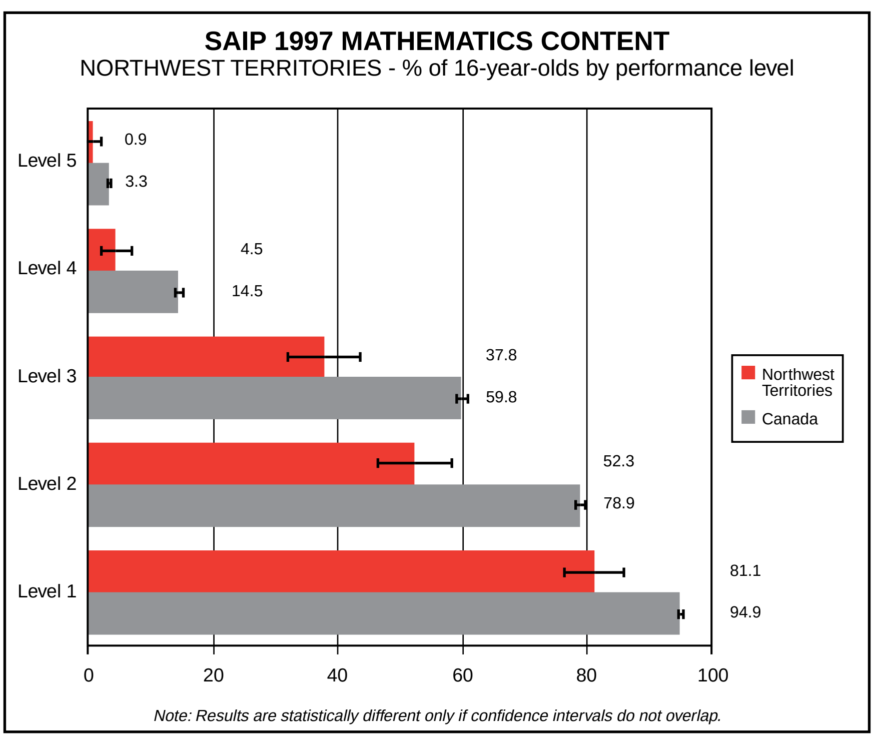


CHART 96



For mathematics problem solving, there are significant differences between this jurisdiction's performance and Canadian performance at all levels, except at level 5 for 16-year-olds.

CHART 97

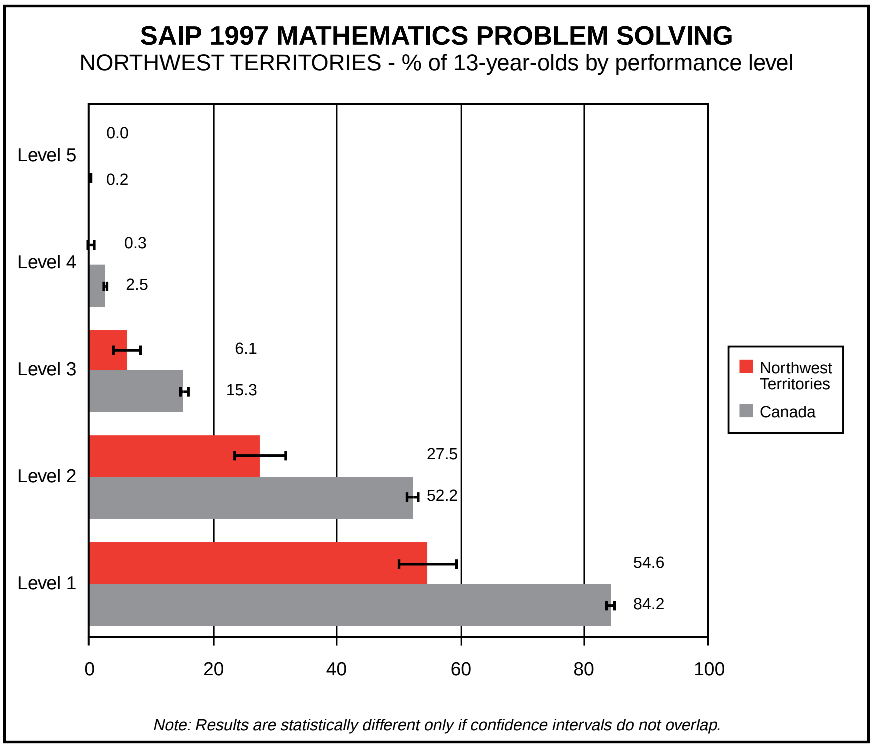
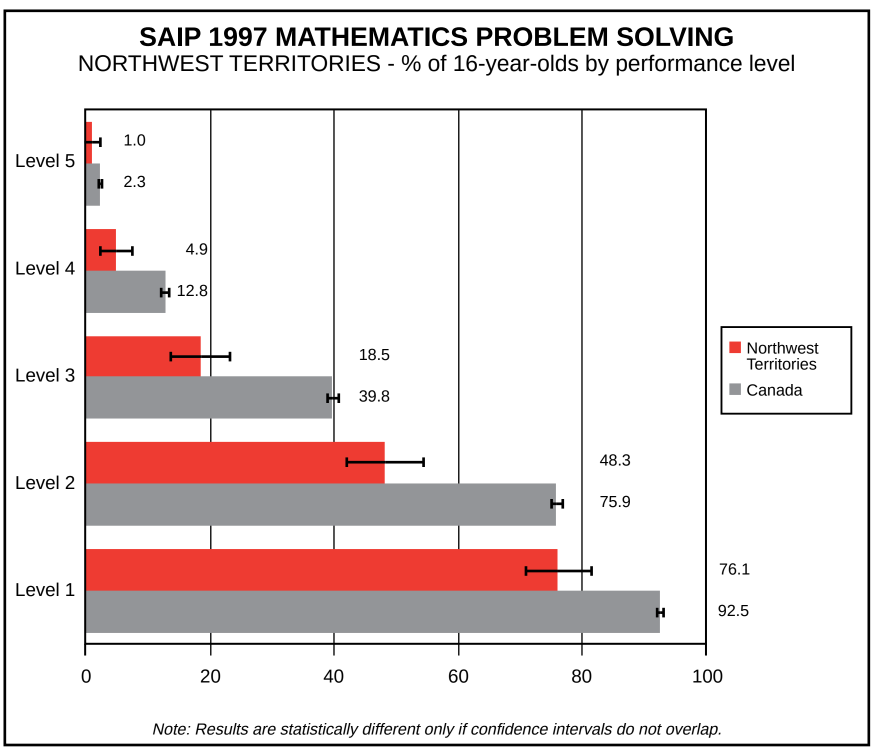


CHART 98



CONTEXT STATEMENT

Social Context

The Yukon has a total land area of 483,450 square kilometres and a population of 30,766. Whitehorse, the capital city, is inhabited by 21,065 people, and the remaining population is divided among the 19 rural communities.

Organization of the School System

There are 28 schools with a total enrolment from kindergarten to grade 12 of 6,083. One-half of the schools are designated as rural schools. These schools typically have low student populations, several multi-level classes, and low pupil-teacher ratios. Many rural schools do not offer grades 11 and 12 and may have fewer optional programs available in the secondary grades.

Unlike most jurisdictions in Canada, there are no school taxes in the Yukon. There is only one school board for *École Émilie-Tremblay*, the territory's only French school. School superintendents work for the Department of Education, which is responsible for most aspects of school operations. Almost every school has a school council, a body which has some, but not all, of the powers of a school board, including the responsibility for school rules, school plans, and dispute resolution.

Yukon follows the British Columbia curriculum in all subject areas. This curriculum is sometimes modified—with departmental approval—to reflect local needs and conditions. As well, up to 20% of a student's educational program may be locally developed. Schools are organized into two segments: elementary (kindergarten to grade 7) and secondary (grades 8 to 12). There are three Catholic schools within the Yukon public school system. Instructional time allotments for each subject vary in the elementary grades, but are standardized to 120 hours per course for grades 8 to 12.

Approximately 25% of Yukon students are of First Nation ancestry. These students often participate in Native language programs and/or in various locally developed courses aimed at developing awareness, appreciation, and knowledge of First Nations culture and traditions. The remainder of the student population is predominantly of European or British ancestry. Approximately 7% of Yukon students are enrolled in a French immersion program, while nearly 1.8% attend French school.

Mathematics Teaching

The grade 8 mathematics curriculum is divided as follows: numbers and number operations (50%); data analysis (10%); geometry (20%); measurement (8%); and algebra (12%). Problem solving has no specific time allocation as problem-solving activities are integrated into the five content strands. Grade 11 mathematics is divided into four content strands: variables and equations (37%); relations and functions (25%); measurement (21%); and geometry (17%).

Mathematics Assessment

Over the past five years, there has been a greater emphasis on problem-solving strategies and the use of calculators in testing situations.

Yukon

For mathematics content, there is no significant difference between this jurisdiction's performance and Canadian performance at all levels.

CHART 99

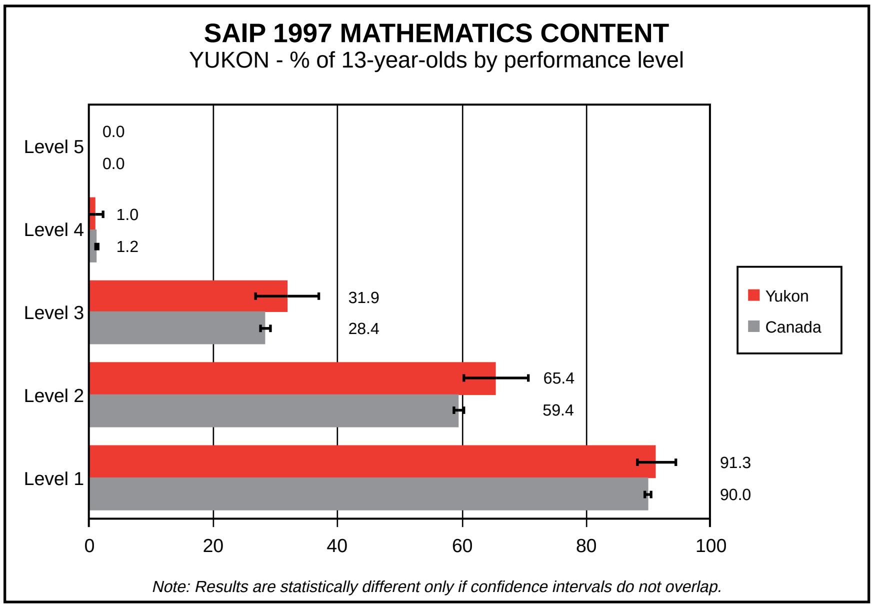
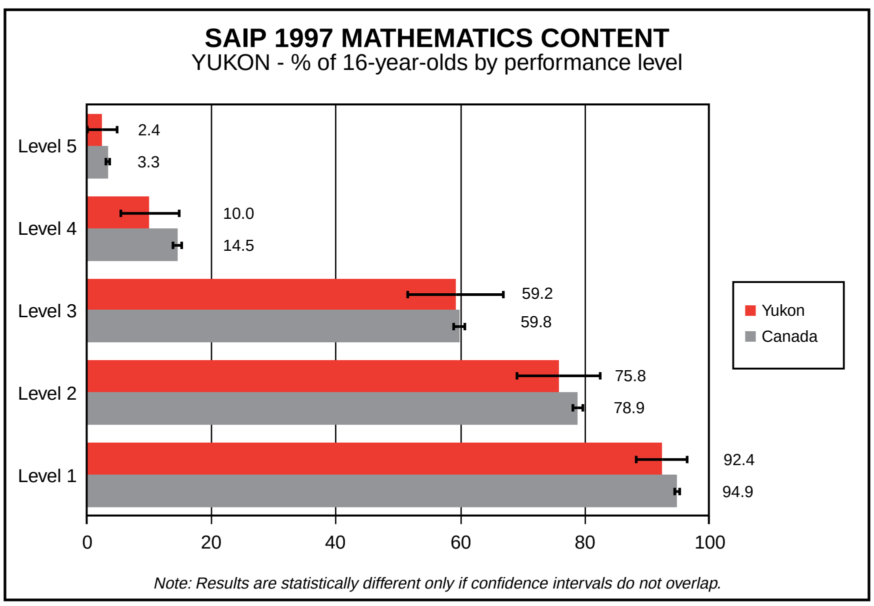


CHART 100



For mathematics problem solving, there are significant differences between this jurisdiction's performance and Canadian performance at levels 1 and 2 for 13-year-olds, and at levels 2 and 3 for 16-year-olds.

CHART 101

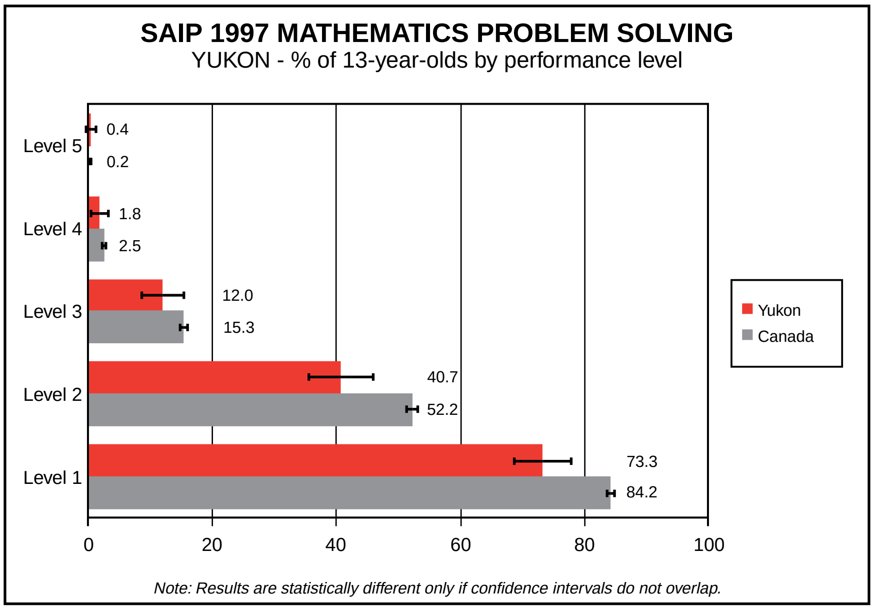
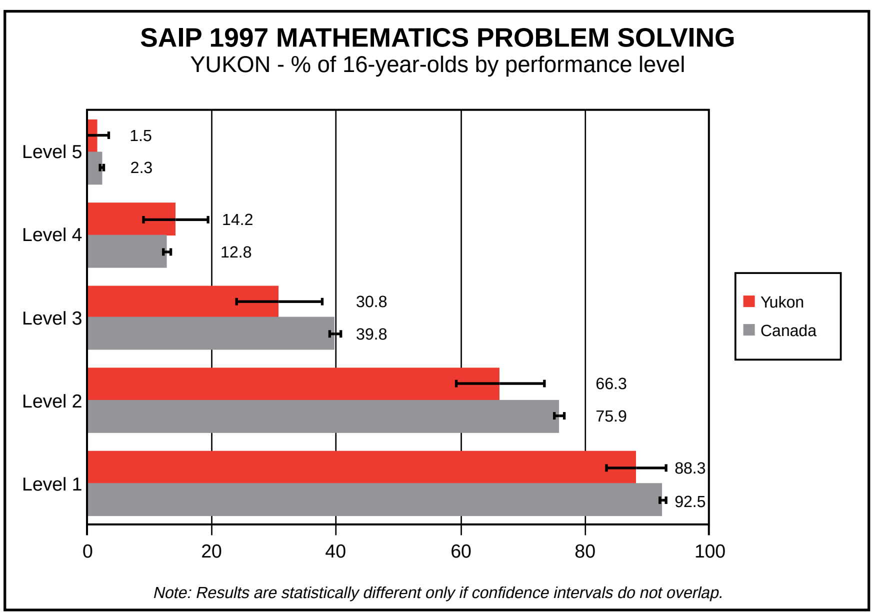


CHART 102



STUDENT QUESTIONNAIRE INFORMATION

Each test booklet for the 1997 mathematics content and problem-solving assessments also included 27 background questions regarding student characteristics, mathematics course organization, and attitudes and practices with regard to mathematics. The following pages highlight information gathered through the responses to questions and relate them to performance at levels 3 or above for the mathematics content assessment. The weighted data apply to Canada as a whole but not necessarily to any individual province. Percentages are rounded. The relationship between responses to the background questions and performance at levels 3 or above in problem solving was examined in the same manner and yielded very similar information.

Percentages in the left column apply to the whole age group population and normally add up to a little less than 100%. This is due to the fact that, for each question, the statistics show that approximately 3% of the responses are either missing or ambiguous. Also, in a few questions, such as grade and type of course, all options are not listed here. Percentages in the right column apply only to the populations listed on the same lines in the left column and do not add up to 100%. To obtain percentages of students at levels Below 1, 1, and 2, subtract the percentages of students at levels 3 to 5 from 100. For example, 10% of all 16-year-olds who took part in the assessment were in grade 10, but only 36% of these grade 10 sixteen-year-olds performed at level 3 or above, and, consequently, 64% performed at levels Below 1, 1, and 2. Note that when a percentage in the left column is smaller than 5%, the percentage in the right column must be interpreted with great caution. Finally, remembering that **28.4% of 13-year-olds and 59.8% of 16-year-olds performed at levels 3 and above** in this assessment will help the reader interpret the percentages in the right column.

What grade are you in?

AGE GROUP AND GRADE	(% OF WHOLE AGE GROUP)	% OF THESE STUDENTS AT LEVEL 3 OR ABOVE
13-year-olds in grade 7/secondary 1 or lower	(8%)	7%
13-year-olds in grade 8/secondary 2	(75%)	29%
13-year-olds in grade 9/secondary 3	(12%)	43%
16-year-olds in grade 10/secondary 4	(10%)	36%
16-year-olds in grade 11/secondary 5	(64%)	64%
16-year-olds in grade 12/CEGEP 1 or higher	(20%)	69%

Most 13-year-olds who participated in the 1997 SAIP mathematics assessment were in grade 8 or secondary 2, and most 16-year-olds were in grade 11 or secondary 5. There is a positive relationship between school grade and performance: for both age groups, the higher the grade, the stronger the performance.

In this school year, is your mathematics course full or semestered?

AGE GROUP AND TYPE OF COURSE	(% OF WHOLE AGE GROUP)	% OF THESE STUDENTS AT LEVEL 3 OR ABOVE
13-year-olds: full	(86%)	30%
13-year-olds: semestered	(8%)	24%
16-year-olds: full	(40%)	71%
16-year-olds: semestered	(49%)	55%

The vast majority of 13-year-olds take full-year courses, while 16-year-olds take semestered courses. In both age groups, students who take semestered courses performed significantly less well than those who take full-year courses.

What do you think of the following statement: "I like mathematics"?

AGE GROUP AND DEGREE OF AGREEMENT	(% OF WHOLE AGE GROUP)	% OF THESE STUDENTS AT LEVEL 3 OR ABOVE
13-year-olds who strongly agree	(11%)	41%
13-year-olds who agree	(56%)	31%
13-year-olds who disagree	(21%)	23%
13-year-olds who strongly disagree	(8%)	16%
16-year-olds who strongly agree	(9%)	80%
16-year-olds who agree	(49%)	66%
16-year-olds who disagree	(29%)	53%
16-year-olds who strongly disagree	(11%)	41%

Most students who took part in this assessment say they like mathematics. In both age groups, those who say they like it perform significantly better at the higher levels than those who say they do not.

What do you think of the following statement: "I feel confident when I do mathematics questions"?

AGE GROUP AND DEGREE OF AGREEMENT	(% OF WHOLE AGE GROUP)	% OF THESE STUDENTS AT LEVEL 3 OR ABOVE
13-year-olds who strongly agree	(15%)	50%
13-year-olds who agree	(59%)	30%
13-year-olds who disagree	(18%)	14%
13-year-olds who strongly disagree	(4%)	8%
16-year-olds who strongly agree	(10%)	82%
16-year-olds who agree	(49%)	69%
16-year-olds who disagree	(15%)	48%
16-year-olds who strongly disagree	(3%)	32%

A large proportion of 13-year-olds and 16-year-olds feel confident when they do mathematics questions. In both cases there is a positive relationship with performance at the higher levels.

What do you think of the following statement: “I have to be able to do mathematics to get a good job”?

AGE GROUP AND DEGREE OF AGREEMENT	(% OF WHOLE AGE GROUP)	% OF THESE STUDENTS AT LEVEL 3 OR ABOVE
13-year-olds who strongly agree	(46%)	29%
13-year-olds who agree	(43%)	30%
13-year-olds who disagree	(6%)	24%
13-year-olds who strongly disagree	(1%)	25%
16-year-olds who strongly agree	(30%)	61%
16-year-olds who agree	(49%)	61%
16-year-olds who disagree	(15%)	61%
16-year-olds who strongly disagree	(3%)	64%

Most students in both age groups think that they need mathematics to get a good job. However, while 13-year-olds who agree with the statement perform significantly better than those who do not, there is no difference in performance for 16-year-olds.

What do you think of the following statement: “I think most people use mathematics in their job”?

AGE GROUP AND DEGREE OF AGREEMENT	(% OF WHOLE AGE GROUP)	% OF THESE STUDENTS AT LEVEL 3 OR ABOVE
13-year-olds who strongly agree	(43%)	31%
13-year-olds who agree	(47%)	28%
13-year-olds who disagree	(6%)	26%
13-year-olds who strongly disagree	(1%)	14%
16-year-olds who strongly agree	(25%)	62%
16-year-olds who agree	(58%)	60%
16-year-olds who disagree	(13%)	60%
16-year-olds who strongly disagree	(1%)	56%

A large majority of students in both age groups think most people use mathematics in their job. However, while 13-year-olds who agree with the statement perform significantly better than those who do not, the difference in performance for 16-year-olds is smaller.

What do you think of the following statement: "To do well in mathematics at school, I need to be interested in mathematics"?

AGE GROUP AND DEGREE OF AGREEMENT	(% OF WHOLE AGE GROUP)	% OF THESE STUDENTS AT LEVEL 3 OR ABOVE
13-year-olds who strongly agree	(24%)	29%
13-year-olds who agree	(45%)	31%
13-year-olds who disagree	(23%)	27%
13-year-olds who strongly disagree	(4%)	23%
16-year-olds who strongly agree	(28%)	62%
16-year-olds who agree	(49%)	61%
16-year-olds who disagree	(8%)	58%
16-year-olds who strongly disagree	(3%)	65%

Most 13- and 16-year-olds agree that they need to be interested in mathematics to do well in that subject. Especially for the older group, there is little difference in performance at higher levels between those who agree and those who do not.

What do you think of the following statement: "To do well in mathematics at school, I need good luck"?

AGE GROUP AND DEGREE OF AGREEMENT	(% OF WHOLE AGE GROUP)	% OF THESE STUDENTS AT LEVEL 3 OR ABOVE
13-year-olds who strongly agree	(3%)	13%
13-year-olds who agree	(7%)	16%
13-year-olds who disagree	(41%)	27%
13-year-olds who strongly disagree	(45%)	34%
16-year-olds who strongly agree	(3%)	37%
16-year-olds who agree	(9%)	44%
16-year-olds who disagree	(47%)	59%
16-year-olds who strongly disagree	(39%)	68%

A large majority of students in both age groups disagree with the idea that they need good luck to succeed in mathematics. Those who strongly disagree do better than those who only disagree with the statement.

What do you think of the following statement: "To do well in mathematics at school, I do lots of work at school"?

AGE GROUP AND DEGREE OF AGREEMENT	(% OF WHOLE AGE GROUP)	% OF THESE STUDENTS AT LEVEL 3 OR ABOVE
13-year-olds who strongly agree	(20%)	34%
13-year-olds who agree	(50%)	29%
13-year-olds who disagree	(22%)	27%
13-year-olds who strongly disagree	(4%)	22%
16-year-olds who strongly agree	(20%)	63%
16-year-olds who agree	(57%)	60%
16-year-olds who disagree	(17%)	61%
16-year-olds who strongly disagree	(3%)	54%

Although most students of both age groups think that to do well in mathematics they need to do lots of work at school, there is not a large difference in performance for 16-year-olds between those who agree with the statement and those who disagree.

What do you think of the following statement: "To do well in mathematics at school, I do lots of work at home"?

AGE GROUP AND DEGREE OF AGREEMENT	(% OF WHOLE AGE GROUP)	% OF THESE STUDENTS AT LEVEL 3 OR ABOVE
13-year-olds who strongly agree	(11%)	29%
13-year-olds who agree	(44%)	30%
13-year-olds who disagree	(34%)	29%
13-year-olds who strongly disagree	(7%)	27%
16-year-olds who strongly agree	(18%)	67%
16-year-olds who agree	(50%)	61%
16-year-olds who disagree	(25%)	59%
16-year-olds who strongly disagree	(5%)	52%

A majority of students of both age groups think that to do well in mathematics they need to do lots of work at home. However, in the case of 13-year-olds, the difference in performance between those who agree with the statement and those who do not is not sizable.

What do you think of the following statement: “To do well in mathematics at school, I need natural ability”?

AGE GROUP AND DEGREE OF AGREEMENT	(% OF WHOLE AGE GROUP)	% OF THESE STUDENTS AT LEVEL 3 OR ABOVE
13-year-olds who strongly agree	(5%)	29%
13-year-olds who agree	(32%)	31%
13-year-olds who disagree	(48%)	30%
13-year-olds who strongly disagree	(10%)	21%
16-year-olds who strongly agree	(8%)	58%
16-year-olds who agree	(47%)	64%
16-year-olds who disagree	(36%)	59%
16-year-olds who strongly disagree	(5%)	53%

A majority of 16-year-olds think that to do well in mathematics they need natural ability, while a majority of 13-year-olds do not. Students in both age groups who disagree strongly with the statement do not perform as well at higher levels.

Do you learn mathematics more easily when you listen to the teacher, read the example in the textbook, work on problems with other students, or work on problems by yourself?

AGE GROUP AND OPTION SELECTED	(% OF WHOLE AGE GROUP)	% OF THESE STUDENTS AT LEVEL 3 OR ABOVE
13-year-olds: listen	(45%)	27%
13-year-olds: read	(13%)	31%
13-year-olds: work with others	(25%)	26%
13-year-olds: work by oneself	(13%)	42%
16-year-olds: listen	(40%)	61%
16-year-olds: read	(10%)	56%
16-year-olds: work with others	(31%)	56%
16-year-olds: work by oneself	(15%)	73%

Students in both age groups say they learn mathematics most easily when they listen to the teacher. However, more students of both age groups who report that they learn mathematics more easily when working by themselves show stronger performance at higher levels.

On average, how many times a week does the teacher show you how to do mathematics problems?

AGE GROUP AND NUMBER OF TIMES	(% OF WHOLE AGE GROUP)	% OF THESE STUDENTS AT LEVEL 3 OR ABOVE
13-year-olds: never	(4%)	27%
13-year-olds: 1-2 times	(27%)	29%
13-year-olds: 3-4 times	(32%)	31%
13-year-olds: 5 or more times	(33%)	28%
16-year-olds: never	(5%)	56%
16-year-olds: 1-2 times	(23%)	62%
16-year-olds: 3-4 times	(31%)	61%
16-year-olds: 5 or more times	(38%)	61%

In both age groups, the vast majority of students report that teachers show them how to do mathematics problems, though the number of times varies. In the older group, students who say the teacher never shows them how to do problems appear to do less well at the higher levels in this assessment.

On average, how many times a week do you copy notes from the blackboard?

AGE GROUP AND NUMBER OF TIMES	(% OF WHOLE AGE GROUP)	% OF THESE STUDENTS AT LEVEL 3 OR ABOVE
13-year-olds: never	(14%)	31%
13-year-olds: 1-2 times	(38%)	31%
13-year-olds: 3-4 times	(25%)	29%
13-year-olds: 5 or more times	(19%)	25%
16-year-olds: never	(9%)	52%
16-year-olds: 1-2 times	(21%)	60%
16-year-olds: 3-4 times	(28%)	65%
16-year-olds: 5 or more times	(39%)	60%

In both age groups, most students report copying notes from the blackboard, though the number of times varies. In the older group, students generally appear to do better when the number of times increases, while the contrary is true for the 13-year-olds.

On average, how many times a week do you work on your own from worksheets or textbooks?

AGE GROUP AND NUMBER OF TIMES	(% OF WHOLE AGE GROUP)	% OF THESE STUDENTS AT LEVEL 3 OR ABOVE
13-year-olds: never	(4%)	28%
13-year-olds: 1-2 times	(16%)	27%
13-year-olds: 3-4 times	(29%)	29%
13-year-olds: 5 or more times	(47%)	30%
16-year-olds: never	(6%)	58%
16-year-olds: 1-2 times	(20%)	59%
16-year-olds: 3-4 times	(29%)	61%
16-year-olds: 5 or more times	(43%)	62%

In both age groups, many students report working on their own from worksheets or textbooks five or more times a week. There does not seem to be a strong relationship between these activities and performance at higher levels.

On average, how many times a week do you work in pairs or small groups?

AGE GROUP AND NUMBER OF TIMES	(% OF WHOLE AGE GROUP)	% OF THESE STUDENTS AT LEVEL 3 OR ABOVE
13-year-olds: never	(33%)	28%
13-year-olds: 1-2 times	(45%)	29%
13-year-olds: 3-4 times	(11%)	31%
13-year-olds: 5 or more times	(7%)	32%
16-year-olds: never	(37%)	63%
16-year-olds: 1-2 times	(40%)	59%
16-year-olds: 3-4 times	(12%)	61%
16-year-olds: 5 or more times	(7%)	60%

In both age groups, a larger percentage of students report working in pairs or small groups once or twice a week, but the high proportion of students who never do so should be pointed out. Performance at higher levels in this assessment, however, does not seem to correlate with the number of times for 16-year-olds.

Outside of your mathematics class, how many times a week on average do you consult a teacher for additional help in mathematics?

AGE GROUP AND NUMBER OF TIMES	(% OF WHOLE AGE GROUP)	% OF THESE STUDENTS AT LEVEL 3 OR ABOVE
13-year-olds: never	(60%)	35%
13-year-olds: 1-2 times	(30%)	21%
13-year-olds: 3-4 times	(4%)	13%
13-year-olds: 5 or more times	(2%)	12%
16-year-olds: never	(60%)	64%
16-year-olds: 1-2 times	(32%)	58%
16-year-olds: 3-4 times	(4%)	44%
16-year-olds: 5 or more times	(2%)	33%

For both age groups, the majority of students say they never consult their teachers for additional help outside of class. Most of those who do report consulting their teachers say they do so once or twice a week. Percentages in this assessment would seem to indicate that the less often one consults a teacher for additional help, the better the performance at higher levels. Since students who experience difficulties in learning mathematics are the ones who are more likely to consult someone else for additional help, it is possible that they do not perform as strongly as those who do not consult. This remark also applies to the next three items.

Outside of your mathematics class, how many times a week on average do you consult other students for additional help in mathematics?

AGE GROUP AND NUMBER OF TIMES	(% OF WHOLE AGE GROUP)	% OF THESE STUDENTS AT LEVEL 3 OR ABOVE
13-year-olds: never	(44%)	34%
13-year-olds: 1-2 times	(41%)	27%
13-year-olds: 3-4 times	(9%)	16%
13-year-olds: 5 or more times	(2%)	19%
16-year-olds: never	(41%)	59%
16-year-olds: 1-2 times	(42%)	63%
16-year-olds: 3-4 times	(10%)	59%
16-year-olds: 5 or more times	(3%)	58%

Most students who consult other students for additional help in mathematics do so once or twice a week. Again, percentages in this assessment tend to indicate that the less often one consults other students, the better the performance at higher levels.

Outside of your mathematics class, how many times a week on average do you consult your parents or guardians for additional help in mathematics?

AGE GROUP AND NUMBER OF TIMES	(% OF WHOLE AGE GROUP)	% OF THESE STUDENTS AT LEVEL 3 OR ABOVE
13-year-olds: never	(44%)	36%
13-year-olds: 1-2 times	(39%)	27%
13-year-olds: 3-4 times	(9%)	16%
13-year-olds: 5 or more times	(3%)	10%
16-year-olds: never	(69%)	65%
16-year-olds: 1-2 times	(23%)	53%
16-year-olds: 3-4 times	(4%)	37%
16-year-olds: 5 or more times	(1%)	44%

Especially for the older group, a large proportion of students never consult their parents or guardians for additional help in mathematics. As in the previous items, those who consult most often perform less well.

Outside of your mathematics class, how many times a week on average do you consult other people for additional help in mathematics?

AGE GROUP AND NUMBER OF TIMES	(% OF WHOLE AGE GROUP)	% OF THESE STUDENTS AT LEVEL 3 OR ABOVE
13-year-olds: never	(61%)	33%
13-year-olds: 1-2 times	(29%)	25%
13-year-olds: 3-4 times	(5%)	17%
13-year-olds: 5 or more times	(2%)	13%
16-year-olds: never	(63%)	63%
16-year-olds: 1-2 times	(28%)	58%
16-year-olds: 3-4 times	(4%)	48%
16-year-olds: 5 or more times	(1%)	43%

Nearly two-thirds of the students in both age groups never consult other people for additional help in mathematics. Those who consult less frequently or do not consult at all show stronger performance at higher levels.

Where do you use a computer for mathematics?

AGE GROUP AND OPTION SELECTED	(% OF WHOLE AGE GROUP)	% OF THESE STUDENTS AT LEVEL 3 OR ABOVE
13-year-olds: only at school	(9%)	16%
13-year-olds: only at home	(7%)	33%
13-year-olds: both at school and at home	(10%)	24%
13-year-olds: never use a computer	(70%)	31%
16-year-olds: only at school	(8%)	50%
16-year-olds: only at home	(4%)	60%
16-year-olds: both at school and at home	(8%)	53%
16-year-olds: never use a computer	(77%)	63%

A surprisingly high percentage of students, especially in the older group, do not use a computer for mathematics. It would seem that 13-year-olds who use a computer at home and 16-year-olds who never use a computer for mathematics show better performance at higher levels in this assessment.

Where do you use a calculator for mathematics?

AGE GROUP AND OPTION SELECTED	(% OF WHOLE AGE GROUP)	% OF THESE STUDENTS AT LEVEL 3 OR ABOVE
13-year-olds: only at school	(8%)	23%
13-year-olds: only at home	(4%)	24%
13-year-olds: both at school and at home	(79%)	31%
13-year-olds: never use a calculator	(5%)	21%
16-year-olds: only at school	(5%)	46%
16-year-olds: only at home	(1%)	46%
16-year-olds: both at school and at home	(90%)	62%
16-year-olds: never use a calculator	(2%)	53%

The vast majority of students in both age groups report using a calculator both at school and at home for mathematics. Such use appears to correlate positively with performance at higher levels .

CONCLUSION

This report describes the outcome of the 1997 SAIP mathematics assessment, a milestone in the School Achievement Indicators Program. Mathematics is the first subject to be assessed for the second time in the SAIP, using essentially the same instruments as in 1993. Forty-eight thousand 13- and 16-year-old students, English- and French-speaking, were administered the assessment instruments designed, developed, and enhanced by representatives of the 10 provinces and two territories, working together under the leadership of the 1993 and 1997 development teams. Given the diversity of student circumstances and education experiences across the country, this challenging exercise nevertheless produced an assessment of skills that are very difficult to address in large-scale testing. This assessment was made possible by the cooperation extended to the development teams by students, teachers, parents, and stakeholder representatives. In 1997, a pan-Canadian panel of representatives of various sectors of society developed a set of expectations to help interpret the results actually achieved by students.

Results show that, for Canada as a whole, performance at higher levels in mathematics content has remained stable between 1993 and 1997. For both age groups and genders, no significant difference in achievement can be observed at level 3 and above. For the four common problem-solving questions, percentages of 13-year-olds are significantly lower in 1997 for all levels except level D, but 16-year-olds show significantly higher percentages at levels D and E, and significantly lower percentages at levels A and B in 1997 (see page 25).

The 1997 results do not meet the expectations expressed by the pan-Canadian panel in mathematics. There is a fairly large gap between the panel's expectations and students' actual achievement at several performance levels.

In this assessment again, 16-year-olds performed much better than 13-year-olds. Although this will come as no surprise, this assessment makes it possible to measure and document with reliable statistics the growth in achievement in mathematics between those two age groups across Canada. We can infer that our education systems foster the development of mathematical knowledge and skills between the ages of 13 and 16.

Except for 13-year-olds in mathematics content, males performed significantly better at higher levels than females in this assessment. This is consistent with findings from several other studies.

Both in mathematics content and in problem solving, the highest level achieved by many students was level 3, the middle of a five-level scale. To be assigned level 3 in mathematics content, a student had to prove that he or she could, for example:

- use the four basic operations with natural numbers and integers
- use concrete materials and diagrams to represent relations
- use monomial algebraic expressions and plot points on a Cartesian grid
- use length, angle measure, area, volume, and repetitions of the same geometric transformation
- extract and represent data using tables and diagrams
- use information from various sources and calculate arithmetic mean and simple probabilitiess

To be assigned level 3 in mathematics problem solving, a student had to prove that he or she could:

- use more than one particular case to establish a proof
- choose from two algorithms to find solutions to multi-step problems, using a limited range of rational numbers
- use necessary and sufficient cases to establish a proof
- use mathematical vocabulary imprecisely to present solutions

Although these definitions may seem technical, they were developed by mathematics and curriculum specialists to set out specifically the concepts underlying the design of the tests and the evaluation of the results.

Given that 13-year-olds and 16-year-olds are administered the same assessment, the SAIP designers thought that the largest proportion of the younger group would achieve at level 2, and that the largest proportion of the older group would achieve at level 3. That a percentage of 13-year-old students reached level 4 and above is a pleasant surprise. The fairly large proportion of level 5 results among 16-year-olds in some jurisdictions will also be of comfort to education authorities since that level requires evidence of sophisticated abilities in mathematics.

Comparisons between the mathematics content component and the problem-solving component results should only be attempted with caution. While students may appear to have achieved higher or lower scores in problem solving than in mathematics content, this may not be significant since different criteria were used in the two assessments, and it is impossible to equate the degree of difficulty of the questions contained in each component.

Results from, and expectations established for, the 1997 SAIP mathematics assessment will serve as points of comparison for the next mathematics assessment scheduled for the year 2000.

FREQUENCY DISTRIBUTION TABLES

SAIP 1997 - MATHEMATICS CONTENT
PERCENTAGE OF STUDENTS BY PERFORMANCE LEVEL AND BY AGE

	Below 1	Level 1	Level 2	Level 3	Level 4	Level 5
13-year-olds	10.0 (0.5)	30.5 (0.8)	31.1 (0.8)	27.2 (0.8)	1.1 (0.2)	0.0 (0.0)
		90.0 (0.5)	59.4 (0.8)	28.4 (0.8)	1.2 (0.2)	0.0 (0.0)
16-year-olds	5.1 (0.4)	16.0 (0.7)	19.1 (0.7)	45.3 (0.9)	11.2 (0.6)	3.3 (0.3)
		94.9 (0.4)	78.9 (0.8)	59.8 (0.9)	14.5 (0.7)	3.3 (0.3)

Note: For each age group, the first line shows the percentages of students by highest level achieved, the second line shows the cumulative percentages of students at or above each level, and the confidence intervals (± 1.96 times the standard errors) for the percentages are shown between parentheses. Results are weighted so as to correctly represent each population

SAIP 1997 - MATHEMATICS CONTENT
PERCENTAGE OF 13-YEAR-OLDS BY PERFORMANCE LEVEL AND BY GENDER

	Below 1	Level 1	Level 2	Level 3	Level 4	Level 5
Female	9.1 (0.7)	31.4 (1.1)	31.3 (1.1)	27.1 (1.1)	1.1 (0.3)	0.0 (0.0)
		90.9 (0.7)	59.5 (1.2)	28.2 (1.1)	1.1 (0.3)	0.0 (0.0)
Male	10.8 (0.8)	29.5 (1.1)	31.0 (1.1)	27.4 (1.1)	1.2 (0.3)	0.0 (0.1)
		89.2 (0.8)	59.7 (1.2)	28.7 (1.1)	1.3 (0.3)	0.0 (0.1)

Note: For each gender group, the first line shows the percentages of students by highest level achieved, the second line shows the cumulative percentages of students at or above each level, and the confidence intervals (± 1.96 times the standard errors) for the percentages are shown between parentheses. Results are weighted so as to correctly represent each population.

SAIP 1997 - MATHEMATICS CONTENT
PERCENTAGE OF 16-YEAR-OLDS BY PERFORMANCE LEVEL AND BY GENDER

	Below 1	Level 1	Level 2	Level 3	Level 4	Level 5
Female	4.0 (0.5)	17.4 (1.0)	20.9 (1.1)	45.6 (1.3)	10.2 (0.8)	1.9 (0.4)
		96.0 (0.5)	78.7 (1.1)	57.8 (1.3)	12.2 (0.9)	1.9 (0.4)
Male	6.1 (0.6)	14.7 (0.9)	17.4 (1.0)	45.2 (1.3)	12.1 (0.9)	4.6 (0.6)
		93.9 (0.6)	79.2 (1.1)	61.8 (1.3)	16.6 (1.0)	4.6 (0.6)

Note: For each gender group, the first line shows the percentages of students by highest level achieved, the second line shows the cumulative percentages of students at or above each level, and the confidence intervals (± 1.96 times the standard errors) for the percentages are shown between parentheses. Results are weighted so as to correctly represent each population.

SAIP 1997 - MATHEMATICS CONTENT
PERCENTAGE OF 13-YEAR-OLDS BY PERFORMANCE LEVEL AND BY POPULATION

	Below 1	Level 1	Level 2	Level 3	Level 4	Level 5
British Columbia	10.3 (1.8)	32.8 (2.8)	29.9 (2.8)	25.7 (2.6)	1.3 (0.7)	0.0 (0.0)
		89.7 (1.8)	56.9 (3.0)	27.0 (2.7)	1.3 (0.7)	0.0 (0.0)
Alberta	7.5 (1.7)	27.8 (2.8)	32.5 (2.9)	30.7 (2.9)	1.4 (0.7)	0.0 (0.0)
		92.5 (1.7)	64.7 (3.0)	32.1 (2.9)	1.4 (0.7)	0.0 (0.0)
Saskatchewan	12.6 (2.1)	39.5 (3.2)	29.4 (2.9)	18.1 (2.5)	0.4 (0.4)	0.0 (0.0)
		87.4 (2.1)	47.9 (3.2)	18.5 (2.5)	0.4 (0.4)	0.0 (0.0)
Manitoba (E)	12.2 (2.2)	35.9 (3.2)	28.9 (3.0)	22.3 (2.8)	0.7 (0.5)	0.0 (0.0)
		87.8 (2.2)	51.9 (3.3)	23.0 (2.8)	0.7 (0.5)	0.0 (0.0)
Manitoba (F)	5.0 (1.4)	33.0 (3.1)	30.1 (3.0)	31.3 (3.1)	0.5 (0.5)	0.0 (0.0)
		95.0 (1.4)	61.9 (3.2)	31.9 (3.1)	0.5 (0.5)	0.0 (0.0)
Ontario (E)	11.6 (2.0)	38.4 (3.0)	32.1 (2.9)	17.5 (2.4)	0.4 (0.4)	0.0 (0.0)
		88.4 (2.0)	50.0 (3.1)	17.9 (2.4)	0.4 (0.4)	0.0 (0.0)
Ontario (F)	9.3 (1.8)	38.8 (2.9)	30.6 (2.8)	20.8 (2.5)	0.5 (0.4)	0.1 (0.2)
		90.7 (1.8)	51.9 (3.0)	21.4 (2.5)	0.6 (0.5)	0.1 (0.2)
Quebec (E)	9.2 (2.0)	25.5 (3.0)	23.4 (2.9)	39.4 (3.3)	2.4 (1.1)	0.0 (0.0)
		90.8 (2.0)	65.3 (3.3)	41.9 (3.4)	2.4 (1.1)	0.0 (0.0)
Quebec (F)	7.1 (1.6)	14.6 (2.2)	29.6 (2.9)	46.2 (3.1)	2.4 (1.0)	0.1 (0.2)
		92.9 (1.6)	78.3 (2.6)	48.7 (3.2)	2.5 (1.0)	0.1 (0.2)
New Brunswick (E)	12.1 (2.2)	33.3 (3.1)	36.1 (3.2)	18.0 (2.6)	0.5 (0.5)	0.0 (0.0)
		87.9 (2.2)	54.6 (3.3)	18.5 (2.6)	0.5 (0.5)	0.0 (0.0)
New Brunswick (F)	9.7 (1.8)	27.1 (2.7)	30.0 (2.8)	32.6 (2.9)	0.6 (0.5)	0.0 (0.0)
		90.3 (1.8)	63.2 (3.0)	33.2 (2.9)	0.6 (0.5)	0.0 (0.0)
Nova Scotia (E)	11.7 (2.1)	35.2 (3.2)	35.8 (3.2)	16.8 (2.5)	0.5 (0.4)	0.0 (0.0)
		88.3 (2.1)	53.0 (3.3)	17.3 (2.5)	0.5 (0.4)	0.0 (0.0)
Nova Scotia (F)	6.9	27.1	29.9	33.7	2.4	0.0
		93.1	66.0	36.1	2.4	0.0
Prince Edward Island	12.2 (2.1)	34.2 (3.0)	38.3 (3.1)	14.7 (2.3)	0.6 (0.5)	0.0 (0.0)
		87.8 (2.1)	53.6 (3.2)	15.3 (2.3)	0.6 (0.5)	0.0 (0.0)
Newfoundland and Labrador	11.1 (2.1)	31.9 (3.1)	33.0 (3.1)	23.1 (2.8)	0.9 (0.6)	0.0 (0.0)
		88.9 (2.1)	56.9 (3.3)	24.0 (2.8)	0.9 (0.6)	0.0 (0.0)
Northwest Territories	38.7 (4.4)	29.9 (4.1)	21.7 (3.7)	9.7 (2.7)	0.0 (0.0)	0.0 (0.0)
		61.3 (4.4)	31.4 (4.2)	9.7 (2.7)	0.0 (0.0)	0.0 (0.0)
Yukon	8.7 (3.1)	25.8 (4.8)	33.5 (5.2)	30.9 (5.1)	1.0 (1.1)	0.0 (0.0)
		91.3 (3.1)	65.4 (5.2)	31.9 (5.1)	1.0 (1.1)	0.0 (0.0)

Note: For each population, the first line shows the percentages of students by highest level achieved, the second line shows the cumulative percentages of students at or above each level, and the confidence intervals (± 1.96 times the standard errors) for the percentages are shown between parentheses. Results are weighted so as to correctly represent each population.

SAIP 1997 - MATHEMATICS CONTENT

PERCENTAGE OF 16-YEAR-OLDS BY PERFORMANCE LEVEL AND BY POPULATION

	Below 1	Level 1	Level 2	Level 3	Level 4	Level 5
British Columbia	6.3 (1.6)	18.3 (2.5)	20.9 (2.6)	41.9 (3.2)	8.6 (1.8)	4.1 (1.3)
		93.7 (1.6)	75.5 (2.8)	54.6 (3.2)	12.7 (2.2)	4.1 (1.3)
Alberta	4.0 (1.3)	14.0 (2.3)	20.6 (2.7)	45.4 (3.3)	12.3 (2.2)	3.7 (1.2)
		96.0 (1.3)	82.0 (2.5)	61.4 (3.2)	16.0 (2.4)	3.7 (1.2)
Saskatchewan	8.4 (1.9)	17.9 (2.6)	23.7 (2.8)	42.1 (3.3)	6.8 (1.7)	1.0 (0.7)
		91.6 (1.9)	73.7 (2.9)	50.0 (3.3)	7.9 (1.8)	1.0 (0.7)
Manitoba (E)	5.0 (1.5)	20.4 (2.8)	21.3 (2.9)	43.7 (3.5)	7.4 (1.8)	2.3 (1.0)
		95.0 (1.5)	74.7 (3.0)	53.4 (3.5)	9.7 (2.1)	2.3 (1.0)
Manitoba (F)	2.0 (1.6)	13.3 (3.8)	23.5 (4.8)	51.4 (5.7)	7.8 (3.0)	2.0 (1.6)
		98.0 (1.6)	84.7 (4.1)	61.2 (5.5)	9.8 (3.4)	2.0 (1.6)
Ontario (E)	5.9 (1.5)	20.9 (2.6)	21.2 (2.6)	42.7 (3.1)	7.0 (1.6)	2.4 (1.0)
		94.1 (1.5)	73.2 (2.8)	52.0 (3.2)	9.3 (1.8)	2.4 (1.0)
Ontario (F)	7.0 (1.7)	24.3 (2.8)	19.6 (2.6)	43.8 (3.2)	5.0 (1.4)	0.4 (0.4)
		93.0 (1.7)	68.7 (3.0)	49.2 (3.3)	5.4 (1.5)	0.4 (0.4)
Quebec (E)	3.5 (1.3)	10.9 (2.3)	11.3 (2.3)	52.4 (3.7)	17.6 (2.8)	4.3 (1.5)
		96.5 (1.3)	85.6 (2.6)	74.3 (3.2)	21.9 (3.0)	4.3 (1.5)
Quebec (F)	2.2 (1.0)	5.0 (1.5)	11.8 (2.2)	52.9 (3.4)	22.4 (2.8)	5.6 (1.6)
		97.8 (1.0)	92.8 (1.8)	81.0 (2.7)	28.1 (3.1)	5.6 (1.6)
New Brunswick (E)	7.2 (1.8)	20.5 (2.8)	25.1 (3.0)	38.9 (3.4)	6.6 (1.7)	1.8 (0.9)
		92.8 (1.8)	72.4 (3.1)	47.3 (3.5)	8.4 (1.9)	1.8 (0.9)
New Brunswick (F)	3.9 (1.3)	12.2 (2.2)	20.4 (2.6)	50.6 (3.3)	12.0 (2.1)	0.8 (0.6)
		96.1 (1.3)	83.8 (2.4)	63.4 (3.2)	12.8 (2.2)	0.8 (0.6)
Nova Scotia (E)	5.1 (1.6)	16.6 (2.6)	21.0 (2.9)	48.9 (3.5)	7.7 (1.9)	0.7 (0.6)
		94.9 (1.6)	78.2 (2.9)	57.3 (3.5)	8.4 (2.0)	0.7 (0.6)
Nova Scotia (F)	2.0	7.8	14.1	57.1	18.0	1.0
		98.0	90.2	76.1	19.0	1.0
Prince Edward Island	7.4 (1.9)	23.5 (3.1)	20.5 (2.9)	44.4 (3.6)	3.5 (1.3)	0.6 (0.5)
		92.6 (1.9)	69.0 (3.4)	48.5 (3.6)	4.1 (1.4)	0.6 (0.5)
Newfoundland and Labrador	9.2 (2.0)	22.4 (2.9)	25.4 (3.0)	35.9 (3.3)	5.5 (1.6)	1.7 (0.9)
		90.8 (2.0)	68.4 (3.2)	43.0 (3.4)	7.2 (1.8)	1.7 (0.9)
Northwest Territories	18.9 (4.7)	28.8 (5.4)	14.4 (4.2)	33.3 (5.6)	3.6 (2.2)	0.9 (1.1)
		81.1 (4.7)	52.3 (5.9)	37.8 (5.8)	4.5 (2.5)	0.9 (1.1)
Yukon	7.6 (4.1)	16.6 (5.8)	16.6 (5.8)	49.1 (7.8)	7.6 (4.1)	2.4 (2.4)
		92.4 (4.1)	75.8 (6.7)	59.2 (7.7)	10.0 (4.7)	2.4 (2.4)

Note: For each population, the first line shows the percentages of students by highest level achieved, the second line shows the cumulative percentages of students at or above each level, and the confidence intervals (± 1.96 times the standard errors) for the percentages are shown between parentheses. Results are weighted so as to correctly represent each population.

SAIP 1997 - MATHEMATICS PROBLEM SOLVING
PERCENTAGE OF STUDENTS BY PERFORMANCE LEVEL AND BY AGE

	Below 1	Level 1	Level 2	Level 3	Level 4	Level 5
13-year-olds	15.8 (0.6)	32.0 (0.8)	36.9 (0.8)	12.9 (0.6)	2.2 (0.3)	0.2 (0.1)
		84.2 (0.6)	52.2 (0.9)	15.3 (0.6)	2.5 (0.3)	0.2 (0.1)
16-year-olds	7.5 (0.5)	16.6 (0.7)	36.1 (0.9)	27.1 (0.8)	10.5 (0.6)	2.3 (0.3)
		92.5 (0.5)	75.9 (0.8)	39.8 (0.9)	12.8 (0.6)	2.3 (0.3)

Note: For each age group, the first line shows the percentages of students by highest level achieved, the second line shows the cumulative percentages of students at or above each level, and the confidence intervals (± 1.96 times the standard errors) for the percentages are shown between parentheses. Results are weighted so as to correctly represent each population.

SAIP 1997 - MATHEMATICS PROBLEM SOLVING
PERCENTAGE OF 13-YEAR-OLDS BY PERFORMANCE LEVEL AND BY GENDER

	Below 1	Level 1	Level 2	Level 3	Level 4	Level 5
Female	13.6 (0.8)	31.8 (1.1)	40.5 (1.2)	12.2 (0.8)	1.6 (0.3)	0.2 (0.1)
		86.4 (0.8)	54.5 (1.2)	14.1 (0.9)	1.8 (0.3)	0.2 (0.1)
Male	17.9 (0.9)	32.1 (1.1)	33.5 (1.1)	13.5 (0.8)	2.8 (0.4)	0.3 (0.1)
		82.1 (0.9)	50.0 (1.2)	16.5 (0.9)	3.1 (0.4)	0.3 (0.1)

Note: For each gender group, the first line shows the percentages of students by highest level achieved, the second line shows the cumulative percentages of students at or above each level, and the confidence intervals (± 1.96 times the standard errors) for the percentages are shown between parentheses. Results are weighted so as to correctly represent each population..

SAIP 1997 - MATHEMATICS PROBLEM SOLVING
PERCENTAGE OF 16-YEAR-OLDS BY PERFORMANCE LEVEL AND BY GENDER

	Below 1	Level 1	Level 2	Level 3	Level 4	Level 5
Female	5.8 (0.6)	16.9 (1.0)	37.9 (1.3)	28.1 (1.2)	10.0 (0.8)	1.4 (0.3)
		94.2 (0.6)	77.4 (1.1)	39.5 (1.3)	11.3 (0.8)	1.4 (0.3)
Male	9.2 (0.8)	16.2 (1.0)	34.3 (1.3)	26.1 (1.2)	11.0 (0.8)	3.2 (0.5)
		90.8 (0.8)	74.6 (1.2)	40.3 (1.3)	14.2 (0.9)	3.2 (0.5)

Note: For each gender group, the first line shows the percentages of students by highest level achieved, the second line shows the cumulative percentages of students at or above each level, and the confidence intervals (± 1.96 times the standard errors) for the percentages are shown between parentheses. Results are weighted so as to correctly represent each population.

SAIP 1997 - MATHEMATICS PROBLEM SOLVING
PERCENTAGE OF 13-YEAR-OLDS BY PERFORMANCE LEVEL AND BY POPULATION

	Below 1	**Level 1**	**Level 2**	**Level 3**	**Level 4**	**Level 5**
British Columbia	19.1 (2.4)	33.0 (2.9)	33.8 (2.9)	11.7 (2.0)	2.1 (0.9)	0.2 (0.3)
		80.9 (2.4)	47.8 (3.1)	14.0 (2.1)	2.3 (0.9)	0.2 (0.3)
Alberta	12.8 (2.1)	29.4 (2.9)	38.0 (3.1)	16.7 (2.3)	2.7 (1.0)	0.4 (0.4)
		87.2 (2.1)	57.8 (3.1)	19.8 (2.5)	3.1 (1.1)	0.4 (0.4)
Saskatchewan	17.1 (2.4)	31.7 (3.0)	39.9 (3.2)	10.0 (1.9)	1.2 (0.7)	0.1 (0.2)
		82.9 (2.4)	51.2 (3.2)	11.3 (2.0)	1.3 (0.7)	0.1 (0.2)
Manitoba (E)	19.1 (2.6)	35.8 (3.2)	33.3 (3.1)	10.2 (2.0)	1.4 (0.8)	0.3 (0.4)
		80.9 (2.6)	45.2 (3.3)	11.9 (2.2)	1.7 (0.9)	0.3 (0.4)
Manitoba (F)	13.9 (2.3)	34.1 (3.1)	35.3 (3.2)	15.7 (2.4)	1.1 (0.7)	0.0 (0.0)
		86.1 (2.3)	52.1 (3.3)	16.8 (2.5)	1.1 (0.7)	0.0 (0.0)
Ontario (E)	18.3 (2.4)	36.3 (3.0)	34.9 (2.9)	9.2 (1.8)	1.2 (0.7)	0.1 (0.2)
		81.7 (2.4)	45.4 (3.1)	10.5 (1.9)	1.3 (0.7)	0.1 (0.2)
Ontario (F)	19.2 (2.4)	37.8 (3.0)	32.4 (2.9)	9.6 (1.8)	1.0 (0.6)	0.0 (0.0)
		80.8 (2.4)	43.0 (3.0)	10.6 (1.9)	1.0 (0.6)	0.0 (0.0)
Quebec (E)	15.0 (2.5)	27.1 (3.1)	40.5 (3.4)	14.5 (2.5)	2.5 (1.1)	0.4 (0.4)
		85.0 (2.5)	57.9 (3.4)	17.4 (2.6)	2.9 (1.2)	0.4 (0.4)
Quebec (F)	9.3 (1.8)	23.9 (2.7)	42.3 (3.1)	19.4 (2.5)	4.6 (1.3)	0.5 (0.5)
		90.7 (1.8)	66.8 (3.0)	24.5 (2.7)	5.1 (1.4)	0.5 (0.5)
New Brunswick (E)	17.1 (2.5)	35.7 (3.2)	35.5 (3.2)	10.2 (2.0)	1.4 (0.8)	0.2 (0.3)
		82.9 (2.5)	47.2 (3.3)	11.8 (2.1)	1.6 (0.8)	0.2 (0.3)
New Brunswick (F)	13.5 (2.1)	33.3 (2.9)	37.1 (3.0)	14.6 (2.2)	1.5 (0.8)	0.0 (0.0)
		86.5 (2.1)	53.2 (3.1)	16.1 (2.3)	1.5 (0.8)	0.0 (0.0)
Nova Scotia (E)	17.9 (2.5)	36.2 (3.2)	34.6 (3.2)	10.3 (2.0)	1.1 (0.7)	0.0 (0.0)
		82.1 (2.5)	46.0 (3.3)	11.4 (2.1)	1.1 (0.7)	0.0 (0.0)
Nova Scotia (F)	18.3	33.6	32.2	14.2	1.7	0.0
		81.7	48.1	15.9	1.7	0.0
Prince Edward Island	15.9 (2.4)	34.9 (3.1)	36.0 (3.1)	12.2 (2.1)	1.1 (0.7)	0.0 (0.0)
		84.1 (2.4)	49.3 (3.2)	13.3 (2.2)	1.1 (0.7)	0.0 (0.0)
Newfoundland	21.7 (2.7)	34.8 (3.2)	33.6 (3.2)	9.4 (1.9)	0.6 (0.5)	0.0 (0.0)
and Labrador		78.3 (2.7)	43.6 (3.3)	10.0 (2.0)	0.6 (0.5)	0.0 (0.0)
Northwest Territories	45.4 (4.6)	27.1 (4.1)	21.4 (3.8)	5.8 (2.2)	0.3 (0.5)	0.0 (0.0)
		54.6 (4.6)	27.5 (4.1)	6.1 (2.2)	0.3 (0.5)	0.0 (0.0)
Yukon	26.7 (4.6)	32.6 (4.9)	28.7 (4.7)	10.2 (3.2)	1.4 (1.2)	0.4 (0.7)
		73.3 (4.6)	40.7 (5.2)	12.0 (3.4)	1.8 (1.4)	0.4 (0.7)

Note: For each population, the first line shows the percentages of students by highest level achieved, the second line shows the cumulative percentages of students at or above each level, and the confidence intervals (± 1.96 times the standard errors) for the percentages are shown between parentheses. Results are weighted so as to correctly represent each population.

SAIP 1997 - MATHEMATICS PROBLEM SOLVING
PERCENTAGE OF 16-YEAR-OLDS BY PERFORMANCE LEVEL AND BY POPULATION

	Below 1	Level 1	Level 2	Level 3	Level 4	Level 5
British Columbia	11.6 (2.1)	20.1 (2.6)	37.1 (3.2)	21.2 (2.7)	8.2 (1.8)	1.8 (0.9)
		88.4 (2.1)	68.3 (3.0)	31.2 (3.0)	9.9 (2.0)	1.8 (0.9)
Alberta	7.2 (1.7)	14.2 (2.3)	33.7 (3.1)	30.2 (3.0)	11.7 (2.1)	2.9 (1.1)
		92.8 (1.7)	78.6 (2.7)	44.8 (3.3)	14.6 (2.3)	2.9 (1.1)
Saskatchewan	7.9 (1.8)	18.6 (2.7)	34.9 (3.2)	27.8 (3.1)	9.5 (2.0)	1.3 (0.8)
		92.1 (1.8)	73.5 (3.0)	38.6 (3.3)	10.9 (2.1)	1.3 (0.8)
Manitoba (E)	6.7 (1.8)	16.6 (2.6)	36.5 (3.4)	30.3 (3.2)	8.2 (1.9)	1.8 (0.9)
		93.3 (1.8)	76.7 (3.0)	40.2 (3.5)	10.0 (2.1)	1.8 (0.9)
Manitoba (F)	3.4 (2.0)	17.7 (4.2)	33.6 (5.2)	37.3 (5.4)	7.2 (2.9)	0.8 (1.0)
		96.6 (2.0)	78.9 (4.5)	45.3 (5.5)	7.9 (3.0)	0.8 (1.0)
Ontario (E)	8.0 (1.7)	19.2 (2.5)	39.9 (3.1)	23.0 (2.7)	7.2 (1.6)	2.8 (1.0)
		92.0 (1.7)	72.9 (2.8)	33.0 (3.0)	10.0 (1.9)	2.8 (1.0)
Ontario (F)	8.8 (1.9)	20.8 (2.7)	42.6 (3.3)	21.7 (2.7)	5.5 (1.5)	0.5 (0.5)
		91.2 (1.9)	70.3 (3.0)	27.8 (3.0)	6.1 (1.6)	0.5 (0.5)
Quebec (E)	6.8 (1.8)	15.0 (2.6)	31.8 (3.3)	28.2 (3.2)	15.2 (2.6)	3.1 (1.2)
		93.2 (1.8)	78.2 (3.0)	46.5 (3.6)	18.3 (2.8)	3.1 (1.2)
Quebec (F)	3.7 (1.3)	9.4 (2.0)	29.9 (3.1)	36.2 (3.3)	18.5 (2.6)	2.3 (1.0)
		96.3 (1.3)	86.9 (2.3)	57.0 (3.4)	20.7 (2.7)	2.3 (1.0)
New Brunswick (E)	8.8 (2.0)	19.8 (2.8)	37.8 (3.4)	24.9 (3.0)	7.7 (1.9)	1.0 (0.7)
		91.2 (2.0)	71.4 (3.2)	33.6 (3.3)	8.7 (2.0)	1.0 (0.7)
New Brunswick (F)	7.6 (1.7)	19.2 (2.6)	36.1 (3.2)	26.7 (2.9)	8.9 (1.9)	1.5 (0.8)
		92.4 (1.7)	73.2 (2.9)	37.1 (3.2)	10.4 (2.0)	1.5 (0.8)
Nova Scotia (E)	7.8 (1.9)	17.6 (2.7)	37.8 (3.5)	27.5 (3.2)	8.7 (2.0)	0.5 (0.5)
		92.2 (1.9)	74.6 (3.1)	36.8 (3.5)	9.2 (2.1)	0.5 (0.5)
Nova Scotia (F)	1.0	15.0	39.8	33.5	8.7	1.9
		99.0	84.0	44.2	10.7	1.9
Prince Edward Island	12.5 (2.4)	22.7 (3.0)	37.3 (3.5)	21.8 (3.0)	4.8 (1.5)	0.9 (0.7)
		87.5 (2.4)	64.8 (3.5)	27.5 (3.2)	5.7 (1.7)	0.9 (0.7)
Newfoundland and Labrador	11.1 (2.2)	21.3 (2.8)	36.7 (3.3)	23.6 (2.9)	6.7 (1.7)	0.5 (0.5)
		88.9 (2.2)	67.6 (3.2)	30.8 (3.2)	7.2 (1.8)	0.5 (0.5)
Northwest Territories	23.9 (5.3)	27.8 (5.6)	29.8 (5.7)	13.6 (4.3)	3.9 (2.4)	1.0 (1.2)
		76.1 (5.3)	48.3 (6.2)	18.5 (4.8)	4.9 (2.7)	1.0 (1.2)
Yukon	11.7 (4.8)	22.0 (6.2)	35.5 (7.2)	16.6 (5.6)	12.7 (5.0)	1.5 (1.8)
		88.3 (4.8)	66.3 (7.1)	30.8 (6.9)	14.2 (5.2)	1.5 (1.8)

Note: For each population, the first line shows the percentages of students by highest level achieved, the second line shows the cumulative percentages of students at or above each level, and the confidence intervals (± 1.96 times the standard errors) for the percentages are shown between parentheses. Results are weighted so as to correctly represent each population.

SAIP 1993 - MATHEMATICS CONTENT
PERCENTAGE OF STUDENTS BY PERFORMANCE LEVEL AND BY AGE

	Below 1	Level 1	Level 2	Level 3	Level 4	Level 5
13-year-olds	6.4 (0.4)	29.2 (0.8)	34.9 (0.8)	28.4 (0.8)	1.1 (0.2)	0.0 (0.0)
		93.6 (0.4)	64.4 (0.8)	29.5 (0.8)	1.2 (0.2)	0.0 (0.0)
16-year-olds	3.0 (0.3)	15.1 (0.7)	20.2 (0.8)	47.2 (0.9)	9.8 (0.6)	4.6 (0.4)
		97.0 (0.3)	81.9 (0.7)	61.6 (0.9)	14.5 (0.7)	4.6 (0.4)

Note: For each age group, the first line shows the percentages of students by highest level achieved, the second line shows the cumulative percentages of students at or above each level, and the confidence intervals (± 1.96 times the standard errors) for the percentages are shown between parentheses. Results are weighted so as to correctly represent each population.

SAIP 1993 - MATHEMATICS CONTENT
PERCENTAGE OF 13-YEAR-OLDS BY PERFORMANCE LEVEL AND BY GENDER

	Below 1	Level 1	Level 2	Level 3	Level 4	Level 5
Female	6.5 (0.6)	29.7 (1.1)	34.3 (1.2)	28.7 (1.1)	0.9 (0.2)	0.0 (0.0)
		93.5 (0.6)	63.9 (1.2)	29.6 (1.1)	0.9 (0.2)	0.0 (0.0)
Male	6.3 (0.6)	28.6 (1.1)	35.6 (1.2)	28.2 (1.1)	1.3 (0.3)	0.1 (0.1)
		93.7 (0.6)	65.1 (1.2)	29.6 (1.1)	1.4 (0.3)	0.1 (0.1)

Note: For each gender group, the first line shows the percentages of students by highest level achieved, the second line shows the cumulative percentages of students at or above each level, and the confidence intervals (± 1.96 times the standard errors) for the percentages are shown between parentheses. Results are weighted so as to correctly represent each population.

SAIP 1993 - MATHEMATICS CONTENT
PERCENTAGE OF 16-YEAR-OLDS BY PERFORMANCE LEVEL AND BY GENDER

	Below 1	Level 1	Level 2	Level 3	Level 4	Level 5
Female	2.9 (0.4)	16.1 (1.0)	20.8 (1.1)	48.1 (1.3)	8.6 (0.7)	3.6 (0.5)
		97.1 (0.4)	81.1 (1.0)	60.3 (1.3)	12.2 (0.9)	3.6 (0.5)
Male	3.2 (0.5)	14.1 (0.9)	19.7 (1.1)	46.1 (1.3)	11.1 (0.8)	5.8 (0.6)
		96.8 (0.5)	82.7 (1.0)	63.0 (1.3)	16.9 (1.0)	5.8 (0.6)

Note: For each gender group, the first line shows the percentages of students by highest level achieved, the second line shows the cumulative percentages of students at or above each level, and the confidence intervals (± 1.96 times the standard errors) for the percentages are shown between parentheses. Results are weighted so as to correctly represent each population.

SAIP 1993 - MATHEMATICS CONTENT
PERCENTAGE OF 13-YEAR-OLDS BY PERFORMANCE LEVEL AND BY POPULATION

	Below 1	Level 1	Level 2	Level 3	Level 4	Level 5
British Columbia	4.8 (1.3)	33.0 (2.8)	35.8 (2.9)	25.7 (2.6)	0.7 (0.5)	0.0 (0.0)
		95.2 (1.3)	62.2 (2.9)	26.4 (2.6)	0.7 (0.5)	0.0 (0.0)
Alberta	5.7 (1.3)	26.1 (2.5)	39.5 (2.8)	28.0 (2.6)	0.8 (0.5)	0.0 (0.0)
		94.3 (1.3)	68.3 (2.7)	28.8 (2.6)	0.8 (0.5)	0.0 (0.0)
Manitoba (E)	9.5 (1.8)	42.3 (3.1)	27.9 (2.8)	19.5 (2.5)	0.8 (0.5)	0.0 (0.0)
		90.5 (1.8)	48.2 (3.1)	20.3 (2.5)	0.8 (0.5)	0.0 (0.0)
Manitoba (F)	5.4 (1.3)	33.4 (2.6)	34.8 (2.7)	26.0 (2.4)	0.3 (0.3)	0.1 (0.2)
		94.6 (1.3)	61.2 (2.7)	26.4 (2.5)	0.4 (0.4)	0.1 (0.2)
Ontario (E)	8.9 (1.6)	35.1 (2.7)	32.0 (2.7)	23.1 (2.4)	0.9 (0.5)	0.1 (0.2)
		91.1 (1.6)	56.0 (2.8)	24.0 (2.5)	0.9 (0.6)	0.1 (0.2)
Ontario (F)	7.7 (1.6)	35.1 (2.9)	37.2 (2.9)	19.7 (2.4)	0.2 (0.3)	0.0 (0.0)
		92.3 (1.6)	57.2 (3.0)	20.0 (2.4)	0.2 (0.3)	0.0 (0.0)
Quebec (E)	5.3 (1.5)	26.8 (2.9)	31.4 (3.1)	35.1 (3.2)	1.5 (0.8)	0.0 (0.0)
		94.7 (1.5)	68.0 (3.1)	36.6 (3.2)	1.5 (0.8)	0.0 (0.0)
Quebec (F)	2.5 (0.9)	14.0 (2.0)	38.3 (2.8)	42.8 (2.9)	2.4 (0.9)	0.0 (0.0)
		97.5 (0.9)	83.4 (2.2)	45.2 (2.9)	2.4 (0.9)	0.0 (0.0)
New Brunswick (E)	6.1 (1.6)	33.5 (3.1)	39.0 (3.2)	21.4 (2.7)	0.1 (0.2)	0.0 (0.0)
		93.9 (1.6)	60.5 (3.2)	21.5 (2.7)	0.1 (0.2)	0.0 (0.0)
New Brunswick (F)	4.9 (1.4)	28.2 (2.9)	39.2 (3.2)	27.5 (2.9)	0.3 (0.3)	0.0 (0.0)
		95.1 (1.4)	66.9 (3.1)	27.8 (2.9)	0.3 (0.3)	0.0 (0.0)
Nova Scotia	7.6 (1.7)	38.1 (3.1)	32.8 (3.0)	20.9 (2.6)	0.5 (0.5)	0.1 (0.2)
		92.4 (1.7)	54.3 (3.1)	21.5 (2.6)	0.6 (0.5)	0.1 (0.2)
Prince Edward Island	9.7 (2.0)	35.4 (3.3)	35.2 (3.3)	19.5 (2.7)	0.1 (0.3)	0.0 (0.0)
		90.3 (2.0)	54.9 (3.4)	19.6 (2.7)	0.1 (0.3)	0.0 (0.0)
Newfoundland	8.7 (1.8)	37.3 (3.1)	35.5 (3.1)	18.2 (2.5)	0.2 (0.3)	0.1 (0.2)
and Labrador		91.3 (1.8)	54.0 (3.2)	18.5 (2.5)	0.3 (0.4)	0.1 (0.2)
Northwest Territories	20.7 (4.5)	46.5 (5.5)	19.8 (4.4)	11.8 (3.6)	1.2 (1.2)	0.0 (0.0)
		79.3 (4.5)	32.8 (5.2)	13.0 (3.7)	1.2 (1.2)	0.0 (0.0)
Yukon	9.4 (3.7)	36.9 (6.2)	33.8 (6.1)	18.7 (5.0)	1.2 (1.4)	0.0 (0.0)
		90.6 (3.7)	53.8 (6.4)	20.0 (5.1)	1.2 (1.4)	0.0 (0.0)

Note: For each population, the first line shows the percentages of students by highest level achieved, the second line shows the cumulative percentages of students at or above each level, and the confidence intervals (± 1.96 times the standard errors) for the percentages are shown between parentheses. Results are weighted so as to correctly represent each population.

SAIP 1993 - MATHEMATICS CONTENT
PERCENTAGE OF 16-YEAR-OLDS BY PERFORMANCE LEVEL AND BY POPULATION

	Below 1	Level 1	Level 2	Level 3	Level 4	Level 5
British Columbia	2.3 (0.9)	16.1 (2.3)	22.9 (2.6)	44.9 (3.1)	7.8 (1.7)	6.0 (1.5)
		97.7 (0.9)	81.6 (2.4)	58.7 (3.1)	13.8 (2.2)	6.0 (1.5)
Alberta	3.3 (1.1)	11.9 (2.0)	21.5 (2.6)	47.2 (3.1)	9.8 (1.8)	6.3 (1.5)
		96.7 (1.1)	84.8 (2.2)	63.3 (3.0)	16.1 (2.3)	6.3 (1.5)
Manitoba (E)	4.3 (1.3)	21.9 (2.7)	22.4 (2.8)	43.1 (3.3)	5.9 (1.6)	2.4 (1.0)
		95.7 (1.3)	73.8 (2.9)	51.4 (3.3)	8.3 (1.8)	2.4 (1.0)
Manitoba (F)	0.6 (0.7)	12.8 (3.2)	23.0 (4.0)	49.8 (4.7)	10.2 (2.9)	3.5 (1.7)
		99.4 (0.7)	86.6 (3.2)	63.6 (4.6)	13.7 (3.3)	3.5 (1.7)
Ontario (E)	4.1 (1.2)	19.0 (2.3)	21.1 (2.4)	46.1 (3.0)	6.2 (1.4)	3.5 (1.1)
		95.9 (1.2)	76.9 (2.5)	55.8 (3.0)	9.7 (1.8)	3.5 (1.1)
Ontario (F)	4.6 (1.4)	20.2 (2.7)	22.3 (2.8)	47.0 (3.3)	4.7 (1.4)	1.2 (0.7)
		95.4 (1.4)	75.3 (2.9)	52.9 (3.3)	5.9 (1.6)	1.2 (0.7)
Quebec (E)	3.0 (1.2)	17.0 (2.6)	17.0 (2.6)	47.1 (3.5)	10.8 (2.2)	5.2 (1.5)
		97.0 (1.2)	80.0 (2.8)	63.0 (3.4)	15.9 (2.6)	5.2 (1.5)
Quebec (F)	0.6 (0.5)	5.6 (1.3)	16.0 (2.1)	51.6 (2.9)	19.4 (2.3)	6.7 (1.5)
		99.4 (0.5)	93.8 (1.4)	77.8 (2.4)	26.2 (2.5)	6.7 (1.5)
New Brunswick (E)	3.7 (1.3)	21.9 (2.8)	20.2 (2.8)	48.3 (3.4)	4.7 (1.4)	1.2 (0.8)
		96.3 (1.3)	74.4 (3.0)	54.2 (3.4)	5.9 (1.6)	1.2 (0.8)
New Brunswick (F)	1.2 (0.7)	13.5 (2.2)	25.3 (2.8)	48.8 (3.2)	8.7 (1.8)	2.6 (1.0)
		98.8 (0.7)	85.3 (2.3)	60.1 (3.2)	11.3 (2.0)	2.6 (1.0)
Nova Scotia	3.2 (1.1)	16.7 (2.4)	19.6 (2.6)	49.7 (3.3)	8.3 (1.8)	2.5 (1.0)
		96.8 (1.1)	80.1 (2.6)	60.5 (3.2)	10.8 (2.0)	2.5 (1.0)
Prince Edward Island	6.0 (1.8)	25.7 (3.3)	19.8 (3.0)	42.6 (3.7)	5.1 (1.7)	0.8 (0.7)
		94.0 (1.8)	68.3 (3.5)	48.5 (3.8)	5.9 (1.8)	0.8 (0.7)
Newfoundland	5.5 (1.6)	23.9 (2.9)	24.0 (2.9)	39.4 (3.3)	5.5 (1.6)	1.7 (0.9)
and Labrador		94.5 (1.6)	70.6 (3.1)	46.6 (3.4)	7.2 (1.8)	1.7 (0.9)
Northwest Territories	16.3 (5.6)	33.3 (7.1)	14.3 (5.3)	23.8 (6.5)	10.2 (4.6)	2.0 (2.1)
		83.7 (5.6)	50.4 (7.6)	36.0 (7.3)	12.2 (5.0)	2.0 (2.1)
Yukon	1.0 (1.7)	15.9 (6.1)	20.5 (6.8)	51.3 (8.4)	6.6 (4.2)	4.6 (3.5)
		99.0 (1.7)	83.1 (6.3)	62.6 (8.1)	11.2 (5.3)	4.6 (3.5)

Note: For each population, the first line shows the percentages of students by highest level achieved, the second line shows the cumulative percentages of students at or above each level, and the confidence intervals (± 1.96 times the standard errors) for the percentages are shown between parentheses. Results are weighted so as to correctly represent each population.

SAIP 1997 - MATHEMATICS CONTENT
NUMBER OF PARTICIPANTS BY JURISDICTION

	Number of 13-year-olds	Number of 16-year-olds
British Columbia	1 047	909
Alberta	974	893
Saskatchewan	924	866
Manitoba (E)	875	786
Manitoba (F)	578	255
Ontario (E)	990	963
Ontario (F)	880	777
Quebec (E)	819	716
Quebec (F)	963	833
New Brunswick (E)	870	797
New Brunswick (F)	783	711
Nova Scotia (E)	869	763
Nova Scotia (F)	247	112
Prince Edward Island	647	536
Newfoundland and Labrador	880	820
Northwest Territories	341	222
Yukon	194	120
Total	**12 881**	**11 079**

SAIP 1997 - MATHEMATICS PROBLEM SOLVING
NUMBER OF PARTICIPANTS BY JURISDICTION

	Number of 13-year-olds	Number of 16-year-olds
British Columbia	1 029	895
Alberta	969	883
Saskatchewan	928	828
Manitoba (E)	866	773
Manitoba (F)	578	265
Ontario (E)	1 011	966
Ontario (F)	867	759
Quebec (E)	793	749
Quebec (F)	963	839
New Brunswick (E)	883	788
New Brunswick (F)	790	709
Nova Scotia (E)	874	748
Nova Scotia (F)	241	113
Prince Edward Island	637	542
Newfoundland and Labrador	863	817
Northwest Territories	328	205
Yukon	206	127
Total	**12 826**	**11 006**

To assist with interpretation of outcomes for the SAIP 1997 mathematics assessment, the Council of Ministers of Education, Canada (CMEC) convened a pan-Canadian panel of educators and non-educators, each of whom attended one of the three sessions held in Atlantic Canada, Central, and Western Canada in September/October 1997. The anonymous panel consisted of teachers, parents, university academics and curriculum specialists, Aboriginal teacher trainers, business and industry leaders, community leaders, and members of national organizations with an interest in mathematics education. The panel featured representatives from every province and territory in Canada.

The 89-member panel reviewed all assessment questions and tasks, criteria, scoring procedures, and actual student results to determine the percentage of 13- and 16-year-old students who should achieve at each of the five performance levels used for scoring student work. Full and open disclosure was provided to panelists of any information pertinent to the assessment, to the student sample, and to the varying opportunities that students have to learn mathematics across the country.

A collaborative process was used to define pan-Canadian expectations for student achievement in both the content and problem-solving components of the assessment. Specifically, participants were asked to answer independently the question: "What percentage of Canadian students should achieve at or above each of the five performance levels, as illustrated by the criteria and questions or problems?"

Panelists' answers to that question were collected to determine desired Canadian student performance and to help interpret how students should do in comparison with actual results. These expectations will be used over the next three years as guidelines by ministries of education when enhancing mathematics programs across the country. In charts 7 to 10, the range* of expectations and the median expectation are identified for each level of achievement. This range is presented beside the bar representing the actual results and their confidence interval, for the purpose of interpretation of the actual results.

As charts 7 to 10 show, both educators and non-educators believe that sufficient numbers of Canadian students are generally demonstrating very basic levels of mathematical understanding as demonstrated by level 1 performance. They feel, however, that insufficient numbers of 13- and 16-year-old Canadian students are achieving as expected at levels 2, 3, and 4.

In the content component, 13-year-old student achievement closely matches expectations with 90% of students at level 1 and 0% at level 5. Performance is short of expectations at level 3 with 28.4% of students reaching level 3, whereas 50% are expected to do so. Similar but smaller gaps between expected and actual performance are evident at levels 2 and 4.

Ninety-five per cent of 16-year-old Canadian students meet expectations for level 1 achievement in mathematics content. However, 40% of 16-year-old students are expected to achieve level 4 performance while 14.5% actually did so. Smaller but significant gaps are evident for levels 2, 3, and 5 performance.

For the problem-solving component, 13-year-old student performance matched expectations with 84.2% at level 1. Just over 15% of Canadian students reached level 3, short of an expected 40%. As with the content component, the gap between expected and actual problem-solving performance is smaller but still significant for levels 2 and 4.

Sixteen-year-old Canadian student problem-solving achievement generally matches expectations for level 1 performance, with 92.5% achieving this level compared with an expected 95%. However, 60% are expected to reach level 3, whereas 39.8% actually did so. The mismatch between expectations and results at levels 2, 4, and 5 is smaller but still apparent.

* The range is the interquartile set of expectations, which represents the middle 50% of panelists' views. The median is the mid-point in the complete range of expectations.

References

Angoff, W.H. (1971). Scales, norms and equivalent scores. In R.L. Thorndike (Ed.) Educational Measurement (2nd ed.) (pp. 508-600) Washington, DC: American Council on Education.

Berk, R.A. (1986). A consumer's guide to setting performance standards on criterion-referenced tests. Review of Educational Research, 56 (1), 137-172.

Hambleton, R.K. & Powell, S. (1983). A framework for viewing the process of standard-setting. Evaluation & the Health Professions, 6, 1, 3-24.

Jaeger, R. (1989). The certification of student competence. In R.L. Linn (Ed.) Educational Measurement (pp. 485-514) London: Collier-Macmillan.