

Chapter 13: The Mathematics Assessment

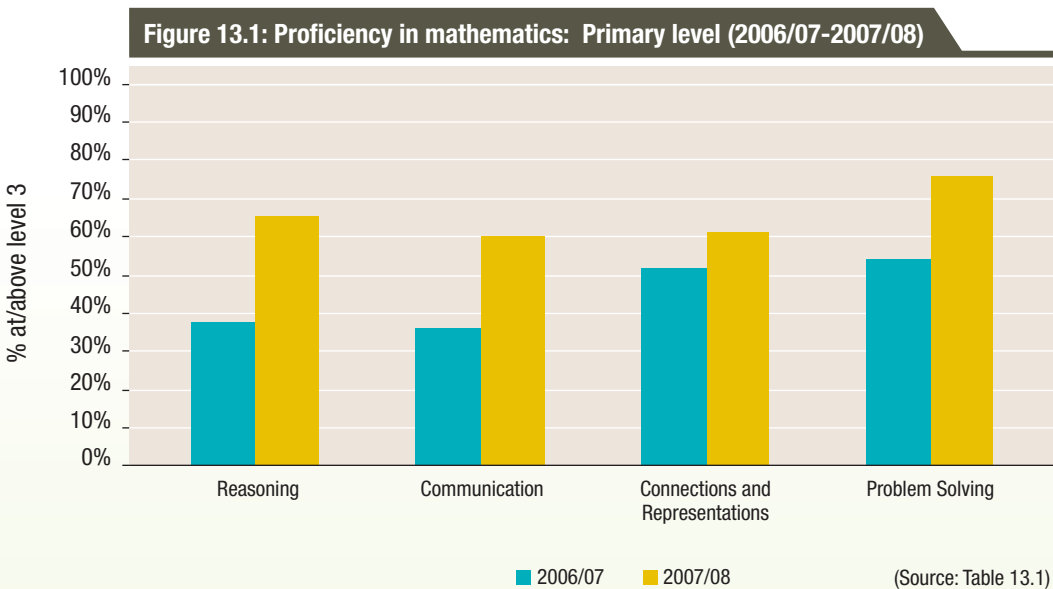
This chapter will focus on the performance of Grade 3, 6 and 9 students on the provincial mathematics assessment.

Primary students (Grade 3)

During the primary grades, children begin to develop specific skills and strategies necessary for mathematical problem solving. These skills form the foundation which older students build upon as they learn about numbers, mathematical operations, geometric concepts, spatial relations, measurement processes, and basic statistical techniques.

- estimate the size of numbers to the nearest ten or hundred, etc.; and,
- Shape and space - knowledge in measurement and geometry.

The final section is timed and consists of a series of facts. Students have two minutes to complete a series of addition and subtraction facts and one minute to complete multiplication. The following sections will discuss how the province’s primary students performed in the each of these areas.



The primary level mathematics CRT is made up of three sections. In the first section, students complete open constructed response questions to assess their ability to reason, communicate and solve problems. The second section assesses three strands of mathematics:

- Number operations - the ability of students to add, subtract, multiply and divide, as well as create and solve problems with these four operations;
- Number concepts - knowledge of number sense and place value. For example, a student’s ability to compare and order whole numbers to thousands,

Student performance in 2006/07 and 2007/08: A provincial perspective

Four categories of questions assessed student ability in number operations - reasoning, communication, connections and representations, and problem solving. Provincially, student performance improved in each of these areas from 2006/07 with increases in the percentage of students at or above level 3 ranging from a low of 9.5 points in the connections and representations section to a high of 28.1 percentage points in the reasoning section (see figure 13.1). These increases were primarily a result of more students performing at level 3 as opposed to level 2.



On the multiple choice questions, the average percent correct declined in both the number operations and shape and space sections (by 1.2 and 7.6 percentage points respectively) but improved in the number concepts section. The timed section assessed student ability in addition and subtraction.¹¹ In both areas, slight declines occurred in average scores between 2006/07 and 2007/08 (see figure 13.2).

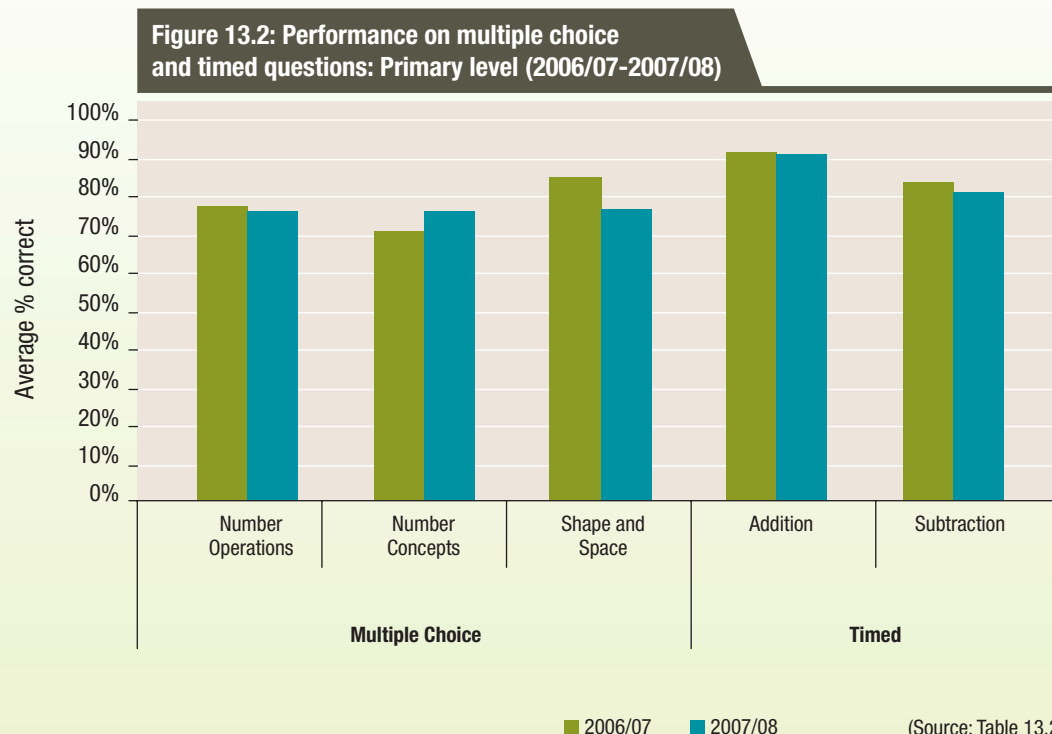
Results of the 2007/08 assessment

Provincially, students achieved the most success in the problem solving section, where over three-quarters of students were assessed at or above level 3. In the other three areas, this percentage ranged from between approximately 60% and 66%. In the multiple choice questions, students, on average, answered approximately three-quarters of the questions correctly. For the

timed questions, students performed better on the addition questions as compared to the subtraction and multiplication questions. Students, on average, answered approximately 91% of the addition questions correctly as compared to 81% of the subtraction and multiplication questions.

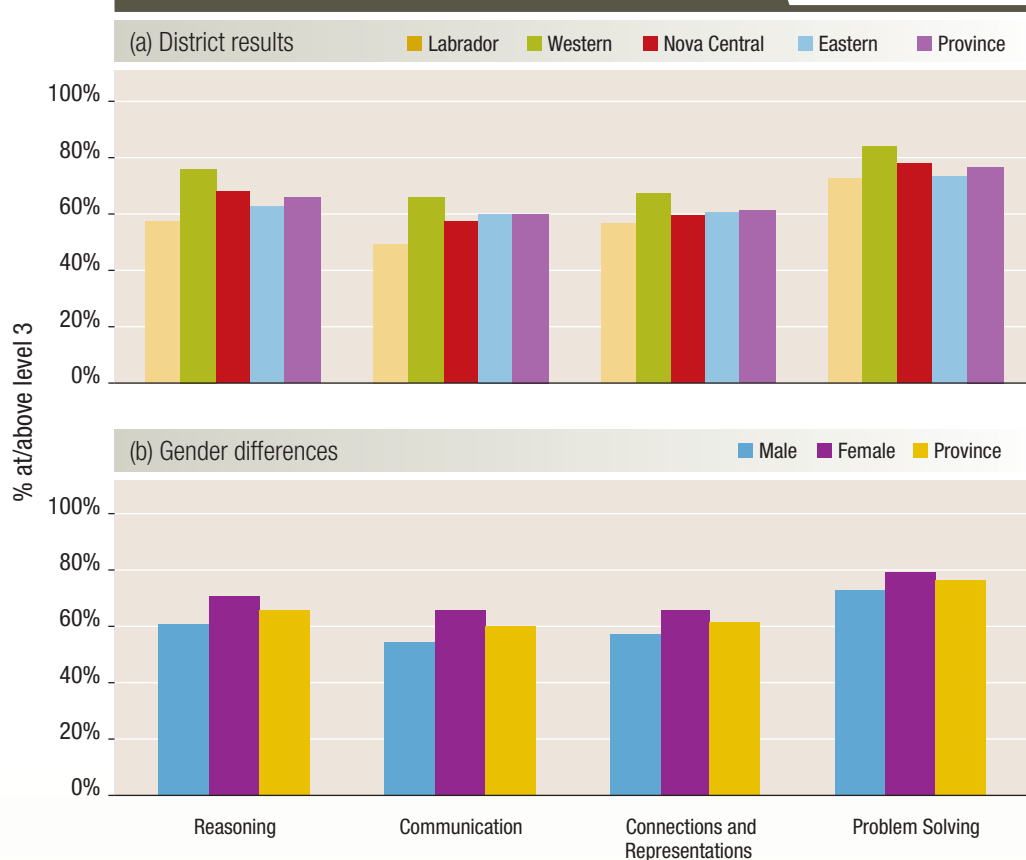
District performance and gender differences

Student performance across the four districts was somewhat varied in the open constructed response questions. The percentage of students at or above level 3 in both the Labrador and Eastern districts was below the provincial average in each of the subtests. Students in the Western district were consistently above the provincial average, and achieved the highest percentage in the province, in each area (see figure 13.3a).



¹¹ The 2007/08 CRT included a section assessing student ability in multiplication. However, this was not included in the 2006/07 CRT.

**Figure 13.3: Mathematical proficiency of primary students:
District performance and gender differences (2007/08)**



(Source: Table 13.3)

Girls outperformed boys in the open constructed response questions, with higher percentages of girls assessed at or above level 3 in each of the subtests. This difference ranged from a low of 6.8 percentage points on the problem solving section to a high of 11.1 percentage points in the communication section (see *figure 13.3b*).

The multiple choice and timed questions

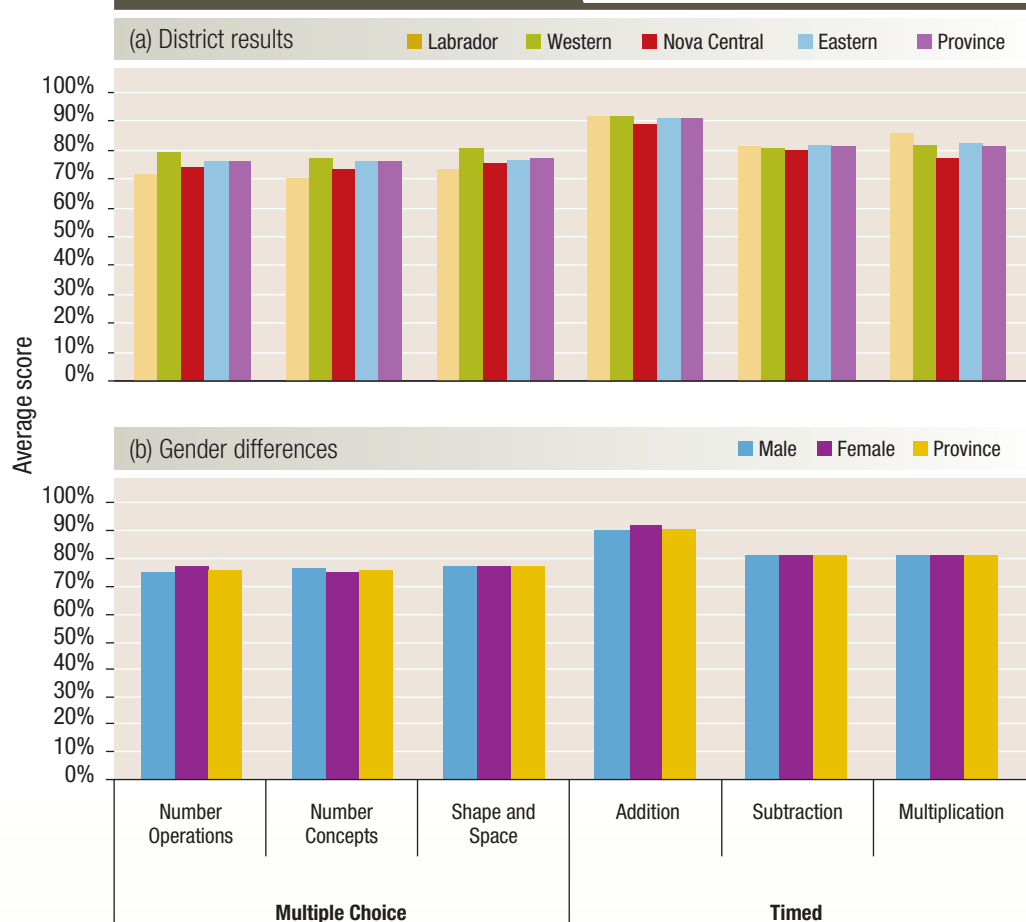
The multiple choice questions assessed student ability in number operations, number concepts, and shape and space. A similar pattern to the open constructed response questions emerged with the average scores of students in Labrador lower than the other districts and the province. Students in the Western district

achieved the highest average scores in all three areas (see *figure 13.4a*). The gender differences were not as apparent in this section, with boys and girls achieving similar average scores (see *figure 13.4b*).

In the timed section, all students performed better on the addition questions compared to the subtraction and multiplication questions. Little variation existed across the districts in the average scores on the addition and subtraction questions. On the multiplication questions, students in the Labrador district performed slightly better compared to the other districts, and the students in Nova Central performed slightly lower (see *figure 13.4a*). The average scores of boys and girls were virtually the same in all three areas (see *figure 13.4b*).



Figure 13.4: Performance on multiple choice and timed questions (2007/08)



(Source: Table 13.4)

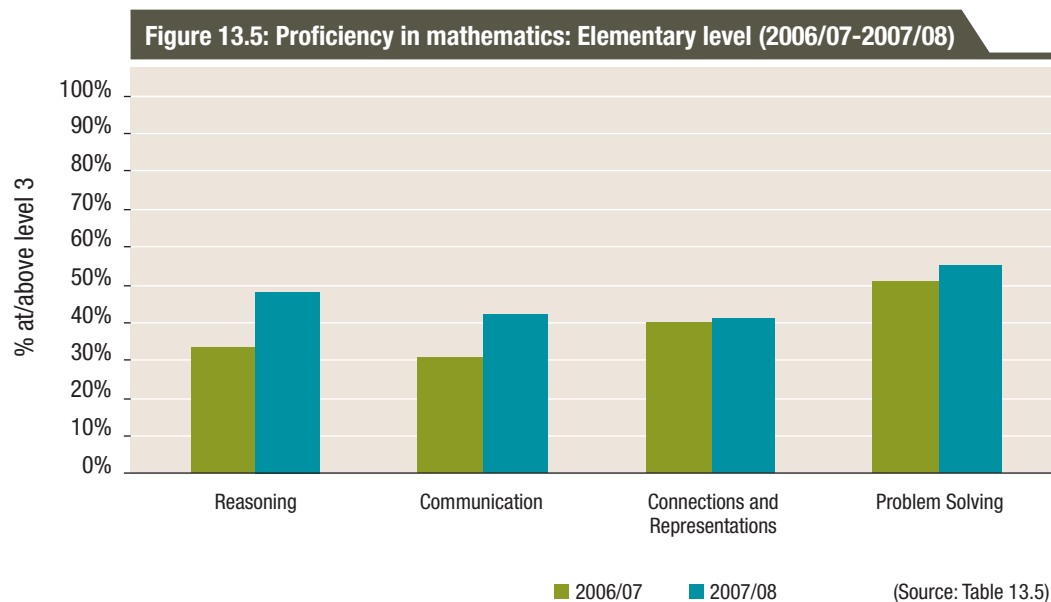
Elementary students (Grade 6)

During the elementary years, the mathematics curriculum is designed to help students further develop and strengthen specific skills and strategies for mathematical problem solving. These skills and strategies are applied as part of the development of basic geometric concepts, spatial relations, measurement processes, and basic statistical techniques.

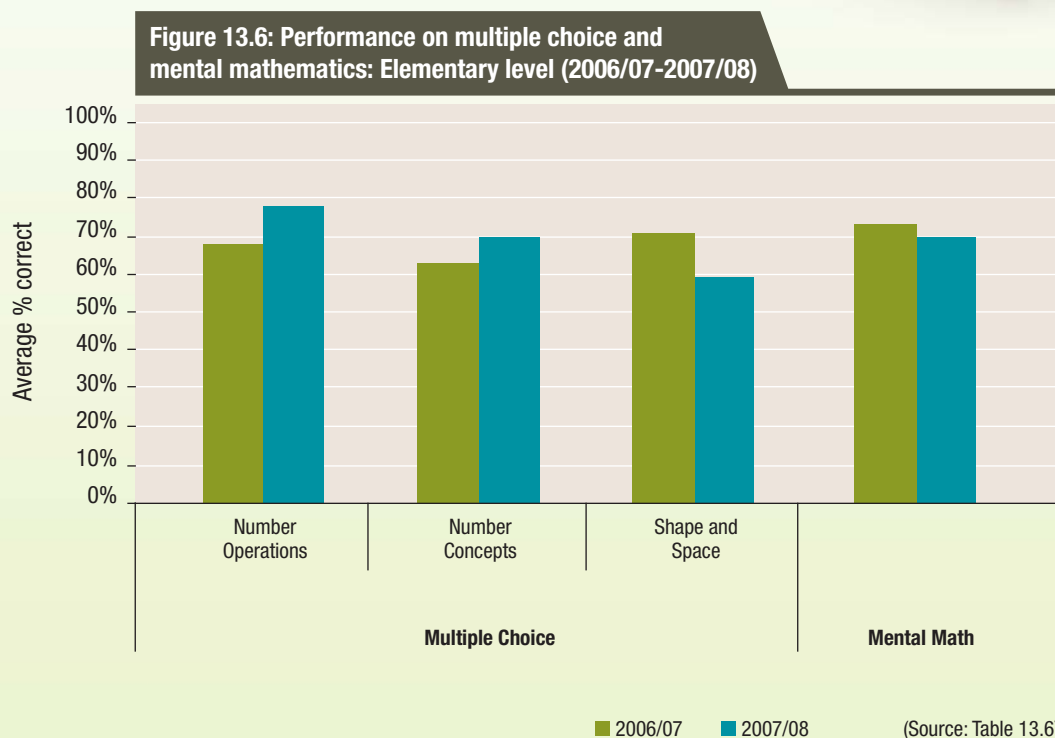
In the elementary CRT, students complete multiple-choice, and closed and open-constructed response questions in four strands of mathematics - number concepts, number operations, shape and space, and mental mathematics.

Student performance in 2006/07 and 2007/08: A provincial perspective

Between 2006/07 and 2007/08, an increase occurred in the percentage of students at or above level 3 in each of the four process strands assessed (i.e., reasoning, communication, connections and representations, and problem solving). The largest gains occurred in the reasoning and communication process strands where increases of 15.2 and 11.3 percentage points respectively were seen. In the remaining two process strands, smaller gains occurred (see *figure 13.5*). However, in all areas assessed the percentage of students at levels 4 and 5 increased from the 2006/07 assessment.



In the multiple choice sections, student ability was assessed in number operations, number concepts, and shape and space. Overall, student performance improved in both the number operations and number concepts process strands from the 2006/07 assessment but declined by 11.9 percentage points in shape and space. In the mental mathematics section, student performance also declined slightly, with the average score dropping by 3.8 percentage points from 73.3% in 2006/07 to 69.5% in 2007/08 (see *figure 13.6*).





Results of the 2007/08 assessment

In the open constructed responses, students experienced the greatest success in problem solving where the percentage of students with at least an adequate knowledge (i.e., at or above level 3) of mathematics was the highest. In the multiple choice section, average scores ranged from a low of 59% in the shape and space section, to a high of 78% in number operations. For the mental math questions, the average score was approximately 70%.

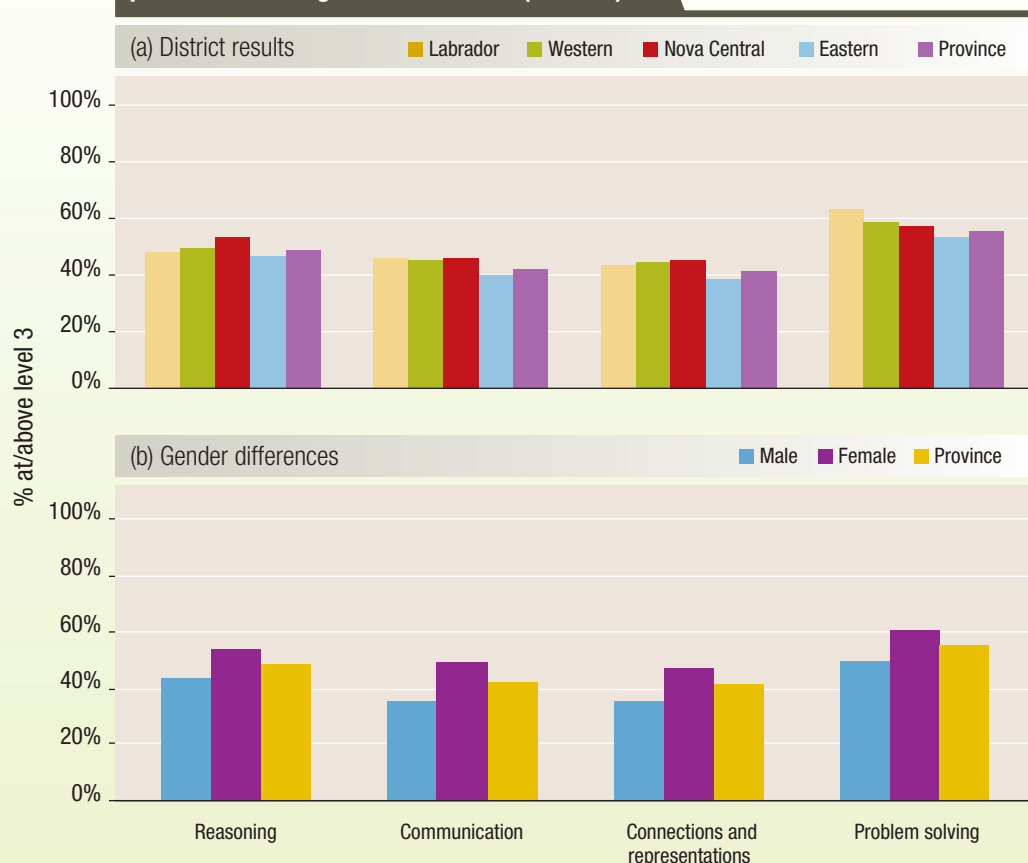
District performance and gender differences

Among the districts, the percentage of students at or above level 3 in the Labrador, Western and Nova Central districts was equal to or slightly above

the provincial percentage in each of the four process strands. Students in the Eastern district, however, were slightly below the provincial level in each of the four mathematical strands (see *figure 13.7a*).

The proportion of girls at or above level 3 once again surpassed both their male counterparts and the provincial percentage. The largest gender gap occurred in the communication strand, where the difference between the percentage of girls and boys at or above level 3 was 13.8 percentage points. In the other three areas, the difference ranged from between 9.9 and 11.9 percentage points (see *figure 13.7b*).

Figure 13.7: Proficiency in mathematics: District performance and gender differences (2007/08)



(Source: Table 13.7)

The multiple choice and mental math questions

Students experienced the most success in number operations where the average score ranged between 76.5% and 81.6% correct. With the exception of the mental math questions, little variation existed among average scores seen in the four districts (see *figure 13.8a*). Along gender lines, boys generally performed slightly higher in the multiple choice questions and the mental math section. The only exception was seen in the number operations questions (see *figure 13.8b*).

Intermediate students (Grade 9)

During the intermediate years, students continue to develop and practice the specific skills and strategies necessary for mathematical problem solving. These skills and strategies are applied as part of the consolidation of the concepts and skills of the real number system and measurement, and the development of introductory algebra, informal geometry and basic descriptive statistics.

During the intermediate CRT, students complete a series of multiple choice and close constructed response questions assessing their proficiency in number operations and concepts, patterns and relationships, shape and space as well as in data management and probability.

Figure 13.8: Performance on multiple choice and mental math questions (2007/08)



(Source: Table 13.8)



Comparison to 2006/07:

A provincial perspective

Overall, the performance of intermediate students improved between the 2006/07 and 2007/08 assessments. The only exception was found in shape and space where the average score decreased by 7.9 percentage points (from 63.0% in 2006/07 to 55.1% in 2007/08). The largest increase occurred in number concepts where the average score increased by approximately 22 percentage points. In the other three areas, increases ranging between 7.2 and 14.6 percentage points occurred (see *figure 13.9*).

Results of the 2007/08 assessment

Provincially, students experienced the most success with the questions assessing their skill in number concepts. The average score of students on these questions was approximately 70%. In the other four areas, average scores ranged between 55% and 63%.

District results and gender differences

A similar pattern was seen in student performance in the four districts. In the five areas assessed, the average scores of students in the Labrador and Western districts were above the other districts and the province. In the Eastern district, average scores were similar to the provincial average score. Finally, average scores of students in Nova Central were below the other districts and the province (see *figure 13.10a*)

Along gender lines, there was little variation between the average scores of boys and girls. Girls earned slightly higher average scores in number operations, patterns and relations, and number concepts (see *figure 13.10b*).

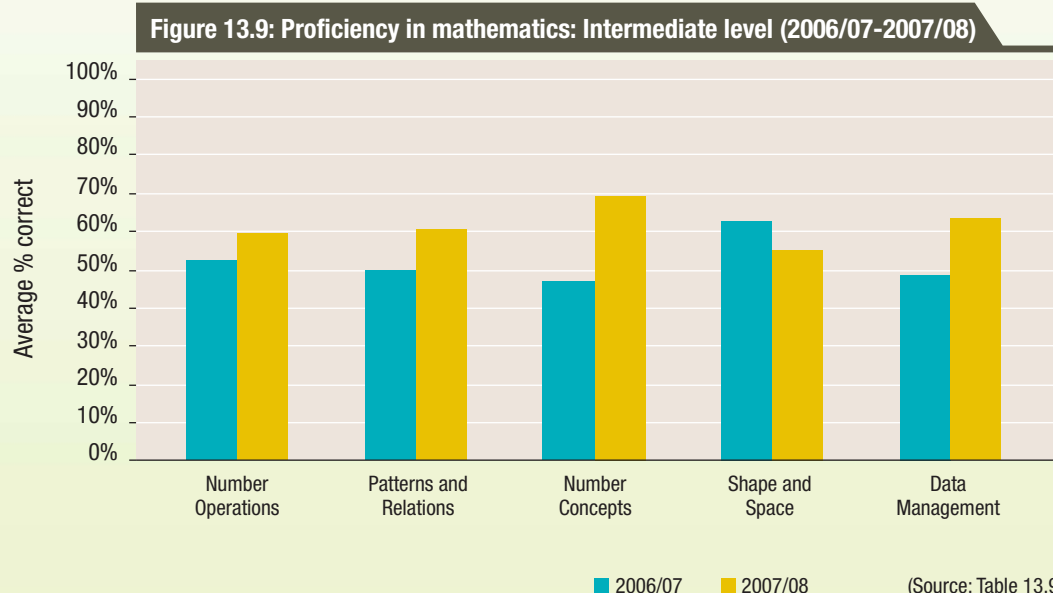
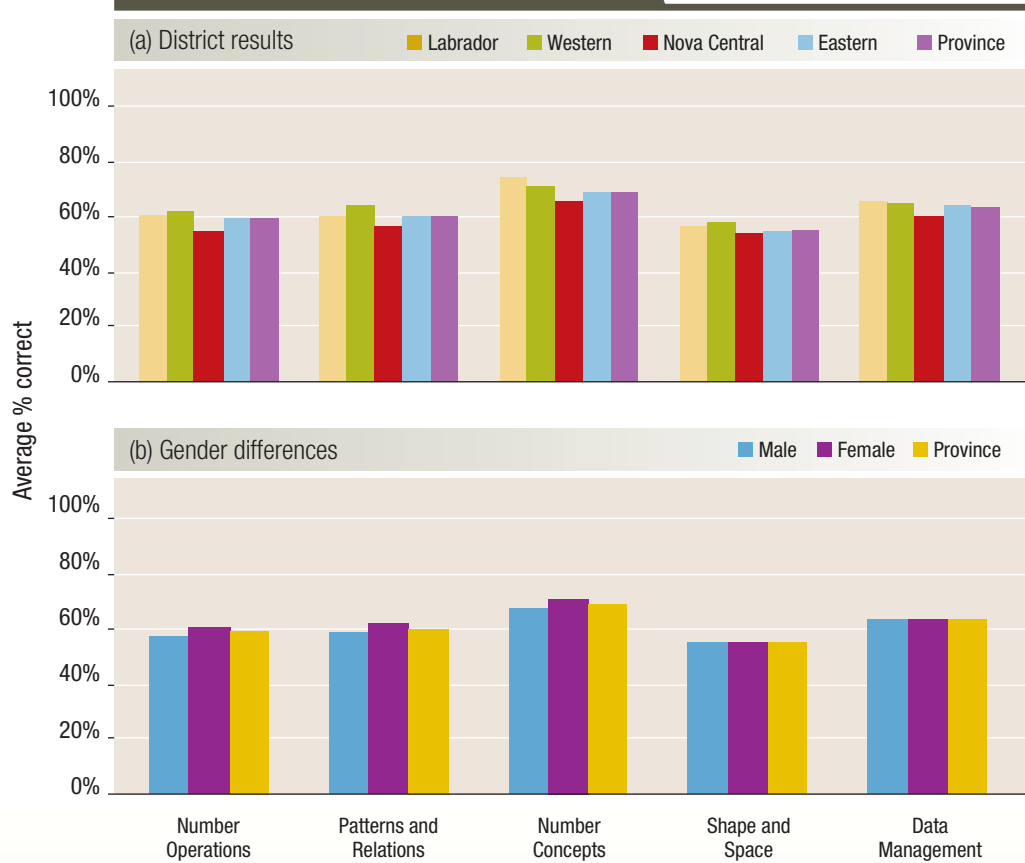


Figure 13.10: Performance on the intermediate mathematics assessment (2007/08)



(Source: Table 13.10)

