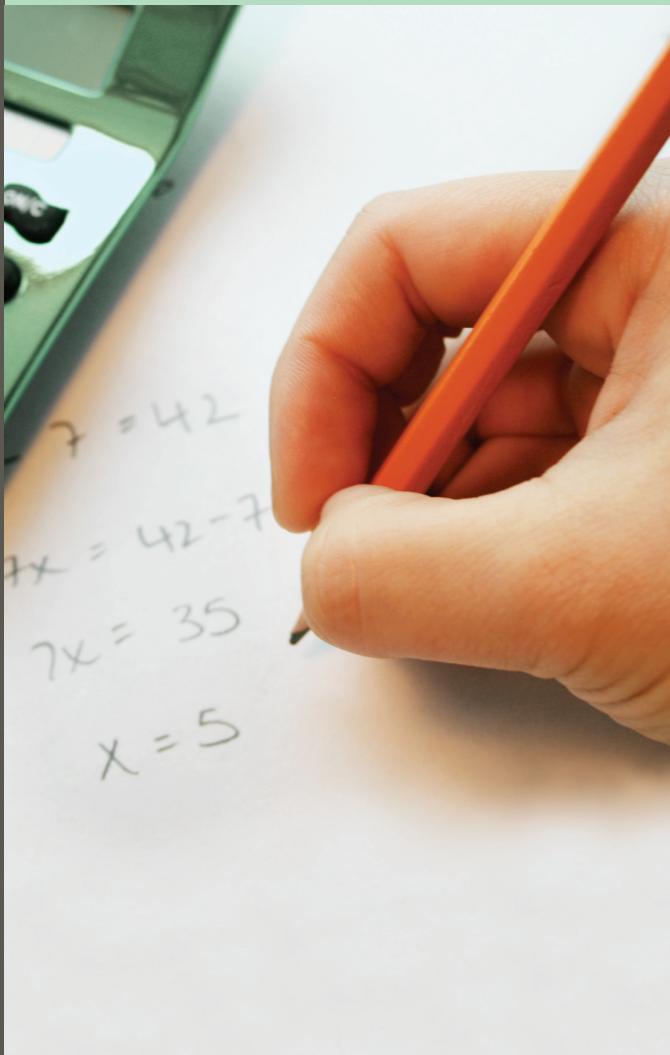


# PCAP-2010

Mathematics, Science, and Reading  
HIGHLIGHTS



cmeC

Council of  
Ministers  
of Education,  
Canada

Conseil des  
ministres  
de l'Éducation  
(Canada)

## PCAP-2010 HIGHLIGHTS

The Pan-Canadian Assessment Program is the most recent commitment from the Council of Ministers of Education, Canada (CMEC) to inform Canadians on how well their education systems are meeting the needs of students and society. As well, the information gained from such an assessment gives each minister of education a basis for examining the curriculum and other aspects of their school system.

### Contents of the public report

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The public report describes the performance of Grade 8<sup>1</sup> students in the second administration of the Pan-Canadian Assessment Program, in which the major domain was mathematics and the secondary or minor domains were science and reading. The report describes the purpose and process of developing the assessment, which involved pan-Canadian expertise, collaboration, and sound practices in producing valid instruments to yield reliable data. The framework design for each domain, which enabled the description of the specific outcomes to be measured, is summarized.

The PCAP 2010 assessment in mathematics, science, and reading provides both pan-Canadian results — the mean scores for Canada overall — as well as results for individual jurisdictions, including breakdowns by language and gender. The public report describes the assessment program and includes context descriptions of the learning environment.

### Assessment design

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Based on a review of contemporary research and the curricula from all participating jurisdictions in the three domains of mathematics, science, and reading, the test development included a bilingual framework-writing team, a bilingual item-development team, a validation process, and field testing. All work came under the constant review by and feedback from the jurisdictions and their particular subject experts. The data acquired through the administration of this second PCAP instrument indicate that the design and content goals of the testing were sound, engaging students effectively and providing reliable and valid data on specific curriculum-based objectives common across the country. The range of question types and subject matter appears to have engaged students sufficiently to allow them to demonstrate their best work in the three domains.

### Cycle of PCAP assessments

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Domains	Actual or proposed date of PCAP assessment		
	Spring 2007 (13-year-olds)	Spring 2010 (Grade 8 students)	Spring 2013 (Grade 8 students)
<b>Major</b>	Reading	Mathematics	Science
<b>Minor</b>	Mathematics	Science	Reading
<b>Minor</b>	Science	Reading	Mathematics

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<sup>1</sup>Grade 8 refers to Secondary II in Quebec throughout this report.

## Participants

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In the spring of 2010, the test was administered to a random sample of schools and students with a random assignment of booklets, all representative of the Canadian cohort of Grade 8 students and of the individual jurisdictions. Close to 32,000 Grade 8 students in over 1,600 schools answered questions in all three domains, with approximately 24,000 responding in English and 8,000 in French. Students wrote for approximately 90 minutes and then completed a context questionnaire.

## Key elements of the mathematics assessment

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As the major domain, the mathematics component in PCAP 2010 encompassed more of the curricula of all Canadian jurisdictions, while the minor domains, science and reading, contained fewer questions and a limited number of subdomains.

The test design of the mathematics component of the assessment focused on four subdomains in mathematics — numbers and operations, geometry and measurement, patterns and relationships, and data management and probability — and five mathematical processes — problem solving, communication, representation, reasoning and proof, and connections.

In addition to the reporting of mean scores, levels of achievement were reported using a performance scale. The performance levels represented how jurisdictional performances measured up to the expected level of achievement on two factors: cognitive demand and degree of difficulty of the items. Based on curriculum expectations in mathematics across Canada, Grade 8 students should be at level 2 or above. Students at level 1 are at a level below that expected of students at this grade level, while students at levels 3 and 4 demonstrate higher levels of mathematics skills and knowledge.

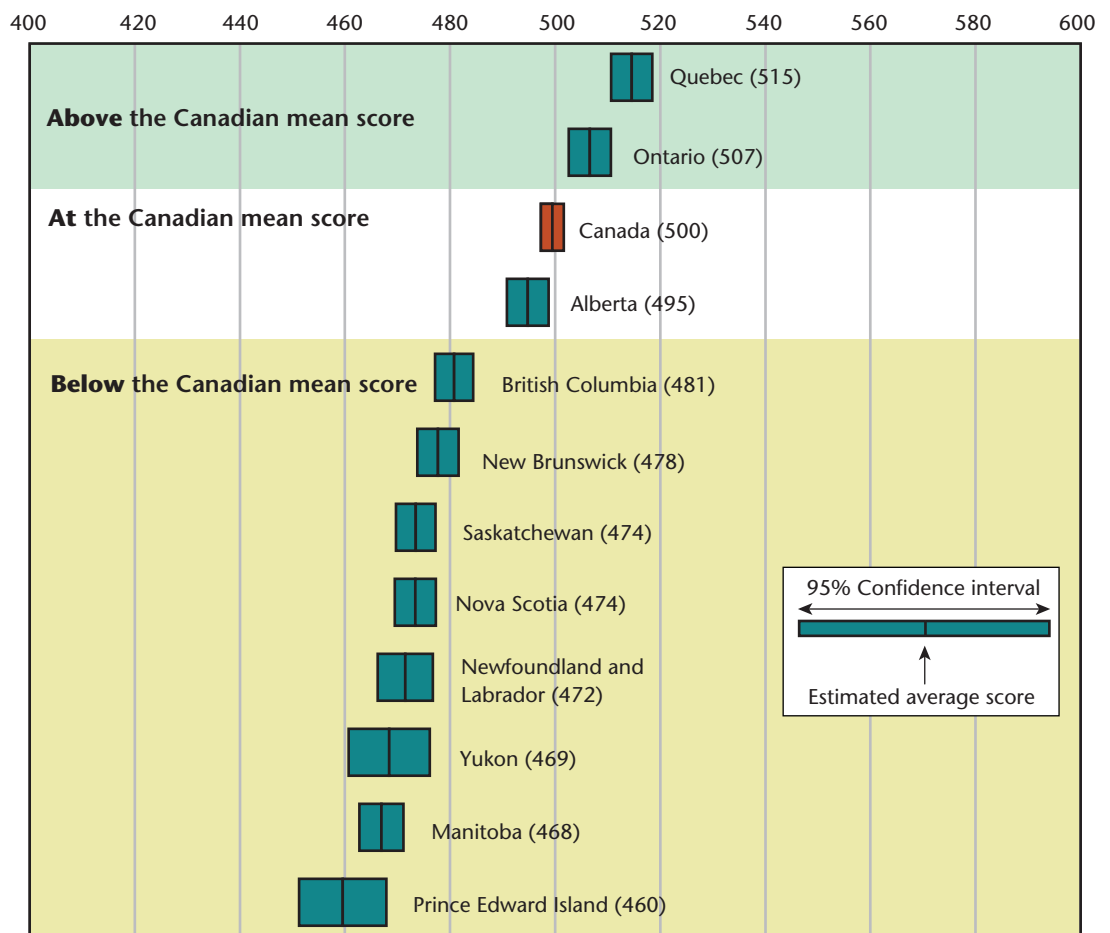
## Description of expected level of performance of Grade 8 students

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Performance level 2 Scores: 358 – 513
<p>The student is able to:</p> <ul style="list-style-type: none"><li>• recall facts, definitions or terms;</li><li>• carry out previously learned procedures such as performing one or more operation, employing formulae, evaluating a variable expression;</li><li>• retrieve information from a table or a graph and apply it to solve a problem;</li><li>• identify a simple number of geometric patterns;</li><li>• solve problems that are clearly defined as to what is required, with no extraneous information or hidden assumptions;</li><li>• solve problems that require mostly low and moderate cognitive demand.</li></ul>

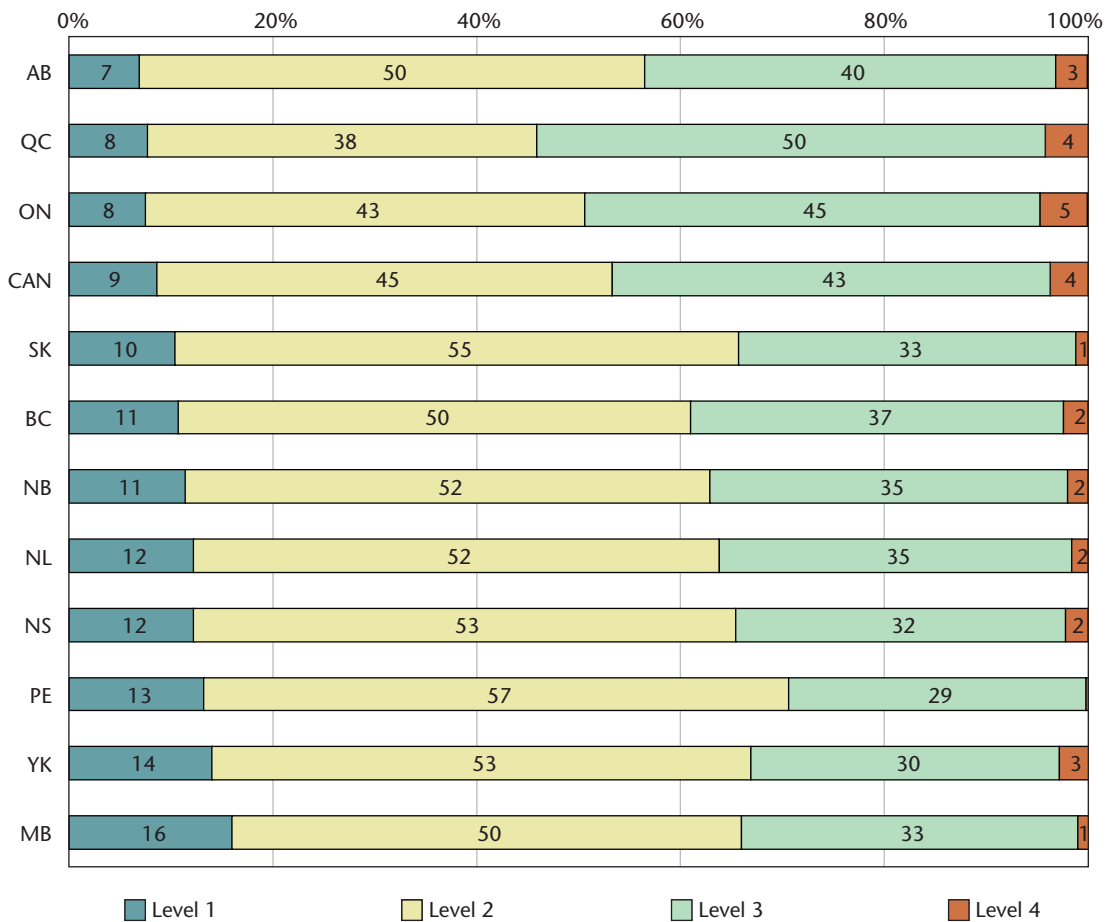
# Assessment results

## Results in mathematics



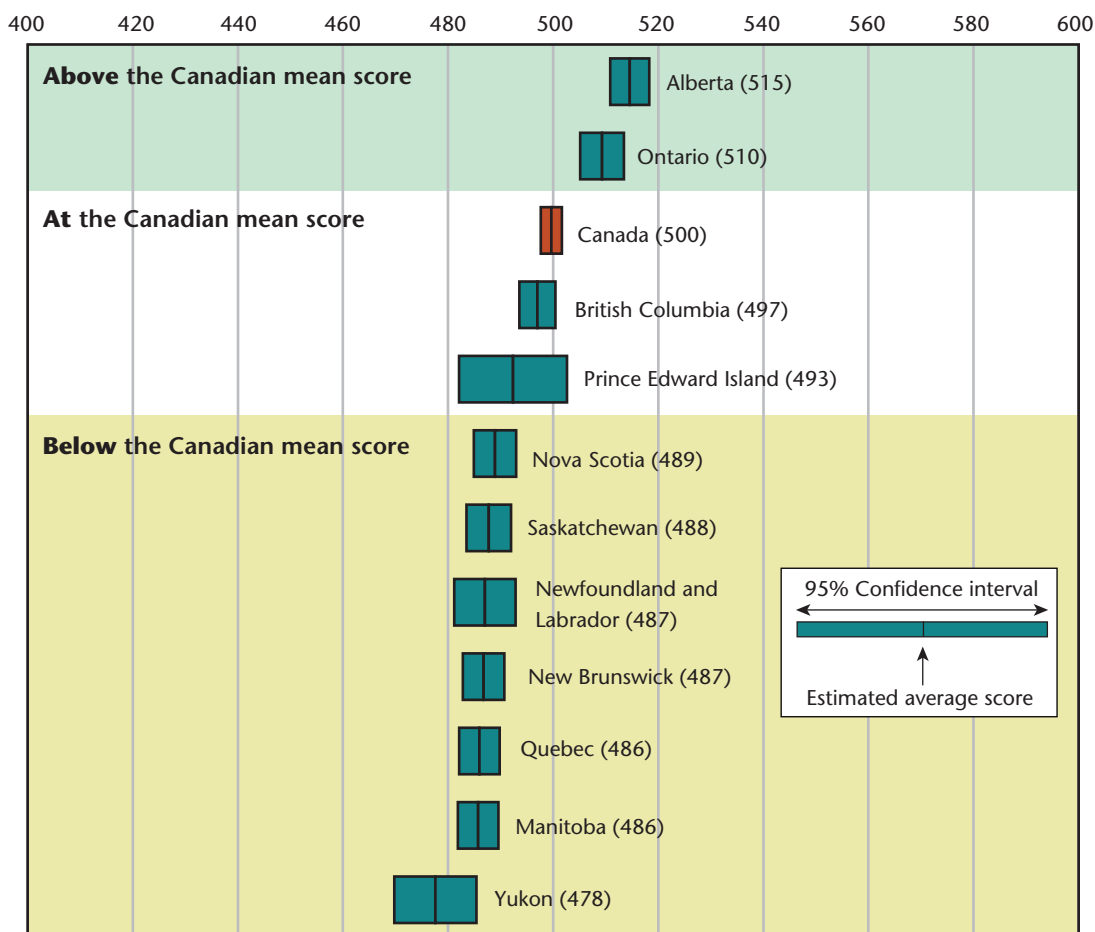
- Quebec, Ontario, and Alberta students had mean scores at or above that of Canadian students overall.
- In English school systems, Alberta, Ontario, and Quebec students had mean scores that were at or above that of Canadian students enrolled in English schools overall.
- In French school systems, Quebec, Ontario, and New Brunswick students had mean scores that were not significantly different from that of Canadian students enrolled in French schools overall.
- In all jurisdictions except Quebec, students in minority-language school systems had higher mathematics performance than students in majority-language school systems.
- In Canada overall and in most jurisdictions, there were no significant differences in the mean scores of females and males in mathematics.
- Male students had significantly higher mean scores in the mathematics subdomain of numbers and operations than female students, while there were no significant differences for the other three subdomains.

## Results for level of performance in mathematics



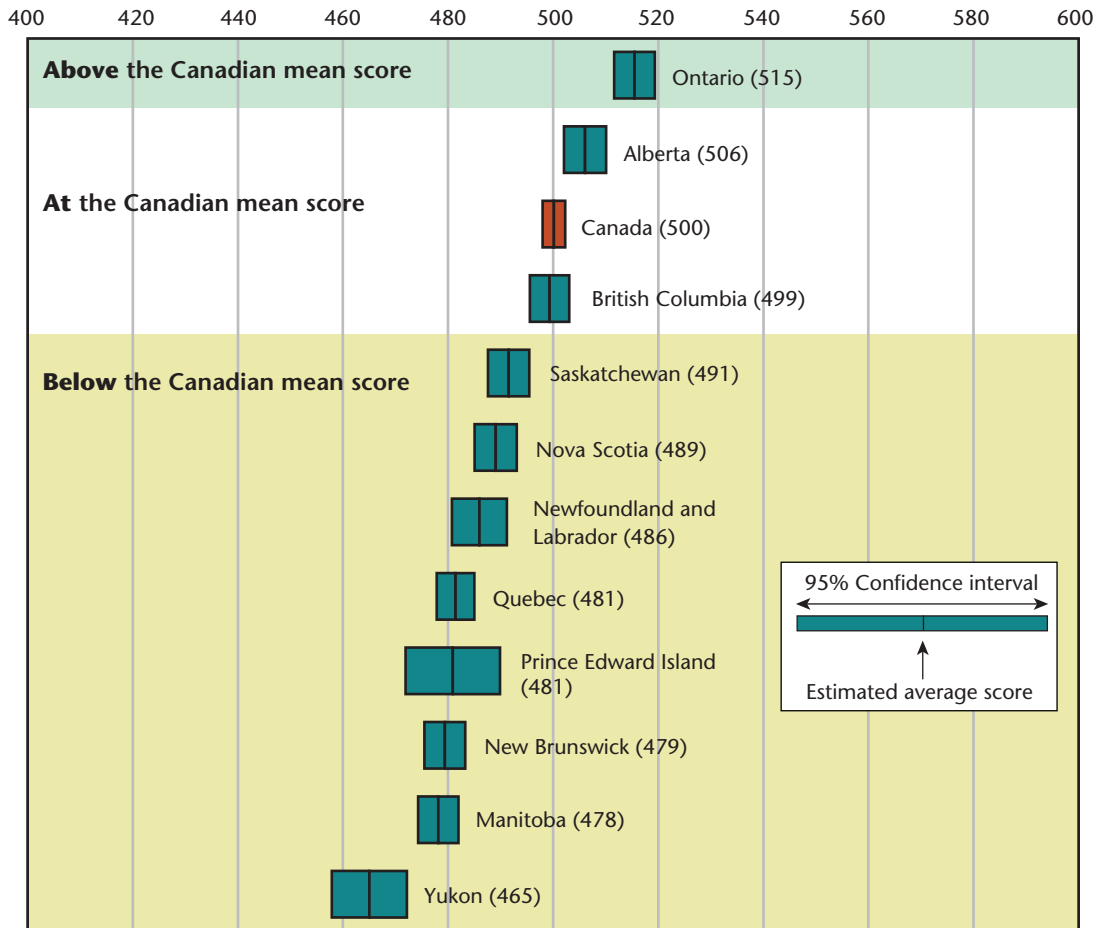
- In Canada overall, 91% of students in Grade 8 achieved or exceeded the expected level of performance (level 2) in mathematics.
- Across jurisdictions, the majority of students (84% to 93%) achieved at or above the expected level of performance.
- Almost half of students are achieving above their expected level.
- Highest levels of performance at levels 3 and 4 were found in Quebec (54%), Ontario (50%), and Alberta (43%).
- Although there were just as many females as males achieving at the appropriate grade level in mathematics (level 2), there seemed to be more males demonstrating higher levels of mathematics knowledge and skill proficiency (levels 3 and 4) than there were females at these levels.

## Results in science



- Alberta, Ontario, British Columbia, and Prince Edward Island students had mean scores at or above that obtained by Canadian students overall.
- In both English and French school systems, Alberta, Ontario, and British Columbia had high achievement in science.
- In English school systems, Prince Edward Island had high achievement in science.
- In French school systems, the mean scores for most jurisdictions were not significantly different from those of Canadian students enrolled in French schools overall.
- In Canada overall, female students in science had higher achievement than male students. In many jurisdictions, there was no significant difference in achievement in science between female and male students.

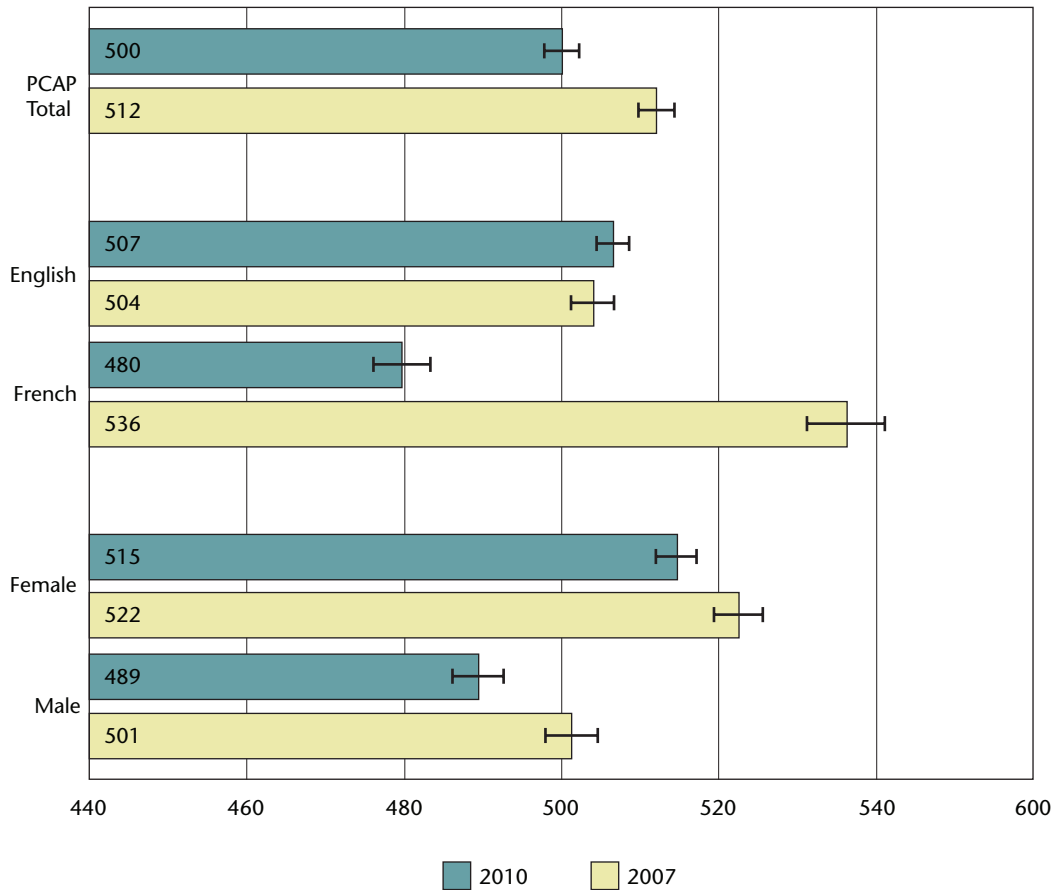
## Results in reading



- Ontario, Alberta, and British Columbia students obtained mean scores at or above that obtained by Canadian students overall.
- In English school systems, Ontario and Alberta students obtained mean scores that were at or above that obtained by Canadian students enrolled in English schools overall.
- In French school systems, Alberta, Ontario, Quebec, Nova Scotia, and British Columbia students had mean scores that were at or above that obtained by Canadian students enrolled in French schools overall.
- In all jurisdictions except Quebec, students attending English majority-language school systems outperformed students who attended French minority-language systems.
- In Canada overall and in all jurisdictions except Yukon, female students had significantly higher achievement in reading than male students.

## Performance comparisons in reading over time

This second administration of PCAP allowed for comparisons of results in reading of Grade 8 students from 2010 to 2007. Using anchor items to link the two tests, this comparison was done indirectly through rescaling scores from the 2007 administration to the metric of the 2010 test.



- Overall, Grade 8 students performed significantly lower in 2010 than in 2007.
- In English school systems, the mean scores of Grade 8 students in 2010 were not significantly different from those in 2007.
- Overall, in French school systems, the mean scores in reading were significantly lower in 2010 compared with 2007.
- In Saskatchewan and New Brunswick there was a significant increase in reading scores; however, for most jurisdictions, there was no significant difference between the two PCAP administrations.
- Female students had higher achievement than male students in both 2007 and 2010.
- The difference between Grade 8 female and male students in 2010 was greater than it was in 2007.



# Conclusions

- Overall in Canada, 91% of students achieve the expected level of performance in mathematics.
- Almost half of students are achieving above their expected level.
- Overall in Canada, females outperformed males in science and reading; there is no significant difference for math.
- In most jurisdictions, females outperformed males in reading; there is no significant difference for mathematics and science.
- In most jurisdictions:
  - English majority-language school systems have higher achievement in reading;
  - French minority-language school systems have higher achievement in mathematics;
  - there is no significant difference in achievement for science.
- The forthcoming PCAP-2010 Contextual Report will provide more information about how the context of learning impacts the results of students in Canada.
- The results of this assessment suggest that Canadian jurisdictions are addressing the demands and practices in mathematics, and that the majority of students know and use their knowledge and skills in practical day-to-day activities.
- Overall, the PCAP testing reaffirms that the CMEC large-scale assessment projects offer innovative and contemporary direction on education policy, curriculum, and classroom practices.

Further results are available in the public report, *PCAP-2010 Report on the Pan-Canadian Assessment of Mathematics, Science, and Reading*. This report is available without charge at the Council of Ministers of Education, Canada, or on the CMEC Web site at [www.cmec.ca/pcap](http://www.cmec.ca/pcap).

Using the data obtained from this assessment, researchers are preparing additional analyses that CMEC will publish in the coming months.