

Pan-Canadian Assessment Program (PCAP)

Findings from
PCAP 2019

October 12, 2021

cmec

Council of
Ministers
of Education,
Canada

Conseil des
ministres
de l'Éducation
(Canada)

PCAP 2019

Report on the Pan-Canadian Assessment of
Mathematics, Reading, and Science



What is PCAP?

Approximately 32,000
Grade 8/Secondary II students
from close to 1,600 schools

Developed by CMEC and
provinces/territories

10 provinces

Initiated in 2007,
administered every
three years

Administered in
English and French



Based on common curriculum
outcomes across Canada

Includes contextual
questionnaires for students,
teachers, and school principals

What does PCAP assess?



- The assessment is not tied to the curriculum of a particular province or territory, but is instead a fair measurement of students' abilities to use their learning skills to solve real-life situations.
- The assessment measures how well students are doing; it does not attempt to assess approaches to learning.
- Student skills in reading, mathematics, and science are assessed.
- PCAP 2019 was the fifth cycle of PCAP to be completed, and it focused on mathematics, defined through four sub-domains: numbers and operations; geometry and measurement; patterns and relationships; and data management and probability.

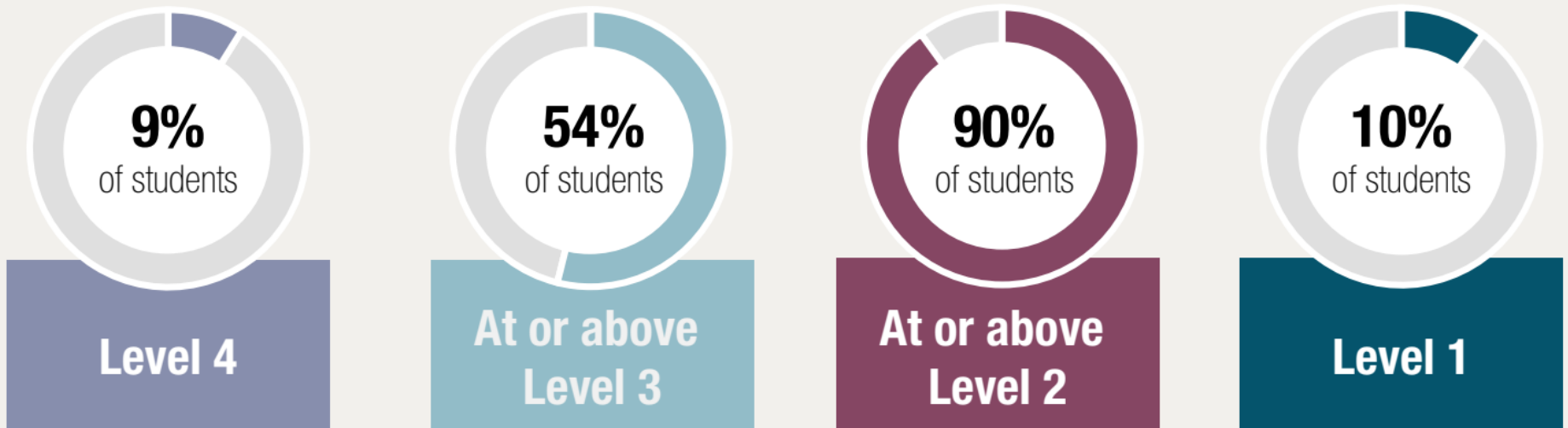
The PCAP results will be published in two reports:

- *PCAP 2019: Report from the Pan-Canadian Assessment of Mathematics, Reading, and Science*
 - Achievement results reported at the pan-Canadian and provincial levels.
- *PCAP 2019: Contextual Report on Student Achievement in Mathematics*
 - Secondary analysis explores how resources, school and classroom conditions, student characteristics, and family circumstances may impact mathematics achievement in Grade 8/Secondary II students.

90 percent of Canadian students meet or exceed the expected level*



Results in mathematics by performance level



* The level at which students demonstrate the mathematics skills and competencies needed to participate effectively in school and in everyday life.

Expected performance level in mathematics for Grade 8/Secondary II students



Level 2 is considered “baseline proficiency.”

Description of Level 2 mathematics achievement (scores between 386 and 497)

Students at Level 2 were able to:

- recall facts, definitions, or terms (e.g., parallel, perpendicular, range)
- carry out calculations involving one or more operations, including operations of different types
- use provided formulae
- compare and order numbers, including fractional representations
- identify the algebraic expression or equation for a given context
- solve problems involving probability
- solve problems that require proportional reasoning, including ratios
- calculate straightforward perimeter and area in a non-problem-solving context
- evaluate a variable expression
- retrieve information from tables, diagrams, or graphs, and apply it to solve a problem
- solve problems that are clearly defined as to what is required

9 percent of Canadian students achieve at the highest level of performance



Across provinces, between 83 and 95 percent of students achieve at or above the expected level (Level 2).

Quebec had the highest percentage of students achieving at the highest level (Level 4).

Province	Levels 2 & above (%)	Level 4 (%)
British Columbia	88	5
Alberta	90	8
Saskatchewan	85	4
Manitoba	83	4
Ontario	90	10
Quebec	95	13
New Brunswick	88	6
Nova Scotia	89	6
Prince Edward Island	92	5
Newfoundland and Labrador	86	4
Canada	90	9

Bold font denotes a significant difference compared to Canada

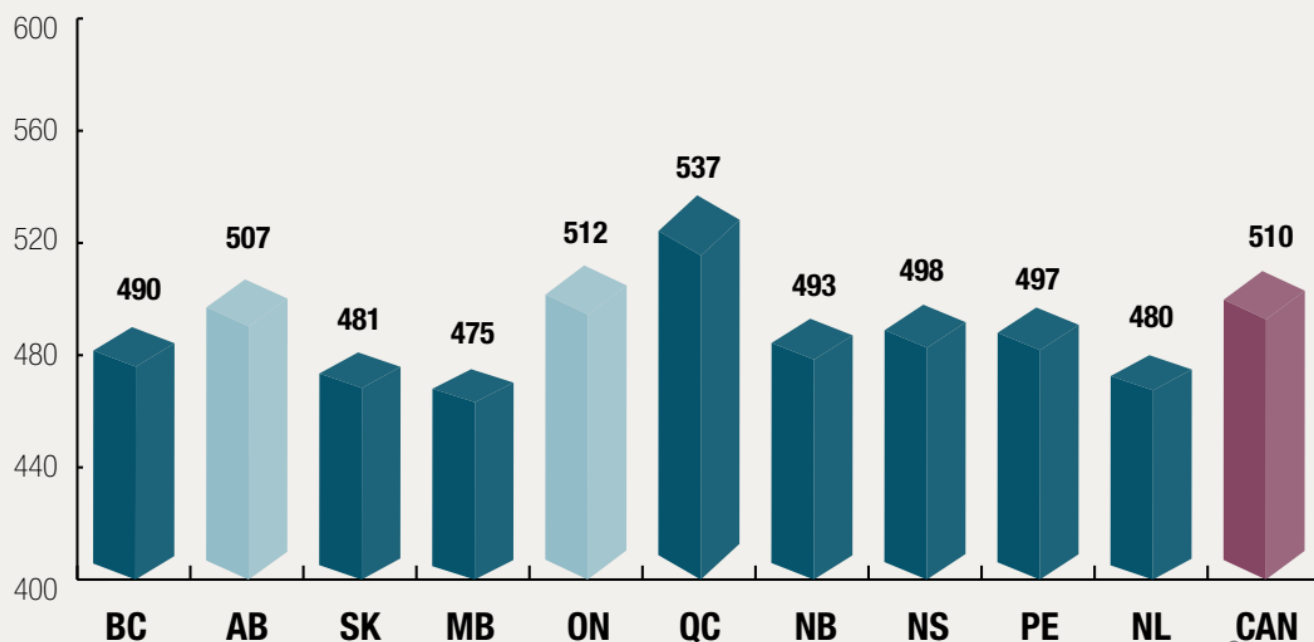
PCAP 2019 achievement results



Students in Quebec achieved above the Canadian mean score, while Alberta and Ontario students achieved similar scores to Canada overall.

Results in mathematics by average score

Students in three provinces achieved at or above the Canadian mean score; students in all other provinces achieved below the Canadian mean score.



Note: Darker shade denotes significant difference compared to Canada.

Provincial achievement compared to overall Canadian results



The highest achievement was found in Quebec for mathematics, in Ontario for reading, and in Alberta, Ontario, and Prince Edward Island for science.

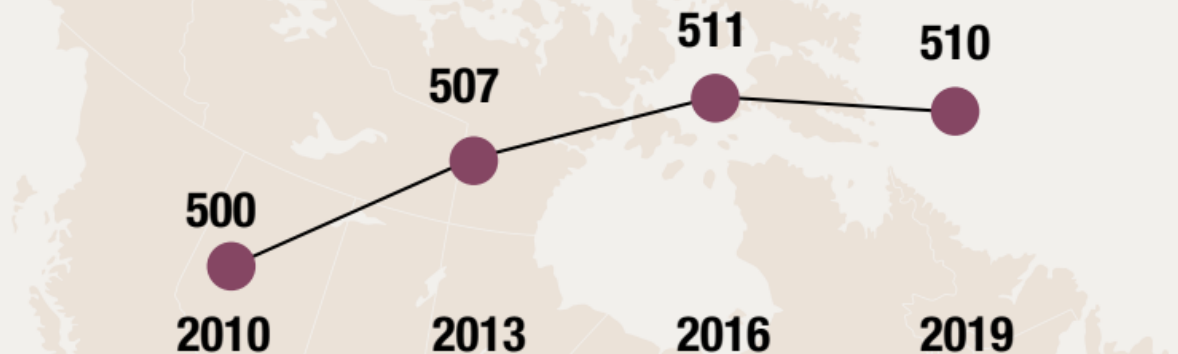
	Above the Canadian average	At the Canadian average	Below the Canadian average
Mathematics	QC	AB, ON	BC, SK, MB, NB, NS, PE, NL
Reading	ON	BC, AB, PE	SK, MB, QC, NB, NS, NL
Science	AB, ON, PE	BC, SK, NS	MB, QC, NB, NL

Mathematics performance over time – PCAP



Change in mathematics performance over time

Mathematics achievement results have improved overall in Canada since the baseline year in 2010.



Results improved: BC, AB, MB, QC,
NB, NS, PE, and NL.

Results stable: SK and ON.

Mathematics performance over time

– PISA and TIMSS



Mathematics results in Canada have remained stable since 2012 in PISA and since 2015 in TIMSS.

	2003	2012*	2018	Long-term change 2003–2018	Short-term change 2012–2018
PISA mathematics 15-year-olds	532	518	512	decline	no change

	2015*	2019	Change 2015–2019
TIMSS mathematics Grade 4	511	512	no change

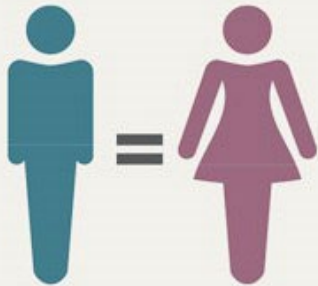
*First Canadian report published

There is no gender gap in mathematics in Grade 8/Secondary II



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Results by gender



Boys and girls performed equally well in mathematics.



Girls outperformed boys by 31 points in reading.



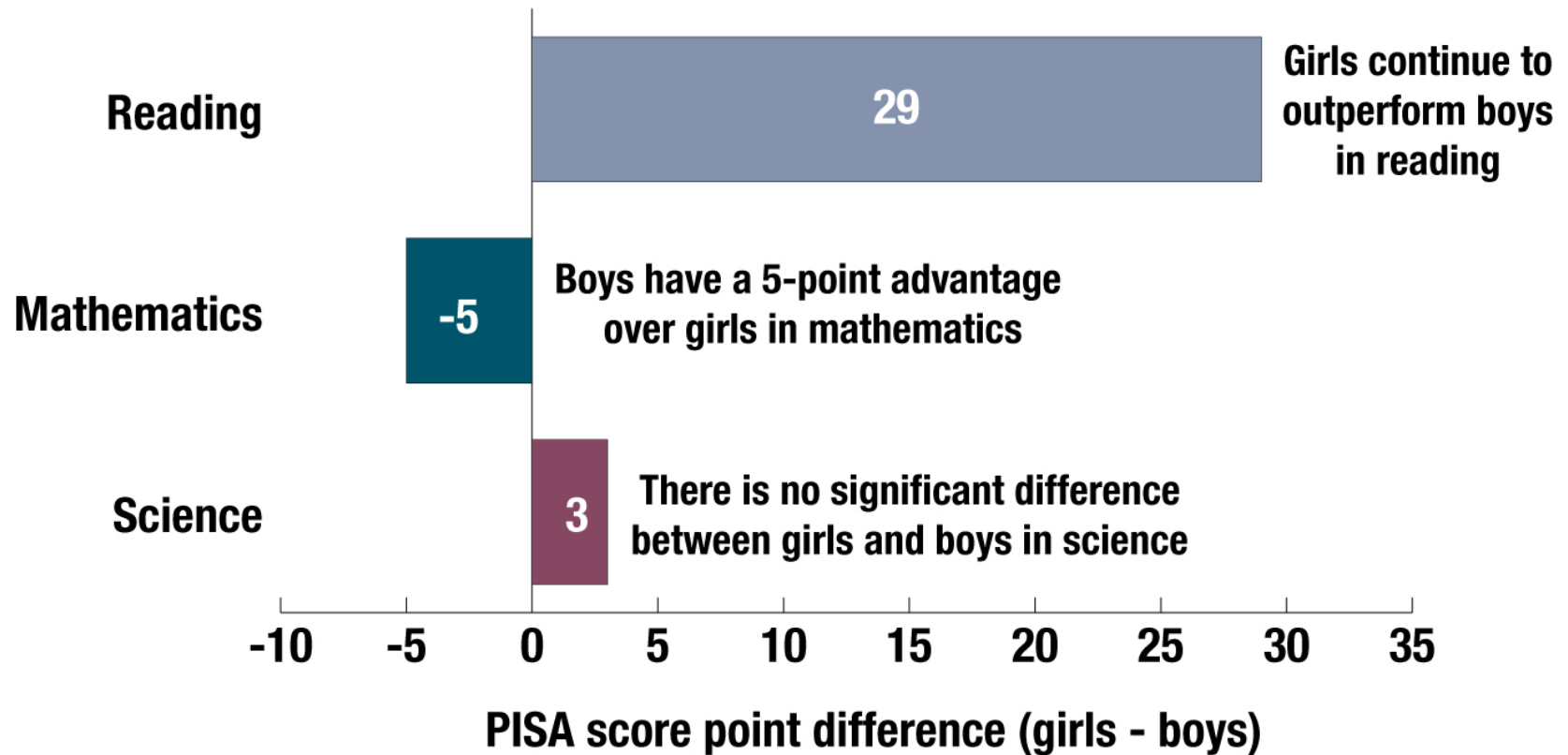
Girls outperformed boys by 4 points in science.



A gender gap was found in high school mathematics



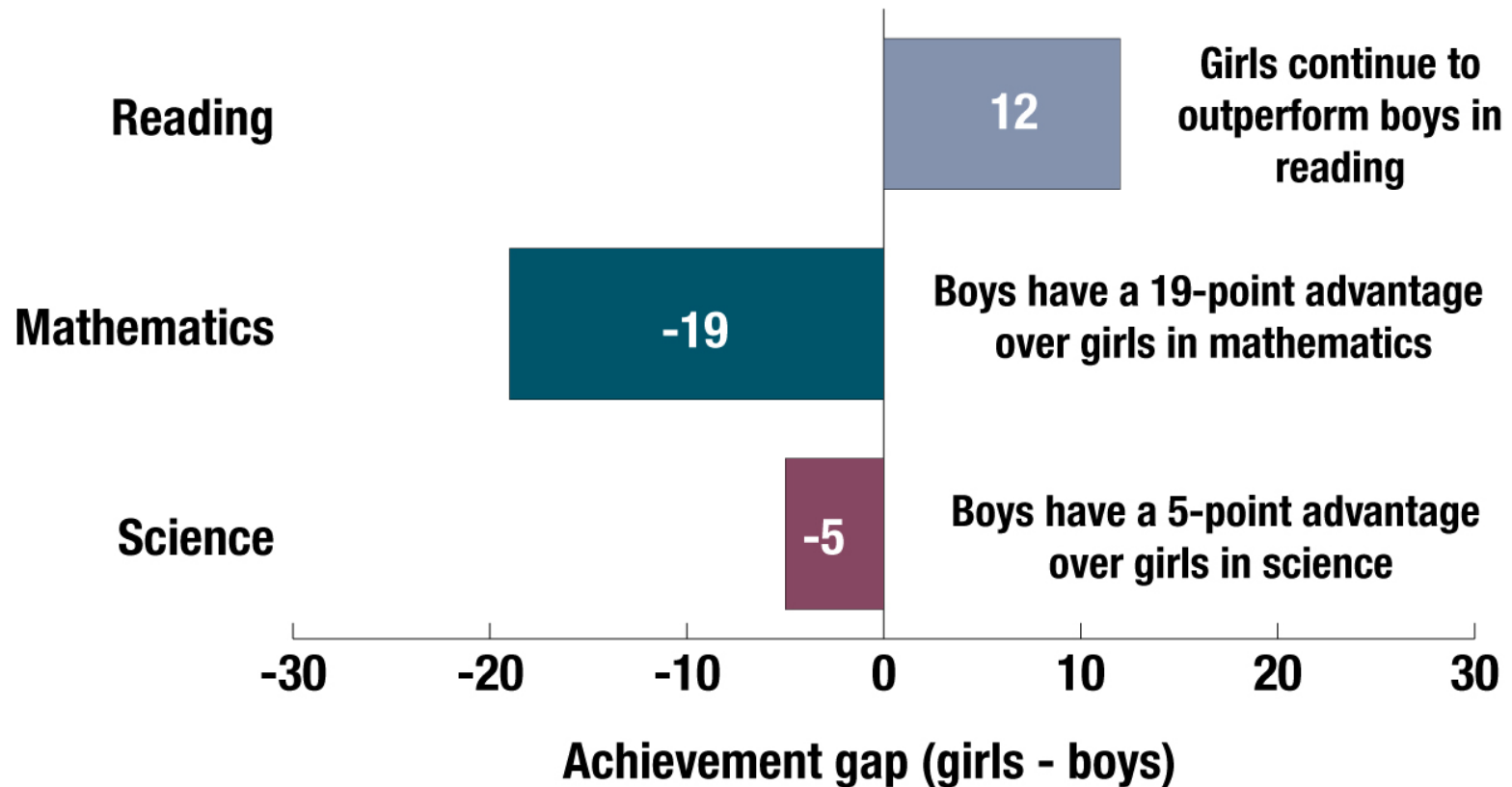
PISA 2018 - results for Canadian 15-year-olds by gender



A gender gap was found in mathematics in elementary school



Results for reading from PIRLS 2016 and mathematics and science from TIMSS 2019



Provincial results by gender



Girls performed significantly better than boys in reading in all provinces, while the results were more variable for mathematics and science.

	Girls perform significantly better than boys	Boys perform significantly better than girls	No significant difference between girls and boys
Mathematics	NB, PE, NL	BC, MB	AB, SK, ON, QC, NS, CAN
Reading	All provinces, CAN		
Science	SK, QC, NB, NS, NL, CAN	PE	BC, AB, MB, ON

Language of the school system



Students in francophone schools have better mathematics outcomes than their peers in anglophone schools in Canada overall.

Assessment	Achievement gap favouring francophone schools
Elementary (TIMSS 2019)	26 points
Middle school (PCAP 2019)	33 points
High school (PISA 2018)	23 points

Provincial results by language of the school system



Students enrolled in francophone schools achieved higher results in mathematics than those enrolled in anglophone schools. The opposite pattern is seen for reading and science.

	Anglophone schools performed significantly better than francophone schools	Francophone schools performed significantly better than anglophone schools	No significant difference between school systems
Mathematics		BC, SK, QC, NB, CAN	AB, MB, ON, NS
Reading	BC, AB, SK, MB, ON, NB, NS, CAN		QC
Science	BC, AB, SK, MB, ON, NB, NS, CAN		QC

Mathematics results by subdomain



Quebec students scored above the Canadian average in all four sub-domains. In provinces that showed significant differences, French-language school systems showed higher achievement, while gender results were more varied.

Provincial strengths (at or above the Canadian mean)	Language equity	Gender equity
Numbers and operations – AB, ON, QC		AB, SK, MB, QC
Geometry and measurement – ON, QC	NS	AB, ON, QC
Patterns and relationships – AB, ON, QC	AB, MB, ON, QC, NS	SK, MB, ON, QC, NL
Data management and probability – QC		BC, AB, QC, NL

There are significant differences between majority- and minority-language systems



In most provinces with a significant difference between the two systems, students in majority-language schools show higher achievement in reading and science, while students in French-language schools in both majority- and minority-language settings show higher achievement in mathematics.

	Majority-language system performs significantly better	Minority-language system performs significantly better	Equity between language systems
Mathematics	QC	BC, SK, NB, CAN	AB, MB, ON NS
Reading	BC, AB, SK, MB, ON, NB, NS, CAN		QC
Science	BC, AB, SK, MB, ON, NB, NS, CAN		QC

Conclusions

- Overall in Canada, 90 percent of students are achieving at or above the expected level of performance (baseline proficiency) in mathematics.
- 9 percent of Grade 8/Secondary II students are at the highest level of performance in mathematics.
- Girls performed better than boys in reading and science; there is no gender gap in mathematics in Canada overall.

Conclusions (continued)

- In most provinces:
 - French-language school systems have higher achievement in mathematics.
 - English-language school systems have higher achievement in reading and science.
- In mathematics, reading, and science, PCAP data show that student achievement has improved or remained stable across Canada compared to the respective baseline years.

Conclusions (continued)

- The results of this assessment suggest that Canadian provinces are meeting common curricular goals 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 CMEC's large-scale assessment projects offer innovative and contemporary direction on education policy, curriculum, and classroom practices.

PCAP 2019 contextual results



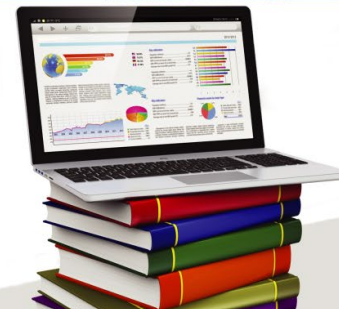
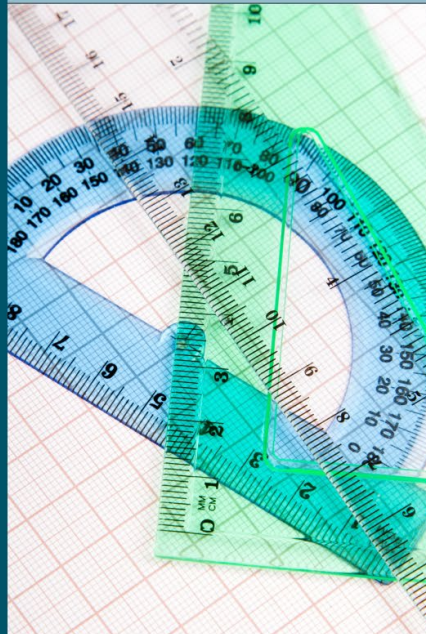
Pan-Canadian Assessment Program

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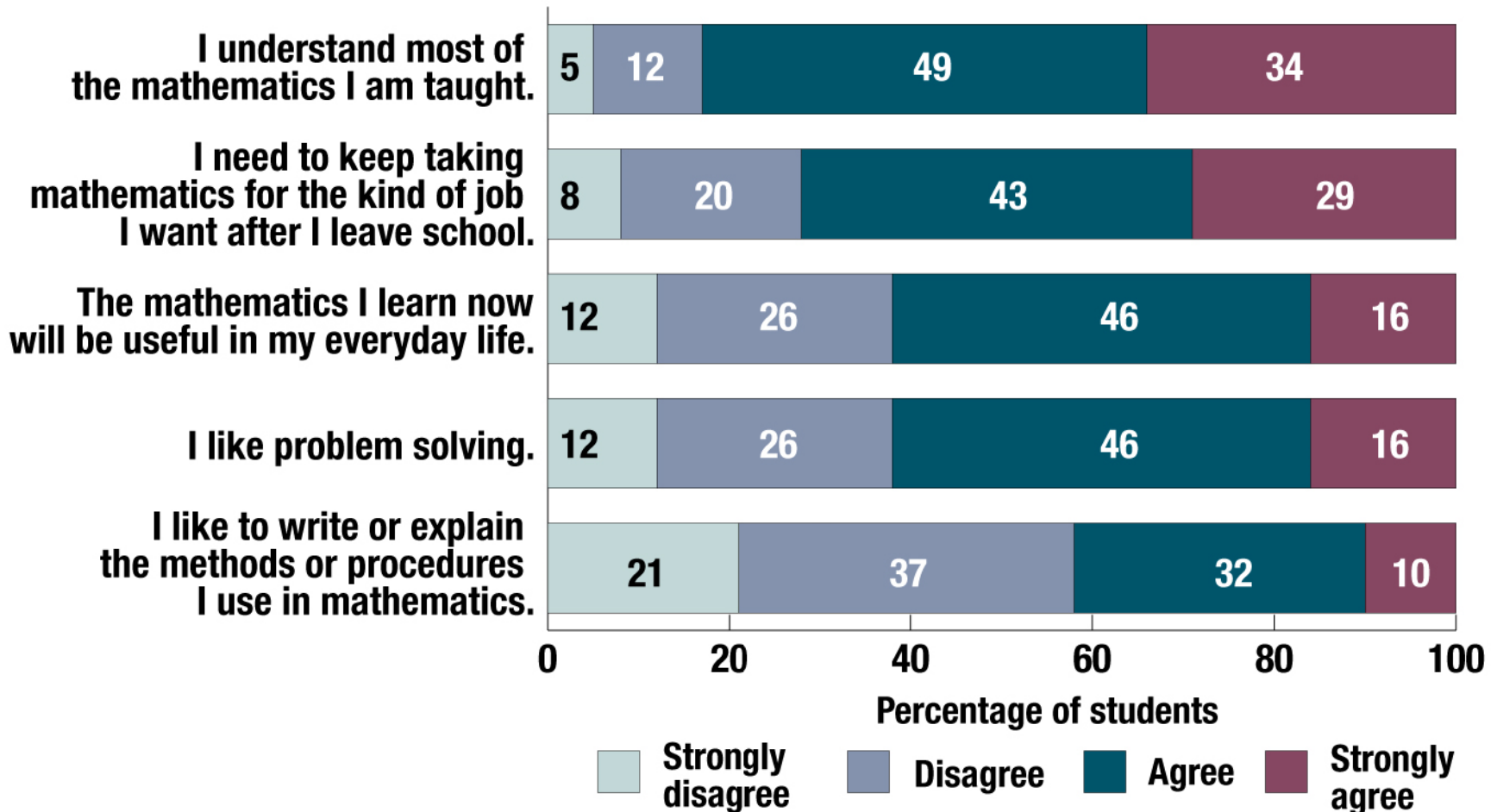
Contextual report on
Student Achievement in Mathematics



Student index: Attitude towards mathematics



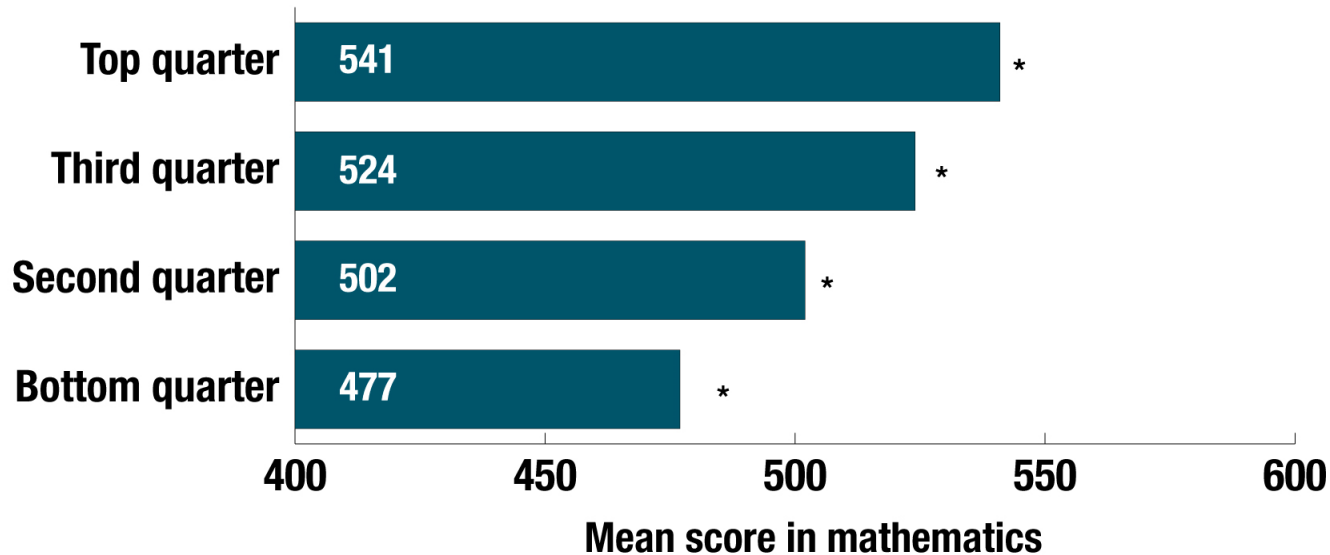
- Some questions that form this index:



Student index: Attitude towards mathematics



- Students who understand their lessons and see value in learning mathematics achieve the highest scores. Ontario students have the most positive attitudes towards mathematics.



* Significant difference compared to the adjacent lower quarter (the bottom quarter is compared to the top quarter)

Above* the Canadian mean	Similar to the Canadian mean	Below* the Canadian mean
ON	AB, SK, MB, NB	BC, QC, NS, PE, NL

* Denotes significant difference

Student index: Activities used to support learning in mathematics



How often do you do the following in your mathematics class?

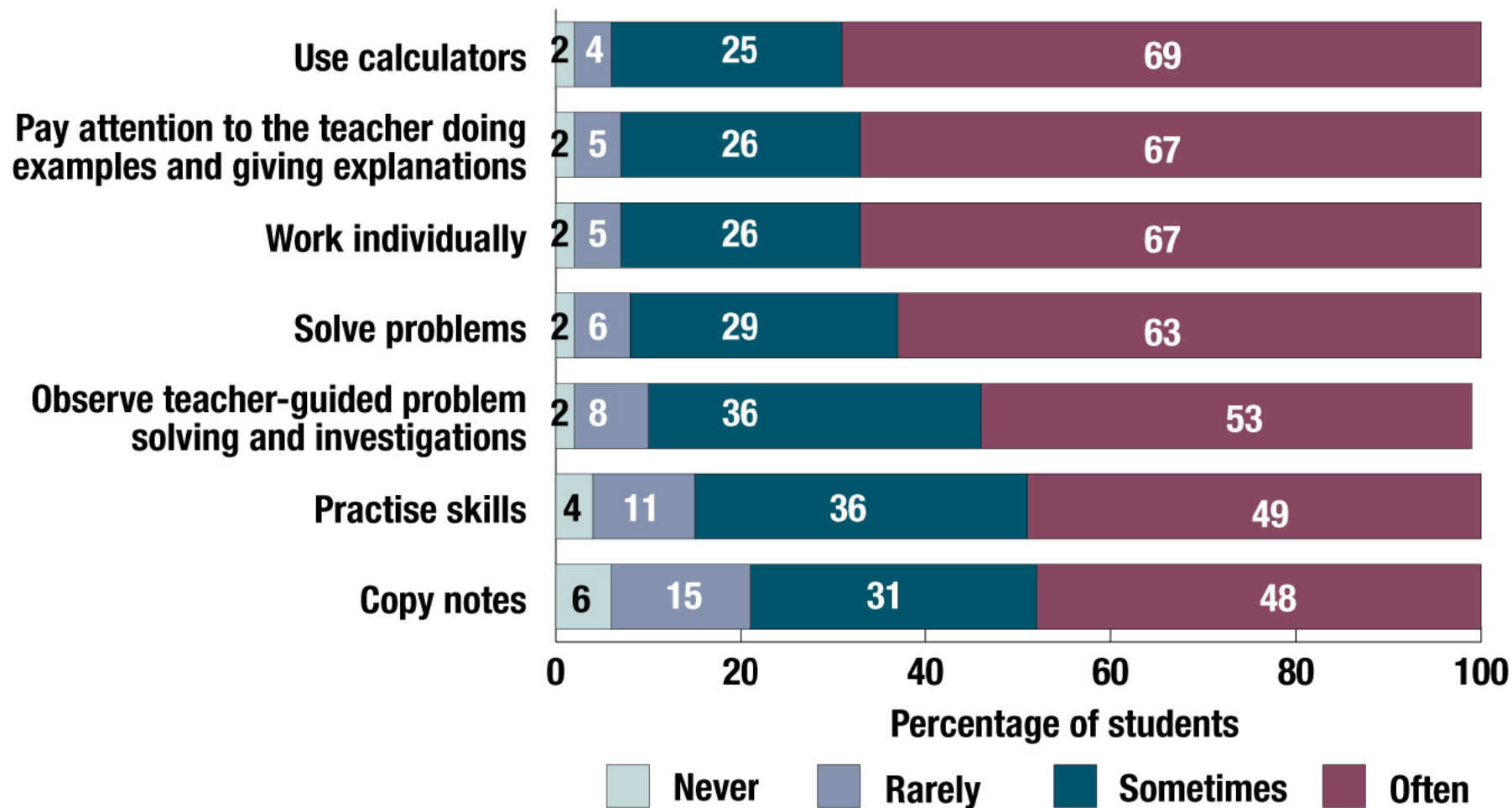
Good correlation with achievement

- Pay attention to the teacher doing examples and giving explanations
- Observe teacher-guided problem solving and investigations
- Solve problems
- Copy notes
- Practise skills
- Work individually
- Use calculators

Weak or no correlation with achievement

- Reflect on what was learned
- Justify your reasoning
- Use an alternative strategy to solve problems
- Create your own mathematical problems
- Work in groups
- Share solutions with others
- Use concrete or virtual manipulatives (e.g., base-ten blocks, colour tiles, geometric solids)
- Use computer software

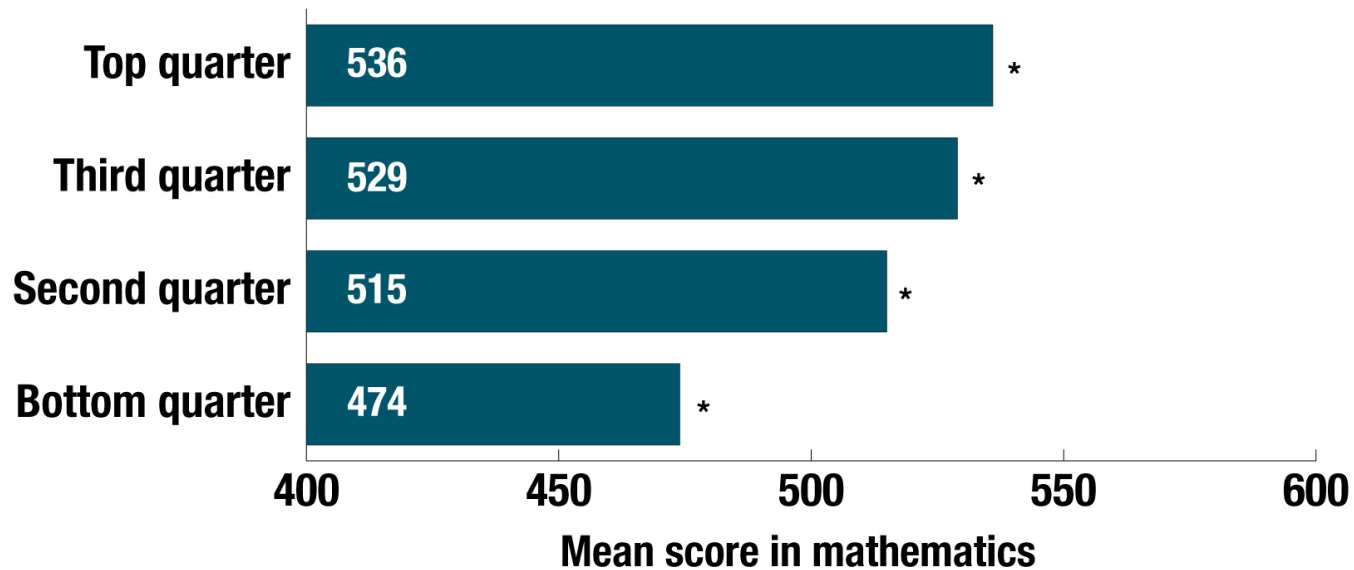
Student index: Activities used to support learning in mathematics



Student index: Activities used to support learning in mathematics



- Higher scores on this index were found for students who often reported their teachers used activities that were considered teacher-directed when teaching mathematics.

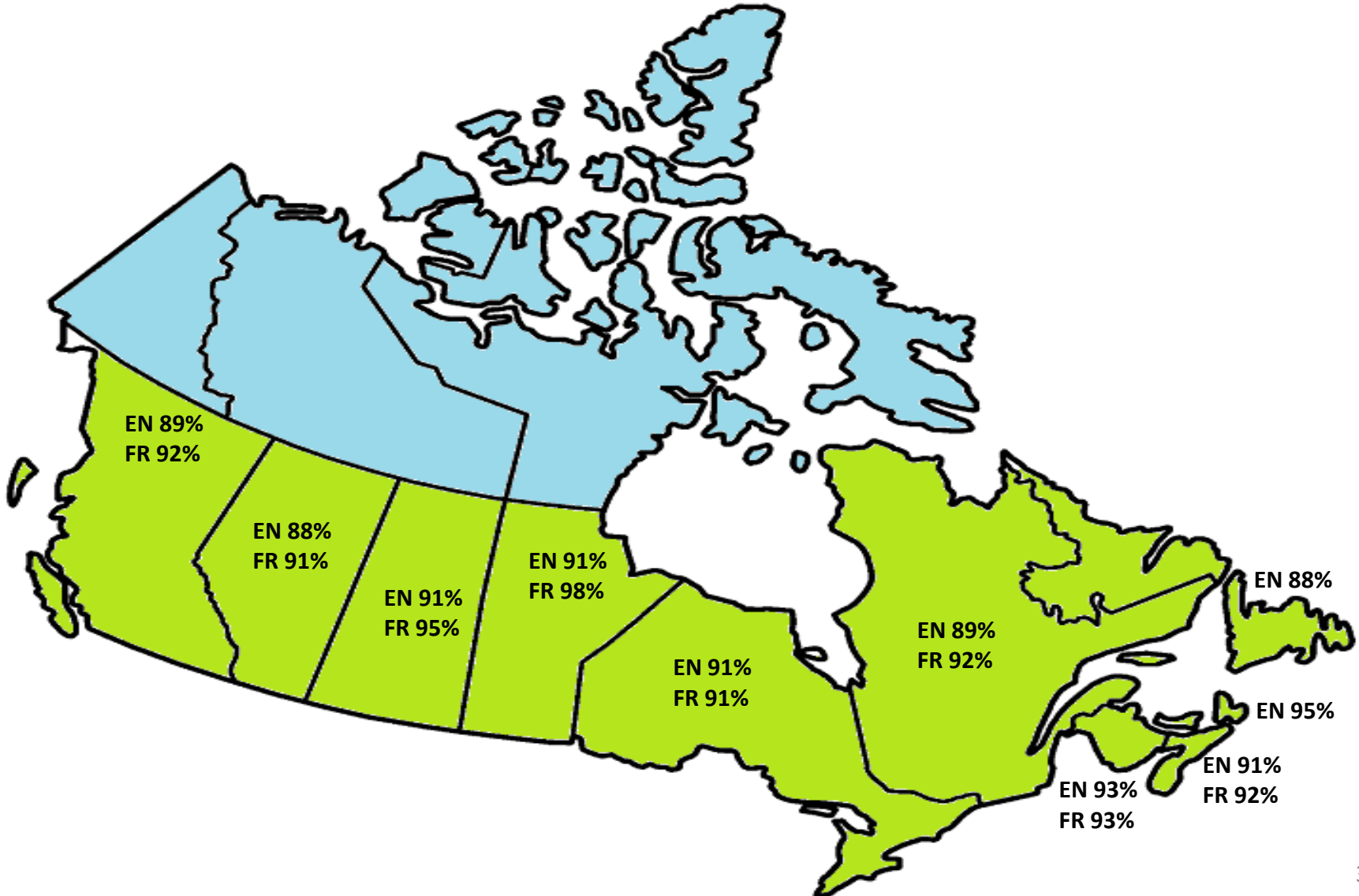


* Significant difference compared to the adjacent lower quarter (the bottom quarter is compared to the top quarter) within each category

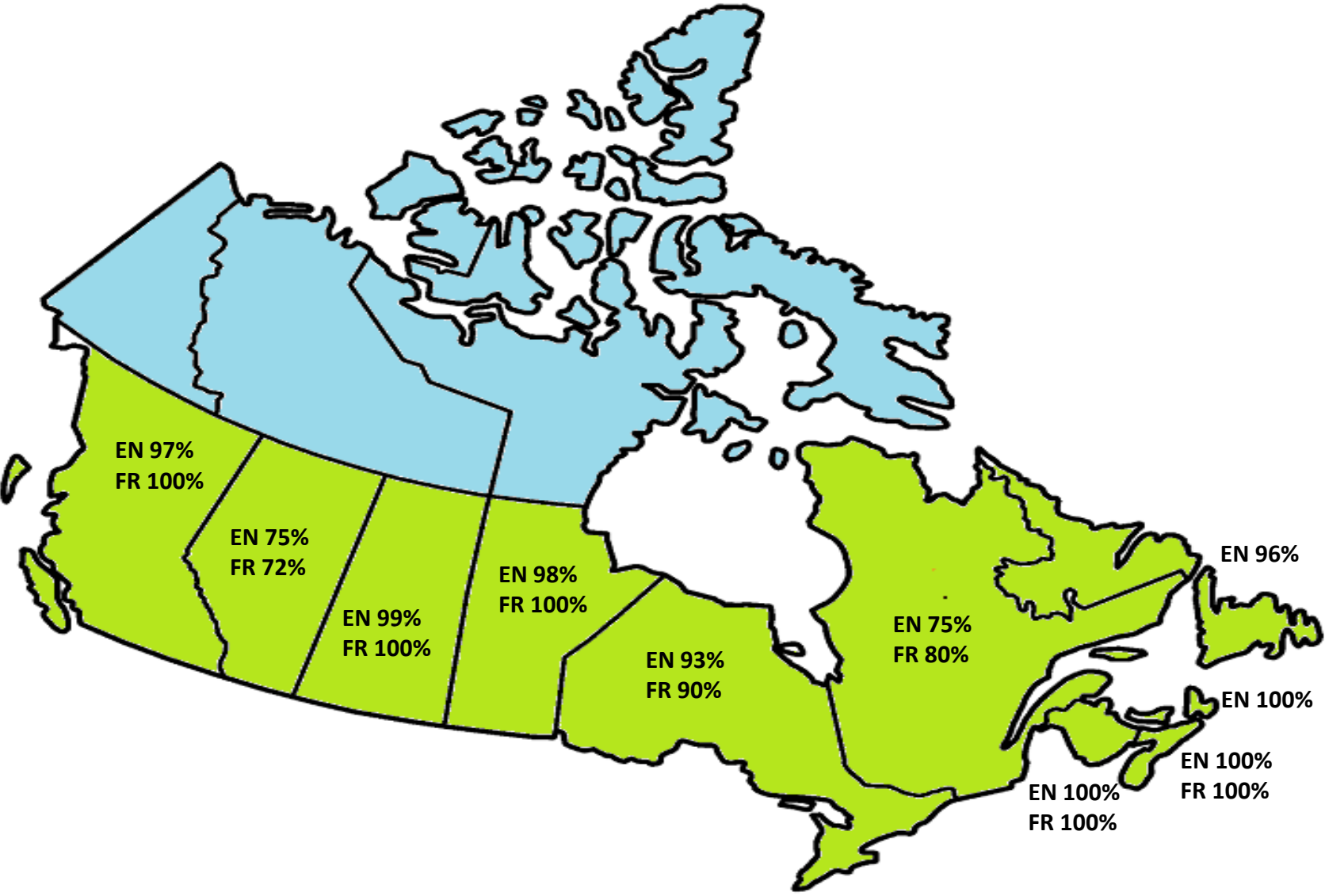
Above* the Canadian mean	Similar to the Canadian mean	Below* the Canadian mean
QC	BC, AB, SK, ON, NS, NL	MB, NB, PE

* Denotes significant difference

Canadian student participation rate: 90.6 percent



Canadian school participation rate: 91.4 percent



Assessment Matters!

In a forthcoming issue of *Assessment Matters!*, a selection of PCAP mathematics items will be released:

- Items will be accompanied by keys or sample student responses and item classification information.
- Performance level descriptors and provincial item data will be included in the issue.

The *Assessment Matters!* series can be found on the CMEC website (<https://cmecc.ca/459/Overview.html>).

- PCAP is designed as a system-level assessment to be used primarily by provincial ministries of education to monitor and assess their respective educational systems.
- PCAP results are reported only at the pan-Canadian and provincial levels, by language of the school system, and by gender. The results are not included in students' academic records, and no results for individual students, schools, or school boards/districts are reported by CMEC.
- Participant responses are confidential and cannot be linked to individual students, teachers, or schools.

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