Pan-Canadian Assessment Program

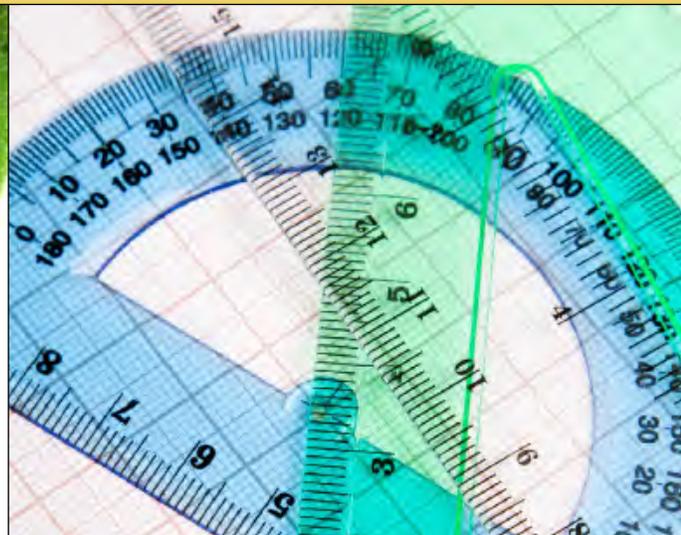# PCAP 2023

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

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Authors

Allison Chapman-Chin, Council of Ministers of Education, Canada
Koffi Houme, Council of Ministers of Education, Canada
Gulam Khan, Council of Ministers of Education, Canada
Ashley Rostamian, Council of Ministers of Education, Canada
Vanja Elez, Council of Ministers of Education, Canada
Danielle Eagleson, Council of Ministers of Education, Canada
Laure Subtil-Smith, Council of Ministers of Education, Canada
Kathryn O'Grady, Progressive Education Research Group Inc.

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Council of Ministers of Education, Canada

Conseil des ministres de l'Éducation (Canada)

The Council of Ministers of Education, Canada (CMEC) was formed in 1967 by the provincial and territorial ministers responsible for education to provide a forum in which they could discuss matters of mutual interest, undertake educational initiatives cooperatively, and represent the interests of the provinces and territories with national educational organizations, the federal government, foreign governments, and international organizations. CMEC is the national voice for education in Canada and, through CMEC, the provinces and territories work collectively on common objectives in a broad range of activities in early childhood education; elementary, secondary, and postsecondary education; and adult learning.

Through the CMEC Secretariat, the Council serves as the organization in which ministries and departments of education undertake cooperatively the activities, projects, and initiatives of particular interest to all provinces and territories. One of the activities on which they cooperate is the development and implementation of pan-Canadian testing based on contemporary research and best practices in the assessment of student achievement in core subjects.

Council of Ministers of Education, Canada
95 St. Clair Avenue West, Suite 1106
Toronto, Ontario M4V 1N6

Telephone: 416-962-8100
E-mail: cmec@cmec.ca
Web: www.cmec.ca

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What is the Pan-Canadian Assessment Program

The Pan-Canadian Assessment Program (PCAP) is a collaborative project that provides data on student achievement in Canadian provinces and territories.[1] It is part of the ongoing commitment of the Council of Ministers of Education, Canada (CMEC) to inform Canadians about how well their education systems are meeting the needs of students and society. Every three years, close to 30,000 Grade 8/Secondary II[2] students from across Canada are assessed with respect to their achievement of the curricular expectations common to all provinces and territories in three core learning domains: science, reading, and mathematics. The information gained from this pan-Canadian assessment provides ministers of education and other stakeholders with a basis for examining their provincial/ territorial curriculum and other aspects of their school systems.

School programs and curricula vary from province to province and from territory to territory across the country, so comparing results in these domains is a complex task. However, young Canadians in different provinces and territories learn many similar skills in science, reading, and mathematics. PCAP has been designed to determine whether students across Canada reach similar levels of performance in these core disciplines at about the same age, and to complement existing provincial/ territorial assessments with comparative Canada-wide data on the achievement levels attained by Grade 8/Secondary II students.

Goals of PCAP

With the establishment of PCAP in 2003, Canada's ministers of education set out the following goals with respect to pan-Canadian educational assessment:

- to inform educational policies that seek to improve approaches to learning;
- to focus on reading, mathematics, and science, with the possibility of including other domains as the need arises;
- to reduce the testing burden on schools through a streamlined administrative process;
- to provide useful background information through the use of complementary context questionnaires for students, teachers, and school administrators; and
- to enable provinces and territories to use both national and international results to validate the results of their own assessment programs, and to improve these programs.[3]

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[1] All 10 provinces have participated in each PCAP administration. The three territories did not participate in PCAP 2023.

[2] PCAP is administered to students in Secondary II in Quebec and Grade 8 in the rest of Canada.

[3] PCAP 2023 results can be compared to those in three international studies: the Progress in International Reading Literacy Study (PIRLS), the Programme for International Student Assessment (PISA), and the Trends in International Mathematics and Science Study (TIMSS). Unlike PCAP, these studies are not aligned with provincial/territorial programs of study. However, the comparisons are useful because the same subjects are assessed, which provides indirect information about the relative progress in performance across grades and ages. PISA is administered in all provinces (with the exception of the first administration, PISA 2000) to the same age cohort of students as PCAP, but two years later. Fewer provinces participate in TIMSS, which assesses Grade 4 and Grade 8/Secondary II students in science and mathematics, and PIRLS, which assesses Grade 4 students in reading.

Development of the assessment

The PCAP assessment cycle

PCAP assessments have been administered every three years, in the spring of the academic year, to students who are in Grade 8/Secondary II. Each assessment cycle collects achievement data, using a cognitive test with a major emphasis on one of the three learning domains — science, reading, or mathematics — and a minor emphasis on the two remaining domains. PCAP also collects a significant range of contextual information (on family, institutional, and community factors) to enhance interpretation of prosperity outcomes (educational attainment, academic achievement, health and well-being, engagement, and social-emotional learning).[4]

Each PCAP assessment includes questions on all three domains, although the focus shifts, as shown in Table I.1. The repetition of the assessments at regular intervals yields timely data that can be compared across provinces and territories, and over time. For the sixth assessment, in 2023, the focus was on science, as it had been in 2013, with reading and mathematics as the minor domains. Note that, after PCAP 2023, the assessment will move from a three-year to a four-year cycle.

TABLE I.1 PCAP assessment schedule

Cycle	Year	Major domain	Minor domains	
	2007	Reading	Mathematics	Science
Cycle 1	2010	Mathematics	Science	Reading
	2013	Science	Reading	Mathematics
	2016	Reading	Mathematics	Science
Cycle 2	2019	Mathematics	Science	Reading
	2023*	Science	Reading	Mathematics
	2027	Reading	Mathematics	Science
Cycle 3	2031	Mathematics	Science	Reading
	2035	Science	Reading	Mathematics

* The administration of PCAP 2022 was delayed until 2023 in response to health concerns related to the global pandemic and to minimize overlap with the Programme for International Student Assessment (PISA), which was delayed one year, from 2021 to 2022.

Development of PCAP frameworks

While school programs differ from one part of the country to another, PCAP is based on curriculum areas that are common to all provinces and territories at the Grade 8/Secondary II level. This focus on common areas allows comparisons of the achievement of students at a comparable point in their schooling, across provinces and territories. *PCAP 2023: Assessment Framework* (CMEC, 2024) describes the theoretical underpinnings, design principles, and performance descriptors that were used to develop test items in each of the three domains for the second cycle of PCAP (2016–2023).

PCAP development began in 2003 with a thorough review of curricula and then-current assessment practices for each of the three target learning domains. All Canadian provinces and territories were consulted, and extensive literature reviews were conducted for each domain. These analyses informed the synthesis of a core of common learning expectations for Canadian Grade 8/ Secondary II students. The resulting common curricular framework for each domain reflected a perspective agreed upon by all provinces and territories, and was informed by the latest pedagogical

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[4] These contextual data and their relationship with the prosperity outcomes will be published in future reports.

research (CMEC, 2005a). The framework document was reviewed and updated in preparation for the second cycle of PCAP; the framework for the major domain is reviewed prior to the beginning of the development for each PCAP assessment.

For each PCAP assessment, the framework document guides the development of assessment units. Units are developed in both official languages, cross-translated, and field tested. *PCAP 2023: Assessment Framework* (CMEC, 2024) describes the theory guiding the construction of PCAP assessments and provides further detail about the design and field testing of questions used in the assessments.

Assessment design

In measuring any complex and integrated set of skills, it is usually best to include a variety of types of items in the assessment, both to allow all students to respond in the manner that best demonstrates their skill attainment and to measure a wide range of the complex skills involved.

In general, the PCAP assessment is designed with units of questions based on a particular context. Each assessment unit presents a context followed by a series of related items. The contexts chosen for assessment units are intended to capture the interests of Canadian Grade 8/Secondary II students and thereby increase their motivation to write the assessment. Contexts are introduced with an opening situation, which could be in the form of a brief narrative and could include fiction or non-fiction reading texts, tables, charts, graphs, or diagrams. For PCAP 2023, developers of the assessment items and the Advisory Panel on Test Fairness ensured that the contexts were developmentally appropriate, free of bias, and not culturally or geographically dependent. Attention was paid to creating a balance of constructed-response and selected-response items, allowing for an efficient use of student testing time. The ratio of selected-response to constructed-response items was approximately 3:1. In developing assessment items, the choice of item format depended on the competency, subdomain, and cognitive level being assessed and the format that best enabled students to demonstrate their proficiency. The PCAP 2023 assessment was administered online.[5]

More details about the assessment design can be found in *PCAP 2023: Assessment Framework* (CMEC, 2024) and the forthcoming *PCAP 2023: Technical Report*.[6]

PCAP contextual questionnaires

Students participating in PCAP, and their teachers and principals, complete questionnaires that are designed to provide the provinces and territories with contextual information to aid in the interpretation of the performance results. Researchers, policy-makers, and practitioners can use the information provided by these questionnaires to help them determine what factors influence learning outcomes.

The contextual questionnaires were revised for PCAP 2023. Previous versions of the PCAP contextual questionnaires were based on an inputs-process-outcomes model (Wang, Haertel, & Walberg, 1993); the revised version is based on the Educational Prosperity framework (Willms, 2018). The key areas of focus in the PCAP contextual questionnaires now include

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[5] PCAP 2019 was the first administration of PCAP online.
[6] *PCAP 2023: Technical Report* will be available on the CMEC website in late 2026.

educational attainment, health and well-being, student engagement, social-emotional learning, family factors, institutional resources, and community supports.

Administering and scoring the assessment

In spring 2023, the PCAP assessment was administered to a random sample of students from across Canada.[7] The selection process occurred in several steps, as shown in Figure I.1. Over 30,000 students from all ten provinces participated in the 2023 PCAP assessment. All participating students answered questions in all three domains. Approximately 24,000 responded in English, and 7,700 in French. The assessment comprised both selected- and constructed-response items. Students' written responses were scored by subject specialists from across Canada, rigorously trained in PCAP assessment protocols. Multiple checks and balances were built in to the assessment process to ensure the reliability of the data collected. Additional information about the design and scoring of PCAP domains can be found in the PCAP 2023 assessment framework (CMEC, 2024) and forthcoming technical report.

FIGURE I.1 Selecting a random sample of Canadian Grade 8/Secondary II students

Randomized school sample	Randomized classroom sample	Randomized test distribution
Random sample of publicly funded schools from each province*	Random selection of a Grade 8/Secondary II classroom within sampled schools**	Random distribution of four different versions of the test among students in the selected classroom
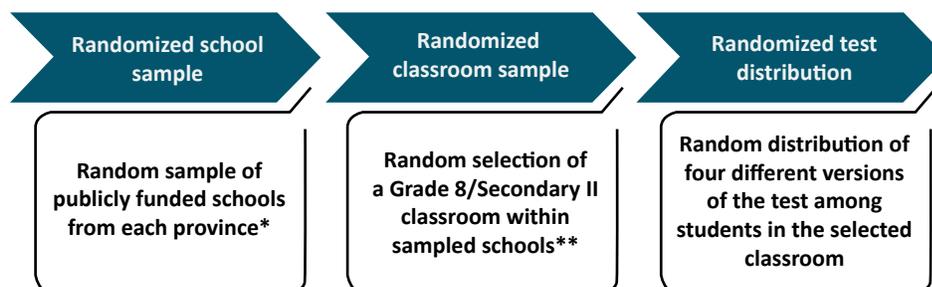
* Provinces provide lists of publicly funded schools. These schools may be public or private.
** In provinces with small school populations, all schools and/or all Grade 8/Secondary II classes meeting the criteria were selected, in order to obtain a sufficient number of participants for a valid sample.

Presentation of PCAP results

Every PCAP report provides data for the three learning domains in the form of average scores. While overall average scores for participating provinces, and their relative rankings compared to the Canadian average scores, are useful indicators of the performance of education systems overall, they do not provide much information about student learning.

To provide a detailed understanding of what students know, understand, and can do, PCAP has developed useful benchmarks or performance levels that align a range of scores to levels of knowledge and skills measured by PCAP as an assessment of learning. For the major domain, which was science in 2023, PCAP used four performances levels, which provide an overall picture of students' accumulated proficiency in science at Grade 8/Secondary II. Performance levels were defined based on what students know, understand, and can do within the science subdomains and competencies. A description of the knowledge and skills characteristic of achievement at each performance level

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[7] Random sampling of schools took place across provinces and/or linguistic groups, except in some cases in which a census of schools was taken. In generating a sample of students to write the assessment, it is necessary to select a large enough number of participants to allow for adequate representation of the population's performance. Here, the word "population" refers to all eligible Grade 8/Secondary II students within a province and/or a linguistic group.

in science can be found in Table 1.2 in Chapter 1. Note that, in this report, results by performance levels are reported only for the overall domain of science. Results by average scores are reported for science overall and the science subdomains and competencies.

The achievement results in the minor subject domains (reading and mathematics, in 2023) are reported only as overall average scores. Together, these two minor domains constituted approximately one-third of the items in the assessment. Because students responded to a smaller subset of items for the two minor subject areas, their results by subdomain and performance level are not reported.

PCAP results are weighted based on population size — provinces with a larger population have a greater weight. This weighting has implications for the average scores: because English-language students from Ontario and French-language students from Quebec contribute the greatest number of assessment results, their average scores are more likely than those of any other population to be closest to the Canadian English average and Canadian French average, respectively.

The actual results from the students' assessments are called "raw scores." The raw scores are converted to a scale, which has a range of 0 to 1000. These raw scores are standardized, providing a common measurement so that meaningful comparisons can be made of scores obtained from different populations over time and on different versions of the assessment.

The standardized scale used for PCAP assessments places scores on a normal distribution with a midpoint or average of 500 and a standard deviation of 100. The scale midpoint of 500 is equal to the pan-Canadian average for each subject in the baseline year.[8] The majority of students in Canada — about two-thirds — will score between 400 and 600, or within one standard deviation of the average. This average can then be used as a reference point that allows the comparison of Canada-wide results.

Large-scale studies such as PCAP summarize student performance by comparing the relative standing of Canada and provinces based on their average scores. This approach can be misleading, because there is a margin of error associated with each score (see the box below on statistical comparisons). When interpreting average performance across Canada and provinces, only those differences that are statistically significant should be taken into account.

A note on statistical comparisons

The purpose of PCAP is to report results on the knowledge and skills of Grade 8/Secondary II students in Canada. A two-stage sampling procedure was followed, as described in Appendix A. The sample size must be large enough to produce reliable estimates that would be generalizable to Canada and individual provinces. In some provinces, in order for the PCAP results to be representative of the population — whether of a province or a linguistic group — a census of schools and/or of students was used.

The averages (for average scores and performance-level percentages) were computed from random samples of students and not from the overall population of students. Consequently, it cannot be said with certainty that a sample average has the same value as the population

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[8] The "baseline year" is the first year in which the domain was the major domain assessed (2007 for reading, 2010 for mathematics, and 2013 for science).

average that would have been obtained had all Grade 8/Secondary II students been assessed. Additionally, a degree of error is associated with the achievement scores, as these scores are estimated based on student responses to test items. A statistic called the standard error is used to express the degree of uncertainty associated with sampling and measurement error.

When comparing scores among provinces or population subgroups, the degree of error in each average should be considered in order to determine whether averages are significantly different from each other. Standard errors and confidence intervals may be used as the basis for performing these comparative statistical tests. Such tests can identify, with a known probability, whether there are actual differences in the populations being compared.

For example, when an observed difference is significant at the .05 level, it implies that the probability is less than .05 that the observed difference could have occurred because of sampling or measurement error. When comparing provinces — or countries, in international assessments — extensive use is made of this type of statistical test in order to reduce the likelihood that differences due to sampling or measurement errors will be interpreted as real.

For comparisons in this report, a test of significance (the t-test, with the use of Bonferroni adjustments for multiple comparisons to reduce the false positive, or Type-I error rate) was conducted in order to determine whether differences were statistically significant.

Unless otherwise stated, only statistically significant differences at the .05 level are noted in this report for the percentage of students at each proficiency level and for average scores.

It is worth noting that, in PCAP 2023, some very small differences were found to be statistically significant. This is due to the inverse relationship between the test of significance and the standard error of the difference (DiffSE). The smaller the DiffSE, the greater the likelihood that the test of significance will be statistically significant. Conversely, the larger the DiffSE, the greater the likelihood that the test of significance will be non-significant. In all the PCAP 2023 results, the associated DiffSEs were very small, hence the statistically significant results. It is important to note that statistical significance does not necessarily translate into a practical significance. The latter is generally assessed using the effect size statistic, the most common being Cohen's d. Cohen's d values of .2 and .8 are generally considered small and large effect size, respectively. While Cohen's d values are not provided in this report, the effect size is negligible for the applicable results (i.e., very small differences found to be statistically significant).

Note: Due to rounding of the scores and percentages presented in this report, scores and differences may not add up precisely, and percentages may not precisely represent the absolute unrounded values and add up to 100.

Comparisons of results by language of the school system

Caution is advised when comparing achievement results for English- and French-language groups, even though assessment instruments were prepared collaboratively with due regard for equity with respect to both groups. Every language has unique features that are not readily comparable. While the cognitive items, performance descriptors, scoring guides, and processes in PCAP 2023 were judged equivalent in English and French, pedagogical, cultural, and geographical differences related to differences in language structure and use render direct

comparisons between language groups inherently difficult, and any such comparisons should be made with caution. Note that, within English-language school systems, results for students in French immersion programs are reported with those of the English-language cohort.

Interpretation of results for small populations

In PCAP 2023, Statistics Canada was contracted to provide survey weights to ensure that the sampled students represented the number of students in the full PCAP population. Replicate weights were also included to estimate sampling variance, a process that is used in international large-scale assessments. Unlike simple random sampling, replicate weights account for stratification within the random sample. If a census of schools was taken within a province or a linguistic group, the sampling variance in most cases resulted in zero, which means the final student weight and the replicate weight are identical, since all schools were selected as part of the first stage of sampling. This may have resulted in standard errors of 0.0 for the following small populations: both language groups in New Brunswick and Prince Edward Island, and the French-language school systems in British Columbia and Saskatchewan. Despite the lack of sampling variance at the school level for these populations, caution is nonetheless advised when interpreting statistically significant differences of student-level results when such differences are small, as not every student was selected within each school to take the assessment.

Reporting by language

For all three domains, results are presented by language of the school system, and by majority- and minority-language systems. The results obtained from students educated in the francophone school systems of their respective provinces are reported as "French." The results obtained from students educated in the anglophone school systems of their respective provinces are reported as "English." Within anglophone school systems, although students in French immersion programs could, at the discretion of the school, complete the PCAP assessment in either English or French, their results are reported with those of the English-language cohort. A resource listing common science and mathematics terms in English and French was provided to all students.

There is one main difference between the results presented by language of the school system and those presented by majority- and minority-language systems. With regard to the former, the Canadian average for English-language school systems is calculated from all English-language school systems across Canada, including the English-language school system in Quebec; similarly, the Canadian average for French-language school systems is calculated from all French-language school systems across Canada, including the French-language school system in Quebec. In contrast, the Canadian average for majority-language systems is calculated from all the English-language school systems across Canada with the exception of Quebec, where the majority-language system is the French-language school system; similarly, the Canadian average for minority-language systems is calculated from all the French-language school systems across Canada with the exception of Quebec, where the minority-language system is the English-language school system.

PCAP samples are representative of both official language groups in all provinces, with the exception of Prince Edward Island and Newfoundland and Labrador. Thus, eight provinces have results disaggregated by language and have sufficient numbers for valid statistical comparisons. Prince

Edward Island and Newfoundland and Labrador did not oversample by language; consequently, results for only English-language school systems and majority-language systems are reported for these two provinces.

Reporting PCAP achievement over time

One of the strengths of PCAP is its measurement of changes over time in student achievement. The PCAP achievement scales provide a common metric on which provinces can compare students' progress at the Grade 8/Secondary II level in the three core subjects from one assessment year to another. Items that were administered in the baseline years, known as "anchor items," provide the basis for linking the assessment results. Such links enable provinces to have comparable achievement data from 2007, 2010, 2013, 2016, 2019, and 2023 and to analyze changes in achievement over time.

Applications of PCAP data

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. They are not included in students' academic records, and no results for individual students, schools, or school boards/districts are reported by CMEC.

The goal of national (and international) large-scale assessments is to provide reliable information about academic achievement and insight into contextual factors influencing it. The data from studies such as PCAP provide policy-makers, administrators, teachers, and researchers with meaningful insights into the functioning of education systems and how they might be improved.

Although public attention is often focused on the results of large-scale, standardized assessments, research suggests that valid and reliable classroom assessments used by teachers in their daily practice also provide powerful tools to improve student achievement (Olson, 2002). Therefore, it is important to recognize the important roles of both classroom assessments (formative and summative) and larger-scale assessments such as PCAP in providing valuable information about student learning. Table I.2 summarizes the similarities and differences between large-scale and classroom assessments.

TABLE I.2 Comparison of large-scale and classroom assessments

Large-scale assessment	Classroom assessment
Summative assessment	Program of formative and summative assessments
Standardized procedures; can be randomly administered	Multiple modes and instances of assessment adapted to student learning needs
Supports analysis of education systems	Supports and assesses the learning of individual students
Fosters system accountability	Provides educators and students with immediate, context-specific feedback on learning
Differentiates by student achievement	Differentiates by student achievement, learning needs, and strengths

Organization of this report

This report provides initial results from the PCAP 2023 assessment for Canada overall and for the ten provinces. It presents the pan-Canadian and provincial results in science, reading, and mathematics, and it also offers comparative results among provinces, and between Canada and individual provinces.

Chapter 1 presents information on science, the primary focus of PCAP 2023. It explains the domain as well as the subdomains and competencies that constitute the PCAP assessment of science and describes the four performance levels that broadly classify achievement as expected (Level 2), below expected (Level 1), and above expected (Levels 3 and 4) for students in Grade 8/Secondary II. This chapter presents science achievement by performance level, with comparisons by province, language, and gender. It also reports on science achievement by overall average score as well as average scores in the subdomains and competencies. Finally, it presents changes in average scores compared to the baseline year of 2013, the first year in which science was the primary focus of the assessment. Comparisons over time by province, language, and gender are also presented.

Chapters 2 and 3 present achievement outcomes in reading and mathematics, the two minor domains assessed in 2023. For these minor domains, only data on average scores are reported. The chapters present comparisons among provinces as well as changes in achievement over time compared to the respective baseline years. Data are presented by province, language, and gender.

Chapter 4 provides background information on each province. Specifically, it presents social and organizational contexts for each province's public education system, and an overview of how the province approaches curriculum in the major domain as well as its approach to assessment.

Major findings are summarized in the Conclusion. Finally, Appendix A includes details on sampling and response rates, while Appendix B comprises tables with detailed data underpinning the findings discussed in this report.

1 SCIENCE ASSESSMENT

This chapter describes the conceptual framework of the science component of PCAP and presents the results of the PCAP 2023 science assessment. The framework is informed by past national science curriculum initiatives of CMEC, historical and current theoretical perspectives in science education, and provincial and territorial science curricula (CMEC, 2005a).

The primary domain: science

Scientific literacy, as defined for the PCAP 2023 assessment, builds upon other CMEC initiatives in Canadian science education: a literature review of Canadian Grade 8/Secondary II science curricula (CMEC, 2005a); the School Achievement Indicators Program (SAIP) Science assessments (CMEC, 1996, 2005b); and the *Common Framework of Science Learning Outcomes, K to 12* (CMEC, 1997).

> The PCAP 2023 assessment framework defines "scientific literacy" as "a student's evolving competencies of understanding the nature of science using science-related attitudes, skills, and knowledge to conduct inquiries, to solve problems, and to reason scientifically in order to understand and make evidence-based decisions about science-related issues" (CMEC, 2024, p. 13).

Science curricula in Canadian provinces aim to develop students' understanding of three competencies — scientific inquiry, proficiency in problem solving, and skills associated with scientific reasoning — enabling students to apply these competencies to real-world situations and familiar problems. For PCAP assessment purposes, the domain of science is divided into these competencies as well as four subdomains (the nature of sciences, life sciences, physical sciences, and Earth sciences). As illustrated in Figure 1.1, the subdomains intersect with each other, and the competencies are interwoven through the subdomains. A detailed description of the science domain, subdomains, and competencies is provided in Chapter 2 of *PCAP 2023: Assessment Framework* (CMEC, 2024).

FIGURE 1.1 PCAP science assessment framework

Nature of sciences

Life sciences

Competencies:
Scientific inquiry
Problem solving
Scientific reasoning

Earth sciences

Physical sciences
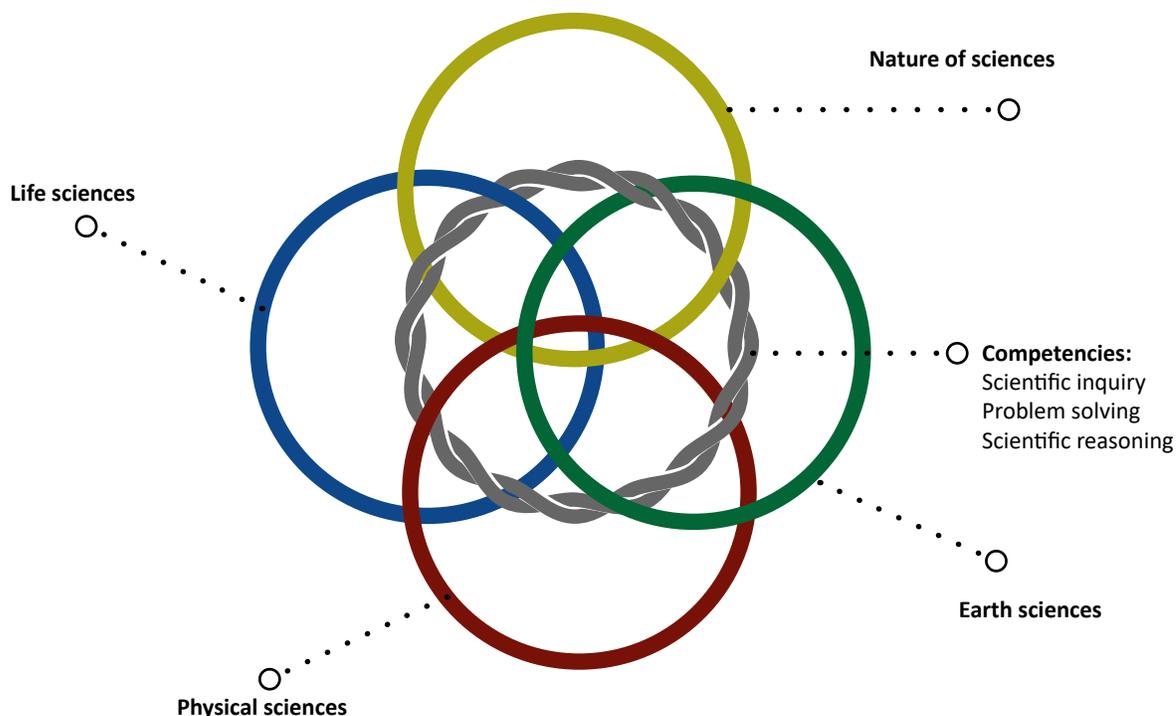
Table 1.1 shows the percentage of items devoted to each competency and subdomain in the PCAP science assessment.

TABLE 1.1 Distribution of competencies and subdomains in PCAP science

		Percentage of items
Competencies	Scientific inquiry	30–40%
	Problem solving	15–25%
	Scientific reasoning	40–50%
Subdomains	Nature of sciences	20–30%
	Life sciences	20–30%
	Physical sciences	20–30%
	Earth sciences	15–25%

Results in science

This chapter presents the results of student performance in the PCAP 2023 science assessment in two ways: as the percentage of students attaining each of the four performance levels and as average scores. It presents results at the pan-Canadian level and by province, both for science overall and for each of its subdomains and competencies. Results are also compared by language and gender. Given that the 2023 assessment marks the second time that PCAP assessed science as a major domain (the first time was in 2013), this chapter also discusses changes in science performance over time.

Results in science by performance level

In reporting levels of performance in science, PCAP provides an overall picture of students' accumulated understanding in this domain by the end of Grade 8/Secondary II. The assessment categorizes results according to four levels of performance. Table 1.2 provides a description of these four performance levels, summarizing the knowledge and skills that characterize the achievement of students at each level.[9] Students classified at a given performance level are assumed to be able to perform most of the tasks at that level as well as those at the lower levels, if any. Based on pan-Canadian curriculum expectations in science, the expected level of performance of Grade 8/Secondary II students is Level 2.

TABLE 1.2 PCAP 2023 science performance levels

Level 4 – Scores above 614
Students at this level were able to: • demonstrate advanced scientific inquiry skills in complex contexts • interpret scientific experiments and draw valid conclusions • design scientifically valid experiments • evaluate and modify procedures and variables to improve experiments • verify and validate information • interpret information from multiple sources, which can include diagrams, graphs, tables, and texts, and use this information to explain scientific or natural phenomena • identify, analyze, and interpret patterns in data from various sources and use the data to explain scientific or natural phenomena (e.g., changes in weather and climate) • communicate their reasoning when solving problems • demonstrate detailed knowledge of various living things • demonstrate a thorough understanding of physical properties of different states of matter
Level 3 – Scores from 529 to 614
Students at this level were able to: • demonstrate strong scientific inquiry skills • recognize the importance of accuracy and replicability in scientific inquiry • select, combine, and interpret information from various sources, which can include diagrams, graphs, tables, and texts • make and evaluate hypotheses, identify trends, and draw conclusions from observations and data • evaluate investigations and demonstrate an understanding of the importance of variables to the results of an experiment • analyze data and use their analysis to construct evidence-based arguments and explanations • solve problems in a given context using two or more sources of information • identify differences in plant and animal cells • identify and interpret patterns in climate data • apply their understanding of the physical properties of matter to make comparisons and predictions • demonstrate a strong understanding of the causes and effects of erosion, and apply this knowledge to related experiments

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[9] The performance levels were updated using the Bookmark standard-setting method (see Lewis et al., 2012) at the 2023 Standard-Setting Session.

TABLE 1.2 PCAP 2023 science performance levels (cont'd)

Level 2 – Scores from 382 to 528

Students at this level were able to:
- identify good scientific inquiry practices
- demonstrate an understanding of what is required for a scientifically valid experiment, identify variables, and use data and/or their scientific knowledge to make suggestions for further investigations
- state and test a hypothesis in a simple experiment
- use observations or other data sources (e.g., pictorial diagrams, data tables) to support given statements or to draw direct conclusions
- make connections using scientific knowledge in specific contexts, drawing on more than one source of information
- select and apply simple problem-solving strategies
- demonstrate an understanding of various interactions between living organisms and their environment
- identify ways to meet the essential needs of life
- identify states of matter, and use the particle theory of matter to explain changes in states
- demonstrate an understanding of some ways in which their actions affect the environment
- demonstrate an understanding of the causes and effects of erosion

Level 1 – Scores below 382

Students at this level were able to:
- apply basic scientific knowledge to practical situations
- provide simple explanations in scientific contexts
- use direct reasoning to draw a single conclusion from one source of information
- identify direct relationships, make direct observations, and develop literal interpretations of the results of an experiment from simple data
- identify some aspects of the relationships between organisms
- identify some of the essential needs of life
- demonstrate an understanding that temperature has an effect on the movement of particles and on the states of matter
- interpret simple climate data

An example of a PCAP science unit showing student responses and the types of knowledge and skills required at each performance level can be found in the PCAP 2013 public report (O'Grady & Houme, 2014, pp. 33–35). A more comprehensive set of sample items is available in issue 8 of *Assessment Matters! PCAP 2013: Science Resources for Teachers.*[10]

In PCAP 2023, 89 percent of Grade 8/Secondary II students in Canada performed at or above Level 2 in science. Across the provinces, the results ranged from 80 percent in New Brunswick (French-language school system) to 91 percent in Alberta and Ontario (Figure 1.2; Appendices B.1.1, B.1.2). Table 1.3 compares the Canadian and provincial percentages of students meeting or exceeding the expected level of performance (Appendix B.1.1). In British Columbia, Alberta, Saskatchewan, and Quebec, the percentage of students achieving Level 2 or above was similar to the Canadian result. By contrast, in Ontario, the percentage was higher than the Canadian result. In all remaining provinces, the percentage of students achieving Level 2 or above was lower than the Canadian result.

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[10] *Assessment Matters!* is a series of articles and research notes available on the CMEC website, at https://cmec.ca/459/Overview.html.

FIGURE 1.2 Canadian and provincial percentages of students at each performance level in science

	Level 1	Level 2	Level 3	Level 4
BC	13	49	26	12
AB	9	45	31	15
SK	17	53	22	8
MB	17	53	22	8
ON	9	47	29	15
QC	12	54	25	9
NB (EN)	19	53	22	6
NB (FR)	20	58	18	4
NS	15	52	23	9
PE	13	55	25	8
NL	17	52	23	8
CAN	11	49	27	12
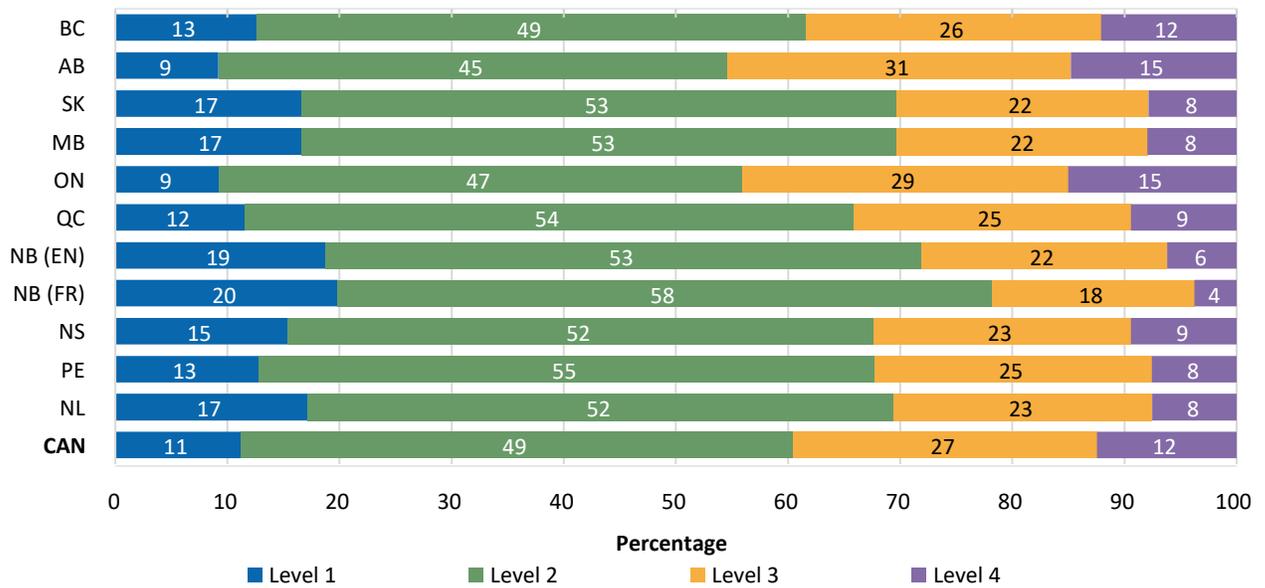
TABLE 1.3 Comparison of Canadian and provincial results in science by percentage of students achieving Level 2 or above

Canada and provinces	%	Standard error	Percentage of students achieving Level 2 or above not significantly different
British Columbia	87	0.7	Alberta, Saskatchewan, Ontario, Quebec, Nova Scotia, Prince Edward Island, **Canada**
Alberta	91	1.3	British Columbia, Ontario, Quebec, Prince Edward Island, **Canada**
Saskatchewan	83	1.0	British Columbia, Manitoba, Quebec, New Brunswick (EN and FR), Nova Scotia, Prince Edward Island, Newfoundland and Labrador, **Canada**
Manitoba	83	0.6	Saskatchewan, New Brunswick (EN and FR), Nova Scotia, Newfoundland and Labrador
Ontario	91	0.7	British Columbia, Alberta, Quebec
Quebec	88	0.8	British Columbia, Alberta, Saskatchewan, Ontario, Prince Edward Island, **Canada**
New Brunswick (EN)	81	0.0	Saskatchewan, Manitoba, New Brunswick (FR)
New Brunswick (FR)	80	0.3	Saskatchewan, Manitoba, New Brunswick (EN)
Nova Scotia	85	0.2	British Columbia, Saskatchewan, Manitoba
Prince Edward Island	87	0.0	British Columbia, Alberta, Saskatchewan, Quebec
Newfoundland and Labrador	83	0.1	Saskatchewan, Manitoba
Canada	**89**	**0.4**	British Columbia, Alberta, Saskatchewan, Quebec

Note: Comparisons are adjusted using the Bonferroni correction as follows: (p <.0009, t-value = 3.32) for multicomparisons among the provinces, and (p <.0045, t-value = 2.84) for those between each province and Canada.

At the higher end of the PCAP scale, 12 percent of Canadian students performed at Level 4. Among the provinces, the percentage of students achieving this level was greater than the Canadian result in Ontario, and similar to the Canadian result in British Columbia and Alberta. All remaining provinces had a lower percentage of students achieving Level 4 compared to the Canadian result (Figure 1.2, Appendix B.1.2).

Overall, the distribution of science proficiency by performance level follows patterns similar to those observed in science among Canadian students in the TIMSS 2019 and PISA 2022 assessments. TIMSS uses five international benchmarks to show the range of students' performance in science. In TIMSS 2019, the minimum proficiency level (low benchmark) was reached by 95 percent of Canadian students, while 37 percent of Canadian students reached the high benchmark (O'Grady, Rostamian, et al., 2021). Although PISA uses a more complex model of performance for science than PCAP or TIMSS, with seven levels of achievement, Level 2 in both PCAP and PISA is considered the expected level of performance, or the level that is required to participate fully in modern society (OECD, 2023). In PISA 2022, 85 percent of Canadian students reached the expected level of achievement, while 12 percent achieved the highest levels of proficiency (Levels 5 and 6) (Elez et al., 2023).

Results in science by average score

PCAP 2023 average scores in science are reported on the PCAP scale, which has a range of 0 to 1000. In the baseline year for science (2013), the Canadian average was set at 500, with a standard deviation of 100. To facilitate direct comparisons over time, the Canadian average has not been rescaled to 500 following the baseline year.

Figure 1.3 provides the average scores in science for all provinces and indicates which results differ statistically from the Canadian average score (Appendix B.1.3). In PCAP 2023, the Canadian average for science was 501, with a standard error of 1.7. The box on statistical comparison in the Introduction provides additional information on interpreting results. Students in British Columbia achieved results that were statistically similar to the Canadian average, while students in Alberta and Ontario had results that were above the Canadian average. Students in all other provinces achieved results below the Canadian average.

FIGURE 1.3 Canadian and provincial average scores in science
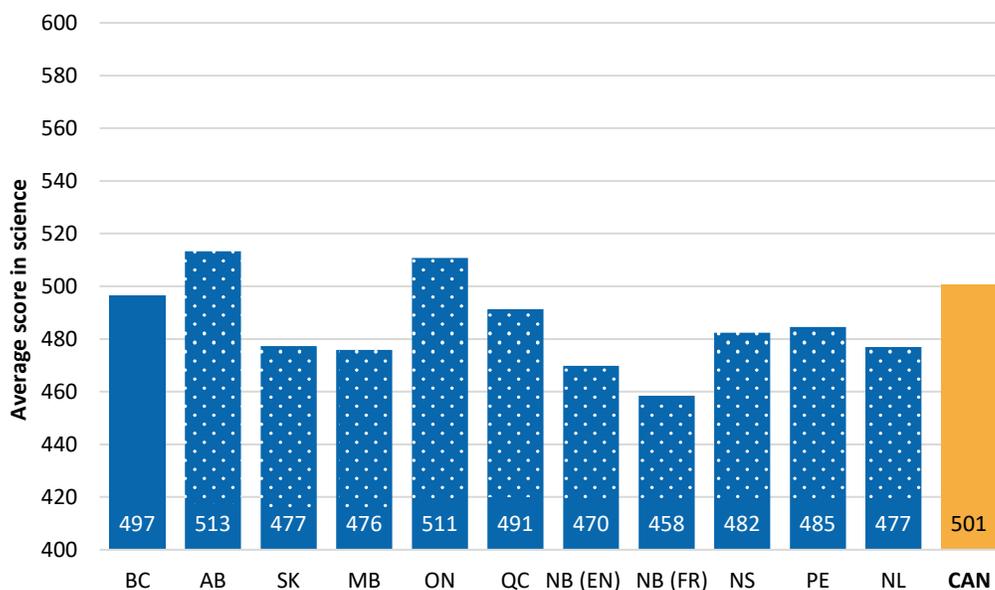
Note: Dotted bars denote significant difference compared to Canada

Comparisons of science achievement by average score can be found in Table 1.4 (Appendices B.1.3, B.1.4). (To read the chart, choose a province from the left-hand column. Read across the row to compare its average score with that of a specific province or Canada overall, as listed along the top of the chart. The symbols indicate whether a province's average score is above, below, or similar to that of the comparison province or Canada.)

TABLE 1.4 Comparison of average scores in science, among provinces and with Canada

Canada and provinces	Average score	Standard error	BC	AB	SK	MB	ON	QC	NB (EN)	NB (FR)	NS	PE	NL	CAN
BC	497	3.0		o	▲	▲	o	o	▲	▲	▲	o	▲	o
AB	513	4.3	o		▲	▲	o	o	▲	▲	▲	▲	▲	▲
SK	477	2.8	▼	▼		o	▼	o	o	▲	o	o	o	▼
MB	476	1.9	▼	▼	o		▼	o	o	▲	o	▼	o	▼
ON	511	3.3	o	o	▲	▲		o	▲	▲	▲	▲	▲	▲
QC	491	3.7	o	o	o	o	o		▲	▲	o	o	o	▼
NB (EN)	470	0.0	▼	▼	o	o	▼	▼		▲	▼	▼	▼	▼
NB (FR)	458	0.8	▼	▼	▼	▼	▼	▼	▼		▼	▼	▼	▼
NS	482	0.6	▼	▼	o	o	▼	o	▲	▲		o	▲	▼
PE	485	0.0	o	▼	o	▲	▼	o	▲	▲	o		▲	▼
NL	477	0.5	▼	▼	o	o	▼	o	▲	▲	▼	▼		▼
CAN	**501**	**1.7**	o	▼	▲	▲	▼	▲	▲	▲	▲	▲	▲	

Note: Comparisons are adjusted using the Bonferroni correction as follows: ($p <.0009$, t-value = 3.32) for multicomparisons among the provinces, and ($p <.0045$, t-value = 2.84) for those between each province and Canada.

▲   Average score significantly higher than that of comparison province or Canada

o   Average score not significantly different from that of comparison province or Canada

▼   Average score significantly lower than that of comparison province or Canada

Results in science subdomains by average score

This section reports on Canadian results for the four subdomains of science: the nature of sciences, life sciences, physical sciences, and Earth sciences. As was the case for the overall science score, the average score for each subdomain was set at 500 in the baseline year in 2013, with a standard deviation of 100. To facilitate direct comparisons over time, the Canadian average for each subdomain has not been rescaled to 500 subsequent years.

An investigation into student achievement scores by subdomain enables a fuller understanding of students' overall science literacy. As a result, this level of analysis may help inform policy-level discussion, curricular emphasis, and/or teaching practice. The Canadian averages for the four science subdomains are shown in Figure 1.4 (Appendix B.1.5). At the pan-Canadian level, students achieved the highest scores in the nature of sciences subdomain (Appendix. B.1.6).

FIGURE 1.4 Canadian average scores in science subdomains
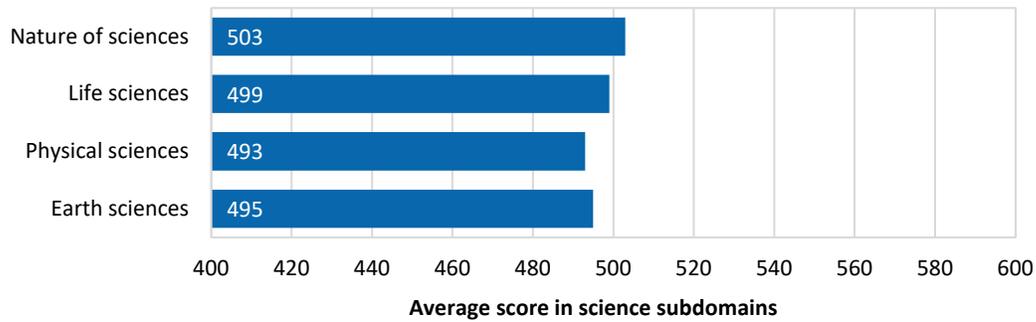
Figure 1.5 and Table 1.5 present a comparison of Canadian and provincial average scores in the four science subdomains. Ontario students scored above the Canadian average in the nature of sciences, life sciences, and physical sciences, while Alberta students scored above the Canadian average in life sciences and Earth sciences. British Columbia students scored at the Canadian average in all four subdomains. Alberta and Quebec students scored at the Canadian average for two of the subdomains (the nature of sciences and physical sciences in Alberta; physical sciences and Earth sciences in Quebec), and Ontario students scored at the Canadian average for one of the subdomains (Earth sciences). The results in the remaining provinces were below the Canadian average in each subdomain (Appendix B.1.5).

FIGURE 1.5 Canadian and provincial average scores in science subdomains

Average score in science subdomains

■ Nature of sciences   ■ Life sciences   ■ Physical sciences   ■ Earth sciences
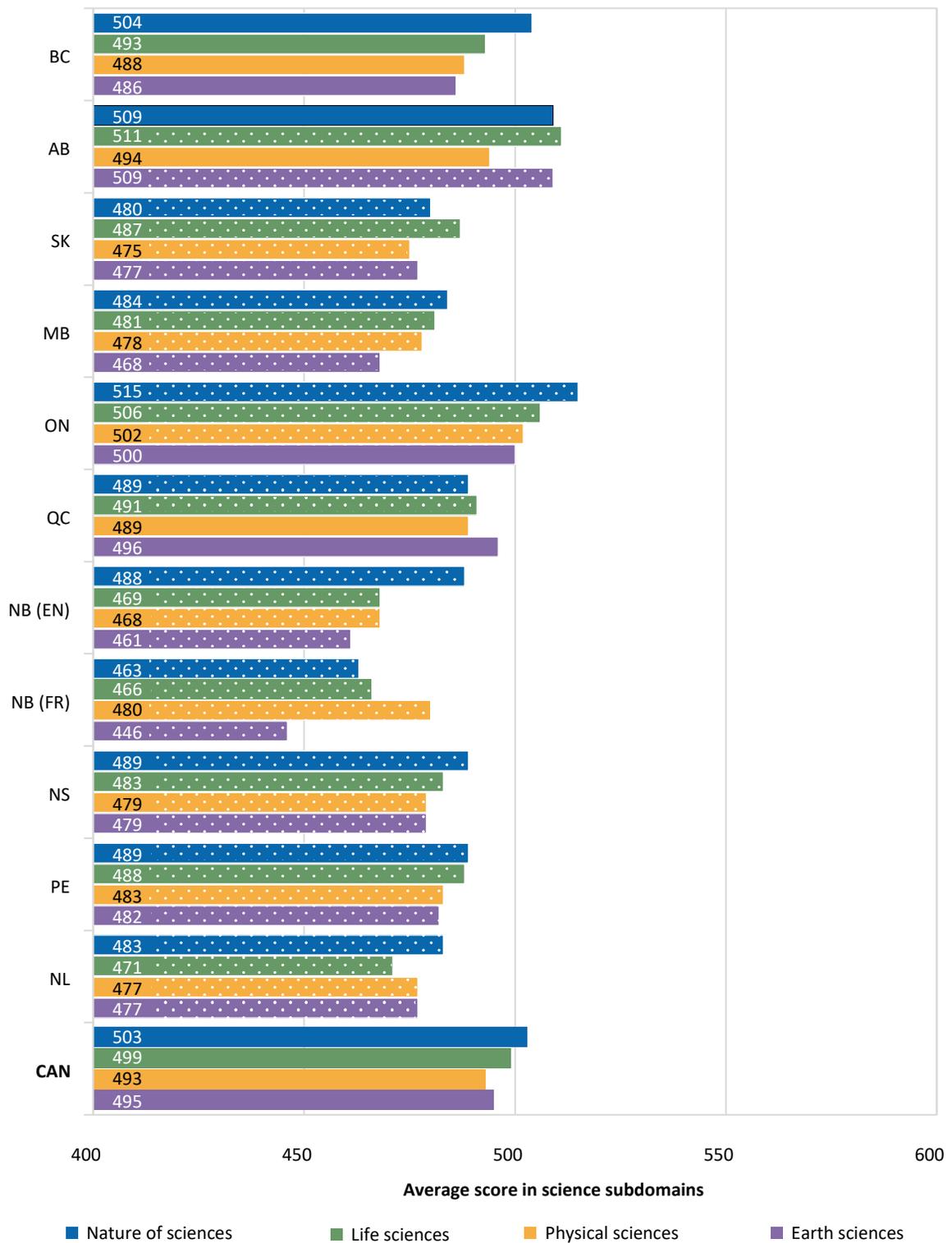
Note: Dotted bars denote significant difference compared to Canada

TABLE 1.5 Comparison of Canadian and provincial average scores in science subdomains

Above* the Canadian average	At the Canadian average	Below* the Canadian average
Nature of sciences		
Ontario	British Columbia, Alberta	Saskatchewan, Manitoba, Quebec, New Brunswick (EN and FR), Nova Scotia, Prince Edward Island, Newfoundland and Labrador
Life sciences		
Alberta, Ontario	British Columbia	Saskatchewan, Manitoba, Quebec, New Brunswick (EN and FR), Nova Scotia, Prince Edward Island, Newfoundland and Labrador
Physical sciences		
Ontario	British Columbia, Alberta, Quebec	Saskatchewan, Manitoba, New Brunswick (EN and FR), Nova Scotia, Prince Edward Island, Newfoundland and Labrador
Earth sciences		
Alberta	British Columbia, Ontario, Quebec	Saskatchewan, Manitoba, New Brunswick (EN and FR), Nova Scotia, Prince Edward Island, Newfoundland and Labrador

* Denotes significant difference

When achievement in the four subdomains is compared within each province, a pattern of higher achievement can be seen in the nature of sciences compared to the other subdomains in British Columbia, Manitoba, Ontario, New Brunswick (English-language school system), Nova Scotia, and Newfoundland and Labrador. If we compare the other three subdomains, students in the majority of provinces tended to score higher in life sciences than in physical sciences and Earth sciences. This was the pattern in British Columbia, Alberta, Saskatchewan, Manitoba, Ontario, New Brunswick (English-language school system), Nova Scotia, and Prince Edward Island, where students' scores in life sciences were either higher than or the same as those in physical sciences and Earth sciences. In contrast, students in Quebec achieved higher average scores in Earth sciences, and students in New Brunswick (French-language school system) achieved higher scores in physical sciences, compared to the three other subdomains (Appendix B.1.6).

Results in science competencies by average score

This section reports on Canadian results for the three science competencies: scientific inquiry, problem solving, and scientific reasoning. As was the case for the overall science score, the average score for each competency was set at 500 in the baseline year in 2013 with a standard deviation of 100. To facilitate direct comparisons over time, the Canadian average for the competencies has not been rescaled to 500 subsequent years.

Scientific literacy is a continually evolving process and is part of being a lifelong learner. The PCAP definition of scientific literacy recognizes that students continue to evolve and develop competencies as they move from grade to grade and mature into adulthood. The term "competency" is used to articulate the importance of students being able to identify questions or issues and pursue science knowledge that will inform the question or issue; to seek answers to practical problems requiring the application of their science knowledge in new ways; and to reason scientifically when making

decisions based on an understanding of the relationships between science, technology, society, and the environment when engaging with science-related issues. A detailed description of the three competencies is found in *PCAP 2023: Assessment Framework* (CMEC, 2024).

The Canadian average scores in the three science competencies are shown in Figure 1.6. At the pan-Canadian level, students achieved the highest scores in scientific reasoning (Appendices B.1.7, B.1.8).

FIGURE 1.6 Canadian average scores in science competencies
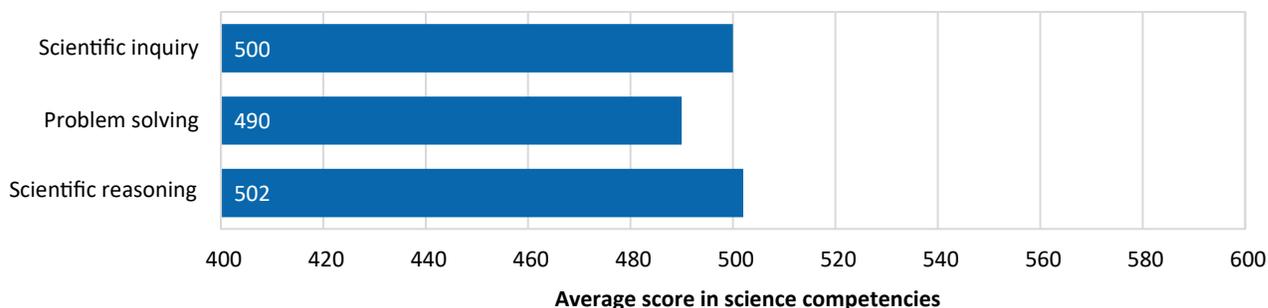
Figure 1.7 and Table 1.6 present a comparison of Canadian and provincial average scores in the three science competencies. Students in Ontario achieved above the Canadian averages in all three competencies, while students in Alberta performed above the Canadian average in scientific reasoning. Students in both British Columbia and Alberta performed at the Canadian average in scientific inquiry and problem solving, while students in Quebec performed at the Canadian average in problem solving and scientific reasoning. The results in the remaining provinces were below the Canadian average in each competency (Appendix B.1.7).

FIGURE 1.7 Canadian and provincial average scores in science competencies

	Scientific inquiry	Problem solving	Scientific reasoning
BC	502	483	490
AB	509	500	512
SK	477	474	482
MB	479	464	482
ON	510	498	513
QC	487	487	496
NB (EN)	482	460	464
NB (FR)	459	460	461
NS	486	471	485
PE	487	479	485
NL	482	466	479
CAN	500	490	502

Average score in science competencies

■ Scientific inquiry   ■ Problem solving   ■ Scientific reasoning
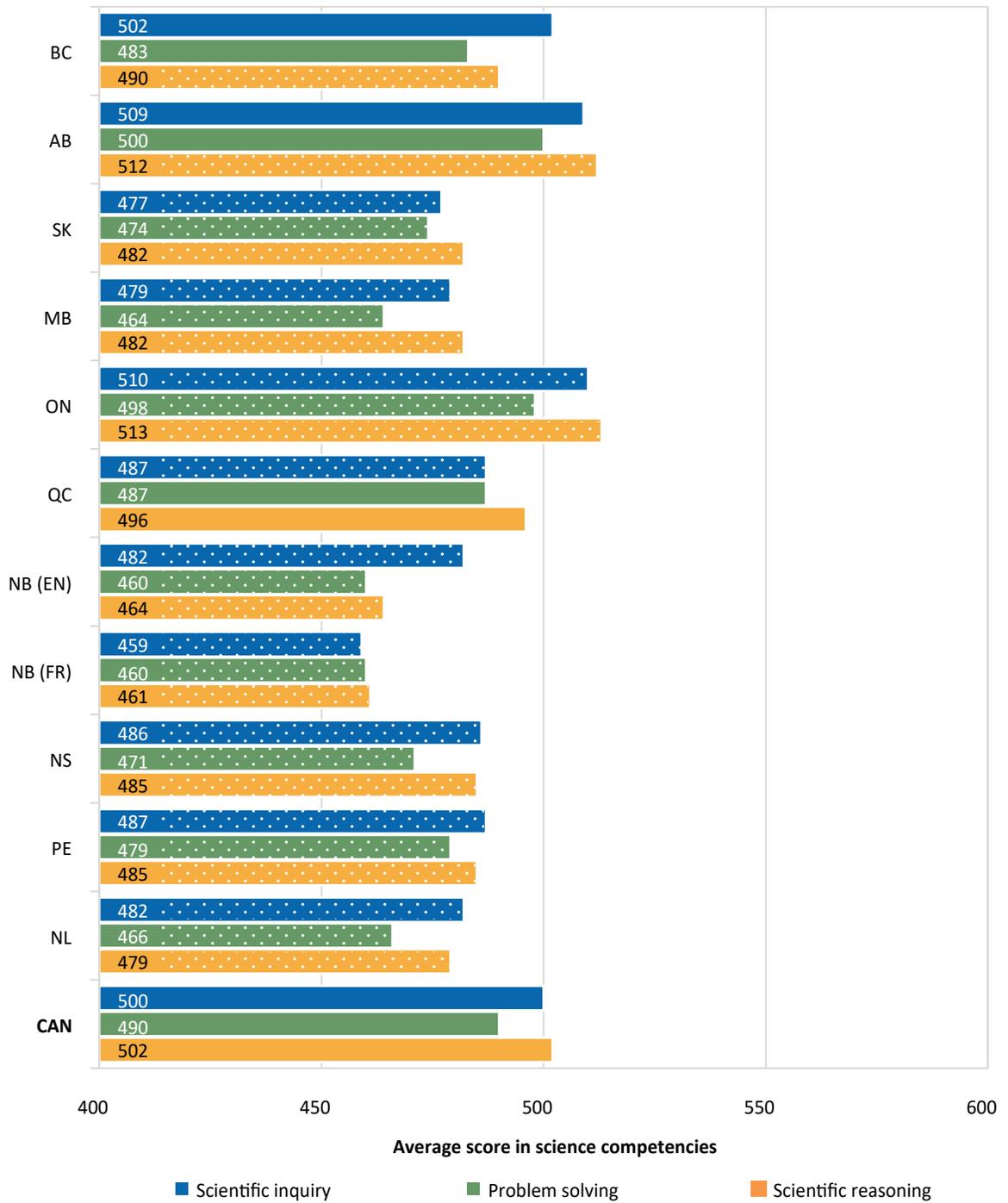
Note: Dotted bars denote significant difference compared to Canada

TABLE 1.6 Comparison of Canadian and provincial average scores in science competencies

Above* the Canadian average	At the Canadian average	Below* the Canadian average
Scientific inquiry		
Ontario	British Columbia, Alberta	Saskatchewan, Manitoba, Quebec, New Brunswick (EN and FR), Nova Scotia, Prince Edward Island, Newfoundland and Labrador
Problem solving		
Ontario	British Columbia, Alberta, Quebec	Saskatchewan, Manitoba, New Brunswick (EN and FR), Nova Scotia, Prince Edward Island, Newfoundland and Labrador
Scientific reasoning		
Alberta, Ontario	Quebec	British Columbia, Saskatchewan, Manitoba, New Brunswick (EN and FR), Nova Scotia, Prince Edward Island, Newfoundland and Labrador

* Denotes significant difference

When achievement in the three competencies is compared within each province, a pattern of higher achievement in scientific inquiry compared to the other two competencies can be seen in British Columbia, New Brunswick (English-language school system), Prince Edward Island, and Newfoundland and Labrador. By contrast, students in Alberta, Saskatchewan, Manitoba, Ontario, Quebec, New Brunswick (French-language school system), and Nova Scotia achieved scores in scientific reasoning that were higher than or similar to those in the other two competencies. A pattern of lower achievement in problem solving compared to the other two competencies can be seen in all provinces, with three exceptions: in Quebec and New Brunswick (French-language school system), there was no significant difference between the scores in problem solving and scientific inquiry, and in New Brunswick (English-language school system), there was no significant difference between the scores in problem solving and scientific reasoning (Appendix B.1.8).

Results in science by language

In Canada overall, 77 percent of students are in English-language school systems, while 23 percent are in French-language school systems. In eight provinces, 95 to 99 percent of Grade 8/Secondary II students are in English-language school systems. The exceptions are Quebec and New Brunswick, with 91 percent and 28 percent of students, respectively, in French-language school systems (Appendix B.1.9).

Figure 1.8 shows performance levels in science in Canada and across the provinces by language of the school system in which students were enrolled.[11] In Canada overall, a similar percentage of students in English- and French-language school systems (89 and 87 percent, respectively) achieved Level 2 or above (Appendix B.1.10). However, a greater percentage of students in English-language school systems attained Level 3 and Level 4 compared to their counterparts in French-language systems (Appendix B.1.11).

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[11] Although students in French immersion programs in English-language school systems could, at the discretion of the province (and, in some instances, the school), complete the PCAP test in either English or French, their results are reported with the English-language cohort.

FIGURE 1.8 Canadian and provincial percentages of students at each performance level in science by language of the school system

		Level 1	Level 2	Level 3	Level 4
BC	English	13	49	26	12
	French	16	55	20	8
AB	English	9	45	31	15
	French	16	47	27	9
SK	English	17	53	22	8
	French	22	57	17	5
MB	English	17	53	22	8
	French	16	60	18	6
ON	English	9	46	29	15
	French	17	50	24	8
QC	English	11	54	26	9
	French	12	54	25	9
NB	English	19	53	22	6
	French	20	58	18	4
NS	English	15	52	23	10
	French	27	58	13	1
PE	English	12	55	25	8
NL	English	17	52	23	7
CAN	English	11	48	28	13
	French	13	54	24	9
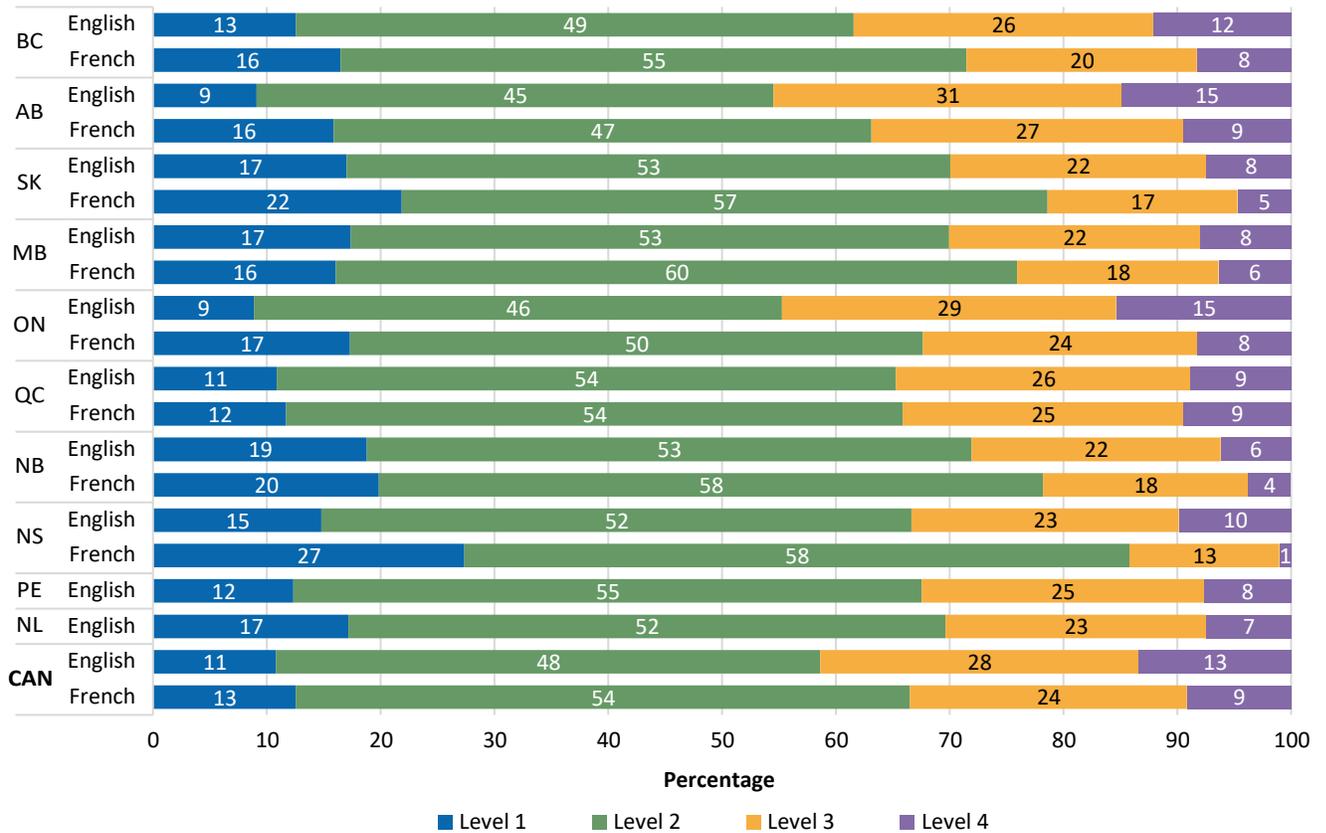
As shown in Table 1.7, when we compare Canadian and provincial results at Level 2 or above for English-language school systems, we see that, compared to the pan-Canadian results, a higher percentage of students in Ontario performed at or above the expected level in science. Students in British Columbia, Alberta, and Quebec achieved these levels at a rate similar to that of students in Canada as a whole. Students in English-language school systems in all other provinces had a lower percentage of students at Level 2 or above compared to Canada overall. With respect to French-language schools, students in Alberta and Quebec achieved Level 2 or above at a rate similar to that of students in Canada as a whole. In all other provinces for which reliable data are available, the percentage of students in French-language school systems who achieved at the expected level or above was lower than the Canadian average (Appendices B.1.10, B.1.12).

TABLE 1.7 Comparison of Canadian and provincial results for percentage of students achieving Level 2 or above in science by language of the school system

English-language school systems		
Higher* percentage than Canada	**The same percentage as Canada**	**Lower* percentage than Canada**
Ontario	British Columbia, Alberta, Quebec	Saskatchewan, Manitoba, New Brunswick, Nova Scotia, Prince Edward Island, Newfoundland and Labrador
French-language school systems		
Higher* percentage than Canada	**The same percentage as Canada**	**Lower* percentage than Canada**
	Alberta, Quebec	British Columbia, Saskatchewan, Manitoba, Ontario, New Brunswick, Nova Scotia

* Denotes significant difference

Provincially, a greater percentage of students in English-language school systems achieved Level 2 or above compared to their peers in French-language school systems in six of the eight provinces for which data are available. The two exceptions were Manitoba and Quebec, in which there was no significant difference between the two groups (Table 1.8, Appendix B.1.10).

TABLE 1.8 Comparison of provincial results for percentage of students achieving Level 2 or above in science by language of the school system

Higher* percentage in English-language school systems	Higher* percentage in French-language school systems	No significant difference between school systems
British Columbia, Alberta, Saskatchewan, Ontario, New Brunswick, Nova Scotia		Manitoba, Quebec

* Denotes significant difference

When we examine results by average scores, we see that students in English-language school systems in Canada overall had averages scores that were 15 points higher than their peers in French-language school systems (Figure 1.9, Appendix B.1.13). This result is consistent with those reported for Grade 8/Secondary II students in PCAP 2013, the baseline year for PCAP science (O'Grady & Houme, 2014), as well as in PCAP 2019 (O'Grady, Houme, Costa, et al., 2021). However, it differs from the findings for Canadian 15-year-olds in the 2022 PISA study, in which there was no significant difference between the two language systems in science (Elez et al., 2023). At the provincial level, PCAP 2023 science scores in English-language school systems ranged from 470 in New Brunswick to 514 in Alberta. In French-language school systems, scores ranged from 433 in Nova Scotia to 491 in Quebec (Appendix B.1.13).

FIGURE 1.9 Canadian average scores in science by language of the school system
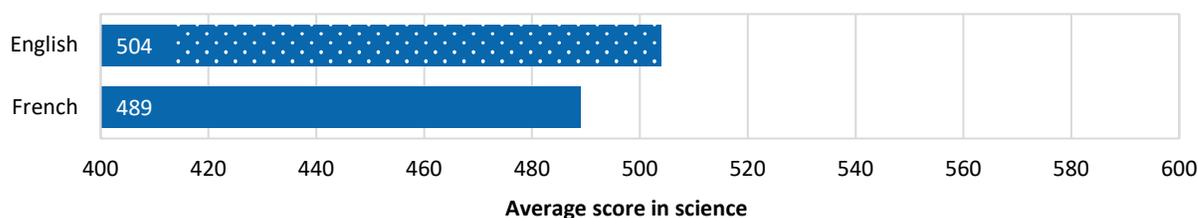
Note: Dotted bar denotes significant difference between the two groups

Table 1.9 presents a comparison of Canadian and provincial average scores by language of the school system. In English-language school systems, students in Ontario achieved scores significantly higher than the Canadian English average, while scores in British Columbia and Alberta were statistically similar to the Canadian English average. All the remaining provinces scored below that average. In French-language school systems, students in Quebec scored above the Canadian French average, while students in British Columbia, Alberta, and Ontario achieved scores similar to the Canadian French average. All the remaining provinces for which reliable data are available scored below that average (Appendix B.1.13).

TABLE 1.9 Comparison of Canadian and provincial average scores in science by language of the school system

English-language school systems		
Above* the Canadian average	**At the Canadian average**	**Below* the Canadian average**
Ontario	British Columbia, Alberta	Saskatchewan, Manitoba, Quebec, New Brunswick, Nova Scotia, Prince Edward Island, Newfoundland and Labrador
French-language school systems		
Above* the Canadian average	**At the Canadian average**	**Below* the Canadian average**
Quebec	British Columbia, Alberta, Ontario	Saskatchewan, Manitoba, New Brunswick, Nova Scotia

* Denotes significant difference

In Canada overall, students in majority-language school systems scored 22 points higher in science than their peers in minority-language school systems (Figure 1.10, Appendix B.1.14). Provincially, science scores in majority-language school systems ranged from 470 in New Brunswick to 514 in Alberta. In minority-language school systems, scores ranged from 433 in Nova Scotia to 492 in Quebec (Appendix B.1.14). For a detailed description of how majority- and minority-language school systems are defined, please see the section "Reporting by language," in the Introduction.

Majority-language school systems — 502

Minority-language school systems — 480

400 420 440 460 480 500 520 540 560 580 600

Average score in science
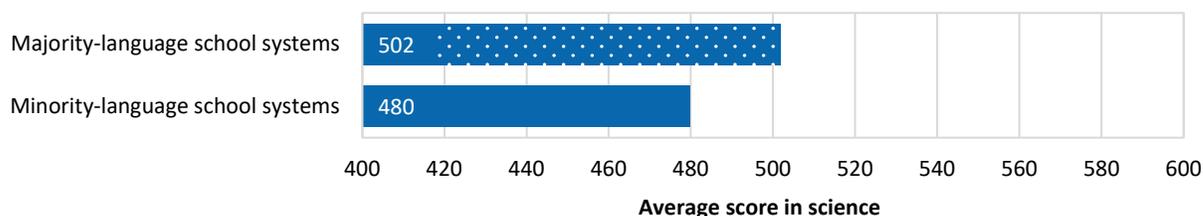
Note: See the Introduction for a definition of majority- and minority-language school systems. Dotted bar denotes significant difference between the two groups

Table 1.10 presents a comparison of Canadian and provincial average scores for majority- and minority-language school systems. In majority-language school systems, students in Alberta and Ontario scored above the Canadian majority-language average, while the scores of students in British Columbia were at that average. In minority-language school systems, students in Quebec scored above the Canadian minority-language average, while the scores for students in British Columbia, Alberta, and Ontario were at that average. The average scores for students in all remaining provinces for which reliable data are available were below the respective Canadian averages for majority- and minority-language school systems (Appendix B.1.14).

TABLE 1.10 Comparison of Canadian and provincial average scores in science by majority- and minority-language school systems

Majority-language school systems		
Above* the Canadian average	**At the Canadian average**	**Below* the Canadian average**
Alberta, Ontario	British Columbia	Saskatchewan, Manitoba, Quebec, New Brunswick, Nova Scotia, Prince Edward Island, Newfoundland and Labrador
Minority-language school systems		
Above* the Canadian average	**At the Canadian average**	**Below* the Canadian average**
Quebec	British Columbia, Alberta, Ontario	Saskatchewan, Manitoba, New Brunswick, Nova Scotia

* Denotes significant difference
Note: See the Introduction for a definition of majority- and minority-language school systems.

Figure 1.11 illustrates the achievement gap in science by language of the school system. Provincially, equity in science scores between school systems (both between English- and French-language systems and between majority- and minority-language systems) was achieved in Manitoba and Quebec. Elsewhere, the achievement gap favoured students in English-language school systems: the data reveal significantly higher average scores in English-language school systems compared to French-language school systems in all other provinces for which reliable data are available, with a similar gap between majority- and minority-language school systems (Appendices B.1.13, B.1.14). This trend is consistent with the previous administration of PCAP, in 2019 (O'Grady, Houme, Costa, et al., 2021). In light of these findings, it would be prudent for policy-makers to further investigate provincial results, given that, among those provinces with an achievement gap, differences between the English- and French-language school systems ranged from 11 points in New Brunswick to 52 points in Nova Scotia (Appendix B.1.13).

FIGURE 1.11 Gap in average scores in science in Canada and the provinces by language of the school system
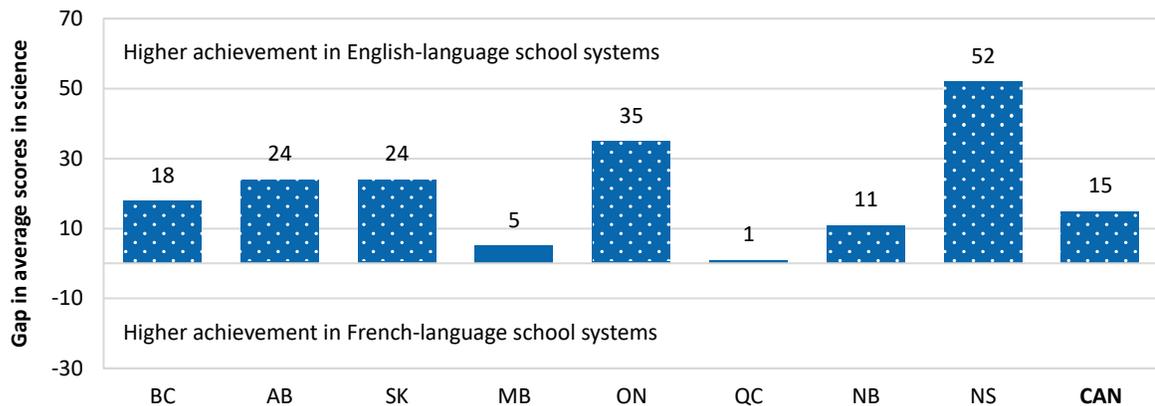
Note: Numbers are average scores in English-language school systems minus those in French-language school systems. Dotted bars denote significant difference within Canada or within a province

At the pan-Canadian level, differences were observed between English- and French-language school systems in three of the science subdomains: the nature of sciences, life sciences, and physical sciences. In these subdomains, students in English-language school systems had higher scores than those in French-language school systems, with differences ranging from 6 to 21 points (Table 1.11, Appendix B.1.15).

TABLE 1.11 Average scores in Canada in science subdomains by language of the school system

Science subdomain	English-language school systems		French-language school systems		Difference (English - French)
	Average score	Standard error	Average score	Standard error	
Nature of sciences	508	1.7	487	2.4	21*
Life sciences	501	1.4	490	1.7	11*
Physical sciences	494	1.3	488	1.9	6*
Earth sciences	496	2.2	492	3.1	4

* Denotes significant difference

Table 1.12 presents a comparison of Canadian and provincial average scores in the science subdomains for both English- and French-language school systems. Students in English-language school systems in the majority of provinces performed at or below the Canadian English average in all four subdomains. The exceptions were students in the English-language school system in Ontario, who performed above the Canadian English average in three subdomains (the nature of sciences, life sciences, and physical sciences), and students in the English-language school system in Alberta, who performed above the Canadian English average in Earth sciences. For students in French-language school systems, average scores in the subdomains in the majority of provinces were at or below the Canadian French average. The exceptions were students in the French-language school system in Quebec, who performed above the Canadian French average in three subdomains (the nature of sciences, life sciences, and Earth sciences), and students in the French-language school system in Alberta, who performed above the Canadian French average in life sciences (Appendix B.1.15).

English-language school systems		
Above* the Canadian English average	**At the Canadian English average**	**Below* the Canadian English average**
Nature of sciences		
Ontario	British Columbia, Alberta	Saskatchewan, Manitoba, Quebec, New Brunswick, Nova Scotia, Prince Edward Island, Newfoundland and Labrador
Life sciences		
Ontario	Alberta	British Columbia, Saskatchewan, Manitoba, Quebec, New Brunswick, Nova Scotia, Prince Edward Island, Newfoundland and Labrador
Physical sciences		
Ontario	Alberta, Quebec	British Columbia, Saskatchewan, Manitoba, New Brunswick, Nova Scotia, Prince Edward Island, Newfoundland and Labrador
Earth sciences		
Alberta	British Columbia, Ontario, Quebec	Saskatchewan, Manitoba, New Brunswick, Nova Scotia, Prince Edward Island, Newfoundland and Labrador
French-language school systems		
Above* the Canadian French average	**At the Canadian French average**	**Below* the Canadian French average**
Nature of sciences		
Quebec	Alberta, Ontario	British Columbia, Saskatchewan, Manitoba, New Brunswick, Nova Scotia
Life sciences		
Alberta, Quebec	Manitoba, Ontario	British Columbia, Saskatchewan, New Brunswick, Nova Scotia
Physical sciences		
	British Columbia, Alberta, Manitoba, Ontario, Quebec	Saskatchewan, New Brunswick, Nova Scotia
Earth sciences		
Quebec	Alberta	British Columbia, Saskatchewan, Manitoba, Ontario, New Brunswick, Nova Scotia

* Denotes significant difference

As shown in Table 1.13, within the majority of provinces, students in English-language school systems achieved higher average scores than their peers in French-language school systems in three of the subdomains (the nature of sciences, life sciences, and Earth sciences). This pattern was not repeated in the subdomain of physical sciences. In that subdomain, Ontario was the only province in which students in the English-language school system achieved higher average scores than their counterparts in the French-language school system. In three provinces — Saskatchewan, Manitoba, and New Brunswick — students in French-language school systems achieved higher average scores in physical sciences compared to their peers in English-language school systems. In the remaining provinces for which reliable data are available, the average scores of students in English- and French-language school systems were similar to each other in this subdomain. The scores of students in both

systems in Quebec were similar to each other in the nature of sciences, life sciences, and physical sciences subdomains (Appendix B.1.15).

TABLE 1.13 Summary of differences in provincial average scores in science subdomains by language of the school system

English-language school systems performed significantly better than French-language school systems	French-language school systems performed significantly better than English-language school systems	No significant difference between school systems
Nature of sciences		
British Columbia, Alberta, Saskatchewan, Manitoba, Ontario, New Brunswick, Nova Scotia		Quebec
Life sciences		
British Columbia, Saskatchewan, Ontario, New Brunswick, Nova Scotia	Manitoba	Alberta, Quebec
Physical sciences		
Ontario	Saskatchewan, Manitoba, New Brunswick	British Columbia, Alberta, Quebec, Nova Scotia
Earth sciences		
British Columbia, Alberta, Saskatchewan, Manitoba, Ontario, New Brunswick, Nova Scotia	Quebec	

When we compare achievement in the four subdomains by the language of the school systems within the provinces, we find that students in English-language systems in all provinces except Saskatchewan achieved higher or the same scores in the nature of sciences compared to the other subdomains. In contrast, students in French-language school systems in British Columbia, Saskatchewan, Ontario, New Brunswick, and Nova Scotia achieved higher scores in physical sciences compared to the other three subdomains (Appendix B.1.16).

As with most of the subdomains, there were differences between English- and French-language school systems with respect to the science competencies. At the pan-Canadian level, students in English-language school systems had higher scores than those in French-language school systems in all three competencies, with differences ranging from 7 to 20 points (Table 1.14, Appendix B.1.17).

TABLE 1.14 Average scores in Canada in science competencies by language of the school system

Science competency	English-language school systems		French-language school systems		Difference (English - French)
	Average score	Standard error	Average score	Standard error	
Scientific inquiry	504	1.9	484	2.7	20*
Problem solving	492	1.9	485	2.4	7*
Scientific reasoning	504	1.7	495	2.3	9*

* Denotes significant difference

Table 1.15 presents a comparison of Canadian and provincial average scores in the science competencies for both English- and French-language school systems. Students in English-language school systems in the majority of provinces had average scores below the Canadian English average in all science competencies. Only in Ontario did students have average scores above the Canadian English average across the three competencies. As for French-language school systems, students in the majority of provinces performed below the Canadian French average. Only students in Quebec

had average scores above the Canadian French average across the three competencies. Students in both language systems in Alberta had scores at the Canadian average in all three competencies (Appendix B.1.17).

TABLE 1.15 Comparison of Canadian and provincial average scores in science competencies by language of the school system

English-language school systems		
Above* the Canadian English average	**At the Canadian English average**	**Below* the Canadian English average**
Scientific inquiry		
Ontario	British Columbia, Alberta	Saskatchewan, Manitoba, Quebec, New Brunswick, Nova Scotia, Prince Edward Island, Newfoundland and Labrador
Problem solving		
Ontario	Alberta	British Columbia, Saskatchewan, Manitoba, Quebec, New Brunswick, Nova Scotia, Prince Edward Island, Newfoundland and Labrador
Scientific reasoning		
Ontario	Alberta	British Columbia, Saskatchewan, Manitoba, Quebec, New Brunswick, Nova Scotia, Prince Edward Island, Newfoundland and Labrador
French-language school systems		
Above* the Canadian French average	**At the Canadian French average**	**Below* the Canadian French average**
Scientific inquiry		
Quebec	Alberta, Ontario	British Columbia, Saskatchewan, Manitoba, New Brunswick, Nova Scotia
Problem solving		
Quebec	Alberta	British Columbia, Saskatchewan, Manitoba, Ontario, New Brunswick, Nova Scotia
Scientific reasoning		
Quebec	British Columbia, Alberta, Ontario	Saskatchewan, Manitoba, New Brunswick, Nova Scotia

* Denotes significant difference

In two of the competencies (scientific inquiry and problem solving), students in English-language school systems performed better than their counterparts in French-language school systems in the majority of provinces. In scientific reasoning, students in English-language school systems had higher scores than their counterparts in French-language systems in four provinces; in the other four provinces for which data are available, no difference was evident between the two systems. In addition, no difference was found between the French- and English-language systems in Quebec in any of the competencies (Table 1.16, Appendix B.1.17).

TABLE 1.16 Comparison of provincial average scores in science competencies by language of the school system

English-language school systems performed significantly better than French-language school systems	French-language school systems performed significantly better than English-language school systems	No significant difference between school systems
Scientific inquiry		
British Columbia, Alberta, Saskatchewan, Manitoba, Ontario, New Brunswick, Nova Scotia		Quebec
Problem solving		
British Columbia, Alberta, Saskatchewan, Ontario, Nova Scotia		Manitoba, Quebec, New Brunswick
Scientific reasoning		
Saskatchewan, Ontario, New Brunswick, Nova Scotia		British Columbia, Alberta, Manitoba, Quebec

In comparing achievement among the three competencies, we find that students in English-language school systems in British Columbia, New Brunswick, Nova Scotia, Prince Edward Island, and Newfoundland and Labrador had higher average scores in scientific inquiry than in the other two competencies. Students in English-language school systems in Saskatchewan and Manitoba performed better in scientific reasoning compared to the other two competencies. As for students in French-language school systems, in all provinces for which reliable data are available, students had higher average scores in scientific reasoning than in the other two competencies (Appendix B.1.18).

Results in science by gender

Inclusive education is valued in Canadian provinces and territories and is supported by the development of policies and resources to strengthen inclusion. One aspect of inclusive education relates to gender identity. As with the PCAP 2019 questionnaires, the question about gender in the PCAP 2023 questionnaires for students, teachers, and school principals provided participants with the choice of female/male as well as two additional choices ("I identify myself in another way" and "I prefer not to say"), as shown in the box below.

How do you identify yourself?
(Please select one response.)
Female
Male
I identify myself in another way.
I prefer not to say.

In Canada overall, similar percentages of students identified as either female (49 percent) or male (51 percent) (Table 1.17). Only a small percentage of students identified themselves in another way or preferred not to say (N = 61), with more than half of these students coming from only two provinces. As a result, statistics could not be computed for these latter two categories, as they were either zero (rounding to the nearest integer) or missing. Due to the relatively small percentage of students in Canada who did not identify themselves as either female or male on the student questionnaire, and in order to ensure pan-Canadian comparability, this report uses the two standardized gender categories from student administrative data to describe results by gender. As categorized by the student administrative data, at the pan-Canadian level, approximately equal proportions of females and males wrote the PCAP 2023 assessment.

TABLE 1.17 Percentage of students by gender self-identification

Canada and provinces	Females		Males	
	%	Standard error	%	Standard error
British Columbia	48	1.0	52	1.0
Alberta	48	1.3	52	1.3
Saskatchewan	50	0.9	50	0.9
Manitoba	47	0.6	53	0.6
Ontario	50	0.8	50	0.8
Quebec	50	1.4	50	1.4
New Brunswick (EN)	49	0.0	51	0.0
New Brunswick (FR)	48	0.2	52	0.2
Nova Scotia	48	0.2	52	0.2
Prince Edward Island	54	0.0	46	0.0
Newfoundland and Labrador	48	0.1	52	0.1
Canada	**49**	**0.5**	**51**	**0.5**

As was the case in PCAP 2013 (O'Grady & Houme, 2014), the previous administration in which science was the major domain, there was no achievement gap at the pan-Canadian level between the percentage of females and males achieving at or above Level 2 (89 and 88 percent, respectively), or achieving any of the levels of performance, in science (Figure 1.12; Appendices B.1.19, B.1.20).

FIGURE 1.12 Canadian and provincial percentages of students at each performance level in science by gender

		Level 1	Level 2	Level 3	Level 4
BC	Females	12	50	26	12
	Males	13	49	26	12
AB	Females	8	47	31	14
	Males	10	44	30	15
SK	Females	17	55	21	7
	Males	17	51	24	9
MB	Females	16	57	20	8
	Males	19	49	24	8
ON	Females	9	48	29	14
	Males	9	46	29	16
QC	Females	12	53	26	10
	Males	12	56	24	9
NB (EN)	Females	20	54	21	5
	Males	18	53	23	7
NB (FR)	Females	18	60	18	4
	Males	22	57	18	3
NS	Females	16	56	21	8
	Males	15	49	25	11
PE	Females	12	58	23	7
	Males	14	51	27	9
NL	Females	16	54	23	8
	Males	18	51	23	7
CAN	Females	11	50	27	12
	Males	12	49	27	13
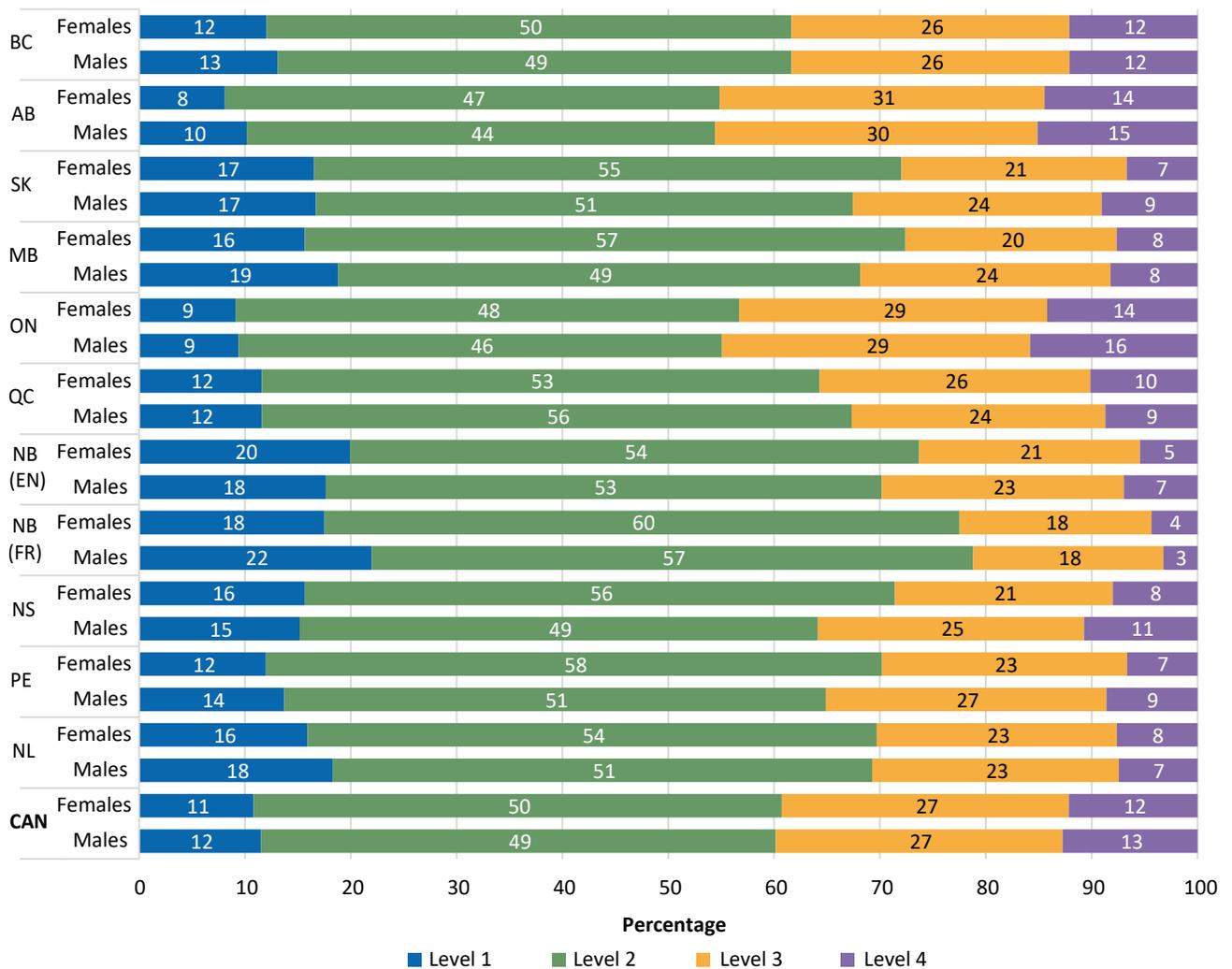
In contrast, at the provincial level, variation was observed in the percentage of females and males attaining some performance levels, with gender gaps in five provinces: Saskatchewan, Manitoba, New Brunswick (French-language school system), Nova Scotia, and Newfoundland and Labrador. In Manitoba and Newfoundland and Labrador, a gender gap was observed for students at Levels 1, 2, and 3, with a higher percentage of males performing at Levels 1 and 3 compared to females, and a higher percentage of females performing at Level 2 compared to males. In New Brunswick (French-language school system), there was a gender gap at Levels 1, 2, and 4, with a higher percentage of males performing at Level 1 compared to females, and a higher percentage of females performing at Levels 2 and 4 compared to males. In Saskatchewan, a gender gap was observed for students at Levels 2 and 4, with a higher percentage of females performing at Level 2 compared to males, and a higher percentage of males performing at Level 4 compared to females. In all other provinces, no gender gaps were found in performance levels (Appendix B.1.19).

Compared to Canada as a whole, a higher percentage of males in Ontario achieved at or above the expected level of performance in science (Level 2) for Grade 8/Secondary II students. In several other provinces, the percentage of female and/or male students who achieved at Level 2 or above

was similar to the respective pan-Canadian percentages: this was the case with females and males in British Columbia, Alberta, and Quebec; females in Ontario and Prince Edward Island; and males in New Brunswick (French-language school system). The percentage of females and males in Saskatchewan, Manitoba, New Brunswick (English-language school system), Nova Scotia, and Newfoundland and Labrador who achieved Level 2 or above was lower than the respective Canadian percentages. This was also the case for females in New Brunswick (French-language school system) and males in Prince Edward Island (Table 1.18, Appendix B.1.20).

TABLE 1.18 Comparison of Canadian and provincial results for percentage of students achieving Level 2 or above in science by gender

Females		
Higher* percentage than Canada	**The same percentage as Canada**	**Lower* percentage than Canada**
	British Columbia, Alberta, Ontario, Quebec, Prince Edward Island	Saskatchewan, Manitoba, New Brunswick (EN and FR), Nova Scotia, Newfoundland and Labrador
Males		
Higher* percentage than Canada	**The same percentage as Canada**	**Lower* percentage than Canada**
Ontario	British Columbia, Alberta, Quebec, New Brunswick (FR)	Saskatchewan, Manitoba, New Brunswick (EN), Nova Scotia, Prince Edward Island, Newfoundland and Labrador

* Denotes significant difference

Within provinces, a higher percentage of females compared to males achieved at or above the expected level of performance in Manitoba, New Brunswick (French-language school system), Prince Edward Island, and Newfoundland and Labrador. In contrast, a higher percentage of males compared to females achieved at or above the expected level of performance in New Brunswick (English-language school system). Gender equity was found in the remaining provinces with respect to achievement at or above Level 2 (Table 1.19, Appendix B.1.20).

TABLE 1.19 Comparison of provincial results for percentage of students achieving Level 2 or above in science by gender

Higher* percentage of females	Higher* percentage of males	No significant difference between females and males
Manitoba, New Brunswick (FR), Prince Edward Island, Newfoundland and Labrador	New Brunswick (EN)	British Columbia, Alberta, Saskatchewan, Ontario, Quebec, Nova Scotia

* Denotes significant difference

When the results of PCAP 2023 science were examined by average score, no gender difference was found at the pan-Canadian level (Figure 1.13, Appendix B.1.21). This finding is consistent with the results for Grade 8/Secondary II students in PCAP 2013 (O'Grady & Houme, 2014), when science was first the major domain. Similarly, in the international context, no difference in average science scores between females and males was observed in Canada overall or in any province for 15-year-old students in PISA 2022 (Elez et al., 2023). In contrast, males outperformed females in science at the Grade 4 level in the 2019 TIMSS study (O'Grady, Rostamian, et al., 2021).

FIGURE 1.13 Canadian average scores in science by gender
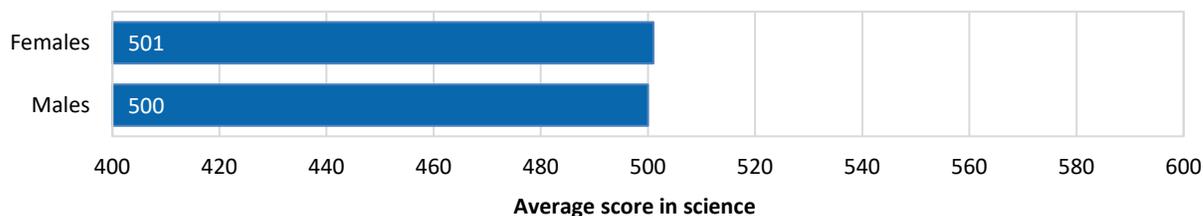
Table 1.20 presents a comparison of Canadian and provincial average scores in the PCAP science assessment for female and male students. Both females and males in Ontario, and females in Alberta, achieved higher scores than the respective Canadian averages in science. Both females and males in British Columbia, as well as females in Quebec and males in Alberta, achieved scores similar to the respective Canadian averages. In all other provinces, both females and males scored below the respective Canadian averages (Appendix B.1.21).

TABLE 1.20 Comparison of Canadian and provincial average scores in science by gender

Females		
Above* the Canadian average	**At the Canadian average**	**Below* the Canadian average**
Alberta, Ontario	British Columbia, Quebec	Saskatchewan, Manitoba, New Brunswick (EN and FR), Nova Scotia, Prince Edward Island, Newfoundland and Labrador
Males		
Above* the Canadian average	**At the Canadian average**	**Below* the Canadian average**
Ontario	British Columbia, Alberta	Saskatchewan, Manitoba, Quebec, New Brunswick (EN and FR), Nova Scotia, Prince Edward Island, Newfoundland and Labrador

* Denotes significant difference

Within provinces, no gender gap in average scores was found in British Columbia, Alberta, Ontario, Quebec, or Newfoundland and Labrador. Males had higher average scores than females in the remaining provinces except New Brunswick (French-language school system), where females had higher average scores than males (Figure 1.14, Appendix B.1.21).

FIGURE 1.14 Gap in average scores in science in Canada and the provinces by gender
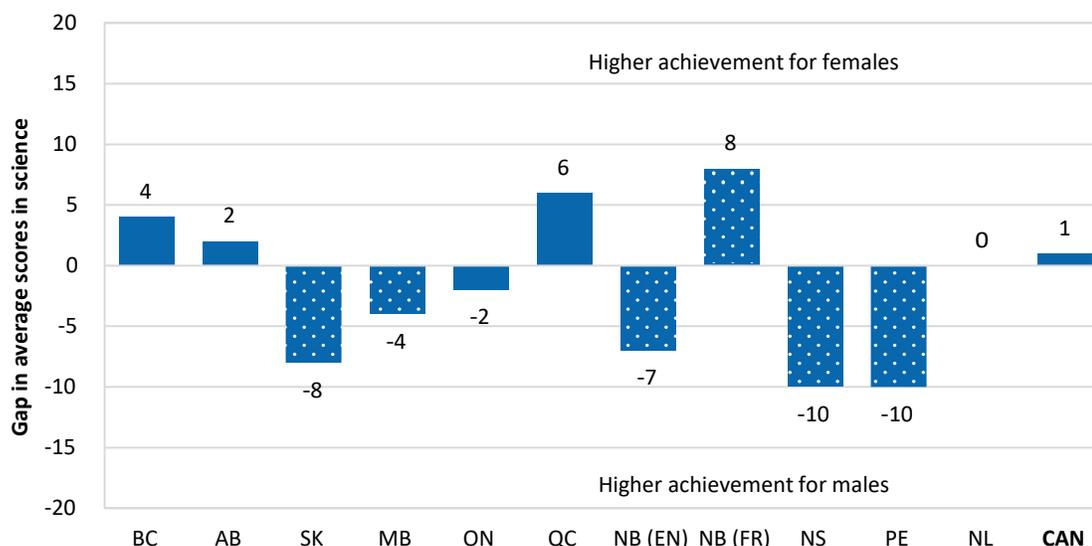
Note: Numbers are average scores for females minus those for males. Dotted bars denote significant difference within Canada or within a province

With respect to the science subdomains, there was no significant difference in the average scores of females and males in Canada overall in any of the four subdomains (Table 1.21, Appendix B.1.22).

TABLE 1.21 Average scores in Canada in science subdomains by gender

Science subdomain	Females		Males		Difference (females - males)
	Average score	Standard error	Average score	Standard error	
Nature of sciences	505	1.7	502	1.7	3
Life sciences	499	1.3	498	1.5	1
Physical sciences	494	1.3	492	1.3	2
Earth sciences	497	2.3	493	2.3	3

As shown in Table 1.22, females and males in Ontario had average scores above the respective Canadian averages across all the subdomains except Earth sciences, where the provincial and pan-Canadian averages were the same. In Alberta, females performed above the Canadian average for females in life sciences, and males performed above the Canadian average for males in Earth sciences. Both genders in British Columbia achieved scores similar to the respective Canadian averages in all four subdomains, with one exception: males in British Columbia achieved scores below the Canadian average in physical sciences. Both genders in Quebec achieved scores similar to the respective Canadian averages in physical sciences and Earth sciences, and males in Quebec achieved scores similar to the Canadian average in life sciences. Both genders in Saskatchewan, Manitoba, New Brunswick (English- and French-language school systems), Nova Scotia, Prince Edward Island, and Newfoundland and Labrador performed below the respective Canadian averages across all four subdomains (Appendix B.1.22).

TABLE 1.22 Comparison of Canadian and provincial average scores in science subdomains by gender

Females		
Above* the Canadian average for females	**At the Canadian average for females**	**Below* the Canadian average for females**
Nature of sciences		
Ontario	British Columbia, Alberta	Saskatchewan, Manitoba, Quebec, New Brunswick (EN and FR), Nova Scotia, Prince Edward Island, Newfoundland and Labrador
Life sciences		
Alberta, Ontario	British Columbia	Saskatchewan, Manitoba, Quebec, New Brunswick (EN and FR), Nova Scotia, Prince Edward Island, Newfoundland and Labrador
Physical sciences		
Ontario	British Columbia, Alberta, Quebec	Saskatchewan, Manitoba, New Brunswick (EN and FR), Nova Scotia, Prince Edward Island, Newfoundland and Labrador
Earth sciences		
	British Columbia, Alberta, Ontario, Quebec	Saskatchewan, Manitoba, New Brunswick (EN and FR), Nova Scotia, Prince Edward Island, Newfoundland and Labrador
Males		
Above* the Canadian average for males	**At the Canadian average for males**	**Below* the Canadian average for males**
Nature of sciences		
Ontario	British Columbia, Alberta	Saskatchewan, Manitoba, Quebec, New Brunswick (EN and FR), Nova Scotia, Prince Edward Island, Newfoundland and Labrador
Life sciences		
Ontario	British Columbia, Alberta, Quebec	Saskatchewan, Manitoba, New Brunswick (EN and FR), Nova Scotia, Prince Edward Island, Newfoundland and Labrador
Physical sciences		
Ontario	Alberta, Quebec	British Columbia, Saskatchewan, Manitoba, New Brunswick (EN and FR), Nova Scotia, Prince Edward Island, Newfoundland and Labrador
Earth sciences		
Alberta	British Columbia, Ontario, Quebec	Saskatchewan, Manitoba, New Brunswick (EN and FR), Nova Scotia, Prince Edward Island, Newfoundland and Labrador

* Denotes significant difference

Table 1.23 summarizes differences in the average scores of female and male students in each province in the four subdomains. Gender equity was achieved in all of the subdomains in Saskatchewan, Ontario, and Quebec, and in three subdomains (the nature of sciences, life sciences, and Earth sciences) in Alberta. Females outperformed males in New Brunswick (English-language school system) and Prince Edward Island across all four subdomains, and in three subdomains in British

Columbia, Manitoba, Nova Scotia, and Newfoundland and Labrador (the subdomains are not the same in these four provinces). In New Brunswick (French-language school system), males outperformed females in two subdomains (life sciences and physical sciences) (Appendix B.1.22).

TABLE 1.23 Summary of differences in provincial average scores in science subdomains by gender

Females performed significantly better than males	Males performed significantly better than females	No significant difference between females and males
Nature of sciences		
British Columbia, Manitoba, New Brunswick (EN), Nova Scotia, Prince Edward Island, Newfoundland and Labrador		Alberta, Saskatchewan, Ontario, Quebec, New Brunswick (FR)
Life sciences		
Manitoba, New Brunswick (EN), Nova Scotia, Prince Edward Island, Newfoundland and Labrador	New Brunswick (FR)	British Columbia, Alberta, Saskatchewan, Ontario, Quebec
Physical sciences		
British Columbia, New Brunswick (EN), Nova Scotia, Prince Edward Island, Newfoundland and Labrador	Alberta, New Brunswick (FR)	Saskatchewan, Manitoba, Ontario, Quebec
Earth sciences		
British Columbia, Manitoba, New Brunswick (EN and FR), Prince Edward Island	Newfoundland and Labrador	Alberta, Saskatchewan, Ontario, Quebec, Nova Scotia

When achievement in the four subdomains is compared within each province, we see that both genders scored higher in the nature of sciences, compared to the other domains, in British Columbia, Ontario, New Brunswick (English-language school system), Nova Scotia, and Newfoundland and Labrador. This pattern also held for males in Manitoba and females in Prince Edward Island. Compared to the other subdomains, both genders scored highest in life sciences in Saskatchewan and in physical sciences in New Brunswick (French-language school system) (Appendix B.1.23).

With respect to the science competencies, no differences were observed in the average scores of female and male students in any of the three categories (Table 1.24, Appendix B.1.24).

TABLE 1.24 Average scores in Canada in science competencies by gender

Science competency	Females		Males		Difference (females - males)
	Average score	Standard error	Average score	Standard error	
Scientific inquiry	502	1.8	498	1.8	3
Problem solving	491	1.8	489	1.9	2
Scientific reasoning	503	1.6	501	1.7	2

Table 1.25 compares Canadian and provincial average scores in the science competencies for both genders. Female students performed below the Canadian averages in all science competencies in the majority of provinces. The only exceptions were in Ontario, where female students performed above the Canadian averages in scientific inquiry and scientific reasoning. Similarly, males in the majority of provinces performed below the Canadian averages in all science competencies. Again, the main exceptions were in Ontario, where male students performed above the Canadian averages in all three competencies. In addition, males in Alberta performed above the Canadian average in scientific reasoning (Appendix B.1.24).

TABLE 1.25 Comparison of Canadian and provincial average scores in science competencies by gender

Females		
Above* the Canadian average for females	**At the Canadian average for females**	**Below* the Canadian average for females**
Scientific inquiry		
Ontario	British Columbia, Alberta, Prince Edward Island	Saskatchewan, Manitoba, Quebec, New Brunswick (EN and FR), Nova Scotia, Newfoundland and Labrador
Problem solving		
	British Columbia, Alberta, Ontario, Quebec	Saskatchewan, Manitoba, New Brunswick (EN and FR), Nova Scotia, Prince Edward Island, Newfoundland and Labrador
Scientific reasoning		
Ontario	British Columbia, Alberta, Quebec	Saskatchewan, Manitoba, New Brunswick (EN and FR), Nova Scotia, Prince Edward Island, Newfoundland and Labrador
Males		
Above* the Canadian average for males	**At the Canadian average for males**	**Below* the Canadian average for males**
Scientific inquiry		
Ontario	British Columbia, Alberta	Saskatchewan, Manitoba, Quebec, New Brunswick (EN and FR), Nova Scotia, Prince Edward Island, Newfoundland and Labrador
Problem solving		
Ontario	British Columbia, Alberta, Quebec	Saskatchewan, Manitoba, New Brunswick (EN and FR), Nova Scotia, Prince Edward Island, Newfoundland and Labrador
Scientific reasoning		
Alberta, Ontario	Quebec	British Columbia, Saskatchewan, Manitoba, New Brunswick (EN and FR), Nova Scotia, Prince Edward Island, Newfoundland and Labrador

* Denotes significant difference

Table 1.26 presents a comparison of average scores in the science competencies in the provinces by gender. Female and male students in Saskatchewan, Ontario, and Quebec achieved similar scores across all three competencies, while females and males in Alberta and Newfoundland and Labrador achieved similar scores in two competences. In contrast, females in Manitoba, New Brunswick (English-language school system), Nova Scotia, and Prince Edward Island scored higher than males in all three competencies; females in British Columbia scored higher than males in two competencies; and males in New Brunswick (French-language school system) scored higher than females in two competencies (Appendix B1.24).

TABLE 1.26 Comparison of provincial average scores in science competencies by gender

Females performed significantly better than males	Males performed significantly better than females	No significant difference between females and males
Scientific inquiry		
British Columbia, Manitoba, New Brunswick (EN), Nova Scotia, Prince Edward Island, Newfoundland and Labrador		Alberta, Saskatchewan, Ontario, Quebec, New Brunswick (FR)
Problem solving		
Manitoba, New Brunswick (EN), Nova Scotia, Prince Edward Island	New Brunswick (FR)	British Columbia, Alberta, Saskatchewan, Ontario, Quebec, Newfoundland and Labrador
Scientific reasoning		
British Columbia, Manitoba, New Brunswick (EN), Nova Scotia, Prince Edward Island	Alberta, New Brunswick (FR)	Saskatchewan, Ontario, Quebec, Newfoundland and Labrador

When achievement in the three competencies is compared within each province, we see that both females and males in British Columbia and New Brunswick (English-language school system), males in Nova Scotia, and females in Prince Edward Island and Newfoundland and Labrador had higher scores on scientific inquiry than on the other two competencies. Females and males in Quebec, females in Saskatchewan, and males in Alberta, Manitoba, and Prince Edward Island performed better in scientific reasoning than in the two other competencies. Females and males in Ontario and females in New Brunswick (French-language school system) had higher scores on scientific inquiry and scientific reasoning compared to problem solving. (Appendix B.1.25).

Change in science performance over time

PCAP 2023 marks the second time that science has been the major domain (the first time was in 2013). Within PCAP, changes over time are typically determined by comparison with the year in which the subject was the major domain, as those assessments involve a relatively large number of items in that domain and broad coverage of its subdomains and competencies.

In Canada overall, the percentage of Grade 8/Secondary II students achieving at Level 2 or above in science decreased from 2013 to 2023, from 92 to 89 percent (Figure 1.15; Appendices B.1.26, 1.27).

FIGURE 1.15 Canadian results in science by performance level, 2013 and 2023
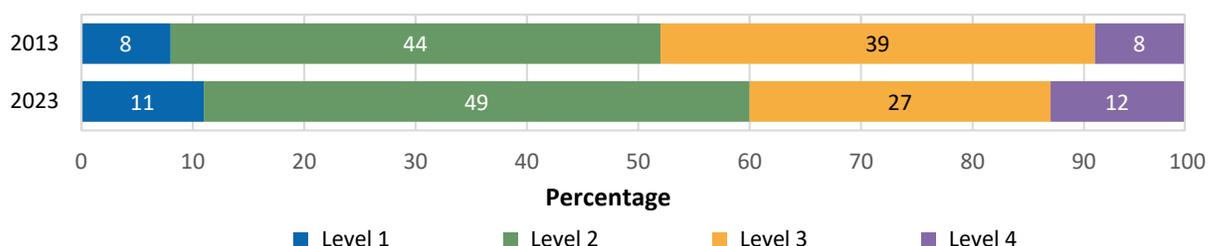
In contrast to performance levels, achievement as measured by average scores remained stable at the pan-Canadian level for science overall in 2023 compared to 2013, as shown in Figure 1.16 and Table 1.27 (Appendix B.1.28).

FIGURE 1.16 Canadian average scores in science, 2013–2023
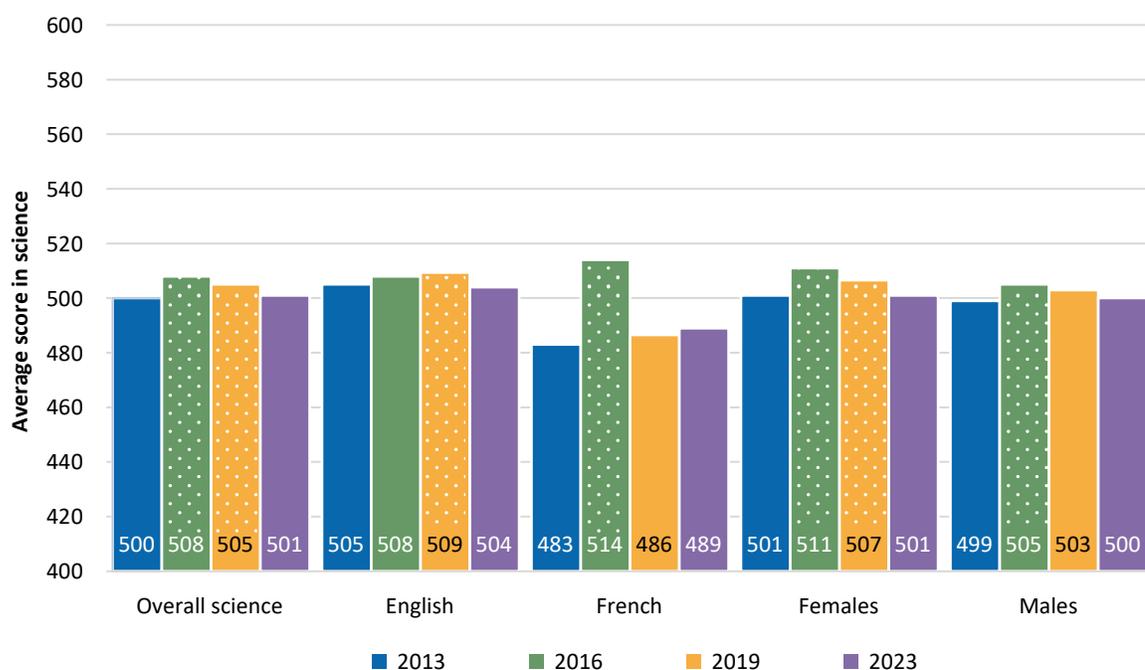
Note: Dotted bars denote significant difference compared to baseline year 2013

With respect to the subdomains, in Canada overall between 2013 and 2023, no change was observed in average scores in the nature of sciences and life sciences, while a negative change was seen in the other two subdomains. The greatest change was in physical sciences, with average scores 7 points lower in 2023 than in 2013 (Table 1.27, Appendix B.1.29). With respect to the three competencies, no change was observed in scientific inquiry or scientific reasoning; in contrast, the average score in problem solving was 10 points lower in 2023 than in 2013 (Table 1.27, Appendix B.1.30).

When science results were examined by the language of the school system, the results remained stable for both school systems in Canada as a whole in 2023 compared to 2013 (Figure 1.16, Table 1.27, Appendix B.1.31). The achievement gap between English- and French-language school systems decreased from 22 points in 2013 to 15 points in 2023. With respect to gender, no gap in the average scores of females and males in Canada overall was observed in either 2013 or 2023, and the achievement scores of both females and males remained stable (Figure 1.16, Table 1.27, Appendix B.1.32).

TABLE 1.27 Summary of Canadian average scores in science, 2013 and 2023

	2013	2023	Change over time
Overall science	500	501	1
Nature of sciences	500	503	3
Life sciences	500	499	-1
Physical sciences	500	493	-7*
Earth sciences	500	495	-5*
Scientific inquiry	500	500	0
Problem solving	500	490	-10*
Scientific reasoning	500	502	2
English-language school systems	505	504	-1
French-language school systems	483	489	6
Achievement gap (EN - FR)	22*	15*	
Females	501	501	0
Males	499	500	1
Achievement gap (F - M)	2	1	

* Denotes significant difference

Note: Numbers may differ from those expected due to rounding. Tests for significance have not been performed for change over time for achievement gaps due to the standard error of the difference in score change over time being disproportionately high relative to the difference in change over time. While a test of significance with a high standard error can be conducted, the resulting inferences would be highly inaccurate and unreliable, given that the test of significance would be performed using point estimates that are highly inaccurate.

Table 1.28 summarizes changes in provincial scores in science in 2023 compared to the baseline year of 2013 for various categories. The results for science overall were stable in British Columbia, Alberta, Ontario, Quebec, and New Brunswick, while improvement was found in Manitoba. The results in science overall decreased in the remaining provinces (Figure 1.17; Appendices B.1.28, B.1.33).

FIGURE 1.17 Canadian and provincial average scores in science, 2013–2023
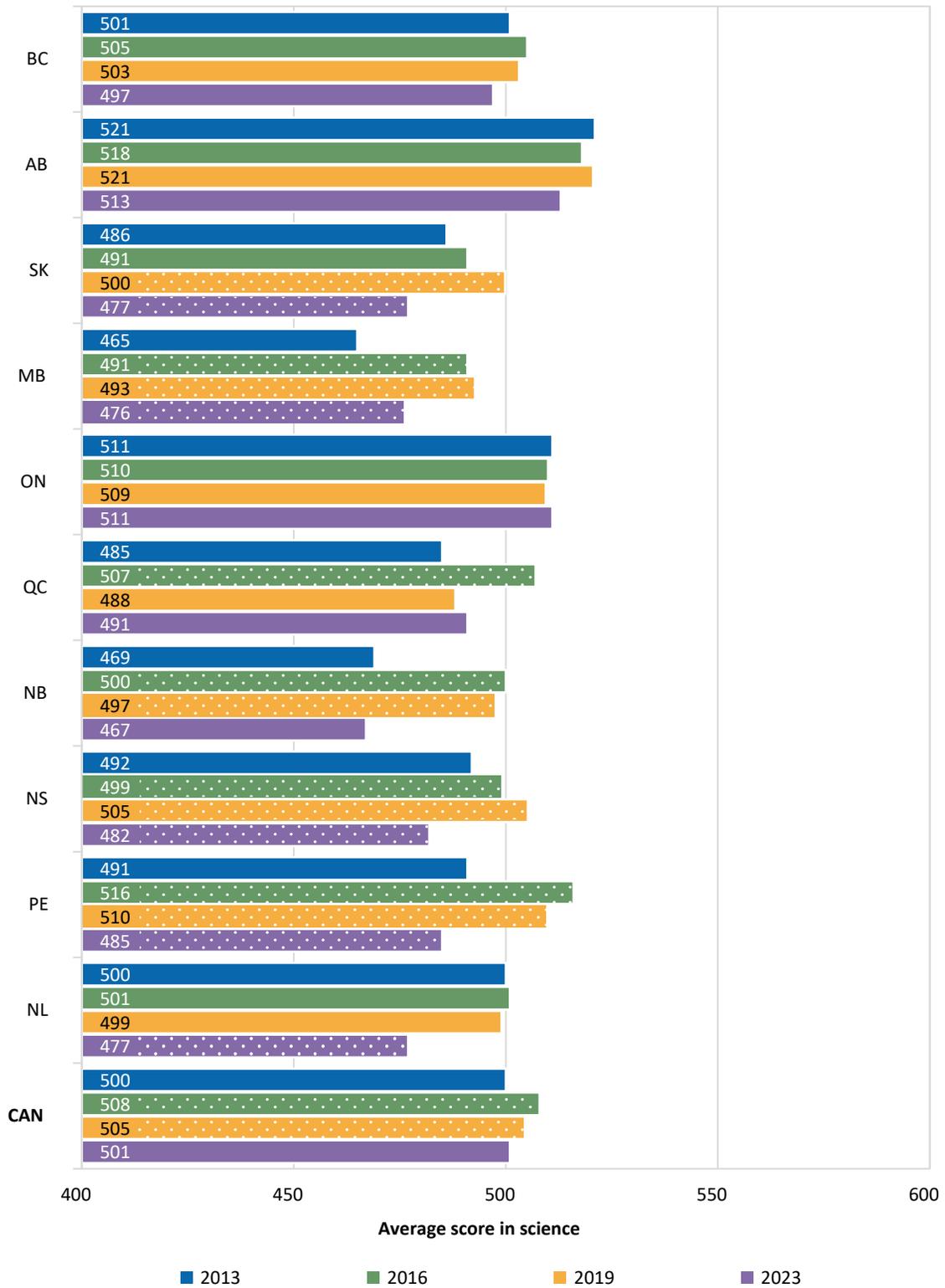
Note: Dotted bars denote significant difference compared to baseline year 2013

With respect to the subdomains, a majority of provinces saw either negative change or no change in the average scores in all four subdomains between 2013 and 2023. More specifically, in the nature of sciences, positive change was found in British Columbia, Manitoba, and New Brunswick; negative change was found in Alberta and Newfoundland and Labrador; and no change was observed in the remaining provinces. In life sciences, Quebec showed a positive change; British Columbia, New Brunswick, Nova Scotia, and Newfoundland and Labrador showed negative change; and no change was found in the remaining provinces. In physical sciences, a positive change was observed in Manitoba; no change was seen in Quebec; and negative change was seen in the remaining provinces. In Earth sciences, there was no change in Alberta, Ontario, and Quebec, while the remaining provinces showed negative change over time (Table 1.28; Appendices B.1.29, B.1.33).

Within the science competencies, average scores decreased for the majority of provinces in two of the competencies — problem solving and scientific reasoning. For problem solving, no change was found in Alberta and Quebec, but all the remaining provinces showed negative change over time. For scientific reasoning, positive change was found in Manitoba and Quebec, no change in Alberta and Ontario, and a negative change in the six remaining provinces. For scientific inquiry, a positive change was found in Manitoba, and negative change in Alberta, Saskatchewan, Nova Scotia, and Newfoundland and Labrador; no change was found in the remaining five provinces (Table 1.28; Appendices B.1.30, B.1.33).

The results by language of the school system are variable. In English-language school systems, Manitoba and Quebec showed positive change; British Columbia, Alberta, Ontario, and New Brunswick showed no change; and the remaining provinces showed negative change in 2023 compared to 2013. In French-language school systems, positive change was observed in Manitoba and Ontario; no change was observed in Alberta and Quebec; and negative change was found in the remaining provinces (Table 1.28; Figure 1.18; Appendices B.1.31, B.1.33).
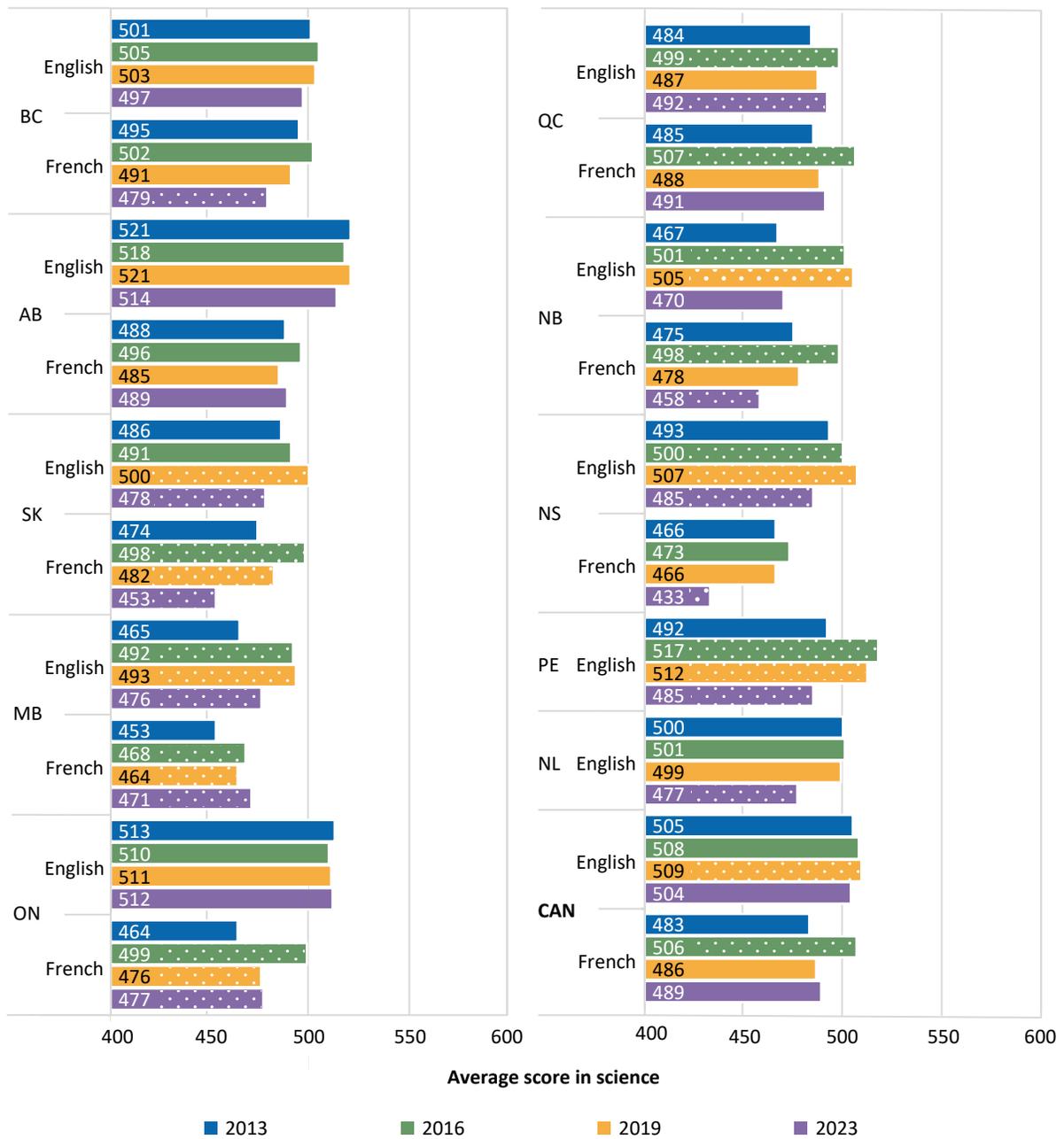
Note: Dotted bars denote significant difference compared to baseline year 2013

The results by gender are also variable. A positive change was observed for both females and males in Manitoba in 2023 compared to 2013. In contrast, average scores of female students declined in Alberta, New Brunswick, Nova Scotia, Prince Edward Island, and Newfoundland and Labrador. Scores for females remained the same in the other four provinces. In contrast to the results in Manitoba, average scores for males declined in Saskatchewan and Newfoundland and Labrador, but no change was observed in the remaining seven provinces (Table 1.28; Figure 1.19; Appendices B.1.32, B.1.33).

FIGURE 1.19 Canadian and provincial average scores in science by gender, 2013–2023

Average score in science

■ 2013   ■ 2016   ■ 2019   ■ 2023
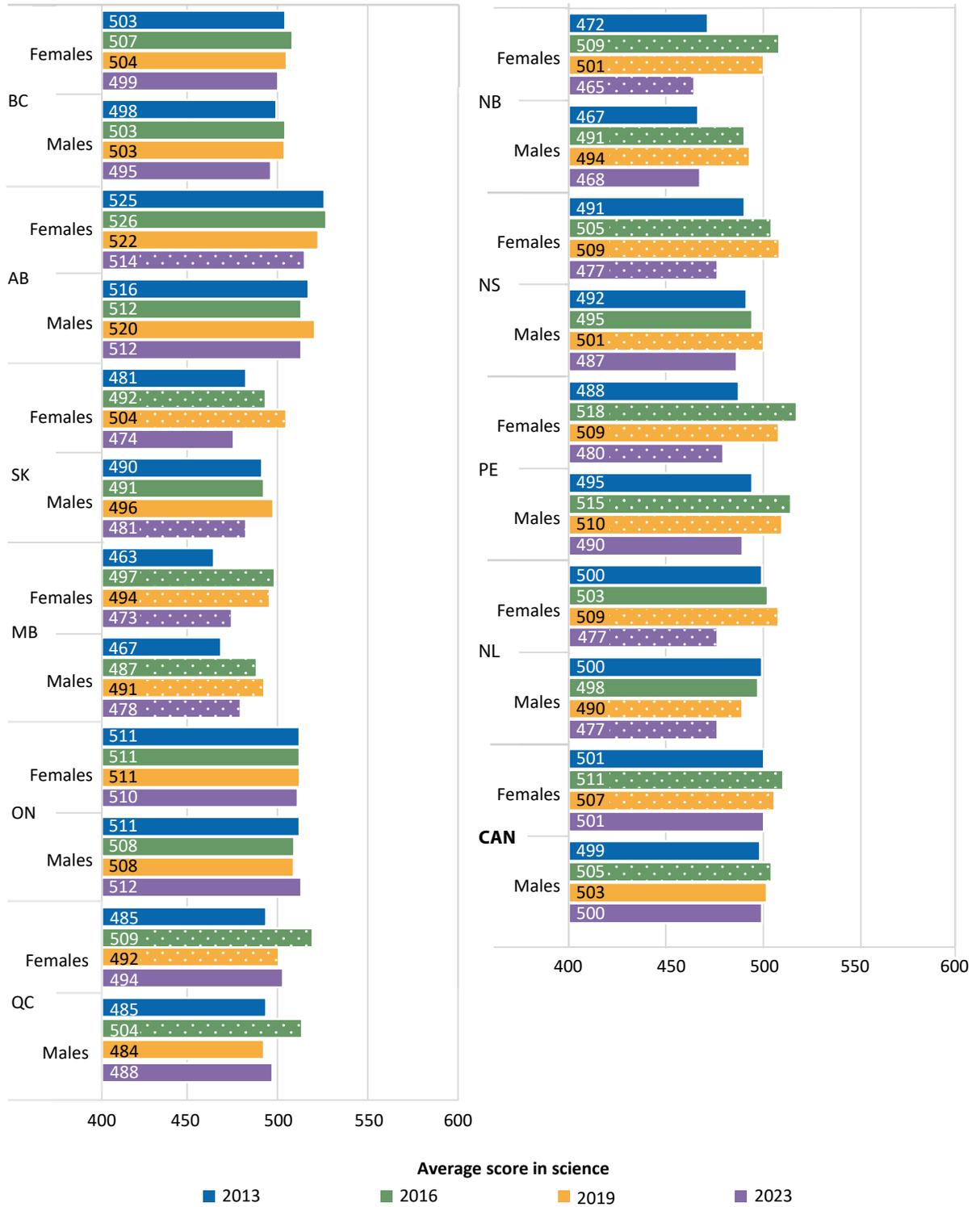
Note: Dotted bars denote significant difference compared to baseline year 2013

TABLE 1.28 Summary of changes in provincial average scores in science, 2013–2023

Positive change over time*	Negative change over time*	No change over time
Science overall		
Manitoba	Saskatchewan, Nova Scotia, Prince Edward Island, Newfoundland and Labrador	British Columbia, Alberta, Ontario, Quebec, New Brunswick
Subdomains		
Nature of sciences		
British Columbia, Manitoba, New Brunswick	Alberta, Newfoundland and Labrador	Saskatchewan, Ontario, Quebec, Nova Scotia, Prince Edward Island
Life sciences		
Quebec	British Columbia, New Brunswick, Nova Scotia, Newfoundland and Labrador	Alberta, Saskatchewan, Manitoba, Ontario, Prince Edward Island
Physical sciences		
Manitoba	British Columbia, Alberta, Saskatchewan, Ontario, New Brunswick, Nova Scotia, Prince Edward Island, Newfoundland and Labrador	Quebec
Earth sciences		
	British Columbia, Saskatchewan, Manitoba, New Brunswick, Nova Scotia, Prince Edward Island, Newfoundland and Labrador	Alberta, Ontario, Quebec
Competencies		
Scientific inquiry		
Manitoba	Alberta, Saskatchewan, Nova Scotia, Newfoundland and Labrador	British Columbia, Ontario, Quebec, New Brunswick, Prince Edward Island
Problem solving		
	British Columbia, Saskatchewan, Manitoba, Ontario, New Brunswick, Nova Scotia, Prince Edward Island, Newfoundland and Labrador	Alberta, Quebec
Scientific reasoning		
Manitoba, Quebec	British Columbia, Saskatchewan, New Brunswick, Nova Scotia, Prince Edward Island, Newfoundland and Labrador	Alberta, Ontario
Language		
English-language school systems		
Manitoba, Quebec	Saskatchewan, Nova Scotia, Prince Edward Island, Newfoundland and Labrador	British Columbia, Alberta, Ontario, New Brunswick
French-language school systems		
Manitoba, Ontario	British Columbia, Saskatchewan, New Brunswick, Nova Scotia	Alberta, Quebec
Gender		
Females		
Manitoba	Alberta, New Brunswick, Nova Scotia, Prince Edward Island, Newfoundland and Labrador	British Columbia, Saskatchewan, Ontario, Quebec
Males		
Manitoba	Saskatchewan, Newfoundland and Labrador	British Columbia, Alberta, Ontario, Quebec, New Brunswick, Nova Scotia, Prince Edward Island

* Denotes significant difference

Table 1.29 shows the changes in average scores over time at the Canadian and provincial level for the science subdomains. A negative change between the two assessment years is evident in most provinces in physical sciences and Earth sciences. In the nature of sciences, by contrast, half of the provinces had stable results, and two showed positive change; in life sciences, half of the provinces had stables results, and one a had a positive change (Appendices B.1.29, B.1.33).

TABLE 1.29 Changes in Canadian and provincial average scores in science subdomains, 2013–2023

Canada and provinces	Nature of sciences	Life sciences	Physical sciences	Earth sciences
British Columbia	8*	-20*	-10*	-11*
Alberta	-15*	-2	-15*	-4
Saskatchewan	-5	-4	-14*	-17*
Manitoba	15*	0	8*	-9*
Ontario	7	-2	-9*	-5
Quebec	0	9*	0	2
New Brunswick	4*	-6*	-6*	-24*
Nova Scotia	-3	-7*	-18*	-19*
Prince Edward Island	-1	0	-11*	-22*
Newfoundland and Labrador	-12*	-35*	-17*	-29*
Canada	**3**	**-1**	**-7***	**-5***

* Denotes significant difference

Table 1.30 shows the changes in average scores over time at the Canadian and provincial level for the science competencies. A negative change between the two assessment years is evident in most provinces in problem solving. In scientific inquiry, half of the provinces had stable results, and one had a positive change. In scientific reasoning, two provinces had a positive change, and two others had stable results (Appendices B.1.30, B.1.33).

TABLE 1.30 Changes in Canadian and provincial average scores in science competencies, 2013–2023

Canada and provinces	Scientific inquiry	Problem solving	Scientific reasoning
British Columbia	6	-12*	-17*
Alberta	-16*	-6	-3
Saskatchewan	-8*	-18*	-7*
Manitoba	10*	-9*	10*
Ontario	2	-12*	4
Quebec	-2	-4	12*
New Brunswick	0	-22*	-8*
Nova Scotia	-8*	-24*	-7*
Prince Edward Island	-5	-22*	-7*
Newfoundland and Labrador	-14*	-32*	-26*
Canada	**0**	**-10***	**2**

* Denotes significant difference

Tables 1.31 and 1.32 show differences between average scores in 2023 and 2013 at the pan-Canadian and provincial level for the science subdomains by language of the school system and by gender, respectively. With respect to changes over time by language, average scores either declined

or remained stable in all of the subdomains in both English- and French-language school systems in Nova Scotia, and in English-language systems in Prince Edward Island and Newfoundland and Labrador. Scores improved in one subdomain in French-language systems in Alberta and Saskatchewan and in English-language systems in British Columbia and New Brunswick, but otherwise declined or remained stable in those provinces. In the three remaining provinces (Manitoba, Ontario, and Quebec), average scores, in most cases, either improved or remained stable (Table 1.31, Appendix B.1.34).

When we compare scores over time for specific subdomains by language of the school system, we find that the scores of students in French-language school systems in Saskatchewan and Ontario increased in physical sciences, while the scores of their counterparts in English-language systems decreased. In the same subdomain, the scores of students in the English-language school system in British Columbia decreased, while the scores of their peers in the French-language system remained stable; the reverse occurred for students in New Brunswick. In life sciences, the scores of students in the French-language school system in Saskatchewan decreased, while the scores of their counterparts in the English-language system remained stable; in Alberta, Manitoba, Ontario, and Quebec the scores of students in French-language school systems increased, while the score of their peers in English-language systems remained stable. Similarly, in Ontario, average scores of students in the French-language school system increased in the nature of sciences, while the score of students in the English-language system remained stable. In this same subdomain, the scores of students in French-language school systems in British Columbia, Saskatchewan, New Brunswick, and Nova Scotia decreased, while the scores of their peers in English-language systems in Saskatchewan and Nova Scotia remained stable, and those in British Columbia and New Brunswick increased. In Alberta, the results for students in the English-language school system declined in the nature of sciences, while the results in the French-language system were stable. Similarly, in Earth sciences, the scores of students in the English-language school system in Manitoba decreased over time, while the scores of their peers in the French-language system remained stable (Table 1.31, Appendix B.1.34).

TABLE 1.31 Changes in Canadian and provincial average scores in science subdomains, 2013–2023, by language of the school system

Canada and provinces	Nature of sciences		Life sciences		Physical sciences		Earth sciences	
	English	French	English	French	English	French	English	French
British Columbia	8*	-20*	-20*	-21*	-10*	-4	-11*	-16*
Alberta	-14*	-12	-2	28*	-15*	-15*	-4	-12
Saskatchewan	-5	-25*	-3	-10*	-14*	9*	-17*	-29*
Manitoba	14*	10*	0	19*	7*	21*	-8*	-5
Ontario	7	9*	-2	9*	-9*	12*	-5	-1
Quebec	0	0	5	10*	1	0	4	2
New Brunswick	12*	-18*	-5*	-8*	-3	-13*	-22*	-30*
Nova Scotia	-2	-26*	-5*	-38*	-18*	-16*	-17*	-53*
Prince Edward Island	0		0		-11*		-23*	
Newfoundland and Labrador	-12*		-35*		-18*		-29*	
Canada	**4**	**0**	**-5***	**9***	**-10***	**0**	**-6***	**0**

* Denotes significant difference

With respect to gender, in the majority of provinces, average scores across the subdomains were more likely to decline or remain stable than to increase for both female and male students. The exception was Manitoba, which saw positive change for both genders in the nature of sciences, as well as positive change for female students in life sciences and physical sciences (Table 1.32, Appendix B.1.35).

TABLE 1.32 Changes in Canadian and provincial average scores in science subdomains, 2013–2023, by gender

Canada and provinces	Nature of sciences		Life sciences		Physical sciences		Earth sciences	
	Females	Males	Females	Males	Females	Males	Females	Males
British Columbia	12*	4	-23*	-17*	-7	-13*	-6	-15*
Alberta	-17*	-12*	-5	3	-20*	-11*	-10	2
Saskatchewan	-3	-8*	0	-7	-8*	-18*	-14*	-19*
Manitoba	17*	12*	7*	-7*	13*	2	-2	-15*
Ontario	7	6	0	-4	-7	-10*	-5	-5
Quebec	0	-1	6	11*	5	-5	5	-1
New Brunswick	4	3	-7*	-7*	-3	-8*	-17*	-31*
Nova Scotia	-4	-3	-5*	-9*	-13*	-23*	-13*	-24*
Prince Edward Island	13*	-15*	-2	0	-4	-19*	-13*	-32*
Newfoundland and Labrador	-7	-15*	-35*	-37*	-12*	-23*	-36*	-22*
Canada	**4**	**3**	**-2**	**-1**	**-5***	**-9***	**-4**	**-7***

* Denotes significant difference

Tables 1.33 and 1.34 show differences between achievement scores in 2023 and 2013 at the pan-Canadian and provincial level for the science competencies by language of the school system and by gender, respectively. Negative change in average scores in each of the competencies was more common than either positive change or no change in the school systems in six provinces (in both English- and French-language school systems in British Columbia, Saskatchewan, New Brunswick, and Nova Scotia, and in English-language systems in Prince Edward Island and Newfoundland and Labrador). In the other four provinces, average scores, in most instances, either improved or remained stable (Table 1.33, Appendix B.1.36).

When we compare average scores over time within specific competencies by language of the school systems, we find that students in the English-language school system in New Brunswick saw improvement in their average scores in scientific inquiry while the scores of their counterparts in the French-language school system declined. In problem solving, the scores of students in English-language school systems in Manitoba and Ontario declined, while the scores of students in French-language systems in these two provinces remained stable. Similarly, in scientific reasoning, the scores of students in the English-language school system in British Columbia declined, while the scores of their peers in the French-language system remained stable. The reverse was found in scientific inquiry in British Columbia, where the results for students in the French-language school system declined while the results for their peers in the English-language system were stable. In Alberta and Ontario, the scores of students in French-language school systems improved in scientific reasoning, while the scores of students in English-language systems remained stable in this competency (Table 1.33, Appendix B.1.36).

TABLE 1.33 Changes in Canadian and provincial average scores in science competencies, 2013–2023, by language of the school system

Canada and provinces	Scientific inquiry		Problem solving		Scientific reasoning	
	English	French	English	French	English	French
British Columbia	6	-27*	-12*	-21*	-17*	-7
Alberta	-15*	-19*	-6	9	-3	17*
Saskatchewan	-7*	-23*	-18*	-22*	-7*	-5*
Manitoba	10*	6*	-9*	4	9*	22*
Ontario	3	5	-12*	-5	3	19*
Quebec	1	-2	-5	-3	10*	13*
New Brunswick	8*	-20*	-18*	-32*	-6*	-13*
Nova Scotia	-6*	-31*	-21*	-73*	-5*	-16*
Prince Edward Island	-4		-22*		-7*	
Newfoundland and Labrador	-15*		-32*		-26*	
Canada	**0**	**-3**	**-11***	**5**	**-1**	**13***

* Denotes significant difference

With respect to gender, scores either declined or were stable across the provinces in each of the competencies for both genders, with the exceptions of Manitoba, Quebec, and Prince Edward Island. Positive change was found in Manitoba for both genders in scientific inquiry and for female students in scientific reasoning. In Quebec, positive change was found for both genders in scientific reasoning. In Prince Edward Island, there was an improvement in the scores of female students in scientific inquiry (Table 1.34, Appendix B.1.37).

TABLE 1.34 Changes in Canadian and provincial average scores in science competencies, 2013–2023, by gender

Canada and provinces	Scientific inquiry		Problem solving		Scientific reasoning	
	Females	Males	Females	Males	Females	Males
British Columbia	7	5	-11*	-13*	-12*	-21*
Alberta	-21*	-10	-2	-10	-12*	7
Saskatchewan	-7	-9*	-11*	-24*	-4	-12*
Manitoba	11*	9*	0	-17*	17*	3
Ontario	0	4	-11*	-13*	7	-2
Quebec	-3	-2	-1	-7*	15*	11*
New Brunswick	1	-1	-23*	-21*	-3	-14*
Nova Scotia	-11*	-4	-19*	-29*	0	-12*
Prince Edward Island	10*	-21*	-19*	-24*	0	-14*
Newfoundland and Labrador	-15*	-13*	-31*	-33*	-25*	-26*
Canada	**-1**	**1**	**-8***	**-12***	**4***	**0**

* Denotes significant difference

Summary

This chapter has presented information on the performance of Canadian students in the PCAP 2023 science assessment. The assessment focused on curricular outcomes that are common to provinces and territories at the Grade 8/Secondary II level.

In 2023, 89 percent of students in Canada overall reached or exceeded the expected level of performance (Level 2), while 12 percent reached the highest level of performance (Level 4). The percentage of students reaching the expected level of performance in 2023 decreased from the baseline year of 2013, from 92 to 89 percent.

With respect to average scores, the Canadian average for science overall in PCAP 2023 was 501, with provincial scores ranging from a low of 458 to a high of 513. There was no significant difference between the average score in Canada overall in 2023 compared to 2013. At the provincial level, a positive change in science scores was found in Manitoba, while no significant change was found in five other provinces (British Columbia, Alberta, Ontario, Quebec, and New Brunswick).

Given that PCAP 2023 marks the second time that science was the primary domain, this chapter reported on changes over time for the science subdomains and competencies. Although negative changes predominate, the results reflect variability among the provinces. For student achievement in the subdomains, in Canada overall, scores decreased in 2023 compared to 2013 in physical sciences and Earth sciences, with no significant change over time in the other two subdomains. In contrast, at the provincial level, scores improved in the nature of sciences in British Columbia, Manitoba, and New Brunswick; in life sciences in Quebec; and in physical sciences in Manitoba. In terms of student achievement in the competencies, in Canada overall, scores remained stable in 2023 compared to 2013 in scientific inquiry and scientific reasoning, and decreased in problem solving. At the provincial level, scores improved in scientific inquiry and scientific reasoning in Manitoba, and in scientific reasoning in Quebec.

This chapter has also presented results by language of the school system (both English- and French-language as well as majority- and minority-language). A similar percentage of students from English- and French-language school systems reached or exceeded the expected level of performance in Canada overall (89 and 87 percent, respectively). This trend was also observed at the provincial level in Manitoba and Quebec. In the remaining provinces, a greater percentage of students in English-language school systems reached or exceeded the expected level of performance compared to their counterparts in French-language school systems.

In terms of average scores, equity between the language systems was achieved in Manitoba and Quebec, with an achievement gap favouring English- or majority-language school systems in all other provinces for which reliable data are available. In Canada overall, science achievement was stable for students in both school systems in 2023 compared to the baseline year of 2013. Provincially, the results over time by language of the school system are variable. Positive changes were observed in both the English- and French-language school systems in Manitoba, as well as in the English-language school system in Quebec, and the French-language school system in Ontario.

With respect to gender, no gender gap in average scores in science for Canada overall was observed in 2023, a finding that is consistent with the results from the baseline year of 2013. Provincially, no gender gap was found in average scores in 2023 in British Columbia, Alberta, Ontario, Quebec, or Newfoundland and Labrador. In the remaining provinces, males outperformed females, except in

New Brunswick (French-language school system), where females outperformed males. Compared to the baseline year, science scores in 2023 remained stable for both females and males in Canada overall and in three provinces. Scores improved for both females and males in only one province, Manitoba.

2 READING ASSESSMENT

Reading was a minor domain in PCAP 2023, and so the reading section of the assessment contained fewer items compared to the major domain of science. As a result, PCAP 2023 allows for an update only on overall achievement in reading. Thus, this chapter does not report on the reading subdomains or on performance levels. It reports on average scores of Grade 8/Secondary II students in reading overall, as well as by language and gender, and on changes in reading scores over time.

Defining reading

In Canada, all curricula seek to develop student literacy in the broadest sense of the word, including the ability to understand, critically analyze, and create a variety of forms of communication (i.e., oral, written, visual, digital, and multimedia). These curricula recognize that reading is a cross-curricular skill necessary in all school subjects, as well as a life skill with applications beyond the classroom.

The conceptual framework for the reading component of PCAP was shaped by careful attention to Canadian curriculum guidelines for those classes that serve Grade 8/Secondary II students, and it reflects provincial and territorial language arts curricula, of which literacy is an integral component.

The reading framework for PCAP 2023 has not been altered from that used to define reading performance in the 2016 assessment, in which reading was the major domain for the second time. This continuity enables comparisons over time between cohorts.

While the reading component of the first cycle of the PCAP assessment focused solely on the process of reading, the second cycle combined two terms: reading and literacy. Adding the term "literacy" broadens the meaning of the ability to read to include skills that will be relevant throughout life for attaining individual and societal goals (Mullis et al., 2009; OECD, 2013; Smith et al., 2000).

In PCAP, "reading literacy" is defined as the ability to construct meaning from texts through understanding, interpreting, and responding personally and critically to text content in order to make sense of the world and participate in society. It also includes metacognitive competencies that allow for awareness and application of different reading strategies appropriate to a given context.

The reader

In order to make meaning of a text, readers must make a connection between what is in the text and what they know or bring to the text. Readers' personal experiences, real or vicarious, allow greater or lesser access to the content and forms of what they read. As readers, students have varying degrees of knowledge related to language and texts, facility with language strategies, and knowledge of the way language works in print and in the digital world.

The text

Definitions of "text" have evolved over time in parallel with changes in technological culture and society. In the contemporary world, the notion of "text" has expanded and is now used to describe any language event (see, for instance, the *Foundation for the Atlantic Canada English Language Arts Curriculum*[12]). In this context, communication that uses words, graphics, sounds, and/or images in print, oral, visual, or digital form to present information and ideas can be considered a text. This expanded concept of "text" takes into account the diverse range of language forms with which people interact and from which they construct meaning.

In their studies as well as their lives outside of school, students must engage with a variety of print and digital texts, such as those generally considered fiction, non-fiction, or a combination of the two. Examples could include short stories, poetry, novels, plays, comics, video clips, pamphlets, labels, instructions, magazine articles, editorials, websites, or online exchanges. Within that range, texts have different degrees of complexity in terms of structure, vocabulary, syntax, organization, ideas, rhetorical devices, and subject matter. The form or type of a particular text plays a part in determining students' success in accessing it.

The reader's purpose

The purpose of a reading activity affects the reader's construction of meaning. Students read texts for a variety of purposes, ranging from the pleasure they get from the text's content and style to the practical information they acquire or point of view to which they are exposed when engaging with it. A student's purpose for reading a particular text also influences the strategies and stance they take toward the text. Texts of any type may be read for many different purposes. Although particular forms or types of text are often considered aesthetic or pragmatic in intention, the reader's purpose may differ from that intent. For example, social studies students may be required to read a novel or access a website to develop knowledge of a particular culture, era, or event.

The context

Context is important in any reading act because it affects the stance the reader takes toward the text. "Context" refers specifically to the physical, emotional, social, and institutional environment at the time of reading. It includes where, when, and why the student is reading. One of the challenges of large-scale assessment is that it is inescapably a testing situation, which, in turn, influences the state of mind the student brings to the reading act. Pre-reading prompts in the PCAP reading assessment offer some sense of context beyond the testing situation.

"Context" also refers more broadly to the worldview of the reader. Any meaning constructed by a reader is a reflection of the social and cultural environment in which the reader lives and reads (Bruffée, 1986; Emerson, 1983; Gee, 1996; Heath, 1983; UNESCO, 2011). Peers, family, and community values affect the stance readers take as they engage with text. This interrelationship is described for print media by Johnston and Costello (2005): "Although we often think of literacy as a set of all-purpose skills and strategies to be learned, it is more complex, more local, more personal, and more social than that. Becoming literate involves developing identities, relationships, dispositions, and values as much as acquiring strategies for working with print" (p. 256).

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[12] Available at https://www.gov.nl.ca/education/files/k12_curriculum_documents_english_english.pdf.

The interaction

Contemporary concepts associated with reading recognize that the process of reading involves the interaction of reader, text, purpose, and context before, during, and after reading. These interactions are critical for print media (Binkley & Linnakylä, 1997; Bruner, 1990) and even more so for digital media, where the sociocultural contexts are more complex (Legros & Crinon, 2002). Reading does not involve a finite set of discrete skills, knowledge, and concepts. Rather, it is a process of continuous growth in which readers constantly expand the boundaries of their understanding and interpretation of and response to texts. In doing so, they refine their fluency in the interactive processes involved in reading (Paris, 2005).

In light of the interactive processes involving reader, text, purpose, and context, the PCAP assessment of reading literacy considers both readers' engagement with text and their response to it.

The subdomains of reading

Language arts curricula across Canada identify the following major aspects, or subdomains, of reading literacy:

- understanding texts
- interpreting texts
- responding personally and critically to texts

These three subdomains are parallel to Gray's (1960) distinction between "reading the lines," "reading between the lines," and "reading beyond the lines" — terms commonly used by Canadian teachers. A more detailed description of the reading domain and subdomains is provided in Chapter 3 of *PCAP 2023: Assessment Framework* (CMEC, 2024).

Results in reading

This chapter presents the average scores in reading achievement for Canada overall and by province. Results are also discussed by language, gender, and performance over time.

Results in reading by average score

The PCAP 2023 average scores in reading are reported on the PCAP scale, which has a range of 0 to 1000. In PCAP 2007, when reading was the major domain for the first time, the Canadian average was set at 500, with a standard deviation of 100. PCAP 2007 assessed 13-year-olds, but, in order to minimize the disruption to classrooms and schools, PCAP 2010 switched to sampling Grade 8/ Secondary II classes. To accommodate this change in the target population and to enhance the validity of comparisons over time, analysts isolated the data on Grade 8/Secondary II students from the 2007 sample, so that only these data would be used for comparisons.[13] The baseline for reading was changed to PCAP 2010, and the scale was reset to 500 in that year. Within PCAP, changes over time are typically determined by comparison to the year in which the subject was first the major domain, as those assessments involve a larger number of items in that domain and broad coverage

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[13] More detailed information on the process used to ensure a valid comparison can be found in *PCAP 2013: Technical Report* (O'Grady & Houme, 2015).

of the subdomains. Because reading was a minor domain in the adjusted baseline year of 2010, it is necessary to exercise caution when interpreting results for reading trends over time.

To facilitate direct comparisons over time, the Canadian average of 500, established in the adjusted baseline year of 2010, has not been rescaled to 500 in subsequent years. In PCAP 2023, the Canadian average for reading was 505, with a standard error of 1.6. The box on statistical comparison in the Introduction provides additional information on interpreting results.

Figure 2.1 provides the average scores in the PCAP 2023 reading assessment of Grade 8/Secondary II students for all the provinces and indicates how they compare to the average score for Canada overall. Students in Ontario achieved results higher than the average score for Canada overall. Students in British Columbia, Alberta, and Quebec achieved results that are statistically similar to the Canadian average, while students in Saskatchewan, Manitoba, New Brunswick (both English- and French-language school systems), Nova Scotia, Prince Edward Island, and Newfoundland and Labrador achieved results below the Canadian average (Appendix B.2.1).

FIGURE 2.1 Canadian and provincial average scores in reading

BC	AB	SK	MB	ON	QC	NB (EN)	NB (FR)	NS	PE	NL	**CAN**
502	508	486	483	514	503	484	468	488	500	485	505
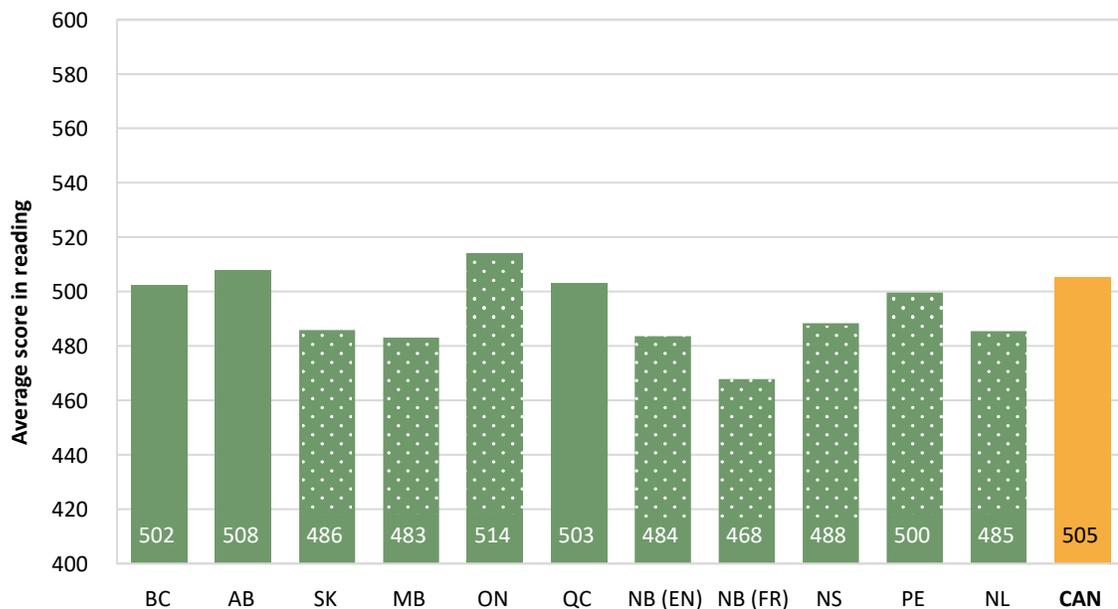
Note: Dotted bars denote significant difference compared to Canada

Table 2.1 shows comparisons of reading achievement among provinces as well as between provinces and Canada overall (Appendices B.2.1, B.2.2). (To read the chart, choose a province from the left-hand column. Read across the row to compare its average score with that of a specific province or Canada overall, as listed along the top of the chart. The symbols indicate whether a province's average score is above, below, or similar to that of the comparison province or Canada.)

TABLE 2.1 Comparison of average scores in reading, among provinces and with Canada

Canada and provinces	Average score	Standard error	BC	AB	SK	MB	ON	QC	NB (EN)	NB (FR)	NS	PE	NL	CAN
BC	502	2.6		○	○	▲	○	○	▲	▲	▲	○	▲	○
AB	508	4.3	○		○	▲	○	○	▲	▲	▲	○	▲	○
SK	486	2.6	○	○		○	▼	○	○	▲	○	▼	○	▼
MB	483	2.0	▼	▼	○		▼	▼	○	▲	○	▼	○	▼
ON	514	3.2	○	○	▲	▲		○	▲	▲	▲	▲	▲	▲
QC	503	3.4	○	○	○	▲	○		▲	▲	○	○	▲	○
NB (EN)	484	0.0	▼	▼	○	○	▼	▼		▲	▼	▼	○	▼
NB (FR)	468	0.8	▼	▼	▼	▼	▼	▼	▼		▼	▼	▼	▼
NS	488	0.6	▼	▼	○	○	▼	○	▲	▲		▼	○	▼
PE	500	0.0	○	○	▲	▲	▼	○	▲	▲	▲		▲	▼
NL	485	0.6	▼	▼	○	○	▼	▼	○	▲	○	▼		▼
CAN	**505**	**1.6**	○	○	▲	▲	▼	○	▲	▲	▲	▲	▲	

Note: Comparisons are adjusted using the Bonferroni correction as follows: (*p* <.0009, *t*-value = 3.32) for multicomparisons among the provinces, and (*p* <.0045, *t*-value = 2.84) for those between each province and Canada.

▲   Average score significantly higher than that of comparison province or Canada

○   Average score not significantly different from that of comparison province or Canada

▼   Average score significantly lower than that of comparison province or Canada

Results in reading by language

In this section, results are presented by language of the school system (both English- and French-language as well as minority- and majority-language systems). In Canada overall, students in English-language and French-language school systems achieved similar average scores in reading (Figure 2.2, Appendix B.2.3). This result is consistent with the results reported for PIRLS 2016, which found no significant difference between the two language systems in reading at the Grade 4 level (Brochu et al., 2018). However, this finding differs from the results reported in PCAP 2016 (O'Grady, Fung, et al., 2018) and 2019 (O'Grady, Houme, et al., 2021) and for Canadian 15-year-olds in the PISA assessment in 2018 (O'Grady, Deussing, et al., 2019) and 2022 (Elez et al., 2023): in all of those assessments, students in English-language school systems outperformed their peers in French-language schools systems in reading. At the provincial level, PCAP 2023 reading scores in English-language school systems ranged from 516 in Ontario to 483 in Manitoba. In French-language school systems, scores ranged from 504 in Quebec to 438 in Nova Scotia (Appendix B.2.3).

FIGURE 2.2 Canadian average scores in reading by language of the school system
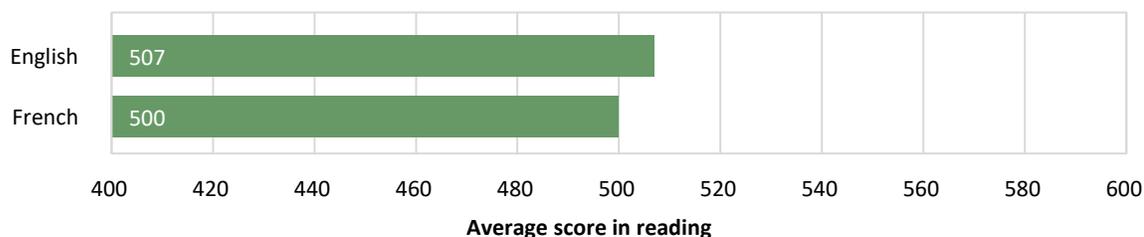
Table 2.2 presents a comparison of provincial achievement scores in reading with the Canadian averages for both English- and French-language school systems. Students in English-language school systems in Ontario and French-language school systems in Quebec had scores that were significantly above the respective Canadian averages. Students in both English- and French-language school systems in Alberta scored at the respective Canadian averages, and students in English-language school systems in British Columbia and Quebec scored at the Canadian English average. The reading achievement scores for students in both English- and French-language school systems in all remaining provinces for which reliable data are available were below the respective Canadian averages (Appendix B.2.3).

TABLE 2.2 Comparison of Canadian and provincial average scores in reading by language of the school system

English-language school systems		
Above* the Canadian average	**At the Canadian average**	**Below* the Canadian average**
Ontario	British Columbia, Alberta, Quebec	Saskatchewan, Manitoba, New Brunswick, Nova Scotia, Prince Edward Island, Newfoundland and Labrador
French-language school systems		
Above* the Canadian average	**At the Canadian average**	**Below* the Canadian average**
Quebec	Alberta	British Columbia, Saskatchewan, Manitoba, Ontario, New Brunswick, Nova Scotia

*Denotes significant difference

In Canada overall, students in majority-language school systems scored 21 points higher than their peers in minority-language school systems in reading (Figure 2.3, Appendix B.2.4). Reading scores across the provinces in the majority-language school systems ranged from 483 in Manitoba to 516 in Ontario. In the minority-language school systems, scores ranged from 438 in Nova Scotia to 500 in Quebec (Appendix B.2.4).

FIGURE 2.3 Canadian average scores in reading by majority- and minority-language school systems
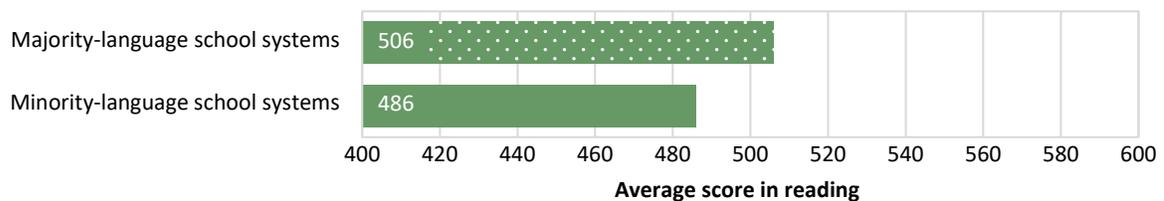
Note: See the Introduction for a definition of majority- and minority-language school systems. Dotted bar denotes significant difference between the two groups

Table 2.3 presents a comparison of provincial scores in reading with the Canadian averages for both majority- and minority-language school systems. In majority-language school systems, students in Ontario scored above the Canadian average, while the scores of students in British Columbia, Alberta, and Quebec were at the Canadian average. In minority-language school systems, students in Quebec scored above the Canadian average, while the scores for students in Alberta, Manitoba, and Ontario were at the Canadian average. The scores for students in all remaining provinces for which reliable data are available were below the respective Canadian averages for majority- and minority-language school systems (Appendix B.2.4).

TABLE 2.3 Comparison of Canadian and provincial average scores in reading by majority- and minority-language school systems

Majority-language school systems		
Above* the Canadian average	**At the Canadian average**	**Below* the Canadian average**
Ontario	British Columbia, Alberta, Quebec	Saskatchewan, Manitoba, New Brunswick, Nova Scotia, Prince Edward Island, Newfoundland and Labrador
Minority-language school systems		
Above* the Canadian average	**At the Canadian average**	**Below* the Canadian average**
Quebec	Alberta, Manitoba, Ontario	British Columbia, Saskatchewan, New Brunswick, Nova Scotia

*Denotes significant difference
Note: See the Introduction for a definition of majority- and minority-language school systems.

Figure 2.4 illustrates the achievement gap in reading between English- and French-language school systems (Appendix B.2.3). Provincially, equity in reading scores between English- and French-language school systems — and between majority- and minority-language school systems (Appendix B.2.4) — was achieved in Manitoba and Quebec. In the remaining provinces for which reliable data are available, students in English-language school systems and majority-language school systems outperformed their counterparts in French-language school systems and minority-language school systems (Appendices B.2.3, B.2.4).
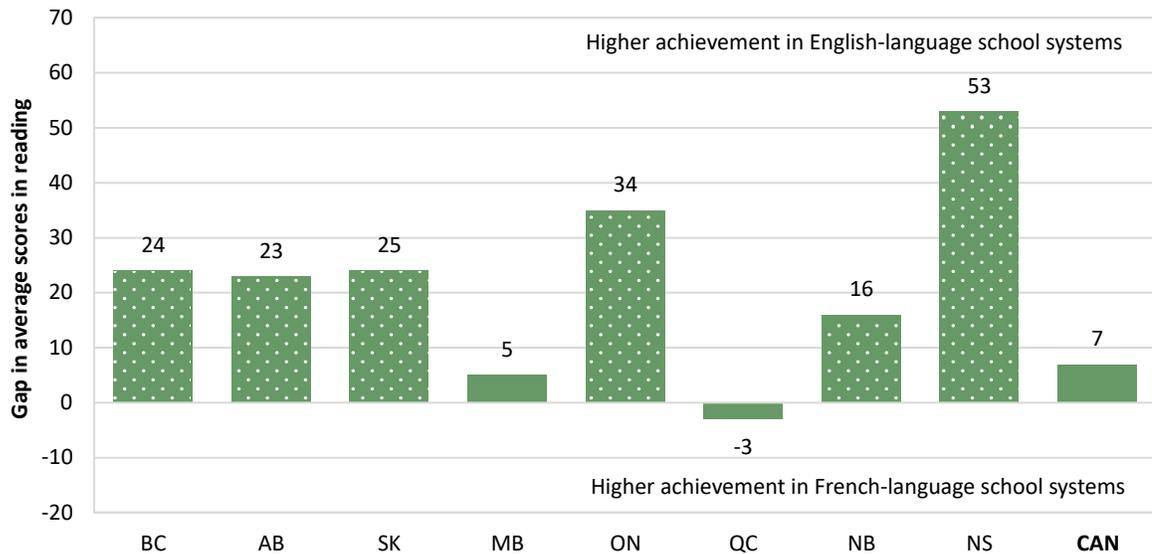
Note: Numbers are achievement scores in English-language school systems minus those in French-language school systems. Dotted bars denote significant difference within Canada or within a province

Results in reading by gender

Similar to previous PCAP administrations (O'Grady & Houme, 2014; O'Grady, Fung, et al. 2018; O'Grady, Houme, et al. 2021), in PCAP 2023, females performed significantly better than males in reading at the pan-Canadian level (Figure 2.5, Appendix B.2.5). On average, females outperformed males by 16 points. A persistent gender gap in reading favouring females is consistent with large-scale international studies measuring achievement in reading at the Grade 4 level (e.g., PIRLS 2016: Brochu et al., 2018), at age 15 (e.g., PISA 2022: Elez et al., 2023), and among adults (ages 16 to 65, e.g., Programme for International Assessment of Adult Competencies (PIAAC), 2012, unpublished data). Interestingly, Summers (2013) reported that women were more socially engaged with reading than were men, and were more likely to be involved with book clubs and social networks to discuss books, while men were more likely to use online media (e.g., recommendations from podcasts, respected public figures, and blogs) to find books that they are interested in reading. Such findings may provide insight into teaching and learning strategies that could lead to improvements in reading achievement.

FIGURE 2.5 Canadian average scores in reading by gender
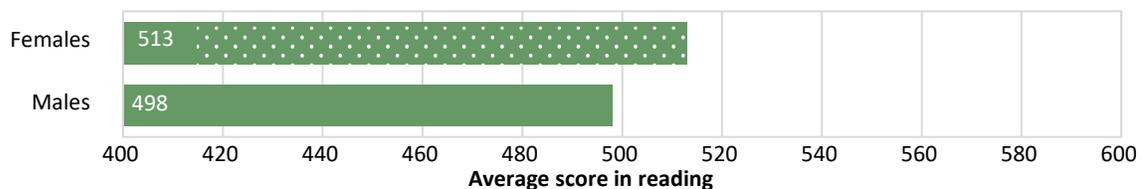
Note: Dotted bar denotes significant difference between the two groups

Table 2.4 compares Canadian and provincial average scores for females and males in reading. Female students in British Columbia, Alberta, Ontario, and Quebec achieved scores similar to the Canadian average for females. Male students in Ontario scored above the Canadian average for males, while those in British Columbia, Alberta, Quebec, and Prince Edward Island achieved scores similar to the Canadian averages for males. In all other provinces, both genders scored below the respective Canadian average scores for females and males (Appendix B.2.5).

TABLE 2.4 Comparison of Canadian and provincial average scores in reading by gender

Females		
Above* the Canadian average	**At the Canadian average**	**Below* the Canadian average**
	British Columbia, Alberta, Ontario, Quebec	Saskatchewan, Manitoba, New Brunswick (EN and FR), Nova Scotia, Prince Edward Island, Newfoundland and Labrador
Males		
Above* the Canadian average	**At the Canadian average**	**Below* the Canadian average**
Ontario	British Columbia, Alberta, Quebec, Prince Edward Island	Saskatchewan, Manitoba, New Brunswick (EN and FR), Nova Scotia, Newfoundland and Labrador

*Denotes significant difference

At the provincial level, a gender gap in reading favouring female students was found in all provinces except Alberta (Figure 2.6, Appendix B.2.5). Differences ranged from 3 points in Prince Edward Island to 35 points in New Brunswick (French-language school system).

FIGURE 2.6 Gap in average scores in reading in Canada and the provinces by gender
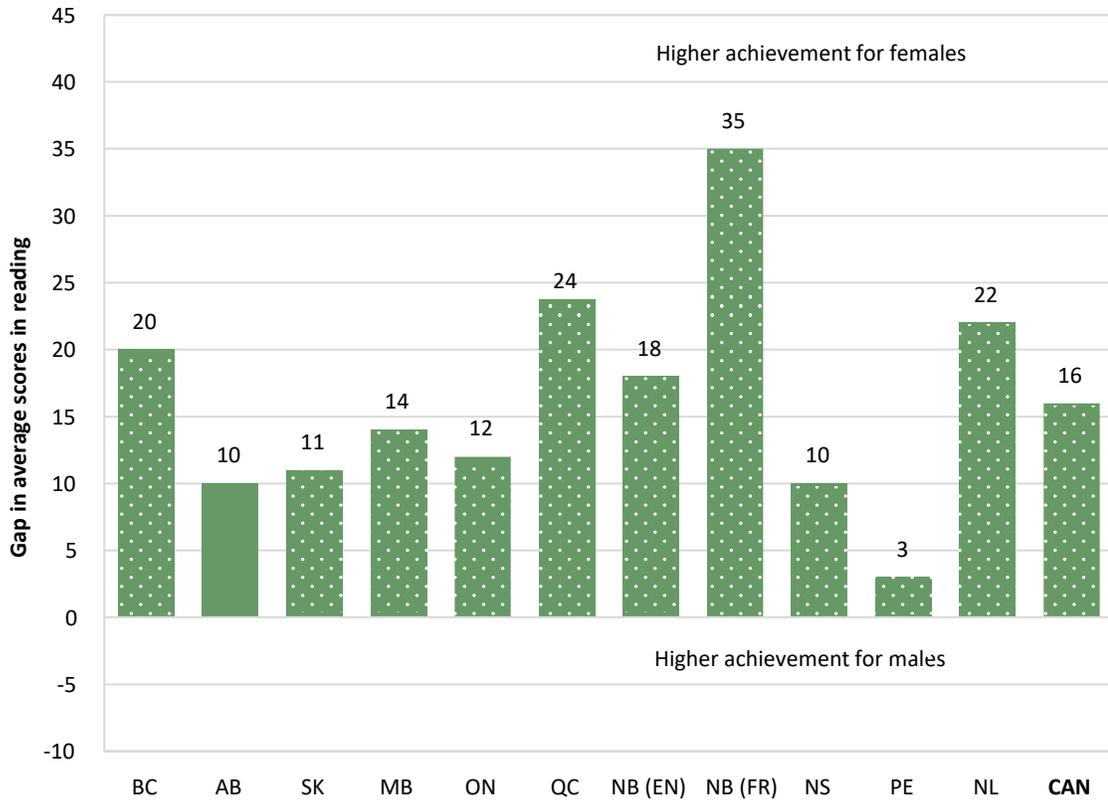
Note: Numbers are achievement scores of female students minus those of male students. Dotted bars denote significant difference within a province or Canada

Change in reading performance over time

Although reading was the major domain in PCAP 2007, changes in sampling, discussed above, render comparisons between that year and the 2023 assessment problematic, and so PCAP 2010 is used as the basis for comparison with PCAP 2023. Changes over time in reading at the pan-Canadian level are shown in Figure 2.7 and summarized in Table 2.5 (Appendices B.2.6, B.2.7, B.2.8).

FIGURE 2.7 Canadian average scores in reading, 2010–2023

Category	2010	2013	2016	2019	2023
Overall reading	500	508	507	505	505
English	507	510	509	509	507
French	480	501	500	490	500
Females	515	521	521	521	513
Males	489	494	494	490	498

Average score in reading

■ 2010   ■ 2013   ■ 2016   ■ 2019   ■ 2023
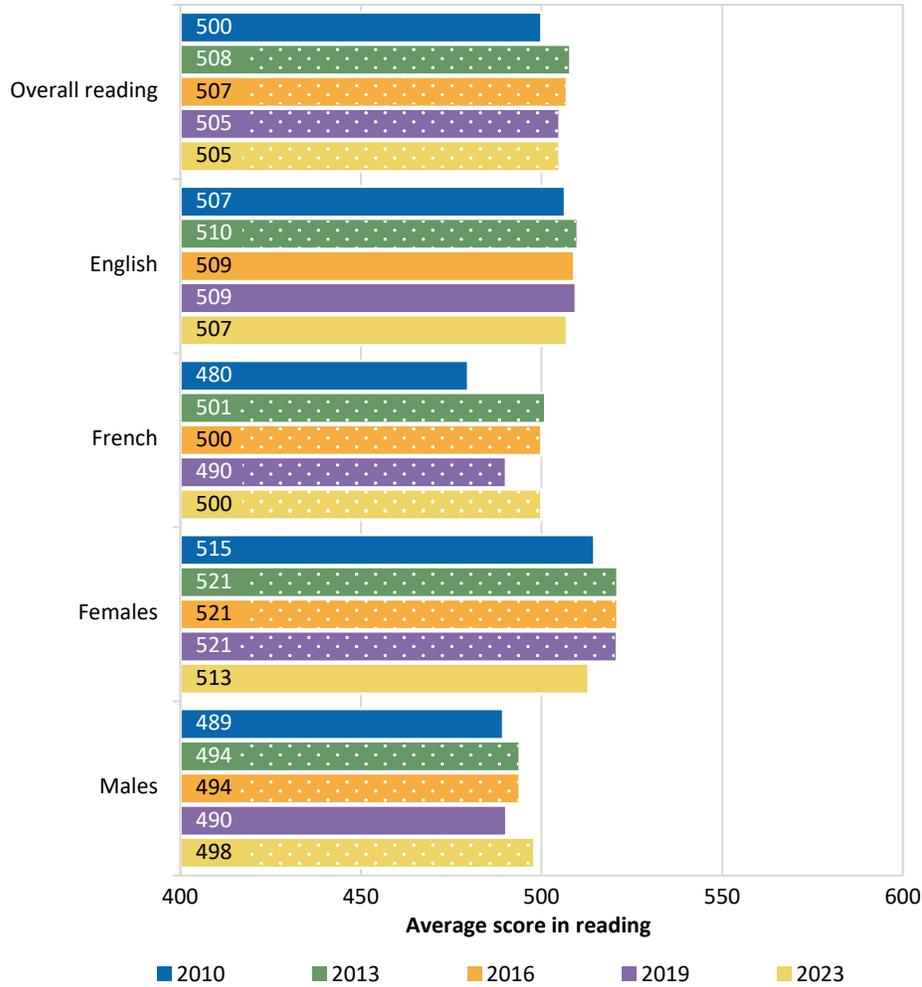
Note: Dotted bars denote significant difference compared to adjusted baseline year 2010

For overall reading in Canada, there was a five-point gain in achievement in 2023 from 2010 (Figure 2.7). Provincially, a positive change in reading overall was found between these two assessments in Quebec and Prince Edward Island; results in the remaining provinces were stable (Figure 2.8, Table 2.6, Appendix B.2.6).

FIGURE 2.8 Canadian and provincial average scores in reading, 2010–2023
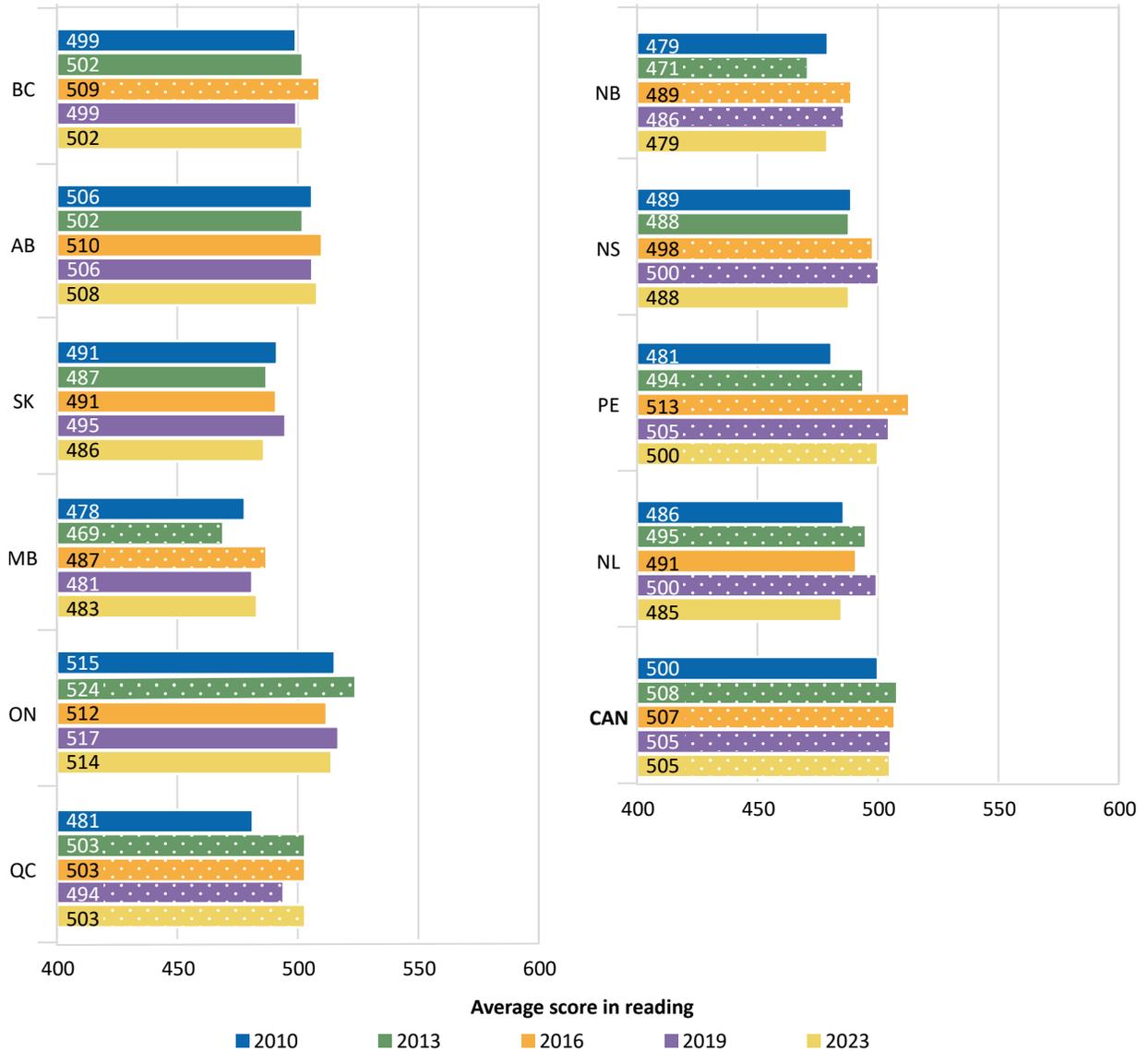
	2010	2013	2016	2019	2023
BC	499	502	509	499	502
AB	506	502	510	506	508
SK	491	487	491	495	486
MB	478	469	487	481	483
ON	515	524	512	517	514
QC	481	503	503	494	503
NB	479	471	489	486	479
NS	489	488	498	500	488
PE	481	494	513	505	500
NL	486	495	491	500	485
CAN	500	508	507	505	505

Average score in reading

■ 2010 ■ 2013 ■ 2016 ■ 2019 ■ 2023

Note: Dotted bars denote significant difference compared to adjusted baseline year 2010

When reading results were examined by the language of the school system for Canada overall, a positive change was found in French-language school systems in 2023 compared to 2010, while the results were stable in English-language school systems. In 2023, there was no achievement gap between language groups, while, in 2010, an achievement gap favouring English-language school systems was found (Table 2.5, Figure 2.7).

TABLE 2.5 Summary of Canadian average scores in reading, 2010 and 2023

	2010	2023	Change over time
Overall reading	500	505	5*
English-language school systems	507	507	0
French-language school systems	480	500	20*
Achievement gap (EN - FR)	27*	7	
Females	515	513	-2
Males	489	498	9*
Achievement gap (F - M)	26*	16*	-

*Denotes significant difference

Note: Numbers may differ from those expected due to rounding. Tests for significance have not been performed for change over time for achievement gaps due to the standard error of the difference in score change over time being disproportionately high relative to the difference in change over time. While a test of significance with a high standard error can be conducted, the resulting inferences would be highly inaccurate and unreliable, given that the test of significance would be performed using point estimates that are highly inaccurate.

Provincially, the greatest improvement in 2023 compared to 2010 was found in the French-language school system in Quebec (24 points), while the greatest negative change was found in the French-language school system in Nova Scotia (37 points) (Figure 2.9, Appendix B.2.7).

As shown in Figure 2.9 and Table 2.6, PCAP 2023 saw a positive change in reading achievement compared to 2010 in both English- and French-language school systems in Quebec, in the English-language school system in Prince Edward Island, and in French-language school systems in British Columbia and Manitoba. In contrast, a negative change was found in the French-language system in Nova Scotia. Results in both English- and French-language school systems in Alberta, Saskatchewan, Ontario, and New Brunswick were stable, as were those in English-language school systems in British Columbia, Manitoba, Nova Scotia, and Newfoundland and Labrador (Appendix B.2.7).

FIGURE 2.9 Canadian and provincial average scores in reading by language of the school system, 2010–2023

	BC English	BC French	AB English	AB French	SK English	SK French	MB English	MB French	ON English	ON French
2010	499	473	506	490	492	468	478	468	517	481
2013	502	499	503	473	487	478	469	471	526	481
2016	509	478	511	481	491	476	488	450	513	485
2019	500	477	506	475	495	473	482	457	519	468
2023	503	479	508	485	486	462	483	479	516	481

	QC English	QC French	NB English	NB French	NS English	NS French	PE English	NL English	CAN English	CAN French
2010	492	480	486	464	489	475	482	486	507	480
2013	497	504	466	485	489	468	496	495	510	501
2016	511	503	498	467	500	439	514	491	509	500
2019	493	494	494	466	503	449	507	500	509	490
2023	500	504	484	468	491	438	501	485	507	500

Average score in reading

■ 2010 ■ 2013 ■ 2016 ■ 2019 ■ 2023

Note: Dotted bars denote significant difference compared to adjusted baseline year 2010.

With respect to gender, at the pan-Canadian level, the results for female students remained stable between 2010 and 2023, while the results for male students showed a positive change (Table 2.5, Figure 2.7). The gender gap in reading continues to favour female students, but has decreased over time from a 26-point difference in 2010 to a 16-point difference in 2023 (Table 2.5; Appendices B.2.5, B.2.8).

Provincially, positive changes were found in the reading achievement of both female and male students in Quebec, and male students in Manitoba, New Brunswick and Prince Edward Island between 2010 and 2023. Negative changes were found for female students in Saskatchewan, Ontario, New Brunswick, Nova Scotia, and Newfoundland and Labrador. The results for females and males in the remaining provinces were stable (Figure 2.10, Table 2.6, Appendix B.2.8).

FIGURE 2.10 Canadian and provincial average scores in reading by gender, 2010–2023
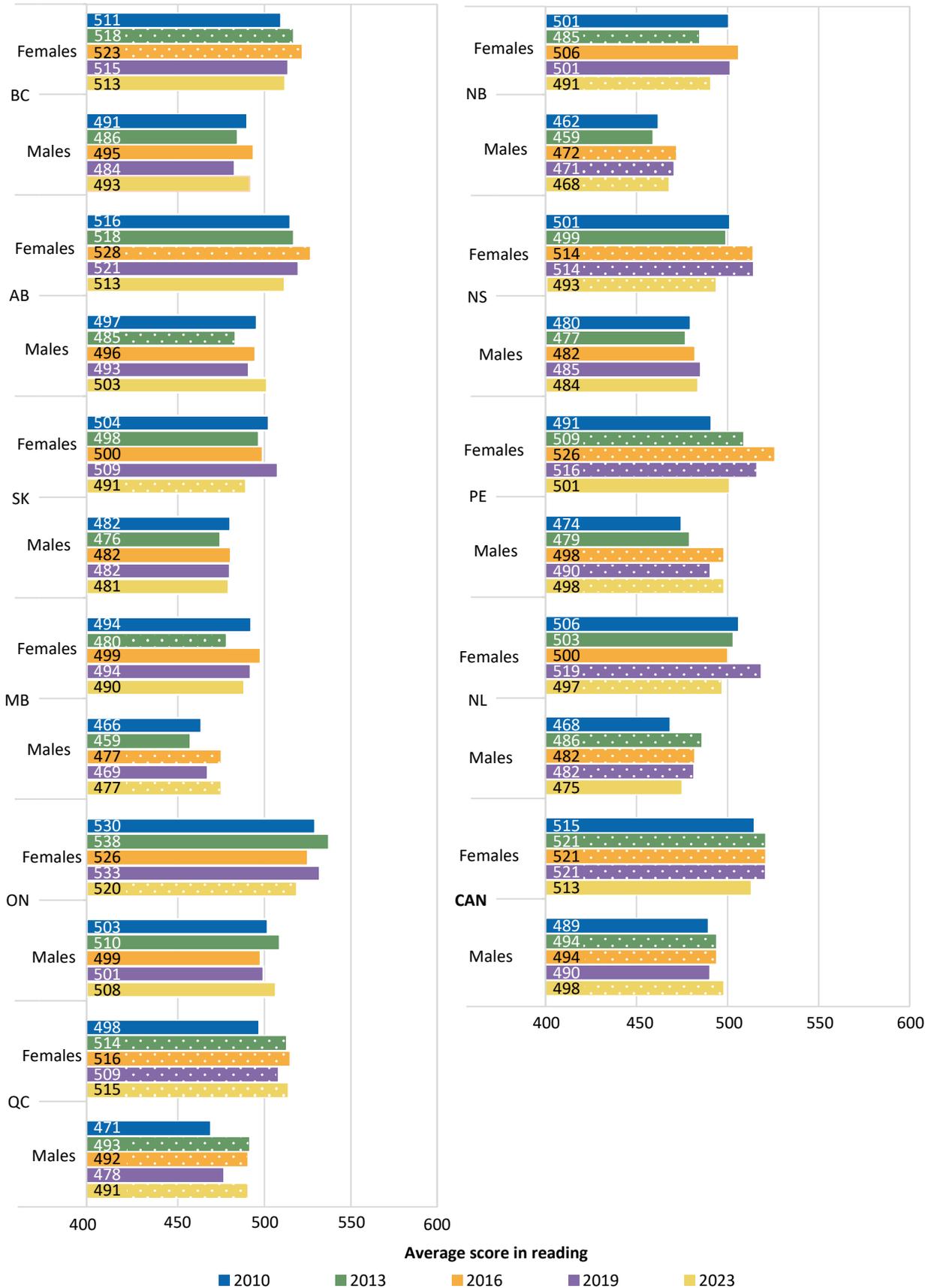
Average score in reading

■ 2010 ■ 2013 ■ 2016 ■ 2019 ■ 2023

Note: Dotted bars denote significant difference compared to adjusted baseline year 2010

TABLE 2.6 Summary of changes in provincial average scores in reading, 2010–2023

Positive change over time*	Negative change over time*	No change over time
Reading overall		
Quebec, Prince Edward Island		British Columbia, Alberta, Saskatchewan, Manitoba, Ontario, New Brunswick, Nova Scotia, Newfoundland and Labrador
Language		
English-language school systems		
Quebec, Prince Edward Island		British Columbia, Alberta, Saskatchewan, Manitoba, Ontario, New Brunswick, Nova Scotia, Newfoundland and Labrador
French-language school systems		
British Columbia, Manitoba, Quebec	Nova Scotia	Alberta, Saskatchewan, Ontario, New Brunswick
Gender		
Females		
Quebec	Saskatchewan, Ontario, New Brunswick, Nova Scotia, Newfoundland and Labrador	British Columbia, Alberta, Manitoba, Prince Edward Island
Males		
Manitoba, Quebec, New Brunswick, Prince Edward Island		British Columbia, Alberta, Saskatchewan, Ontario, Nova Scotia, Newfoundland and Labrador

* Denotes significant difference

Summary

This chapter has presented information on the performance of Canadian students on the PCAP 2023 reading assessment. Reading was a minor domain in PCAP 2023, so the reading assessment comprised a smaller number of items than the assessment of science, which was the major domain. Consequently, in contrast to PCAP 2007 and 2016, when reading was the primary focus of the assessment, this chapter provides average scores for reading overall but not on subdomains, nor does it provide performance levels for reading.

For reading overall, students in Ontario had the highest achievement, with scores significantly above the Canadian average. Students in British Columbia, Alberta, and Quebec achieved results that were statistically similar to the Canadian average, while students in Saskatchewan, Manitoba, New Brunswick (both English- and French-language school systems), Nova Scotia, Prince Edward Island, and Newfoundland and Labrador achieved results below the Canadian average.

Compared to the adjusted baseline year of 2010, reading achievement in PCAP 2023 increased by 5 points in Canada overall. Provincially, a positive change was found in Quebec and Prince Edward Island, while results were stable in the remaining provinces.

In the PCAP 2023 reading assessment, students in English- and French-language school systems achieved significantly similar results in Canada overall; this was not the case in the adjusted baseline year of 2010, where students in English-language school systems outperformed their counterparts

in French-language school systems. In English-language school systems, students in Ontario scored above the Canadian English average in PCAP 2023; in French-language school systems, students in Quebec scored above the Canadian French average.

Equity in reading scores between English- and French-language school systems was achieved in Manitoba and Quebec. In the other six provinces for which reliable data are available, students in English-language school systems outperformed their peers in French-language school systems. With respect to changes over time, reading achievement in English-language school systems in Canada overall remained stable in 2023 compared to the adjusted baseline year of 2010, while achievement improved in French-language school systems.

Lastly, similar to previous PCAP administrations, a gender gap favouring females was evident in reading in PCAP 2023 in Canada overall and all provinces except Alberta. At the pan-Canadian level, reading scores in 2023 improved for male students and were stable for female students, compared to the adjusted baseline year of 2010. Across the provinces, reading scores improved for both genders in 2023 compared to 2010 in Quebec, and remained stable in British Columbia and Alberta. In addition, reading results for female students remained stable in Manitoba and Prince Edward Island, and declined in Saskatchewan, Ontario, New Brunswick, Nova Scotia, and Newfoundland and Labrador. For male students, reading results improved in Manitoba, New Brunswick, and Prince Edward Island, and were stable in Saskatchewan, Ontario, Nova Scotia, and Newfoundland and Labrador.

3 MATHEMATICS ASSESSMENT

Like reading, mathematics was a minor domain in PCAP 2023, and so the mathematics section of the assessment contained fewer items compared to the major domain of science. As a result, PCAP 2023 allows for an update only on overall achievement in mathematics. Thus, this chapter does not report on the mathematics subdomains or on performance levels. It reports on average scores of Grade 8/Secondary II students in mathematics overall, as well as by language and gender, and on changes in mathematics scores over time.

Defining mathematics

For the purpose of the PCAP assessment, mathematics is broadly defined as the study of patterns and relationships and as a discipline involving conceptual understanding, procedural knowledge, and processes. The mathematics framework for PCAP 2023 has not been altered from that used to define mathematics performance in the 2019 assessment, in which mathematics was the major domain for the second time. This continuity enables comparisons over time between cohorts.

The framework is closely aligned with provinces' and territories' curricula, which generally have been guided by National Council of Teachers of Mathematics (NCTM) standards, as articulated in *Principles and Standards for School Mathematics* (NCTM, 2000) and *Curriculum Focal Points for Prekindergarten through Grade 8 Mathematics: A Quest for Coherence* (NCTM, 2006).

The domain of mathematics is divided into four subdomains and five processes. The subdomains, which are traditional groupings of conceptual and procedural knowledge, are:

- numbers and operations,
- geometry and measurement,
- patterns and relationships, and
- data management and probability.

The processes are:

- problem solving,
- reasoning and proof,
- communication,
- connections, and
- representation.

As illustrated in Figure 3.1, the concepts and procedures of the subdomains intersect, while the processes are interwoven through all the subdomains. A detailed description of the mathematics domain, subdomains, and processes is provided in Chapter 4 of *PCAP 2023: Assessment Framework* (CMEC, 2024).

FIGURE 3.1 PCAP mathematics assessment framework

Numbers and operations

Geometry and measurement

Patterns and relationships

Mathematical processes:
Problem solving
Reasoning and proof
Communication
Connections
Representation

Data management and probability
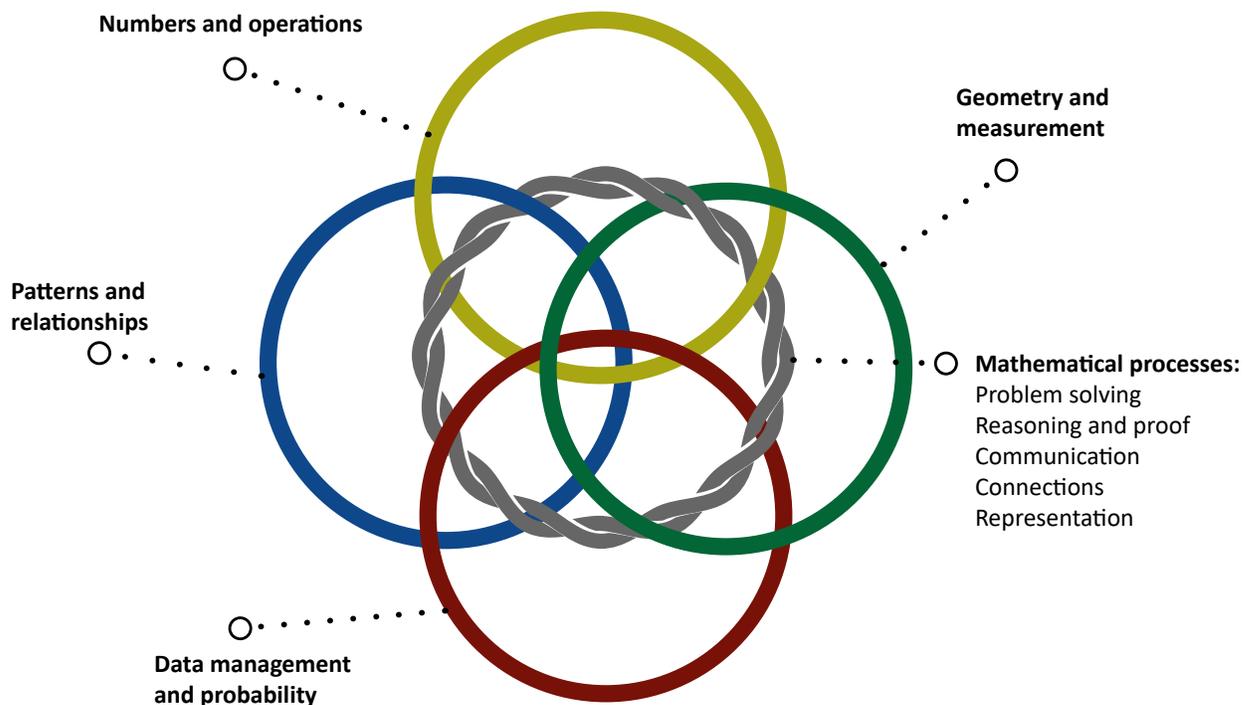
Results in mathematics

This chapter presents the average scores in mathematics achievement for Canada overall and by province. Average scores are also discussed by language, gender, and performance over time.

Results in mathematics by average score

The PCAP 2023 average scores in mathematics are reported on the PCAP scale, which has a range of 0 to 1000. In PCAP 2010, when mathematics was the major domain for the first time, the Canadian average was set at 500, with a standard deviation of 100. To facilitate direct comparisons over time, the Canadian average has not been rescaled to 500 in subsequent years. In PCAP 2023, the Canadian average for mathematics was 510, with a standard error of 1.9. The box on statistical comparison in the Introduction provides additional information on interpreting results.

Figure 3.2 provides the average scores in mathematics for all provinces and indicates the extent to which the results differ statistically from the Canadian average score. Students in Quebec had the highest achievement, with scores above the Canadian average. Students in Alberta and Ontario achieved results statistically similar to the Canadian average. Students in all other provinces achieved scores statistically below the Canadian average (Appendix B.3.1).

FIGURE 3.2 Canadian and provincial average scores in mathematics

Average score in mathematics

BC	AB	SK	MB	ON	QC	NB (EN)	NB (FR)	NS	PE	NL	CAN
496	513	482	483	516	522	467	478	486	493	475	510
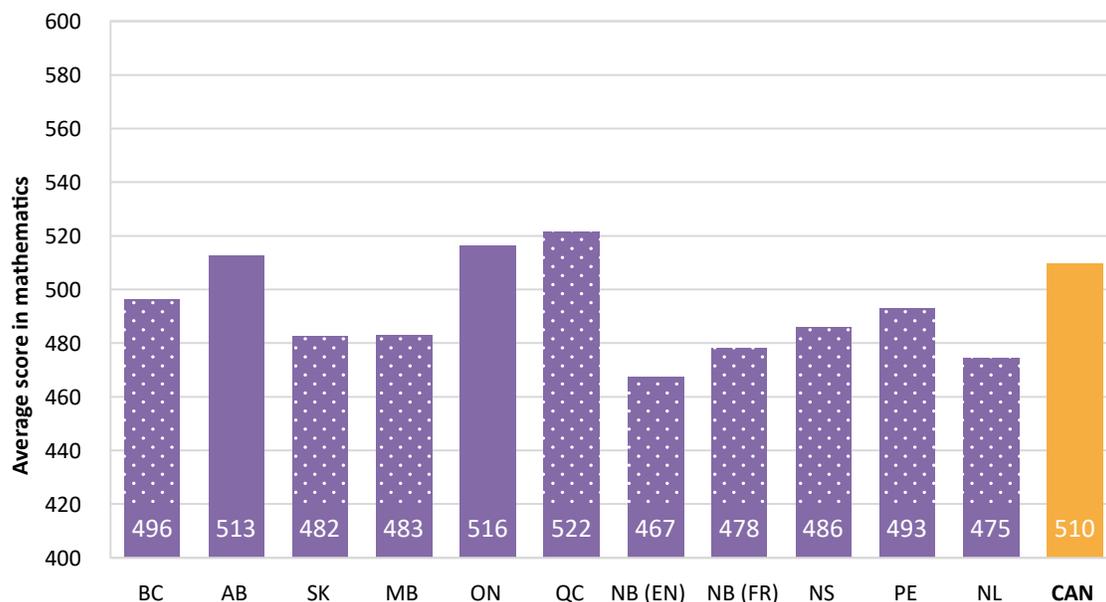
Note: Dotted bars denote significant difference compared to Canada

Table 3.1 allows comparisons of achievement in mathematics among provinces as well as between provinces and Canada overall (Appendices B.3.1, B.3.2). (To read the chart, choose a province from the left-hand column. Read across the row to compare its average score with that of a specific province or Canada overall, as listed along the top of the chart. The symbols indicate whether a province's average score is above, below, or similar to that of the comparison province or Canada.)

TABLE 3.1 Comparison of average scores in mathematics, among provinces and with Canada

Province or Canada	Average score	Standard error	BC	AB	SK	MB	ON	QC	NB (EN)	NB (FR)	NS	PE	NL	CAN
BC	496	3.4		o	o	o	o	▼	▲	▲	o	o	▲	▼
AB	513	4.2	o		▲	▲	o	o	▲	▲	▲	▲	▲	o
SK	482	2.7	o	▼		o	▼	▼	▲	o	o	o	o	▼
MB	483	1.8	o	▼	o		▼	▼	▲	o	o	▼	▲	▼
ON	516	4.2	o	o	▲	▲		o	▲	▲	▲	▲	▲	o
QC	522	3.8	▲	o	▲	▲	o		▲	▲	▲	▲	▲	▲
NB (EN)	467	0.0	▼	▼	▼	▼	▼	▼		▼	▼	▼	▼	▼
NB (FR)	478	0.9	▼	▼	o	o	▼	▼	▲		▼	▼	o	▼
NS	486	0.7	o	▼	o	o	▼	▼	▲	▲		▼	▲	▼
PE	493	0.0	o	▼	o	▲	▼	▼	▲	▲	▲		▲	▼
NL	475	0.4	▼	▼	o	▼	▼	▼	▲	o	▼	▼		▼
CAN	**510**	**1.9**	▲	o	▲	▲	o	▼	▲	▲	▲	▲	▲	

Note: Comparisons are adjusted using the Bonferroni correction as follows: (p <.0009, t-value = 3.32) for multicomparisons among the provinces, and (p <.0045, t-value = 2.84) for those between each province and Canada.

▲   Average score significantly higher than that of comparison province or Canada

o   Average score not significantly different from that of comparison province or Canada

▼   Average score significantly lower than that of comparison province or Canada

Results in mathematics by language

In this section, results are presented by language of the school system (both English- and French-language as well as minority- and majority-language systems). In Canada overall, students in French-language school systems achieved higher average scores in mathematics than their peers in English-language school systems (Figure 3.3, Appendix B.3.3). This result is consistent with results reported for 15-year-olds in the 2022 PISA study (Elez et al., 2023); for Canadian Grade 4 students in the TIMSS 2019 study (O'Grady, Rostamian, et al., 2021); and in previous PCAP administrations (O'Grady & Houme, 2014; O'Grady, Fung, et al. 2018; O'Grady, Houme, et al. 2021). At the provincial level, PCAP 2023 mathematics scores in English-language school systems ranged from 516 in Ontario to 467 in New Brunswick. In French-language school systems, scores ranged from 522 in Quebec to 468 in Saskatchewan (Appendix B.3.3).

FIGURE 3.3 Canadian average scores in mathematics by language of the school system
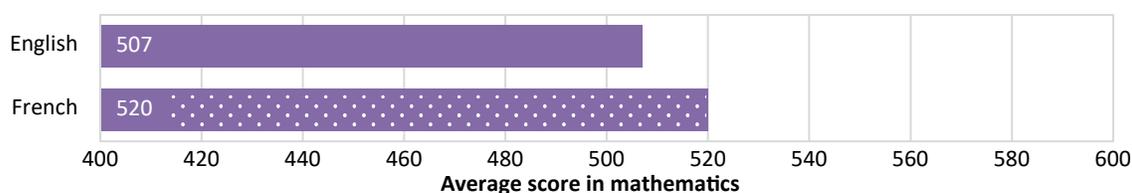
Note: Dotted bar denotes significant difference between the two groups

Table 3.2 presents a comparison of provincial results with the Canadian averages for both English- and French-language school systems. Students in the English-language school system in Ontario scored above the Canadian English average, while students in the English-language school systems in Alberta and Quebec scored at the Canadian English average. The scores of students in French-language school systems in Alberta, Ontario, and Quebec were at the Canadian French average. The mathematics achievement scores for students in both English- and French-language school systems in all remaining provinces for which reliable data are available were below the respective Canadian averages (Appendix B.3.3).

TABLE 3.2 Comparison of Canadian and provincial average scores in mathematics by language of the school system

English-language school systems		
Above* the Canadian average	**At the Canadian average**	**Below* the Canadian average**
Ontario	Alberta, Quebec	British Columbia, Saskatchewan, Manitoba, New Brunswick, Nova Scotia, Prince Edward Island, Newfoundland and Labrador
French-language school systems		
Above* the Canadian average	**At the Canadian average**	**Below* the Canadian average**
	Alberta, Ontario, Quebec	British Columbia, Saskatchewan, Manitoba, New Brunswick, Nova Scotia

*Denotes significant difference

In Canada overall, students in majority-language school systems achieved mathematics results statistically similar to their peers in minority-language school systems (Figure 3.4, Appendix B.3.4). Provincially, mathematics scores in majority-language school systems ranged from 522 in Quebec to 467 in New Brunswick. In minority-language school systems, scores ranged from 516 in Ontario to 468 in Saskatchewan (Appendix B.3.4).

FIGURE 3.4 Canadian average scores in mathematics by majority- and minority-language school systems
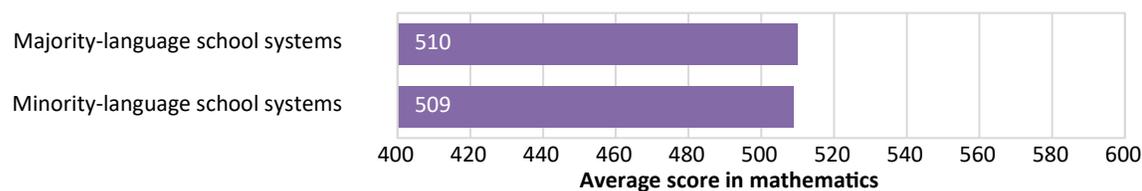
Note: See the Introduction for a definition of majority- and minority-language school systems.

Table 3.3 presents a comparison of Canadian and provincial average scores in mathematics for both majority- and minority-language school systems. In majority-language school systems, students in Quebec scored above the Canadian average, while the scores for students in Alberta and Ontario were at the Canadian average. In minority-language school systems, students in Alberta, Ontario, and Quebec scored at the Canadian average. The mathematics achievement scores for students in all remaining provinces were below the respective Canadian averages for majority- and minority-language school systems (Appendix B.3.4).

TABLE 3.3 Comparison of Canadian and provincial average scores in mathematics by majority- and minority-language school systems

Majority-language school systems		
Above* the Canadian average	**At the Canadian average**	**Below* the Canadian average**
Quebec	Alberta, Ontario	British Columbia, Saskatchewan, Manitoba, New Brunswick, Nova Scotia, Prince Edward Island, Newfoundland and Labrador
Minority-language school systems		
Above* the Canadian average	**At the Canadian average**	**Below* the Canadian average**
	Alberta, Ontario, Quebec	British Columbia, Saskatchewan, Manitoba, New Brunswick, Nova Scotia

*Denotes significant difference
Note: See the Introduction for a definition of majority- and minority-language school systems.

Figure 3.5 illustrates the achievement gap in mathematics between English- and French-language school systems (Appendix B.3.3). Equity in mathematics scores between English- and French-language school systems — and between majority- and minority-language school systems (Appendix B.3.4) — was achieved in British Columbia, Alberta, Ontario, Quebec, and Nova Scotia. The data reveal significant differences in achievement between English- and French-language school systems, and between majority- and minority-language school systems, within the remaining provinces for which reliable data are available. In Manitoba and New Brunswick, students in French-language school systems and minority-language school systems outperformed their counterparts in English-language school systems and majority-language school systems. In contrast, in Saskatchewan, students in English-language school systems and majority-language school systems outperformed their counterparts in French-language school systems and minority-language school systems (Appendices B.3.3, B.3.4).

FIGURE 3.5 Gap in average scores in mathematics in Canada and the provinces by language of the school system
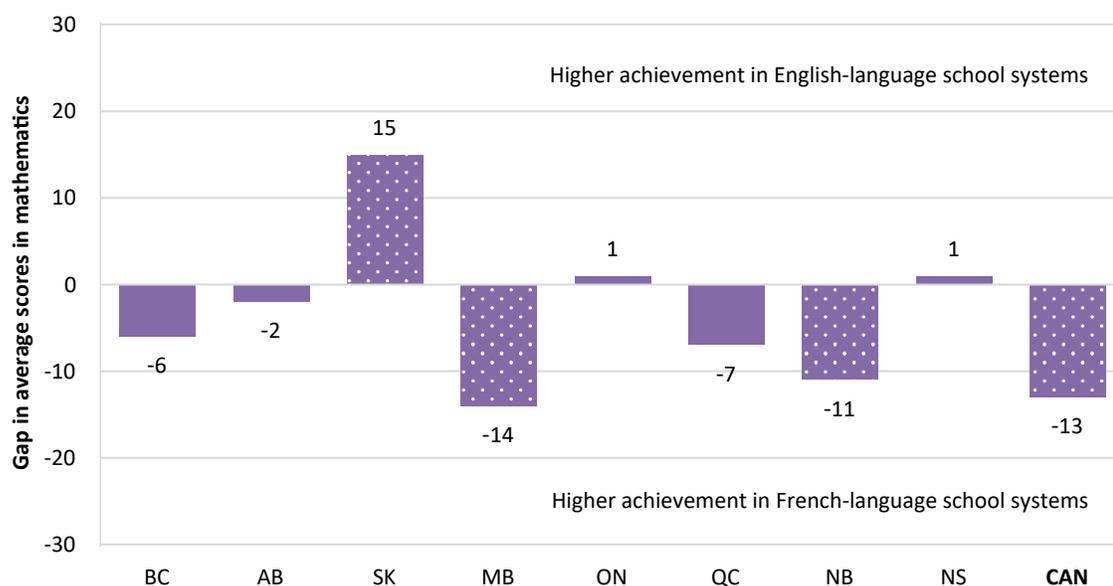
Note: Numbers are achievement scores in English-language school systems minus those in French-language school systems. Dotted bars denote significant difference within Canada or within a province

Results in mathematics by gender

In PCAP 2023, males outperformed females in mathematics achievement at the pan-Canadian level (Figure 3.6, Appendix B.3.5). This finding is not consistent with previous cycles of PCAP, where there was no gender difference (CMEC, 2011; O'Grady & Houme, 2014; O'Grady, Fung, et al., 2018; O'Grady, Houme, et al., 2021). However, it is consistent with TIMSS 2019 for Grade 4 students (O'Grady, Rostamian, et al., 2021) and PISA 2022 for students at age 15 (Elez et al., 2023): in both of those studies, males outperformed females in mathematics.

FIGURE 3.6 Canadian average scores in mathematics by gender
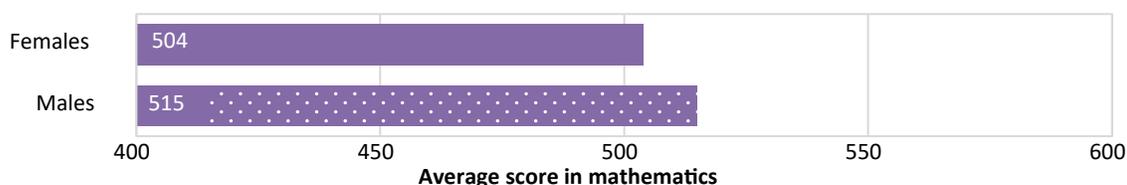
Note: Dotted bar denotes significant difference between the two groups

Table 3.4 compares Canadian and provincial average scores in mathematics for both genders. Female students in Quebec scored above the Canadian average, while those in British Columbia, Alberta, and Ontario achieved scores similar to the Canadian average. Male students in Ontario scored above the Canadian average, while those in Alberta and Quebec achieved scores similar to the Canadian average. In all other provinces, both genders scored below the respective Canadian averages for females and males (Appendix B.3.5).

TABLE 3.4 Comparison of Canadian and provincial average scores in mathematics by gender

Females		
Above* the Canadian average	**At the Canadian average**	**Below* the Canadian average**
Quebec	British Columbia, Alberta, Ontario	Saskatchewan, Manitoba, New Brunswick (EN and FR), Nova Scotia, Prince Edward Island, Newfoundland and Labrador
Males		
Above* the Canadian average	**At the Canadian average**	**Below* the Canadian average**
Ontario	Alberta, Quebec	British Columbia, Saskatchewan, Manitoba, New Brunswick (EN and FR), Nova Scotia, Prince Edward Island, Newfoundland and Labrador

*Denotes significant difference

When average scores of females and males were compared, significant differences were found in the majority of provinces, with male students outperforming female students. No gender gap was found for mathematics in British Columbia, Quebec, or New Brunswick (French-language school system) (Figure 3.7, Appendix B.3.5).

FIGURE 3.7 Gap in average scores in mathematics in Canada and the provinces by gender
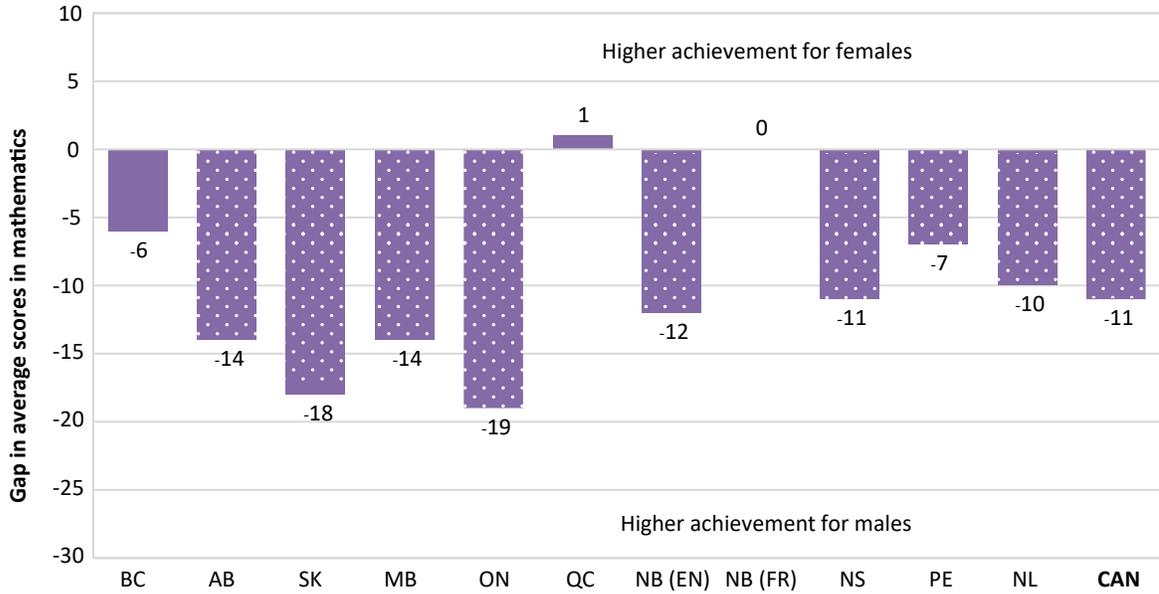
Note: Numbers are achievement scores of female students minus those of male students. Dotted bars denote significant difference within a province or Canada

Change in mathematics performance over time

Changes over time in mathematics at the pan-Canadian level are shown in Figure 3.8 and Table 3.5 (Appendices B.3.6, B.3.7, B.3.8). For overall mathematics, scores improved in 2023 compared to the baseline year of 2010.

FIGURE 3.8 Canadian average scores in mathematics, 2010–2023

	2010	2013	2016	2019	2023
Overall mathematics	500	507	511	510	510
English	495	501	502	503	507
French	515	526	540	536	520
Females	499	507	511	508	504
Males	504	507	512	511	515

Average score in mathematics

■ 2010   ■ 2013   ■ 2016   ■ 2019   ■ 2023
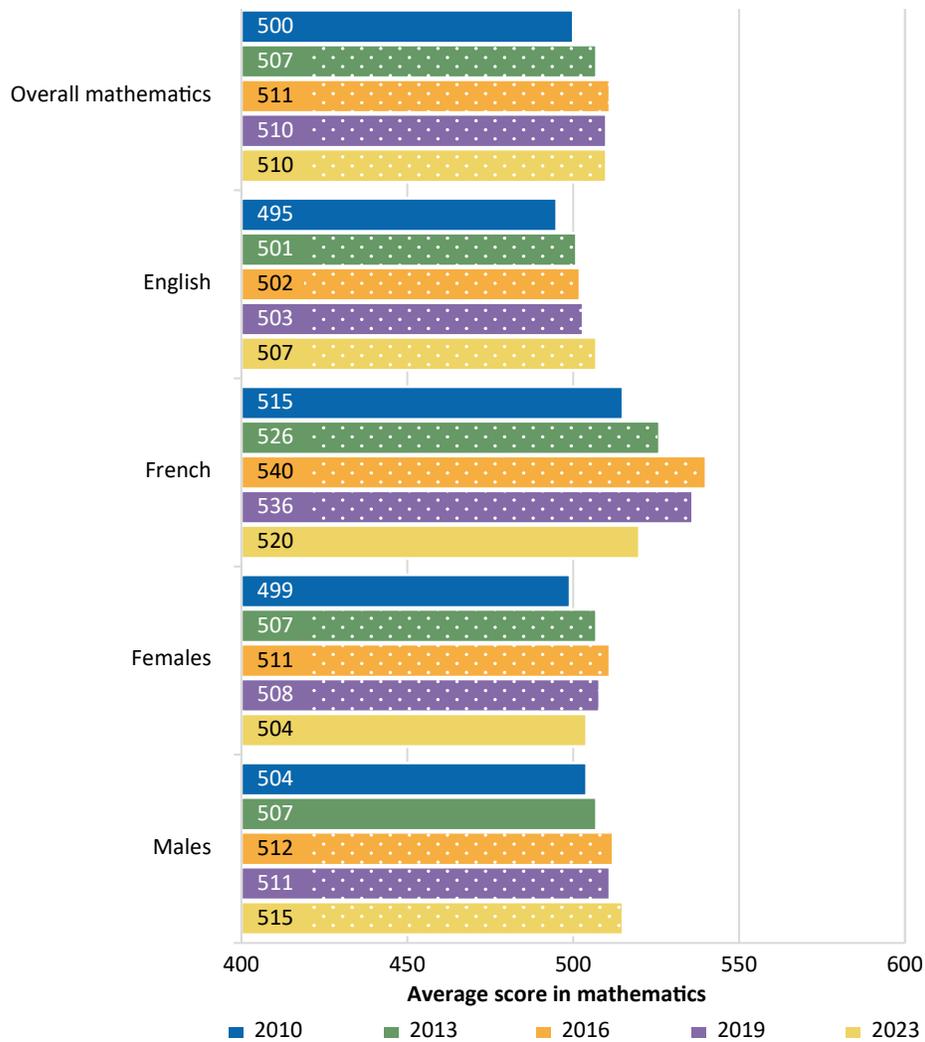
Note: Dotted bars denote significant difference compared to baseline year 2010

Provincially, a positive change in overall mathematics was found between 2010 and 2023 in all provinces except Ontario, Quebec, New Brunswick, and Newfoundland and Labrador: a negative change in mathematics achievement was found in New Brunswick, while results in Ontario, Quebec, and Newfoundland and Labrador were stable (Figure 3.9, Table 3.6, Appendix B.3.6).

Average score in mathematics

■ 2010   ■ 2013   ■ 2016   ■ 2019   ■ 2023
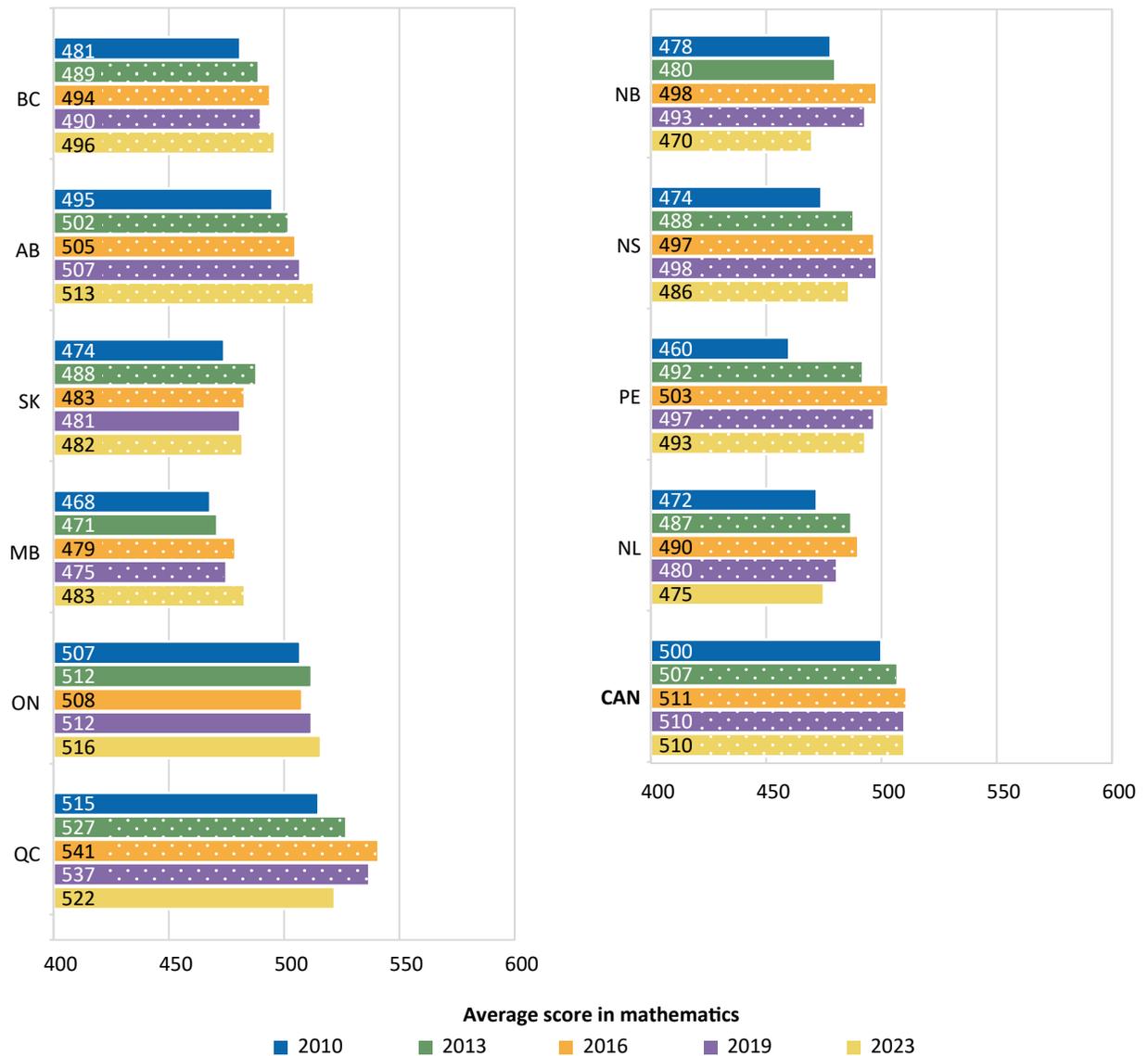
Note: Dotted bars denote significant difference compared to baseline year 2010

When mathematics results over time were examined by the language of the school system for Canada overall, a positive change was found in English-language school systems in 2023 compared to 2010, while results were stable in French-language school systems. The achievement gap between students in English- and French-language school systems narrowed from 20 points in 2010 to 13 points in 2023, with the gap continuing to favour French-language school systems (Table 3.5, Figure 3.8, Appendix B.3.7).

TABLE 3.5 Summary of Canadian average scores in mathematics, 2010 and 2023

	2010	2023	Change over time
Overall mathematics	500	510	10*
English-language school systems	495	507	12*
French-language school systems	515	520	5
Achievement gap (EN - FR)	-20*	-13*	
Females	499	504	5
Males	504	515	11*
Achievement gap (F - M)	-5	-11*	

*Denotes significant difference

Note: Numbers may differ from those expected due to rounding. Tests for significance have not been performed for change over time for achievement gaps due to the standard error of the difference in score change over time being disproportionately high relative to the difference in change over time. While a test of significance with a high standard error can be conducted, the resulting inferences would be highly inaccurate and unreliable, given that the test of significance would be performed using point estimates that are highly inaccurate.

As shown in Figure 3.10 and Table 3.6, the results over time by language of the school system varied across provinces: English-language school systems in British Columbia, Alberta, Saskatchewan, Manitoba, Ontario, Nova Scotia, and Prince Edward Island showed positive change in 2023 compared to 2010, while the remaining provinces had stable results. French-language school systems in Manitoba improved their scores in 2023 compared to the baseline year, while the results in British Columbia, Alberta, Ontario, and Quebec were stable. The results in French-language systems in all remaining provinces for which data are available were lower in 2023 compared to 2010 (Appendix B.3.7).

FIGURE 3.10 Canadian and provincial average scores in mathematics by language of the school system, 2010–2023

Province	Language	2010	2013	2016	2019	2023
BC	English	481	489	494	489	496
BC	French	504	513	516	523	502
AB	English	495	502	505	506	513
AB	French	504	502	506	515	514
SK	English	474	487	483	481	483
SK	French	498	518	501	509	468
MB	English	467	470	479	474	483
MB	French	480	476	474	480	497
ON	English	507	512	507	512	516
ON	French	511	500	528	516	516
QC	English	507	509	522	518	515
QC	French	516	529	543	540	522
NB	English	466	470	489	479	467
NB	French	507	507	521	525	478
NS	English	473	488	497	498	486
NS	French	503	499	507	501	485
PE	English	460	492	503	497	493
NL	English	472	487	490	480	474
CAN	English	495	501	502	503	507
CAN	French	515	526	540	536	520

Average score in mathematics

Legend: ■ 2010 ■ 2013 ■ 2016 ■ 2019 ■ 2023

Note: Dotted bars denote significant difference compared to baseline year 2010

With respect to gender, at the pan-Canadian level, the scores of male students increased in 2023 relative to the baseline year, while the scores of female students remained stable. In contrast to 2010, male students outperformed female students in mathematics in Canada overall in 2023 (CMEC, 2011; Table 3.5, Appendix B.3.5). Compared to the baseline year, the results in 2023 improved for both female and male students in Alberta, Manitoba, and Prince Edward Island. As well, the results in 2023 improved for females in British Columbia and males in Saskatchewan, Ontario, Nova Scotia, and Newfoundland and Labrador. Stable results were observed for both genders in Quebec; female students in Saskatchewan, Ontario, Nova Scotia, and Newfoundland and Labrador; and male students in British Columbia and New Brunswick. A negative change was observed for female students in New Brunswick (Figure 3.11, Table 3.6, Appendix B.3.8).

FIGURE 3.11 Canadian and provincial average scores in mathematics by gender, 2010–2023

Average score in mathematics

■ 2010 ■ 2013 ■ 2016 ■ 2019 ■ 2023
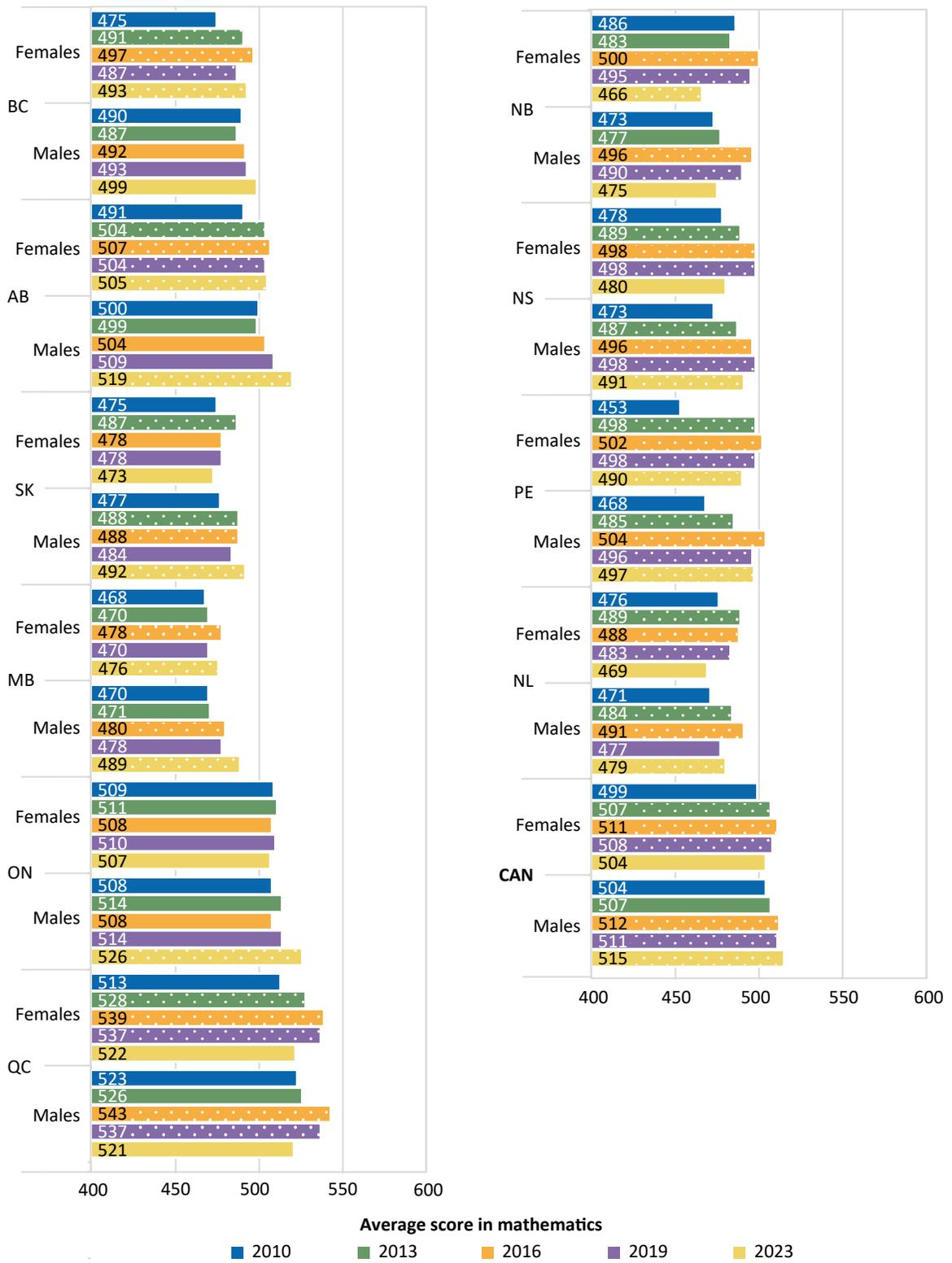
Note: Dotted bars denote significant difference compared to baseline year 2010

TABLE 3.6 Summary of changes in provincial average scores in mathematics, 2010–2023

Positive change over time*	Negative change over time*	No change over time
Mathematics overall		
British Columbia, Alberta, Saskatchewan, Manitoba, Nova Scotia, Prince Edward Island	New Brunswick	Ontario, Quebec, Newfoundland and Labrador
Language		
English-language school systems		
British Columbia, Alberta, Saskatchewan, Manitoba, Ontario, Nova Scotia, Prince Edward Island		Quebec, New Brunswick, Newfoundland and Labrador
French-language school systems		
Manitoba	Saskatchewan, New Brunswick, Nova Scotia	British Columbia, Alberta, Ontario, Quebec
Gender		
Females		
British Columbia, Alberta, Manitoba, Prince Edward Island	New Brunswick	Saskatchewan, Ontario, Quebec, Nova Scotia, Newfoundland and Labrador
Males		
Alberta, Saskatchewan, Manitoba, Ontario, Nova Scotia, Prince Edward Island, Newfoundland and Labrador		British Columbia, Quebec, New Brunswick

*Denotes significant difference

Summary

This chapter has presented findings on the performance of Canadian students in the PCAP 2023 mathematics assessment. Mathematics was a minor domain in PCAP 2023, so the mathematics assessment comprised a smaller number of items than the science assessment. Consequently, in contrast to PCAP 2010 and 2019, when mathematics was the primary focus of the assessment, this chapter provides average scores on overall mathematics but not on subdomains, nor does it provide performance levels for mathematics.

In 2023, the Canadian average for mathematics overall was 510, with provincial scores ranging from a low of 467 in New Brunswick (English-language school system) to a high of 522 in Quebec. Students in Quebec achieved scores above the Canadian average, while scores in Alberta and Ontario were statistically similar to the Canadian average. Students in British Columbia, Saskatchewan, Manitoba, New Brunswick (in both English- and French-language school systems), Nova Scotia, Prince Edward Island, and Newfoundland and Labrador scored below the Canadian average. Compared to the baseline year of 2010, overall mathematics achievement in Canada has improved.

At the pan-Canadian level, students in French-language school systems achieved higher average scores in mathematics compared to their peers in English-language school systems. This finding is consistent with the results from previous PCAP cycles. At the provincial level, equity between English- and French-language school systems was achieved in British Columbia, Alberta, Ontario, Quebec, and Nova Scotia.

With respect to changes over time, a positive change in mathematics achievement was evident at the pan-Canadian level in 2023 compared to the baseline year of 2010 for English-language school systems, with scores increasing from 495 in 2010 to 507 in 2023. Scores of students in French-language school systems remained stable, with students scoring 515 in 2010 and 520 in 2023.

When results in mathematics were examined by gender, a gender gap favouring male students was found in Canada overall; this finding is inconsistent with the results from previous PCAP cycles. At the provincial level, a gender gap favouring males was observed in most provinces. While no gender gap was found in British Columbia, Quebec, and New Brunswick (French-language school system), males outperformed females in all the other provinces.

At the pan-Canadian level, mathematics scores in 2023 improved for male students and were stable for female students, compared to the baseline year of 2010. Across the provinces, mathematics scores improved for both genders in 2023 compared to 2010 in Alberta, Manitoba, and Prince Edward Island, and remained stable in Quebec. During this same time period, mathematics results for female students improved in British Columbia; remained stable in Saskatchewan, Ontario, Nova Scotia, and Newfound and Labrador; and declined in New Brunswick. For male students, mathematics results improved in Saskatchewan, Ontario, Nova Scotia, and Newfoundland and Labrador, and were stable in British Columbia and New Brunswick.

This chapter presents a context statement for each province, which includes information on the social and organizational contexts of the province's public education system, and an overview of how the province approaches science teaching and assessment.

BRITISH COLUMBIA

Social context

In 2023, British Columbia had a population of more than five and a half million.[14] Eighty-six percent of the population live in urban areas, with the largest portion concentrated in the Greater Vancouver region.[15]

Organization of the school system

Approximately 700,000 students are enrolled in the public school system, with another 89,000 in independent schools and over 4,500 in home schools. The province has 60 school districts, including a French-language school board, the *Conseil scolaire francophone de la Colombie-Britannique*.[16]

Science teaching

The BC curriculum, including the science curriculum, has been designed around the know-do-understand (KDU) model, which presents a way of conceptualizing the knowledge, competencies, and understandings that students are expected to acquire. Three core competencies — communication, thinking, and personal and social competencies — are integrated throughout the curriculum. The redesigned K–9 curriculum has been fully implemented since the 2016-2017 school year, while the Grade 10 curriculum was implemented in the 2018-2019 school year, and the Grade 11–12 curriculum in the 2019-2020 school year. The curriculum for K–12 science is available in both English and French.

The science curriculum reflects the same format as the curricula for all other areas of learning. Three curricular elements — big ideas, curricular competencies, and content — link the knowing, doing, and understanding of scientific learning. Teachers are expected to teach, assess, and report on the learning standards in the curricular competencies and content elements. Elaborations support each curricular element by providing suggestions, definitions, and clarifications to support teaching and learning.

The science curriculum is designed to build on students' scientific knowledge and to enable them to apply this knowledge to a broad range of situations encountered in everyday life, and to create deeper personal understanding of this knowledge. Critical to this approach are the core competencies,

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[14] In this chapter, populations figures for the provinces are from 2023 and are taken from Statistics Canada (2024b).

[15] For demographic information, see the government of British Columbia website, at http://www.gov.bc.ca.

[16] For more information on the BC school system, see https://www2.gov.bc.ca/gov/content/governments/organizational-structure/ministries-organizations/ministries/education.

which enable students to think critically, solve problems, and make ethical decisions. In the science learning area, the core competencies inform the curricular competencies, in which students learn to communicate their questions, express reasoned opinions based on scientific evidence, and challenge ideas in a scientifically literate way.

The goals of the curriculum are facilitated by focusing on personalized teaching and learning within relevant situational contexts, and enabling students to develop a strong foundation of scientific understandings and skills, as part of an interdisciplinary set of problem-solving, exploratory, and investigative skills and knowledge.

With a focus on inquiry and conceptual learning, the science curriculum provides students with opportunities to ask questions; consider a range of views; collect, analyze, and interpret data, while considering any biases (in either the data or their assumptions); work collaboratively; and ultimately make informed conclusions, including ones that lead to personally and socially responsible choices. The emphasis on competency development along with knowledge attainment encourages students not only to build their knowledge by observing their immediate environment but also to engage in actions and decision making on a local, national, and global scale as scientifically educated citizens.

The big ideas in the science curriculum tell the story of science through principles and key concepts, emphasizing the understanding of science. For each area of science — biology; chemistry; physics; and Earth, space, and environmental sciences — important concepts are introduced in Kindergarten and expanded in subsequent grades, resulting in a deep understanding of the story of science. In chemistry, for example, the progression of the big ideas is designed to provide students with a developmentally appropriate understanding of matter, beginning with observable human interactions with matter through familiar materials, and building to the behaviour of matter at the molecular level.[17]

First Peoples' knowledge and perspectives and other traditional ecological knowledge are embedded throughout the science curriculum. Students learn to foster an awareness of their role as ecologically literate citizens who are engaged in caring for living things and environmental systems and can approach that caring with competence.

Assessment

British Columbia's provincial assessments were revised to align with the redesigned curriculum. All students at the beginning of Grades 4 and 7 are assessed annually in literacy and numeracy through the Foundation Skills Assessment (FSA).[18] Secondary school students are required to write numeracy and literacy assessments in Grade 10, and a second literacy assessment in Grade 12. All of these assessments are cross-curricular in nature and may include competencies developed in science classrooms, such as data analysis or interpreting source bias. The Grade 10 numeracy assessment has been in place since the 2018-2019 school year; the Grade 10 literacy assessment since the 2019-2020 school year; and the Grade 12 literacy assessment since the 2021-2022 school year. Students also participate in the Pan-Canadian Assessment Program (PCAP) and two international assessments — the Progress in International Reading Literacy Study (PIRLS) and the Programme for International Student Assessment (PISA).

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[17] More information on the curriculum model is available at https://www.curriculum.gov.bc.ca/curriculum/overview.

[18] For more detail on this assessment, see https://www2.gov.bc.ca/gov/content/education-training/k-12/administration/program-management/assessment/foundation-skills-assessment.

The British Columbia Ministry of Education and Child Care is currently developing the BC Learning Pathways, an ongoing series of resources that support teachers in developing and assessing students' literacy and numeracy skills in classrooms in all learning areas, including science. The resources support teachers with planning, teaching, classroom assessment, and reporting of student learning and competency development. The current focus of this work is outlining a developmental progression for foundational literacy and numeracy skills from Kindergarten to Grade 7 and working with secondary and francophone teachers to create supporting resources in their respective classroom settings.

ALBERTA

Social context

Alberta is home to a culturally diverse population of more than four and a half million people; international migration is the largest contributor to Alberta's population growth (Government of Alberta, 2023, p. 1). Alberta remains the province with the youngest population, with an average age of 39.0 years in 2022 (Government of Alberta, 2023, p. 3).

Organization of the school system

The province's *Education Act*, which came into force on September 1, 2019, specifies goals for Alberta's Early Childhood Services to Grade 12 (ECS–12) education system and identifies the roles and responsibilities of the Ministry, school boards, charter schools, private schools, teachers, parents, and students.[19]

Educational options in Alberta include public, separate, and francophone schools; charter schools; private schools; home education; and online learning.[20] Students in Alberta are required to attend school from the age of six to 16, although parents may choose to home school their children.

Alberta has one publicly funded education system, which includes public, separate, and francophone schools. Public, separate, and francophone schools, which are operated by locally elected officials and overseen by the government of Alberta, teach the Alberta curriculum to eligible students. These schools may choose optional programs as needed to meet the unique needs of their students and communities.[21]

In the 2022-2023 school year, 770,058 Albertan students were registered in 2,368 schools. Of these students, 66 percent attended public schools, 23 percent attended separate schools, 1 percent attended francophone schools, and the remaining 10 percent attended private, charter, provincial, or federal schools.[22]

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[19] The act can be accessed at https://open.alberta.ca/publications/e00p3.
[20] Information on educational options is available at https://www.alberta.ca/education-options.
[21] Information on education rights is available at https://www.alberta.ca/education-rights.
[22] Information on student population statistics is available at https://www.alberta.ca/student-population-statistics.

Science teaching

Elementary and secondary science programs help prepare students for life in a rapidly changing world — a world of expanding knowledge and technology in which new challenges and opportunities continually arise.

The purpose of the elementary science program (Grades 1 to 6) is to encourage and stimulate children's learning by nurturing their sense of wonder, by developing their skills and confidence in investigating their surroundings, and by building a foundation of experience and understanding upon which later learning can be based.

The secondary science program, including the junior high school science program (Grades 7 to 9), develops students' scientific literacy — that is, the science-related knowledge, skills, and attitudes that students need to solve problems, make decisions, and become lifelong learners. To support the development of science literacy, school programs must provide a foundation of learning experiences that address critical aspects of science and its application. These critical areas provide general direction for the program and identify major components of its structure.

Alberta Education's elementary science program engages students in a process of inquiry and problem solving in which they develop both knowledge and skills. The elementary science program is based on the following principles:

- Children's curiosity provides a natural starting point for learning.
- Children's learning builds on what they currently know and can do.
- Communication is essential for science learning.
- Students learn best when they are challenged and actively involved.
- Confidence and self-reliance are important outcomes of learning.

The junior high school science program is guided by the vision that all students have the opportunity to develop scientific literacy. The goals of the program are to work toward this vision by:

- encouraging students at all grade levels to develop a critical sense of wonder and curiosity about scientific and technical endeavours;
- enabling students to use science and technology to acquire new knowledge and solve problems in order to improve the quality of their own lives and the lives of others;
- preparing students to critically address science-related societal, economic, ethical, and environmental issues;
- providing students with a foundation in science that creates opportunities for them to pursue progressively higher levels of study and prepares them for science-related hobbies appropriate to their interests and abilities; and
- enabling students of varying aptitudes and interests to develop knowledge of the wide spectrum of careers related to science, technology, and the environment.

To support the development of scientific literacy, each unit of study for each grade is structured around the following four foundational areas, which address the critical aspects of science and its application:

- *Science, technology, and society:* Students develop an understanding of the nature of science and technology, the relationships between science and technology, and the social and environmental contexts of science and technology.
- *Knowledge:* Students construct knowledge and conceptual understanding in life science, physical science, and Earth and space science, and apply this understanding to interpret, integrate, and extend their knowledge.
- *Skills:* Students develop the skills required for scientific and technological inquiry, for problem solving, for communicating scientific ideas and results, for working collaboratively, and for making informed decisions.
- *Attitudes:* Students are encouraged to develop attitudes that support the responsible acquisition and application of scientific and technological knowledge to the mutual benefit of self, society, and the environment.

Each unit has an identified science, technology, and society emphasis through which the other foundations can be developed. Units with a nature of science emphasis focus on the processes by which scientific knowledge is developed and tested, and on the nature of scientific knowledge itself. The skills emphasized in these units are related to scientific inquiry. Units with a science and technology emphasis encourage students to seek solutions to practical problems by developing and testing prototypes, products, and techniques to meet a given need. These units emphasize problem-solving skills in combination with scientific inquiry skills. Finally, in units with a social and environmental emphasis, students focus on issues and decisions relating to applications of science and technology. These units emphasize using research and inquiry skills to inform the decision-making process.

Knowledge and Employability science courses (Grades 8 and 9 as well as 10-4 and 20-4 high school courses) are focused on developing and applying essential science skills, knowledge, and attitudes needed for everyday living at home, in the workplace, and in the community. The courses emphasize career and life skills, teamwork, communication skills, and thinking processes.[23]

The senior high school science program (Science 10, Science 14-24 and 20-30, Biology 20-30, Chemistry 20-30, and Physics 20-30) helps all students attain the scientific awareness needed to function as effective members of society. These courses enable students to pursue further studies and careers in science and develop a better understanding of themselves and the world around them. The expected student knowledge, skills, and attitudes are approached from a common philosophical position in each science course.

Courses in the senior high school sciences incorporate Indigenous perspectives to develop, in all students, an appreciation of the cultural diversity and achievements of members of First Nation, Métis, and Inuit communities.

Current graduation requirements for an Alberta High School Diploma call for students to successfully complete a 20-level course in science. The science requirement can also be met with a combination of Science 14 and Science 10.[24]

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[23] Information on Knowledge and Employability courses can be found at https://education.alberta.ca/knowledge-and-employability/junior-high-ke-courses/?searchMode=3.

[24] Information on graduation requirements, credentials, and credits can be found at https://www.alberta.ca/guide-to-education.

Assessment

Alberta has participated in the previous School Achievement Indicators Program (SAIP) Science assessments as well as in PCAP. Alberta has also participated in a number of international studies of achievement, including the Trends in International Mathematics and Science Study (TIMSS) since 1995, and PISA since 2000. Through its active involvement in these international studies and the ensuing trend analyses of student achievement levels, Alberta is able to identify and develop its understanding of its students' strengths and weaknesses in an international context, one that allows comparisons with other participating countries and jurisdictions.

In addition to classroom assessment, Provincial Achievement Tests (PATs) are administered annually in English and French language arts, *Français*, mathematics, science, and social studies in Grades 6 and 9. Grade 9 PATs based on the Knowledge and Employability programs of study in English language arts, mathematics, science, and social studies are also administered. French versions of all mathematics, science, and social studies PATs are available for students in francophone schools and French immersion programs.[25]

Information about student performance on PATs is provided to school staff, school authorities, parents, and the public so that they may know how well students in their schools are meeting local targets and provincial expectations. Teachers and administrators can use this information in planning and delivering relevant and effective instruction in relation to learning outcomes in Alberta's programs of study.

Alberta's provincial assessments, including PATs, and diploma exams assess many of the outcomes set out in the provincial programs of study, but they don't assess them all during a single administration.

Diploma examinations are administered for select Grade 12 courses at different times throughout the school year; the examinations for Biology 30, Chemistry 30, Physics 30, and Science 30 are administered five times each year. In the 2022-2023 school year, due to learning disruptions caused by the COVID-19 pandemic, provincial diploma examinations were temporarily weighted at 20 percent of the student's final mark, but were returned to 30 percent in the 2023-2024 school year. The current 70/30 weighting (70 percent for course work, 30 percent for the diploma exam) puts an appropriate emphasis on the combination of course work and school-awarded marks. It reflects the broad range of work students put in over an entire course.[26]

These tests and examinations are jointly developed by departmental staff and classroom teachers based on provincial programs of study and provide information on the degree to which students meet provincial standards. Following each major test administration (January and June), based on the data collected from the provincial assessment, the Ministry generates and provides schools with detailed reports at the school authority, school, class, and individual student levels. Teachers and other school and jurisdictional personnel use these reports to help identify their students' strengths and areas for instructional improvement.

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[25] For information on provincial achievement tests, see https://www.alberta.ca/provincial-achievement-tests.
[26] For an overview of diploma exams, see https://www.alberta.ca/diploma-exams-overview.

For more information, refer to Alberta Education's website:

- https://www.alberta.ca/education (English)
- https://www.alberta.ca/fr/education (*Français*)

SASKATCHEWAN

Social context

In 2023, Saskatchewan had a population of just over 1.2 million, an increase of 11 percent over the past decade. The population is spread throughout a vast geographic area. Nearly half of Saskatchewan's population live in towns, villages, or rural municipalities, or on First Nation reserves, providing a strong rural influence in the province. Potash and uranium mining, oil production, agriculture, and forestry are the major industries. Saskatchewan has a diverse cultural heritage, including a large and fast-growing First Nation and Métis population and an increasing number of immigrants from around the world.

Organization of the school system

Saskatchewan has approximately 216,000 students in Kindergarten to Grade 12. About 90 percent of elementary/secondary students attend 770 publicly funded provincial schools; 10 percent attend First Nation schools, postsecondary institution Adult Secondary Programs, or custody or care schools, or are home schooled. In 2023, a Crown corporation was established to oversee centralized online education. A new provincial online school, the Saskatchewan Distance Learning Centre (Sask DLC), was opened to provide distance learning opportunities to students throughout the province. The school currently serves more than 2,000 full-time K–12 students and 5,000 part-time students, primarily in Grades 10–12.

Science teaching

The aim of K–12 science education is to enable all Saskatchewan students to develop scientific literacy. Diverse learning experiences based on the outcomes in the curriculum provide students with many opportunities to explore, analyze, evaluate, synthesize, appreciate, and understand the interrelationships among science, technology, society, and the environment (STSE), including those that will affect their personal lives, their careers, and their future.

The four goals of K–12 science education are the following:

- *Understanding the nature of science and STSE interrelationships:* Students will develop an understanding of the nature of science and technology, their interrelationships, and their social and environmental contexts, including interrelationships between the natural and constructed worlds.

- *Constructing scientific knowledge:* Students will construct an understanding of concepts, principles, laws, and theories in life science, in physical science, in Earth and space science, and in Indigenous knowledge of nature, and then apply these understandings to interpret, integrate, and extend their knowledge.

- *Developing scientific and technological skills:* Students will develop the skills required for scientific and technological inquiry, problem solving, and communicating; for working collaboratively; and for making informed decisions.
- *Developing attitudes that support scientific habits of mind:* Students will develop attitudes that support the responsible acquisition and application of scientific, technological, and Indigenous knowledge, to the mutual benefit of self, society, and the environment.

Assessment

Classroom teachers in Saskatchewan are responsible for assessment, evaluation, and promotion of students from Kindergarten through Grade 11. At the Grade 12 level, final marks are determined in two ways. For science, mathematics, and English language arts courses taught by non-accredited teachers, the teacher is responsible for determining 60 percent of each student's final mark; the remaining 40 percent is determined by a provincial examination administered by the Ministry of Education. In contrast, accredited teachers who are teaching Grade 12 courses are responsible for determining 100 percent of each student's final mark in those courses.

In 2022, the Ministry of Education developed a teacher resource called Supporting Student Assessment in Saskatchewan (Saskatchewan, 2022), which outlines philosophical ideas and guiding principles for assessment in Saskatchewan classrooms and describes research-based effective assessment practices. This resource contains four modules, which are based on a model illustrating the interaction among the four guiding principles of assessment in Saskatchewan: engaging and empowering the learner; supporting responsive instruction and inspiring learning; using culturally inclusive and affirming assessment practices; and clearly informing stakeholders. This approach recognizes that students' strengths, needs, and interests are central to effective classroom-based assessment experiences.

In all grades, students are assessed on a combination of knowledge, skills, attitudes, and values that are reflected in the curriculum. 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.

Saskatchewan students participate in national and international assessments, including PCAP and PISA, both of which assess science achievement among a random sample of schools.

For more information about education in Saskatchewan, visit the Ministry of Education's website, at http://www.saskatchewan.ca/residents/education-and-learning.

MANITOBA

Social context

In 2023, Manitoba had a population of approximately 1.5 million people, about 56 percent of whom reside in the capital city of Winnipeg. Manitoba's population comprises a wide range of ethnic and cultural groups, including a strong Franco-Manitoban community and an Indigenous community, in both rural and urban areas. Manitoba has a broad and diverse economic base.

Organization of the school system

Schools group grades by early years (Kindergarten to Grade 4), middle years (Grades 5 to 8), and senior years (Grades 9 to 12). Manitoba's system of public schools and funded independent schools enrols about 208,000 students in Kindergarten to Grade 12 and employs about 15,000 teachers in 37 school divisions and funded independent schools. Students may choose courses from four school programs — the English Program, the *Français* Program (about 3 percent of students), the French Immersion Program (about 14 percent of students), and the Senior Years Technology Education Program. Children whose parents are French language–rights holders (as defined by section 23 of the *Canadian Charter of Rights and Freedoms*) may enrol in the *Division scolaire franco-manitobaine* (*DSFM*), which offers the *Français* Program. Individuals who do not fulfill these criteria may submit an application to the *DSFM*, which is reviewed by the school board. Other educational options include non-funded independent schools, home schooling, and federally funded on-reserve schools for First Nation students.

Science teaching

Manitoba's science curricula were developed in keeping with the CMEC Pan-Canadian Protocol for Collaboration on School Curriculum — a process that led to the development and publication of the *Common Framework of Science Learning Outcomes, K to 12* (CMEC, 1997). Guidance for, and development of, science learning outcomes specific to Manitoba commenced shortly after the release of the *Common Framework*, with the publication of *Kindergarten to Grade 4 Science: Manitoba Curriculum Framework of Outcomes* in 2009; *Grades 5–8 Science: Manitoba Curriculum Framework of Outcomes* in 2000; *Senior 1 Science: Manitoba Curriculum Framework of Outcomes* in 2000; and *Senior 2 Science: Manitoba Curriculum Framework of Outcomes* in 2001.[27] From 2003 to 2013, Manitoba developed provincial curriculum frameworks for discipline-specific courses for Grades 11 and 12, including biology, chemistry, and physics, which are closely aligned with the learning outcomes of the *Common Framework*. For the *Français* and French Immersion Programs in the province, simultaneous development of curriculum frameworks in science was established, with close collaboration with the English Program.

The conceptual framework for K–12 sciences in Manitoba is founded on five foundations for a broad-spectrum approach to science literacy:

- the nature of science and technology;
- science, technology, society, and the environment (STSE);
- scientific and technological skills and attitudes;
- essential science knowledge; and
- unifying concepts.

Although these five foundations share equal status conceptually, Manitoba science curricula, when enacted, place particular emphases on STSE connections, scientific inquiry, the technological design process, and the incorporation of Indigenous perspectives in teaching and learning contexts.

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[27] "Senior 1" and "Senior 2" are equivalent to Grade 9 and Grade 10, respectively.

For additional information on Manitoba's science curriculum documents, see:

- https://www.edu.gov.mb.ca/k12/cur/science/scicurr.html (English Program)
- https://www.edu.gov.mb.ca/m12/progetu/sn/doc.html (*Français* and French Immersion Programs)

Assessment

Manitoba's Provincial Assessment Program includes assessments of language arts (English or French) and mathematics in various grades but does not include a science assessment. In terms of assessing science achievement, both public schools and provincially funded independent schools participate in PCAP. Students in the *Français* Program participate in that assessment in French. French immersion students participate in either English or French, at the discretion of the school; their results are included in the English results for the province. Manitoba students also participate in international assessments, including PISA and TIMSS, both of which include an assessment of science achievement among a random sample of schools.

For more information about Manitoba's Provincial Assessment Program, see www.edu.gov.mb.ca/k12/assess/index.html.

ONTARIO

Social context

In 2023, Ontario's population was over 15 million. First Nation, Métis, and Inuit individuals constitute approximately 3 percent of the population of the province. English is Ontario's official language, with French language rights extended to the province's legal and education systems.[28] According to the 2021 Census, when asked which language was their mother tongue,[29] approximately 65 percent of Ontarians reported that it was English, 3 percent reported that it was French, and 27 percent cited a language other than English or French. The most frequently reported mother tongue languages other than English or French include Indo-Iranian languages (6.3 percent), Italic (Romance) languages (4.3 percent), and Chinese languages (4.4 percent) (Statistics Canada, 2023).

Organization of the school system

In Ontario, the Ministry of Education is responsible for delivering a high-quality publicly funded education system from Kindergarten to Grade 12 and for oversight of the province's childcare and early years systems. The Ministry is committed to ensuring that all children develop the skills and knowledge they need to reach their full potential and achieve lifelong success, and that parents and families are also supported with respect to their children's education.

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[28] See the province's "About Ontario" webpage, at https://www.ontario.ca/page/about-ontario#section-5.

[29] "Mother tongue" refers to the first language learned at home in childhood and still understood by the person at the time the data was collected. If the person no longer understands the first language learned, the mother tongue is the second language learned. For a person who learned more than one language at the same time in early childhood, the mother tongue is the language this person spoke most often at home before starting school. The person has more than one mother tongue only if they learned these languages at the same time and still understand them. For a child who has not yet learned to speak, the mother tongue is the language spoken most often to this child at home. A child who has not yet learned to speak has more than one mother tongue only if these languages are spoken to them equally often, so that the child learns these languages at the same time.

In Ontario, Kindergarten to Grade 12 public education is governed principally by the *Education Act*. The Act and its regulations set out the duties and responsibilities of the Minister of Education and of school boards, school board supervisory officers, principals, teachers, parents, and students. The *Child Care and Early Years Act* (*CCEYA*) establishes the rules for childcare and early years programs and services in Ontario and authorizes the Minister of Education to issue policy statements regarding programming and pedagogy for the purpose of guiding operators of childcare and early years programs and services.

Approximately 93 percent of Ontario's students are enrolled in publicly funded schools.[30] In the 2022-2023 school year, over 2 million students were enrolled in Ontario's publicly funded education system, of whom approximately 96,060 were Indigenous children of school age (Statistics Canada, 2022). The province has around 4,000 elementary and 900 secondary schools. About two-thirds of Ontario's students are enrolled in public schools and one-third in public Catholic schools. Approximately 5.4 percent of Ontario's students are enrolled in French-language schools. Ontario has 72 district school boards — 31 English public, 29 English Catholic, 4 French public, and 8 French Catholic.[31]

Along with these school boards, the province has 10 school authorities: six of these are located in treatment centres for children and youth; the other four school authorities are for schools in remote and sparsely populated regions. In addition, the province has one provincial schools authority.[32] Four Ministry-operated provincial schools serve students who are Deaf, hard of hearing, blind, low-vision, or deafblind; three Ministry-operated demonstration schools serve students with severe learning disabilities. The Centre Jules-Léger Consortium operates one provincial school and one demonstration school for francophone students.

Some students are unable to attend school because of their primary need for care, rehabilitation, or treatment, or because of a court order to serve a custodial or detention sentence. These students may be enrolled in an Education and Community Partnership Program. These are voluntary programs developed between school boards and government-approved facilities such as custody and correctional facilities, mental health agencies, or hospitals, wherein education continues to be provided while students receive treatment or care. The Ministry provides these students with educational programming that supports treatment objectives, student success, and improved life outcomes.

Approximately 1,400 private schools operate in Ontario. Students in private schools represent approximately 7 percent of all students in Ontario schools. Private schools in Ontario operate as independent businesses or non-profit organizations and receive no public funding or financial assistance from the government. While the Ministry inspects the standard of instruction in private schools that seek the authority to grant credits toward an Ontario Secondary School Diploma (OSSD) (in order to determine whether they can be granted this authority), the Ministry does not regulate, license, accredit, or otherwise oversee the operation of private schools.

Ontario has a two-year Kindergarten program that is child-centred and developmentally appropriate for four- and five-year-olds. The purpose of the program is to establish a strong foundation for

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[30] As reported by schools through the Ontario School Information System, 2022–2023, Final public posting as of October 4, 2024 (subsequent revisions may be made by school boards). Unless otherwise indicated, the statistics in this section are from this source.

[31] "Education Facts, 2022-2023 (Preliminary)," available on the Ontario Ministry of Education's website, at http://www.edu.gov.on.ca/eng/educationFACTS.html.

[32] "Quick Facts: Ontario Schools, 2022-2023 – Ontario Data Catalogue," available on the Ontario Ministry of Education's website, at https://data.ontario.ca/en/dataset/quick-facts-ontario-schools/resource/0f23b97f-1a73-40ee-83dd-62353d1c2f9a.

learning in the early years, and to do so in a safe and caring play- and inquiry-based environment that promotes the physical, social, emotional, and cognitive development of all children. Parents may enrol their children in the first year of Kindergarten at age four or the second year of Kindergarten at age five. Some students may start the first year of Kindergarten at age three, if their fourth birthday is between September 1 and December 31. While Kindergarten is not mandatory, 85 percent of eligible children are enrolled in it.[33]

Students who are six years old on or before the first day of school are required to attend school until they reach the age of 18 or graduate.[34] Ontario has four education divisions: primary (Kindergarten to Grade 3), junior (Grades 4 to 6), intermediate (Grades 7 to 10), and senior (Grades 11 and 12). Teachers who hold qualifications in the primary and junior divisions are qualified to teach all subjects in Kindergarten to Grade 6 (some exceptions apply). Teachers who hold qualifications in the intermediate division and a specific subject (e.g., science) are qualified to teach that subject in Grades 7 and 8 and Grades 9 and 10.

Grades 1 to 8 constitute the elementary grades. At this level, students receive 25 hours per week of instructional time. With some exceptions, decisions regarding the amount of time spent on science and other areas of the elementary curriculum are made at the local level, to allow educators choice in integrating subject content. (The subjects with set instructional minutes are mathematics,[35] foundations of language,[36] daily physical activity,[37] Indigenous language programs, where offered,[38] and French as a second language in English-language schools.[39]) Grades 9 to 12 constitute the secondary level. At this level, students earn credits through the successful completion of courses that are a minimum of 110 hours in length.

Science teaching

The Ministry of Education released the revised elementary science curriculum — *Ontario Curriculum, Grades 1 to 8: Science and Technology* and *Le curriculum de l'Ontario: Sciences et technologie, de la 1re à la 8e année* — in 2022.[40] The English- and French-language curricula for science and technology were developed, revised, and implemented in parallel with each other. These documents guided the science education of the Ontario students who participated in the PCAP 2023 assessment.

Ontario's elementary science and technology curriculum provides numerous opportunities for students to develop essential science, technology, engineering, and mathematics (STEM) skills while making important connections that allow them to deepen their understanding of the fundamental

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[33] As reported by schools in the Ontario School Information System (OnSIS), 2022-2023 (OnSIS): Final public posting as of October 4, 2024 (subsequent revisions may be made by school boards); see also Statistics Canada (2024b) for the total number of children used to compute the percentage of eligible children enrolled.

[34] Legal reasons for being absent from school (e.g., receiving satisfactory instruction at home or elsewhere) continue to apply. For more information, see Bill 52, at https://www.ola.org/sites/default/files/node-files/bill/document/pdf/2006/2006-12/bill---text-38-2-en-b052ra.pdf.

[35] For more information about the protected instruction time for mathematics, see Policy/Program Memorandum No. 160, Protected Time for Daily Mathematics Instruction, Grades 1–8, at http://www.edu.gov.on.ca/extra/eng/ppm/ppm160.pdf.

[36] For more information about foundations of language, see the learning continua section in the language curriculum, at https://www.dcp.edu.gov.on.ca/en/curriculum/elementary-language/context/strands#b.

[37] For more information about daily physical activity in elementary schools, see Policy/Program Memorandum No. 138, at https://www.ontario.ca/document/education-ontario-policy-and-program-direction/policyprogram-memorandum-138.

[38] For more information about class time allocation for Indigenous language programs, see the Native languages curriculum, at https://www.edu.gov.on.ca/eng/curriculum/elementary/nativelang18curr.pdf.

[39] For more information about French as a second language programs, see https://www.ontario.ca/page/french-second-language-programs#:~:text=At%20the%20elementary%20level%2C%20students,for%20Grades%2011%20and%2012.

[40] The English-language Ontario Grades 1 to 8 science and technology curriculum can be accessed at https://www.dcp.edu.gov.on.ca/en/curriculum/science-technology; the French-language curriculum can be found at https://www.dcp.edu.gov.on.ca/fr/curriculum/sciences-technologie.

concepts of science and technology. The fundamental concepts in science and technology provide a framework for the acquisition of all scientific and technological knowledge. They also help students integrate scientific and technological knowledge with knowledge in other subject areas, such as mathematics and social studies.

The science and technology curriculum focuses on connecting, developing, reinforcing, and refining the knowledge, concepts, and skills that students acquire as they work toward meeting the overall expectations in the elementary school program. This approach reflects and accommodates the progressive nature of the development of knowledge, concepts, and skills in science and technology learning.

Ontario's elementary science and technology curriculum has three main goals for students:

- to develop the skills and make the connections needed for scientific and technological investigation;
- to relate science and technology to our changing world, including society, the economy, and the environment; and
- to explore and understand science and technology concepts.

Ensuring that all students see themselves as confident, effective science and technology learners and practitioners is at the forefront of the program. Students analyze scientific and technological discoveries and innovations made by people with diverse experiences and integrate their own scientific and technological skills and knowledge to enhance their learning in the classroom. Students explore Indigenous knowledges, which can broaden their understanding of and appreciation for Indigenous cultures and practices and provide them with valuable ways in which to investigate how diverse perspectives enrich science and technology practices. Finally, the science and technology curriculum helps students develop important scientific literacy and technological skills that will enable them to thrive in their future professional and personal lives and to become discerning, knowledgeable, and active problem solvers in their communities.

The strands in the elementary science and technology curriculum

The science and technology curriculum expectations are organized into five distinct but related strands, or broad areas of learning: STEM Skills and Connections; Life Systems; Matter and Energy; Structures and Mechanisms; and Earth and Space Systems. In all grades, the learning related to the STEM Skills and Connections strand is applied to learning related to the other four areas, or content strands. The STEM Skills and Connections strand enables students to investigate concepts and integrate knowledge from each of the content strands and to make practical connections between science and technology and other subject areas. Students integrate the STEM Skills and Connections expectations with the other strands as they develop their understanding of strand-specific concepts, investigate phenomena, and make meaningful connections to the real world.

The four content strands of the Grade 8 science and technology curriculum can be described as follows:

- *Life Systems:* Building on the knowledge that the cell is the basic unit of life, as part of the introduction to cell theory, students examine the structure and function of plant and animal

cells and their components. They investigate simple cell processes and the impact of emerging technologies in the field of cell biology on society and the environment.

- *Matter and Energy:* Students examine basic fluid mechanics principles, and the properties and uses of fluids. They explore how fluid compression affects its use in technological applications and examine the buoyancy of an object in a variety of fluids. They deepen their learning on how forces are transferred in fluids and identify factors affecting the flow of fluids. They also assess the impact of various technologies that rely on the properties of fluids, learn about pneumatic and hydraulic systems, and explore how flow is regulated in mechanical devices and in living systems.

- *Structures and Mechanisms:* Students explore different types of mechanical systems, and the factors that contribute to their safe and efficient operation. They also describe the conditions that are required for work to be done, analyze the mechanical advantage of various systems, and describe technological innovations that make these systems more efficient. They assess personal, social, and environmental impacts of various systems.

- *Earth and Space Systems:* Students investigate different water systems, such as local watersheds and municipal water management facilities, and learn about sustainability by examining the impact of human activities on natural water systems. They examine factors, including climate change, that have contributed to the melting of glaciers and polar ice caps and describe the effects of this phenomenon on local and global water systems.

Assessment

In Ontario, teachers are responsible for classroom assessment and evaluation to improve student learning. Teachers and early childhood educators bring varied assessment and evaluation approaches to the classroom, grounded in assessment "for, as, and of" learning (Ontario Ministry of Education, 2010). The ministry's curriculum policy documents include an achievement chart that identifies four categories of knowledge and skills: knowledge and understanding, thinking, application, and communication. The achievement chart is a standard province-wide guide used by teachers to make judgments about student work that are based on clear performance standards and on a body of evidence collected over time.

The Education Quality and Accountability Office (EQAO), an agency of the Ministry of Education, develops and administers annual large-scale provincial assessments. These assessments are administered in English and French to all students in Grades 3 and 6 in reading, writing, and mathematics; in Grade 9 in mathematics; and in Grade 10, when the Ontario Secondary School Literacy Test (OSSLT)/*Test provincial de compétences linguistiques* (TPCL) is first administered. Results do not affect student grades or promotion in Grades 3 and 6; in Grade 9, beginning in the 2024-2025 school year, teachers count the results of the mathematics assessment as a portion of the overall course grade (for at least 10 percent, up to a maximum of 30 percent). To obtain an Ontario Secondary School Diploma, all students must meet a graduation literacy requirement. Passing the OSSLT/TPCL is the main means of meeting that requirement. Students who are not successful on this test may retake it or may satisfy the requirement by completing the Ontario Secondary School Literacy Course.

The Grade 3, 6, and 9 assessments are based on Ontario curriculum expectations, and the OSSLT/ TPCL is based on cross-curricular reading and writing expectations up to the end of Grade 9. All assessments include both selected-response and open-response questions, and all writing assessments include extended writing.

To complement classroom and provincial-level assessment efforts, Ontario participates in PCAP, and in PISA and TIMSS — two international assessments that assess science, among other domains. Together, classroom, provincial, national, and international assessments constitute the province's multi-level assessment effort, with the goal of improving student learning so that Ontario students successfully advance to postsecondary education, training, and/or the workforce.

More information on provincial, national, and international assessments in Ontario can be found on the EQAO website:

- English: https://www.eqao.com/the-assessments/
- French: https://www.eqao.com/les-tests/?lang=fr

QUEBEC

Social context

Quebec's population of approximately nine million is concentrated in the south of the province, mostly in its largest city, Montreal, and its capital, Quebec City. French is Quebec's official language. Francophones account for around 78 percent of Quebec's total population, while anglophones make up around 10 percent of the population. Quebec is also home to 11 Indigenous nations. For eight of these nations, youth education is the responsibility of the federal government, with support from the *Ministère de l'Éducation* (MEQ) as needed. For the other three, the schools are part of the MEQ system but have special powers under the rights and provisions set out in the James Bay and Northern Quebec Agreement and the Northeastern Quebec Agreement.

An increase in immigration, especially to the Greater Montreal Area, has resulted in a massive inflow of students whose first language is neither French nor English. Under provincial legislation, these students attend French schools. To meet the needs of this new client group, schools have implemented special welcoming and francization measures, in addition to offering welcome classes in certain situations.

Organization of the school system

Overview of the education system

In Quebec, the public education system is currently made up of 60 French-language school service centres and nine English-language school boards,[41] one special-status school service centre (Littoral), and two special-status school boards (the Cree School Board and Kativik Ilisarniliriniq). Elementary and secondary education is also offered by private institutions, some of which are partially subsidized by MEQ. In 2022-2023, 6.3 percent of elementary students and 20.3 percent of secondary

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[41] On June 15, 2020, French-language school boards were renamed "school service centres." The term "school boards" still exists in the English-language education system.

students attended private schools. Private schools must adhere to the same basic school regulations as public schools and follow the official curriculum. In 2022-2023, a total of 1,137,300 students were registered in general non-adult classes in Quebec's 2,738 elementary and secondary schools — 2,418 public schools run by the 72 school service centres and school boards, and 320 private schools.[42]

Quebec's education system offers the public a variety of programs[43] and education services from Kindergarten through university, and the role that MEQ plays varies depending on each education level. More specifically, the education system consists of four levels: elementary (preschool to Grade 6), secondary (Secondary I to V and vocational training), college (cégep), and university. During the 2022-2023 school year, full- and part-time enrolment in all four levels was over 1.9 million students. For preschool, elementary, secondary, and college education, MEQ decides the programs and the educational content or standards, except for those school boards created under an agreement. In terms of labour relations, MEQ negotiates and signs provincial collective agreements. MEQ also defines a normative framework for finances and provides the large majority of educational resources used in schools. For universities, MEQ takes a hands-off approach to teaching and research, providing educational institutions with the resources they need to operate and develop while also encouraging cooperation with partners. All persons residing in Quebec have the right to receive a free preschool, elementary, and secondary education. College and university students pay tuition fees.

Preschool education is for children ages four and five. With the assistance of their parents, four-year-olds can benefit from the Passe-Partout program, which provides parents with tools to help their child succeed in school and guarantee their child a positive and stimulating transition to elementary school. Full-time Kindergarten for four-year-olds has been gradually implemented across Quebec since the 2013-2014 school year. During that school year, 664 four-year-olds were enrolled in Kindergarten, compared to 18,243 in 2022-2023. Elementary school is compulsory and is divided into three two-year cycles. Secondary school lasts five years and is divided into two cycles. The first cycle, which lasts two years, is a continuation of elementary school and aims to provide the same basic education to all students. The second cycle lasts three years. Some secondary schools offer vocational training programs. Secondary school is compulsory until age 16, which is usually when students are in Secondary IV. Once they complete secondary school, students may continue their education at a college, where they can pursue either two-year pre-university training or three-year technical training; both options lead to a Diploma of College Studies.

Quebec's preschool education program has been in place since 2021,[44] while its elementary school program was implemented in September 2000. Secondary Cycle One has been in place since September 2005; Secondary Cycle Two was implemented gradually from September 2007 to September 2009. Additionally, programs in some elementary and secondary school subject areas that are not bound to main subjects have since been changed, such as the culture and citizenship in Quebec program in elementary and secondary schools (Gouvernement du Québec, 2023) and the history program in secondary schools (Gouvernement du Québec, 2017).

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[42] For information on school governance, see https://www.quebec.ca/en/education/preschool-elementary-and-secondary-schools/administration-frameworks/school-governance/school-governance.

[43] For information on programs, see https://www.quebec.ca/en/education/study-quebec/education-system.

[44] See Implantation du nouveau programme de l'éducation pour la maternelle dès la rentrée 2021, at https://www.quebec.ca/nouvelles/actualites/details/implantation-du-nouveau-programme-de-leducation-pour-la-maternelle-des-la-rentree-2021 (available in French only).

The Quebec Education Program (QEP)[45] for preschool and elementary and secondary schools focuses on skills development. It includes certain subjects and cross-curricular competencies that are required for the broad areas of learning — which correspond to the major spheres of students' lives — organized into subject areas. The QEP defines "competency" as a set of behaviours based on the effective mobilization and use of a range of resources. One aim of a competency-based program is to ensure that students' learnings serve as tools for both action and thought (which is also a form of action). In this context, competency is complex and progressive. It is more than a simple combination or juxtaposition of elements, and students can continue to develop it throughout the school curriculum and beyond. Additional documents have been created to define the knowledge that students must acquire and be able to use in each year of elementary and secondary school.

Language of instruction

Elementary schools in Quebec teach in French, English, or an Indigenous language; secondary schools teach in French or English. Some secondary schools offer Spanish as a third language in addition to the official curriculum, and some elementary and secondary schools offer instruction to students whose first language is from other language communities (e.g., Greek, Hebrew, Italian, Portuguese, German). Sometimes instruction in this language is offered to all students at a school. Anglophones have access to a full system of educational institutions, from preschool to university. For Indigenous school boards and service centres created under an agreement, instruction is provided in the students' first language during preschool and the first three years of elementary school. French or English is introduced gradually starting in Grade 3.

In Quebec, specialists provide second-language instruction (English or French) in elementary schools and secondary schools. Students receive instruction in English as a second language starting in Grade 1 for one hour a week, on average. Some schools offer instruction in English as a second language starting in preschool (international program), and others offer intensive English as a second language instruction starting in Grade 5 or 6 to meet the needs of the community. In secondary school, the Basic School Regulation suggests that students in Secondary I and II receive 200 hours of instructional time per year in English as a second language, either in a core program or an enriched program, and that students in Secondary III, IV, and V receive 100 hours of instructional time per year in English as a second language. The Basic School Regulation also suggests that students in Secondary I and II receive 300 hours of instructional time per year in French as a second language, that students in Secondary III receive 150 hours, and that students in Secondary IV and V receive 100 hours of instructional time per year in this subject.[46]

Science teaching

In Quebec, students may begin learning about science and technology in Grade 1; this subject is compulsory from Grade 3 through Secondary IV. In Elementary Cycle One, the competencies and knowledge related to this subject are developed through other subject areas and through the broad areas of learning. In Elementary Cycles Two and Three, science and technology (ST) is included as a subject in the Basic School Regulation, but there is no specific time allocated for teaching it. In Secondary Cycle One, the suggested instructional time for ST is 100 hours per year. In Secondary Cycle Two, the suggested instructional time is 150 hours in Secondary III and 150 hours in

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[45] For information on QEP, see https://www.quebec.ca/en/education/preschool-elementary-and-secondary-schools/programs-training-evaluation/quebec-education-program.

[46] For the Basic School Regulation, see https://www.legisquebec.gouv.qc.ca/en/pdf/cr/I-13.3,%20R.%208.pdf.

Secondary IV, or 150 hours of applied science and technology (AST) instructional time per year in Secondary III and Secondary IV.[47] Science and technology programs are optional in the final year of Secondary Cycle Two (Secondary V). Students who want to study science or certain technical fields at the college level must enrol in and pass either a physics or chemistry course (or both) in Secondary V.

In elementary school, the ST program revolves around three competencies:

- proposing explanations for or solutions to scientific or technological problems;
- making the most of scientific and technological tools, objects, and procedures; and
- communicating in the languages used in science and technology.

Similarly, in Secondary Cycle One, the program enables students to:

- seek answers or solutions to scientific and technological problems;
- make the most of their scientific and technological knowledge; and
- communicate in the languages used in science and technology.

With a view to continuity with the Secondary Cycle One program, the Secondary Cycle Two ST program targets development of the same three competencies. Progression of Learning documents specify the knowledge that should be taught in ST courses (Québec, 2009, 2011b). The content of these documents is considered to be a suggestion for elementary school and prescriptive for secondary school.

Assessment

There is no ministerial science assessment in Quebec elementary schools. However, to earn their Secondary School Diploma, students must have completed 54 credits in Secondary IV and V, including the Secondary IV science credits, and must pass a ministerial (i.e., standard) examination in science and technology or applied science and technology at the end of Secondary IV (counting for 50 percent of students' final score for the theory component). The final mark for science is calculated according to the weighting assigned to each component: 60 percent for theory and 40 percent for practical (Québec, 2011a).[48] MEQ marks the multiple-choice question section of these examinations, while schools mark short-answer and constructed-response questions, using answer keys provided by MEQ. Evaluating the students is the responsibility of the schools, which must adopt a local evaluation policy in accordance with current ministerial frameworks.

Quebec students participate in national and international assessments, including PCAP, PISA, and TIMSS, all of which assess science achievement among a random sample of schools.

For additional information on the science curriculum in Quebec, visit the following websites:

- https://www.quebec.ca/en/education/preschool-elementary-and-secondary-schools
- https://www.quebec.ca/en/education/preschool-elementary-and-secondary-schools/programs-training-evaluation/quebec-education-program.

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[47] Cycle Two has two different pathways: ST and AST are the compulsory science courses associated with these pathways for Secondary III and IV. In Secondary IV, students with a strong interest in science can choose to add the environmental science (ES) or environmental science and technology (EST) option to their basic program. For more information, see https://www.legisquebec.gouv.qc.ca/fr/pdf/cr/I-13.3,%20R.%208.pdf.

[48] See Report Card Weightings and Wording in Secondary School, https://www.quebec.ca/en/education/prescolaire-primaire-et-secondaire/epreuves-ministerielles-evaluation-apprentissages/ponderations-libelles-bulletin/report-card-weightings-wording.

For additional information on assessment in Quebec, see:

- https://www.quebec.ca/en/education/preschool-elementary-and-secondary-schools/programs-training-evaluation/ministerial-examinations-evaluation-learning/ministerial-examinations/preparatory-documents/-guides-parents

NEW BRUNSWICK

Social context

In 2023, the estimated population of New Brunswick was about 834,691. The provincial population increased over the preceding four years, with the rate of growth in 2023 doubling over the previous year. According to the 2021 Census, approximately 21,000 First Nation people live in New Brunswick, 37 percent of whom reside in First Nation communities.

Since 2009, the number of older people in New Brunswick has exceeded the number of children. While, according to 2021 Census information, the median age of the Indigenous population (37.3 years) in the province is younger than the non-Indigenous population (44.5 years), these are both higher than the Canadian medians of 33.6 and 41.8 years, respectively (Statistics Canada, 2021).

Organization of the school system

New Brunswick's *Education Act* affirms the right of all students to be educated in a common learning environment to the fullest extent practicable. Inclusive education has been entrenched in the public education system since 1986. Recently developed provincial policy has strengthened the requirements for supporting all learners to enable them to develop to their full potential in a common, positive learning environment. A recent amendment to the *Education Act* has reinforced the obligation of the Minister to approve programs and services that foster an understanding of Indigenous history and culture among all students.

As Canada's only officially bilingual province, New Brunswick offers students the opportunity to learn in both English and French. In addition, students can take language and culture classes in Wolastoqey Latuwewakon and Mi'kmaw. In 1974, New Brunswick recognized its linguistic duality in public education by establishing two parallel but distinct school systems. The francophone sector of the Department of Education and Early Childhood Development is responsible for French-language schools, including curriculum, student support services, and assessment; the anglophone sector is responsible for the same in English-language schools. Schools are organized within seven school districts, three francophone and four anglophone. Each school district is governed by a District Education Council, whose members are locally elected by the public and who are responsible for policy development and decision making regarding school and district operations, through the superintendent of the school district.

In the 2022-2023 school year, 29,866 students were enrolled in French-language schools and 73,068 students in English-language schools. These students represented 29.0 percent and 71.0 percent, respectively, of the total enrolment of 102,934 in the province from Kindergarten to Grade 12. On September 30, 2022, there were 1,485 students living in First Nation communities in the province and attending provincial schools. Of these, 1,402 attended English-language schools

and 83 attended French-language schools. The number of Indigenous students living outside First Nation communities and attending public schools is not tracked.

 "School age," as defined in the *Education Act*, extends from the year in which a child turns five years old on or before December 31 to age 21 years. School attendance is compulsory until students have met graduation requirements or until the age of 18, whichever comes first. In 2010, early childhood development was integrated into the Department of Education to allow greater continuity in programming in support of early learning as well as support and services in French and English. Early learning services and programs are offered by the Department and school districts and through private agencies to children under the age of eight, with after-school programming available for children up to age 12.

The Department oversees licensing of early learning and childcare facilities, which operate primarily within the private sector. In 2017, the Department introduced a voluntary New Brunswick Early Learning Centre (NBELC) designation for facilities serving children from infancy to Kindergarten entry as part of its transformational initiative toward a more publicly managed early learning and childcare system. Designated NBELCs use one of the two provincial early learning and childcare curriculum frameworks (anglophone or francophone), which align the early learning and childcare system with New Brunswick's dual public education sectors.

For more information about New Brunswick's anglophone school districts, see https://www2.gnb.ca/content/gnb/en/departments/education/k12.html.

For more information about New Brunswick's francophone school districts, see https://www2.gnb.ca/content/gnb/fr/ministeres/education/m12.html.

Science teaching

Science is a core subject in New Brunswick public schools and is a compulsory curricular component for all students from Kindergarten to secondary school. The anglophone sector introduced its holistic scientific literacy curriculum for Kindergarten to Grade 9 in fall 2023. The francophone sector implemented new science curricula for primary levels from 2011 to 2014, and for secondary levels from 2007 to 2009, with updates in 2011. Both sectors reviewed and modified their science curricula between 2018 and 2021, and individual secondary school science courses are currently under renewal.

In the anglophone sector, students in Grades 10, 11, and 12 require eight science credits to graduate. Recent changes in the francophone secondary education framework now require students to obtain a minimum of two compulsory credits from the available science courses over four years, rather than targeting specific courses or grade levels.

The curriculum aims to develop skills that enhance students' scientific literacy and their ability to engage in scientific inquiry. All science curricula are focused on skills-based concepts and hands-on learning.

Assessment

At the provincial level, both language sectors administer science examinations, which include selected- and constructed-response items, to assess curricular outcomes through knowledge-based,

inquiry-based, and skills-based questions. Teachers participate in all stages of the development, administration, and marking of these examinations.

In the anglophone sector, science examinations take place in the spring in Grades 4, 6, and 8, and are available in English and French. Individual students' results are issued to schools before the end of the school year. Summary reports are provided to districts and schools to support goal setting for improvement. Success rates are published to inform parents and the general public of overall student achievement.

In the francophone sector, science examinations take place in Grade 8. The tests are administered in May, with individual students' results made available to schools and parents before the end of the school year. These assessments generate standardized data on progress in learning, providing valuable information on student achievement to parents, schools, and the general public.

New Brunswick students participate in national and international assessments, including PCAP and PISA, both of which assess science achievement among a random sample of schools.

NOVA SCOTIA

Social context

In 2023, Nova Scotia's population was just over one million, with a higher rural population than the Canadian average. The annual population growth rate is about 4 percent, and immigration rates continue to increase year after year, with immigrants now making up 7 percent of the population. Almost 90 percent of Nova Scotians are anglophones. About 10 percent of the population speak both English and French or French only; less than 1 percent speak neither official language. Almost 10 percent of the total population are visible minorities. Unemployment rates in Nova Scotia are typically similar to the Canadian average.

Organization of the school system

There are seven anglophone regional centres for education in Nova Scotia, which serve almost 95 percent of all public school students. The provincial school board for Acadian/francophone students, the *Conseil scolaire acadien provincial*, is responsible for the remaining 5 percent of public school students. Nova Scotia's total public school population exceeds 130,000 students, from Grade Pre-Primary to Grade 12. School enrolment has been increasing since 2015. Students who are entering Grade Pre-Primary must be four years old on or before December 31 of that school year. Students must attend school until they are 16 years old.

Science teaching

The Nova Scotia science curriculum is shaped by a vision that fosters the development of scientifically literate students who can extend and apply their learning. An important and universal goal of science education is to equip learners with an understanding of the roles that science and technology play in society. The Nova Scotia science curriculum aims to develop learners' scientific literacy and their ability to problem solve and apply the principles of scientific inquiry to real-world situations and familiar problems. In so doing, learners develop skills and competencies. Additionally,

the science curriculum seeks to develop scientific inquiry through a focus on designing and building for technological innovation, writing for scientific communication, and data analysis.

Nova Scotia students are required to take science for the first 10 years of school. The integrated elementary science program encourages learners to explore their environment by manipulating materials, making first-hand observations, and talking and writing about what they are learning. This active, experiential approach promotes the importance of building and expanding on the natural curiosity of children and helps to nurture a lifelong desire to experience, question, and investigate. The junior high school science program also provides students with significant hands-on, minds-on experiences relating to science, technology, society, and the environment.

In order to graduate, students are required to earn two science credits during their high school years. Students can choose from a variety of science courses, including Science 10, Biology, Chemistry, Physics, Oceans, Agriculture, Geology, and Food Science. In addition to two science credits, students must earn three credits in mathematics and one other from a science and technology course.

Nova Scotia students benefit from opportunities to engage actively, by doing science in outdoor and community-based learning environments and from other opportunities afforded by a range of education partners. More information about the Nova Scotia Primary–Grade 12 education system can be found on the Nova Scotia curriculum website at https://curriculum.novascotia.ca/.

Assessment

Student assessment in Nova Scotia is integrated with instruction and includes a wide variety of strategies. Students' progress in science and their other subjects is monitored each year within the school. At this time, the provincial assessment program does not assess science. However, Nova Scotia students participate in PISA and PCAP, both of which assess science achievement among a random sample of schools.

PRINCE EDWARD ISLAND

Social context

Prince Edward Island is the smallest province in Canada, in terms of both land (5,684 square kilometres) and population (173,713 in 2023). Ninety-nine percent of the population speak English. Prince Edward Island has the third-highest rate of bilingualism in Canada, with 13 percent of the population self-identifying as speaking both English and French. Approximately 6,000 francophones live in Prince Edward Island. Fifty-six percent of the province's population is rural, with approximately 7 percent living on farms. The environment is predominately rural, with agriculture, tourism, fishing, and manufacturing constituting the major industries. However, the Island economy is diversifying, with growth industries such as aerospace, bioscience (including agriculture and fisheries), information technology, and renewable energy. The Confederation Bridge, the world's longest continuous multi-span bridge, opened in 1997, connecting Prince Edward Island to mainland New Brunswick.

Organization of the school system

During the 2015-2016 school year, the part of Prince Edward Island's public school system responsible for English-language students was reorganized into the Public Schools Branch (the French school board was unchanged). In 2023, 22,241 students were enrolled in the province's 62 public schools. This figure includes approximately 1,259 students in six French schools, with 5,109 students enrolled in French immersion programs. In addition, there were five private schools, with an enrolment of 443 students, along with one First Nation–operated school, with an enrolment of approximately 50 students. Prince Edward Island has approximately 1,750 teachers.

The school system consists of Kindergarten to Grade 12. High school is Grades 10–12. Students entering Kindergarten must be five years of age by the end of December of their first school year. Prince Edward Island's students are accommodated within facilities that contain a number of grade configurations, including K–3, K–4, K–6, K–8, K–12, 4–6, 5–8, 7–9, 9–12, and 10–12. This diversity results from the realities of enrolments and existing facilities as well as demands placed on the schools by local communities.

More information on the Prince Edward Island education system can be found at https://www.princeedwardisland.ca/en/topic/education-and-early-years.

Science teaching

The Prince Edward Island science curriculum is guided by the vision that all students have the opportunity to develop scientific literacy. "Scientific literacy" is defined as the set of knowledge, skills, and attitudes that enables an individual to inquire, problem solve, critically evaluate and make well-informed decisions, and maintain a sense of wonder about the world around them. The science curriculum is designed around the traditional strands of life sciences, physical sciences, and Earth and space sciences. These strands provide students with a range of purposeful experiences to help them better understand and appreciate science and to apply it to the world around them.

Aim

The Prince Edward Island science curriculum aims to facilitate the development of scientifically literate students by providing opportunities to:

- develop and apply an understanding of the nature of science in order to evaluate claims related to science;
- develop skills and strategies required to perform scientific inquiry and to apply science to solve problems;
- work collaboratively to generate and explore ideas and to carry out investigations;
- reason scientifically;
- develop foundational understanding of scientific concepts that explain the natural and material world;
- communicate scientific information effectively; and
- evaluate the personal, societal, environmental, and ethical implications of the applications of science and technology from a variety of perspectives.

Attitudes

The science curriculum seeks to foster positive attitudes toward science in all learners. "Attitudes" can be defined as generalized aspects of behaviour that can be modelled by adults and encouraged by selective approval. Positive attitudes toward science include, but are not limited to, the following:

- exhibiting a sense of wonder and curiosity about scientific and technological endeavours;
- engaging and persevering in science tasks and projects;
- demonstrating resilience;
- showing concern for safety during inquiry activities;
- exhibiting collaborative behaviours;
- valuing the role of science and technology in our understanding of the world;
- demonstrating an appreciation of the nature of science;
- demonstrating respect and sensitivity in maintaining a balance between the needs of humans and the environment; and
- being open-minded and projecting beyond the personal consequences of proposed actions.

The science curriculum articulates the vision for science instruction in Prince Edward Island as a vehicle that enables and encourages students to become lifelong learners of science. Science education seeks to empower students in asking and answering meaningful questions and in making the connections between inquiry, problem solving, and decision making in real-world contexts.

Essential Graduation Competencies (EGCs)

Curriculum is designed to articulate what students are expected to know and be able to do by the time they graduate from high school. The PE Department of Education and Lifelong Learning designs curriculum that is based on the Atlantic Canada Framework for EGCs released by the Council of Atlantic Ministers of Education and Training. Competencies articulate the interrelated sets of attitudes, skills, and knowledge — beyond foundational literacy and numeracy — that prepare learners to successfully participate in lifelong learning and life/work transitions. They are cross-curricular in nature and provide opportunities for interdisciplinary learning. The framework identifies six EGCs: citizenship, communication, personal-career development, creativity and innovation, critical thinking, and technological fluency. Achievement of the EGCs is monitored through the assessment and evaluation of curriculum outcomes developed for individual courses and programs.

Assessment

Assessment and evaluation are integral components of the teaching and learning process in Prince Edward Island. They are continuous activities that are planned for and derived from specific curriculum outcomes and are consistent with instruction. Effectively planned assessment and evaluation improve and guide future instruction. They also promote learning, build confidence, and develop students' understanding of themselves as learners. Teachers use a variety of assessments (formative and summative) as part of a systematic process of gathering information on student learning.

Prince Edward Island conducts provincial assessments in literacy and mathematics in various grades, but not in science. However, students participate in national and international assessments, including PCAP and PISA, both of which assess science achievement among a random sample of schools in the province.

NEWFOUNDLAND AND LABRADOR

Social context

Newfoundland and Labrador's population was an estimated 538,907 people in 2023, spread over a large geographical area. The population of rural areas has been declining, while that of urban areas has been rising: currently, the capital city of St. John's and its metropolitan area is home to 43 percent of the total population of the province. The decline in the size of rural communities, along with the large geographic area of the province, presents many challenges for the delivery of educational programs and services.

Organization of the school system

The province's education system is organized into two public school systems — one English, administered by the Department of Education, and one French, administered by the French School District — and includes six private schools and three Indigenous schools. The public school system contains 256 schools, with a total enrolment of approximately 63,720 students, and 5,232 school-based teachers. Fifty-six percent of provincial student enrolment is concentrated on the Avalon Peninsula, in the eastern part of the province. School entry is compulsory for children who are six years of age by December 31 of the school year; however, most children enter Kindergarten at the age of five. Typically, Grade 8 students are 13 years old. Early French immersion (K–12) and late French immersion (Grades 7–12) programs are offered in the English school system. Approximately 15 percent of the total student population is enrolled in either early or late French immersion.

More information about the Newfoundland and Labrador K–12 education system may be found on the Department of Education website, at https://www.gov.nl.ca/education/.

Science teaching

Science education in Newfoundland and Labrador aims to develop scientific literacy, which is defined as a blend of science-related attitudes, skills, and knowledge that enables students to develop inquiry, problem-solving, and decision-making abilities, fostering lifelong learning and a sense of wonder about the world. The cultivation of scientific literacy is supported by learning environments that emphasize three sets of skills:

- *scientific inquiry:* encouraging students to ask questions about the natural world and develop explanations for phenomena through both broad exploration and focused investigations;
- *problem solving:* guiding students to find solutions to practical problems by applying their scientific knowledge in innovative ways to achieve optimal outcomes; and
- *decision making:* helping students identify questions or issues, seek out scientific knowledge to inform their decisions, and determine appropriate responses for citizens.

The learning experience in science offers students diverse opportunities to explore, analyze, evaluate, synthesize, appreciate, and understand the interconnections between science, technology, society, and the environment, and how they may impact their personal lives, careers, and future.

The science program is structured around the following four key components of scientific literacy:

- *Science, technology, society, and the environment (STSE):* Students gain an understanding of the nature of science and technology, their interrelationships, and their social and environmental contexts.
- *Skills:* Students develop the skills necessary for scientific and technological inquiry, problem solving, communicating scientific ideas and results, collaborating effectively, and making informed decisions.
- *Knowledge:* Students build knowledge and understanding of concepts in life science, physical science, and Earth and space science, applying these understandings to interpret, integrate, and expand their knowledge.
- *Attitudes:* Students are encouraged to develop attitudes that support the responsible attainment and application of scientific and technological knowledge for the benefit of themselves, society, and the environment.

More information about the provincial science program can be found at https://www.gov.nl.ca/education/k12/curriculum/descriptions/science/.

Assessment

Newfoundland and Labrador science educators utilize a range of formative and summative assessments to support, guide, and evaluate the learning success of all students. Teachers are encouraged to adopt flexible approaches in assessing student success and to explore diverse methods for students to showcase their knowledge and skills.

Newfoundland and Labrador is in the process of transitioning from provincial examinations (last administered in 2020) to a modular assessment program for academic and advanced levels in 3000-level core subjects, including the high school sciences (biology, chemistry, Earth systems, and physics). The plan for administration of these assessments (along with the assessments themselves) is still in development, with an aim for implementation in September 2025.

Newfoundland and Labrador students participate in national and international assessments, including PCAP, PISA, and TIMSS, all of which assess science achievement among a representative sample of students.

CONCLUSION

The Pan-Canadian Assessment Program (PCAP) reflects CMEC's ongoing commitment to inform Canadians about how well their education systems are meeting the needs of students and society. The information gained from this pan-Canadian assessment provides ministers of education with a basis for monitoring and evaluating the curriculum and other aspects of their school systems.

This report has described the performance of Grade 8/Secondary II students in the sixth administration of PCAP. In this assessment, the major domain was science, and the minor domains were reading and mathematics. As the major domain, the science component of PCAP 2023 encompassed more of the curricula of the Canadian provinces than did the other two domains. The components of reading and mathematics, assessed as minor domains, maintained a focus on the same subdomains as in baseline years (reading in 2007, and mathematics in 2010), but fewer items were assessed.

Participation in the testing process can be a demanding exercise. PCAP does not provide student results on an individual or a school basis, which means that the testing process can appear to be of no immediate consequence to the participants at those levels. Therefore, it is a tribute to the students, the teachers, and the school principals who participated in the administration process that they so readily and thoroughly applied themselves to the tasks required of them.

Overview of results

Science

In 2023, 89 percent of students in Canada overall reached or exceeded the expected level of performance (Level 2) for Grade 8/Secondary II students in science, while 12 percent reached the highest level of performance (Level 4). In terms of achievement scores, the Canadian average for science overall was 501, and provincial scores ranged from 458 to 513.

At the pan-Canadian level, there was no significant change in the average score in science overall in 2023 compared to 2013. At the provincial level, a positive change in science overall was found in Manitoba, while no significant change was found in five other provinces (British Columbia, Alberta, Ontario, Quebec, and New Brunswick).

Given that PCAP 2023 marks the second time that science was the primary focus of the assessment, changes over time for the subdomains and competencies of science were also reported. Although negative changes predominate for both the subdomains and the competencies, the results reflected much variability among the provinces.

Reading

Results in reading were reported by average scores only. Students in Ontario had the highest achievement, with scores significantly above the Canadian average. Students in British Columbia, Alberta, and Quebec achieved results that were statistically similar to the Canadian average, while students in Saskatchewan, Manitoba, New Brunswick (both English- and French-language school

systems), Nova Scotia, Prince Edward Island, and Newfoundland and Labrador achieved results below the Canadian average.

Compared to the adjusted baseline year of 2010, reading achievement in PCAP 2023 increased in Canada overall. Within the provinces, a positive change was found in Quebec and Prince Edward Island, while results were stable in the remaining provinces.

Mathematics

Results in mathematics were reported by average scores only. Students in Quebec achieved scores that were above the Canadian average, while students in Alberta and Ontario achieved results similar to the Canadian average. Students in British Columbia, Saskatchewan, Manitoba, New Brunswick (both English- and French-language school systems), Nova Scotia, Prince Edward Island, and Newfoundland and Labrador had scores below the Canadian average.

Compared to 2010, the baseline year for the PCAP mathematics assessment, mathematics achievement improved in Canada overall. Provincially, scores remained stable in Ontario, Quebec, and Newfoundland and Labrador, declined in New Brunswick (both English- and French-language school systems), and improved in the remaining provinces.

Achievement by language of the school system

In Canada, a similar percentage of students in English- and French-language school systems reached or exceeded the expected level of performance (Level 2) in science. This trend was also observed at the provincial level in Manitoba and Quebec. In the remaining provinces for which reliable data are available, a greater percentage of students in English-language school systems reached Level 2 or above compared to their counterparts in French-language school systems.

When science results are examined by average scores, at the pan-Canadian level, students in English-language school systems outperformed their peers in French-language school systems. At the provincial level, equity in scores between the two languages was achieved in Manitoba and Quebec, with an achievement gap favouring English-language school systems in all remaining provinces for which reliable data are available.

At the pan-Canadian level, the average science scores for students in both English- and French-language school systems were stable between 2013 and 2023. Provincially, the results over time by language of the school system are variable. Positive changes were observed in both English- and French-language school systems in Manitoba, as well as in the English-language school system in Quebec and the French-language school system in Ontario.

In reading, the scores of students in English- and French-language school systems were similar in Canada overall in 2023. Provincially, in English-language school systems, students in Ontario scored above the Canadian English average; in French-language school systems, students in Quebec scored above the Canadian French average. Students in English-language school systems outperformed their peers in French-language school systems in six provinces (British Columbia, Alberta, Saskatchewan, Ontario, New Brunswick, and Nova Scotia), while equity between the language groups was achieved in Manitoba and Quebec.

At the pan-Canadian level, reading achievement in English-language school systems remained stable in 2023 compared to the adjusted baseline year of 2010, while scores increased in French-language

school systems. Provincially, higher average scores over time were observed in both English- and French-language school systems in Quebec, in the English-language school system in Prince Edward Island, and in French-language school systems in British Columbia and Manitoba.

In mathematics in Canada overall, students in French-language school systems achieved higher average scores than their peers in English-language school systems. In English-language school systems, students in Ontario scored above the Canadian English average; in French-language school systems, no province scored above the Canadian French average. Equity between the language groups was achieved in five provinces (British Columbia, Alberta, Ontario, Quebec, and Nova Scotia), while students in the English-language school system in Saskatchewan outperformed their peers in the French-language school system, and students in French-language school systems in Manitoba and New Brunswick outperformed their peers in English-language school systems.

At the pan-Canadian level, mathematics achievement in English-language school systems improved in 2023 compared to the baseline year of 2010, while it remained stable in French-language school systems. Provincially, higher achievement scores over time in English-language school systems were observed in all but three provinces (Quebec, New Brunswick, and Newfoundland and Labrador). In French-language school systems, higher averages scores over time were found in Manitoba, while results remained stable in four provinces (British Columbia, Alberta, Ontario, and Quebec).

Achievement by gender

In 2023, at the pan-Canadian level, there was no gender gap in average scores in science, a finding that is consistent with the results from PCAP 2013. Provincially, no gender gap in average scores in science was found in British Columbia, Alberta, Ontario, Quebec, or Newfoundland and Labrador. In the remaining provinces, males outperformed females, except in New Brunswick (French-language school system), where females outperformed males. Compared to the baseline year of 2013, science scores in 2023 remained stable for both females and males in Canada overall and in three provinces. Scores improved for both females and males in only one province, Manitoba.

In reading, a gender gap in achievement scores favouring females was evident in PCAP 2023 in Canada overall and all provinces except Alberta. In Canada overall, the reading achievement of females in 2023 compared to the adjusted baseline year of 2010 remained stable, while the achievement of males improved over time. Provincially, reading scores for both females and males improved in Quebec in 2023 compared to the baseline year, and also for males in Manitoba, New Brunswick, and Prince Edward Island.

In mathematics in PCAP 2023, there was a gender gap in achievement scores at the pan-Canadian level in favour of male students. Similarly, male students outperformed female students in the majority of provinces. However, no gender gap was apparent in British Columbia, Quebec, or New Brunswick (French-language school system).

In Canada overall, mathematics achievement for males improved in 2023 compared to the baseline year of 2010 and remained stable for female students. Results improved over time for both females and males in Alberta, Manitoba, and Prince Edward Island, as well as for females in British Columbia and males in Saskatchewan, Ontario, Nova Scotia, and Newfoundland and Labrador. Mathematics results remained stable over time for females and males in the other provinces except for females in New Brunswick, whose scores declined.

Final statement

The results of PCAP 2023 reveal that, in Canada, a majority of students have attained the expected level of achievement or higher in science. There was no gender difference at the pan-Canadian level in the percentage of students at each performance level or in overall scores in science. A similar percentage of students in English- and French-language school systems attained the expected level of performance or higher in science in Canada overall. However, when we examine results by average score, a persistent achievement gap in science favouring students in English-language school systems exists. Lastly, while, in Canada overall, the percentage of students reaching the expected level of performance decreased between 2013 and 2023, there was no significant difference between average scores in 2023 compared to 2013, which represents the baseline year for science.

Across Canada, averages scores in 2023 in reading and mathematics improved over those in 2010, which represents the adjusted baseline year for reading and the baseline year for mathematics. However, in both domains, an achievement gap exists by gender; in mathematics, an achievement gap also exists by language. Specifically, the reading achievement gap in Canada favours females over males. In contrast, the mathematics achievement gap in Canada favours males over females. In mathematics, the achievement gap by language favours French- over English-language school systems.

Although there are differences in achievement among the provinces, the approach taken in this report does not lend itself to developing explanations for these differences. Secondary analysis undertaken as part of the forthcoming *PCAP 2023: Contextual Report on Student Outcomes and Factors that Support Success* will explore the five Prosperity Outcomes and the three Foundations for Success, as defined in the *PCAP 2023: Assessment Framework* (CMEC, 2024), among Grade 8/Secondary II students. Further reports will explore connections between these constructs and will be available in forthcoming issues of *Assessment Matters!*, a series of articles available on the CMEC website, at https://cmec.ca/459/Overview.html.

PCAP is designed to determine whether students across Canada are reaching similar levels of performance in the core disciplines of science, reading, and mathematics at about the same age. It complements existing assessments in each province, generating comparative Canada-wide data on the achievement attained by Grade 8/Secondary II students across the country. The assessment provides information for ministries and departments of education as well as for education partners, contributing to their ability to validate current education policies, learning outcomes, and teaching approaches and strategies, as well as to allocate resources to ensure that they continue meeting the needs of students and of our society. Further comparative evidence can be obtained from international assessments such as PIRLS, which tests Grade 4 students in reading; TIMMS, which tests Grade 4 and Grade 8 students in mathematics and science; and PISA, which tests the same cohort of students as PCAP in science, reading, and mathematics, but two years later.

Overall, PCAP testing reaffirms that CMEC's large-scale assessment projects offer innovative direction on education policy, curriculum, and classroom practices in Canada. Although Canadian students are performing well in science, reading, and mathematics, this report, and the upcoming contextual report, helps identify areas that could be improved. Over the coming months, CMEC, in collaboration with ministries and departments of education, will continue to analyze the results from PCAP in conjunction with other education indicators to better inform teaching and learning in the three core domains as well as related educational policies.

Today's teenagers will eventually become adults responsible for the success of our economy and society, so it is important to both celebrate the successes and address the challenges highlighted in this report. It is essential that our education systems contribute significantly to preparing Canadian youth for full participation in our modern society for generations to come.

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The accuracy of PCAP results depends on the quality of the information on which the sample is based, as well as the sampling procedures. The PCAP 2023 sample for Canada was based on a two-stage stratified sample. The first stage consisted of sampling individual schools in which Grade 8/Secondary II students were enrolled. Schools were sampled systematically, with probabilities proportional to size, the measure of size being a function of the estimated number of eligible (Grade 8/Secondary II) students enrolled in the school. A minimum number of schools were required to be selected in each province in order to produce reliable estimates for English-language school systems in all provinces and French-language school systems in British Columbia, Alberta, Saskatchewan, Manitoba, Ontario, Quebec, New Brunswick, and Nova Scotia. The second stage of the selection process sampled classes within the schools. Once schools were selected, one or more intact classes were selected, and then a list of all Grade 8/Secondary II students in each was prepared. Sampled students who were to be exempted by the school still had to be included in the sampling documentation, and a list drawn up stating the reason for their exemption.

In order to minimize the potential for response bias, data quality standards in PCAP require minimum participation rates for schools and students. PCAP requires a minimum student participation rate of 80 percent of all participating students and a minimum school participation rate of 85 percent of all participating schools.

Table A.1 shows the student participation rates for PCAP 2023. At the national level, over 37,000 Grade 8/Secondary II students were sampled, of whom 31,449 (84 percent) participated in the assessment. All provinces, with the exception of the French-language school system in Alberta (76 percent) and the English-language school system in Nova Scotia (77 percent), met the required student participation rate: in provinces where reliable data are available,[49] this rate ranged from 81 percent in New Brunswick (French-language school system) to 91 percent in Saskatchewan (French-language school system).

A number of accommodations for the administration of PCAP were available for students who receive such accommodations in a test situation in their regular school program. Alternative test formats included audio versions for the science and mathematics portions of the assessment, coloured background, a dyslexia font, and a large-print format. Other accommodations permitted were additional time, supervised breaks, an alternative setting, use of a scribe, and verbatim reading of instructions and occasional prompts or questions in the science and mathematics portions of the test. Table A.1 shows that, in Canada overall, 3 percent of students used accommodations in PCAP 2023.

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[49] As noted in the Introduction, Prince Edward Island and Newfoundland and Labrador did not oversample by language; consequently, results for only English-language school systems and majority-language systems are reported for these two provinces.

TABLE A.1 Student participation rates

Canada and provinces	Language	Students sampled* (N)	Student non-participation rates						Student participation rates			
			Total		Absent		Other**		Total†		With accommodations‡	
			n	%	n	%	n	%	n	%	n	%
BC	English	3,686	643	17.4	517	14.0	126	3.4	3,043	82.6	49	1.6
	French	405	73	18.0	69	17.0	4	1.0	332	82.0	23	6.9
AB	English	2,079	344	16.5	309	14.9	35	1.7	1,735	83.5	39	2.2
	French	336	79	23.5	74	22.0	5	1.5	257	76.5	1	0.4
SK	English	3,250	486	15.0	436	13.4	50	1.5	2,764	85.0	67	2.4
	French	122	11	9.0	11	9.0	0	0.0	111	91.0	3	2.7
MB	English	3,239	492	15.2	448	13.8	44	1.4	2,747	84.8	63	2.3
	French	389	59	15.2	55	14.1	4	1.0	330	84.8	10	3.0
ON	English	3,214	463	14.4	378	11.8	85	2.6	2,751	85.6	91	3.3
	French	2,216	288	13.0	226	10.2	62	2.8	1,928	87.0	74	3.8
QC	English	2,230	294	13.2	249	11.2	45	2.0	1,936	86.8	83	4.3
	French	3,289	318	9.7	280	8.5	38	1.2	2,971	90.3	46	1.5
NB	English	2,837	517	18.2	463	16.3	54	1.9	2,320	81.8	63	2.7
	French	1,773	341	19.2	310	17.5	31	1.7	1,432	80.8	30	2.1
NS	English	4,577	1061	23.2	942	20.6	119	2.6	3,516	76.8	192	5.5
	French	315	52	16.5	51	16.2	1	0.3	263	83.5	1	0.4
PE	English	719	127	17.7	107	14.9	20	2.8	592	82.3	12	2.0
	French	81	9	11.1	7	8.6	2	2.5	72	88.9	0	0.0
NL	English	2,825	492	17.4	423	15.0	69	2.4	2,333	82.6	130	5.6
	French	17	1	5.9	1	5.9	0	0.0	16	94.1	0	0.0
CAN	**Total**	37,599	6,150	16.4	5,356	14.2	794	2.1	31,449	83.6	977	3.1
	English	28,656	4,919	17.2	4,272	14.9	647	2.3	23,737	82.8	789	3.3
	French	8,943	1,231	13.8	1,084	12.1	147	1.6	7,712	86.2	188	2.4

* Students sampled = non-participating students + participating students
** "Other" includes students: (1) exempted by the school; (2) no longer enrolled in the selected school/class; (3) who did not wish to participate; and (4) for whom no data were available.
† Student participation rate = (participating students / students sampled) × 100%
‡ Percentage of students using alternative test formats and accommodations
Note: Numbers presented in this table do not represent the total number in the final dataset because they do not reflect invalid data removed before analysis. The achievement results from French-language school systems in Prince Edward Island and Newfoundland and Labrador are not reported due to small sample size.

Table A.2 displays the total number of exempted students, who are then further classified into specific categories in accordance with the national standards. Students could be exempted based on three categories:

- *students with a functional disability:* the student has a moderate-to-severe permanent physical disability such that they are not able to participate in PCAP, even with the permissible accommodations and/or alternative test formats;

- *students with an intellectual disability or socio-emotional condition:* the student has an intellectual disability or socio-emotional condition such that they are not able to participate in PCAP, even with the permissible accommodations and/or alternative test formats; or

- *students with limited assessment language experience:* the student does not have English or French as their first language, and has been in Canada for less than two years.

The student exemption rate for Canada overall was 2.5 percent. Provincially, where reliable data are available, this proportion ranged from less than 1 percent in French-language school systems in Saskatchewan and Quebec to 4.5 percent in the English-language school system in Nova Scotia. For Canada as a whole, the majority of exemptions (approximately 2 percent) were the result of an intellectual disability or socio-emotional condition.

TABLE A.2 Student exemption rates

Canada and provinces	Language	Students sampled (N)	Exemption rate*		Exempted rates by type of exemption						
					Functional disability		Intellectual disability or socio-emotional condition		Limited assessment language experience		
			n	%	n	%	n	%	n	%
BC	English	3,686	124	3.4	19	0.5	91	2.5	14	0.4
	French	405	15	3.7	2	0.5	13	3.2	0	0.0
AB	English	2,079	56	2.7	8	0.4	36	1.7	12	0.6
	French	336	11	3.3	1	0.3	4	1.2	6	1.8
SK	English	3,250	59	1.8	1	0.0	43	1.3	15	0.5
	French	122	0	0.0	0	0.0	0	0.0	0	0.0
MB	English	3,239	77	2.4	14	0.4	43	1.3	20	0.6
	French	389	5	1.3	2	0.5	3	0.8	0	0.0
ON	English	3,214	62	1.9	2	0.1	54	1.7	6	0.2
	French	2,216	14	0.6	2	0.1	10	0.5	2	0.1
QC	English	2,230	27	1.2	6	0.3	19	0.9	2	0.1
	French	3,289	4	0.1	0	0.0	2	0.1	2	0.1
NB	English	2,837	115	4.1	9	0.3	88	3.1	18	0.6
	French	1,773	73	4.1	12	0.7	50	2.8	11	0.6
NS	English	4,577	205	4.5	19	0.4	162	3.5	24	0.5
	French	315	13	4.1	4	1.3	7	2.2	2	0.6
PE	English	719	12	1.7	0	0.0	10	1.4	2	0.3
	French	81	0	0.0	0	0.0	0	0.0	0	0.0
NL	English	2,825	70	2.5	6	0.2	56	2.0	8	0.3
	French	17	0	0.0	0	0.0	0	0.0	0	0.0
CAN	**Total**	**37,599**	**942**	**2.5**	**107**	**0.3**	**691**	**1.8**	**144**	**0.4**
	English	**28,656**	**807**	**2.8**	**84**	**0.3**	**602**	**2.1**	**121**	**0.4**
	French	**8,943**	**135**	**1.5**	**23**	**0.3**	**89**	**1.0**	**23**	**0.3**

* Exemption rate = (exempted students / students sampled) × 100%
Note: The achievement results from French-language school systems in Prince Edward Island and Newfoundland and Labrador are not reported due to small sample size.

Table A.3 presents the response rates for schools. The school participation rate for Canada overall was 88 percent. With the exception of both the English- and French-language schools systems in Alberta and Quebec, the school participation rate was approximately 89 percent or above in both English- and French-language school systems in all provinces for which reliable data are available. Both the English- and French-language school systems in Alberta (52 and 46 percent, respectively) and Quebec (72 and 81 percent, respectively) did not meet the minimum school participation rate of 85 percent.

TABLE A.3 School response rates

Canada and provinces	Language	Schools sampled (*N*)	Participating schools (*n*)	School participation rate* (%)
BC	English	150	149	99.3
	French	21	19	90.5
AB	English	150	78	52.0
	French	24	11	45.8
SK	English	150	149	99.3
	French	10	10	100.0
MB	English	150	149	99.3
	French	18	17	94.4
ON	English	156	138	88.5
	French	126	115	91.3
QC	English	86	62	72.1
	French	151	122	80.8
NB	English	88	83	94.3
	French	62	60	96.8
NS	English	113	111	98.2
	French	12	11	91.7
PE	English	25	24	96.0
	French	5	5	100.0
NL	English	120	111	92.5
	French	3	2	66.7
CAN	**Total**	**1,620**	**1,426**	**88.0**
	English	**1,188**	**1,054**	**88.7**
	French	**432**	**372**	**86.1**

* School participation rate = (participating schools / schools sampled) × 100%
Note: The achievement results from French-language school systems in Prince Edward Island and Newfoundland and Labrador are not reported due to small sample size.

Due to minimum student and/or school participation rates not being met, caution is advised when interpreting achievement results for both language groups in Alberta and Quebec and the English-language school system in Nova Scotia, as the samples may not be representative of the population in these provinces (see Table A.1 and A.3). Additionally, the sample size of students/schools in French-language school systems in Prince Edward Island and Newfoundland and Labrador were too small for reliable reporting of achievement results.

Because of rounding, some numbers in the tables in this appendix may not add up exactly to the totals shown. Percentages, average scores, and differences are always calculated on the basis of the exact numbers and are rounded only after calculation.

All standard errors have been rounded to one decimal place. Where the value 0.0 is shown, this does not necessarily imply that the standard error is zero, but that it is smaller than 0.05.

TABLE B.1.1 Comparison of Canadian and provincial results for percentage of students achieving Level 2 or above in science

Canada and provinces	%	SE	Differences†											
			BC	AB	SK	MB	ON	QC	NB (EN)	NB (FR)	NS	PE	NL	CAN
BC	87	0.7		-3	4	5*	-3	-1	6*	7*	3	0	5*	**-1**
AB	91	1.3	3		7*	8*	0	2	10*	11*	6*	4	8*	**2**
SK	83	1.0	-4	-7*		1	-7*	-5	2	3	-1	-4	1	**-5**
MB	83	0.6	-5*	-8*	-1		-8*	-6*	1	3	-2	-5*	0	**-6***
ON	91	0.7	3	0	7*	8*		2	10*	11*	6*	4*	8*	**2***
QC	88	0.8	1	-2	5	6*	-2		7*	8*	4*	1	6*	**0**
NB (EN)	81	0.0	-6*	-10*	-2	-1	-10*	-7*		1	-3*	-6*	-2*	**-8***
NB (FR)	80	0.3	-7*	-11*	-3	-3	-11*	-8*	-1		-4*	-7*	-3*	**-9***
NS	85	0.2	-3	-6*	1	2	-6*	-4*	3*	4*		-3*	2*	**-4***
PE	87	0.0	0	-4	4	5*	-4*	-1	6*	7*	3*		4*	**-2***
NL	83	0.1	-5*	-8*	-1	0	-8*	-6*	2*	3*	-2*	-4*		**-6***
CAN	**89**	**0.4**	**1**	**-2**	**5**	**6***	**-2***	**0**	**8***	**9***	**4***	**2***	**6***	

SE Standard error
* Significant difference between the province and the comparison province or between the province and Canada. The comparisons are adjusted using the Bonferroni correction as follows: ($p < .0009$, t-value = 3.32) for multicomparisons among the provinces, and ($p < .0045$, t-value = 2.84) for those between each province and Canada.
† A negative difference means that the percentage of students achieving Level 2 or above in the province or Canada (in the row) was below that of the comparison province or Canada (in the column). A positive difference means that the percentage of students achieving Level 2 or above in the province or Canada (in the row) was above that of the comparison province or Canada (in the column).

TABLE B.1.2 Percentage of students at each performance level in science

Canada and provinces	Level 1			Level 2			Level 3			Level 4		
	%	SE	Dif. (Prov - Can)†	%	SE	Dif. (Prov - Can)†	%	SE	Dif. (Prov - Can)†	%	SE	Dif. (Prov - Can)†
BC	13	0.7	1	49	1.1	0	26	0.8	-1	12	0.8	0
AB	9	1.2	-2	45	1.4	-4*	31	1.3	3	15	1.1	2
SK	17	1.0	5*	53	1.0	4*	22	0.8	-5*	8	0.6	-5*
MB	17	0.6	6*	53	0.7	4*	22	0.6	-5*	8	0.4	-5*
ON	9	0.7	-2*	47	1.3	-3*	29	0.9	2*	15	1.0	3*
QC	12	0.8	0	54	1.2	5*	25	1.0	-2	9	0.8	-3*
NB (EN)	19	0.0	8*	53	0.0	4*	22	0.0	-5*	6	0.0	-6*
NB (FR)	20	0.3	9*	58	0.3	9*	18	0.3	-9*	4	0.2	-9*
NS	15	0.2	4*	52	0.1	3*	23	0.2	-4*	9	0.1	-3*
PE	13	0.0	2*	55	0.0	6*	25	0.0	-2*	8	0.0	-5*
NL	17	0.1	6*	52	0.1	3*	23	0.1	-4*	8	0.1	-5*
CAN	**11**	**0.4**	**-**	**49**	**0.6**	**-**	**27**	**0.5**	**-**	**12**	**0.5**	**-**

SE Standard error
Dif. Difference
* Significant difference compared to Canada. The comparisons are adjusted using the Bonferroni correction ($p < .0045$, t-value = 2.84).
† A negative difference means that the provincial percentage is below that of Canada. A positive difference means that the provincial percentage is above that of Canada.

TABLE B.1.3 Comparison of average scores in science, among provinces and with Canada

Canada and provinces	Average score	SE	Differences†											
			BC	AB	SK	MB	ON	QC	NB (EN)	NB (FR)	NS	PE	NL	CAN
BC	497	3.0		-17	19*	21*	-14	5	27*	38*	14*	12	20*	**-4**
AB	513	4.3	17		36*	37*	3	22	43*	55*	31*	29*	36*	**13***
SK	477	2.8	-19*	-36*		1	-33*	-14	8	19*	-5	-7	0	**-23***
MB	476	1.9	-21*	-37*	-1		-35*	-15	6	17*	-7	-9*	-1	**-25***
ON	511	3.3	14	-3	33*	35*		19	41*	52*	28*	26*	34*	**10***
QC	491	3.7	-5	-22	14	15	-19		22*	33*	9	7	14	**-9***
NB (EN)	470	0.0	-27*	-43*	-8	0	-41*	-22*		11*	-13*	-15*	-7*	**-31***
NB (FR)	458	0.8	-38*	-55*	-19*	-17*	-52*	-33*	-11*		-24*	-26*	-18*	**-42***
NS	482	0.6	-14*	-31*	5	7	-28*	-9	13*	24*		-2	6*	**-18***
PE	485	0.0	-12	-29*	7	9*	-26*	-7	15*	26*	2		8*	**-16***
NL	477	0.5	-20*	-36*	0	1	-34*	-14	7*	18*	-6*	-8*		**-24***
CAN	**501**	**1.7**	**4**	**-13***	**23***	**25***	**-10***	**10***	**31***	**43***	**19***	**16***	**24***	

SE Standard error

* Significant difference between the province and the comparison province or between the province and Canada. The comparisons are adjusted using the Bonferroni correction as follows: ($p < .0009$, t-value = 3.32) for multicomparisons among the provinces, and ($p < .0045$, t-value = 2.84) for those between each province and Canada.

† A negative difference means that the provincial or Canadian average score (in the row) is below that of the comparison province or Canada (in the column). A positive difference means that the provincial or Canadian average score (in the row) is above that of the comparison province or Canada (in the column).

TABLE B.1.4 Comparison of average scores in science, among provinces and with Canada

Canada and provinces	Average score	SE	Average scores not significantly different
British Columbia	497	3.0	Alberta, Ontario, Quebec, Prince Edward Island, **Canada**
Alberta	513	4.3	British Columbia, Ontario, Quebec
Saskatchewan	477	2.8	Manitoba, Quebec, New Brunswick (EN), Nova Scotia, Prince Edward Island, Newfoundland and Labrador
Manitoba	476	1.9	Saskatchewan, Quebec, New Brunswick (EN), Nova Scotia, Newfoundland and Labrador
Ontario	511	3.3	British Columbia, Alberta, Quebec
Quebec	491	3.7	British Columbia, Alberta, Saskatchewan, Manitoba, Ontario, Nova Scotia, Prince Edward Island, Newfoundland and Labrador
New Brunswick (EN)	470	0.0	Saskatchewan, Manitoba
New Brunswick (FR)	458	0.8	
Nova Scotia	482	0.6	Saskatchewan, Manitoba, Quebec, Prince Edward Island
Prince Edward Island	485	0.0	British Columbia, Saskatchewan, Quebec, Nova Scotia
Newfoundland and Labrador	477	0.5	Saskatchewan, Manitoba, Quebec
Canada	**501**	**1.7**	British Columbia

SE Standard error

Note: The comparisons are adjusted using the Bonferroni correction as follows: ($p < .0009$, t-value = 3.32) for multicomparisons among the provinces, and ($p < .0045$, t-value = 2.84) for those between each province and Canada.

TABLE B.1.5 Average scores in science by subdomain

Canada and provinces	Nature of sciences			Life sciences			Physical sciences			Earth sciences		
	Av. score	SE	Dif. (Prov - Can)†	Av. score	SE	Dif. (Prov - Can)†	Av. score	SE	Dif. (Prov - Can)†	Av. score	SE	Dif. (Prov - Can)†
BC	504	2.7	1	493	2.0	-6	488	1.9	-5	486	3.2	-9
AB	509	3.6	6	511	4.2	12*	494	2.7	1	509	4.5	14*
SK	480	2.1	-23*	487	2.1	-11*	475	1.5	-18*	477	2.8	-18*
MB	484	1.6	-19*	481	1.8	-18*	478	1.4	-15*	468	2.0	-27*
ON	515	3.2	12*	506	2.2	8*	502	2.2	9*	500	3.9	5
QC	489	2.5	-14*	491	1.7	-7*	489	2.0	-4	496	3.3	1
NB (EN)	488	0.0	-15*	469	0.0	-30*	468	0.0	-25*	461	0.0	-34*
NB (FR)	463	0.8	-40*	466	0.7	-33*	480	0.7	-13*	446	0.8	-49*
NS	489	0.5	-14*	483	0.5	-16*	479	0.3	-14*	479	0.6	-16*
PE	489	0.0	-14*	488	0.0	-11*	483	0.0	-10*	482	0.0	-13*
NL	483	0.4	-20*	471	0.4	-28*	477	0.2	-16*	477	0.5	-18*
CAN	**503**	**1.4**	**-**	**499**	**1.1**	**-**	**493**	**1.1**	**-**	**495**	**1.9**	**-**

Av. Average
SE Standard error
Dif. Difference
* Significant difference compared to Canada. The comparisons are adjusted using the Bonferroni correction ($p < .0045$, t-value = 2.84).
† A negative difference means that the average score in the province is below that of Canada. A positive difference indicates that the average score in the province is above that of Canada.

TABLE B.1.6 Difference in average scores between subdomains

Canada and provinces	Nature of sciences (NS)		Life sciences (LS)		Physical sciences (PS)		Earth sciences (ES)		Dif. (NS - LS)†	Dif. (NS - PS)†	Dif. (NS - ES)†	Dif. (LS - PS)†	Dif. (LS - ES)†	Dif. (PS - ES)†
	Average score	SE	Average score	SE	Average score	SE	Average score	SE						
BC	504	2.7	493	2.0	488	1.9	486	3.2	11*	16*	18*	5*	7*	2
AB	509	3.6	511	4.2	494	2.7	509	4.5	-2	15*	0	17*	2	-15*
SK	480	2.2	487	2.1	475	1.5	477	2.8	-8*	4*	3	12*	11*	-1
MB	484	1.6	481	1.8	478	1.4	468	2.0	3*	6*	15*	3	12*	9*
ON	515	3.2	506	2.2	502	2.2	500	3.9	9*	13*	15*	4	6*	2
QC	489	2.6	491	1.8	489	2.0	496	3.3	-2	0	-7*	3*	-5*	-7*
NB (EN)	488	0.0	469	0.0	468	0.0	461	4.4	19*	20*	27*	1	8*	7*
NB (FR)	463	0.8	466	0.7	480	0.7	446	0.8	-2*	-17*	17*	-14*	19*	34*
NS	489	0.5	483	0.5	479	0.3	479	0.6	6*	10*	9*	4*	3*	0
PE	489	0.0	488	0.0	483	0.0	482	1.5	2	6*	8*	5*	6*	1
NL	483	0.4	471	0.4	477	0.2	477	0.5	13*	6*	6*	-6*	-6*	0
CAN	**503**	**1.4**	**499**	**1.1**	**493**	**1.1**	**495**	**1.9**	**4***	**10***	**8***	**6***	**4***	**-2**

SE Standard error
Dif. Difference
* Significant difference between pairs of subdomains ($p < .05$, t-value = 1.96).
† A negative difference between a pair (e.g., NS - LS) means that students had a lower average score in the first subdomain (i.e., NS) than in the second (i.e., LS). A positive difference between a pair (e.g., NS - LS) means that students had a higher average score in the first subdomain (i.e., NS) than in the second (i.e., LS).

TABLE B.1.7 Average scores in science by competency

Canada and provinces	Scientific inquiry			Problem solving			Scientfic reasoning		
	Average score	SE	Dif. (Prov - Can)†	Average score	SE	Dif. (Prov - Can)†	Average score	SE	Dif. (Prov - Can)†
British Columbia	502	3.0	2	483	2.7	-7	490	2.2	-11*
Alberta	509	3.9	9	500	5.4	10	512	3.5	10*
Saskatchewan	477	2.2	-23*	474	2.5	-16*	482	2.1	-20*
Manitoba	479	1.8	-21*	464	2.0	-26*	482	1.6	-20*
Ontario	510	3.4	10*	498	3.0	8*	513	2.9	11*
Quebec	487	2.8	-13*	487	2.5	-3	496	2.4	-6
New Brunswick (EN)	482	0.0	-18*	460	0.0	-30*	464	0.0	-38*
New Brunswick (FR)	459	0.8	-41*	460	0.9	-30*	461	0.6	-41*
Nova Scotia	486	0.5	-14*	471	0.6	-19*	485	0.5	-17*
Prince Edward Island	487	0.0	-13*	479	0.0	-11*	485	0.0	-17*
Newfoundland and Labrador	482	0.4	-18*	466	0.5	-24*	479	0.3	-23*
Canada	**500**	**1.5**	**-**	**490**	**1.5**	**-**	**502**	**1.4**	**-**

SE Standard error
* Significant difference compared to Canada. The comparisons are adjusted using the Bonferroni correction ($p < .0045$, t-value = 2.84).
† A negative difference means that the provincial average score is below that of Canada. A positive difference indicates that the provincial average score is above that of Canada.

TABLE B.1.8 Difference in average scores between competencies

Canada and provinces	Scientific inquiry (SI)		Problem solving (PbS)		Scientific reasoning (SR)		Dif. (SI - PbS)†	Dif. (SI - SR)†	Dif. (PbS - SR)†
	Average score	SE	Average score	SE	Average score	SE			
British Columbia	502	3.0	483	2.7	490	2.2	19*	12*	-8*
Alberta	509	3.9	500	5.4	512	3.5	9*	-3	-12*
Saskatchewan	477	2.3	474	2.5	482	2.1	4*	-4*	-8*
Manitoba	479	1.8	464	2.0	482	1.6	15*	-3*	-18*
Ontario	510	3.4	498	3.0	513	2.9	12*	-3	-15*
Quebec	487	2.8	487	2.5	496	2.4	0	-9*	-9*
New Brunswick (EN)	482	0.0	460	0.0	464	0.0	22*	18*	-4
New Brunswick (FR)	459	0.8	460	0.9	461	0.6	-1	-2*	-2*
Nova Scotia	486	0.5	471	0.6	485	0.5	15*	-1	-15*
Prince Edward Island	487	0.0	479	0.0	485	0.0	8*	2*	-6*
Newfoundland and Labrador	482	0.4	466	0.5	479	0.3	16*	2*	-14*
Canada	**500**	**1.5**	**490**	**1.5**	**502**	**1.4**	**10***	**-2***	**-12***

SE Standard error
Dif. Difference
* Significant difference between pairs of competencies ($p < .05$, t-value = 1.96)
† A negative difference between a pair (e.g., SI - SR) means that students had a lower average score in the first competency (i.e., SI) than in the second (i.e., SR). A positive difference between a pair (e.g., SI - SR) means that students had a higher average score in the first competency (i.e., SI) than in the second (i.e., SR).

TABLE B.1.9 Percentage of students by language of the school system

Canada and provinces	English-language school systems		French-language school systems	
	%	SE	%	SE
British Columbia	99	0.0	1	0.0
Alberta	99	0.3	1	0.3
Saskatchewan	99	0.0	1	0.0
Manitoba	97	0.1	3	0.1
Ontario	95	0.3	5	0.3
Quebec	9	0.5	91	0.5
New Brunswick	72	0.4	28	0.4
Nova Scotia	95	0.4	5	0.4
Prince Edward Island	95	0.0	5	0.0
Newfoundland and Labrador	99	0.2	1	0.2
Canada	**77**	**0.4**	**23**	**0.4**

SE Standard error

TABLE B.1.10 Percentage of students at Level 2 or above in science by language of the school system

Canada and provinces	English-language school systems			French-language school systems			Difference (EN - FR)‡
	%	SE	Difference (Prov - Can)†	%	SE	Difference (Prov - Can)†	
British Columbia	87	0.7	-2	84	0.0	-4*	4**
Alberta	91	1.3	2	84	2.4	-3	7**
Saskatchewan	83	1.0	-6*	78	0.0	-9*	5**
Manitoba	83	0.6	-7*	84	0.8	-4*	-1
Ontario	91	0.8	2*	83	0.8	-5*	8**
Quebec	89	0.6	0	88	0.9	1	1
New Brunswick	81	0.0	-8*	80	0.3	-7*	1**
Nova Scotia	85	0.2	-4*	73	1.1	-15*	13**
Prince Edward Island	88	0.0	-2*	-	-	-	-
Newfoundland and Labrador	83	0.1	-6*	-	-	-	-
Canada	**89**	**0.4**	**-**	**87**	**0.8**	**-**	**2**

SE Standard error
* Significant difference compared to Canada. The comparisons are adjusted using the Bonferroni correction (p < .005, t-value = 2.81).
** Significant difference within Canada or within province (p < .05, t-value = 1.96)
† A negative difference means that the provincial percentage is below that of Canada. A positive difference indicates that the provincial percentage is above that of Canada.
‡ A negative difference means that a lower percentage of students in English-language school systems performed at Level 2 or above compared to students in French-language school systems. A positive difference means that a higher percentage of students in English-language school systems performed at Level 2 or above compared to students in French-language school systems.

TABLE B.1.11 Percentage of students at each performance level in science by language of the school system

Canada and provinces	Level 1					Level 2					Level 3					Level 4				
	English-language school systems		French-language school systems		Dif. (EN - FR)†	English-language school systems		French-language school systems		Dif. (EN - FR)†	English-language school systems		French-language school systems		Dif. (EN - FR)†	English-language school systems		French-language school systems		Dif. (EN - FR)†
	%	SE	%	SE		%	SE	%	SE		%	SE	%	SE		%	SE	%	SE	
BC	13	0.7	16	0.0	-4*	49	1.1	55	0.0	-6*	26	0.8	20	0.0	6*	12	0.8	8	0.0	4*
AB	9	1.3	16	2.4	-7*	45	1.4	47	1.7	-2	31	1.4	27	1.4	3	15	1.2	9	1.7	5*
SK	17	1.0	22	0.0	-5*	53	1.0	57	0.0	-4*	22	0.8	17	0.0	6*	8	0.6	5	0.0	3*
MB	17	0.6	16	0.8	1	53	0.7	60	0.5	-7*	22	0.6	18	0.5	4*	8	0.4	6	0.4	2*
ON	9	0.8	17	0.8	-8*	46	1.4	50	1.4	-4	29	1.0	24	1.1	5*	15	1.1	8	0.9	7*
QC	11	0.6	12	0.9	-1	54	0.9	54	1.3	0	26	0.8	25	1.1	1	9	0.6	9	0.9	-1
NB	19	0.0	20	0.3	-1*	53	0.0	58	0.3	-5*	22	0.0	18	0.3	4*	6	0.0	4	0.2	2*
NS	15	0.2	27	1.1	-13*	52	0.1	58	0.5	-7*	23	0.2	13	1.1	10*	10	0.1	1	0.2	9*
PE	12	0.0	-	-	-	55	0.0	-	-	-	25	0.0	-	-	-	8	0.0	-	-	-
NL	17	0.1	-	-	-	52	0.1	-	-	-	23	0.1	-	-	-	7	0.1	-	-	-
CAN	**11**	**0.4**	**13**	**0.8**	**-2**	**48**	**0.7**	**54**	**1.2**	**-6***	**28**	**0.6**	**24**	**1.0**	**4***	**13**	**0.6**	**9**	**0.8**	**4***

SE Standard error
Dif. Difference
* Significant difference within Canada or within province ($p < .05$, t-value = 1.96)
† A negative difference means that a lower percentage of students in English-language school systems achieved the given performance level compared to students in French-language school systems. A positive difference means that a higher percentage of students in English-language school systems achieved the given performance level compared to students in French-language school systems.

TABLE B.1.12 Difference between Canadian and provincial percentages of students at each performance level in science by language of the school system

Canada and provinces	English-language school systems											
	Level 1			Level 2			Level 3			Level 4		
	%	SE	Dif. (Prov - Can)†	%	SE	Dif. (Prov - Can)†	%	SE	Dif. (Prov - Can)†	%	SE	Dif. (Prov - Can)†
British Columbia	13	0.7	2	49	1.1	1	26	0.8	-2	12	0.8	-1
Alberta	9	1.3	-2	45	1.4	-2	31	1.4	3	15	1.2	1
Saskatchewan	17	1.0	6*	53	1.0	5*	22	0.8	-5*	8	0.6	-6*
Manitoba	17	0.6	7*	53	0.7	5*	22	0.6	-6*	8	0.4	-5*
Ontario	9	0.8	-2*	46	1.4	-1	29	1.0	1	15	1.1	2
Quebec	11	0.6	0	54	0.9	7*	26	0.8	-2	9	0.6	-5*
New Brunswick	19	0.0	8*	53	0.0	5*	22	0.0	-6*	6	0.0	-7*
Nova Scotia	15	0.2	4*	52	0.1	4*	23	0.2	-4*	10	0.1	-4*
Prince Edward Island	12	0.0	2*	55	0.0	7*	25	0.0	-3*	8	0.0	-6*
Newfoundland and Labrador	17	0.1	6*	52	0.1	5*	23	0.1	-5*	7	0.1	-6*
Canada	**11**	**0.4**	**-**	**48**	**0.7**	**-**	**28**	**0.6**	**-**	**13**	**0.6**	**-**

Canada and provinces	French-language school systems											
	Level 1			Level 2			Level 3			Level 4		
	%	SE	Dif. (Prov - Can)†	%	SE	Dif. (Prov - Can)†	%	SE	Dif. (Prov - Can)†	%	SE	Dif. (Prov - Can)†
British Columbia	16	0.0	4*	55	0.0	1	20	0.0	-4*	8	0.0	-1
Alberta	16	2.4	3	47	1.7	-7*	27	1.4	3	9	1.7	0
Saskatchewan	22	0.0	9*	57	0.0	3	17	0.0	-8*	5	0.0	-4*
Manitoba	16	0.8	4*	60	0.5	6*	18	0.5	-7*	6	0.4	-3*
Ontario	17	0.8	5*	50	1.4	-4	24	1.1	0	8	0.9	-1
Quebec	12	0.9	-1	54	1.3	0	25	1.1	0	9	0.9	0
New Brunswick	20	0.3	7*	58	0.3	4*	18	0.3	-6*	4	0.2	-5*
Nova Scotia	27	1.1	15*	58	0.5	4*	13	1.1	-11*	1	0.2	-8*
Canada	**13**	**0.8**	**-**	**54**	**1.2**	**-**	**24**	**1.0**	**-**	**9**	**0.8**	**-**

SE Standard error
Dif. Difference
* Significant difference compared to Canada. The comparisons are adjusted using the Bonferroni correction ($p < .005$, t-value = 2.81).
† A negative difference means that the provincial percentage is below that of Canada. A positive difference means that the provincial percentage is above that of Canada.

TABLE B.1.13 Average scores in science by language of the school system

Canada and provinces	English-language school systems			French-language school systems			Difference (EN - FR)‡
	Average score	SE	Difference (Prov - Can)†	Average score	SE	Difference (Prov - Can)†	
British Columbia	497	3.0	-7	479	0.0	-10	18**
Alberta	514	4.4	9	489	6.9	1	24**
Saskatchewan	478	2.9	-27*	453	0.0	-35*	24**
Manitoba	476	2.0	-28*	471	2.1	-17*	5
Ontario	512	3.5	8*	477	3.9	-11	35**
Quebec	492	2.5	-12*	491	4.0	2*	1
New Brunswick	470	0.0	-34*	458	0.8	-30*	11**
Nova Scotia	485	0.6	-19*	433	3.6	-55*	52**
Prince Edward Island	485	0.0	-19*	-	-	-	-
Newfoundland and Labrador	477	0.4	-27*	-	-	-	-
Canada	**504**	**1.9**	**-**	**489**	**3.5**	**-**	**15****

SE Standard error
* Significant difference compared to Canada. The comparisons are adjusted using the Bonferroni correction ($p < .005$, t-value = 2.81).
** Significant difference within Canada or within province ($p < .05$, t-value = 1.96)
† A negative difference means that the average score in the province is below that of Canada. A positive difference indicates that the average score in the province is above that of Canada.
‡ A negative difference means that students in English-language school systems achieved a lower average score than students in French-language school systems. A positive difference means that students in English-language school systems achieved a higher average score than students in French-language school systems.

TABLE B.1.14 Average scores in science by majority- and minority-language school systems

Canada and provinces	Majority-language school systems			Minority-language school systems			Difference (Maj - Min)‡
	Average score	SE	Difference (Prov - Can)	Average score	SE	Difference (Prov - Can)†	
British Columbia	497	3.0	-5	479	0.0	-1	18**
Alberta	514	4.4	12*	489	6.9	9	24**
Saskatchewan	478	2.9	-24*	453	0.0	-27*	24**
Manitoba	476	2.0	-26*	471	2.1	-9*	5
Ontario	512	3.5	11*	477	3.9	-3	35**
Quebec	491	4.0	-10*	492	2.5	12*	-1
New Brunswick	470	0.0	-32*	458	0.8	-22*	11**
Nova Scotia	485	0.6	-17*	433	3.6	-47*	52**
Prince Edward Island	485	0.0	-16*	-	-	-	-
Newfoundland and Labrador	477	0.4	-25*	-	-	-	-
Canada	**502**	**1.8**	**-**	**480**	**1.9**	**-**	**22****

SE Standard error
* Significant difference compared to Canada. The comparisons are adjusted using the Bonferroni correction ($p < .005$, t-value = 2.81).
** Significant difference within Canada or within province ($p < .05$, t-value = 1.96)
† A negative difference means that the average score in the province is below that of Canada. A positive difference indicates that the average score in the province is above that of Canada.
‡ A negative difference means that students in majority-language school systems had a lower average score compared to students in minority-language school systems. A positive difference means that students in majority-language school systems had a higher average score compared to students in minority-language school systems.

TABLE B.1.15 Average scores in science by subdomain and language of the school system

Canada and provinces	Nature of sciences						
	English-language school systems			French-language school systems			Difference (EN - FR)‡
	Average score	SE	Difference (Prov - Can)†	Average score	SE	Difference (Prov - Can)†	
British Columbia	504	2.7	-4	479	0.0	-8*	25**
Alberta	510	3.6	2	487	6.9	1	22**
Saskatchewan	480	2.2	-28*	459	0.0	-28*	21**
Manitoba	484	1.7	-24*	473	1.7	-14*	11**
Ontario	517	3.4	9*	479	3.0	-8	38**
Quebec	492	2.3	-16*	489	2.8	2*	4
New Brunswick	488	0.0	-20*	463	0.8	-24*	24**
Nova Scotia	491	0.5	-17*	441	3.2	-46*	50**
Prince Edward Island	491	0.0	-17*	-	-	-	-
Newfoundland and Labrador	483	0.4	-25*	-	-	-	-
Canada	**508**	**1.7**	**-**	**487**	**2.4**	**-**	**21****

Canada and provinces	Life sciences						
	English-language school systems			French-language school systems			Difference (E - F)‡
	Average score	SE	Difference (Prov - Can)†	Average score	SE	Difference (Prov - Can)†	
British Columbia	493	2.0	-8*	482	0.0	-8*	11**
Alberta	511	4.2	10	511	6.5	21*	0
Saskatchewan	488	2.1	-14*	470	0.0	-20*	18**
Manitoba	481	1.9	-20*	487	1.9	-3	-6**
Ontario	507	2.3	6*	483	2.4	-7	24**
Quebec	488	1.6	-13*	492	1.9	2*	-3
New Brunswick	469	0.0	-33*	466	0.7	-24*	3**
Nova Scotia	486	0.5	-16*	434	1.6	-56*	52**
Prince Edward Island	489	0.0	-13*	-	-	-	-
Newfoundland and Labrador	471	0.4	-31*	-	-	-	-
Canada	**501**	**1.4**	**-**	**490**	**1.7**	**-**	**11****

(cont'd on next page)

Canada and provinces	Physical sciences						
	English-language school systems			French-language school systems			Difference (E - F)‡
	Average score	SE	Difference (Prov - Can)†	Average score	SE	Difference (Prov - Can)†	
British Columbia	488	1.9	-6*	490	0.0	2	-3
Alberta	494	2.8	0	489	4.3	1	5
Saskatchewan	475	1.5	-19*	479	0.0	-9*	-3**
Manitoba	478	1.5	-17*	483	1.6	-5	-5**
Ontario	503	2.3	9*	491	2.3	3	12**
Quebec	490	1.7	-4	488	2.2	0	2
New Brunswick	468	0.0	-27*	480	0.7	-8*	-13**
Nova Scotia	479	0.3	-15*	477	2.4	-11*	2
Prince Edward Island	483	0.0	-11*	-	-	-	-
Newfoundland and Labrador	477	0.2	-17*	-	-	-	-
Canada	**494**	**1.3**	**-**	**488**	**1.9**	**-**	**6****

Canada and provinces	Earth sciences						
	English-language school systems			French-language school systems			Difference (E - F)‡
	Average score	SE	Difference (Prov - Can)†	Average score	SE	Difference (Prov - Can)†	
British Columbia	486	3.2	-10	472	0.0	-20*	14**
Alberta	510	4.6	14*	467	9.7	-25	42**
Saskatchewan	477	2.8	-19*	463	0.0	-29*	14**
Manitoba	469	2.1	-27*	463	1.9	-30*	6**
Ontario	502	4.2	6	467	2.9	-25*	35**
Quebec	488	3.2	-8	497	3.6	5*	-9**
New Brunswick	461	0.0	-35*	446	0.8	-46*	14**
Nova Scotia	482	0.6	-13*	422	2.6	-70*	60**
Prince Edward Island	482	0.0	-14*	-		-	-
Newfoundland and Labrador	477	0.4	-19*	-		-	-
Canada	**496**	**2.2**	**-**	**492**	**3.1**	**-**	**4**

SE Standard error

* Significant difference compared to Canada. The comparisons are adjusted using the Bonferroni correction ($p < .0045$, t-value = 2.84).

** Significant difference within Canada or within province ($p < .05$, t-value = 1.96)

† A negative difference means that the average score in the province is below that of Canada. A positive difference indicates that the average score in the province is above that of Canada.

‡ A negative difference means that students in English-language school systems achieved a lower average score than students in French-language school systems. A positive difference means that students in English-language school systems achieved a higher average score than students in French-language school systems.

TABLE B.1.16 Difference in average scores between subdomains by language of the school system

Canada and provinces	Language	Nature of sciences (NS)		Life sciences (LS)		Physical sciences (PS)		Earth sciences (ES)		Dif. (NS - LS)†	Dif. (NS - PS)†	Dif. (NS - ES)†	Dif. (LS - PS)†	Dif. (LS - ES)†	Dif. (PS - ES)†
		Av. score	SE	Av. score	SE	Av. score	SE	Av. score	SE						
BC	English	504	2.7	493	2.0	488	1.9	486	3.2	11*	16*	18*	5*	7*	2
	French	479	0.0	482	0.0	490	0.0	472	0.0	-3	-11*	7*	-9*	10*	19*
AB	English	510	3.6	511	4.2	494	2.8	510	4.6	-2	16*	0	17*	2	-16*
	French	487	6.9	511	6.5	489	4.3	467	9.7	-23*	-2	20*	21*	43*	22*
SK	English	480	2.2	488	2.1	475	1.5	477	2.8	-7*	5*	3	12*	11*	-2
	French	459	0.0	470	0.0	479	0.0	463	0.0	-11*	-20*	-5*	-9*	6*	16*
MB	English	484	1.7	481	1.9	478	1.5	469	2.1	4*	6*	16*	3	12*	9*
	French	473	1.7	487	1.9	483	1.6	463	1.9	-13*	-10*	11*	4*	24*	20*
ON	English	517	3.4	507	2.3	503	2.3	502	4.2	10*	14*	15*	4	5	1
	French	479	3.0	483	2.4	491	2.3	467	2.9	-4*	-12*	12*	-8*	16*	24*
QC	English	492	2.3	488	1.6	490	1.7	488	3.2	4*	2	5*	-2	1	3
	French	489	2.8	492	1.9	488	2.2	497	3.6	-3	0	-8*	3	-5*	-8*
NB	English	488	0.0	469	0.0	468	0.0	461	0.0	19*	20*	27*	1	8*	7*
	French	463	0.8	466	0.7	480	0.7	446	0.8	-2*	-17*	17*	-14*	19*	34*
NS	English	491	0.5	486	0.5	479	0.3	482	0.6	6*	12*	9*	6*	3*	-3*
	French	441	3.2	434	1.6	477	2.4	422	2.6	7*	-36*	19*	-43*	12*	55*
PE	English	491	0.0	489	0.0	483	0.0	482	0.0	2	8*	8*	5*	6*	1
NL	English	483	0.4	471	0.4	477	0.2	477	0.4	12*	6*	6*	-6*	-6*	0
CAN	**English**	**508**	**1.7**	**501**	**1.4**	**494**	**1.3**	**496**	**2.2**	**7***	**14***	**12***	**7***	**5***	**-2**
	French	**487**	**2.4**	**490**	**1.7**	**488**	**1.9**	**492**	**3.1**	**-3***	**-1**	**-5***	**2**	**-2**	**-4**

Av. Average
SE Standard error
Dif. Difference
* Significant difference between pairs of subdomains ($p < .05$, t-value = 1.96)
† A negative difference between a pair (e.g., NS - LS) means that the corresponding language group had a lower average score in the first subdomain (i.e., NS) than in the second (i.e., LS). A positive difference between a pair (e.g., NS - LS) means that the corresponding language group had a higher average score in the first subdomain (i.e., NS) than in the second (i.e., LS).

TABLE B.1.17 Average scores in science by competency and language of the school system

Canada and provinces	Scientific inquiry						
	English-language school systems			French-language school systems			Difference (EN - FR)‡
	Average score	SE	Difference (Prov - Can)†	Average score	SE	Difference (Prov - Can)†	
British Columbia	502	3.0	-2	474	0.0	-10*	28**
Alberta	510	4.0	5	482	7.6	-3	28**
Saskatchewan	478	2.3	-27*	461	0.0	-23*	16**
Manitoba	479	1.9	-25*	469	1.9	-16*	11**
Ontario	512	3.6	7*	475	3.0	-10	37**
Quebec	492	2.6	-13*	487	3.1	2*	5
New Brunswick	482	0.0	-22*	459	0.8	-26*	23**
Nova Scotia	489	0.5	-15*	435	3.2	-50*	54**
Prince Edward Island	488	0.0	-16*	-	-	-	-
Newfoundland and Labrador	481	0.4	-23*	-	-	-	-
Canada	**504**	**1.9**	**-**	**484**	**2.7**	**-**	**20****

Canada and provinces	Problem solving						
	English-language school systems			French-language school systems			Difference (EN - FR)‡
	Average score	SE	Difference (Prov - Can)†	Average score	SE	Difference (Prov - Can)†	
British Columbia	483	2.7	-9*	470	0.0	-14*	13**
Alberta	500	5.4	9	475	6.9	-10	25**
Saskatchewan	474	2.5	-18*	452	0.0	-33*	22**
Manitoba	464	2.1	-28*	467	2.4	-18*	-3
Ontario	500	3.2	8*	470	2.8	-15*	30**
Quebec	481	2.2	-11*	488	2.7	3*	-7
New Brunswick	460	0.0	-32*	460	0.9	-25*	0
Nova Scotia	474	0.5	-18*	411	1.8	-74*	63**
Prince Edward Island	480	0.0	-12*	-	-	-	-
Newfoundland and Labrador	466	0.5	-26*	-	-	-	-
Canada	**492**	**1.9**	**-**	**485**	**2.4**	**-**	**7****

TABLE B.1.17 Average scores in science by competency and language of the school system (cont'd)

Canada and provinces	Scientific reasoning						
	English-language school systems			French-language school systems			Difference (EN - FR)‡
	Average score	SE	Difference (Prov - Can)†	Average score	SE	Difference (Prov - Can)†	
British Columbia	490	2.2	-14*	489	0.0	-5	1
Alberta	512	3.6	8	500	7.1	5	12
Saskatchewan	482	2.1	-22*	473	0.0	-22*	9**
Manitoba	482	1.6	-22*	481	1.4	-13*	1
Ontario	514	3.1	10*	488	2.9	-7	26**
Quebec	493	2.4	-11*	497	2.7	2*	-4
New Brunswick	464	0.0	-40*	461	0.6	-33*	2**
Nova Scotia	487	0.5	-17*	458	2.3	-37*	29**
Prince Edward Island	485	0.0	-19*	-	-	-	-
Newfoundland and Labrador	479	0.3	-25*	-	-	-	-
Canada	**504**	**1.7**	**-**	**495**	**2.3**	**-**	**9****

SE Standard error

* Significant difference compared to Canada. The comparisons are adjusted using the Bonferroni correction (*p* < .005, *t*-value = 2.81).

** Significant difference within Canada or within province (*p* < .05, *t*-value = 1.96)

† A negative difference means that the average score in the province is below that of Canada. A positive difference indicates that the average score in the province is above that of Canada.

‡ A negative difference means that students in English-language school systems achieved a lower average score than students in French-language school systems.
A positive difference means that students in English-language school systems achieved a higher average score than students in French-language school systems.

TABLE B.1.18 Difference in average scores between competencies by language of the school system

Canada and provinces	Language	Scientific inquiry (SI)		Problem solving (PbS)		Scientific reasoning (SR)		Dif. (SI - PbS)†	Dif. (SI - SR)†	Dif. (PbS - SR)†
		Av. score	SE	Av. score	SE†	Av. score	SE			
BC	English	502	3.0	483	2.7	490	2.2	19*	12*	-7*
	French	474	0.0	470	0.0	489	0.0	4	-15*	-19*
AB	English	510	4.0	500	5.5	512	3.6	10*	-2	-12*
	French	482	7.6	475	6.9	500	7.1	7	-18*	-25*
SK	English	478	2.3	474	2.5	482	2.1	4*	-4*	-8*
	French	461	0.0	452	0.0	473	0.0	10*	-12*	-22*
MB	English	479	1.9	464	2.1	482	1.6	16*	-3*	-19*
	French	469	1.9	467	2.4	481	1.4	2	-13*	-15*
ON	English	512	3.6	500	3.2	514	3.1	12*	-2	-14*
	French	475	3.0	470	2.8	488	2.9	5*	-13*	-18*
QC	English	492	2.6	481	2.2	493	2.4	11*	-1	-12*
	French	487	3.1	488	2.7	497	2.7	-1	-10*	-9*
NB	English	482	0.0	460	0.0	464	0.0	22*	18*	-4
	French	459	0.8	460	0.9	461	0.6	-1	-2*	-2*
NS	English	489	0.5	474	0.5	487	0.5	15*	2*	-13*
	French	435	3.2	411	1.8	458	2.3	24*	-23*	-47*
PE	English	488	0.0	480	0.0	485	0.0	8*	3*	-5*
NL	English	481	0.4	466	0.5	479	0.3	16*	2*	-14*
CAN	**English**	**504**	**1.9**	**492**	**1.9**	**504**	**1.7**	**13***	**0**	**-12***
	French	**484**	**2.7**	**485**	**2.4**	**495**	**2.3**	**0**	**-10***	**-10***

Av. Average
SE Standard error
Dif. Difference
* Significant difference between pairs of competencies ($p < .05$, t-value = 1.96)
† A negative difference between a pair (e.g., SI - SR) means that the corresponding language group had a lower average score in the first competency (i.e., SI) than in the second (i.e., SR). A positive difference between a pair (e.g., SI - SR) means that the corresponding language group had a higher average score in the first competency (i.e., SI) than in the second (i.e., SR).

TABLE B.1.19 Percentage of students at each performance level in science by gender

Canada and provinces	Level 1					Level 2					Level 3					Level 4				
	Females		Males		Dif. (F - M)†	Females		Males		Dif. (F - M)†	Females		Males		Dif. (F - M)†	Females		Males		Dif. (F - M)†
	%	SE	%	SE		%	SE	%	SE		%	SE	%	SE		%	SE	%	SE	
BC	12	0.9	13	0.9	-1	50	1.3	49	1.4	1	26	1.0	26	1.1	0	12	0.9	12	1.1	0
AB	8	1.2	10	1.6	-2	47	1.9	44	1.6	2	31	1.7	30	1.6	0	14	1.3	15	1.4	-1
SK	17	1.1	17	1.2	0	55	1.3	51	1.3	5*	21	1.0	24	1.1	-2	7	0.6	9	0.7	-2*
MB	16	0.6	19	0.9	-3*	57	0.9	49	1.1	7*	20	0.7	24	0.8	-4*	8	0.5	8	0.5	-1
ON	9	1.1	9	0.8	0	48	1.7	46	1.7	2	29	1.4	29	1.2	0	14	1.2	16	1.3	-2
QC	12	1.0	12	1.0	0	53	1.7	56	1.3	-3	26	1.2	24	1.2	2	10	1.2	9	0.8	1
NB (EN)	20	0.0	18	0.0	2	54	0.0	53	0.0	1	21	0.0	23	0.0	-2	5	0.0	7	0.0	-2
NB (FR)	18	0.4	22	0.4	-4*	60	0.5	57	0.4	3*	18	0.3	18	0.4	0	4	0.2	3	0.2	1*
NS	16	0.2	15	0.2	1*	56	0.2	49	0.2	7*	21	0.2	25	0.2	-5*	8	0.1	11	0.2	-3*
PE	12	0.0	14	0.0	-2	58	0.0	51	0.0	7	23	0.0	27	0.0	-3	7	0.0	9	0.0	-2
NL	16	0.2	18	0.2	-2*	54	0.2	51	0.2	3*	23	0.2	23	0.2	-1*	8	0.1	7	0.1	0
CAN	11	0.5	12	0.5	-1	50	0.8	49	0.8	1	27	0.7	27	0.6	0	12	0.6	13	0.6	-1

SE Standard error
Dif. Difference
* Significant difference within Canada or within province (*p* < .05, *t*-value = 1.96)
† A negative difference means that the female percentage at a performance level is below that of males. A positive difference means that the female percentage at a performance level is above that of males.

TABLE B.1.20 Percentages of students at Level 2 or above in science by gender

Canada and provinces	Females			Males			Difference (F - M)‡
	%	SE	Difference (Prov - Can)†	%	SE	Difference (Prov - Can)†	
British Columbia	88	0.9	-1	87	0.9	-2	1
Alberta	92	1.2	3	90	1.6	1	2
Saskatchewan	83	1.1	-6*	83	1.2	-5*	0
Manitoba	84	0.6	-5*	81	0.9	-7*	3**
Ontario	91	1.1	2	91	0.8	2*	0
Quebec	88	1.0	-1	88	1.0	0	0
New Brunswick (EN)	80	0.0	-9*	82	0.0	-6*	-2**
New Brunswick (FR)	82	0.4	-7*	78	0.4	-10	4**
Nova Scotia	84	0.2	-5*	85	0.2	-4*	-1
Prince Edward Island	88	0.0	-1	86	0.0	-2*	2**
Newfoundland and Labrador	84	0.2	-5*	82	0.2	-7*	2**
Canada	89	0.5	-	88	0.5	-	1

SE Standard error
* Significant difference compared to Canada. The comparisons are adjusted using the Bonferroni correction (*p* < .0045, *t*-value = 2.84).
** Significant difference within Canada or within province (*p* < .05, *t*-value = 1.96).
† A negative difference means that the provincial percentage is below that of Canada. A positive difference indicates that the provincial percentage is above that of Canada.
‡ A negative difference means that a lower percentage of female students performed at Level 2 or above compared to male students. A positive difference means that a higher percentage of female students performed at Level 2 or above compared to male students.

TABLE B.1.21 Average scores in science by gender

Canada and provinces	Females			Males			Difference (F - M)‡
	Average score	SE	Difference (Prov - Can)†	Average score	SE	Difference (Prov - Can)†	
British Columbia	499	3.3	-2	495	3.7	-6	4
Alberta	514	4.5	14*	512	5.1	12	2
Saskatchewan	474	3.2	-27*	481	3.3	-19*	-8**
Manitoba	473	2.2	-27*	478	2.2	-22*	-4**
Ontario	510	4.1	9*	512	3.5	12*	-2
Quebec	494	4.3	-7	488	3.9	-12*	6
New Brunswick (EN)	466	0.0	-35*	473	0.0	-27*	-7**
New Brunswick (FR)	462	0.9	-38*	455	0.9	-45*	8**
Nova Scotia	477	0.7	-24*	487	0.7	-13*	-10**
Prince Edward Island	480	0.0	-21*	490	0.0	-11*	-10**
Newfoundland and Labrador	477	0.6	-24*	477	0.5	-24*	0
Canada	**501**	**2.0**	**-**	**500**	**1.9**	**-**	**1**

SE Standard error
* Significant difference compared to Canada. The comparisons are adjusted using the Bonferroni correction ($p < .0045$, t-value = 2.84).
** Significant difference within Canada or within province ($p < .05$, t-value = 1.96).
† A negative difference means that the average score in the province is below that of Canada. A positive difference means that the average score in the province is above that of Canada.
‡ A negative difference means that female students achieved a lower average score compared to male students. A positive difference means that female students achieved a higher average score compared to male students.

TABLE B.1.22 Average scores in science by subdomain and gender

Canada and provinces	Nature of sciences						
	Females			Males			Difference (F - M)‡
	Average score	SE	Difference (Prov - Can)†	Average score	SE	Difference (Prov - Can)†	
British Columbia	509	3.4	5	499	3.2	-3	10**
Alberta	509	3.9	4	509	4.5	8	0
Saskatchewan	479	2.6	-25*	480	2.9	-21*	-1
Manitoba	487	2.2	-18*	481	1.8	-20*	5**
Ontario	516	3.5	11*	515	3.8	13*	1
Quebec	491	3.2	-13*	487	3.0	-15*	5
New Brunswick (EN)	492	0.0	-13*	484	0.0	-18*	8**
New Brunswick (FR)	463	0.9	-41*	463	0.9	-38*	0
Nova Scotia	490	0.6	-15*	488	0.5	-14*	2**
Prince Edward Island	499	0.0	-6*	479	0.0	-23*	20**
Newfoundland and Labrador	486	0.5	-19*	481	0.4	-20*	4**
Canada	**505**	**1.7**	**-**	**502**	**1.7**	**-**	**3**

Canada and provinces	Life sciences						
	Females			Males			Difference (F - M)‡
	Average score	SE	Difference (Prov - Can)†	Average score	SE	Difference (Prov - Can)†	
British Columbia	494	2.6	-4	491	2.4	-7	3
Alberta	512	4.1	13*	511	5.3	12	1
Saskatchewan	487	2.6	-12*	487	2.6	-11*	0
Manitoba	485	2.3	-14*	477	2.1	-21*	8**
Ontario	506	2.5	7*	506	2.8	8*	-1
Quebec	491	2.5	-8*	492	2.2	-6	-2
New Brunswick (EN)	475	0.0	-24*	462	0.0	-36*	13*
New Brunswick (FR)	461	0.9	-38*	470	0.9	-28*	-9**
Nova Scotia	486	0.5	-13*	480	0.6	-18*	5**
Prince Edward Island	489	0.0	-9*	486	0.0	-13*	4**
Newfoundland and Labrador	471	0.5	-27*	470	0.5	-28*	1**
Canada	**499**	**1.3**	**-**	**498**	**1.5**	**-**	**1**

TABLE B.1.22 Average scores in science by subdomain and gender (cont'd)

Canada and provinces	Physical sciences						
	Females			Males			Difference (F - M)‡
	Average score	SE	Difference (Prov - Can)†	Average score	SE	Difference (Prov - Can)†	
British Columbia	493	2.3	-1	483	2.4	-9*	10**
Alberta	489	2.9	-5	499	3.8	7	-10**
Saskatchewan	476	2.0	-18*	475	2.4	-17*	1
Manitoba	479	1.8	-15*	477	1.8	-15*	2
Ontario	504	2.6	10*	501	2.8	9*	3
Quebec	489	2.9	-5	488	2.2	-4	2
New Brunswick (EN)	472	0.0	-22*	464	0.0	-28*	8**
New Brunswick (FR)	478	0.8	-16*	482	0.9	-10*	-4**
Nova Scotia	481	0.4	-13*	477	0.4	-15*	4**
Prince Edward Island	485	0.0	-9*	480	0.0	-12*	5**
Newfoundland and Labrador	478	0.3	-16*	476	0.3	-16*	1**
Canada	**494**	**1.3**	**-**	**492**	**1.3**	**-**	**2**

Canada and provinces	Earth sciences						
	Females			Males			Difference (F - M)‡
	Average score	SE	Difference (Prov - Can)†	Average score	SE	Difference (Prov - Can)†	
British Columbia	491	3.9	-6	482	3.7	-11	9**
Alberta	509	5.4	12	509	5.6	16*	0
Saskatchewan	475	3.4	-22*	479	3.4	-14*	-4
Manitoba	473	2.5	-23*	464	2.5	-29*	9**
Ontario	501	4.6	5	499	4.7	5	3
Quebec	498	4.2	1	494	3.8	1	4
New Brunswick (EN)	467	0.0	-30*	455	0.0	-38*	11**
New Brunswick (FR)	450	1.1	-47*	444	1.0	-50*	6**
Nova Scotia	480	0.8	-17*	479	0.7	-14*	0
Prince Edward Island	484	0.0	-13*	479	0.0	-14*	5**
Newfoundland and Labrador	476	0.6	-20*	478	0.6	-15*	-2**
Canada	**497**	**2.3**	**-**	**493**	**2.3**	**-**	**3**

SE Standard error

* Significant difference compared to Canada. The comparisons are adjusted using the Bonferroni correction ($p < .0045$, t-value = 2.84).

** Significant difference within Canada or within province ($p < .05$, t-value = 1.96)

† A negative difference means that the average score in the province is below that of Canada. A positive difference indicates that the average score in the province is above that of Canada.

‡ A negative difference means that female students achieved a lower average score compared to male students. A positive difference means that female students achieved a higher average score compared to male students.

TABLE B.1.23 Difference in average scores between subdomains by gender

Canada and provinces	Gender	Nature of sciences (NS)		Life sciences (LS)		Physical sciences (PS)		Earth sciences (ES)		Dif. (NS - LS)†	Dif. (NS - PS)†	Dif. (NS - ES)†	Dif. (LS - PS)†	Dif. (LS - ES)†	Dif. (PS - ES)†
		Av. score	SE	Av. score	SE	Av. score	SE	Av. score	SE						
BC	Female	509	3.4	494	2.6	493	2.3	491	3.9	15*	16*	19*	1	4	3
	Male	499	3.2	491	2.4	483	2.4	482	3.7	8*	16*	17*	9*	9*	1
AB	Female	509	3.9	512	4.1	489	2.9	509	5.4	-3	20*	0	23*	3	-20*
	Male	509	4.5	511	5.3	499	3.8	509	5.6	-1	11*	0	12*	2	-10*
SK	Female	479	2.6	487	2.6	476	2.0	475	3.4	-8*	3	5	11*	13*	1
	Male	480	2.9	487	2.6	475	2.4	479	3.4	-7*	6*	1	13*	8*	-4
MB	Female	487	2.2	485	2.3	479	1.8	473	2.5	2	8*	13*	6*	12*	5*
	Male	481	1.8	477	2.1	477	1.8	464	2.5	4*	4*	17*	0	13*	13*
ON	Female	516	3.6	506	2.5	504	2.6	501	4.6	10*	12*	14*	2	4	3
	Male	515	3.8	506	2.8	501	2.8	499	4.7	9*	14*	16*	6*	8*	2
QC	Female	491	3.2	491	2.5	489	2.9	498	4.2	1	2	-6*	1	-7*	-8*
	Male	487	3.0	492	2.2	488	2.2	494	3.8	-5*	-1	-8*	4	-2	-6*
NB (EN)	Female	492	0.0	475	0.0	472	0.0	467	0.0	17*	20*	25*	3	9*	5
	Male	484	0.0	462	0.0	464	0.0	455	0.0	22*	20*	29*	-2	7	9
NB (FR)	Female	463	0.9	461	0.9	478	0.8	450	1.1	2*	-15*	14*	-17*	12*	29*
	Male	463	0.9	470	0.9	482	0.9	444	1.0	-7*	-19*	20*	-12*	27*	39*
NS	Female	490	0.6	486	0.5	481	0.4	480	0.8	4*	9*	11*	4*	6*	2*
	Male	488	0.5	480	0.6	477	0.4	479	0.7	7*	10*	8*	3*	-1	-2*
PE	Female	499	0.0	489	0.0	485	0.0	484	0.0	9*	13*	15*	4*	6*	1
	Male	479	0.0	486	0.0	480	0.0	479	0.0	-7*	-2	-1	5*	6*	1
NL	Female	486	0.5	471	0.5	478	0.3	476	0.6	14*	8*	9*	-6*	-5*	-1
	Male	481	0.4	470	0.5	476	0.3	478	0.6	11*	5*	3*	-6*	-8*	-2*
CAN	**Female**	**505**	**1.7**	**499**	**1.3**	**494**	**1.3**	**497**	**2.3**	**6***	**11***	**8***	**5***	**2**	**-3**
	Male	**502**	**1.7**	**498**	**1.5**	**492**	**1.3**	**493**	**2.3**	**3***	**10***	**8***	**6***	**5***	**-1**

Av. Average
SE Standard error
Dif. Difference
* Significant difference between pairs of subdomains (*p* < .05, *t*-value = 1.96)
† A negative difference between a pair (e.g., NS - LS) means that the gender group had lower average scores in the first subdomain (i.e., NS) than in the second (i.e., LS). A positive difference between a pair (e.g., NS - LS) means that the gender group had higher average scores in the first subdomain (i.e., NS) than in the second (i.e., LS).

TABLE B.1.24 Average scores in science by compentency and gender

Canada and provinces	Scientific inquiry						
	Females			Males			Difference (F - M)‡
	Average score	SE	Difference (Prov - Can)†	Average score	SE	Difference (Prov - Can)†	
British Columbia	508	3.8	6	497	3.4	-1	11**
Alberta	509	4.5	7	510	4.6	12	-1
Saskatchewan	476	2.7	-26*	479	3.1	-19*	-3
Manitoba	482	2.4	-19*	476	2.1	-22*	7**
Ontario	510	3.7	9*	509	4.1	11*	1
Quebec	490	3.5	-12*	484	3.3	-14*	6
New Brunswick (EN)	488	0.0	-14*	477	0.0	-21*	11**
New Brunswick (FR)	460	1.0	-42*	458	0.9	-40*	1
Nova Scotia	487	0.7	-15*	486	0.5	-12*	1**
Prince Edward Island	499	0.0	-3	473	0.0	-25*	26**
Newfoundland and Labrador	483	0.5	-19*	481	0.4	-17*	2**
Canada	**502**	**1.8**	**-**	**498**	**1.8**	**-**	**3**

Canada and provinces	Problem solving						
	Females			Males			Difference (F - M)‡
	Average score	SE	Difference (Prov - Can)†	Average score	SE	Difference (Prov - Can)†	
British Columbia	486	3.3	-5	480	3.2	-9	6
Alberta	504	5.3	13	496	6.5	7	9
Saskatchewan	474	3.1	-17*	473	3.0	-16*	0
Manitoba	469	2.6	-22*	459	2.4	-30*	10**
Ontario	498	3.6	6	499	3.6	10*	-1
Quebec	487	3.3	-4	487	2.9	-2	0
New Brunswick (EN)	466	0.0	-25*	454	0.0	-35*	12**
New Brunswick (FR)	456	1.1	-35*	463	1.1	-26*	-6**
Nova Scotia	474	0.6	-18*	468	0.7	-21*	5**
Prince Edward Island	481	0.0	-10*	477	0.0	-12*	4**
Newfoundland and Labrador	466	0.6	-25*	466	0.6	-23*	1
Canada	**491**	**1.8**	**-**	**489**	**1.9**	**-**	**2**

TABLE B.1.24 Average scores in science by compentency and gender (cont'd)

Canada and provinces	Scientific reasoning						
	Females			Males			Difference (F - M)‡
	Average score	SE	Difference (Prov - Can)†	Average score	SE	Difference (Prov - Can)†	
British Columbia	495	2.9	-8	486	2.7	-15*	9**
Alberta	506	3.4	3	518	4.6	17*	-12**
Saskatchewan	482	2.4	-21*	481	2.7	-20*	1
Manitoba	485	2.0	-18*	479	2.0	-21*	6**
Ontario	515	3.2	12*	510	3.4	9*	5
Quebec	497	3.3	-6	496	2.8	-5	1
New Brunswick (EN)	470	0.0	-33*	458	0.0	-43*	12**
New Brunswick (FR)	460	0.8	-43*	462	0.7	-39*	-2**
Nova Scotia	488	0.6	-15*	483	0.5	-18*	5**
Prince Edward Island	486	0.0	-17*	483	0.0	-17*	3**
Newfoundland and Labrador	479	0.4	-24*	480	0.4	-21*	0
Canada	**503**	**1.6**	**-**	**501**	**1.7**	**-**	**2**

SE Standard error

* Significant difference compared to Canada. The comparisons are adjusted using the Bonferroni correction (p < .0045, t-value = 2.84).

** Significant difference within Canada or within province (p < .05, t-value = 1.96)

† A negative difference means that the average score in the province is below that of Canada. A positive difference indicates that the average score in the province is above that of Canada.

‡ A negative difference means that female students achieved a lower average score compared to male students. A positive difference means that female students achieved a higher average score compared to male students.

TABLE B.1.25 Difference in average scores between competencies by gender

Canada and provinces	Gender	Scientific inquiry (SI)		Problem solving (PbS)		Scientific reasoning (SR)		Dif. (SI - PbS)†	Dif. (SI - SR)†	Dif. (PbS - SR)†
		Av. score	SE	Av. score	SE	Av. score	SE			
BC	Female	508	3.8	486	3.3	495	2.9	22*	12*	-9*
	Male	497	3.4	480	3.2	486	2.7	17*	11*	-6*
AB	Female	509	4.5	504	5.3	506	3.4	5	3	-2
	Male	510	4.6	496	6.5	518	4.6	14*	-8*	-22*
SK	Female	476	2.7	474	3.1	482	2.4	2	-7*	-8*
	Male	479	3.1	474	3.0	481	2.7	5*	-2	-8*
MB	Female	482	2.4	469	2.6	485	2.0	13*	-3	-16*
	Male	476	2.1	459	2.4	479	2.0	17*	-4*	-20*
ON	Female	510	3.7	498	3.6	515	3.2	13*	-5	-18*
	Male	509	4.1	499	3.6	510	3.4	11*	-1	-12*
QC	Female	490	3.5	487	3.3	497	3.3	3	-7*	-10*
	Male	484	3.3	487	2.9	496	2.8	-3	-11*	-8*
NB (EN)	Female	488	0.0	466	0.0	470	0.0	22*	18*	-4
	Male	477	0.0	454	0.0	458	0.0	23*	19*	-4
NB (FR)	Female	460	1.0	456	1.1	460	0.8	3*	-1	-4*
	Male	458	0.9	463	1.1	462	0.7	-5*	-4*	1
NS	Female	487	0.7	474	0.6	488	0.6	13*	-1	-14*
	Male	486	0.5	468	0.7	483	0.5	17*	3*	-15*
PE	Female	499	0.0	481	0.0	486	0.0	18*	12*	-5*
	Male	473	0.0	477	0.0	483	0.0	-4*	-10*	-6*
NL	Female	483	0.5	466	0.6	479	0.4	16*	3*	-13*
	Male	481	0.4	466	0.6	480	0.4	15*	-1	-14*
CAN	**Female**	**502**	**1.8**	**491**	**1.8**	**503**	**1.6**	**10***	**-1**	**-12***
	Male	**498**	**1.8**	**489**	**1.9**	**501**	**1.7**	**9***	**-3***	**-12***

Av. Average
SE Standard error
* Significant difference between pairs of competencies ($p < .05$, t-value = 1.96)
† A negative difference between a pair (e.g., SI - SR) means that the gender group had lower average scores in the first competency (i.e., SI) than in the second (i.e., SR). A positive difference between a pair (e.g., SI - SR) means that the gender group had higher average scores in the first competency (i.e., SI) than in the second (i.e., SR).

TABLE B.1.26 Percentages of students at each performance level in science, 2013 and 2023

Canada and provinces	Level 1				Level 2				Level 3				Level 4			
	2013		2023		2013		2023		2013		2023		2013		2023	
	%	SE	%	SE	%	SE	%	SE	%	SE	%	SE	%	SE	%	SE
BC	9	0.5	13	0.7	43	1.0	49	1.1	39	0.9	26	0.8	9	0.6	12	0.8
AB	6	0.6	9	1.2	37	1.1	45	1.4	44	1.2	31	1.3	12	0.7	15	1.1
SK	11	0.6	17	1.0	47	0.9	53	1.0	35	0.8	22	0.8	6	0.4	8	0.6
MB	15	0.7	17	0.6	53	1.0	53	0.7	29	0.7	22	0.6	4	0.3	8	0.4
ON	7	0.5	9	0.7	41	1.0	47	1.3	43	1.0	29	0.9	10	0.6	15	1.0
QC	9	0.5	12	0.8	50	0.9	54	1.2	36	0.8	25	1.0	5	0.4	9	0.8
NB	13	0.6	19	0.1	52	0.9	55	0.1	31	0.9	21	0.1	4	0.4	6	0.0
NS	9	0.6	15	0.2	48	1.2	52	0.1	37	0.8	23	0.2	6	0.5	9	0.1
PE	7	0.7	13	0.0	50	1.3	55	0.0	37	1.4	25	0.0	6	0.6	8	0.0
NL	6	0.5	17	0.1	47	1.1	52	0.1	39	1.2	23	0.1	8	0.6	8	0.1
CAN	**8**	**0.2**	**11**	**0.4**	**44**	**0.5**	**49**	**0.6**	**39**	**0.5**	**27**	**0.5**	**8**	**0.3**	**12**	**0.5**

SE Standard error

TABLE B.1.27 Comparison of percentage of students at Level 2 or above, 2013 and 2023

Canada and provinces	2013		2023		Difference (2023 - 2013)†
	%	SE	%	SE	
British Columbia	91	0.6	87	0.7	-4*
Alberta	94	0.6	91	1.3	-3*
Saskatchewan	89	0.8	83	1.0	-6*
Manitoba	85	0.8	83	0.6	-2
Ontario	93	0.9	91	0.7	-2
Quebec	91	0.8	88	0.8	-3*
New Brunswick	87	0.2	81	0.1	-6*
Nova Scotia	91	0.1	85	0.2	-6*
Prince Edward Island	93	0.0	87	0.0	-6*
Newfoundland and Labrador	94	0.2	83	0.1	-11*
Canada	**92**	**0.4**	**89**	**0.4**	**-3***

SE Standard error
* Significant difference compared to the baseline year 2013 (p < .05, t-value = 1.96)
† A negative difference means that a lower percentage of students in 2023 performed at Level 2 or above compared to the baseline year 2013. A positive difference means that a higher percentage of students in 2023 performed at Level 2 or above compared to the baseline year 2013.

Canada and provinces	2013		2016		2019		2023		Dif. (2016 - 2013)†	Dif. (2019 - 2013)†	Dif. (2023 - 2013)†
	Average score	SE	Average score	SE	Average score	SE	Average score	SE			
BC	501	2.1	505	2.1	503	2.3	497	3.0	4	2	-4
AB	521	2.5	518	1.7	521	3.2	513	4.3	-3	0	-8
SK	486	2.2	491	2.0	500	2.5	477	2.8	5	14*	-9*
MB	465	1.6	491	1.6	493	2.3	476	1.9	26*	28*	11*
ON	511	2.3	510	2.0	509	2.3	511	3.3	-1	-2	0
QC	485	1.8	507	2.3	488	2.2	491	3.7	22*	3	6
NB	469	1.9	500	1.5	497	0.0	467	0.2	31*	28*	-2
NS	492	1.8	499	1.3	505	0.3	482	0.6	7*	13*	-10*
PE	491	2.6	516	3.8	510	0.0	485	1.0	25*	19*	-6*
NL	500	2.2	501	2.6	499	1.0	477	0.5	1	-1	-23*
CAN	**500**	**1.0**	**508**	**1.0**	**505**	**1.1**	**501**	**1.7**	**8***	**4***	**1**

SE Standard error

Dif. Difference

* Significant difference compared to the baseline year 2013 ($p < .05$, t-value = 1.96)

† A negative difference means that students in the indicated year had lower average scores compared to students in the baseline year 2013. A positive difference means that students in the indicated year had higher average scores compared to students in the baseline year 2013.

TABLE B.1.29 Comparison of science average scores by subdomain, 2013 and 2023

Canada and provinces	Nature of sciences					Life sciences					Physical sciences					Earth sciences				
	2013		2023		Dif.	2013		2023		Dif.	2013		2023		Dif.	2013		2023		Dif.
	Av. score	SE	Av. score	SE	(2023 - 2013)†	Av. score	SE	Av. score	SE	(2023 - 2013)†	Av. score	SE	Av. score	SE	(2023 - 2013)†	Av. score	SE	Av. score	SE	(2023 - 2013)†
BC	496	1.8	504	2.7	8*	513	2.0	493	2.0	-20*	498	1.9	488	1.9	-10*	497	1.9	486	3.2	-11*
AB	524	2.0	509	3.6	-15*	513	2.0	511	4.2	-2	509	1.9	494	2.7	-15*	513	2.1	509	4.5	-4
SK	485	1.6	480	2.1	-5	491	2.2	487	2.1	-4	489	2.4	475	1.5	-14*	494	1.9	477	2.8	-17*
MB	469	1.5	484	1.6	15*	481	2.1	481	1.8	0	470	1.6	478	1.4	8*	477	1.8	468	2.0	-9*
ON	508	1.8	515	3.2	7	508	2.0	506	2.2	-2	511	1.9	502	2.2	-9*	505	1.9	500	3.9	-5
QC	489	1.4	489	2.5	0	482	1.6	491	1.7	9*	489	1.6	489	2.0	0	494	1.7	496	3.3	2
NB	477	1.7	481	0.2	4*	474	2.0	468	0.2	-6*	477	1.6	471	0.2	-6*	481	1.4	457	0.2	-24*
NS	492	1.9	489	0.5	-3	490	1.7	483	0.5	-7*	497	2.1	479	0.3	-18*	498	1.9	479	0.6	-19*
PE	490	2.8	489	0.0	-1	488	2.2	488	0.0	0	494	2.6	483	0.0	-11*	504	2.8	482	0.0	-22*
NL	495	2.6	483	0.4	-12*	506	2.3	471	0.4	-35*	494	2.2	477	0.2	-17*	506	3.0	477	0.5	-29*
CAN	**500**	**1.0**	**503**	**1.4**	**3**	**500**	**1.0**	**499**	**1.1**	**-1**	**500**	**1.0**	**493**	**1.1**	**-7***	**500**	**0.8**	**495**	**1.9**	**-5***

Av. Average
SE Standard error
Dif. Difference
* Significant difference compared to the baseline year 2013 ($p < .05$, t-value = 1.96)
† A negative difference means that students in 2023 had lower average scores compared to students in the baseline year 2013. A positive difference means that students in 2023 had higher average scores compared to students in the baseline year 2013.

TABLE B.1.30 Comparison of science average scores by competency, 2013 and 2023

Canada and provinces	Scientific inquiry					Problem solving					Scientific reasoning				
	2013		2023		Dif. (2023 - 2013)†	2013		2023		Dif. (2023 - 2013)†	2013		2023		Dif. (2023 - 2013)†
	Av. score	SE	Av. score	SE		Av. score	SE	Av. score	SE		Av. score	SE	Av. score	SE	
BC	496	1.7	502	3.0	6	495	1.9	483	2.7	-12*	507	1.9	490	2.2	-17*
AB	525	1.9	509	3.9	-16*	506	1.9	500	5.4	-6	515	2.3	512	3.5	-3
SK	485	1.7	477	2.3	-8*	492	1.7	474	2.5	-18*	489	2.2	482	2.1	-7*
MB	469	1.9	479	1.8	10*	473	1.7	464	2.0	-9*	472	1.4	482	1.6	10*
ON	508	2.4	510	3.4	2	510	2.1	498	3.0	-12*	509	1.7	513	2.9	4
QC	489	1.7	487	2.8	-2	491	1.7	487	2.5	-4	484	1.7	496	2.4	12*
NB	475	1.6	475	0.2	0	482	2.4	460	0.3	-22*	471	1.9	463	0.2	-8*
NS	494	2.2	486	0.5	-8*	495	2.1	471	0.6	-24*	492	2.2	485	0.5	-7*
PE	492	2.9	487	0.0	-5	501	2.7	479	0.0	-22*	492	3.3	485	0.0	-7*
NL	496	2.4	482	0.4	-14*	498	2.8	466	0.5	-32*	505	2.8	479	0.3	-26*
CAN	**500**	**0.9**	**500**	**1.5**	**0**	**500**	**0.9**	**490**	**1.5**	**-10***	**500**	**1.0**	**502**	**1.4**	**2**

Av. Average
SE Standard error
Dif. Difference
* Significant difference compared to the baseline year 2013 ($p < .05$, t-value = 1.96)
† A negative difference means that students in 2023 had lower average scores compared to students in the baseline year 2013. A positive difference means that students in 2023 had higher average scores compared to students in the baseline year 2013.

TABLE B.1.31 Comparison of science average scores by language of the school system, 2013, 2016, 2019, and 2023

Canada and provinces	Language	2013		2016		2019		2023		Dif. (2016 - 2013)†	Dif. (2019 - 2013)†	Dif. (2023 - 2013)†
		Average score	SE	Average score	SE	Average score	SE	Average score	SE			
BC	English	501	2.2	505	1.9	503	2.3	497	3.1	4	2	-4
	French	495	4.0	502	1.5	491	0.0	479	0.0	7	-4	-16*
AB	English	521	2.1	518	2.0	521	3.3	514	4.4	-3	0	-7
	French	488	2.5	496	3.7	485	3.7	489	6.9	8	-3	1
SK	English	486	2.3	491	1.6	500	2.5	478	2.9	5	14*	-8*
	French	474	0.8	498	0.0	482	0.0	453	0.0	24*	8*	-21*
MB	English	465	1.8	492	1.7	493	2.4	476	2.0	27*	28*	11*
	French	453	1.8	468	2.7	464	0.0	471	2.1	15*	11*	18*
ON	English	513	2.6	510	1.6	511	2.4	512	3.5	-3	-2	-1
	French	464	2.1	499	2.3	476	1.9	477	3.9	35*	12*	13*
QC	English	484	2.6	499	2.8	487	4.1	492	2.5	15*	3	8*
	French	485	1.9	507	2.2	488	2.4	491	4.0	22*	3	6
NB	English	467	1.9	501	2.8	505	0.0	470	0.0	34*	38*	3
	French	475	2.6	498	2.3	478	0.0	458	0.8	23*	3	-17*
NS	English	493	2.1	500	1.4	507	0.3	485	0.6	7*	14*	-8*
	French	466	1.9	473	5.6	466	3.4	433	3.6	7	0	-33*
PE	English	492	2.6	517	4.1	512	0.0	485	0.0	25*	20*	-7*
NL	English	500	2.4	501	2.7	499	1.0	477	0.4	1	-1	-23*
CAN	**English**	**505**	**1.2**	**508**	**1.0**	**509**	**1.3**	**504**	**1.9**	**3**	**4***	**-1**
	French	**483**	**1.3**	**506**	**2.3**	**486**	**2.1**	**489**	**3.5**	**23***	**3**	**6**

SE Standard error
Dif. Difference
* Significant difference compared to the baseline year 2013 (*p* < .05, *t*-value = 1.96)
† A negative difference means that students in the indicated year had lower average scores compared to students in the baseline year 2013. A positive difference means that students in the indicated year had higher average scores compared to students in the baseline year 2013.

TABLE B.1.32 Comparison of science average scores by gender, 2013, 2016, 2019, and 2023

Canada and provinces	Gender	2013 Average score	SE	2016 Average score	SE	2019 Average score	SE	2023 Average score	SE	Dif. (2016 - 2013)†	Dif. (2019 - 2013)†	Dif. (2023 - 2013)†
BC	Female	503	2.8	507	2.5	504	2.5	499	3.3	4	1	-4
	Male	498	2.5	503	2.8	503	3.0	495	3.7	5	5	-3
AB	Female	525	3.2	526	2.6	522	3.8	514	4.5	1	-3	-11*
	Male	516	3.2	512	2.9	520	3.4	512	5.1	-4	4	-4
SK	Female	481	2.5	492	2.2	504	3.0	474	3.2	11*	23*	-7
	Male	490	3.1	491	2.0	496	2.8	481	3.3	1	6	-9*
MB	Female	463	2.3	497	2.6	494	2.7	473	2.2	34*	31*	10*
	Male	467	2.4	487	2.2	491	2.8	478	2.2	20*	24*	11*
ON	Female	511	2.9	511	2.3	511	2.4	510	4.1	0	0	-1
	Male	511	2.9	508	2.2	508	3.0	512	3.5	-3	-3	1
QC	Female	485	2.5	509	2.6	492	2.2	494	4.3	24*	7*	9
	Male	485	2.3	504	2.8	484	2.8	488	3.9	19*	-1	3
NB	Female	472	2.8	509	2.2	501	0.0	465	0.3	37*	29*	-7*
	Male	467	2.7	491	2.1	494	0.0	468	0.2	24*	27*	1
NS	Female	491	2.9	505	2.4	509	0.4	477	0.7	14*	18*	-14*
	Male	492	2.7	495	2.5	501	0.4	487	0.7	3	9*	-5
PE	Female	488	3.7	518	4.5	509	0.0	480	0.0	30*	21*	-8*
	Male	495	2.8	515	5.9	510	0.0	490	0.0	20*	15*	-5
NL	Female	500	3.4	503	2.8	509	0.9	477	0.5	3	9*	-23*
	Male	500	3.9	498	3.3	490	1.5	477	0.6	-2	-10*	-23*
CAN	**Female**	**501**	**1.3**	**511**	**1.6**	**507**	**1.2**	**501**	**2.0**	**10***	**6***	**0**
	Male	**499**	**1.2**	**505**	**1.3**	**503**	**1.5**	**500**	**1.9**	**6***	**4**	**1**

SE Standard error
Dif. Difference
* Significant difference compared to the baseline year 2013 ($p < .05$, t-value = 1.96)
† A negative difference means that students in the indicated year had lower average scores compared to students in the baseline year 2013. A positive difference means that students in the indicated year had higher average scores compared to students in the baseline year 2013.

TABLE B.1.33 Summary of average scores in science, 2013 and 2023

	2013	2023	Change over time
British Columbia			
Overall science	501	497	-4
Nature of sciences	496	504	8*
Life sciences	513	493	-20*
Physical sciences	498	488	-10*
Earth sciences	497	486	-11*
Scientific inquiry	496	502	6
Problem solving	495	483	-12*
Scientific reasoning	507	490	-17*
English-language school system	501	497	-4
French-language school system	495	479	-16*
Achievement gap (EN - FR)	6	18*	
Females	503	499	-4
Males	498	495	-3
Achievement gap (F - M)	5	4	-
Alberta			
Overall science	521	513	-8
Nature of sciences	524	509	-15*
Life sciences	513	511	-2
Physical sciences	509	494	-15*
Earth sciences	513	509	-4
Scientific inquiry	525	509	-16*
Problem solving	506	500	-6
Scientific reasoning	515	512	-3
English-language school system	521	514	-7
French-language school system	488	489	1
Achievement gap (EN - FR)	33*	24*	
Females	525	514	-11*
Males	516	512	-4
Achievement gap (F - M)	9*	2	-

(cont'd on next page)

	2013	2023	Change over time
Saskatchewan			
Overall science	486	477	-9*
Nature of sciences	485	480	-5
Life sciences	491	487	-4
Physical sciences	489	475	-14*
Earth sciences	494	477	-17*
Scientific inquiry	485	477	-8*
Problem solving	492	474	-18*
Scientific reasoning	489	482	-7*
English-language school system	486	478	-8*
French-language school system	474	453	-21*
Achievement gap (EN - FR)	12*	24*	–
Females	481	474	-7
Males	490	481	-9*
Achievement gap (F - M)	-9*	-8*	-
Manitoba			
Overall science	465	476	11*
Nature of sciences	469	484	15*
Life sciences	481	481	0
Physical sciences	470	478	8*
Earth sciences	477	468	-9*
Scientific inquiry	469	479	10*
Problem solving	473	464	-9*
Scientific reasoning	472	482	10*
English-language school system	465	476	11*
French-language school system	453	471	18*
Achievement gap (EN - FR)	12*	5	
Females	463	473	10*
Males	467	478	11*
Achievement gap (F - M)	-4	-4*	-

	2013	2023	Change over time
Ontario			
Overall science	511	511	0
Nature of sciences	508	515	7
Life sciences	508	506	-2
Physical sciences	511	502	-9*
Earth sciences	505	500	-5
Scientific inquiry	508	510	2
Problem solving	510	498	-12*
Scientific reasoning	509	513	4
English-language school system	513	512	-1
French-language school system	464	477	13*
Achievement gap (EN - FR)	49*	35*	-
Females	511	510	-1
Males	511	512	1
Achievement gap (F - M)	0	-2	-
Quebec			
Overall science	485	491	6
Nature of sciences	489	489	0
Life sciences	482	491	9*
Physical sciences	489	489	0
Earth sciences	494	496	2
Scientific inquiry	489	487	-2
Problem solving	491	487	-4
Scientific reasoning	484	496	12*
English-language school system	484	492	8*
French-language school system	485	491	6
Achievement gap (EN - FR)	-1	1	-
Females	485	494	9
Males	485	488	3
Achievement gap (F - M)	0	6	-

TABLE B.1.33 Summary of average scores in science, 2013 and 2023 (cont'd)

	2013	2023	Change over time
New Brunswick			
Overall science	469	467	-2
Nature of sciences	477	481	4*
Life sciences	474	468	-6*
Physical sciences	477	471	-6*
Earth sciences	481	457	-24*
Scientific inquiry	475	475	0
Problem solving	482	460	-22*
Scientific reasoning	471	463	-8*
English-language school system	467	470	3
French-language school system	475	458	-17*
Achievement gap (EN - FR)	-8	11*	-
Females	472	465	-7*
Males	467	468	1
Achievement gap (F - M)	5	-3	-
Nova Scotia			
Overall science	492	482	-10*
Nature of sciences	492	489	-3
Life sciences	490	483	-7*
Physical sciences	497	479	-18*
Earth sciences	498	479	-19*
Scientific inquiry	494	486	-8*
Problem solving	495	471	-24*
Scientific reasoning	492	485	-7*
English-language school system	493	485	-8*
French-language school system	466	433	-33*
Achievement gap (EN - FR)	27*	52*	
Females	491	477	-14*
Males	492	487	-5
Achievement gap (F - M)	-1	-10*	-

	2013	2023	Change over time
Prince Edward Island			
Overall science	491	485	-6*
Nature of sciences	490	489	-1
Life sciences	488	488	0
Physical sciences	494	483	-11*
Earth sciences	504	482	-22*
Scientific inquiry	492	487	-5
Problem solving	501	479	-22*
Scientific reasoning	492	485	-7*
English-language school system	492	485	-7*
French-language school system	-	-	-
Achievement gap (EN - FR)	-	-	-
Females	488	480	-8*
Males	495	490	-5
Achievement gap (F - M)	-7	-10*	-
Newfoundland and Labrador			
Overall science	500	477	-23*
Nature of sciences	495	483	-12*
Life sciences	506	471	-35*
Physical sciences	494	477	-17*
Earth sciences	506	477	-29*
Scientific inquiry	496	482	-14*
Problem solving	498	466	-32*
Scientific reasoning	505	479	-26*
English-language school system	500	477	-23*
French-language school system	-	-	-
Achievement gap (EN - FR)	-	-	-
Females	500	477	-23*
Males	500	477	-23*
Achievement gap (F - M)	0	0	-

TABLE B.1.33 Summary of average scores in science, 2013 and 2023 (cont'd)

	2013	2023	Change over time
Canada			
Overall science	500	501	1
Nature of sciences	500	503	3
Life sciences	500	499	-1
Physical sciences	500	493	-7*
Earth sciences	500	495	-5*
Scientific inquiry	500	500	0
Problem solving	500	490	-10*
Scientific reasoning	500	502	2
English-language school system	505	504	-1
French-language school system	483	489	6
Achievement gap (EN - FR)	22*	15*	-
Females	501	501	0
Males	499	500	1
Achievement gap (F - M)	2	1	-

* Denotes significant difference
Note: Numbers may differ from those expected due to rounding. Tests for significance have not been performed for change over time for achievement gaps due to the standard error of the difference in score change over time being disproportionately high relative to the difference in change over time. While a test of significance with a high standard error can be conducted, the resulting inferences would be highly inaccurate and unreliable, given that the test of significance would be performed using point estimates which are highly inaccurate.

TABLE B.1.34 Comparison of science average scores by subdomain and language of the school system, 2013 and 2023

Canada and provinces	Language	Nature of sciences					Life sciences					Physical sciences					Earth sciences				
		2013		2023		Dif.	2013		2023		Dif.	2013		2023		Dif.	2013		2023		Dif.
		Av. score	SE	Av. score	SE	(2023 - 2013)†	Av. score	SE	Av. score	SE	(2023 - 2013)†	Av. score	SE	Av. score	SE	(2023 - 2013)†	Av. score	SE	Av. score	SE	(2023 - 2013)†
BC	English	496	2.4	504	2.7	8*	513	2.3	493	2.0	-20*	498	2.0	488	1.9	-10*	497	2.0	486	3.2	-11*
	French	499	4.1	479	0.0	-20*	503	4.5	482	0.0	-21*	494	4.4	490	0.0	-4	488	3.7	472	0.0	-16*
AB	English	524	2.5	510	3.6	-14*	513	1.8	511	4.2	-2	509	2.2	494	2.8	-15*	514	2.1	510	4.6	-4
	French	499	2.3	488	6.9	-12	483	2.4	511	6.5	28*	496	3.1	489	4.3	-15*	479	2.0	467	9.7	-12
SK	English	485	1.6	480	2.2	-5	491	2.3	488	2.1	-3	489	1.9	475	1.5	-14*	494	1.8	477	2.8	-17*
	French	484	0.9	459	0.0	-25*	480	1.0	470	0.0	-10*	470	1.0	479	0.0	9*	492	0.9	463	0.0	-29*
MB	English	470	2.2	484	1.7	14*	481	1.7	481	1.9	0	471	2.4	478	1.5	7*	477	1.9	469	2.1	-8*
	French	463	2.0	473	1.7	10*	468	2.1	487	1.9	19*	462	1.8	483	1.6	21*	468	1.9	463	1.9	-5
ON	English	510	2.6	517	3.4	7	509	2.3	507	2.3	-2	512	2.3	503	2.3	-9*	507	2.9	502	4.2	-5
	French	470	2.4	479	3.0	9*	474	2.4	483	2.4	9*	479	2.3	491	2.3	12*	468	1.8	467	2.9	-1
QC	English	492	3.1	492	2.3	0	483	2.7	488	1.6	5	489	2.3	490	1.7	1	484	2.9	488	3.2	4
	French	489	1.8	489	2.8	0	482	1.9	492	1.9	10*	488	1.9	488	2.2	0	495	1.8	497	3.6	2
NB	English	476	2.5	488	0.0	12*	474	2.5	469	0.0	-5*	471	2.3	468	0.0	-3	483	1.9	461	0.0	-22*
	French	481	2.6	463	0.8	-18*	474	2.6	466	0.7	-8*	493	2.4	480	0.7	-13*	476	2.2	446	0.8	-30*
NS	English	493	2.0	491	0.5	-2	491	2.1	486	5.0	-5*	497	2.1	479	0.3	-18*	499	2.0	482	0.6	-17*
	French	467	1.7	441	3.2	-26*	472	2.3	434	1.6	-38*	493	2.1	477	2.4	-16*	475	2.4	422	2.6	-53*
PE	English	491	2.6	491	0.0	0	489	2.5	489	0.0	0	494	2.8	483	0.0	-11*	505	2.7	482	0.0	-23*
NL	English	495	2.7	483	0.4	-12*	506	2.3	471	0.4	-35*	495	2.5	477	0.2	-18*	506	2.8	477	0.4	-29*
CAN	**English**	**504**	**1.2**	**508**	**1.7**	**4**	**506**	**1.2**	**501**	**1.4**	**-5***	**504**	**1.2**	**494**	**1.3**	**-10***	**502**	**1.3**	**496**	**2.2**	**-6***
	French	**487**	**1.5**	**487**	**2.4**	**0**	**481**	**1.8**	**490**	**1.7**	**9***	**488**	**1.8**	**488**	**1.9**	**0**	**492**	**1.3**	**492**	**3.1**	**0**

Av. Average
SE Standard error
Dif. Difference
* Significant difference compared to the baseline year 2013 ($p < .05$, t-value = 1.96)
† A negative difference means that students in 2023 had lower average scores compared to students in the baseline year 2013. A positive difference means that students in 2023 had higher average scores compared to students in the baseline year 2013.

Canada and provinces	Gender	Nature of sciences					Life sciences					Physical sciences					Earth sciences				
		2013		2023		Dif.	2013		2023		Dif.	2013		2023		Dif.	2013		2023		Dif.
		Av. score	SE	Av. score	SE	(2023 - 2013)†	Av. score	SE	Av. score	SE	(2023 - 2013)†	Av. score	SE	Av. score	SE	(2023 - 2013)†	Av. score	SE	Av. score	SE	(2023 - 2013)†
BC	Female	497	2.6	509	3.4	12*	517	2.5	494	2.6	-23*	500	2.9	493	2.3	-7	497	2.7	491	3.9	-6
	Male	495	3.1	499	3.2	4	508	2.5	491	2.4	-17*	496	2.8	483	2.4	-13*	497	2.4	482	3.7	-15*
AB	Female	526	3.2	509	3.9	-17*	517	2.9	512	4.1	-5	509	3.4	489	2.9	-20*	519	3.1	509	5.4	-10
	Male	521	3.6	509	4.5	-12*	508	3.1	511	5.3	3	510	3.5	499	3.8	-11*	507	3.1	509	5.6	2
SK	Female	482	2.5	479	2.6	-3	487	2.1	487	2.6	0	484	2.4	476	2.0	-8*	489	2.3	475	3.4	-14*
	Male	488	1.9	480	2.9	-8*	494	4.6	487	2.6	-7	493	3.1	475	2.4	-18*	498	2.4	479	3.4	-19*
MB	Female	470	2.5	487	2.2	17*	478	2.5	485	2.3	7*	466	2.9	479	1.8	13*	475	2.7	473	2.5	-2
	Male	469	2.7	481	1.8	12*	484	2.8	477	2.1	-7*	475	2.9	477	1.8	2	479	2.5	464	2.5	-15*
ON	Female	508	3.2	516	3.5	7	506	2.6	506	2.5	0	511	2.8	504	2.6	-7	506	3.1	501	4.6	-5
	Male	509	3.6	515	3.8	6	510	2.4	506	2.8	-4	511	2.9	501	2.8	-10*	504	2.8	499	4.7	-5
QC	Female	491	2.6	491	3.2	0	484	2.7	491	2.5	6	484	2.8	489	2.9	5	493	1.9	498	4.2	5
	Male	488	2.4	487	3.0	-1	481	2.3	492	2.2	11*	493	2.5	488	2.2	-5	495	2.1	494	3.8	-1
NB	Female	480	2.2	484	0.3	4	478	2.7	471	0.3	-7*	477	2.3	474	0.2	-3	479	2.3	462	0.3	-17*
	Male	475	3.0	478	0.2	3	471	2.5	464	0.3	-7*	477	2.3	469	0.3	-8*	483	2.3	452	0.3	-31*
NS	Female	494	2.8	490	0.6	-4	491	2.2	486	0.5	-5*	494	3.0	481	0.4	-13*	493	2.3	480	0.8	-13*
	Male	491	3.3	488	0.5	-3	489	2.8	480	0.6	-9*	500	2.5	477	0.4	-23*	503	2.7	479	0.7	-24*
PE	Female	486	3.7	499	0.0	13*	491	4.0	489	0.0	-2	489	3.5	485	0.0	-4	497	3.3	484	0.0	-13*
	Male	494	3.9	479	0.0	-15*	486	4.1	486	0.0	0	499	3.3	480	0.0	-19*	511	3.4	479	0.0	-32*
NL	Female	493	3.7	486	0.5	-7	506	4.0	471	0.5	-35*	490	2.8	478	0.3	-12*	512	3.5	476	0.6	-36*
	Male	496	3.3	481	0.4	-15*	507	3.9	470	0.5	-37*	499	3.7	476	0.3	-23*	500	3.5	478	0.6	-22*
CAN	Female	501	1.4	505	1.6	4	501	1.3	499	1.3	-2	499	1.3	494	1.3	-5*	501	1.7	497	2.3	-4
	Male	499	1.4	502	1.7	3	499	1.0	498	1.5	-1	501	1.2	492	1.3	-9*	500	1.5	493	2.3	-7*

Av. Average
SE Standard error
Dif. Difference
* Significant difference compared to the baseline year 2013 (*p* < .05, *t*-value = 1.96)
† A negative difference means that students in 2023 had lower average scores compared to students in the baseline year 2013. A positive difference means that students in 2023 had higher average scores compared to students in the baseline year 2013.

TABLE B.1.36 Comparison of science average scores by competency and language of the school system, 2013 and 2023

Canada and provinces	Language	Scientific inquiry					Problem solving					Scientific reasoning				
		2013		2023		Dif. (2023-2013)†	2013		2023		Dif. (2023-2013)†	2013		2023		Dif. (2023-2013)†
		Av. score	SE	Av. score	SE		Av. score	SE	Av. score	SE		Av. score	SE	Av. score	SE	
BC	English	496	2.0	502	3.0	6	495	1.9	483	2.7	-12*	507	2.0	490	2.2	-17*
	French	501	4.5	474	0.0	-27*	491	3.7	470	0.0	-21*	496	4.4	489	0.0	-7
AB	English	525	2.0	510	4.0	-15*	506	1.8	500	5.4	-6	515	2.1	512	3.6	-3
	French	501	3.5	482	7.6	-19*	484	3.7	475	6.9	9	483	2.7	500	7.1	17*
SK	English	485	1.7	478	2.3	-7*	492	1.8	474	2.5	-18*	489	2.2	482	2.1	-7*
	French	484	1.0	461	0.0	-23*	474	1.1	452	0.0	-22*	478	0.8	473	0.0	-5*
MB	English	469	2.2	479	1.9	10*	473	2.2	464	2.1	-9*	473	2.2	482	1.6	9*
	French	463	2.0	469	1.9	6*	463	1.8	467	2.4	4	459	1.9	481	1.4	22*
ON	English	509	2.7	512	3.6	3	512	2.6	500	3.2	-12*	511	2.4	514	3.1	3
	French	470	2.0	475	3.0	5	475	2.9	470	2.8	-5	469	1.9	488	2.9	19*
QC	English	491	2.5	492	2.6	1	486	2.4	481	2.2	-5	483	2.2	493	2.4	10*
	French	489	2.1	487	3.1	-2	491	1.6	488	2.7	-3	484	2.1	497	2.7	13*
NB	English	474	2.5	482	0.0	8*	478	2.2	460	0.0	-18*	470	2.3	464	0.0	-6*
	French	479	2.3	459	0.8	-20*	492	2.9	460	0.9	-32*	474	2.5	461	0.6	-13*
NS	English	495	2.0	489	0.5	-6*	495	1.8	474	0.5	-21*	492	1.7	487	0.5	-5*
	French	466	2.1	435	3.2	-31*	484	2.4	411	1.8	-73*	474	2.5	458	2.3	-16*
PE	English	492	2.7	488	0.0	-4	502	2.9	480	0.0	-22*	492	2.7	485	0.0	-7*
NL	English	496	2.5	481	0.4	-15*	498	2.4	466	0.5	-32*	505	2.4	479	0.3	-26*
CAN	English	504	1.0	504	1.9	0	503	1.1	492	1.9	-11*	505	1.0	504	1.7	-1
	French	487	1.5	484	2.7	-3	490	1.8	485	2.4	5	482	1.7	495	2.3	13*

Av. Average
SE Standard error
Dif. Difference
* Significant difference compared to the baseline year 2013 ($p < .05$, t-value = 1.96)
† A negative difference means that students in 2023 had lower average scores compared to students in the baseline year 2013. A positive difference means that students in 2023 had higher average scores compared to students in the baseline year 2013.

TABLE B.1.37 Comparison of science average scores by competency and gender, 2013 and 2023

Canada and provinces	Gender	Scientific inquiry					Problem solving					Scientific reasoning				
		2013		2023		Dif.	2013		2023		Dif.	2013		2023		Dif.
		Av. score	SE	Av. score	SE	(2023 - 2013)†	Av. score	SE	Av. score	SE	(2023 - 2013)†	Av. score	SE	Av. score	SE	(2023 - 2013)†
BC	Female	501	2.7	508	3.8	7	497	2.5	486	3.3	-11*	507	2.3	495	2.9	-12*
	Male	492	3.3	497	3.4	5	493	2.7	480	3.2	-13*	507	2.7	486	2.7	-21*
AB	Female	530	3.2	509	4.5	-21*	506	2.6	504	5.3	-2	518	2.8	506	3.4	-12*
	Male	520	3.0	510	4.6	-10	506	2.8	496	6.5	-10	511	3.8	518	4.6	7
SK	Female	483	2.5	476	2.7	-7	485	2.5	474	3.1	-11*	486	2.7	482	2.4	-4
	Male	488	3.1	479	3.1	-9*	498	2.8	474	3.0	-24*	493	3.5	481	2.7	-12*
MB	Female	471	2.6	482	2.4	11*	469	3.2	469	2.6	0	468	2.9	485	2.0	17*
	Male	467	2.7	476	2.1	9*	476	2.4	459	2.4	-17*	477	2.4	480	2.0	3
ON	Female	510	3.4	510	3.7	0	509	2.8	498	3.6	-11*	508	2.6	515	3.2	7
	Male	505	2.6	509	4.1	4	512	2.9	499	3.6	-13*	512	3.1	510	3.4	-2
QC	Female	493	2.8	490	3.5	-3	488	2.5	487	3.3	-1	482	2.6	497	3.3	15*
	Male	486	2.0	484	3.3	-2	494	1.9	487	2.9	-7*	485	2.2	496	2.8	11*
NB	Female	479	2.3	480	0.2	1	486	2.6	463	0.3	-23*	470	2.6	467	0.2	-3
	Male	472	2.7	471	0.2	-1	478	2.6	457	0.3	-21*	473	3.2	459	0.2	-14*
NS	Female	498	2.6	487	0.7	-11*	493	3.0	474	0.6	-19*	488	2.3	488	0.6	0
	Male	490	2.9	486	0.5	-4	497	3.0	468	0.7	-29*	495	2.5	483	0.5	-12*
PE	Female	489	3.9	499	0.0	10*	500	3.3	481	0.0	-19*	486	3.4	486	0.0	0
	Male	494	3.5	473	0.0	-21*	501	4.1	477	0.0	-24*	497	3.6	483	0.0	-14*
NL	Female	498	3.5	483	0.5	-15*	497	3.5	466	0.6	-31*	504	4.2	479	0.4	-25*
	Male	494	3.7	481	0.4	-13*	499	2.8	466	0.6	-33*	506	3.5	480	0.4	-26*
CAN	**Female**	**503**	**1.3**	**502**	**1.8**	**-1**	**499**	**1.6**	**491**	**1.8**	**-8***	**499**	**1.3**	**503**	**1.6**	**4***
	Male	**497**	**1.7**	**498**	**1.8**	**1**	**501**	**1.2**	**489**	**1.9**	**-12***	**501**	**1.4**	**501**	**1.7**	**0**

Av. Average
SE Standard error
Dif. Difference
* Significant difference compared to the baseline year 2013 (p < .05, t-value = 1.96)
† A negative difference means that students in 2023 had lower average scores compared to students in the baseline year 2013. A positive difference means that students in 2023 had higher average scores compared to students in the baseline year 2013.

TABLE B.2.1 Comparison of average scores in reading, among provinces and with Canada

Canada and provinces	Average score	SE	Differences†											
			BC	AB	SK	MB	ON	QC	NB (EN)	NB (FR)	NS	PE	NL	CAN
BC	502	2.6		-5	17	19*	-11	-1	19*	35*	14*	3	17*	**-3**
AB	508	4.3	5		22	25*	-6	4	24*	40*	19*	8	22*	**3**
SK	486	2.6	-17	-22		3	-28*	-17	2	18*	-2	-14*	0	**-19***
MB	483	2.0	-19*	-25*	-3		-31*	-20*	-1	15*	-5	-16*	-2	**-22***
ON	514	3.2	11	6	28*	31*		11	30*	46*	26*	14*	28*	**9***
QC	503	3.4	1	-4	17	20*	-11		20*	35*	15	4	18*	**-2**
NB (EN)	484	0.0	-19*	-24*	-2	1	-30*	-20*		16*	-5*	-16*	-2	**-21***
NB (FR)	468	0.8	-35*	-40*	-18*	-15*	-46*	-35*	-16*		-21*	-32*	-18*	**-37***
NS	488	0.6	-14*	-19*	2	5	-26*	-15	5*	21*		-11*	3	**-17***
PE	500	0.0	-3	-8	14*	16*	-14*	-4	16*	32*	11*		14*	**-5***
NL	485	0.6	-17*	-22*	0	2	-28*	-18*	2	18*	-3	-14*		**-20***
CAN	**505**	**1.6**	**3**	**-3**	**19***	**22***	**-9***	**2**	**21***	**37***	**17***	**5***	**20***	

SE Standard error

* Significant difference between the province and the comparison province or between the province and Canada. The comparisons are adjusted using the Bonferroni correction as follows: ($p < .0009$, t-value = 3.32) for multicomparisons among the provinces, and ($p < .0045$, t-value = 2.84) for those between each province and Canada.

† A negative difference means that the provincial or Canadian average score (in the row) is below that of the comparison province or Canada (in the column).
A positive difference means that the provincial or Canadian average score (in the row) is above that of the comparison province or Canada (in the column).

TABLE B.2.2 Comparison of average scores in reading, among provinces and with Canada

Canada and provinces	Average score	SE	Average scores not significantly different
British Columbia	502	2.6	Alberta, Saskatchewan, Ontarion, Quebec, Prince Edward Island, **Canada**
Alberta	508	4.3	British Columbia, Saskatchewan, Ontario, Quebec, Prince Edward Island, **Canada**
Saskatchewan	486	2.6	British Columbia, Alberta, Manitoba, Quebec, New Brunswick (EN), Nova Scotia, Newfoundland and Labrador
Manitoba	483	2.0	Saskatchewan, New Brunswick (EN), Nova Scotia, Newfoundland and Labrador
Ontario	514	3.2	British Columbia, Alberta, Quebec
Quebec	503	3.4	British Columbia, Alberta, Saskatchewan, Ontario, Nova Scotia, Prince Edward Island, **Canada**
New Brunswick (EN)	484	0.0	Saskatchewan, Manitoba, Newfoundland and Labrador
New Brinswick (FR)	468	0.8	-
Nova Scotia	488	0.6	Saskatchewan, Manitoba, Quebec, Newfoundland and Labrador
Prince Edward Island	500	0.0	British Columbia, Alberta, Quebec
Newfoundland and Labrador	485	0.6	Saskatchewan, Manitoba, New Brunswick (EN), Nova Scotia
Canada	**505**	**1.6**	British Columbia, Alberta, Quebec

SE Standard error

Note: The comparisons are adjusted using the Bonferroni correction as follows: ($p < .0009$, t-value = 3.32) for multicomparisons among the provinces, and ($p < .0045$, t-value = 2.84) for those between each province and Canada.

TABLE B.2.3 Average scores in reading by language of the school system

Canada and provinces	English-language school systems			French-language school systems			Difference (EN - FR)‡
	Average score	SE	Difference (Prov - Can)†	Average score	SE	Difference (Prov - Can)†	
British Columbia	503	2.7	-4	479	0.0	-21*	24**
Alberta	508	4.3	1	485	6.4	-15	23**
Saskatchewan	486	2.7	-21*	462	0.0	-38*	25**
Manitoba	483	2.1	-24*	479	2.0	-21*	5
Ontario	516	3.4	9*	481	3.4	-19*	34**
Quebec	500	2.5	-7	504	3.7	4*	-3
New Brunswick	484	0.0	-23*	468	0.8	-32*	16**
Nova Scotia	491	0.6	-16*	438	3.8	-62*	53**
Prince Edward Island	501	0.0	-6*	-	-	-	-
Newfoundland and Labrador	485	0.6	-22*	-	-	-	-
Canada	**507**	**1.8**	**-**	**500**	**3.2**		**7**

SE Standard error
* Significant difference compared to Canada. The comparisons are adjusted using the Bonferroni correction (p < .005, t-value = 2.81).
** Significant difference within Canada or within province (p < .05, t-value = 1.96)
† A negative difference means that the average score in the province is below that of Canada. A positive difference indicates that the average score in the province is above that of Canada.
‡ A negative difference means that students in English-language school systems had a lower average score compared to students in French-language school systems. A positive difference means that students in English-language school systems had a higher average score compared to students in French-language school systems.

TABLE B.2.4 Average scores in reading by majority- and minority-language school systems

Canada and provinces	Majority-language school systems			Minority-language school systems			Difference (Maj - Min)‡
	Average score	SE	Difference (Prov - Can)†	Average score	SE	Difference (Prov - Can)†	
British Columbia	503	2.7	-4	479	0.0	-7*	24**
Alberta	508	4.3	2	485	6.4	0	23**
Saskatchewan	486	2.7	-20*	462	0.0	-24*	25**
Manitoba	483	2.1	-23*	479	2.0	-7	5
Ontario	516	3.4	9*	481	3.4	-5	34**
Quebec	504	3.7	-3	500	2.5	15*	3
New Brunswick	484	0.0	-23*	468	0.8	-18*	16**
Nova Scotia	491	0.6	-15*	438	3.8	-48*	53**
Prince Edward Island	501	0.0	-5*	-	-	-	-
Newfoundland and Labrador	485	0.6	-21*	-	-	-	-
Canada	**506**	**1.7**	**-**	**486**	**1.7**	**-**	**21**

SE Standard error
* Significant difference compared to Canada. The comparisons are adjusted using the Bonferroni correction (p < .005, t-value = 2.81).
** Significant difference within Canada or within province (p < .05, t-value = 1.96)
† A negative difference means that the average score in the province is below that of Canada. A positive difference indicates that the average score in the province is above that of Canada.
‡ A negative difference means that students in majority-language school systems had a lower average score compared to students in minority-language school systems. A positive difference means that students in majority-language school systems had a higher average score compared to students in minority-language school systems.

Table B.2.5 Average scores in reading by gender

Canada and provinces	Females			Males			Difference (F - M)‡
	Average score	SE	Difference (Prov - Can)†	Average score	SE	Difference (Prov - Can)†	
British Columbia	513	3.1	-1	493	3.1	-5	20**
Alberta	513	5.3	0	503	5.2	5	10
Saskatchewan	491	3.1	-22*	481	3.2	-17*	11**
Manitoba	490	2.3	-23*	477	2.4	-21*	14**
Ontario	520	3.5	7	508	3.7	10*	12**
Quebec	515	4.0	2	491	3.5	-6	24**
New Brunswick (EN)	493	0.0	-21*	475	0.0	-23*	18**
New Brunswick (FR)	486	0.9	-27*	451	0.9	-47*	35**
Nova Scotia	493	0.6	-20*	484	0.6	-14*	10**
Prince Edward Island	501	0.0	-13*	498	0.0	0	3**
Newfoundland and Labrador	497	0.7	-17*	475	0.5	-23*	22**
Canada	**513**	**1.8**	**-**	**498**	**1.9**	**-**	**16****

SE Standard error
* Significant difference compared to Canada. The comparisons are adjusted using the Bonferroni correction ($p < .0045$, t-value = 2.84).
** Significant difference within Canada or within province ($p < .05$, t-value = 1.96)
† A negative difference means that the average score in the province is below that of Canada. A positive difference indicates that the average score in the province is above that of Canada.
‡ A negative difference means that female students achieved a lower average score compared to male students. A positive difference means that female students achieved a higher average score compared to male students.

Table B.2.6 Comparison of reading average scores, 2010, 2013, 2016, 2019, and 2023

Canada and provinces	2010		2013		2016		2019		2023		Dif. (2013 - 2010)	Dif. (2016 - 2010)	Dif. (2019 - 2010)	Dif. (2023 - 2010)
	Av. score	SE	Av. score	SE	Av. score	SE	Av. score	SE	Av. score	SE				
British Columbia	499	1.9	502	1.7	509	2.5	499	2.3	502	2.6	3	10*	0	3
Alberta	506	2.0	502	1.9	510	1.7	506	3.3	508	4.3	-4	4	0	2
Saskatchewan	491	2.0	487	1.6	491	1.5	495	2.6	486	2.6	-4	0	3	-5
Manitoba	478	2.0	469	1.5	487	2.2	481	2.7	483	2.0	-9*	9*	3	5
Ontario	515	2.0	524	1.8	512	2.2	517	3.0	514	3.2	9*	-3	2	-1
Quebec	481	1.8	503	1.3	503	2.1	494	2.9	503	3.4	22*	22*	13*	22*
New Brunswick	479	2.0	471	1.5	489	1.8	486	0.0	479	0.2	-8*	10*	7*	0
Nova Scotia	489	2.0	488	1.6	498	1.9	500	0.4	488	0.6	-1	9*	11*	-1
Prince Edward Island	481	4.6	494	2.3	513	3.7	505	0.0	500	0.0	13*	32*	24*	19*
Newfoundland and Labrador	486	2.7	495	2.0	491	2.6	500	1.2	485	0.6	9*	5	14*	1
Canada	**500**	**1.1**	**508**	**1.0**	**507**	**1.1**	**505**	**1.4**	**505**	**1.6**	**8***	**7***	**5***	**5***

Av. Average
SE Standard error
Dif. Difference
* Significant difference compared to the adjusted baseline year 2010 ($p < .05$, t-value = 1.96)

TABLE B.2.7 Comparison of reading average scores by language of the school system, 2010, 2013, 2016, 2019, and 2023

Canada and provinces	Language	2010 Av. score	2010 SE	2013 Av. score	2013 SE	2016 Av. score	2016 SE	2019 Av. score	2019 SE	2023 Av. score	2023 SE	Dif. (2013 - 2010)	Dif. (2016 - 2010)	Dif (2019 - 2010)	Dif. (2023 - 2010)
BC	English	499	2.0	502	1.7	509	2.2	500	2.3	503	2.7	3	10*	0	4
	French	473	2.6	499	4.2	478	1.4	477	0.0	479	0.0	26*	5	4	6*
AB	English	506	2.1	503	2.1	511	2.3	506	3.4	508	4.3	-3	5	0	2
	French	490	2.7	473	2.0	481	4.4	475	3.5	485	6.4	-17*	-9	-15*	-5
SK	English	492	2.0	487	1.3	491	1.6	495	2.6	486	2.7	-5	-1	3	-6
	French	468	4.1	478	1.2	476	0.0	473	0.0	462	0.0	10*	8	4	-6
MB	English	478	2.0	469	1.4	488	1.8	482	2.7	483	2.1	-9*	10*	3	5
	French	468	2.0	471	1.6	450	2.5	457	0.0	479	2.0	3	-18*	-11*	11*
ON	English	517	2.5	526	1.8	513	2.2	519	3.2	516	3.4	9*	-4	3	-1
	French	481	1.9	481	1.6	485	2.2	468	3.0	481	3.4	0	4	-13*	0
QC	English	492	3.0	497	2.0	511	3.0	493	4.0	500	2.5	5	19*	1	8*
	French	480	1.8	504	1.7	503	2.6	494	3.1	504	3.7	24*	23*	14*	24*
NB	English	486	2.7	466	1.9	498	2.5	494	0.0	484	0.0	-20*	12*	9*	-2
	French	464	2.3	485	2.4	467	2.5	466	0.0	468	0.8	21*	3	2	4
NS	English	489	1.8	489	2.0	500	1.7	503	0.4	491	0.6	0	11*	13*	2
	French	475	1.5	468	2.0	439	5.2	449	3.3	438	3.8	-7*	-36*	-25*	-37*
PE	English	482	5.3	496	2.8	514	4.4	507	0.0	501	0.0	14*	32*	25*	19*
NL	English	486	2.6	495	2.3	491	3.1	500	1.2	485	0.6	9*	5	14*	-1
CAN	**English**	**507**	**1.1**	**510**	**1.1**	**509**	**2.5**	**509**	**1.6**	**507**	**1.8**	**3***	**2**	**3**	**0**
	French	**480**	**1.8**	**501**	**1.1**	**500**	**2.2**	**490**	**2.7**	**500**	**3.2**	**21***	**20***	**11***	**20***

Av. Average
SE Standard error
Dif. Diffrence
* Significant difference compared to the adjusted baseline year 2010 (*p* < .05, *t*-value = 1.96)

TABLE B.2.8 Comparison of reading average scores by gender, 2010, 2013, 2016, 2019, and 2023

Canada and provinces	Gender	2010 Av. score	2010 SE	2013 Av. score	2013 SE	2016 Av. score	2016 SE	2019 Av. score	2019 SE	2023 Av. score	2023 SE	Dif. (2013 - 2010)	Dif. (2016 - 2010)	Dif. (2019 - 2010)	Dif. (2023 - 2010)
BC	Female	511	2.9	518	2.1	523	3.2	515	2.5	513	3.1	7*	12*	4	2
	Male	491	2.8	486	2.4	495	3.2	484	2.9	493	3.1	-5	4	-7	2
AB	Female	516	2.8	518	2.6	528	2.8	521	4.0	513	5.3	2	12*	5	-3
	Male	497	2.3	485	2.6	496	3.2	493	3.6	503	5.2	-12*	-1	-5	6
SK	Female	504	3.0	498	2.0	500	2.3	509	3.3	491	3.1	-6	-4	5	-13*
	Male	482	2.6	476	2.7	482	2.2	482	2.7	481	3.2	-6	0	0	-1
MB	Female	494	2.8	480	2.2	499	3.0	494	3.0	490	2.3	-14*	5	0	-4
	Male	466	3.0	459	2.1	477	2.6	469	2.9	477	2.4	-7	11*	4	11*
ON	Female	530	3.1	538	2.5	526	2.3	533	3.5	520	3.5	8	-4	3	-10*
	Male	503	2.9	510	2.8	499	2.7	501	3.3	508	3.7	7	-4	-2	5
QC	Female	498	2.3	514	2.3	516	3.7	509	3.1	515	4.0	16*	18*	11*	17*
	Male	471	2.7	493	2.2	492	2.4	478	3.3	492	3.5	22*	21*	7	21*
NB	Female	501	2.5	485	2.0	506	2.4	501	0.0	491	0.2	-16*	5	1	-10*
	Male	462	3.0	459	2.6	472	2.4	471	0.0	468	0.3	-3	10*	9*	6*
NS	Female	501	2.5	499	2.7	514	2.9	514	0.4	493	0.6	-2	13*	13*	-8*
	Male	480	2.9	477	2.6	482	2.3	485	0.5	484	0.6	-3	2	5	4
PE	Female	491	6.9	509	3.0	526	4.8	516	0.0	501	0.0	18*	35*	26*	10
	Male	474	7.0	479	3.7	498	6.4	490	0.0	498	0.0	5	24*	16*	24*
NL	Female	506	3.8	503	2.4	500	2.9	519	1.1	497	0.7	-3	-6	13*	-9*
	Male	468	3.7	486	4.0	482	3.2	482	1.3	475	0.5	18*	14*	13*	7
CAN	**Female**	**515**	**1.3**	**521**	**1.1**	**521**	**1.8**	**521**	**1.7**	**513**	**1.8**	**6***	**6***	**6***	**-2**
	Male	**489**	**1.7**	**494**	**1.2**	**494**	**1.2**	**490**	**1.6**	**498**	**1.9**	**5***	**5***	**1**	**9***

Av. Average
SE Standard error
Dif. Difference
* Significant difference compared to the adjusted baseline year 2010 (*p* < .05, *t*-value = 1.96)

TABLE B.3.1 Comparison of average scores in mathematics, among provinces and with Canada

Canada and provinces	Average score	SE	Differences†											
			BC	AB	SK	MB	ON	QC	NB (EN)	NB (FR)	NS	PE	NL	CAN
BC	496	3.4		-16	14	13	-20	-25*	29*	18*	10	3	22*	-14*
AB	513	4.2	16		30*	30*	-4	-9	45*	35*	27*	20*	38*	3
SK	482	2.7	-14	-30*		-1	-34*	-39*	15*	4	-4	-11	8	-28*
MB	483	1.8	-13	-30*	1		-33*	-39*	16*	5	-3	-10*	8*	-27*
ON	516	4.2	20	4	34*	33*		-5	49*	38*	30*	23*	42*	7
QC	522	3.8	25*	9	39*	39*	5		54*	44*	36*	29*	47*	12*
NB (EN)	467	0.0	-29*	-45*	-15*	-16*	-49*	-54*		-11*	-19*	-26*	-7*	-42*
NB (FR)	478	0.9	-18*	-35*	-4	-5	-38*	-44*	11*		-8*	-15*	3	-32*
NS	486	0.7	-10	-27*	4	3	-30*	-36*	19*	8*		-7*	11*	-24*
PE	493	0.0	-3	-20*	11	10*	-23*	-29*	26*	15*	7*		18*	-17*
NL	475	0.4	-22*	-38*	-8	-8*	-42*	-47*	7*	-3	-11*	-18*		-35*
CAN	**510**	**1.9**	**14***	**-3**	**28***	**27***	**-7**	**-12***	**42***	**32***	**24***	**17***	**35***	

SE Standard error

* Significant difference between the province and the comparison province or between the province and Canada. The comparisons are adjusted using the Bonferroni correction as follows: ($p < .0009$, t-value = 3.32) for multicomparisons among the provinces, and ($p < .0045$, t-value = 2.84) for those between each province and Canada.

† A negative difference means that the provincial or Canadian average score (in the row) is below that of the comparison province or Canada (in the column). A positive difference means that the provincial or Canadian average score (in the row) is above that of the comparison province or Canada (in the column).

TABLE B.3.2 Comparison of average scores in mathematics, among provinces and with Canada

Canada and provinces	Average score	SE	Average scores not significantly different
British Columbia	496	3.4	Alberta, Saskatchewan, Manitoba, Ontario, Nova Scotia, Prince Edward Island
Alberta	513	4.2	British Columbia, Ontario, Quebec, **Canada**
Saskatchewan	482	2.7	British Columbia, Manitoba, New Brunswick (FR), Nova Scotia, Prince Edward Island, Newfoundland and Labrador
Manitoba	483	1.8	British Columbia, Saskatchewan, New Brunswick (FR), Nova Scotia
Ontario	516	4.2	British Columbia, Alberta, Quebec, **Canada**
Quebec	522	3.8	Alberta, Ontario
New Brunswick (EN)	467	0.0	-
New Brunswick (FR)	478	0.9	Saskatchewan, Manitoba, Newfoundland and Labrador
Nova Scotia	486	0.7	British Columbia, Saskatchewan, Manitoba
Prince Edward Island	493	0.0	British Columbia, Saskatchewan
Newfoundland and Labrador	475	0.4	Saskatchewan, New Brunswick (FR)
Canada	**510**	**1.9**	Alberta, Ontario

SE Standard error

Note: The comparisons are adjusted using the Bonferroni correction as follows: ($p < .0009$, t-value = 3.32) for multicomparisons among the provinces, and ($p < .0045$, t-value = 2.84) for those between each province and Canada.

TABLE B.3.3 Average scores in mathematics by language of the school system

Canada and provinces	English-language school systems			French-language school systems			Difference (EN - FR)‡
	Average score	SE	Difference (Prov - Can)†	Average score	SE	Difference (Prov - Can)†	
British Columbia	496	3.4	-11*	502	0.0	-18*	-6
Alberta	513	4.3	6	514	7.2	-6	-2
Saskatchewan	483	2.7	-24*	468	0.0	-52*	15**
Manitoba	483	1.9	-24*	497	2.1	-23*	-14**
Ontario	516	4.4	10*	516	4.0	-4	1
Quebec	515	3.2	8	522	4.2	2	-7
New Brunswick	467	0.0	-39*	478	0.9	-42*	-11**
Nova Scotia	486	0.6	-21*	485	4.8	-35*	1
Prince Edward Island	493	0.0	-14*	-	-	-	-
Newfoundland and Labrador	474	0.4	-33*	-	-	-	-
Canada	**507**	**2.2**	**-**	**520**	**3.6**	**-**	**-13****

SE Standard error
* Significant difference compared to Canada. The comparisons are adjusted using the Bonferroni correction ($p < .005$, t-value = 2.81).
** Significant difference within Canada or within province ($p < .05$, t-value = 1.96)
† A negative difference means that the average score in the province is below that of Canada. A positive difference indicates that the average score in the province is above that of Canada.
‡ A negative difference means that students in English-language school systems had a lower average score compared to students in French-language school systems. A positive difference means that students in English-language school systems had a higher average score compared to students in French-language school systems.

TABLE B.3.4 Average scores in mathematics by majority- and minority-language school systems

Canada and provinces	Majority-language school systems			Minority-language school systems			Difference (Maj - Min)‡
	Average score	SE	Difference (Prov - Can)†	Average score	SE	Difference (Prov - Can)†	
British Columbia	496	3.4	-14*	502	0.0	-7*	-6
Alberta	513	4.3	3	514	7.2	5	-2
Saskatchewan	483	2.7	-27*	468	0.0	-41*	15**
Manitoba	483	1.9	-27*	497	2.1	-13*	-14**
Ontario	516	4.4	7	516	4.0	6	1
Quebec	522	4.2	12*	515	3.2	6	7
New Brunswick	467	0.0	-43*	478	0.9	-31*	-11**
Nova Scotia	486	0.6	-24*	485	4.8	-24*	1
Prince Edward Island	493	0.0	-17*	-	-	-	-
Newfoundland and Labrador	474	0.4	-36*	-	-	-	-
Canada	**510**	**2.0**	**-**	**509**	**2.1**	**-**	**0**

SE Standard error
* Significant difference compared to Canada. The comparisons are adjusted using the Bonferroni correction ($p < .005$, t-value = 2.81).
** Significant difference within Canada or within province ($p < .05$, t-value = 1.96)
† A negative difference means that the average score in the province is below that of Canada. A positive difference indicates that the average score in the province is above that of Canada.
‡ A negative difference means that students in majority-language school systems had a lower average score compared to students in minority-language school systems. A positive difference means that students in majority-language school systems had a higher average score compared to students in minority-language school systems.

TABLE B.3.5 Average scores in mathematics by gender

Canada and provinces	Females			Males			Difference (F - M)‡
	Average score	SE	Difference (Prov - Can)†	Average score	SE	Difference (Prov - Can)†	
British Columbia	493	3.6	-11	499	4.1	-16*	-6
Alberta	505	5.2	1	519	4.9	4	-14**
Saskatchewan	473	3.0	-31*	492	3.3	-24*	-18**
Manitoba	476	2.1	-28*	489	2.1	-26*	-14**
Ontario	507	5.1	3	526	4.2	10*	-19**
Quebec	522	4.6	18*	521	3.9	6	1
New Brunswick (EN)	461	0.0	-43*	473	0.0	-42*	-12**
New Brunswick (FR)	478	0.9	-26*	478	1.1	-37*	0
Nova Scotia	480	0.6	-24*	491	0.8	-24*	-11**
Prince Edward Island	490	0.0	-14*	497	0.0	-19*	-7**
Newfoundland and Labrador	469	0.5	-35*	479	0.5	-36*	-10**
Canada	**504**	**2.4**	**-**	**515**	**2.0**	**-**	**-11****

SE Standard error
* Significant difference compared to Canada. The comparisons are adjusted using the Bonferroni correction ($p < .045$, t-value = 2.84).
** Significant difference within Canada or within province ($p < .05$, t-value = 1.96).
† A negative difference means that the average score in the province is below that of Canada. A positive difference indicates that the average score in the province is above that of Canada.
‡ A negative difference means that female students achieved a lower average score compared to male students. A positive difference means that female students achieved a higher average score compared to male students.

TABLE B.3.6 Comparison of mathematics average scores, 2010, 2013, 2016, 2019, and 2023

Canada and provinces	2010		2013		2016		2019		2023		Dif. (2013 - 2010)	Dif. (2016 - 2010)	Dif. (2019 - 2010)	Dif. (2023 - 2010)
	Av. score	SE	Av. score	SE	Av. score	SE	Av. score	SE	Av. score	SE				
BC	481	1.8	489	1.6	494	1.7	490	2.8	496	3.4	8*	13*	8*	15*
AB	495	2.0	502	2.0	505	1.7	507	4.0	513	4.2	7*	10*	11*	17*
SK	474	1.9	488	2.0	483	1.5	481	3.0	482	2.7	14*	9*	7	8*
MB	468	2.1	471	1.7	479	2.2	475	2.8	483	1.8	3	11*	7*	16*
ON	507	2.0	512	1.8	508	1.9	512	3.9	516	4.2	5	1	5	9
QC	515	2.0	527	1.5	541	1.9	537	3.5	522	3.8	12*	26*	22*	7
NB	478	2.0	480	1.8	498	1.7	493	0.0	470	0.3	2	20*	14*	-8*
NS	474	2.0	488	1.7	497	1.4	498	0.5	486	0.7	14*	23*	24*	12*
PE	460	4.2	492	1.9	503	3.4	497	0.0	493	0.0	32*	43*	37*	33*
NL	472	2.7	487	2.4	490	2.1	480	1.2	475	0.4	15*	18*	8*	3
CAN	**500**	**1.1**	**507**	**1.0**	**511**	**1.1**	**510**	**1.8**	**510**	**1.9**	**7***	**11***	**10***	**10***

Av. Average
SE Standard error
* Significant difference compared to the baseline year 2010 ($p < .05$, t-value = 1.96)

TABLE B.3.7 Comparison of mathematics average scores by language of the school system, 2010, 2013, 2016, 2019, and 2023

Canada and provinces	Language	2010 Av. score	2010 SE	2013 Av. score	2013 SE	2016 Av. score	2016 SE	2019 Av. score	2019 SE	2023 Av. score	2023 SE	Dif. (2013 - 2010)	Dif. (2016 - 2010)	Dif. (2019 - 2010)	Dif. (2023 - 2010)
BC	English	481	1.9	489	1.7	494	2.0	489	2.8	496	3.4	8*	13*	8*	15*
	French	504	2.6	513	3.1	516	1.3	523	0.0	502	0.0	9*	12*	19*	-1
AB	English	495	2.0	502	2.0	505	1.6	506	4.1	513	4.3	7*	10*	11*	17*
	French	504	2.7	502	1.8	506	3.7	515	3.6	514	7.2	-2	2	10*	10
SK	English	474	2.0	487	1.7	483	1.6	481	3.0	483	2.7	13*	9*	7	9*
	French	498	3.6	518	1.1	501	0.0	509	0.0	468	0.0	20*	3	11*	-30*
MB	English	467	2.2	470	1.3	479	1.7	474	2.9	483	1.9	3	12*	7*	15*
	French	480	1.8	476	1.5	474	2.8	480	0.0	497	2.1	-4	-6	1	16*
ON	English	507	2.4	512	1.5	507	1.9	512	4.1	516	4.4	5	0	5	10*
	French	511	1.9	500	2.0	528	1.9	516	3.4	516	4.0	-11*	17*	5	5
QC	English	507	3.4	509	2.0	522	2.4	518	4.4	515	3.2	2	15*	11*	8
	French	516	1.8	529	1.8	543	2.2	540	3.9	522	4.1	13*	27*	23*	6
NB	English	466	2.5	470	2.0	489	2.3	479	0.0	467	0.0	4	23*	13*	1
	French	507	2.7	507	2.9	521	2.3	525	0.0	478	0.9	0	14*	18*	-29*
NS	English	473	2.2	488	2.1	497	1.6	498	0.4	486	0.6	15*	24*	25*	13*
	French	503	1.6	499	1.9	507	4.8	501	6.2	485	4.8	-4	4	-2	-18*
PE	English	460	5.2	492	2.2	503	4.0	497	0.0	493	0.0	32*	43*	37*	33*
NL	English	472	2.7	487	2.4	490	2.5	480	1.2	474	0.4	15*	18*	8*	2
CAN	**English**	**495**	**1.2**	**501**	**1.0**	**502**	**1.2**	**503**	**1.9**	**507**	**2.2**	**6***	**7***	**8***	**12***
	French	**515**	**1.9**	**526**	**1.5**	**540**	**1.5**	**536**	**2.5**	**520**	**3.6**	**11***	**25***	**21***	**5**

Av. Average
SE Standard error
Dif. Difference
* Significant difference compared to the baseline year 2010 (*p* < .05, *t*-value = 1.96)

TABLE B.3.8 Comparison of mathematics average scores by gender, 2010, 2013, 2016, 2019, and 2023

Canada and provinces	Gender	2010 Av. score	2010 SE	2013 Av. score	2013 SE	2016 Av. score	2016 SE	2019 Av. score	2019 SE	2023 Av. score	2023 SE	Dif. (2013 - 2010)	Dif. (2016 - 2010)	Dif. (2019 - 2010)	Dif. (2023 - 2010)
BC	Female	475	2.5	491	2.2	497	2.4	487	2.9	493	3.6	16*	22*	11*	18*
	Male	490	2.8	487	2.2	492	3.2	493	3.2	499	4.1	-3	2	2	9
AB	Female	491	2.5	504	2.6	507	2.1	504	4.3	505	5.2	13*	16*	13*	14*
	Male	500	2.5	499	2.7	504	2.7	509	4.4	519	4.9	-1	4	8	19*
SK	Female	475	2.7	487	2.4	478	2.1	478	3.1	473	3.0	12*	3	3	-1
	Male	477	2.5	488	3.3	488	2.4	484	3.6	492	3.3	11*	11*	7	15*
MB	Female	468	2.6	470	1.9	478	2.7	470	2.9	476	2.1	2	10*	3	8*
	Male	470	3.0	471	2.1	480	2.3	478	3.6	489	2.1	1	10*	8	19*
ON	Female	509	3.1	511	2.7	508	2.6	510	4.2	507	5.1	2	-1	1	-2
	Male	508	2.9	514	2.9	508	2.6	514	4.4	526	4.2	6	0	6	18*
QC	Female	513	2.4	528	2.5	539	2.8	537	4.0	522	4.6	15*	26*	24*	9
	Male	523	2.8	526	1.7	543	3.0	537	4.0	521	3.9	3	20*	15*	-2
NB	Female	486	3.0	483	2.2	500	2.1	495	0.0	466	0.3	-3	14*	9*	-20*
	Male	473	2.7	477	2.6	496	2.5	490	0.0	475	0.3	4	23*	17*	1
NS	Female	478	2.4	489	2.0	498	2.3	498	0.6	480	0.6	11*	20*	19*	2
	Male	473	3.0	487	2.2	496	2.2	498	0.6	491	0.8	14*	23*	25*	19*
PE	Female	453	5.7	498	3.0	502	6.2	498	0.0	490	0.0	45*	49*	45*	37*
	Male	468	6.0	485	3.7	504	6.0	496	0.0	497	0.0	17*	36*	28*	29*
NL	Female	476	3.3	489	2.5	488	2.6	483	1.3	469	0.5	13*	12*	7*	-6
	Male	471	4.1	484	3.4	491	2.8	477	1.6	479	0.5	13*	20*	6	9*
CAN	**Female**	**499**	**1.5**	**507**	**1.0**	**511**	**1.4**	**508**	**2.0**	**504**	**2.4**	**8***	**12***	**9***	**5**
	Male	**504**	**1.5**	**507**	**1.5**	**512**	**1.5**	**511**	**2.1**	**515**	**2.0**	**3**	**8***	**7***	**11***

Av. Average
SE Standard error
Dif. Difference
* Significant difference compared to the baseline year 2010 ($p < .05$, t-value = 1.96)

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