Measuring up: Canadian Results of the OECD PISA Study

The Performance of Canada's Youth in Mathematics, Reading and Science

2012 First Results for Canadians Aged 15

cmec

Canada

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Andrew Parkin
Director General
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Introduction

The skills and knowledge that individuals bring to their jobs, to further studies, and to our society play an important role in determining our economic success and our overall quality of life. Today's knowledge-based economy — driven by advances in information and communication technologies, reduced trade barriers, and the globalization of markets — has precipitated changes in the type of competencies that the present and future economy requires. This includes a rising demand for a core set of foundational skills upon which further learning is built.

Education systems play a central role in laying a solid base upon which subsequent knowledge and skills can be developed. Students leaving secondary education without strong basic competencies may experience difficulty accessing the postsecondary education system and the labour market, and they may benefit less when learning opportunities are presented later in life. Without the tools needed to be effective learners throughout their lives, these individuals with limited skills risk economic and social marginalization.

Governments in industrialized countries have devoted large portions of their budgets to providing high-quality schooling. Given these investments, they are interested in the relative effectiveness of their education systems. To address these issues, member countries of the Organisation for Economic Co-operation and Development (OECD), along with partner countries and economies,[1] developed a common tool to improve their understanding of what makes young people — and education systems as a whole — successful. This tool is the Programme for International Student Assessment (PISA), which seeks to measure the extent to which youth, at age 15, have acquired some of the knowledge and skills that are essential for full participation in modern societies.

The Programme for International Student Assessment

PISA is a collaborative effort among member countries of the OECD. PISA is designed to provide policy-oriented international indicators of the skills and knowledge of 15-year-old students and shed light on a range of factors that contribute to successful students, schools, education systems, and learning environments.[2] It measures skills that are generally recognized by participating countries as key outcomes of the educational process. The assessment focuses on young people's ability to use their knowledge and skills to meet real-life challenges. These skills are believed to be prerequisites for efficient learning in adulthood and full participation in society.

Information gathered through PISA enables a thorough comparative analysis of the performance of students near the end of their compulsory education. PISA also permits exploration of the ways that achievement varies across different social and economic groups, and the factors that influence achievement within and among countries.

[1] From this point forward, the term "countries" will be used to denote "countries and economies."

[2] OECD. (2013). *PISA 2012 Assessment and analytical framework: Mathematics, reading, science, problem solving and financial literacy*, Paris: Author. Retrieved from http://www.oecd.org/pisa/pisaproducts/PISA%202012%20framework%20e-book_final.pdf.

Over the past decade, PISA has brought significant public and educational attention to international assessments and related studies by generating data that enhance the ability of policy makers to formulate decisions based on evidence. Canadian provinces have used information gathered from PISA, along with such other sources of information as the Pan-Canadian Assessment Program (PCAP),[3] other international assessments, and their own provincial assessment programs, to inform various education-related initiatives. In Canada, PISA is carried out through a partnership consisting of Employment and Social Development Canada (ESDC), the Council of Ministers of Education, Canada (CMEC), and Statistics Canada.

The project began in 2000 and focuses on the capabilities of 15-year-olds as they near the end of compulsory education. It reports on mathematical, reading, and scientific literacy every three years, and selects one of those domains for more detailed study. In 2012 the focus is on mathematical literacy.

Why did Canada participate in PISA?

Canada's participation in PISA stems from many of the same questions motivating other participating countries. In Canada, provinces and territories invest significant public resources in the provision of elementary and secondary education, and Canadians are interested in the outcomes of learning. How can resources be directed to the achievement of higher levels of knowledge and skills upon which lifelong learning is founded, and to the potential reduction of social inequality?

Elementary and secondary education systems play a key role in providing students with the knowledge and skills that form the foundation necessary to further develop human capital, either through participation in the workforce, postsecondary education, or lifelong learning. Previous studies based on PISA data have shown the relationship between strong skills in the core subject areas at age 15 and outcomes in later life. Youth with strong reading skills were much more likely to finish high school and complete postsecondary education. For example, results from the Youth in Transition Survey (YITS) show that there is a strong association between reading proficiency and educational attainment. Canadian students in the bottom quartile of PISA reading scores were much more likely to drop out of secondary school and less likely to have completed a year of postsecondary education than those in the highest quartile of reading scores. In contrast, Canadian students in the top PISA level of reading performance were 20 times more likely to go to university than those in the lowest PISA level.[4]

Questions about educational effectiveness can be partly answered with data on the average performance of Canada's youth in key subject areas. However, two other questions with respect to equity can only be answered by examining the distribution of competencies: Who are the students at the lowest levels? Do certain groups or regions appear to be at greater risk? These are important questions because, among other things, acquisition of knowledge and skills during compulsory schooling influences access to postsecondary education, eventual success in the labour market, and the effectiveness of continuous, lifelong learning.

[3] CMEC. (2008). *PCAP-13 2007 Report on the assessment of 13-year-olds in reading, mathematics, and science*. Toronto: Author.
[4] OECD. (2010). *Pathways to success: How knowledge and skills at age 15 shape future lives in Canada*. Paris: Author.

What is PISA 2012?

PISA 2012 is the fifth cycle of PISA to be completed, and it focuses on mathematical literacy. While mathematics was also assessed in previous PISA cycles, it was the major focus only in 2003. Students who participated in PISA 2012 entered primary school at about the time of the 2003 survey, and thus the 2012 results provide an opportunity to relate policy changes undertaken in 2003 to changes in learning outcomes. With an emphasis on mathematics, PISA 2012 reports on general mathematical literacy as well as four content knowledge areas (*Change and Relationships; Space and Shape; Quantity;* and *Uncertainty and Data*) and three process areas (*Formulating* situations mathematically; *Employing* mathematical concepts, facts, procedures, and reasoning; and *Interpreting*, applying, and evaluating mathematical outcomes). As minor domains in PISA 2012, reading and science are only measured at an overall, rather than detailed, level.

Until now, PISA in Canada has been implemented through a paper-based assessment. However, PISA 2012 also includes a computer-based assessment of problem solving, reading, and mathematics[5]. The 2009 reading framework and the 2012 mathematics and problem-solving frameworks include electronic assessments and expand the definition of 'PISA literacies' beyond what can be measured by a traditional paper-and-pencil test. PISA recognizes the pervasiveness of computer-based tools in the workplace and everyday life in the 21st century. This design feature of PISA 2012 represents a transition, as PISA 2015 will move to a fully computer-based mode of administration.

Sixty-five countries participated in PISA 2012, including all 34 OECD countries.[6] Between 5,000 and 10,000 students aged 15 from at least 150 schools were typically tested in each country. In Canada, approximately 21,000 15-year-olds from about 900 schools participated across the ten provinces.[7]

The large Canadian sample was required to produce reliable estimates representative of each province, and of both francophone and anglophone school systems in Nova Scotia, New Brunswick, Quebec, Ontario, Manitoba, Alberta, and British Columbia. It should be noted that PISA was administered in English or French according to the respective school system.

The assessment was administered in schools, during regular school hours in April and May 2012. It was a two-hour paper-and-pencil test. In addition, an 80-minute computer-based assessment was administered to a subset of students in either mathematics, reading, or problem solving. All students also completed a 30-minute background questionnaire providing information about themselves and their home, while school principals completed a 20-minute questionnaire about their schools. As part of PISA 2012, national options could also be implemented. Canada chose to add a 20-minute student questionnaire as a national component to collect more information on the school experiences of 15-year-olds, their work activities, their relationships with others, and their attitudes toward trades.

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5 Results of the problem-solving component will be released later by OECD.

6 OECD countries include: Australia, Austria, Belgium, Canada, Chile, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Korea, Luxembourg, Mexico, the Netherlands, New Zealand, Norway, Poland, Portugal, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey, United Kingdom, and United States.
Partner countries are: Albania, Argentina, Brazil, Bulgaria, Chinese Taipei, Colombia, Costa Rica, Croatia, Cyprus, Hong Kong-China, Indonesia, Jordan, Kazakhstan, Latvia, Liechtenstein, Lithuania, Macao-China, Malaysia, Montenegro, Peru, Qatar, Romania, Russian Federation, Serbia, Shanghai-China, Singapore, Thailand, Tunisia, United Arab Emirates, Uruguay, and Vietnam.

7 No data were collected in the three territories and in First Nations schools. Further information on sampling procedures and response rates for Canada can be found in Appendix A.

Overview of PISA 2012		
	International	Canada
Participating jurisdictions	• 65 countries and economies	• 10 provinces
Population	• Youth aged 15	• Same
Number of participating students	• Between 5,000 and 10,000 per country with some exceptions for a total of around 470,000	• Approximately 21,000
Domains	• Major: paper-based mathematics • Minor: paper-based reading and science • Computer-based problem solving	• Same
Languages in which the test was administered	• 47 languages	• English and French
Assessment	• Two hours of assessments of mathematics, reading, and science • Forty-minute computer-based assessment of problem solving • A contextual questionnaire administered to students • A school questionnaire administered to school principals	• Same
International options	• Ten-minute optional questionnaire on information technology and communications administered to students • Ten-minute optional questionnaire on educational career administered to students • Twenty-minute optional questionnaire administered to parents • Forty-minute optional electronic reading and mathematics assessment • Grade-based sampling • One-hour optional assessment of financial literacy • One-hour booklet directed at assessment of lower-level skills	• Forty-minute optional electronic reading and mathematics assessment • Ten-minute optional questionnaire on educational career administered to students
National options	• Other options were undertaken in a limited number of countries	• Ten-minute questionnaire administered to students regarding their attitudes towards working in the trades

Objectives and organization of the report

This report provides the initial results from the PISA 2012 assessment for Canada and the provinces. It presents the national and provincial results in mathematics, reading, and science, and complements the information presented in the PISA 2012 International report.[8] Results are compared to other participating countries, and across Canadian provinces.

Chapter 1 provides information on the performance of Canadian 15-year-old students on the PISA 2012 assessment in mathematics, covering both the paper-based and computer-based assessments. Chapter 2 presents results on the performance of Canada and the provinces in the minor domains of reading (paper-based and computer-based) and science. Finally, the major findings and opportunities for further study are discussed in the conclusion.

[8] The PISA 2012 international report is released in five volumes. Results presented in this report correspond to results presented in Volume 1, OECD. (2013). *What Students Know and Can Do: Student Performance in Mathematics, Reading and Science.* Paris: Author.

Chapter 1

The performance of Canadian students in mathematics in an international context

This chapter presents results of the PISA 2012 assessment in the major domain of mathematics in terms of average scores and proficiency levels for both the paper-based and computer-based components. First, the performance of Canadian 15-year-old students is compared to the performance of 15-year-olds from the other participating countries. Results are presented for Canada overall and by province, both for mathematics overall and by the sub-domains of mathematics (processes and content areas) for the paper-based component. The Canadian results are then described in terms of the six PISA proficiency levels for mathematics.

Next, the report presents the performance of students enrolled in anglophone and francophone school systems for those provinces in which the two groups were sampled separately, and compares the performance in mathematics of Canadian students by gender. It follows this with results from the new computer-based assessment of mathematics. These are presented by province and by gender, as well as in aggregate with the paper-based component for a combined score denoted as "composite mathematics." Finally, change in mathematics performance over time is also discussed.

Defining mathematics

In the PISA context, "mathematics" denotes "mathematical literacy," which implies a focus on students' active engagement in mathematics and their preparedness for life in a modern society. As such, it is expected that students can demonstrate their capacity to use mathematical content and language in contexts that are appropriate for 15-year-olds, when they are close to the end of their formal mathematics training.

Mathematical literacy is defined as: "… an individual's capacity to formulate, employ, and interpret mathematics in a variety of contexts. It includes reasoning mathematically and using mathematical concepts, procedures, facts, and tools to describe, explain, and predict phenomena. It assists individuals to recognize the role that mathematics plays in the world and to make the well-founded judgments and decisions needed by constructive, engaged and reflective citizens."[9]

The mathematics framework was originally developed for PISA 2000 and further articulated in 2003, when mathematics was the major domain. It has kept its essential features since then, which allows reporting on trends in performance over time. However, in 2012 two major improvements were made to the 2003 framework: 1) the articulation of "processes" in which students engage when solving mathematical problems, and their inclusion as a distinct reporting category; and 2) the new, optional computer-based assessment of mathematics in which 32 countries, including Canada, participated. These two elements do not jeopardize the possibility of reporting on trends in mathematics performance because they expand the information that was already available in PISA 2003.

[9] OECD. (2013). *PISA 2012 Assessment and analytical framework: Mathematics, reading, science, problem solving and financial literacy*. Paris: Author.

Three mathematical processes are used in PISA 2012 to describe what individuals do to integrate the context of a problem with mathematics to solve it. These processes are as follows:

- *Formulating* situations mathematically: being able to recognize and identify opportunities to use mathematics and then provide mathematical structure to a problem presented in some contextualized form by translating it into a mathematical form.
- *Employing* mathematical concepts, facts, procedures, and reasoning: being able to employ these elements to solve mathematically formulated problems.
- *Interpreting*, applying, and evaluating mathematical outcomes: being able to reflect upon mathematical solutions, results, or conclusions and interpret them in the context of real-life problems.

Although students use all these processes together when solving mathematical problems, each item on the PISA assessment is assigned to one of them only, for reporting purposes. Overall, approximately half of the score points are assigned to the process of *Employing,* with the other half divided equally between *Formulating* and *Interpreting*.

As was the case in 2003, the mathematical content knowledge is organized around four broad content areas central to the discipline. Although their definitions and delineations may vary, these are also consistent with the way provincial curricula, as well as provincial, pan-Canadian[10] and other international assessments,[11] are organized. These broad content categories are as follows:

- *Change and Relationships* involves the study of temporary and permanent relationships among phenomena, where changes occur within systems of interrelated objects or phenomena when the elements influence one another. This requires understanding fundamental types of change and recognizing when they occur, in order to use suitable mathematical models to describe and predict change. Mathematically this means modelling the change and relationships with appropriate functions, as well as creating, interpreting, and translating symbolic and graphical representations of relationships. Aspects of the traditional mathematical content of functions and algebra, including symbolic expressions, tables, and graphical representations, are central in describing, modelling, and interpreting change.
- *Space and Shape* relates to visual phenomena that are encountered everywhere in our world: patterns, properties of objects, positions and orientations, representations of objects, decoding and encoding of visual information, navigation, and dynamic interaction with real shapes and representations. From a curricular and a pedagogical perspective, it is worth noting that concepts of geometry serve as an essential foundation for *Space and Shape*. Mathematical literacy in the area of *Space and Shape* involves a range of activities, such as understanding perspective: for example, perspective is required in painting, creating and reading maps, transforming shapes using technology, interpreting views of three-dimensional scenes from various perspectives, and constructing representations of shapes.
- *Quantity* incorporates the quantification of phenomena, relationships, situations, and entities in the world; understanding representations of those quantifications; and judging interpretations and arguments based on quantity. To engage with the quantification of the world involves understanding measurements, counts, indicators, relative size, and numerical trends and patterns. Mathematical literacy in the area of *Quantity* relies heavily on knowledge and processes related to numbers, applied in a wide variety of settings.

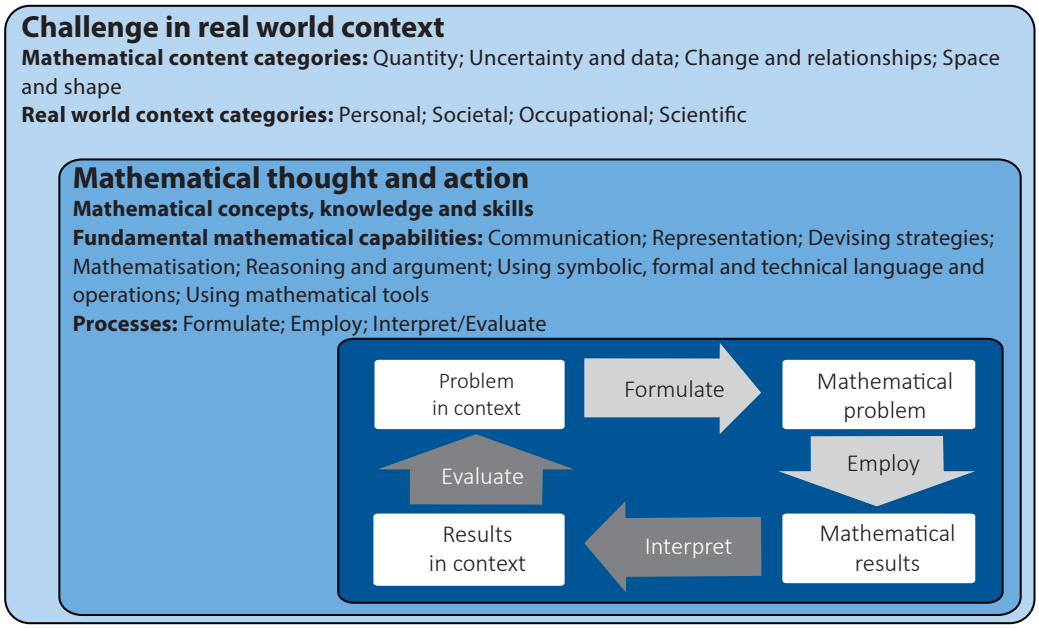
[10] CMEC. (2011). *PCAP 2010: Report on the pan-Canadian assessment of mathematics, science, and reading.* Toronto: Author.
[11] Mullis, I., Martin, M., Ruddock, G., O'Sullivan, C. and Preuschoff, C. (2009). *TIMSS Assessment Frameworks*. Chestnut Hill, MA: Boston College.

- *Uncertainty and Data* involves recognizing the place of variation in processes, having a sense of the quantification of that variation, acknowledging uncertainty and error in measurement, and knowing about chance. In the traditional areas of probability and statistics, it provides means of describing, modelling, and interpreting uncertainty phenomena, and of making inferences. It further includes a knowledge of numbers and certain aspects of algebra, such as graphs and symbolic representation, with a focus on data interpretation and presentation.

These four content categories are equally weighted on the PISA assessment. In addition, each item is set in one of four contexts also equally balanced throughout the assessment: personal, occupational, societal, and scientific.

As part of the PISA 2012 mathematics framework, a set of seven fundamental mathematical capabilities has also been identified that underpins performance in mathematics: Communication; Representation; Devising strategies; Mathematisation; Reasoning and argument; Using symbolic, formal and technical language and operations; and Using mathematical tools.[12] These cognitive capabilities are required to understand and engage with the world in a mathematical way. They are embedded in all the content categories, and are used to varying degrees in each of the three mathematical processes defined in the reporting.

The main features of the PISA 2012 mathematics framework are presented in the illustration below.



(Source: *PISA 2012 Assessment and Analytical Framework*)

The PISA scores for mathematics are expressed on a scale with an average of 500 points and a standard deviation of 100. This was the average score attained across OECD countries in 2003; in 2012 the OECD average was 494.[13] This means that overall, across OECD countries, a slight deterioration of mathematical proficiency can be observed over the past nine years. Approximately two-thirds of all students in OECD countries scored between 394 and 594 (i.e., within one standard deviation of the average) on the PISA 2012 assessment.

[12] *PISA 2012 Assessment and analytical framework: Mathematics, reading, science, problem solving and financial literacy* for further explanation.
[13] Further details on the interpretation of change over time are provided in a separate section of this report.

International studies such as PISA summarize student performance by comparing the relative standing of countries based on their average test scores. Care must be taken when comparing countries' relative positioning based on their average scores because there is a margin of uncertainty associated with each score. When interpreting average performances, only those differences between countries that are statistically significant should be taken into account.

A note on statistical comparisons

The results in PISA were computed from the scores of random samples of students from each country, and not from the population of all students in each country. Consequently, it cannot be said with certainty that a sample average has the same value as the population average that would have been obtained had all 15-year-old students been assessed. Additionally, a degree of uncertainty is associated with the scores describing student performance, 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 error and measurement error. The standard error can be used to construct a confidence interval, which provides a means of making inferences about the population averages and proportions in a manner that reflects the uncertainty associated with sample estimates. A 95% confidence interval is used in this report and represents a range of plus or minus about two standard errors around the sample average. Using this confidence interval it can be inferred that the population mean or proportion would lie within the confidence interval in 95 out of 100 replications of the measurement, using different samples randomly drawn from the same population.

When comparing scores among countries, provinces, or population subgroups the degree of uncertainty in each average should be considered in order to determine if averages are truly 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 actual differences are likely to be observed 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 countries and provinces, extensive use is made of this type of statistical test to reduce the likelihood that differences due to sampling or measurement errors will be interpreted as real.

Only statistically significant differences at the .05 level are noted in this report, unless otherwise stated. If the confidence intervals overlap, the differences are defined as not statistically significant. When the confidence intervals overlapped marginally, an additional test of significance (t-test) was conducted in order to determine whether the difference was statistically significant. In case of multiple t-tests, no corrections were made to reduce the false positive, or Type-I error rate.

Finally, when comparing results over time, the standard error includes a linking error to account for the fact that different cohorts of students have been tested over time with a test that also varied slightly over time.

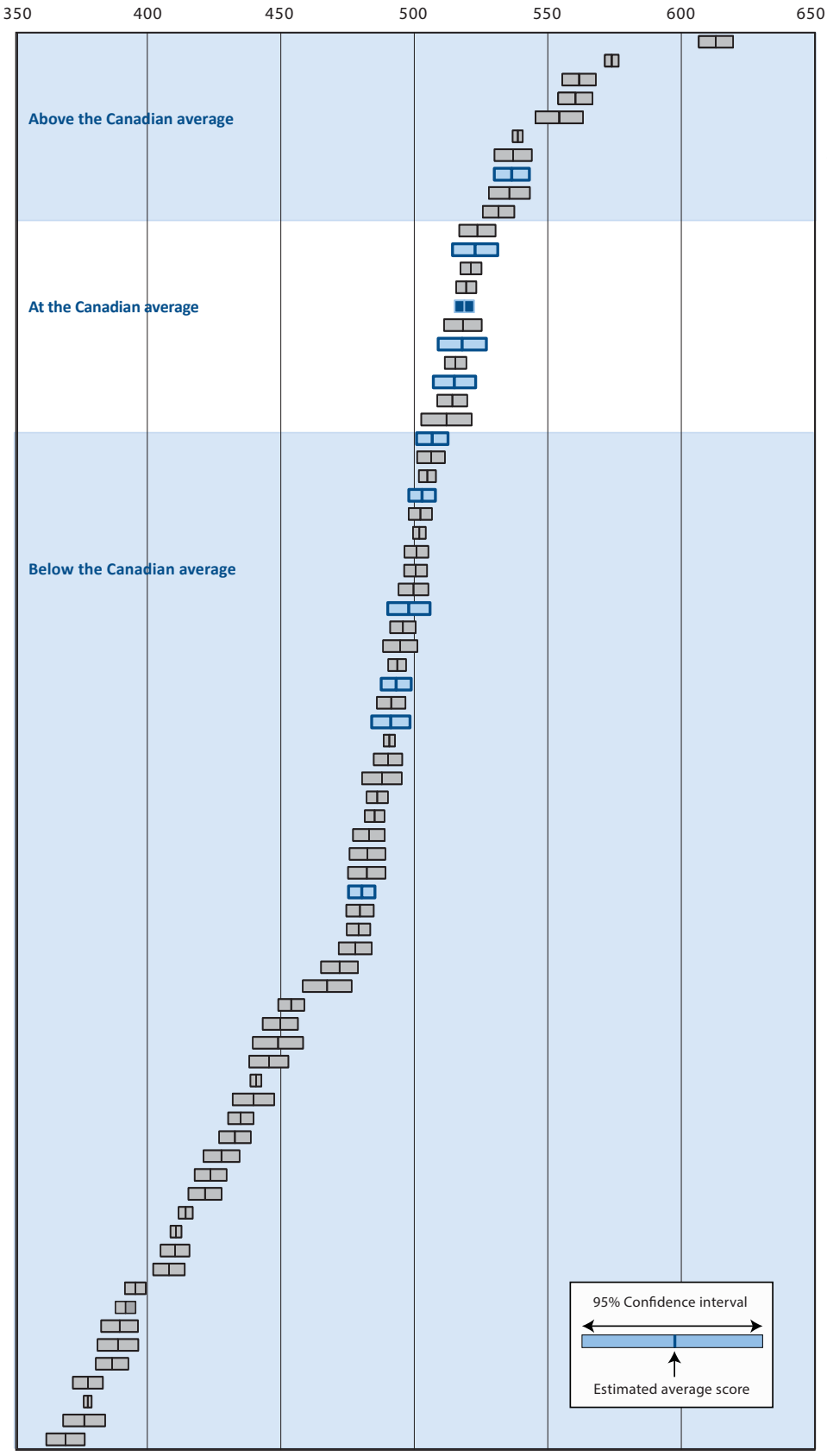
Canadian students continue to perform well in mathematics in a global context

Overall, Canadian 15-year-old students achieved a mean score of 518, which is 24 points above the OECD average. As illustrated in Figure 1.1,[14] Canada was outperformed by only Korea, Japan, and Switzerland among OECD countries. Among all 65 participating countries, nine performed better than Canada. Table 1.1 lists those countries performing significantly better than or as well as Canada on the overall mathematics scale, and on each mathematical process and content subscale (with all remaining countries that took part in PISA 2012 being statistically below the Canadian average).

[14] More detailed results can be found in Appendix B at the end of this report.

Figure 1.1

Estimated average scores and confidence intervals for countries and provinces: PAPER-BASED MATHEMATICS



Countries and provinces	Average	S.E.
Shanghai-China	613	3.3
Singapore	573	1.3
Hong Kong-China	561	3.2
Chinese Taipei	560	3.3
Korea	554	4.6
Macao-China	538	1.0
Japan	536	3.6
Quebec	536	3.4
Liechtenstein	535	4.0
Switzerland	531	3.0
The Netherlands	523	3.5
British Columbia	522	4.4
Estonia	521	2.0
Finland	519	1.9
Canada	518	1.8
Poland	518	3.6
Alberta	517	4.6
Belgium	515	2.1
Ontario	514	4.1
Germany	514	2.9
Vietnam	511	4.8
Saskatchewan	506	3.0
Austria	506	2.7
Australia	504	1.6
New Brunswick	502	2.6
Ireland	501	2.2
Slovenia	501	1.2
Denmark	500	2.3
New Zealand	500	2.2
Czech Republic	499	2.9
Nova Scotia	497	4.1
France	495	2.5
United Kingdom	494	3.3
Iceland	493	1.7
Manitoba	492	2.9
Latvia	491	2.8
Newfoundland and Labrador	490	3.7
Luxembourg	490	1.1
Norway	489	2.7
Portugal	487	3.8
Italy	485	2.0
Spain	484	1.9
Russian Federation	482	3.0
Slovak Republic	482	3.4
United States	481	3.6
Prince Edward Island	479	2.5
Lithuania	479	2.6
Sweden	478	2.3
Hungary	477	3.2
Croatia	471	3.5
Israel	466	4.7
Greece	453	2.5
Serbia	449	3.4
Turkey	448	4.8
Romania	445	3.8
Cyprus	440	1.1
Bulgaria	439	4.0
United Arab Emirates	434	2.4
Kazakhstan	432	3.0
Thailand	427	3.4
Chile	423	3.1
Malaysia	421	3.2
Mexico	413	1.4
Montenegro	410	1.1
Uruguay	409	2.8
Costa Rica	407	3.0
Albania	394	2.0
Brazil	391	2.1
Argentina	388	3.5
Tunisia	388	3.9
Jordan	386	3.1
Colombia	376	2.9
Qatar	376	0.8
Indonesia	375	4.0
Peru	368	3.7

Note: OECD countries appear in italics.
The OECD average is 494, with a standard error of 0.5.

When interpreting results, it should be kept in mind that PISA students were aged between 15 years and 3 months and 16 years and 2 months in participating countries. In Canada, 85% of students were at the Grade 10 (Secondary 4) level, and they achieved an average score of 524. Grade 9 (Secondary 3) students (13% of the Canadian sample) achieved an average score of 487.

Table 1.1

Countries performing better than or as well as Canada — Mathematics

	Better than Canada*	As well as Canada*
Mathematics - Overall	Shanghai-China, Singapore, Hong Kong-China, Chinese Taipei, Korea, Macao-China, Japan, Liechtenstein, Switzerland	The Netherlands, Estonia, Finland, Poland, Belgium, Germany, Vietnam
Mathematics - Process subscales		
Formulating	Shanghai-China, Singapore, Chinese Taipei, Hong Kong-China, Korea, Japan, Macao-China, Switzerland, Liechtenstein, the Netherlands	Finland, Estonia, Poland, Belgium, Germany
Employing	Shanghai-China, Singapore, Hong Kong-China, Korea, Chinese Taipei, Liechtenstein, Macao-China, Japan, Switzerland, Estonia	Vietnam, Poland, the Netherlands, Germany, Belgium, Finland
Interpreting	Shanghai-China, Singapore, Hong Kong-China, Chinese Taipei, Liechtenstein, Korea, Japan, Macao-China, Finland	Switzerland, the Netherlands, Germany, Poland
Mathematics - Content subscales		
Change and Relationships	Shanghai-China, Singapore, Hong Kong-China, Chinese Taipei, Korea, Macao-China, Japan, Liechtenstein	Estonia, Switzerland, Finland, the Netherlands
Space and Shape	Shanghai-China, Chinese Taipei, Singapore, Korea, Hong Kong-China, Macao-China, Japan, Switzerland, Liechtenstein, Poland	Estonia, Belgium, the Netherlands, Germany, Vietnam, Finland
Quantity	Shanghai-China, Singapore, Hong Kong-China, Chinese Taipei, Liechtenstein, Korea, the Netherlands, Switzerland, Macao-China, Finland, Estonia	Belgium, Poland, Japan, Germany, Austria, Vietnam
Uncertainty and Data	Shanghai-China, Singapore, Hong Kong-China, Chinese Taipei, Korea, the Netherlands, Japan, Liechtenstein, Macao-China	Switzerland, Vietnam, Finland, Poland

* Differences in scores are statistically significant only when confidence intervals do not overlap. Countries performing as well as Canada have a confidence interval that overlaps that of Canada.

When analyzing results for the three process subscales of mathematics, it should be noted that students' facility at applying mathematics to problems and situations is dependent on skills inherent in all three processes. A closer analysis of results in each category can help inform policy-level discussions, curricular emphasis, and teaching practice. Canadian students achieved strong results in each of the three processes assessed by PISA. (See Appendix B.1.3.) However, they tend to achieve, on average, a higher score in *Interpreting* than in the other two processes. Among top performing countries, Shanghai-China showed particularly strong results in *Formulating* and *Employing*, surpassing Canada by almost 100 points in both of these processes. Singapore also achieved high average scores in these processes.

Canadian results by knowledge content categories also show some differences, with a lower average score in *Space and Shape* (510), followed by *Quantity* (515), *Uncertainty and Data* (516), and *Change and Relationships* (525). It is worth noting that across OECD countries, students achieved the lowest average scores in *Space and Shape* (490), followed by *Change and Relationships* and *Uncertainty and Data* (493). Among top-performing countries, Shanghai-China showed particularly strong results in *Space and Shape* (649), and *Change and Relationships* (624).

In Canada there are marked variations between provinces

Table 1.2 presents a summary of provinces performing above or at the Canadian average in overall mathematics, as well as for each process and content subscale. At the provincial level, only 15-year-old students in Quebec performed above the Canadian average. With an average score of 536, they were surpassed by only five countries. Students in Ontario, Alberta, and British Columbia performed at the Canadian average, while those in the remaining provinces were below the Canadian average. Prince Edward Island was the only province whose score was below the OECD average.

Table 1.2

Provincial results in mathematics in relation to the Canadian average

	Better than Canada*	As well as Canada*
Mathematics - Overall	Quebec	British Columbia, Alberta, Ontario
Mathematics - Process subscales		
Formulating	Quebec	British Columbia, Alberta, Ontario
Employing	Quebec	British Columbia, Alberta, Ontario
Interpreting	Quebec	British Columbia, Alberta, Ontario
Mathematics - Content subscales		
Change and Relationships	Quebec	British Columbia, Alberta, Ontario
Space and Shape	Quebec	British Columbia, Alberta, Ontario
Quantity	Quebec	British Columbia, Alberta, Ontario
Uncertainty and Data	Quebec	British Columbia, Alberta, Ontario

* Differences in scores are statistically significant only when confidence intervals do not overlap. Provinces performing as well as Canada have a confidence interval that overlaps that of Canada.

An analysis of results by mathematical processes also reveals provincial differences. Only students in Quebec achieved above the Canadian average in each of the three processes. Students in Ontario, Alberta, and British Columbia achieved at the Canadian average in the three processes; and students in the other provinces were below. Students in Newfoundland and Labrador achieved lower than the OECD average in *Formulating*, while students in Prince Edward Island were lower in all three processes.

In terms of content areas, Canadian students performed best in *Change and Relationships*, as noted above. This is also the area where Canada's result exceeds that of the OECD by the greatest margin (525 vs. 493), and the only area where all provinces are at or above the OECD average. This content area, as well as *Uncertainty and Data,* also shows the smallest gap in average score between provinces (46 points between Quebec and Prince Edward Island). The largest difference between provinces is found in the area of *Space and Shape* (75 points between the same two provinces). Interestingly, this sub-domain, related to *Geometry and Measurement,* was also the topic area with the largest difference between the same two provinces, according to the most recent PCAP 2010 assessment.[15] Only Quebec performed above the Canadian average in all four content areas, while three provinces (Ontario, Alberta, and British Columbia) were at the average. The remaining six provinces were below the Canadian average in all four. Further analysis is required to look at these inter-provincial differences across content areas.

Canadian results in mathematics are characterized by relatively high levels of achievement and equity

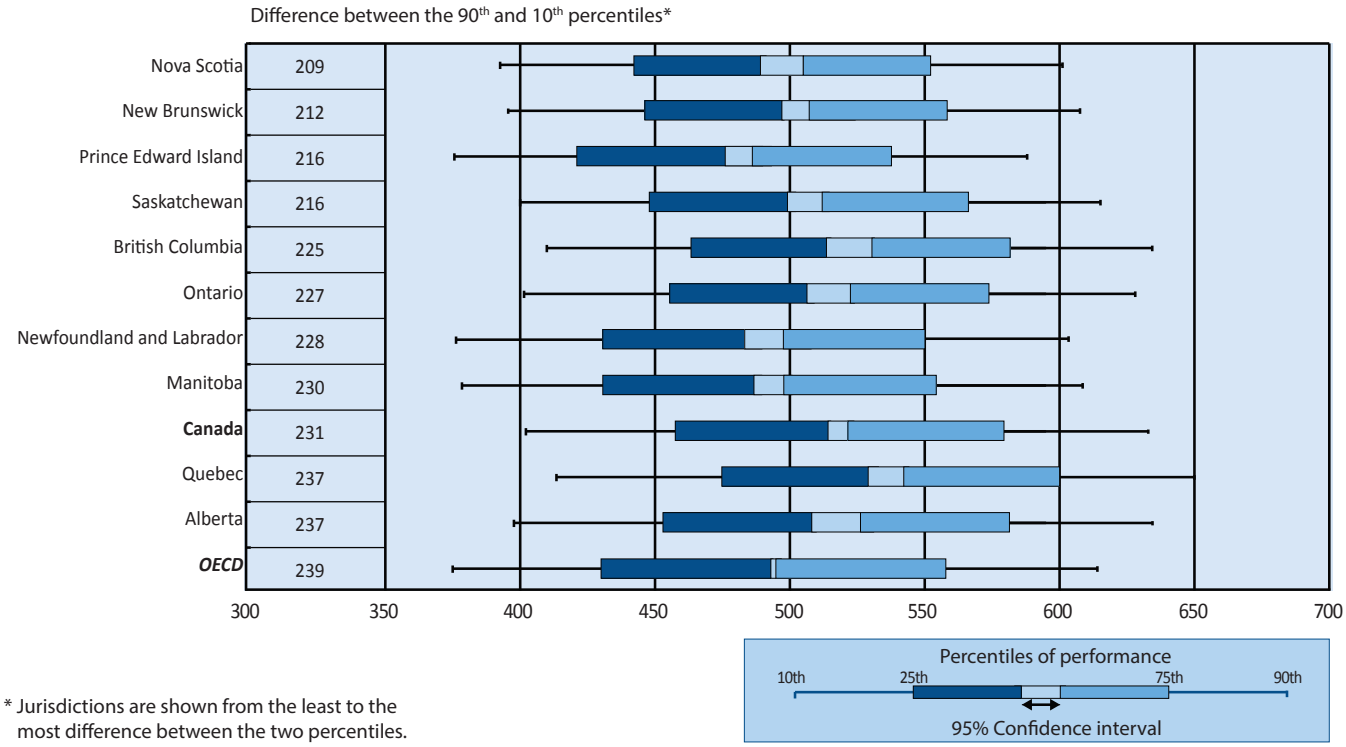
Another way of studying differences in achievement is to look at the distribution of scores within a population. The difference between the average score of students at the 90th percentile and those at the 10th percentile is often used as a measure of equity in educational outcomes.[16] As such, the relative distribution of scores or the gap that exists between students with the highest and lowest levels of performance within each jurisdiction is examined. Figure 1.2 shows the difference in average scores between lowest and highest achievers in mathematics in Canada and the provinces. For Canada overall, those in the highest decile scored 231 points higher than those in the lowest. This compares to 239 across OECD countries. At the provincial level, the largest gap can be observed in Alberta and Quebec (less equity) and the smallest in Nova Scotia (more equity). It is worth noting that although high-achieving countries tend to have a larger gap (because they have large proportions of high achievers), high achievement does not necessarily come at the cost of equity. British Columbia, for example, demonstrates both high achievement and high equity. Internationally, Estonia and Finland achieved average scores comparable to Canada's (521 and 519 respectively) and a smaller difference in the gap between the top and bottom deciles (209 and 219 respectively).

[15] CMEC. (2011). *PCAP 2010: Report on the pan-Canadian assessment of mathematics, science, and reading*. Toronto: Author.

[16] Or "equality in learning outcomes" as explained in OECD. (2010). *PISA 2009 results: Overcoming social background. Equity in learning opportunities and outcomes. Volume II.* Paris: Author.

Figure 1.2

PISA 2012 Mathematics
Difference between high and low achievers, Canada, provinces, and OECD



* Jurisdictions are shown from the least to the most difference between the two percentiles.

Overall average scores, relative rankings, and percentile distribution of scores are useful indicators of the performance of education systems, but they do not provide much information about what students can actually do in mathematics. PISA developed useful benchmarks relating a range of scores to levels of knowledge and skills measured by the assessment. Although these levels are not linked directly to any specific program of study in mathematics, they provide an overall picture of students' accumulated proficiency at age 15.

In PISA 2012, mathematical literacy is expressed on a six-level scale, whereby tasks at the lower end of the scale (Level 1) are deemed easier and less complex than tasks at the higher end (Level 6), and this progression in task difficulty/complexity applies to both overall mathematics and to each process and content area. A summary description of the six proficiency levels for overall mathematics is provided in Table 1.3 below, along with the corresponding lower bound in score points for each level.

Table 1.3

PISA 2012 mathematics proficiency levels – summary description*

Level	Lower score limit	Percentage of students able to perform tasks at this level or above	Characteristics of tasks
6	669.30	3.3% of students across the OECD and 4.3% in Canada	Students at Level 6 of the PISA mathematics assessment are able to successfully complete the most difficult PISA items. At Level 6, students can: • conceptualize, generalize and use information based on their investigations and modeling of complex problem situations, use their knowledge in relatively non-standard contexts. • link different information sources and representations and move flexibly among them. • demonstrate advanced mathematical thinking and reasoning and apply this insight and understanding, along with a mastery of symbolic and formal mathematical operations and relationships, to develop new approaches and strategies for addressing novel situations. • reflect on their actions, and formulate and precisely communicate their actions and reflections regarding their findings, interpretations and arguments, as well as explain why they were applied to the original situation.
5	606.99	12.6% of students across the OECD and 16.4% in Canada	At Level 5, students can: • develop and work with models for complex situations, identifying constraints and specifying assumptions. • select, compare and evaluate appropriate problem-solving strategies for dealing with complex problems related to these models. • work strategically using broad, well-developed thinking and reasoning skills, appropriate linked representations, symbolic and formal characterisations, and insights pertaining to these situations. • begin to reflect on their work and formulate and communicate their interpretations and reasoning.
4	544.68	30.8% of students across the OECD and 38.8% in Canada	At Level 4, students can: • work effectively with explicit models on complex, concrete situations that may involve constraints or call for making assumptions. • select and integrate different representations, including symbolic representations, linking them directly to aspects of real-world situations. • use their limited range of skills and reason with some insight, in straightforward contexts. • construct and communicate explanations and arguments based on their interpretations, arguments, and actions.
3	482.38	54.6% of students across the OECD and 65.2% in Canada	At Level 3, students can: • execute clearly described procedures, including those that require sequential decisions. Their interpretations are sufficiently sound to be the basis for building a simple model or for selecting and applying simple problem-solving strategies. • interpret and use representations based on different information sources and reason directly from them. • demonstrate some ability to handle percentages, fractions, and decimal numbers, and to work with proportional relationships. • provide solutions reflecting that they have engaged in basic interpretation and reasoning.
2	420.07	77.1% of students across the OECD and 86.2% in Canada	At Level 2, students can: • interpret and recognize situations in contexts that require no more than direct inference. • extract relevant information from a single source and make use of a single representational mode. • employ basic algorithms, formulae, procedures, or conventions to solve problems involving whole numbers. • make literal interpretations of the results. **Level 2 is considered the baseline level of mathematical proficiency that is required to participate fully in modern society.**
1	357.77	92.0% of student across the OECD and 96.4% in Canada	At Level 1, students can: • answer questions involving familiar contexts where all relevant information is present and the questions are clearly defined. • identify information and carry out routine procedures according to direct instructions in explicit situations. • perform actions that are almost always obvious and follow immediately from the given stimuli.

*Adapted from OECD. (2013). *What students know and can do: Student performance in mathematics, reading and science. Volume I. Paris: Author.*

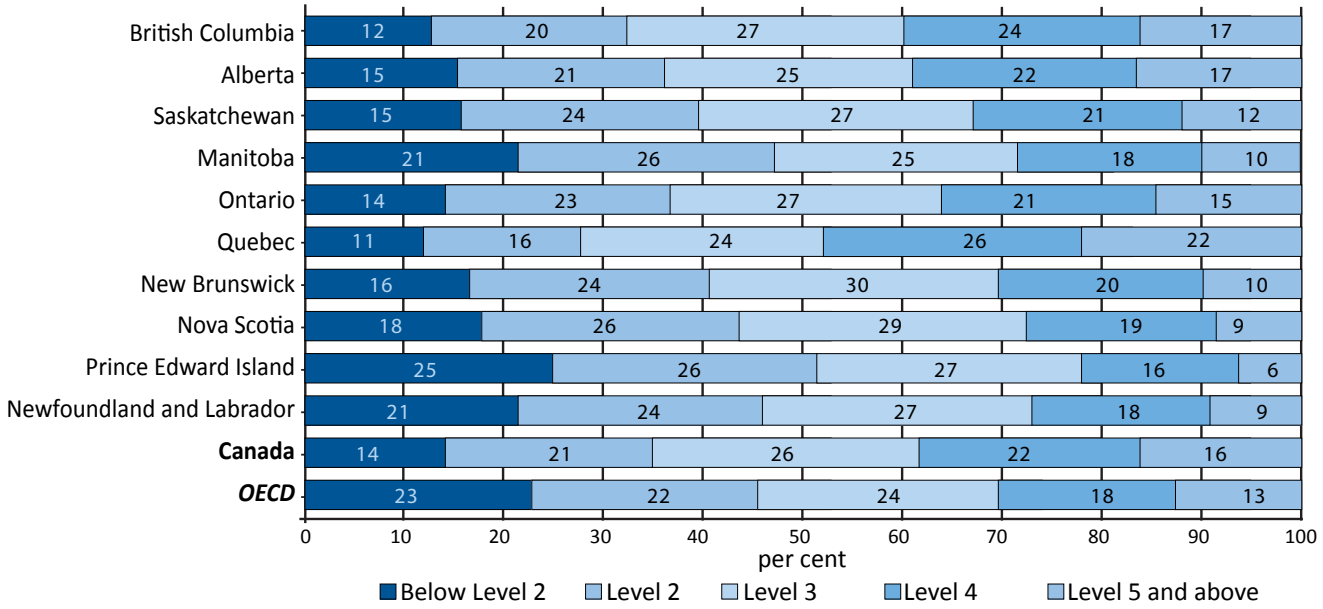
As described in Table 1.3, the lowest proficiency level assessed by PISA is Level 1. However, Level 2 is considered the baseline level of mathematical proficiency that is required to participate fully in modern society. In this report, performing below Level 2 corresponds to low achievement, whereas performing at Level 5 or above corresponds to high achievement. Over 16% of Canadian students performed at Level 5 or above, compared to an average of 13% across OECD. Although this is a higher proportion of students than in most other countries participating in PISA, 11 countries had a statistically higher proportion of high achievers than Canada, including Shanghai-China, Singapore, Chinese Taipei, Hong Kong-China, and Korea, all of which had over 30% of students performing at Level 5 or above. Provincially, almost one in four students in Quebec and one in six students in British Columbia and Alberta performed at these high levels of achievement. (See Figure 1.3). Conversely, Newfoundland and Labrador, Prince Edward Island, and Nova Scotia had fewer than one in 10 such high-performing students.

Over 85% of Canadian students reached the baseline Level 2 or above in mathematics, 9% more than the OECD average. Seven countries had statistically more students reaching this level than Canada, with over 90% doing so in Shanghai-China, Singapore, Hong Kong-China, and Korea. Provincially, Quebec and British Columbia had the lowest proportion of these low achievers (11% and 12% respectively), and Prince Edward Island the highest (25%).

Students performing below Level 1 may still be able to perform very direct and straightforward mathematical tasks, such as reading a single value from a well-labeled chart or table, where the labels match the words in the question, or performing arithmetic calculations with whole numbers by following clear and well-defined instructions. Across OECD, 8% of 15-year-olds did not achieve Level 1, while this proportion was 4% in Canada. Provincially, more than 6% of students in Newfoundland and Labrador, Manitoba, and Prince Edward Island did not achieve Level 1, compared to 3% or less in Quebec and British Columbia. Generally, compared with other high-achieving countries, Canada has a similar proportion of low-achieving students but a lower proportion of high-achieving students.

Figure 1.3

Distribution of students by proficiency level on the overall mathematics scale, Canada, provinces, and OECD



Across Canada, mathematics results show some differences by language of the school system

In seven Canadian provinces (Nova Scotia, New Brunswick, Quebec, Ontario, Alberta, Manitoba, and British Columbia), the sample was sufficiently large to allow for separate reporting for students in the anglophone and francophone school systems.[17]

Given the results in the province of Quebec, it is not surprising to see that for Canada overall, the average of students in the francophone school systems (535) is higher than for students in the anglophone systems (513). As can be seen from Table 1.4, only two provinces (Quebec and Ontario) showed a statistically different performance on the mathematics scale between the two systems. Students from the francophone system in Quebec and from the anglophone system in Ontario achieved a higher average than their peers in the same province.

Table 1.4

Estimated average scores and score differences in mathematics by language of the school system

	Anglophone system		Francophone system		Difference between systems*	
	Average	S.E.	Average	S.E.	Score difference	S.E.
Nova Scotia	497	4.1	506	6.9	-9	9.5
New Brunswick	503	3.3	500	3.2	4	7.1
Quebec	517	3.4	538	3.7	**-21**	**6.3**
Ontario	515	4.2	501	2.8	**14**	**5.1**
Manitoba	492	2.9	497	5.9	-5	4.7
Alberta	517	4.7	506	5.4	11	4.6
British Columbia	522	4.4	517	8.2	5	8.0
Canada	513	2.3	535	3.3	**-21**	4.2

* Results in bold indicate a statistical difference between the two school systems. A negative difference means that the result for the francophone school system is higher. The Canadian results include students from all provinces.

In terms of mathematical processes, students in the francophone school system in Quebec and Manitoba performed better than their counterparts in the anglophone system in *Formulating*. Students in the francophone system in Quebec and in the anglophone school system in Ontario also achieved a higher average score in *Employing* than their peers in the minority-language system. Finally, in *Interpreting*, there is a significant difference between the two school systems in Quebec (in favour of francophones), and in New Brunswick, Ontario, Alberta, and British Columbia (in favour of anglophones).

Differences by content categories may provide useful insights in terms of programs of study, teaching resources, and teaching approaches when comparing students in the same province but from different school systems. Students in the majority-language system (francophone in Quebec and anglophone in the other provinces) achieved higher average scores in the areas of *Change and Relationships*, and *Quantity* in New Brunswick, Quebec, and Ontario. They also achieved a higher average score in the area

[17] Within anglophone school systems, students in French immersion programs completed the mathematics component in English, and these students are included in the average scores for the anglophone systems.

of *Uncertainty and Data* in Quebec, Ontario, and British Columbia. Students in the francophone system performed significantly better than their peers in the anglophone system in the area of *Space and Shape* in Nova Scotia, New Brunswick, Quebec, and Manitoba. The observed differences in achievement in the four content areas by language of the school system suggest that more analysis is required, as these possibly relate to factors such as curriculum emphasis, resources, teacher qualifications, and teaching approaches.

In Canada and in most other countries, boys perform better than girls in mathematics

Across OECD countries, the average difference between boys and girls in mathematics achievement as assessed by PISA in paper format was 11 points in favour of boys, similar to what was observed in Canada (10 points). Only in a few countries did girls achieve a higher average score than boys (Jordan, Qatar, Thailand, Malaysia, and Iceland). It is worth noting that across provinces, differences between boys and girls are statistically significant in overall mathematics in four provinces only (Quebec, Ontario, Alberta, and British Columbia). When analyzing mathematical processes and content areas, the gender difference is statistically significant for all three processes and all content areas at the Canadian level, with larger gender differences in favour of boys observed in *Formulating* (13 points) and in *Change and Relationships* (14 points). The gender differences at the provincial level are reported in appendices B.1.16 and B.1.17.

Interestingly, the proportion of low achievers (Below Level 2) is quite similar across gender in Canada (13% vs. 14% for boys and girls, respectively), but more boys achieved the highest levels (Levels 5 and 6) than girls (19% vs. 14%). At the provincial level, the differences in the proportion of low achievers by gender were also very small (less than 3%). However, more boys than girls achieved the highest levels of performance in Prince Edward Island, Quebec, Ontario, Manitoba, and Alberta. (See Appendix B.1.20).

A PISA innovation: the computer-based assessment of mathematics

For the first time in 2012, PISA included an optional assessment of mathematical literacy that was administered on a computer. In Canada and some other countries, a group of students who wrote the regular paper-based mathematics test also wrote the computer-based assessment, allowing countries to compare and contrast mathematics achievement between these two modes of administration.

The computer-based mathematics assessment made use of enhancements offered by computer technology to present more engaging questions and new item formats, which in turn required students to provide a wider array of answers. When combined with the paper-based assessment, the computer-based test provides a more rounded picture of students' mathematical literacy.

> In order to examine the association between paper-based and computer-based modes, a correlation coefficient was calculated for Canada. In mathematics, the correlation in student achievement between the two modes is r = 0.79, and in reading it is r = 0.71. Although both correlation coefficients are relatively high, over 35% of the variance remains unshared between the two delivery modes. As such, care must be exercised when comparing results between paper-based and computer-based assessments.

As shown in Table 1.5, among the 32 countries that participated in this optional component, Canada performed well overall, with an average score of 523, compared to an OECD average of 497. Only Singapore, Shanghai-China, Korea, Hong Kong-China, Macao-China, Japan, and Chinese Taipei performed better than Canada (on a statistically significant basis).

Table 1.5

Countries and provinces performing better than, as well as, or less well than Canada on the computer-based mathematics assessment

Better than Canada*			As well as Canada*			Less well than Canada*		
	Average	S.E.		Average	S.E.		Average	S.E.
Singapore	566	1.3	British Columbia	532	4.7	Estonia	516	2.2
Shanghai-China	562	3.4	Ontario	530	5.5	Belgium	511	2.4
Korea	553	4.5	Quebec	523	3.8	Newfoundland and Labrador	511	3.2
Hong Kong-China	550	3.4	**Canada**	**523**	**2.2**	Germany	509	3.3
Macao-China	543	1.1	Alberta	516	5.2	France	508	3.3
Japan	539	3.3				Australia	508	1.6
Chinese Taipei	537	2.8				Austria	507	3.5
						Nova Scotia	503	5.9
						Saskatchewan	499	3.3
						Italy	499	4.2
						United States	498	4.1
						Norway	498	2.8
						Slovak Republic	497	3.5
						New Brunswick	496	2.8
						Denmark	496	2.7
						Manitoba	493	3.2
						Ireland	493	2.9
						Prince Edward Island	491	3.0
						Sweden	490	2.9
						Russian Federation	489	2.6
						Poland	489	4.0
						Portugal	489	3.1
						Slovenia	487	1.2
						Spain	475	3.2
						Hungary	470	3.9
						Israel	447	5.6
						United Arab Emirates	434	2.2
						Chile	432	3.3
						Brazil	418	4.5
						Colombia	397	3.2

* Differences in scores are statistically significant only when confidence intervals do not overlap. Countries performing as well as Canada have confidence intervals that overlap Canada's.

At the provincial level, the computer-based assessment reveals some interesting results when compared with the paper-based component. Students in Quebec, Ontario, Alberta, and British Columbia, performed at the Canadian average, while those in the remaining provinces were below the Canadian average. All provinces, with the exception of Prince Edward Island, were at or above the OECD average in computer-based mathematics. (See Appendix B.1.4.)

In Canada overall, there was no statistical difference by language on the computer-based component, with students from the anglophone school systems achieving an average score of 523 and students in the francophone systems achieving a score of 521. Provincially, significant differences could be observed in Ontario, Alberta, and British Columbia in favour of students in the anglophone systems.

As was the case for the paper-based component, Canadian boys performed better on the computer-based assessment than girls (532 vs. 514), with a slightly larger gender gap of 17 points. Boys performed better than girls in Quebec, Ontario, Manitoba, Alberta, and British Columbia, but girls achieved a higher average score in Prince Edward Island.

As was explained previously, it is possible to combine the results in paper-based and computer-based mathematics to obtain a more rounded picture of student achievement in mathematics. In PISA 2012, this was done by computing a simple average of the two components for each student.

Given that Canadian students performed quite well in both the paper-based and the computer-based components, it is not surprising that when the results are aggregated, Canada's overall average score (520) remains strong in composite mathematics. Out of the 32 countries that participated in both types of assessment, only Shanghai-China, Singapore, Hong Kong-China, Korea, Chinese Taipei, Macao-China, and Japan showed statistically significant results that were above Canada's. As described previously, the absolute and relative performance of provinces did not vary markedly between the two components. Overall, students in Quebec performed above the Canadian average. Students in British Columbia, Ontario, and Alberta performed at the Canadian average, while those in the remaining provinces were below.

In composite mathematics, there were some differences in performance by language of the school system. Students in the francophone system in Quebec performed better than their peers in the anglophone system, and students in the anglophone system in Ontario and Alberta outperformed their counterparts in the francophone system. In addition, the gender gap favouring boys still persisted in Canada as a whole (527 vs. 514).

More research will be conducted to gain a better understanding of the differences in results between the two types of assessments. However, care must be taken when comparing results between them for at least two reasons. First, the computer-based assessment includes elements of mathematics that can only be assessed electronically (e.g., sorting or charting data using a computer) or using computer-based item formats (e.g., drag-and-drop, hot spots). Second, not all OECD countries participated in the computer-based assessment, and this affected the OECD average.

Over the past nine years, the Canadian scores in mathematics have declined

The richness of the PISA data grows with every cycle. Although mathematics results over time cannot be compared before 2003, there are four paper-based assessments where comparable mathematics assessments were conducted in a nine-year span (2003, 2006, 2009, and 2012). This provides extremely useful information on the performance of individual education systems over time and relative to other systems.

As can be seen from Table 1.6, the performance of Canadian 15-year-olds has declined by 14 points in the past nine years, a decline that is statistically significant. Among OECD countries, no clear pattern emerges. A few average or low-performing countries improved over time, but among high-performing countries, only Macao-China, Poland, and Germany improved in mathematics over the past four PISA cycles. As was the case in Canada, in the Netherlands, Finland, and Belgium there was a decrease in average achievement, while the other countries maintained their scores.

In Canada, scores decreased in all provinces except Quebec and Saskatchewan, where the changes were not statistically significant over the nine-year span. The largest declines occurred in Manitoba (36 points), Alberta (32 points), and Newfoundland and Labrador (26 points).

Table 1.6

PISA 2003-2012 – Results in paper-based mathematics – Canada and provinces

	2003		2006		2009		2012	
	Average	S.E.	Average	S.E. with linking error*	Average	S.E. with linking error*	Average	S.E. with linking error*
Canada	532	1.8	527	2.4	527	2.6	**518**	2.7
Newfoundland and Labrador	517	2.5	**507**	2.8	**503**	3.4	**490**	4.2
Prince Edward Island	500	2	501	2.7	**487**	3.0	**479**	3.2
Nova Scotia	515	2.2	**506**	2.7	512	3.0	**497**	4.5
New Brunswick	512	1.8	506	2.5	**504**	3.0	**502**	3.2
Quebec	537	4.7	540	4.4	543	3.9	536	3.9
Ontario	530	3.6	526	3.9	526	3.8	**514**	4.5
Manitoba	528	3.1	521	3.6	**501**	4.1	**492**	3.5
Saskatchewan	516	3.9	507	3.6	506	3.8	506	3.6
Alberta	549	4.3	**530**	4.0	**529**	4.8	**517**	5.0
British Columbia	538	2.4	**523**	4.6	**523**	5.0	**522**	4.8

Results in bold indicate a statistically significant difference compared with the baseline (2003).
* The standard error of measurement includes a linking error to account for the comparison of results over time between the baseline (2003) and subsequent years.

Across Canada, the gender gap in favour of boys has remained remarkably stable over the past nine years, ranging from 11 points in 2003 to 10 points in 2012. Furthermore, the differences in mathematics performance by language of the school system decreased in most provinces in 2012 compared to previous years. Further analyses will be required to better understand these differences over time.

Summary

This chapter summarizes the performance of Canadian students on the PISA 2012 assessment of mathematics. As was the case in past PISA cycles, 15-year-olds continue to perform very well in a global context, with only nine out of 65 countries showing a statistically significant higher average score. At the provincial level, students in Quebec performed among the top jurisdictions in PISA, while those in the other provinces achieved at or above the OECD average, with the exception of students in Prince Edward Island. About 14% of Canadian students did not achieve the baseline level in mathematics (Level 2), while 16% reached Level 5 or 6. Students in the francophone school system in Quebec and in the anglophone school system in Ontario achieved a higher average score than their counterparts in the minority-language school system. As was observed in past PISA assessments, as well as in other national and international tests, boys performed better than girls in mathematics.

An optional computer-based mathematics assessment was administered for the first time in 2012, and Canadian students also showed strong results: almost all provinces achieved at or above the OECD average. In composite mathematics (combining paper-based and computer-based assessments), students in the majority-language system in Quebec, Ontario, and Alberta performed significantly better than their peers in the minority-language system. Also, the gender gap in favour of boys persisted in Canada overall.

Finally, Canadian students performed consistently well in mathematics over the last nine years, but there is a clear trend showing a decrease in average score in most provinces, as well as an increase in the number of countries outperforming Canada. In the near future, further analysis of the information collected through PISA will help provide a better understanding of the performance of Canadian students in mathematics. Of particular interest will be the link between achievement in mathematics and a large number of background variables collected at the student and school levels.

Chapter 2

The performance of Canadian students in reading and science in an international context

This chapter presents the overall results of PISA 2012 in the minor domains of reading and science, as well as in digital reading. For each domain, the performance of 15-year-old students across Canada and in the 10 provinces is compared to the performance of 15-year-olds from the other countries that participated in PISA 2012. Next, the performance of students enrolled in anglophone and francophone school systems is examined for those provinces in which the two groups were sampled sufficiently. This is followed by a comparison between the performance of boys and girls in Canada and the provinces. Lastly, changes over time are discussed.

Defining reading and science

Since reading and science were minor domains in PISA 2012, less assessment time was given to these two areas compared to the major domain of mathematics. Consequently, PISA 2012 allows for only an update on overall performance in reading and science, and not on their sub-domains. Additionally, while PISA 2012 was implemented through a paper-based assessment, it also included a digital reading assessment. Reading and science were defined as follows by PISA, with an emphasis on functional knowledge and skills that allow active participation in society:[18]

- *Reading literacy* (hereafter referred to as reading): An individual's capacity to understand, use, reflect on, and engage with written texts, in order to achieve one's goals, develop one's knowledge and potential, and participate in society.
- *Scientific literacy* (hereafter referred to as science): An individual's scientific knowledge, and use of that knowledge to identify questions, acquire new knowledge, explain scientific phenomena, and draw evidence-based conclusions about science-related issues; an understanding of the characteristic features of science as a form of human knowledge and enquiry; an awareness of how science and technology shape our material, intellectual, and cultural environments; and a willingness to engage in science-related issues, and with the ideas of science, as a reflective citizen.

As is the case for mathematics, the scores for reading and science are expressed on a scale with an average among OECD countries of 500 and a standard deviation of 100. This average was established in the year in which the domain became the main focus of the assessment (2000 for reading and 2006 for science). Approximately two-thirds of the students in OECD countries scored between 400 and 600 (i.e., within one standard deviation of the average). Due to changes in performance over time, the OECD average scores for paper-based reading and science in PISA 2012 differ slightly from 500.

[18] OECD. (2013). *PISA 2012 Assessment and analytical framework: Mathematics, reading, science, problem solving and financial literacy*. Paris: Author.

Canadian students continue to perform well in reading and science in a global context

One way to summarize student performance and compare the relative standing of countries is by examining their average test scores. However, simply ranking countries based on their average scores can be misleading because there is a margin of uncertainty associated with each score. As discussed in Chapter 1, when interpreting average performances, only those differences between countries that are statistically significant should be noted.

On average, Canadian 15-year-olds performed well in reading and science (Table 2.1 and figures 2.1 and 2.2). Canadian students had an average score of 523 in reading and 525 in science, well above the OECD averages of 496 and 501, respectively. Table 2.1 shows the countries that performed significantly better than or the same as Canada in reading and science. The averages of the students in all of the remaining countries were significantly below those of Canada. Among the 65 countries that participated in PISA 2012, five outperformed Canada in reading while seven outperformed Canada in science.

Table 2.1

Countries performing better than or as well as Canada — Reading and Science

	Better than Canada*	As well as Canada*
Reading	Shanghai-China, Hong Kong-China, Singapore, Japan, Korea	Finland, Ireland, Chinese Taipei, Poland, Liechtenstein
Science	Shanghai-China, Hong Kong-China, Singapore, Japan, Finland, Estonia, Korea	Vietnam, Poland, Liechtenstein, Germany, Chinese Taipei, the Netherlands, Ireland, Australia

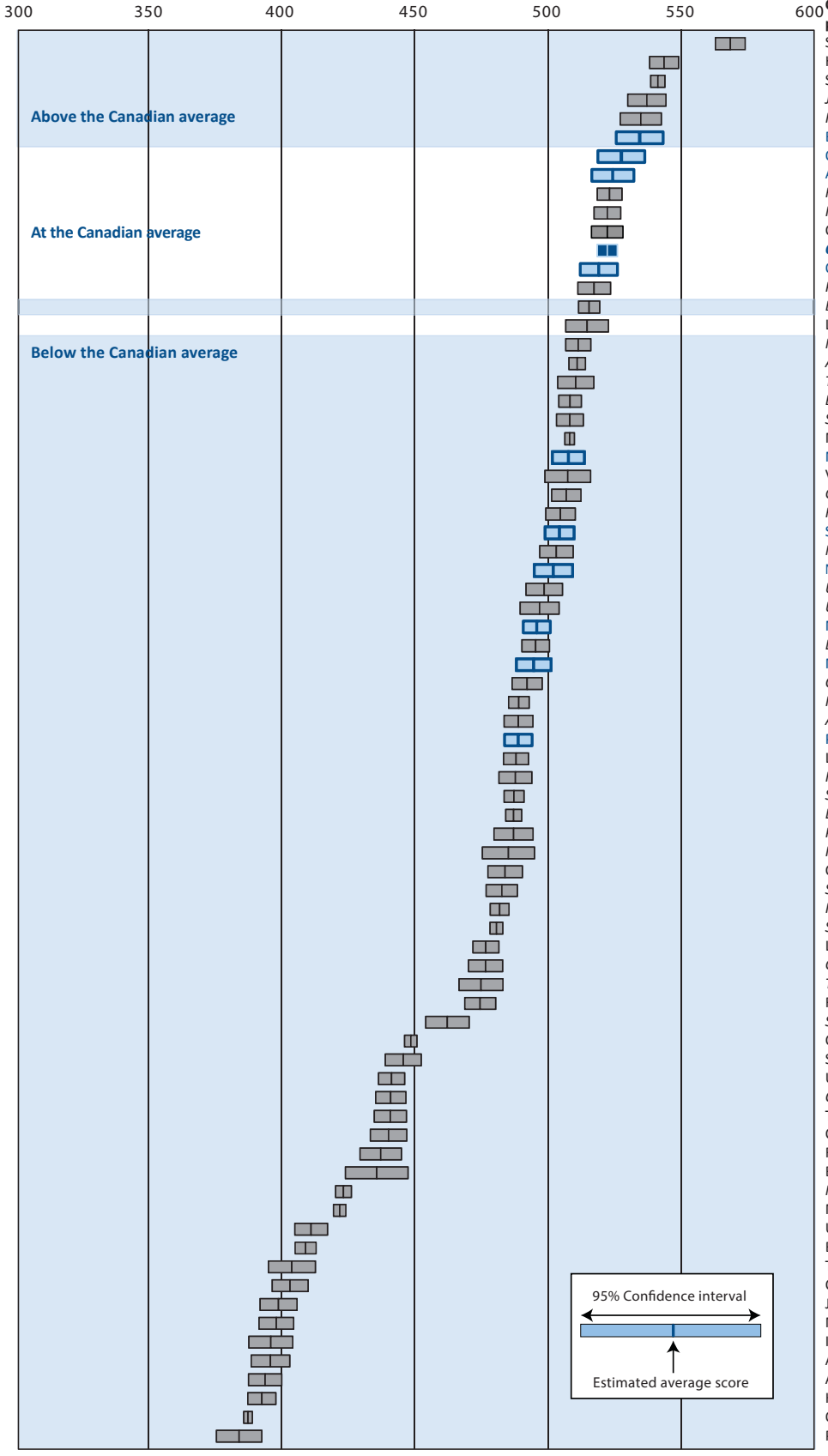
* Differences in scores are statistically significant only when confidence intervals do not overlap. Countries performing as well as Canada have a confidence interval that overlaps that of Canada.

While average performance is useful in assessing the overall performance of students, it can mask significant variation within a jurisdiction. Further light on the performance within jurisdictions can be shed by examining the relative distribution of scores — specifically, the gap that exists between students with the highest and lowest levels of performance. This is an important indicator of the equity of educational outcomes.

For Canada overall, those in the highest decile (90th percentile) scored 235 points higher in reading and 232 points higher in science than those in the lowest decile (10th percentile). This compares to 242 points in reading and 239 points in science across all OECD countries.

Figure 2.1

Estimated average scores and confidence intervals for countries and provinces: READING

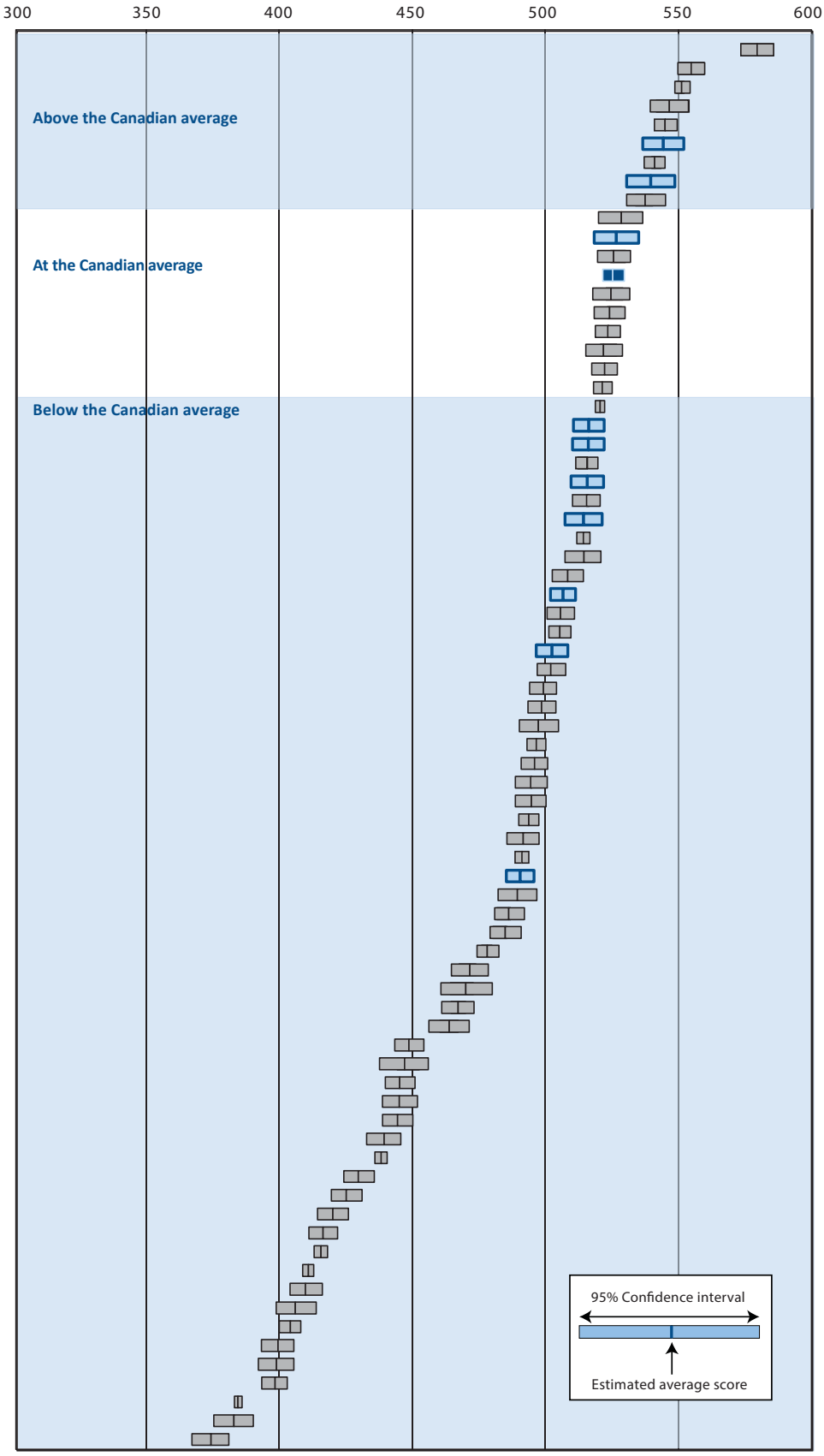


Countries and provinces	Average	S.E.
Shanghai-China	570	(2.9)
Hong Kong-China	545	(2.8)
Singapore	542	(1.4)
Japan	538	(3.7)
Korea	536	(3.9)
British Columbia	535	(4.5)
Ontario	528	(4.4)
Alberta	525	(4.1)
Finland	524	(2.4)
Ireland	523	(2.6)
Chinese Taipei	523	(3.0)
Canada	**523**	(1.9)
Quebec	520	(3.6)
Poland	518	(3.1)
Estonia	516	(2.0)
Liechtenstein	516	(4.1)
New Zealand	512	(2.4)
Australia	512	(1.6)
The Netherlands	511	(3.5)
Belgium	509	(2.2)
Switzerland	509	(2.6)
Macao-China	509	(0.9)
Nova Scotia	508	(3.1)
Vietnam	508	(4.4)
Germany	508	(2.8)
France	505	(2.8)
Saskatchewan	505	(2.8)
Norway	504	(3.2)
Newfoundland and Labrador	503	(3.7)
United Kingdom	499	(3.5)
United States	498	(3.7)
New Brunswick	497	(2.6)
Denmark	496	(2.6)
Manitoba	495	(3.3)
Czech Republic	493	(2.9)
Italy	490	(2.0)
Austria	490	(2.8)
Prince Edward Island	490	(2.7)
Latvia	489	(2.4)
Hungary	488	(3.2)
Spain	488	(1.9)
Luxembourg	488	(1.5)
Portugal	488	(3.8)
Israel	486	(5.0)
Croatia	485	(3.3)
Sweden	483	(3.0)
Iceland	483	(1.8)
Slovenia	481	(1.2)
Lithuania	477	(2.5)
Greece	477	(3.3)
Turkey	475	(4.2)
Russian Federation	475	(3.0)
Slovak Republic	463	(4.2)
Cyprus	449	(1.2)
Serbia	446	(3.4)
United Arab Emirates	442	(2.5)
Chile	441	(2.9)
Thailand	441	(3.1)
Costa Rica	441	(3.5)
Romania	438	(4.0)
Bulgaria	436	(6.0)
Mexico	424	(1.5)
Montenegro	422	(1.2)
Uruguay	411	(3.2)
Brazil	410	(2.1)
Tunisia	404	(4.5)
Colombia	403	(3.4)
Jordan	399	(3.6)
Malaysia	398	(3.3)
Indonesia	396	(4.2)
Argentina	396	(3.7)
Albania	394	(3.2)
Kazakhstan	393	(2.7)
Qatar	388	(0.8)
Peru	384	(4.3)

Note: OECD countries appear in italics.
The OECD average is 496, with a standard error of 0.5.

Figure 2.2

Estimated average scores and confidence intervals for countries and provinces: SCIENCE



Countries and provinces	Average	S.E.
Shanghai-China	580	(3.0)
Hong Kong-China	555	(2.6)
Singapore	551	(1.5)
Japan	547	(3.6)
Finland	545	(2.2)
British Columbia	544	(3.9)
Estonia	541	(1.9)
Alberta	539	(4.7)
Korea	538	(3.7)
Vietnam	528	(4.3)
Ontario	527	(4.3)
Poland	526	(3.1)
Canada	525	(1.9)
Liechtenstein	525	(3.5)
Germany	524	(3.0)
Chinese Taipei	523	(2.3)
The Netherlands	522	(3.5)
Ireland	522	(2.5)
Australia	521	(1.8)
Macao-China	521	(0.8)
Saskatchewan	516	(2.9)
Nova Scotia	516	(3.0)
New Zealand	516	(2.1)
Quebec	516	(3.3)
Switzerland	515	(2.7)
Newfoundland and Labrador	514	(3.6)
Slovenia	514	(1.3)
United Kingdom	514	(3.4)
Czech Republic	508	(3.0)
New Brunswick	507	(2.6)
Austria	506	(2.7)
Belgium	505	(2.1)
Manitoba	503	(3.2)
Latvia	502	(2.8)
France	499	(2.6)
Denmark	498	(2.7)
United States	497	(3.8)
Spain	496	(1.8)
Lithuania	496	(2.6)
Norway	495	(3.1)
Hungary	494	(2.9)
Italy	494	(1.9)
Croatia	491	(3.1)
Luxembourg	491	(1.3)
Prince Edward Island	490	(2.7)
Portugal	489	(3.7)
Russian Federation	486	(2.9)
Sweden	485	(3.0)
Iceland	478	(2.1)
Slovak Republic	471	(3.6)
Israel	470	(5.0)
Greece	467	(3.1)
Turkey	463	(3.9)
United Arab Emirates	448	(2.8)
Bulgaria	446	(4.8)
Chile	445	(2.9)
Serbia	445	(3.4)
Thailand	444	(2.9)
Romania	439	(3.3)
Cyprus	438	(1.2)
Costa Rica	429	(2.9)
Kazakhstan	425	(3.0)
Malaysia	420	(3.0)
Uruguay	416	(2.8)
Mexico	415	(1.3)
Montenegro	410	(1.1)
Jordan	409	(3.1)
Argentina	406	(3.9)
Brazil	405	(2.1)
Colombia	399	(3.1)
Tunisia	398	(3.5)
Albania	397	(2.4)
Qatar	384	(0.7)
Indonesia	382	(3.8)
Peru	373	(3.6)

Note: OECD countries appear in italics.
The OECD average is 501, with a standard error of 0.5.

The amount of variation in performance within a country in reading and science fluctuated widely (appendices B.2.5 and B.2.8). Canada was one of the few countries with above-average performance and below-average disparity in student performance, as measured by the difference between the 90th and 10th percentiles.

Most provinces performed at or above the OECD average in reading and science

For both reading and science, the performance of students in all provinces, with the exception of Prince Edward Island, was at or above the OECD average. Students in Newfoundland and Labrador and New Brunswick performed at the average in reading and above the average in science; students in Manitoba performed at the average in both domains; and students in Prince Edward Island performed below the average in both domains. Students in all other provinces performed above the average in both domains.

Within Canada, students in British Columbia performed above the Canadian average in both domains, as shown in Table 2.2. Students in Ontario performed at the average in both domains, while students in Alberta performed above the average in science and at the average in reading. Students in Quebec performed at the average in reading and below the average in science, while students in the remaining provinces performed below the Canadian average in both domains.

Table 2.2

Provincial results in reading and science relative to the Canadian average

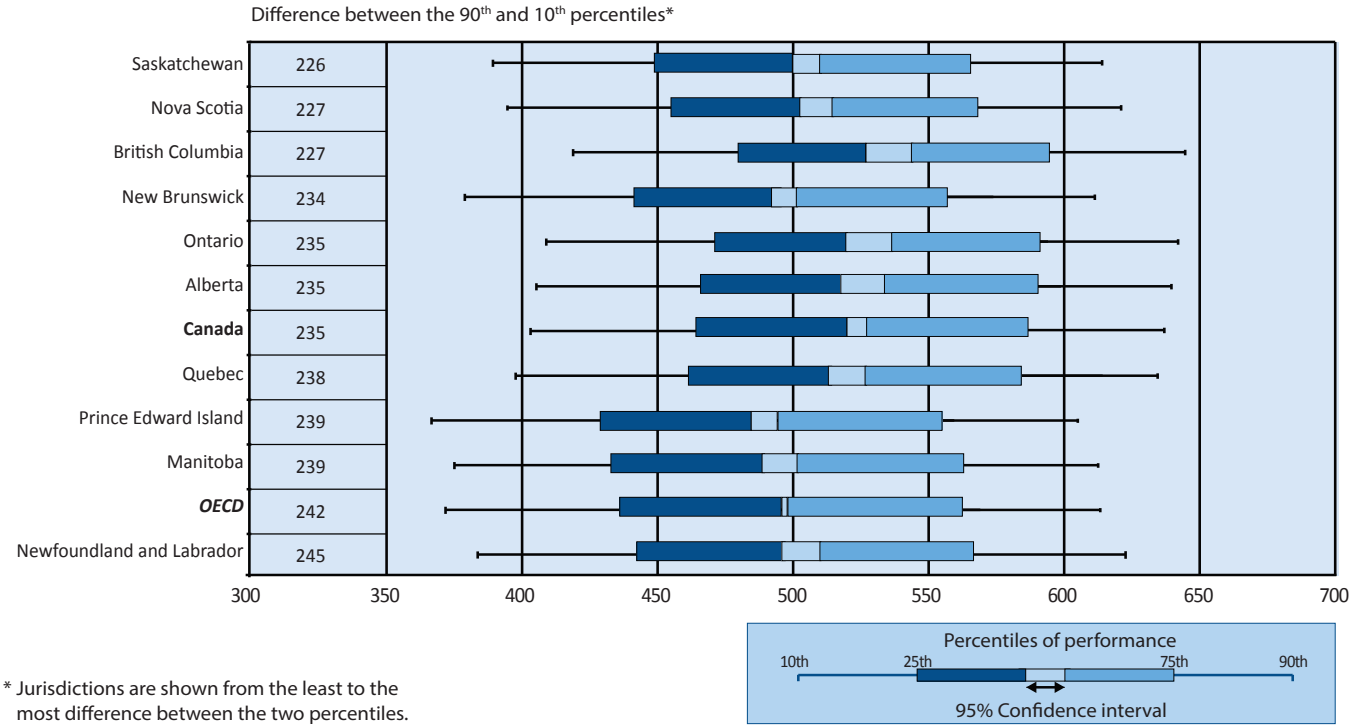
	Better than Canada*	As well as Canada*	Lower than Canada*
Reading	British Columbia	Quebec, Ontario, Alberta	Newfoundland and Labrador, Prince Edward Island, Nova Scotia, New Brunswick, Manitoba, Saskatchewan
Science	Alberta, British Columbia	Ontario	Newfoundland and Labrador, Prince Edward Island, Nova Scotia, New Brunswick, Quebec, Manitoba, Saskatchewan

* Differences in scores are statistically significant only when confidence intervals do not overlap.

Figures 2.3 and 2.4 show the difference in average scores between those in the lowest decile (10th percentile) and those in the highest (90th percentile) in reading and in science. For reading, differences ranged from 226 points in Saskatchewan to 245 in Newfoundland and Labrador, while for science they ranged from 213 points in Quebec to 242 in Manitoba. In all provinces (with the exception of Newfoundland and Labrador in reading and science, and Manitoba and Alberta in science only), the difference in performance between high achievers and low achievers was smaller than the OECD average. This indicates that Canada's education systems achieve a slightly greater degree of equity.

Figure 2.3

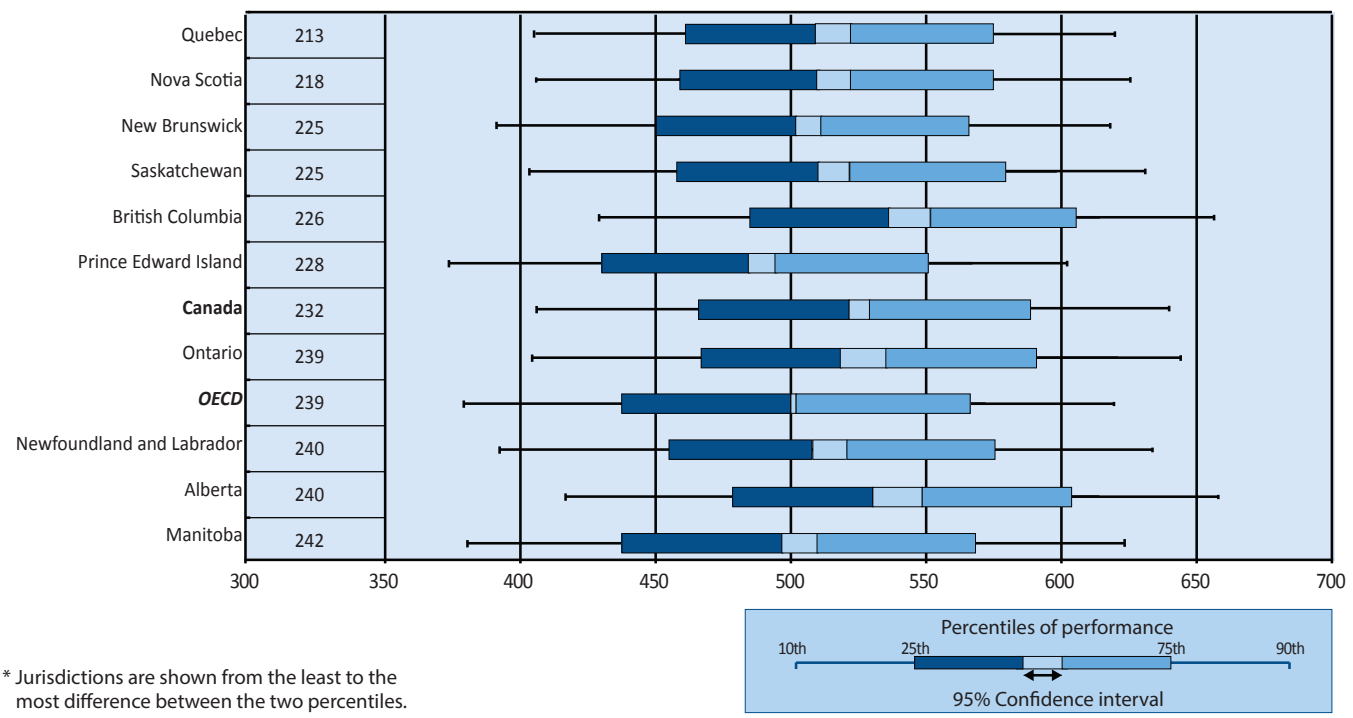
PISA 2012 Reading
Difference between high and low achievers, Canada, provinces, and OECD



* Jurisdictions are shown from the least to the most difference between the two percentiles.

Figure 2.4

PISA 2012 Science
Difference between high and low achievers, Canada, provinces, and OECD



* Jurisdictions are shown from the least to the most difference between the two percentiles.

In most provinces students attending majority-language school systems outperformed students who attend minority-language systems in reading and science

This section examines the performance of minority-language students in seven provinces (Nova Scotia, New Brunswick, Quebec, Ontario, Manitoba, Alberta, and British Columbia).[19]

As shown in Table 2.3, the relative performance of students in the two systems varied across provinces and by domain. In reading, differences in performance between students in the anglophone and francophone systems aggregated across Canada were not statistically significant. At the provincial level, students in majority-language school systems outperformed their counterparts in minority-language systems in four of the seven provinces. This difference ranged from 43 points favouring students attending anglophone schools in Ontario to 23 points in Nova Scotia. In Quebec, Manitoba, and Alberta, the differences were not statistically significant.

Across Canada, students in the anglophone school systems outperformed those in the francophone school systems in science by 16 points. Students in majority-language school systems outperformed their peers in minority-language systems in five of the seven provinces. The differences between systems varied from 28 points in British Columbia to 42 points in New Brunswick. In Quebec and Manitoba, the differences were not statistically significant.

Table 2.3

Estimated average reading and science scores, by province and language of the school system

		Anglophone school system		Francophone school system		Difference between systems*	
		Average	Standard error	Average	Standard error	Score difference	Standard error
Reading							
	Nova Scotia	509	(3.2)	486	(7.4)	**23**	(8.2)
	New Brunswick	505	(3.4)	471	(3.0)	**34**	(4.5)
	Quebec	518	(3.5)	520	(4.0)	-2	(5.0)
	Ontario	530	(4.6)	487	(2.8)	**43**	(5.3)
	Manitoba	495	(3.4)	494	(5.6)	2	(6.8)
	Alberta	525	(4.1)	506	(9.8)	20	(10.5)
	British Columbia	535	(4.5)	509	(8.2)	**26**	(9.8)
	Canada	525	(2.4)	517	(3.6)	8	(4.7)
Science							
	Nova Scotia	517	(3.1)	482	(5.3)	**35**	(6.2)
	New Brunswick	517	(3.3)	475	(3.1)	**42**	(4.6)
	Quebec	514	(3.6)	516	(3.6)	-2	(4.8)
	Ontario	528	(4.5)	487	(3.1)	**41**	(5.4)
	Manitoba	503	(3.3)	496	(6.2)	7	(7.0)
	Alberta	540	(4.7)	507	(6.5)	**33**	(8.0)
	British Columbia	545	(4.0)	517	(8.2)	**28**	(9.6)
	Canada	529	(2.4)	513	(3.2)	**16**	(4.3)

* Results in bold indicate a statistical difference between the two school systems. A negative difference means that the result for the francophone school system is higher. The Canadian results include students from all provinces.

[19] Only seven out of 10 provinces had minority-language schools with a sufficient sample of students.

Canadian females outperformed males in reading, while no significant differences existed between the genders in science

As was the case in PISA 2000, girls performed significantly better than boys in PISA 2012 on the reading test in all countries and all provinces. On average across OECD countries, girls outperformed boys by 38 points in PISA 2012, while in Canada this difference was 35 points. This difference is much larger than the 10-point difference favouring boys in mathematics. At the provincial level, the gender gap favouring girls ranged from 26 points in British Columbia to 53 points in Newfoundland and Labrador (Appendix B.2.11).

In science, on average across OECD countries, males had a statistically significant higher score, but the one-point difference was small compared to the larger gender gap in reading and the more moderate gender difference in mathematics. In Canada, and across all provinces, no statistically significant gender differences were observed between boys and girls in this domain.

Canadian students' performance in reading remained relatively stable over time while performance in science decreased

PISA 2012 is the fifth assessment of reading since 2000, when the first major assessment of reading took place, and the third assessment of science since 2006, when the first major assessment of science took place.

> While this section looks at changes over time, performance differences should be interpreted with caution, for several reasons. First, since data are available for only three points in time for science, it is not possible to determine the extent to which observed differences in this domain are indicative of longer-term changes. Secondly, in order to allow for comparability over time, some common assessment items were used in each survey. However, because there are a limited number of common items, an additional source of measurement error must be taken into account for these comparisons over time (a linking error). Consequently only changes that are indicated as statistically significant should be considered.

On average across OECD countries, reading performance remained unchanged. The OECD average of 496 points in 2012 was not significantly different from the baseline average score of 500 in 2000. However, there were changes in performance in some of the 39 countries that participated in both PISA 2000 and PISA 2012. In 11 countries reading performance improved on a statistically significant basis, while in six it declined. Although Canada's average score in reading decreased from 534 in 2000 to 523 in 2012, this decrease was not statistically significant (Figure 2.5).

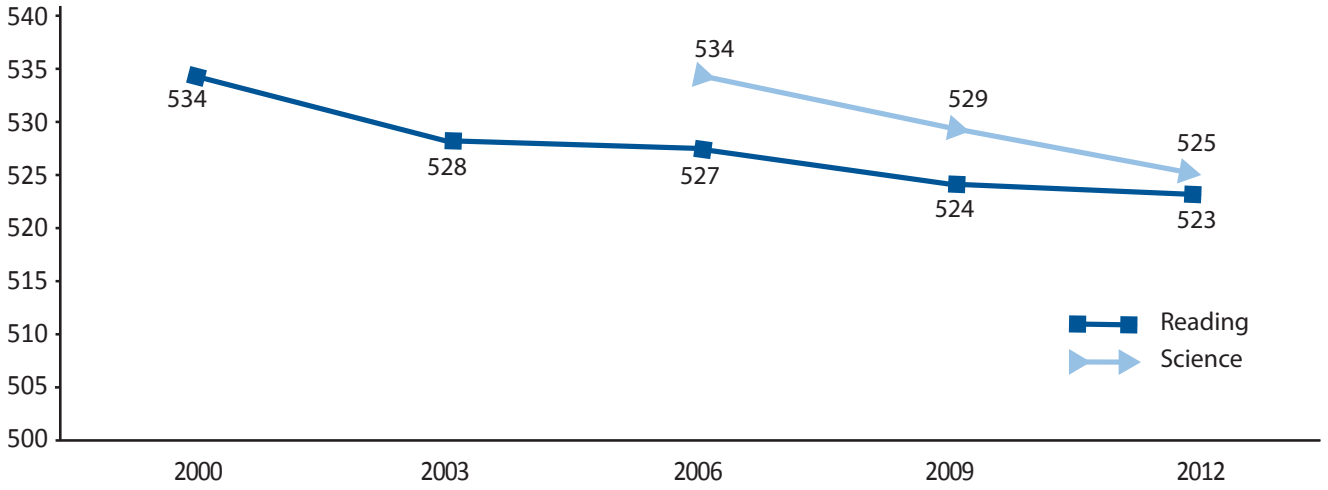
On average across OECD countries, science performance remained unchanged between PISA 2006 and PISA 2012, although changes in performance were observed in some of the 55 countries that participated in both surveys. Science performance increased on a statistically significant basis in 17 countries and decreased in eight. In Canada, the decrease in science performance was statistically significant between 2006 (534) and 2012 (525) (Figure 2.5).

Although Canada continues to perform well in both reading and science, its international standing among PISA participants has slipped. In reading the number of countries outperforming Canada has risen from one in 2000 to five in 2012: while Finland (which previously led Canada) has fallen behind, Hong-Kong-China, Korea, and Japan have pulled ahead, and they have been joined by newcomers Shanghai-China and Singapore.

Similarly, in science two countries outperformed Canada in 2006, whereas in 2012 this number rose to seven: Finland and Hong-Kong continued to outperform Canada, and they have been joined by Estonia, Korea, Japan, Shanghai-China, and Singapore.

Figure 2.5

PISA - Canadian results over time, 2000-2012
Reading and Science



While reading performance did not change significantly for Canada overall between 2000 and 2012, it decreased in Prince Edward Island, Quebec, Manitoba, Saskatchewan, and Alberta. Declines ranged from 16 points in Quebec to 34 in Manitoba. Performance in reading did not change significantly in the remaining provinces (see Appendix B.2.13). For science, performance decreased between 2006 and 2012 in Newfoundland and Labrador (-11), Prince Edward Island (-18), Quebec (-15), and Manitoba (-21), and remained unchanged in the six remaining provinces (see Appendix B.2.14). In no Canadian province have scores in either reading or science improved since 2000 or 2006 respectively.

Digital reading assessment

Reading in the 21st century demands proficiency in dealing with both print and digital texts. Printed and digital technologies each possess unique features that result in important differences in the way texts are produced, displayed, organized, and connected to other texts. Furthermore, whereas printed texts are permanent, digital texts are potentially dynamic and can be constantly revised and updated. These differences have consequences for the access to, as well as the comprehension and uses of text in a wide variety of situations, ranging from education to work to personal and civic purposes. It is therefore crucial to understand and assess the new forms of reading literacy that come with the practice of reading on digital displays (Coiro, 2009).[20]

PISA's 2012 reading framework incorporates the reading of electronic texts as an international option. In Canada, a subset of students who wrote the regular paper-based reading test also wrote the computer-based assessment. The latter allows countries to assess how well students can read digital texts. For the purposes of PISA, digital text is synonymous with hypertext: a text or texts with navigation tools and

[20] Coiro, J. (2009). Rethinking reading assessment in a digital age: How is reading comprehension different and where do we turn now? *Educational Leadership, 66*(6), 59–63.

features that make possible — and indeed even require — non-sequential reading. Each reader constructs a "customized" text from the information encountered in the links he or she follows. In essence, such digital texts have an unfixed, dynamic existence.

As this was an optional component of PISA, not all countries participated. Of the 32 countries that did, Canada performed well overall, with an average score of 532 — only Singapore, Korea, Hong Kong-China, and Japan performed better.

Across Canada, average scores ranged from 491 in Prince Edward Island to 548 in British Columbia, with all provinces performing above the OECD average with the exception of Prince Edward Island (which performed at the OECD average). Only British Columbia performed higher than the Canadian average, while Nova Scotia, Ontario, and Alberta performed at the average and the remaining provinces performed below. In most cases, these results mirror those observed for print reading at the provincial level.

While no significant differences were seen in the print-reading performance of Canadian students by language of the school-system, there was a difference in digital reading: specifically, students in anglophone systems outperformed their counterparts in francophone systems by 22 points (Table 2.4). Five provinces out of seven observed significant differences in digital-reading performance between the two systems, ranging from 33 points in British Columbia to 65 points in Ontario. It is noteworthy that in Alberta the print-reading performance of students was not significantly different between the two systems, whereas in digital reading students in the anglophone system scored 45 points higher than their peers in the francophone system.

Table 2.4

Estimated average reading scores for print reading and digital reading by province and language of the school system

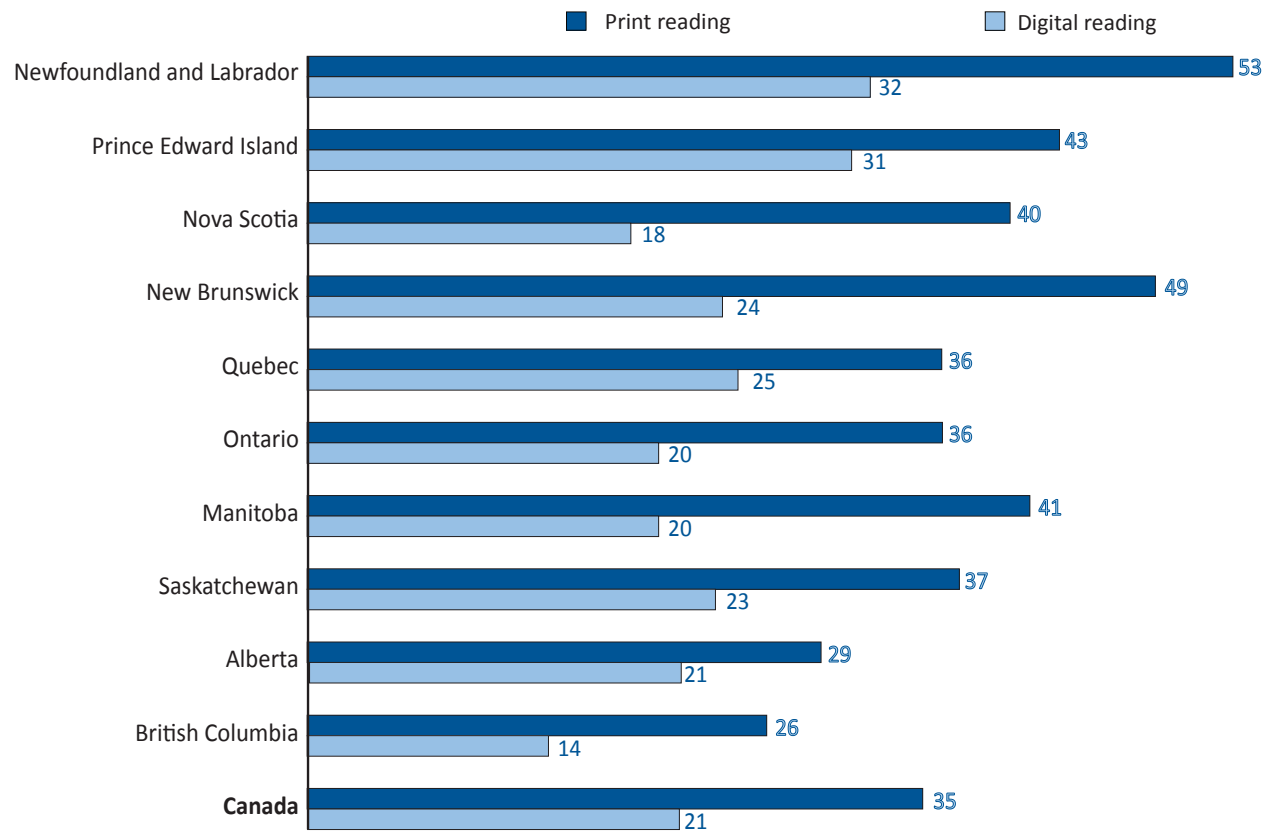
	Anglophone school system		Francophone school system		Difference between systems*	
	Average	Standard error	Average	Standard error	Score difference	Standard error
Print reading						
Nova Scotia	509	(3.2)	486	(7.4)	**23**	(8.2)
New Brunswick	505	(3.4)	471	(3.0)	**34**	(4.5)
Quebec	518	(3.5)	520	(4.0)	-2	(5.0)
Ontario	530	(4.6)	487	(2.8)	**43**	(5.3)
Manitoba	495	(3.4)	494	(5.6)	2	(6.8)
Alberta	525	(4.1)	506	(9.8)	20	(10.5)
British Columbia	535	(4.5)	509	(8.2)	**26**	(9.8)
Canada	525	(2.4)	517	(3.6)	8	(4.7)
Digital reading						
Nova Scotia	532	(9.9)	494	(5.5)	**39**	(11.6)
New Brunswick	525	(3.0)	489	(2.7)	**36**	(4.2)
Quebec	523	(3.7)	519	(3.9)	5	(5.5)
Ontario	542	(5.7)	478	(3.4)	**65**	(6.5)
Manitoba	510	(3.8)	504	(5.0)	6	(6.2)
Alberta	532	(5.4)	488	(12.9)	**45**	(13.7)
British Columbia	549	(3.6)	516	(7.1)	**33**	(8.2)
Canada	537	(2.9)	515	(3.5)	**22**	(4.8)

* Results in bold indicate a statistically significant difference between the two school systems. A negative difference means that the result for the francophone school system is higher. The Canadian results include students from all provinces.

As in print reading, girls outperformed boys in digital reading, although the gender gap was smaller: girls outperformed boys by 21 points, compared to 35 points in print reading. Across Canada, the gender gap ranged from 14 points in British Columbia to 32 points in Newfoundland and Labrador. These results suggest that it might be possible to harness boys' performance in digital reading to improve their reading proficiency in both print and digital formats.

Figure 2.6

Comparison of gender gaps (in favour of girls) in print and digital reading



Because readers today encounter texts in both digital and print media, it is useful to consider reading proficiency as a single measure. PISA 2012 has developed a composite scale which is based on equal weighting of results from the digital- and print-reading assessments (i.e., a simple average). Canada's average score for composite digital and print reading was 528, well above the OECD average of 498 and surpassed only by Singapore, Shanghai-China, Hong Kong-China, Korea, and Japan. Provincially, average scores on the composite reading scale ranged from 490 in Prince Edward Island to 542 in British Columbia, with students in British Columbia performing above the Canadian average and students in Nova Scotia, Ontario, and Alberta performing at the Canadian average. Students in the remaining provinces performed below the Canadian average.

The difference in digital reading by language of the school system contributed to a difference in composite reading, with students in the anglophone school systems outperforming those in the francophone systems by 15 points.

While girls consistently outperformed boys in both reading modes across all provinces and most countries (Colombia and Korea have no significant gender gap in digital reading), the gender gap narrows in digital

reading. Given that the composite reading scale is an amalgam of the two scales, with equal weighting for each, it is not surprising that the gender gap in Canada for composite reading is — at 28 points — between the gap for print reading (35) and digital reading (21). Newfoundland and Labrador shows the largest gender gap (42) on the composite reading scale while British Columbia shows the smallest (20).

Summary

Because reading and science were minor domains in PISA 2012, a smaller proportion of students were assessed in them compared to the mathematics assessment. Additionally, they comprised a smaller number of items than in the mathematics assessment. Consequently, this chapter provides only an update on overall performance in each of these domains, and not on their sub-domains as was done in previous years.

Canada continues to perform well internationally in reading and science. It scores well above the OECD average and is outperformed by only five countries in reading and seven in science among the 65 countries that participated in PISA 2012. Among the provinces, students in Nova Scotia, Quebec, Ontario, Saskatchewan, Alberta, and British Columbia performed above the OECD average in both reading and science. Students in Newfoundland and Labrador and New Brunswick performed at the average in reading and above the average in science. Students in Manitoba performed at the average in both reading and science, while students in Prince Edward Island performed below the OECD average in both domains.

Among the seven provinces where performance was examined by language of the school system, students attending majority-language schools in Nova Scotia, New Brunswick, Ontario, and British Columbia outperformed their counterparts attending minority-language schools in reading and science. Students attending majority-language schools in Alberta outperformed their counterparts attending minority-language schools only in science, while in Quebec and Manitoba there were no differences observed in either domain between the anglophone and francophone systems. In Canada and across all provinces, gender differences in performance persist in reading, with females outperforming males, while no gender difference was observed in science.

Canadian students' performance in reading remained stable over time, while in science it decreased. This result, coupled with improved performance in some other countries and the accession to PISA of new countries with high performance scores, has led to an erosion of Canada's international standing in reading and science. As such, although Canada's performance in these domains is still strong, even a minor decrease in performance may be an indication of potential loss of future competitiveness in a global economy.

Although Canada's performance in reading remained stable between 2000 and 2012, achievement decreased in five of the 10 provinces. Three of these provinces (Quebec, Saskatchewan, and Alberta) showed continued strong performance in PISA 2012, well above the OECD average. On the other hand, as a result of a decrease in performance in reading, Manitoba went from performing above the OECD average in 2000 to performing at the OECD average in 2012, and Prince Edward Island went from performing above the average in 2000 to performing below it in 2012.

As well, performance in science decreased in Newfoundland and Labrador, Prince Edward Island, Quebec, and Manitoba between 2006 and 2012. Of these provinces, Newfoundland and Labrador and Quebec continued to perform strongly in PISA 2012, well above the OECD average. Manitoba went from performing above the OECD average in 2006 to performing at the OECD average in 2012, and Prince Edward Island went from performing above the average in 2006 to performing below it in 2012.

An optional digital reading assessment was administered for the first time in Canada in PISA 2012, providing initial insights into the proficiency of Canadian youth in accessing, interpreting, and evaluating information on line. Again Canada performed well, being surpassed by only four of the 32 participating countries. British Columbia performed better than the Canadian average, while Nova Scotia, Ontario, and Alberta performed at the average. While no significant differences were seen in print-reading performance between the anglophone and francophone school systems, for Canada overall students in anglophone systems outperformed their francophone counterparts in digital reading. As in print reading, girls outperformed boys in digital reading, but by a narrower margin.

The results of the digital reading assessment have also been reported in combination with print reading as a composite score, reflecting what it means to be a proficient reader in the 21st century. Results on the composite reading scale mirror those of the digital reading assessment, with students in the anglophone school systems outperforming their counterparts in the francophone school systems, and girls outperforming boys (but by a smaller margin than that observed in print reading).

Conclusion

The Program for International Student Assessment (PISA) is an international survey that measures trends in learning outcomes at age 15. The study has been conducted every three years under the aegis of the Organization for Economic Cooperation and Development (OECD) since 2000. In 2012, it was administered in 65 countries, including Canada. The major focus of PISA 2012 was mathematics, while reading, science, and computer-based problem solving were tested as minor domains. Approximately 21,000 students from slightly over 900 schools in all provinces took the PISA assessment in the spring of 2012.

The value of PISA resides in its capacity to provide comparative information on skill levels of students as they near the end of compulsory education. Not only does PISA enable comparisons between provinces and countries on the knowledge and skills of their youth, it also provides an opportunity to monitor their change in performance over time.

Once again, PISA demonstrates that Canadian youths are well equipped with the foundational skills that are essential for full participation in modern society. In mathematics, Canada remains one of the top-performing countries, being surpassed only by three OECD countries and six non-OECD countries. Canadian 15-year-olds also performed very well internationally on the computer-based assessment of mathematics, a new component in PISA 2012. From a Canadian perspective, only students in Quebec performed higher than the Canadian average in paper-based mathematics, which places them among top-performing participants globally. All other provinces, except Prince Edward Island, achieved a score at or above the average for OECD countries.

In 2012, Canadian students in francophone school systems performed better in mathematics than their counterparts in the anglophone systems, mainly because of the results in Quebec. This finding is consistent with the results from the most recent Pan-Canadian Assessment Program (PCAP) evaluation of mathematics in 2010.[21] As was the case in most other countries, Canadian males performed better than females in mathematics. From the baseline year of 2003, the Canadian results in mathematics in 2012 have decreased on a statistically significant basis (532 vs. 518). This trend was observed in all provinces except Quebec and Saskatchewan, where the change was not statistically significant. Compared with past PISA cycles, Canada's ranking in mathematics has declined, although it is still high. This decline is attributable to an overall decrease in the Canadian average performance, an increase in the performance of other countries, and the accession to PISA since 2000 of new high-performing countries. Compared with 2003, proportionally more Canadian students did not reach the benchmark level established by the OECD (Level 2), and fewer students reached the highest levels (Levels 5 and 6).

Although they are still strong, Canadian results in mathematics have slipped over time, both from a relative and an absolute perspective. Significantly, ministers of education agreed in July 2013 that numeracy was a key priority and that "provinces and territories would work together to identify and share best practices on innovative teaching and learning strategies to raise student achievement in this area."[22]

The Canadian results in reading are consistent with those observed in mathematics. Results in 2012 confirmed Canada's consistently high level of achievement in this foundational area, with only five countries out of

[21] CMEC. (2011). *PCAP 2010: Report on the pan-Canadian assessment of mathematics, science, and reading.* Toronto: Author.

[22] CMEC. (2013). "Ministers Call for More Innovation and Expanded Opportunities as Education Systems Look to the Future". Press Release, July 2013. Retrieved from: http://cmec.ca/278/Press-Releases/Press-Releases-Detail/Ministers-Call-for-More-Innovation-and-Expanded-Opportunities-as-Education-Systems-Look-to-the-Future.html?id_article=626

65 surpassing Canada's average score. As was the case in mathematics, all provinces with the exception of Prince Edward Island performed at or above the OECD average. Students in British Columbia performed particularly well in reading, exceeding even the Canadian average. A computer-based assessment (reading of digital texts) was also administered to a subset of Canadian students for the first time in PISA 2012, and overall only four countries out of the 32 participating achieved a higher score than Canada on this component.

Unlike in mathematics, the reading performance of students in francophone school systems did not differ significantly from their counterparts in the anglophone systems at the Canadian level, although marked differences can be seen in several provinces. As is the case internationally, the gender gap in reading favouring girls persists in Canada, with none of the provinces able to close the gap in the past 12 years. Between 2000 — when the major focus of PISA was reading for the first time — and 2012, Canada's overall performance in reading did not change, although it decreased in five provinces on a statistically significant basis.

PISA 2012 also provides valuable indicators of scientific literacy. Overall, seven countries outperformed Canada in science. Students in British Columbia and Alberta achieved higher results than the Canadian average, while all other provinces except Ontario, who was at the Canadian average, achieved results below. Furthermore, the performance of students in all provinces except for Prince Edward Island was at or above the OECD average. At the Canadian level, and in five out of seven provinces for which such results are reported, students in the anglophone school systems outperformed students in the francophone systems, with much larger differences in science than in reading. In PISA 2012, there is no gender difference in science achievement across Canada or in any provinces. As in mathematics, science performance decreased over time in Canada, with four provinces experiencing significant declines in their 15-year-olds' skill levels between 2006 and 2012.

As a measure of equity in educational outcomes, PISA considers the difference between high-performing and low-performing students. In all three areas assessed by PISA, the gap between high- and low-achievers is smaller in Canada than in OECD countries on average (which means more equity). Provincially, Nova Scotia and New Brunswick show smaller gaps in all three areas.

Results from PISA 2012 confirm the success of our education systems from a global perspective. Indeed, Canada remains in a small group of top-performing countries, and achieves its standing with mostly equitable outcomes. However, the trend in decreasing average scores noted in past PISA cycles is confirmed in 2012. Indeed, results from PISA, as well as from other pan-Canadian and international assessments, show that several provinces have experienced a significant decline in the skill levels of their youth over the past decade. This trend is perhaps a strong signal for ministries and departments of education, as well as for education partners, to work together in validating current education policies, learning outcomes, and teaching approaches and strategies, as well as allocating resources to ensure that they continue meeting the needs of our society.

The quality of human capital in the future will not exceed the quality of the education we provide to our children today. PISA's teenagers will eventually become adults responsible for the success of our economy, so it is important to address the challenges highlighted in this report immediately. Indeed, the recent results released from the Programme for the International Assessment of Adult Competencies (PIAAC) indicate that many Canadians between the ages of 16 and 65 face significant challenges in terms of literacy, numeracy, and problem-solving in a technology-rich environment.[23] It is essential that our education systems prepare Canadian youth for full participation in modern society for generations to come.

[23] Ministry of Industry. (2013). *Skills in Canada: First results from the Programme for the International Assessment of Adult Competencies (PIAAC)*. Ottawa. Author.

Appendix A

PISA 2012 sampling procedures and response rates

The accuracy of PISA survey results depends on the quality of the information on which the sample is based, as well as the sampling procedures. The PISA 2012 sample for Canada was based on a two-stage stratified sample. The first stage consisted of sampling individual schools in which 15-year-old 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 (15-year-old) students enrolled in the school). While a minimum of 150 schools were required to be selected in each country, in Canada a much larger sample of schools was selected in order to produce reliable estimates for each province and for each of the anglophone and francophone school systems in Nova Scotia, New Brunswick, Quebec, Ontario, Manitoba, Alberta, and British Columbia.

The second stage of the selection process sampled students within the schools. Once schools were selected, a list of all 15-year-old students in each was prepared. From this list, up to 35 students were then selected with equal probability. (All students were selected if fewer than 35 were enrolled.) Additionally, in Newfoundland and Labrador, Prince Edward Island, Nova Scotia, New Brunswick, and Quebec, as well as in the francophone school systems in Manitoba and Alberta, more than 35 students were selected where possible in order to meet sample size requirements. In addition, in each participating school a sub-sample of approximately 15 students was randomly selected to take the computer-based assessment of PISA in either mathematics, reading, or problem solving, after they had completed the core paper-based components.

Each country participating in PISA attempted to maximize the coverage of PISA's target population within the sampled schools. Within each sampled school, all eligible students (namely those 15 years of age), regardless of grade, were first listed. Sampled students who were to be excluded by the school had still to be included in the sampling documentation, and a list drawn up stating the reason for their exclusion. Tables A.1a and A.1b shows the total number of excluded students by province, who are then further described and classified into specific categories in accordance with the international standards. Students could be excluded based on these three categories: i) students with a functional disability (student has a moderate to severe permanent physical disability such that he/she cannot perform in the PISA testing situation); ii) students with an intellectual disability (student has a mental or emotional disability and is cognitively delayed such that he/she cannot perform in the PISA testing situation); and iii) students with a limited proficiency in the assessment language (student is unable to read or speak any of the languages of the assessment in the country and would be unable to overcome the language barrier in the testing situation – typically a student who has received less than one year of instruction in the language of the assessment).

The weighted student exclusion rate for Canada overall was 5.5%, and this proportion ranged from 3.6% in Saskatchewan to 9.7% in Newfoundland and Labrador. Across all provinces the vast majority of exclusions was a result of an intellectual disability (category ii) above). Compared with PISA 2009, the weighted student exclusion rates increased by more than 2% in Newfoundland and Labrador, Prince Edward Island, and Nova Scotia.

Table A.1a

PISA 2012 student exclusion rate

Canada and provinces	Total number of eligible students sampled (participating, not participating, and excluded)		Total number of students excluded		Student exclusion rate	
	Unweighted*	Weighted**	Unweighted*	Weighted**	Unweighted* %	Weighted** %
Newfoundland and Labrador	1,926	5,151	189	501	9.8	9.7
Prince Edward Island	1,804	1,806	149	149	8.3	8.3
Nova Scotia	1,979	12,446	153	1,151	7.7	9.2
New Brunswick	2,497	9,562	212	663	8.5	6.9
Quebec	6,305	86,504	264	3,577	4.2	4.1
Ontario	5,039	155,161	309	9,992	6.1	6.4
Manitoba	2,784	15,225	153	800	5.5	5.3
Saskatchewan	2,647	15,159	107	546	4.0	3.6
Alberta	2,907	38,473	130	1,596	4.5	4.1
British Columbia	2,682	50,477	146	2,546	5.4	5.0
Canada	**30,570**	**389,966**	**1,812**	**21,522**	**5.9**	**5.5**

* Based on students selected to participate.
** Weighted based on student enrolment such that the total weighted value represents all 15-year-olds enrolled in the province and not just those selected for PISA.

Table A.1b

PISA 2012 student exclusion rate by type of exclusion

Canada and provinces	Exclusion rate: students with a physical disability		Exclusion rate: students with an intellectual disability		Exclusion rate: students with limited language skills	
	Unweighted* %	Weighted** %	Unweighted* %	Weighted** %	Unweighted* %	Weighted** %
Newfoundland and Labrador	0.5	0.5	9.1	9.1	0.2	0.2
Prince Edward Island	0.2	0.2	7.3	7.3	0.7	0.7
Nova Scotia	0.2	0.2	7.1	8.6	0.5	0.5
New Brunswick	0.3	0.3	8.0	6.4	0.2	0.3
Quebec	0.1	0.1	3.8	3.7	0.3	0.3
Ontario	0.4	0.3	5.6	5.9	0.1	0.2
Manitoba	0.3	0.3	4.7	4.5	0.5	0.5
Saskatchewan	0.2	0.2	3.2	2.7	0.6	0.7
Alberta	0.5	0.5	3.5	3.3	0.4	0.4
British Columbia	0.1	0.1	4.6	4.2	0.7	0.7
Canada	**0.3**	**0.3**	**5.3**	**4.9**	**0.4**	**0.4**

* Based on students selected to participate.
** Weighted based on student enrolment such that the total weighted value represents all 15-year-olds enrolled in the province and not just those selected for PISA.

In order to minimize the potential for response bias, data quality standards in PISA require minimum participation rates for schools and students. At the Canada-wide level, a minimum response rate of 85% was required for schools initially selected. School response rates were also considered acceptable where the initial school response rate was between 65% and 85%, and replacement schools were selected to achieve a school response rate of 85% or higher. Schools with student participation rates between 25% and 50% were not counted as participating schools, but data for these schools were included in the database. Schools with student participation rates of less than 25% were not counted as participating and their data were excluded from the database.

PISA 2012 also requires a minimum student participation rate of 80% within all participating schools combined (original sample and replacements) at the national level.

Table A.2 shows the response rates for schools and students, before and after replacement, for Canada and the 10 provinces. At the national level 907 schools were selected to participate in PISA 2012, and 828 of these initially selected schools participated. Rather than calculating school participation rates by dividing the number of participating schools by the total number of schools, school response rates were weighted based on 15-year-old enrolment numbers in each school.

At the provincial level, school response rates after replacement ranged from 85% in Quebec to 99% in Prince Edward Island. Across Canada, the school response rate was 93%.

At the student level Canada's response rate after replacement was 81%. Apart from Quebec (76%) and Nova Scotia (79%), all provinces achieved a student response rate above 80%. Compared to PISA 2009, the weighted student participation rates after replacement decreased by more than 2% in Newfoundland and Labrador, Prince Edward Island, and New Brunswick, while it increased by more than 2% in Quebec and Ontario.

Even though Nova Scotia fell short of the expected response rate by less than 2% (78.6% vs. 80%), a non-response analysis was conducted on the non-respondents. It was concluded that the possible bias of these non-respondents would have been marginal in Nova Scotia (less than two points on the provincial average for mathematics) and therefore determined that the provincial data for Nova Scotia could be included in the Canadian data set without restrictions.

Given that the response rate among Quebec's francophone students did not meet the international standards (75% vs. 80%), an analysis of the non-respondents in PISA 2012 was undertaken by Quebec's *ministère de l'Éducation, du Loisir et du Sport*. By linking the PISA 2012 raw data set for Quebec with administrative data at the Ministry, it was determined that those students who did not respond to the PISA survey differed from those who responded based on the following characteristics:

- Proportionally, more PISA non-respondents came from public schools than PISA respondents.
- On average, PISA non-respondents came from households with a higher International Socioeconomic Index of occupational status (ISEI) than PISA respondents.
- Proportionally, there were more male students among PISA non-respondents than among PISA respondents.
- On average, PISA non-respondents did not perform as well as PISA respondents on the provincial test of French administered to students in Quebec.

The PISA data set does not take into account the difference in the distribution by socioeconomic status and the differences in performance between respondents and non-respondents. This may marginally impact the results for Quebec, especially in terms of average performance in each subject area, and when results are reported by socioeconomic status.

Table A.2

PISA 2012 school and student response rates

Canada and provinces	Total number of selected schools (participating and not participating)	School response rate before replacement		School response rate after replacement		Total number of eligible students sampled (participating and not participating)		Total number of students participating		Weighted % student participation rate after replacement (participating and not participating)
		Number	Weighted %	Number	Weighted %	Unweighted	Weighted	Unweighted	Weighted	
Newfoundland and Labrador	59	56	96.7	56	96.7	1,639	4,579	1,313	3,734	81.6
Prince Edward Island	28	24	99.2	24	99.2	1,583	1,583	1,288	1,288	81.4
Nova Scotia	61	60	98.3	60	98.3	1,713	10,670	1,365	8,383	78.6
New Brunswick	59	57	94.2	57	94.2	2,098	6,665	1,775	5,646	84.7
Quebec	184	157	85.3	157	85.3	4,980	66,847	3,850	50,506	75.6
Ontario	152	147	96.7	147	96.7	4,437	133,974	3,652	110,936	82.8
Manitoba	90	86	97.2	86	97.2	2,477	13,656	2,060	11,119	81.4
Saskatchewan	91	86	96.4	86	96.4	2,274	10,931	1,933	9,260	84.7
Alberta	99	82	79.8	93	91.2	2,476	35,481	2,017	28,855	81.3
British Columbia	84	73	87.9	74	89.3	2,158	39,942	1,741	32,201	80.6
Canada	**907**	**828**	**91.3**	**840**	**92.9**	**25,835**	**324,328**	**20,994**	**261,928**	**80.8**

Note: School response rates were weighted based on student enrolment.

Appendix B

PISA 2012 data tables

Table B.1.1

Estimated average scores and confidence intervals for countries, economies, and provinces: PAPER-BASED MATHEMATICS

Country, economy, or province	average	standard error	confidence interval – 95% lower limit	confidence interval – 95% upper limit
Shanghai-China	613	(3.3)	606	619
Singapore	573	(1.3)	571	576
Hong Kong-China	561	(3.2)	555	568
Chinese Taipei	560	(3.3)	553	566
Korea	554	(4.6)	545	563
Macao-China	538	(1.0)	536	540
Japan	536	(3.6)	529	543
Quebec	**536**	**(3.4)**	**529**	**542**
Liechtenstein	535	(4.0)	527	543
Switzerland	531	(3.0)	525	537
The Netherlands	523	(3.5)	516	530
British Columbia	**522**	**(4.4)**	**514**	**531**
Estonia	521	(2.0)	517	525
Finland	519	(1.9)	515	523
Canada	**518**	**(1.8)**	**514**	**522**
Poland	518	(3.6)	510	525
Alberta	**517**	**(4.6)**	**508**	**526**
Belgium	515	(2.1)	511	519
Ontario	**514**	**(4.1)**	**506**	**522**
Germany	514	(2.9)	508	519
Vietnam	511	(4.8)	502	521
Saskatchewan	**506**	**(3.0)**	**500**	**512**
Austria	506	(2.7)	500	511
Australia	504	(1.6)	501	507
New Brunswick	**502**	**(2.6)**	**497**	**507**
Ireland	501	(2.2)	497	506
Slovenia	501	(1.2)	499	504
Denmark	500	(2.3)	496	505
New Zealand	500	(2.2)	495	504
Czech Republic	499	(2.9)	493	505
Nova Scotia	**497**	**(4.1)**	**489**	**505**
France	495	(2.5)	490	500
United Kingdom	494	(3.3)	487	500
Iceland	493	(1.7)	489	496
Manitoba	**492**	**(2.9)**	**487**	**498**
Latvia	491	(2.8)	485	496
Newfoundland and Labrador	**490**	**(3.7)**	**483**	**498**
Luxembourg	490	(1.1)	488	492
Norway	489	(2.7)	484	495
Portugal	487	(3.8)	480	495
Italy	485	(2.0)	481	489
Spain	484	(1.9)	481	488
Russian Federation	482	(3.0)	476	488
Slovak Republic	482	(3.4)	475	488
United States	481	(3.6)	474	488
Prince Edward Island	**479**	**(2.5)**	**475**	**484**
Lithuania	479	(2.6)	474	484
Sweden	478	(2.3)	474	483
Hungary	477	(3.2)	471	483
Croatia	471	(3.5)	464	478
Israel	466	(4.7)	457	476
Greece	453	(2.5)	448	458
Serbia	449	(3.4)	442	456
Turkey	448	(4.8)	439	457
Romania	445	(3.8)	437	452
Cyprus	440	(1.1)	438	442
Bulgaria	439	(4.0)	431	447
United Arab Emirates*	434	(2.4)	429	439
Kazakhstan	432	(3.0)	426	438
Thailand	427	(3.4)	420	433
Chile	423	(3.1)	417	429
Malaysia	421	(3.2)	414	427
Mexico	413	(1.4)	411	416
Montenegro	410	(1.1)	408	412
Uruguay	409	(2.8)	404	415
Costa Rica	407	(3.0)	401	413
Albania	394	(2.0)	390	398
Brazil	391	(2.1)	387	395
Argentina	388	(3.5)	382	395
Tunisia	388	(3.9)	380	395
Jordan	386	(3.1)	379	392
Colombia	376	(2.9)	371	382
Qatar	376	(0.8)	375	378
Indonesia	375	(4.0)	367	383
Peru	368	(3.7)	361	375

Note: The OECD average was 494, with a standard error of 0.5.
*Excluding Dubai (in this and all other tables).

Table B.1.2

Estimated average scores and confidence intervals for Canada and the provinces: PAPER-BASED MATHEMATICS BY CONTENT SUBSCALES

Canada and provinces	average	standard error	confidence interval – 95% lower limit	confidence interval – 95% upper limit
Change and Relationships				
Canada	**525**	**(2.0)**	**521**	**529**
Newfoundland and Labrador	500	(3.9)	492	507
Prince Edward Island	490	(2.7)	485	495
Nova Scotia	499	(5.8)	487	510
New Brunswick	505	(3.0)	499	511
Quebec	535	(3.7)	528	543
Ontario	525	(4.2)	517	533
Manitoba	498	(3.2)	492	504
Saskatchewan	516	(3.3)	509	522
Alberta	526	(4.9)	517	536
British Columbia	530	(4.8)	521	540
Note: The OECD average was 493, with a standard error of 0.6.				
Quantity				
Canada	**515**	**(2.2)**	**511**	**520**
Newfoundland and Labrador	485	(4.0)	477	493
Prince Edward Island	475	(2.9)	469	480
Nova Scotia	494	(4.1)	486	502
New Brunswick	504	(2.9)	499	510
Quebec	534	(3.5)	527	541
Ontario	511	(4.9)	501	521
Manitoba	488	(3.5)	481	495
Saskatchewan	501	(3.5)	494	507
Alberta	512	(5.3)	502	523
British Columbia	523	(5.3)	513	534
Note: The OECD average was 495, with a standard error of 0.5.				
Space and Shape				
Canada	**510**	**(2.1)**	**506**	**514**
Newfoundland and Labrador	477	(3.7)	470	484
Prince Edward Island	460	(2.6)	455	465
Nova Scotia	482	(2.7)	477	488
New Brunswick	493	(2.7)	488	499
Quebec	535	(4.0)	527	543
Ontario	505	(4.4)	496	513
Manitoba	484	(3.2)	478	490
Saskatchewan	497	(3.8)	490	505
Alberta	509	(4.9)	500	519
British Columbia	512	(5.0)	502	521
Note: The OECD average was 490, with a standard error of 0.5.				
Uncertainty and Data				
Canada	**516**	**(1.8)**	**513**	**520**
Newfoundland and Labrador	491	(5.0)	482	501
Prince Edward Island	488	(2.7)	482	493
Nova Scotia	503	(5.5)	492	514
New Brunswick	498	(2.8)	492	503
Quebec	534	(3.5)	527	540
Ontario	511	(4.1)	503	519
Manitoba	495	(2.9)	489	501
Saskatchewan	507	(2.9)	502	513
Alberta	517	(4.8)	508	527
British Columbia	521	(4.1)	513	529
Note: The OECD average was 493, with a standard error of 0.5.				

Table B.1.3

Estimated average scores and confidence intervals for Canada and the provinces: PAPER-BASED MATHEMATICS BY PROCESS SUBSCALES

Canada and provinces	average	standard error	confidence interval – 95% lower limit	confidence interval – 95% upper limit
Employing				
Canada	517	(1.9)	513	520
Newfoundland and Labrador	490	(3.8)	483	498
Prince Edward Island	479	(2.5)	475	484
Nova Scotia	493	(3.1)	487	499
New Brunswick	500	(2.8)	495	506
Quebec	536	(3.4)	529	542
Ontario	512	(4.3)	504	521
Manitoba	489	(3.2)	483	496
Saskatchewan	506	(3.2)	499	512
Alberta	515	(4.6)	506	524
British Columbia	522	(4.5)	513	531
Note: The OECD average was 493, with a standard error of 0.5.				
Formulating				
Canada	516	(2.2)	512	520
Newfoundland and Labrador	482	(4.6)	473	491
Prince Edward Island	476	(2.8)	470	481
Nova Scotia	494	(6.4)	481	506
New Brunswick	504	(2.9)	498	509
Quebec	539	(3.9)	531	546
Ontario	512	(4.7)	502	521
Manitoba	487	(3.3)	480	494
Saskatchewan	502	(3.3)	495	508
Alberta	514	(5.6)	503	525
British Columbia	517	(5.2)	507	527
Note: The OECD average was 492, with a standard error of 0.5.				
Interpreting				
Canada	521	(2.0)	517	525
Newfoundland and Labrador	499	(3.8)	491	506
Prince Edward Island	487	(2.9)	481	492
Nova Scotia	507	(3.8)	500	515
New Brunswick	502	(2.8)	496	507
Quebec	536	(3.4)	529	542
Ontario	517	(4.4)	508	525
Manitoba	502	(3.0)	496	507
Saskatchewan	508	(3.1)	502	514
Alberta	523	(5.2)	513	533
British Columbia	528	(4.1)	520	536

Note: The OECD average was 497, with a standard error of 0.5.

Table B.1.4

Estimated average scores and confidence intervals for countries, economies, and provinces: COMPUTER-BASED MATHEMATICS

Country, economy, or province	average	standard error	confidence interval – 95% lower limit	confidence interval – 95% upper limit
Singapore	566	(1.3)	563	569
Shanghai-China	562	(3.4)	556	569
Korea	553	(4.5)	544	561
Hong Kong-China	550	(3.4)	543	556
Macao-China	543	(1.1)	541	545
Japan	539	(3.3)	533	546
Chinese Taipei	537	(2.8)	532	543
British Columbia	**532**	**(4.7)**	**523**	**541**
Ontario	**530**	**(5.5)**	**519**	**541**
Quebec	**523**	**(3.8)**	**516**	**531**
Canada	**523**	**(2.2)**	**518**	**527**
Alberta	**516**	**(5.2)**	**506**	**526**
Estonia	516	(2.2)	512	520
Belgium	511	(2.4)	507	516
Newfoundland and Labrador	**511**	**(3.2)**	**505**	**517**
Germany	509	(3.3)	503	516
France	508	(3.3)	502	514
Australia	508	(1.6)	504	511
Austria	507	(3.5)	500	514
Nova Scotia	**503**	**(5.9)**	**492**	**515**
Saskatchewan	**499**	**(3.3)**	**493**	**505**
Italy	499	(4.2)	491	507
United States	498	(4.1)	490	506
Norway	498	(2.8)	492	503
Slovak Republic	497	(3.5)	490	504
New Brunswick	**496**	**(2.8)**	**491**	**502**
Denmark	496	(2.7)	491	501
Manitoba	**493**	**(3.2)**	**487**	**499**
Ireland	493	(2.9)	487	499
Prince Edward Island	**491**	**(3.0)**	**485**	**497**
Sweden	490	(2.9)	484	496
Russian Federation	489	(2.6)	484	494
Poland	489	(4.0)	481	497
Portugal	489	(3.1)	483	495
Slovenia	487	(1.2)	485	489
Spain	475	(3.2)	469	481
Hungary	470	(3.9)	462	477
Israel	447	(5.6)	436	458
United Arab Emirates	434	(2.2)	430	438
Chile	432	(3.3)	425	439
Brazil	421	(4.7)	412	430
Colombia	397	(3.2)	391	403

Note: The OECD average was 497, with a standard error of 0.7.

Table B.1.5

Estimated average scores and confidence intervals for countries, economies, and provinces: COMPOSITE MATHEMATICS

Country, economy, or province	average	standard error	confidence interval – 95% lower limit	confidence interval – 95% upper limit
Shanghai-China	587	(3.1)	581	594
Singapore	570	(1.3)	567	572
Hong Kong-China	555	(3.0)	550	561
Korea	553	(4.4)	545	562
Chinese Taipei	549	(2.8)	543	554
Macao-China	541	(0.9)	539	542
Japan	538	(3.3)	531	544
Quebec	**530**	**(3.3)**	**523**	**536**
British Columbia	**527**	**(4.2)**	**519**	**535**
Ontario	**522**	**(4.5)**	**513**	**531**
Canada	**520**	**(1.9)**	**517**	**524**
Estonia	518	(1.9)	515	522
Alberta	**517**	**(4.5)**	**508**	**526**
Belgium	513	(2.1)	509	517
Germany	511	(2.9)	506	517
Austria	506	(2.8)	501	512
Australia	506	(1.5)	503	509
Poland	503	(3.6)	496	510
Saskatchewan	**502**	**(2.9)**	**497**	**508**
France	502	(2.5)	497	506
Newfoundland and Labrador	**501**	**(3.3)**	**494**	**507**
Nova Scotia	**500**	**(4.8)**	**491**	**510**
New Brunswick	**499**	**(2.5)**	**494**	**504**
Denmark	498	(2.3)	494	503
Ireland	497	(2.3)	493	502
Slovenia	494	(1.2)	492	496
Italy	493	(3.7)	486	501
Norway	493	(2.4)	489	498
Manitoba	**493**	**(2.9)**	**487**	**498**
United States	490	(3.7)	483	497
Slovak Republic	489	(3.3)	483	496
Portugal	488	(3.2)	482	494
Russian Federation	486	(2.5)	481	491
Prince Edward Island	**485**	**(2.3)**	**481**	**490**
Sweden	484	(2.2)	480	488
Spain	479	(2.4)	474	484
Hungary	473	(3.3)	467	480
Israel	457	(5.0)	447	466
United Arab Emirates	434	(2.1)	430	438
Chile	427	(2.9)	422	433
Brazil	409	(3.9)	401	416
Colombia	387	(2.7)	381	392

Note: The OECD average was 497, with a standard error of 0.6.

Table B.1.6

Variation in student performance for countries, economies, and provinces: PAPER-BASED MATHEMATICS

Country, economy, or province	Percentiles												Difference in score points between the 10th and 90th percentiles
	5th		10th		25th		75th		90th		95th		
	score	standard error	score	standard error	score	standard error	score	standard error	score	standard error	score	standard error	
Costa Rica	301	(3.8)	323	(3.8)	361	(3.6)	449	(3.9)	496	(5.1)	525	(6.9)	172
Indonesia	266	(4.9)	288	(4.2)	327	(3.8)	418	(5.2)	469	(7.8)	501	(12.4)	181
Kazakhstan	319	(3.1)	343	(2.5)	383	(2.8)	478	(4.4)	527	(5.7)	554	(6.0)	183
Colombia	262	(4.8)	285	(4.0)	326	(2.8)	423	(3.6)	474	(4.8)	506	(5.4)	189
Mexico	295	(1.8)	320	(1.9)	362	(1.6)	462	(1.7)	510	(2.0)	539	(2.1)	191
Jordan	263	(4.4)	290	(4.0)	335	(3.2)	435	(3.3)	485	(4.3)	514	(6.8)	195
Argentina	264	(5.5)	292	(4.6)	337	(3.8)	440	(4.5)	488	(4.1)	514	(4.3)	196
Tunisia	267	(4.7)	292	(4.3)	334	(3.7)	437	(4.5)	488	(7.3)	523	(11.6)	196
Brazil	275	(2.7)	298	(2.0)	337	(1.9)	440	(2.7)	495	(4.5)	530	(5.5)	197
Thailand	302	(3.8)	328	(3.1)	372	(2.6)	476	(4.8)	535	(7.3)	575	(8.6)	207
Nova Scotia	**364**	**(8.2)**	**393**	**(6.8)**	**442**	**(5.6)**	**552**	**(5.7)**	**601**	**(7.1)**	**632**	**(7.6)**	**209**
Estonia	389	(3.5)	417	(3.0)	465	(2.7)	576	(2.7)	626	(3.2)	657	(4.1)	209
Romania	322	(3.9)	344	(3.5)	386	(3.8)	497	(4.8)	553	(6.1)	588	(7.4)	209
Chile	299	(4.1)	323	(3.7)	365	(3.5)	476	(4.2)	532	(4.2)	563	(4.1)	209
Malaysia	294	(3.4)	319	(3.2)	363	(3.1)	474	(4.3)	530	(4.9)	562	(5.6)	211
Latvia	360	(4.8)	387	(4.4)	434	(3.3)	546	(3.8)	597	(3.7)	626	(4.6)	211
New Brunswick	**365**	**(5.7)**	**396**	**(4.8)**	**446**	**(4.1)**	**559**	**(5.0)**	**608**	**(5.4)**	**640**	**(7.8)**	**212**
Denmark	363	(4.6)	393	(4.0)	444	(3.3)	556	(2.7)	607	(3.1)	635	(4.2)	214
Montenegro	280	(2.7)	306	(2.0)	352	(1.7)	465	(2.0)	520	(2.7)	552	(3.2)	214
Peru	237	(4.0)	264	(3.4)	311	(3.6)	421	(4.9)	478	(6.7)	517	(7.6)	214
Saskatchewan	**368**	**(6.4)**	**400**	**(4.0)**	**448**	**(3.6)**	**566**	**(4.8)**	**616**	**(5.2)**	**644**	**(6.9)**	**216**
Prince Edward Island	**344**	**(5.6)**	**370**	**(4.8)**	**421**	**(4.1)**	**536**	**(3.2)**	**587**	**(4.6)**	**618**	**(8.8)**	**216**
Ireland	359	(5.0)	391	(3.6)	445	(3.2)	559	(2.4)	610	(2.5)	640	(3.2)	219
Finland	376	(4.5)	409	(3.3)	463	(2.5)	577	(2.4)	629	(3.1)	657	(3.2)	219
Vietnam	371	(8.1)	401	(7.4)	454	(5.3)	568	(5.5)	623	(6.8)	654	(7.9)	222
Russian Federation	341	(4.2)	371	(3.9)	423	(3.1)	540	(3.6)	595	(4.7)	626	(5.3)	224
British Columbia	**381**	**(7.0)**	**410**	**(5.8)**	**464**	**(4.1)**	**582**	**(5.2)**	**635**	**(6.3)**	**665**	**(5.3)**	**225**
Ontario	**370**	**(5.6)**	**401**	**(5.1)**	**456**	**(4.0)**	**574**	**(5.2)**	**628**	**(5.4)**	**660**	**(6.4)**	**227**
Spain	339	(3.6)	370	(3.1)	424	(2.6)	546	(2.1)	597	(2.4)	626	(2.0)	228
Newfoundland and Labrador	**346**	**(9.4)**	**376**	**(7.1)**	**431**	**(6.1)**	**550**	**(4.8)**	**604**	**(5.8)**	**636**	**(6.6)**	**228**
Greece	308	(4.6)	338	(3.8)	393	(3.6)	513	(2.8)	567	(3.1)	597	(3.7)	228
Uruguay	267	(5.0)	297	(4.1)	347	(3.0)	470	(3.6)	526	(3.8)	558	(6.4)	228
Croatia	334	(4.2)	360	(3.3)	408	(3.6)	531	(4.5)	589	(7.3)	623	(8.8)	229
Manitoba	**350**	**(6.3)**	**378**	**(4.9)**	**431**	**(3.7)**	**554**	**(4.0)**	**608**	**(5.9)**	**640**	**(6.5)**	**230**
Norway	341	(5.1)	373	(3.9)	428	(2.9)	552	(3.3)	604	(3.4)	638	(5.1)	231
Canada	**370**	**(2.8)**	**402**	**(2.4)**	**457**	**(2.1)**	**580**	**(2.3)**	**633**	**(2.3)**	**663**	**(2.7)**	**231**
Albania	236	(5.9)	278	(4.8)	338	(3.0)	454	(2.4)	510	(3.5)	540	(3.5)	231
United Arab Emirates	297	(3.0)	323	(2.5)	370	(2.9)	494	(2.9)	555	(3.9)	591	(3.4)	232
Lithuania	334	(3.9)	364	(3.5)	418	(3.1)	540	(3.3)	596	(3.5)	627	(4.0)	232
Serbia	306	(4.4)	335	(4.1)	386	(3.7)	508	(4.4)	567	(5.8)	603	(6.7)	233
United States	339	(4.2)	368	(3.9)	418	(3.7)	543	(4.4)	600	(4.3)	634	(5.4)	233
Poland	373	(3.9)	402	(2.8)	454	(3.3)	580	(4.9)	636	(6.0)	669	(7.1)	234
Sweden	329	(4.4)	360	(3.5)	415	(2.9)	543	(2.7)	596	(2.9)	627	(3.6)	236
Quebec	**380**	**(6.3)**	**413**	**(5.2)**	**475**	**(4.4)**	**600**	**(3.9)**	**650**	**(3.8)**	**678**	**(4.9)**	**237**

Table B.1.6 (continued)

Variation in student performance for countries, economies, and provinces: PAPER-BASED MATHEMATICS

Country, economy, or province	Percentiles												Difference in score points between the 10th and 90th percentiles
	5th		10th		25th		75th		90th		95th		
	score	standard error	score	standard error	score	standard error	score	standard error	score	standard error	score	standard error	
Alberta	**368**	**(6.0)**	**398**	**(6.0)**	**453**	**(5.6)**	**582**	**(5.5)**	**635**	**(5.1)**	**665**	**(5.8)**	**237**
Turkey	313	(4.3)	339	(3.3)	382	(3.6)	507	(8.0)	577	(9.7)	614	(9.4)	238
Iceland	339	(4.1)	372	(2.8)	431	(2.6)	557	(3.0)	612	(3.3)	641	(3.7)	239
Austria	353	(4.1)	384	(3.9)	440	(3.2)	572	(3.5)	624	(3.8)	654	(4.3)	240
Cyprus	287	(2.8)	320	(2.6)	376	(1.6)	503	(2.0)	561	(2.1)	595	(3.1)	240
Slovenia	357	(3.9)	384	(2.5)	434	(2.0)	566	(2.1)	624	(2.9)	655	(4.3)	240
Italy	333	(2.6)	366	(2.2)	421	(2.3)	550	(2.7)	607	(3.0)	639	(3.4)	241
Macao-China	379	(3.9)	415	(2.8)	476	(1.7)	605	(1.7)	657	(2.3)	685	(2.4)	242
The Netherlands	367	(4.8)	397	(5.5)	457	(5.1)	591	(4.3)	638	(3.7)	665	(4.0)	242
Japan	377	(6.1)	415	(5.1)	473	(4.2)	603	(4.4)	657	(5.1)	686	(5.5)	242
Switzerland	374	(3.9)	408	(3.3)	466	(3.4)	597	(3.6)	651	(4.3)	681	(4.7)	243
Czech Republic	344	(6.4)	377	(4.9)	432	(3.9)	566	(3.3)	621	(3.6)	653	(4.0)	244
Hungary	327	(4.6)	358	(4.2)	411	(3.3)	540	(4.8)	603	(6.4)	637	(7.9)	245
United Kingdom	336	(4.7)	371	(5.0)	429	(4.2)	560	(3.7)	616	(4.1)	648	(5.1)	245
Bulgaria	290	(5.7)	320	(4.8)	372	(4.7)	503	(5.2)	565	(5.6)	597	(6.2)	245
Portugal	333	(4.5)	363	(4.2)	421	(5.0)	554	(4.3)	610	(3.9)	640	(4.1)	247
Australia	348	(2.9)	382	(2.3)	437	(2.0)	571	(2.3)	630	(3.0)	663	(3.4)	249
Hong Kong-China	391	(5.9)	430	(6.2)	499	(4.7)	629	(3.5)	679	(4.2)	709	(4.3)	249
Luxembourg	334	(3.3)	363	(3.0)	422	(1.5)	558	(1.6)	613	(2.2)	644	(2.3)	250
Germany	353	(5.4)	385	(4.7)	447	(3.6)	583	(3.6)	637	(3.8)	667	(4.1)	252
Liechtenstein	370	(16.8)	403	(11.2)	470	(8.0)	606	(5.0)	656	(9.2)	680	(12.5)	253
Korea	386	(7.4)	425	(5.8)	486	(4.8)	624	(5.1)	679	(6.0)	710	(7.5)	254
France	330	(5.0)	365	(4.7)	429	(2.7)	565	(3.4)	621	(3.5)	652	(3.7)	256
Qatar	230	(2.1)	257	(1.7)	306	(1.3)	440	(1.7)	514	(1.9)	560	(2.5)	257
New Zealand	340	(4.9)	371	(3.6)	428	(3.2)	570	(2.8)	632	(3.0)	665	(4.4)	261
Slovak Republic	314	(6.7)	352	(6.2)	413	(4.2)	553	(4.7)	613	(5.3)	647	(6.7)	261
Shanghai-China	435	(6.9)	475	(5.8)	546	(4.4)	685	(3.5)	737	(3.5)	765	(5.6)	262
Belgium	343	(4.5)	378	(4.0)	444	(3.1)	589	(2.4)	646	(2.7)	677	(2.9)	268
Israel	292	(7.3)	328	(5.7)	393	(5.1)	541	(5.3)	603	(6.0)	639	(6.1)	275
Singapore	393	(3.6)	432	(3.6)	501	(2.7)	650	(1.9)	707	(2.3)	737	(2.5)	275
Chinese Taipei	363	(5.6)	402	(4.8)	478	(4.8)	645	(3.4)	703	(4.9)	738	(5.1)	301
OECD average	**343**	**(0.8)**	**375**	**(0.7)**	**430**	**(0.6)**	**558**	**(0.6)**	**614**	**(0.7)**	**645**	**(0.8)**	**239**

Table B.1.7

Variation in student performance for countries, economies, and provinces: COMPUTER-BASED MATHEMATICS

Country, economy, or province	Percentiles												Difference in score points between the 10th and 90th percentiles
	5th		10th		25th		75th		90th		95th		
	score	standard error	score	standard error	score	standard error	score	standard error	score	standard error	score	standard error	
Colombia	280	(5.8)	307	(4.4)	350	(3.5)	443	(3.8)	490	(4.5)	521	(5.9)	183
Russian Federation	356	(4.3)	387	(3.8)	436	(3.0)	544	(2.9)	590	(3.8)	619	(4.1)	204
Newfoundland and Labrador	**369**	**(14.6)**	**408**	**(9.7)**	**457**	**(4.8)**	**568**	**(4.0)**	**612**	**(5.8)**	**639**	**(6.6)**	**205**
Ireland	355	(6.2)	388	(4.6)	442	(3.8)	548	(2.8)	594	(3.0)	619	(3.2)	206
Chile	301	(5.3)	330	(4.5)	376	(4.1)	488	(4.0)	538	(4.3)	567	(3.6)	209
New Brunswick	**347**	**(9.0)**	**389**	**(7.3)**	**447**	**(3.9)**	**553**	**(4.0)**	**599**	**(6.5)**	**627**	**(5.2)**	**210**
Spain	335	(6.3)	367	(5.2)	421	(4.2)	533	(3.1)	577	(3.4)	603	(3.6)	210
Estonia	380	(4.7)	411	(3.4)	462	(3.1)	573	(2.5)	621	(3.2)	650	(3.8)	210
Brazil	291	(6.2)	319	(4.7)	364	(4.9)	473	(5.4)	530	(9.0)	567	(10.9)	211
Italy	360	(6.9)	391	(6.3)	443	(5.2)	556	(5.1)	604	(5.8)	631	(6.5)	213
Macao-China	401	(3.5)	433	(2.7)	489	(2.0)	600	(1.5)	647	(2.3)	674	(2.4)	214
United Arab Emirates	297	(3.8)	327	(3.2)	378	(2.8)	490	(2.7)	542	(3.4)	575	(4.2)	216
Hong Kong-China	394	(9.1)	435	(6.3)	499	(4.8)	608	(3.2)	654	(3.8)	680	(3.8)	218
Poland	345	(5.9)	380	(5.5)	432	(4.2)	548	(4.1)	599	(5.1)	628	(5.3)	219
Slovak Republic	348	(7.5)	384	(6.5)	443	(4.7)	557	(3.9)	603	(4.0)	630	(5.0)	219
Sweden	349	(4.2)	380	(4.1)	432	(3.6)	548	(3.3)	600	(3.7)	629	(5.1)	220
Portugal	347	(4.9)	378	(4.7)	431	(4.3)	549	(3.3)	598	(3.7)	626	(4.6)	220
Denmark	349	(5.4)	383	(4.5)	439	(3.7)	557	(2.9)	604	(3.3)	633	(4.1)	222
Nova Scotia	**354**	**(16.1)**	**392**	**(9.3)**	**449**	**(8.6)**	**562**	**(5.6)**	**614**	**(5.8)**	**642**	**(5.1)**	**222**
Norway	354	(5.4)	386	(4.2)	439	(4.0)	557	(3.4)	608	(3.3)	637	(4.3)	222
Japan	391	(6.0)	426	(5.0)	482	(4.1)	597	(3.7)	649	(4.7)	682	(6.1)	223
Saskatchewan	**352**	**(5.6)**	**387**	**(5.3)**	**443**	**(4.2)**	**561**	**(4.6)**	**610**	**(5.7)**	**638**	**(5.9)**	**223**
United States	350	(7.7)	386	(5.5)	440	(4.5)	558	(4.3)	611	(5.9)	643	(6.3)	225
Ontario	**382**	**(8.2)**	**416**	**(7.3)**	**473**	**(5.6)**	**590**	**(5.1)**	**642**	**(7.0)**	**671**	**(8.5)**	**226**
Slovenia	341	(3.1)	375	(2.4)	426	(2.3)	549	(1.7)	601	(2.8)	629	(2.9)	226
British Columbia	**385**	**(8.4)**	**418**	**(5.7)**	**471**	**(4.8)**	**591**	**(6.1)**	**645**	**(8.8)**	**681**	**(11.1)**	**227**
Korea	403	(5.3)	437	(5.4)	494	(5.0)	615	(5.2)	665	(5.9)	695	(8.2)	228
Canada	**369**	**(4.3)**	**406**	**(3.3)**	**465**	**(2.4)**	**585**	**(2.5)**	**635**	**(3.1)**	**666**	**(3.9)**	**229**
Chinese Taipei	386	(6.1)	419	(4.6)	478	(3.9)	600	(3.1)	649	(3.8)	676	(4.2)	230
France	353	(8.3)	390	(5.8)	450	(3.7)	572	(3.3)	620	(4.0)	647	(4.4)	231
Quebec	**361**	**(7.9)**	**403**	**(5.8)**	**467**	**(4.5)**	**587**	**(4.5)**	**634**	**(5.4)**	**662**	**(5.2)**	**231**
Austria	357	(6.2)	388	(6.1)	447	(5.0)	571	(3.7)	619	(4.8)	646	(5.1)	231
Manitoba	**344**	**(8.6)**	**374**	**(7.4)**	**436**	**(6.1)**	**555**	**(3.4)**	**606**	**(4.3)**	**633**	**(6.3)**	**232**
Australia	357	(3.3)	391	(2.9)	447	(2.1)	570	(2.0)	623	(2.7)	654	(3.3)	232
Hungary	313	(7.3)	350	(7.3)	410	(4.8)	534	(4.5)	587	(6.0)	619	(6.1)	237
Prince Edward Island	**327**	**(7.2)**	**369**	**(6.4)**	**429**	**(3.9)**	**553**	**(2.7)**	**607**	**(5.8)**	**642**	**(6.0)**	**238**
Shanghai-China	404	(5.9)	439	(5.3)	500	(5.1)	628	(3.5)	679	(3.5)	708	(4.7)	240
Alberta	**350**	**(14.9)**	**393**	**(10.1)**	**455**	**(5.1)**	**582**	**(6.0)**	**637**	**(6.7)**	**669**	**(8.4)**	**244**
Germany	345	(5.6)	382	(6.1)	446	(4.5)	577	(4.0)	629	(4.0)	660	(5.4)	247
Singapore	399	(3.7)	434	(2.9)	500	(2.6)	635	(2.0)	689	(2.9)	717	(2.5)	254
Belgium	338	(5.2)	379	(4.2)	446	(3.4)	582	(3.0)	638	(3.6)	667	(3.6)	258
Israel	252	(10.4)	299	(9.2)	375	(6.7)	525	(5.7)	586	(6.9)	617	(7.0)	286
OECD average	**347**	**(1.3)**	**382**	**(1.1)**	**439**	**(0.9)**	**559**	**(0.8)**	**609**	**(0.9)**	**638**	**(1.0)**	**227**

Table B.1.8

Variation in student performance for countries, economies, and provinces: COMPOSITE MATHEMATICS

Country, economy, or province	Percentiles												Difference in score points between the 10th and 90th percentiles
	5th		10th		25th		75th		90th		95th		
	score	standard error	score	standard error	score	standard error	score	standard error	score	standard error	score	standard error	
Colombia	281	(4.3)	304	(3.4)	341	(2.7)	429	(3.3)	475	(4.4)	505	(6.8)	171
Prince Edward Island	**364**	**(5.1)**	**390**	**(4.3)**	**435**	**(3.6)**	**536**	**(2.7)**	**577**	**(4.3)**	**599**	**(5.5)**	**186**
Brazil	292	(4.5)	315	(3.4)	355	(4.0)	457	(5.0)	512	(8.1)	545	(9.0)	197
Chile	309	(3.6)	332	(3.3)	373	(3.1)	479	(3.7)	530	(4.0)	559	(4.0)	198
Estonia	390	(3.7)	418	(2.8)	465	(2.7)	572	(2.3)	620	(3.1)	649	(4.0)	202
Ireland	362	(4.7)	395	(4.2)	445	(2.9)	552	(2.2)	597	(2.3)	624	(2.4)	202
Russian Federation	355	(3.9)	385	(3.6)	432	(3.0)	539	(3.2)	588	(3.6)	616	(3.5)	203
New Brunswick	**360**	**(7.1)**	**395**	**(5.5)**	**447**	**(4.4)**	**552**	**(4.2)**	**599**	**(6.4)**	**625**	**(6.5)**	**204**
Newfoundland and Labrador	**367**	**(11.2)**	**400**	**(10.0)**	**445**	**(4.9)**	**555**	**(4.4)**	**605**	**(5.1)**	**631**	**(7.9)**	**204**
Spain	347	(4.2)	375	(3.4)	425	(3.0)	535	(2.7)	580	(2.7)	605	(2.8)	205
Nova Scotia	**367**	**(8.0)**	**396**	**(7.2)**	**445**	**(6.6)**	**556**	**(5.4)**	**602**	**(5.2)**	**630**	**(7.1)**	**206**
Denmark	363	(4.4)	393	(3.2)	443	(3.2)	554	(2.7)	602	(3.2)	629	(3.7)	209
Saskatchewan	**368**	**(5.8)**	**397**	**(5.0)**	**446**	**(4.1)**	**561**	**(4.1)**	**609**	**(5.4)**	**634**	**(6.5)**	**212**
United Arab Emirates	306	(3.3)	331	(2.5)	376	(2.5)	489	(2.9)	544	(3.4)	577	(3.5)	213
Ontario	**383**	**(5.4)**	**416**	**(5.4)**	**466**	**(5.6)**	**580**	**(5.4)**	**629**	**(5.0)**	**659**	**(8.1)**	**213**
Italy	354	(6.3)	386	(5.3)	437	(4.1)	552	(4.4)	600	(4.7)	626	(5.7)	214
British Columbia	**388**	**(7.3)**	**419**	**(4.7)**	**469**	**(5.0)**	**585**	**(5.2)**	**635**	**(6.3)**	**666**	**(7.5)**	**216**
Sweden	348	(3.7)	375	(2.9)	425	(2.7)	543	(2.9)	593	(3.2)	622	(3.6)	218
Manitoba	**357**	**(6.3)**	**384**	**(7.6)**	**436**	**(4.3)**	**551**	**(2.9)**	**602**	**(4.5)**	**630**	**(6.9)**	**218**
Norway	354	(4.0)	384	(4.0)	435	(3.1)	552	(3.3)	603	(3.1)	631	(3.6)	218
Canada	**378**	**(2.9)**	**410**	**(2.6)**	**462**	**(2.2)**	**580**	**(2.1)**	**629**	**(2.3)**	**657**	**(3.2)**	**219**
Poland	364	(4.2)	395	(3.6)	445	(3.5)	562	(4.7)	614	(5.5)	644	(6.9)	219
Macao-China	394	(3.7)	428	(2.6)	484	(1.5)	601	(1.4)	648	(2.1)	675	(2.2)	220
United States	350	(5.0)	380	(4.6)	430	(3.9)	549	(4.5)	602	(5.1)	635	(5.2)	222
Hong Kong-China	398	(7.4)	438	(6.2)	502	(4.3)	615	(3.1)	661	(3.2)	687	(3.9)	223
Japan	391	(6.9)	424	(4.8)	480	(4.1)	598	(3.9)	648	(4.4)	678	(5.6)	224
Portugal	347	(4.7)	376	(3.8)	427	(4.6)	549	(3.5)	600	(3.7)	627	(4.2)	224
Quebec	**379**	**(6.0)**	**414**	**(5.7)**	**473**	**(4.8)**	**590**	**(3.9)**	**638**	**(3.3)**	**663**	**(4.5)**	**224**
Slovenia	355	(2.8)	382	(2.8)	431	(2.0)	557	(2.1)	610	(2.1)	639	(4.1)	228
Austria	360	(5.1)	390	(3.8)	444	(3.7)	570	(3.4)	618	(3.5)	646	(4.3)	229
Alberta	**369**	**(9.4)**	**401**	**(5.7)**	**455**	**(5.8)**	**578**	**(5.5)**	**632**	**(5.5)**	**660**	**(6.2)**	**231**
Hungary	328	(5.1)	359	(4.4)	412	(4.4)	535	(4.4)	592	(6.3)	624	(7.7)	233
Slovak Republic	337	(5.8)	371	(6.1)	429	(4.3)	553	(3.6)	604	(4.3)	635	(5.1)	233
Australia	358	(2.7)	390	(2.3)	443	(1.7)	568	(2.1)	624	(2.7)	654	(3.1)	233
Korea	401	(5.6)	434	(5.0)	491	(4.8)	618	(4.4)	668	(5.7)	696	(6.8)	234
France	346	(5.8)	379	(4.6)	440	(3.0)	566	(2.9)	617	(3.4)	645	(4.5)	238
Shanghai-China	426	(7.0)	462	(5.1)	524	(4.6)	654	(2.9)	703	(3.2)	731	(4.6)	241
Germany	354	(5.4)	388	(4.6)	448	(3.6)	578	(3.3)	630	(4.0)	659	(4.1)	242
Belgium	349	(4.3)	384	(3.5)	446	(3.4)	582	(2.4)	637	(3.2)	667	(2.9)	253
Chinese Taipei	379	(5.5)	414	(4.4)	479	(4.2)	620	(2.8)	673	(3.9)	702	(4.3)	259
Singapore	400	(3.8)	436	(2.6)	501	(2.7)	641	(1.7)	695	(2.7)	723	(2.5)	259
Israel	281	(7.1)	320	(6.7)	385	(5.4)	532	(5.7)	590	(6.3)	623	(5.5)	270
OECD average	**353**	**(1.0)**	**384**	**(0.9)**	**437**	**(0.7)**	**558**	**(0.7)**	**609**	**(0.8)**	**638**	**(1.0)**	**225**

Table B.1.9

Percentage of students at each proficiency level for countries, economies, and provinces: PAPER-BASED MATHEMATICS

Country, economy, or province	Proficiency levels													
	Below Level 1		Level 1		Level 2		Level 3		Level 4		Level 5		Level 6	
	%	standard error	%	standard error	%	standard error	%	standard error	%	standard error	%	standard error	%	standard error
Shanghai-China	0.8	(0.2)	2.9	(0.5)	7.5	(0.6)	13.1	(0.8)	20.2	(0.8)	24.6	(1.0)	30.8	(1.2)
Singapore	2.2	(0.2)	6.1	(0.4)	12.2	(0.7)	17.5	(0.7)	22.0	(0.6)	21.0	(0.6)	19.0	(0.5)
Hong Kong-China	2.6	(0.4)	5.9	(0.6)	12.0	(0.8)	19.7	(1.0)	26.1	(1.1)	21.4	(1.0)	12.3	(0.9)
Korea	2.7	(0.5)	6.4	(0.6)	14.7	(0.8)	21.4	(1.0)	23.9	(1.2)	18.8	(0.9)	12.1	(1.3)
Estonia	2.0	(0.3)	8.6	(0.6)	22.0	(0.8)	29.4	(0.8)	23.4	(0.9)	11.0	(0.7)	3.6	(0.4)
Macao-China	3.2	(0.3)	7.6	(0.5)	16.4	(0.7)	24.0	(0.7)	24.4	(0.9)	16.8	(0.6)	7.6	(0.3)
Japan	3.2	(0.5)	7.9	(0.7)	16.9	(0.8)	24.7	(1.0)	23.7	(0.9)	16.0	(0.9)	7.6	(0.8)
Quebec	**3.0**	**(0.4)**	**8.2**	**(0.7)**	**16.4**	**(1.0)**	**24.2**	**(1.0)**	**25.9**	**(1.0)**	**16.2**	**(1.1)**	**6.2**	**(0.6)**
Finland	3.3	(0.4)	8.9	(0.5)	20.5	(0.7)	28.8	(0.8)	23.2	(0.8)	11.7	(0.6)	3.5	(0.3)
British Columbia	**2.6**	**(0.6)**	**9.6**	**(1.0)**	**20.3**	**(1.3)**	**27.4**	**(1.3)**	**23.5**	**(1.4)**	**12.1**	**(1.2)**	**4.4**	**(0.7)**
Switzerland	3.6	(0.3)	8.9	(0.6)	17.8	(1.1)	24.5	(1.0)	23.9	(0.8)	14.6	(0.8)	6.8	(0.7)
Chinese Taipei	4.5	(0.5)	8.3	(0.6)	13.1	(0.6)	17.1	(0.6)	19.7	(0.8)	19.2	(0.9)	18.0	(1.0)
Ontario	**3.8**	**(0.6)**	**10.0**	**(0.9)**	**22.6**	**(1.5)**	**27.3**	**(1.2)**	**21.3**	**(1.2)**	**11.0**	**(1.0)**	**4.0**	**(0.7)**
Canada	**3.6**	**(0.3)**	**10.2**	**(0.4)**	**21.0**	**(0.6)**	**26.4**	**(0.6)**	**22.4**	**(0.5)**	**12.1**	**(0.5)**	**4.3**	**(0.3)**
Liechtenstein	3.5	(1.3)	10.6	(1.8)	15.2	(2.5)	22.7	(2.8)	23.2	(3.0)	17.4	(3.2)	7.4	(1.9)
Vietnam	3.6	(0.8)	10.6	(1.3)	22.8	(1.3)	28.4	(1.5)	21.3	(1.2)	9.8	(1.0)	3.5	(0.7)
Poland	3.3	(0.4)	11.1	(0.8)	22.1	(0.9)	25.5	(0.9)	21.3	(1.1)	11.7	(0.8)	5.0	(0.8)
The Netherlands	3.8	(0.6)	11.0	(0.9)	17.9	(1.1)	24.2	(1.2)	23.8	(1.1)	14.9	(1.0)	4.4	(0.6)
Alberta	**3.9**	**(0.7)**	**11.3**	**(1.4)**	**20.6**	**(1.6)**	**24.9**	**(1.7)**	**22.4**	**(1.4)**	**12.5**	**(1.2)**	**4.5**	**(0.7)**
Saskatchewan	**3.9**	**(0.6)**	**11.5**	**(1.0)**	**24.4**	**(1.3)**	**27.2**	**(1.7)**	**20.9**	**(1.4)**	**9.9**	**(1.1)**	**2.2**	**(0.7)**
New Brunswick	**4.2**	**(0.7)**	**12.0**	**(1.1)**	**23.9**	**(1.5)**	**29.5**	**(2.2)**	**20.2**	**(1.8)**	**8.0**	**(1.4)**	**2.1**	**(0.7)**
Denmark	4.4	(0.5)	12.5	(0.7)	24.4	(1.0)	29.0	(1.0)	19.8	(0.7)	8.3	(0.6)	1.7	(0.3)
Ireland	4.8	(0.5)	12.1	(0.7)	23.9	(0.7)	28.2	(0.9)	20.3	(0.8)	8.5	(0.5)	2.2	(0.2)
Nova Scotia	**4.3**	**(1.1)**	**13.5**	**(1.8)**	**25.5**	**(3.0)**	**28.9**	**(1.9)**	**18.9**	**(1.8)**	**7.4**	**(1.1)**	**1.6**	**(0.5)**
Germany	5.5	(0.7)	12.2	(0.8)	19.4	(0.8)	23.7	(0.8)	21.7	(0.7)	12.8	(0.7)	4.7	(0.5)
Austria	5.7	(0.6)	13.0	(0.7)	21.9	(0.9)	24.2	(0.8)	21.0	(0.9)	11.0	(0.7)	3.3	(0.4)
Belgium	7.0	(0.6)	11.9	(0.6)	18.4	(0.6)	22.6	(0.7)	20.7	(0.6)	13.4	(0.5)	6.1	(0.4)
Australia	6.1	(0.4)	13.5	(0.6)	21.9	(0.8)	24.6	(0.6)	19.0	(0.5)	10.5	(0.4)	4.3	(0.4)
Latvia	4.8	(0.5)	15.1	(1.0)	26.6	(1.3)	27.8	(0.9)	17.6	(0.9)	6.5	(0.6)	1.5	(0.3)
Slovenia	5.1	(0.5)	15.0	(0.7)	23.6	(0.9)	23.9	(1.0)	18.7	(0.8)	10.3	(0.6)	3.4	(0.4)
Czech Republic	6.8	(0.8)	14.2	(1.0)	21.7	(0.8)	24.8	(1.1)	19.7	(0.9)	9.6	(0.7)	3.2	(0.3)
Manitoba	**6.3**	**(1.0)**	**14.9**	**(1.6)**	**25.5**	**(1.3)**	**24.9**	**(1.4)**	**18.1**	**(1.1)**	**7.9**	**(0.8)**	**2.3**	**(0.5)**
Newfoundland and Labrador	**6.4**	**(1.5)**	**14.9**	**(1.4)**	**24.4**	**(1.8)**	**27.1**	**(1.5)**	**17.8**	**(1.4)**	**7.8**	**(1.1)**	**1.6**	**(0.6)**
Iceland	7.5	(0.5)	14.0	(0.8)	23.6	(0.9)	25.7	(0.9)	18.1	(0.8)	8.9	(0.6)	2.3	(0.4)
United Kingdom	7.8	(0.8)	14.0	(0.8)	23.2	(0.8)	24.8	(0.8)	18.4	(0.8)	9.0	(0.6)	2.9	(0.4)
Norway	7.2	(0.8)	15.1	(0.9)	24.3	(0.8)	25.7	(1.0)	18.3	(1.0)	7.3	(0.6)	2.1	(0.3)
France	8.7	(0.7)	13.6	(0.8)	22.1	(1.0)	23.8	(0.8)	18.9	(0.8)	9.8	(0.5)	3.1	(0.4)
New Zealand	7.5	(0.6)	15.1	(0.7)	21.6	(0.8)	22.7	(0.8)	18.1	(0.8)	10.5	(0.7)	4.5	(0.4)
Spain	7.8	(0.5)	15.8	(0.6)	24.9	(0.6)	26.0	(0.6)	17.6	(0.6)	6.7	(0.4)	1.3	(0.2)
Russian Federation	7.5	(0.7)	16.5	(0.8)	26.6	(1.0)	26.0	(1.0)	15.7	(0.8)	6.3	(0.6)	1.5	(0.3)
Luxembourg	8.8	(0.5)	15.5	(0.5)	22.3	(0.7)	23.6	(0.7)	18.5	(0.6)	8.6	(0.4)	2.6	(0.2)
Italy	8.5	(0.4)	16.1	(0.5)	24.1	(0.5)	24.6	(0.6)	16.7	(0.5)	7.8	(0.4)	2.2	(0.2)
Prince Edward Island	**7.3**	**(0.9)**	**17.4**	**(1.3)**	**26.4**	**(1.6)**	**26.7**	**(1.7)**	**15.8**	**(1.2)**	**5.3**	**(0.7)**	**1.1**	**(0.4)**
Portugal	8.9	(0.8)	16.0	(1.0)	22.8	(0.9)	24.0	(0.8)	17.7	(0.9)	8.5	(0.7)	2.1	(0.3)
United States	8.0	(0.7)	17.9	(1.0)	26.3	(0.8)	23.3	(0.9)	15.8	(0.9)	6.6	(0.6)	2.2	(0.3)
Lithuania	8.7	(0.7)	17.3	(0.9)	25.9	(0.8)	24.6	(1.0)	15.4	(0.7)	6.6	(0.5)	1.4	(0.2)

Table B.1.9 (continued)

Percentage of students at each proficiency level for countries, economies, and provinces: PAPER-BASED MATHEMATICS

Country, economy, or province	Proficiency levels													
	Below Level 1		Level 1		Level 2		Level 3		Level 4		Level 5		Level 6	
	%	standard error	%	standard error	%	standard error	%	standard error	%	standard error	%	standard error	%	standard error
Sweden	9.5	(0.7)	17.5	(0.8)	24.7	(0.9)	23.9	(0.8)	16.3	(0.7)	6.5	(0.5)	1.6	(0.3)
Slovak Republic	11.1	(1.0)	16.4	(0.9)	23.1	(1.1)	22.1	(1.1)	16.4	(1.1)	7.8	(0.6)	3.1	(0.5)
Hungary	9.9	(0.8)	18.2	(1.0)	25.3	(1.2)	23.0	(1.0)	14.4	(0.9)	7.1	(0.7)	2.1	(0.5)
Croatia	9.5	(0.7)	20.4	(1.0)	26.7	(0.9)	22.9	(1.1)	13.5	(0.8)	5.4	(0.8)	1.6	(0.5)
Israel	15.9	(1.2)	17.6	(0.9)	21.6	(0.9)	21.0	(0.9)	14.6	(0.9)	7.2	(0.7)	2.2	(0.4)
Greece	14.5	(0.9)	21.2	(0.8)	27.2	(1.0)	22.1	(0.9)	11.2	(0.8)	3.3	(0.4)	0.6	(0.1)
Serbia	15.5	(1.2)	23.4	(0.9)	26.5	(1.1)	19.5	(1.0)	10.5	(0.7)	3.5	(0.5)	1.1	(0.3)
Romania	14.0	(1.2)	26.8	(1.2)	28.3	(1.1)	19.2	(1.1)	8.4	(0.8)	2.6	(0.4)	0.6	(0.3)
Turkey	15.5	(1.1)	26.5	(1.3)	25.5	(1.2)	16.5	(1.0)	10.1	(1.1)	4.7	(0.8)	1.2	(0.5)
Cyprus	19.0	(0.6)	23.0	(0.7)	25.5	(0.6)	19.2	(0.6)	9.6	(0.4)	3.1	(0.2)	0.6	(0.2)
Bulgaria	20.0	(1.5)	23.8	(0.9)	24.4	(1.1)	17.9	(0.9)	9.9	(0.8)	3.4	(0.5)	0.7	(0.2)
Kazakhstan	14.5	(0.9)	30.7	(1.4)	31.5	(0.9)	16.9	(1.1)	5.4	(0.8)	0.9	(0.3)	0.1	(0.0)
United Arab Emirates	20.5	(0.9)	25.8	(0.8)	24.9	(0.7)	16.9	(0.6)	8.5	(0.5)	2.9	(0.3)	0.5	(0.1)
Thailand	19.1	(1.1)	30.6	(1.2)	27.3	(1.0)	14.5	(1.2)	5.8	(0.7)	2.0	(0.4)	0.5	(0.2)
Chile	22.0	(1.4)	29.5	(1.0)	25.3	(1.0)	15.4	(0.8)	6.2	(0.6)	1.5	(0.2)	0.1	(0.0)
Malaysia	23.0	(1.2)	28.8	(1.1)	26.0	(0.9)	14.9	(0.9)	6.0	(0.7)	1.2	(0.3)	0.1	(0.1)
Mexico	22.8	(0.7)	31.9	(0.6)	27.8	(0.5)	13.1	(0.4)	3.7	(0.2)	0.6	(0.1)	0.0	(0.0)
Uruguay	29.2	(1.2)	26.5	(0.8)	23.0	(0.9)	14.4	(0.9)	5.4	(0.6)	1.3	(0.3)	0.1	(0.1)
Montenegro	27.5	(0.6)	29.1	(1.1)	24.2	(1.1)	13.1	(0.7)	4.9	(0.5)	0.9	(0.2)	0.1	(0.1)
Costa Rica	23.6	(1.7)	36.2	(1.2)	26.8	(1.3)	10.1	(1.0)	2.6	(0.5)	0.5	(0.2)	0.1	(0.1)
Albania	32.5	(1.0)	28.1	(1.0)	22.9	(0.9)	12.0	(0.9)	3.6	(0.3)	0.8	(0.2)	0.0	(0.0)
Argentina	34.9	(1.9)	31.6	(1.2)	22.2	(1.4)	9.2	(0.9)	1.8	(0.4)	0.3	(0.1)	0.0	(0.0)
Tunisia	36.5	(1.9)	31.3	(1.1)	21.1	(1.2)	8.0	(0.8)	2.3	(0.7)	0.7	(0.3)	0.1	(0.1)
Brazil	35.2	(0.9)	31.9	(0.7)	20.4	(0.7)	8.9	(0.5)	2.9	(0.3)	0.7	(0.2)	0.0	(0.0)
Jordan	36.5	(1.6)	32.1	(0.9)	21.0	(1.0)	8.1	(0.6)	1.8	(0.3)	0.5	(0.3)	0.1	(0.1)
Qatar	47.0	(0.4)	22.6	(0.5)	15.2	(0.4)	8.8	(0.3)	4.5	(0.3)	1.7	(0.2)	0.3	(0.1)
Colombia	41.6	(1.7)	32.2	(1.0)	17.8	(0.9)	6.4	(0.6)	1.6	(0.3)	0.3	(0.1)	0.0	(0.0)
Peru	47.0	(1.8)	27.6	(0.9)	16.1	(1.0)	6.7	(0.7)	2.1	(0.4)	0.5	(0.2)	0.0	(0.0)
Indonesia	42.3	(2.1)	33.4	(1.6)	16.8	(1.1)	5.7	(0.9)	1.5	(0.5)	0.3	(0.2)	0.0	(0.0)
OECD average	**8.0**	**(0.1)**	**15.0**	**(0.1)**	**22.5**	**(0.1)**	**23.7**	**(0.2)**	**18.2**	**(0.1)**	**9.3**	**(0.1)**	**3.3**	**(0.1)**

Note: Countries, economies, and provinces have been sorted by the total percentage of students who attained Level 2 or higher.

Table B.1.10

Percentage of students at each proficiency level for countries, economies, and provinces: COMPUTER-BASED MATHEMATICS

Country, economy, or province	Below Level 1		Level 1		Level 2		Level 3		Level 4		Level 5		Level 6	
	Proficiency levels													
	%	standard error	%	standard error	%	standard error	%	standard error	%	standard error	%	standard error	%	standard error
Shanghai-China	1.8	(0.3)	5.1	(0.6)	13.2	(0.8)	20.8	(0.9)	25.8	(1.0)	21.0	(1.0)	12.3	(0.9)
Korea	1.8	(0.3)	5.4	(0.6)	14.3	(1.0)	23.9	(1.0)	26.9	(1.3)	18.7	(1.2)	9.0	(1.2)
Macao-China	1.7	(0.2)	5.9	(0.4)	15.3	(0.5)	26.4	(0.7)	28.5	(0.8)	16.6	(0.6)	5.6	(0.4)
Singapore	2.0	(0.3)	5.7	(0.4)	12.4	(0.5)	19.7	(0.6)	24.7	(1.0)	21.2	(0.9)	14.4	(0.6)
Hong Kong-China	2.6	(0.5)	5.2	(0.8)	12.1	(0.8)	24.5	(1.0)	30.3	(1.1)	18.7	(1.0)	6.7	(0.7)
Japan	2.4	(0.4)	6.6	(0.6)	16.3	(0.8)	26.5	(1.2)	26.9	(1.1)	14.8	(0.9)	6.6	(0.9)
Chinese Taipei	2.8	(0.4)	7.5	(0.6)	16.2	(0.9)	25.0	(0.9)	26.4	(1.0)	16.1	(0.9)	6.0	(0.6)
British Columbia	**2.6**	**(0.6)**	**7.9**	**(1.0)**	**18.7**	**(1.5)**	**26.5**	**(1.4)**	**24.5**	**(1.4)**	**13.3**	**(1.6)**	**6.4**	**(1.1)**
Ontario	**3.2**	**(0.7)**	**7.6**	**(0.9)**	**17.8**	**(1.3)**	**27.3**	**(1.5)**	**25.1**	**(1.7)**	**13.8**	**(1.2)**	**5.2**	**(1.0)**
Estonia	2.9	(0.4)	9.3	(0.5)	22.1	(0.8)	29.1	(1.0)	23.3	(1.0)	10.6	(0.7)	2.8	(0.4)
Newfoundland and Labrador	**4.0**	**(0.9)**	**8.6**	**(1.2)**	**22.0**	**(1.7)**	**29.4**	**(1.9)**	**24.9**	**(1.6)**	**9.1**	**(1.3)**	**2.0**	**(0.5)**
Canada	**4.1**	**(0.3)**	**8.6**	**(0.4)**	**18.8**	**(0.6)**	**26.9**	**(0.6)**	**24.3**	**(0.8)**	**12.8**	**(0.7)**	**4.5**	**(0.5)**
Quebec	**4.6**	**(0.6)**	**8.5**	**(0.8)**	**17.2**	**(1.0)**	**26.2**	**(1.3)**	**25.7**	**(1.3)**	**13.8**	**(1.1)**	**4.0**	**(0.6)**
Alberta	**5.7**	**(1.1)**	**9.2**	**(0.9)**	**20.1**	**(1.5)**	**25.5**	**(1.4)**	**22.5**	**(1.4)**	**12.2**	**(1.4)**	**4.8**	**(0.9)**
France	5.6	(0.8)	10.8	(0.7)	20.1	(0.9)	27.1	(0.9)	23.3	(0.9)	10.5	(0.8)	2.5	(0.4)
Nova Scotia	**5.1**	**(1.0)**	**11.3**	**(1.7)**	**22.0**	**(1.3)**	**29.1**	**(1.6)**	**20.9**	**(2.1)**	**10.0**	**(1.0)**	**1.6**	**(0.6)**
New Brunswick	**6.1**	**(0.8)**	**10.5**	**(1.0)**	**23.7**	**(1.3)**	**30.9**	**(1.5)**	**20.4**	**(1.6)**	**7.4**	**(1.2)**	**0.9**	**(0.3)**
Australia	5.0	(0.4)	11.6	(0.5)	22.1	(0.7)	26.8	(0.6)	20.9	(0.6)	10.2	(0.4)	3.4	(0.3)
Austria	5.1	(0.7)	12.3	(0.9)	20.4	(0.9)	26.2	(1.0)	23.2	(1.0)	10.4	(0.9)	2.4	(0.4)
Italy	4.8	(0.8)	12.8	(1.1)	24.1	(1.3)	28.8	(1.2)	20.3	(1.1)	7.5	(0.9)	1.8	(0.4)
Saskatchewan	**5.8**	**(0.8)**	**12.0**	**(1.1)**	**23.0**	**(1.5)**	**28.0**	**(1.3)**	**20.8**	**(1.6)**	**8.7**	**(1.0)**	**1.8**	**(0.5)**
Germany	6.5	(0.7)	11.4	(0.8)	19.7	(0.9)	25.3	(1.0)	21.7	(0.8)	11.5	(0.8)	4.0	(0.5)
Ireland	5.3	(0.7)	12.5	(0.8)	25.2	(0.9)	30.3	(1.1)	19.5	(1.0)	6.1	(0.5)	0.9	(0.2)
Slovak Republic	6.1	(0.8)	11.8	(0.9)	23.0	(1.1)	29.1	(1.3)	20.9	(1.1)	7.6	(0.8)	1.5	(0.4)
Belgium	7.2	(0.5)	11.1	(0.5)	18.8	(0.7)	24.5	(0.7)	21.3	(0.7)	12.4	(0.7)	4.7	(0.4)
United States	5.9	(0.8)	12.4	(1.0)	24.7	(1.1)	26.9	(0.9)	19.3	(1.1)	8.2	(0.8)	2.5	(0.5)
Norway	5.5	(0.6)	13.2	(0.8)	24.4	(0.9)	27.0	(1.0)	19.7	(0.8)	8.3	(0.6)	2.0	(0.3)
Russian Federation	5.2	(0.5)	13.8	(0.8)	27.3	(0.9)	29.3	(1.1)	17.7	(0.9)	5.7	(0.5)	1.1	(0.2)
Denmark	6.0	(0.6)	13.0	(0.8)	23.4	(1.0)	27.5	(1.2)	20.8	(0.9)	7.7	(0.6)	1.6	(0.3)
Manitoba	**7.0**	**(1.1)**	**13.3**	**(1.3)**	**23.8**	**(1.6)**	**27.0**	**(1.4)**	**19.2**	**(1.3)**	**7.8**	**(0.7)**	**1.9**	**(0.5)**
Poland	6.6	(0.8)	14.3	(0.9)	25.7	(1.0)	27.2	(0.9)	18.0	(1.0)	6.8	(0.7)	1.5	(0.3)
Sweden	6.2	(0.5)	14.7	(0.8)	25.2	(0.8)	28.0	(0.8)	17.5	(0.8)	6.8	(0.6)	1.6	(0.3)
Portugal	6.4	(0.6)	14.9	(0.9)	25.2	(0.9)	27.2	(1.0)	18.4	(1.0)	6.5	(0.6)	1.5	(0.2)
Prince Edward Island	**8.3**	**(0.9)**	**13.7**	**(1.3)**	**23.4**	**(1.5)**	**26.5**	**(1.5)**	**18.2**	**(1.3)**	**7.1**	**(0.9)**	**2.8**	**(0.5)**
Slovenia	7.1	(0.4)	15.8	(0.7)	25.3	(0.8)	25.3	(1.0)	17.9	(0.8)	7.4	(0.5)	1.3	(0.3)
Spain	8.5	(0.9)	16.4	(0.9)	27.1	(1.0)	27.7	(1.0)	15.9	(0.9)	4.0	(0.4)	0.4	(0.1)
Hungary	11.3	(1.2)	17.4	(1.0)	26.0	(1.2)	24.4	(1.1)	14.4	(1.0)	5.5	(0.7)	1.0	(0.3)
Israel	20.7	(1.6)	18.0	(1.1)	21.9	(0.9)	20.1	(0.9)	13.0	(1.0)	5.3	(0.8)	1.1	(0.3)
United Arab Emirates	18.2	(0.9)	25.5	(0.8)	28.5	(0.8)	18.3	(0.7)	7.3	(0.5)	2.0	(0.3)	0.2	(0.1)
Chile	18.2	(1.4)	26.9	(1.2)	28.0	(1.0)	18.3	(1.1)	7.1	(0.6)	1.4	(0.2)	0.2	(0.1)
Brazil	22.6	(1.9)	28.4	(1.2)	27.3	(1.7)	13.9	(1.0)	6.0	(1.1)	1.6	(0.5)	0.2	(0.1)
Colombia	28.9	(1.6)	35.5	(1.2)	23.8	(1.0)	9.2	(0.8)	2.2	(0.4)	0.3	(0.1)	0.1	(0.1)
OECD average	**6.9**	**(0.2)**	**13.1**	**(0.2)**	**22.7**	**(0.2)**	**26.3**	**(0.2)**	**19.7**	**(0.2)**	**8.7**	**(0.1)**	**2.6**	**(0.1)**

Note: Countries, economies, and provinces have been sorted by the total percentage of students who attained Level 2 or higher.

Table B.1.11

Percentage of students at each proficiency level for countries, economies, and provinces: COMPOSITE MATHEMATICS

Country, economy, or province	Proficiency levels													
	Below Level 1		Level 1		Level 2		Level 3		Level 4		Level 5		Level 6	
	%	standard error	%	standard error	%	standard error	%	standard error	%	standard error	%	standard error	%	standard error
Shanghai-China	1.0	(0.2)	3.5	(0.5)	9.7	(0.7)	17.1	(0.8)	24.3	(0.9)	24.6	(1.0)	19.8	(1.0)
Hong Kong-China	2.2	(0.3)	5.1	(0.7)	11.9	(0.7)	22.7	(1.0)	29.4	(1.1)	20.5	(1.1)	8.2	(0.8)
Korea	1.8	(0.3)	5.7	(0.6)	14.5	(0.9)	23.5	(1.0)	25.4	(1.0)	19.3	(0.9)	9.8	(1.2)
Singapore	1.9	(0.2)	5.7	(0.4)	12.3	(0.7)	19.0	(0.6)	23.5	(0.8)	21.5	(0.7)	16.2	(0.5)
Macao-China	2.1	(0.2)	6.5	(0.4)	15.8	(0.5)	26.0	(0.6)	27.1	(0.7)	16.7	(0.6)	5.8	(0.3)
Japan	2.3	(0.4)	6.8	(0.6)	16.8	(0.9)	26.3	(1.0)	26.0	(1.0)	15.4	(0.9)	6.3	(0.8)
British Columbia	**2.1**	**(0.6)**	**8.2**	**(0.9)**	**20.0**	**(1.2)**	**27.9**	**(1.3)**	**24.3**	**(1.4)**	**12.9**	**(1.2)**	**4.6**	**(0.8)**
Estonia	1.9	(0.3)	8.7	(0.6)	22.3	(1.0)	30.4	(1.0)	23.6	(0.9)	10.5	(0.7)	2.6	(0.3)
Ontario	**2.4**	**(0.5)**	**8.4**	**(0.8)**	**20.9**	**(1.3)**	**28.8**	**(1.3)**	**23.7**	**(1.5)**	**11.8**	**(1.1)**	**4.0**	**(0.7)**
Quebec	**3.1**	**(0.4)**	**8.0**	**(0.7)**	**17.1**	**(1.1)**	**26.2**	**(1.1)**	**26.8**	**(1.1)**	**14.7**	**(0.9)**	**4.1**	**(0.6)**
Chinese Taipei	3.1	(0.4)	8.0	(0.6)	14.7	(0.6)	20.4	(0.8)	23.9	(0.9)	19.2	(0.9)	10.7	(0.8)
Canada	**3.0**	**(0.3)**	**9.1**	**(0.4)**	**20.5**	**(0.6)**	**27.8**	**(0.6)**	**23.9**	**(0.7)**	**12.0**	**(0.6)**	**3.7**	**(0.3)**
Alberta	**4.1**	**(0.9)**	**10.3**	**(1.0)**	**20.7**	**(1.3)**	**25.7**	**(1.6)**	**23.1**	**(1.5)**	**12.1**	**(1.6)**	**3.9**	**(0.7)**
Newfoundland and Labrador	**4.0**	**(0.9)**	**11.6**	**(1.4)**	**25.6**	**(1.7)**	**28.9**	**(1.8)**	**20.4**	**(1.6)**	**8.5**	**(0.9)**	**1.1**	**(0.4)**
Nova Scotia	**3.8**	**(0.6)**	**11.8**	**(1.8)**	**25.4**	**(2.3)**	**29.2**	**(1.7)**	**20.9**	**(2.6)**	**7.6**	**(1.3)**	**1.4**	**(0.4)**
New Brunswick	**4.8**	**(0.7)**	**11.0**	**(1.0)**	**23.9**	**(1.5)**	**31.8**	**(1.9)**	**20.4**	**(1.6)**	**7.0**	**(1.1)**	**1.1**	**(0.3)**
Saskatchewan	**3.7**	**(0.5)**	**12.4**	**(1.0)**	**23.7**	**(1.2)**	**28.4**	**(1.7)**	**21.2**	**(1.4)**	**9.2**	**(1.1)**	**1.4**	**(0.5)**
Ireland	4.5	(0.5)	11.8	(0.7)	25.6	(0.8)	30.1	(1.0)	20.2	(0.9)	6.8	(0.5)	1.1	(0.2)
Poland	4.2	(0.5)	12.4	(0.8)	24.5	(1.0)	27.3	(0.9)	19.9	(0.9)	8.9	(0.8)	2.6	(0.5)
Germany	5.4	(0.5)	11.5	(0.8)	20.6	(0.8)	24.8	(0.9)	22.1	(0.8)	12.0	(0.8)	3.7	(0.4)
Denmark	4.4	(0.5)	13.0	(0.7)	24.4	(0.8)	29.3	(1.4)	20.1	(1.0)	7.5	(0.5)	1.3	(0.2)
Austria	4.7	(0.6)	12.7	(1.0)	21.7	(0.8)	25.6	(1.0)	22.6	(0.9)	10.4	(0.8)	2.3	(0.3)
Australia	4.9	(0.3)	12.6	(0.5)	22.7	(0.6)	26.2	(0.6)	19.8	(0.6)	10.3	(0.4)	3.4	(0.3)
Belgium	6.0	(0.5)	11.9	(0.6)	19.1	(0.7)	24.1	(0.7)	21.5	(0.6)	12.6	(0.5)	4.7	(0.4)
France	6.5	(0.7)	12.4	(0.7)	21.7	(1.0)	25.8	(1.0)	21.1	(0.9)	10.0	(0.6)	2.4	(0.4)
Prince Edward Island	**4.3**	**(0.7)**	**14.8**	**(1.1)**	**28.5**	**(1.4)**	**31.5**	**(1.5)**	**17.1**	**(1.2)**	**3.5**	**(0.7)**	**0.4**	**(0.2)**
Italy	5.5	(0.8)	13.7	(1.0)	25.1	(1.3)	28.1	(1.3)	19.3	(1.1)	7.0	(0.8)	1.4	(0.3)
Manitoba	**5.3**	**(1.0)**	**14.0**	**(1.8)**	**25.7**	**(1.8)**	**27.5**	**(1.4)**	**18.6**	**(1.2)**	**7.3**	**(0.7)**	**1.7**	**(0.4)**
Norway	5.6	(0.5)	14.1	(0.7)	25.2	(0.9)	27.2	(1.1)	19.0	(1.1)	7.6	(0.6)	1.5	(0.3)
Russian Federation	5.3	(0.6)	15.0	(0.9)	28.4	(0.9)	28.3	(0.9)	16.6	(0.9)	5.4	(0.6)	0.9	(0.2)
Slovenia	5.4	(0.4)	15.6	(0.6)	24.7	(0.9)	25.1	(0.8)	18.1	(1.0)	9.0	(0.6)	1.9	(0.3)
United States	6.0	(0.7)	15.2	(1.0)	26.5	(1.0)	25.9	(1.0)	17.4	(1.0)	7.1	(0.7)	2.0	(0.3)
Slovak Republic	7.9	(0.9)	14.2	(1.0)	24.3	(1.4)	25.4	(1.2)	18.9	(1.1)	7.5	(0.6)	1.9	(0.5)
Portugal	6.6	(0.7)	16.0	(1.0)	24.5	(0.8)	26.4	(0.9)	17.9	(1.1)	7.3	(0.6)	1.3	(0.2)
Spain	6.6	(0.6)	16.5	(1.0)	27.4	(0.9)	28.5	(0.9)	16.3	(0.8)	4.3	(0.4)	0.4	(0.1)
Sweden	6.5	(0.5)	16.9	(0.8)	25.8	(1.0)	26.4	(0.8)	17.1	(0.8)	6.1	(0.4)	1.2	(0.2)
Hungary	9.8	(0.9)	18.2	(1.1)	26.6	(1.2)	23.6	(1.1)	14.6	(0.9)	6.0	(0.7)	1.2	(0.4)
Israel	17.7	(1.4)	18.2	(1.0)	22.3	(0.9)	20.7	(1.0)	14.1	(1.0)	5.9	(0.7)	1.2	(0.3)
United Arab Emirates	18.2	(0.8)	27.4	(0.8)	26.9	(0.7)	17.5	(0.7)	7.6	(0.5)	2.0	(0.3)	0.3	(0.1)
Chile	18.5	(1.3)	30.4	(1.1)	27.5	(1.1)	16.4	(0.9)	6.0	(0.6)	1.1	(0.2)	0.1	(0.0)
Brazil	26.3	(1.8)	32.8	(1.3)	24.0	(1.3)	11.7	(1.0)	4.1	(0.7)	0.9	(0.3)	0.1	(0.1)
Colombia	34.9	(1.6)	35.9	(1.1)	20.7	(1.0)	6.8	(0.6)	1.5	(0.3)	0.2	(0.1)	0.0	(0.0)
OECD average	**6.3**	**(0.1)**	**13.8**	**(0.2)**	**23.2**	**(0.2)**	**25.9**	**(0.2)**	**19.3**	**(0.2)**	**8.9**	**(0.1)**	**2.5**	**(0.1)**

Note: Countries, economies, and provinces have been sorted by the total percentage of students who attained Level 2 or higher.

Table B.1.12

Estimated average scores by language of the school system for Canada and the provinces: PAPER-BASED, COMPUTER-BASED, AND COMPOSITE MATHEMATICS

	Anglophone school system		Francophone school system		Difference between systems	
Canada and provinces	average	standard error	average	standard error	difference	standard error
Paper-Based Mathematics						
Canada	**513**	**(2.3)**	**535**	**(3.3)**	**-21***	**(4.2)**
Nova Scotia	497	(4.1)	506	(6.9)	-9	(8.0)
New Brunswick	503	(3.3)	500	(3.2)	4	(4.6)
Quebec	517	(3.4)	538	(3.7)	-21*	(4.7)
Ontario	515	(4.2)	501	(2.8)	14*	(5.1)
Manitoba	492	(2.9)	497	(5.9)	-5	(6.3)
Alberta	517	(4.7)	506	(5.4)	11	(7.1)
British Columbia	522	(4.4)	517	(8.2)	5	(9.5)
Computer-Based Mathematics						
Canada	**523**	**(3.0)**	**521**	**(3.8)**	**2**	**(5.4)**
Nova Scotia	503	(6.0)	510	(4.2)	-7	(7.5)
New Brunswick	495	(3.6)	500	(4.5)	-4	(5.9)
Quebec	524	(3.5)	523	(4.3)	1	(5.4)
Ontario	531	(5.7)	501	(3.5)	30*	(6.4)
Manitoba	493	(3.3)	502	(4.7)	-9	(6.0)
Alberta	516	(5.3)	466	(18.2)	50*	(19.0)
British Columbia	532	(4.7)	508	(8.5)	24*	(10.3)
Composite Mathematics						
Canada	**518**	**(2.5)**	**528**	**(3.2)**	**-9***	**(4.5)**
Nova Scotia	500	(5.0)	508	(4.9)	-8	(6.9)
New Brunswick	499	(3.2)	500	(3.6)	0	(4.9)
Quebec	521	(3.3)	531	(3.6)	-10*	(4.7)
Ontario	523	(4.6)	501	(3.0)	22*	(5.4)
Manitoba	493	(2.9)	499	(5.1)	-7	(5.8)
Alberta	517	(4.6)	486	(10.9)	31*	(11.8)
British Columbia	527	(4.2)	513	(7.6)	14	(9.1)

* Statistically significant differences.

Table B.1.13

Estimated average scores by language of the school system for Canada and the provinces: PAPER-BASED MATHEMATICS CONTENT SUBSCALES

	Anglophone school system		Francophone school system		Difference between systems	
Canada and provinces	average	standard error	average	standard error	difference	standard error
Change and Relationships						
Canada	**523**	**(2.3)**	**534**	**(3.7)**	**-11***	**(4.4)**
Nova Scotia	499	(5.9)	507	(12.0)	-8	(13.5)
New Brunswick	508	(3.7)	495	(3.6)	13*	(5.1)
Quebec	524	(3.4)	537	(4.1)	-12*	(5.1)
Ontario	526	(4.3)	507	(3.0)	19*	(5.2)
Manitoba	498	(3.3)	503	(6.9)	-5	(7.4)
Alberta	527	(5.0)	512	(6.3)	15	(7.9)
British Columbia	530	(4.9)	533	(7.2)	-3	(9.1)
Quantity						
Canada	**510**	**(2.7)**	**533**	**(3.5)**	**-23***	**(4.6)**
Nova Scotia	494	(4.2)	498	(8.6)	-4	(9.9)
New Brunswick	507	(3.6)	495	(3.5)	12*	(5.1)
Quebec	510	(3.5)	537	(3.9)	-27*	(4.9)
Ontario	511	(5.1)	497	(4.5)	14*	(6.6)
Manitoba	488	(3.6)	483	(6.1)	5	(6.7)
Alberta	512	(5.3)	500	(8.0)	13	(9.5)
British Columbia	523	(5.3)	511	(8.7)	13	(10.6)
Space and Shape						
Canada	**503**	**(2.5)**	**535**	**(4.0)**	**-32***	**(4.7)**
Nova Scotia	482	(2.8)	508	(8.5)	-27*	(8.9)
New Brunswick	489	(3.3)	506	(3.4)	-16*	(4.7)
Quebec	509	(3.7)	538	(4.4)	-29*	(5.5)
Ontario	504	(4.6)	505	(3.6)	-1	(5.7)
Manitoba	483	(3.2)	501	(7.1)	-18*	(7.6)
Alberta	509	(4.9)	506	(6.0)	4	(7.8)
British Columbia	511	(5.1)	518	(8.3)	-7	(9.9)
Uncertainity and Data						
Canada	**512**	**(2.3)**	**531**	**(3.4)**	**-19***	**(4.4)**
Nova Scotia	503	(5.6)	504	(4.9)	-1	(7.6)
New Brunswick	499	(3.6)	495	(3.4)	4	(5.1)
Quebec	518	(3.4)	536	(3.8)	-17*	(4.8)
Ontario	512	(4.3)	492	(3.1)	20*	(5.3)
Manitoba	495	(3.0)	500	(5.6)	-4	(6.0)
Alberta	517	(4.8)	502	(6.5)	15	(7.9)
British Columbia	521	(4.1)	505	(6.7)	16*	(7.8)

* Statistically significant differences.

Table B.1.14

Estimated average scores by language of the school system for Canada and the provinces: PAPER-BASED MATHEMATICS PROCESS SUBSCALES

	Anglophone school system		Francophone school system		Difference between systems	
Canada and provinces	average	standard error	average	standard error	difference	standard error
Employing						
Canada	**512**	**(2.4)**	**534**	**(3.4)**	**-22***	**(4.4)**
Nova Scotia	493	(3.2)	505	(9.2)	-12	(9.8)
New Brunswick	502	(3.6)	496	(3.2)	5	(4.8)
Quebec	519	(3.2)	538	(3.8)	-18*	(4.7)
Ontario	513	(4.4)	499	(3.2)	14*	(5.5)
Manitoba	489	(3.3)	488	(4.8)	1	(5.8)
Alberta	515	(4.6)	507	(5.4)	8	(7.6)
British Columbia	522	(4.5)	517	(7.4)	5	(8.5)
Formulating						
Canada	**510**	**(2.6)**	**538**	**(3.8)**	**-28***	**(4.6)**
Nova Scotia	493	(6.5)	512	(9.9)	-19	(12.1)
New Brunswick	502	(3.9)	510	(3.5)	-8	(5.7)
Quebec	517	(3.5)	541	(4.3)	-24*	(5.2)
Ontario	512	(4.8)	501	(4.1)	11	(6.4)
Manitoba	487	(3.4)	506	(5.5)	-19*	(5.9)
Alberta	514	(5.7)	505	(6.7)	9	(9.1)
British Columbia	517	(5.2)	525	(10.1)	-8	(11.3)
Interpreting						
Canada	**517**	**(2.5)**	**534**	**(3.4)**	**-17***	(4.4)
Nova Scotia	507	(3.9)	501	(4.8)	6	(6.7)
New Brunswick	505	(3.6)	492	(3.4)	13*	(5.0)
Quebec	515	(4.2)	538	(3.8)	-23*	(5.3)
Ontario	517	(4.6)	501	(3.0)	16*	(5.5)
Manitoba	502	(3.0)	500	(5.5)	2	(6.2)
Alberta	523	(5.3)	498	(7.6)	25*	(9.3)
British Columbia	528	(4.2)	509	(7.6)	19*	(8.6)

* Statistically significant differences.

Table B.1.15

Estimated average scores by gender for Canada and the provinces: PAPER-BASED, COMPUTER-BASED, AND COMPOSITE MATHEMATICS

Canada and provinces	Females		Males		Difference (Female-Male)	
	average	standard error	average	standard error	difference	standard error
Paper-Based Mathematics						
Canada	**513**	**(2.1)**	**523**	**(2.1)**	**-10***	**(2.0)**
Newfoundland and Labrador	490	(3.9)	491	(5.2)	-1	(5.6)
Prince Edward Island	478	(3.3)	481	(3.6)	-3	(4.9)
Nova Scotia	492	(6.1)	503	(3.9)	-11	(6.1)
New Brunswick	500	(3.8)	504	(3.9)	-3	(5.7)
Quebec	531	(3.8)	541	(4.3)	-10*	(4.3)
Ontario	509	(4.0)	520	(4.9)	-10*	(3.7)
Manitoba	489	(4.5)	495	(3.6)	-6	(5.7)
Saskatchewan	502	(3.6)	510	(3.9)	-8	(4.5)
Alberta	512	(5.1)	522	(5.0)	-11*	(4.0)
British Columbia	515	(5.9)	529	(4.8)	-14*	(6.1)
Computer-Based Mathematics						
Canada	**514**	**(2.3)**	**532**	**(2.5)**	**-17***	**(1.9)**
Newfoundland and Labrador	510	(3.2)	512	(5.0)	-2	(5.4)
Prince Edward Island	497	(3.6)	485	(4.0)	13*	(4.7)
Nova Scotia	495	(9.3)	510	(4.0)	-15	(8.1)
New Brunswick	494	(3.5)	498	(4.5)	-4	(5.8)
Quebec	517	(4.2)	529	(4.5)	-12*	(4.1)
Ontario	519	(5.5)	542	(6.1)	-23*	(3.8)
Manitoba	484	(4.3)	502	(4.1)	-18*	(5.4)
Saskatchewan	496	(3.9)	502	(3.9)	-6	(4.4)
Alberta	510	(6.3)	522	(4.9)	-12*	(4.2)
British Columbia	519	(5.0)	545	(6.1)	-26*	(6.0)
Composite Mathematics						
Canada	**514**	**(2.0)**	**527**	**(2.2)**	**-14***	(1.9)
Newfoundland and Labrador	500	(3.4)	501	(4.9)	-1	(5.2)
Prince Edward Island	487	(2.8)	483	(3.2)	5	(3.9)
Nova Scotia	494	(7.6)	506	(3.6)	-13	(6.8)
New Brunswick	497	(3.4)	501	(4.0)	-4	(5.4)
Quebec	524	(3.7)	535	(4.1)	-11*	(4.0)
Ontario	514	(4.4)	531	(5.1)	-17*	(3.6)
Manitoba	487	(4.2)	499	(3.7)	-12*	(5.4)
Saskatchewan	499	(3.4)	506	(3.6)	-7	(4.0)
Alberta	511	(5.4)	522	(4.4)	-11*	(3.8)
British Columbia	517	(5.1)	537	(5.1)	-20*	(5.9)

* Statistically significant differences.

Table B.1.16

Estimated average scores by gender for Canada and the provinces: PAPER-BASED MATHEMATICS CONTENT SUBSCALES

Canada and provinces	Females		Males		Difference (Female-Male)	
	average	standard error	average	standard error	difference	standard error
Change and Relationships						
Canada	**518**	**(2.2)**	**532**	**(2.2)**	**-14***	**(2.0)**
Newfoundland and Labrador	499	(4.4)	500	(5.2)	-1	(5.6)
Prince Edward Island	486	(3.4)	493	(3.7)	-8	(4.9)
Nova Scotia	490	(7.7)	507	(5.2)	-17*	(6.2)
New Brunswick	503	(3.6)	507	(4.5)	-4	(5.6)
Quebec	527	(4.3)	545	(4.4)	-18*	(4.5)
Ontario	519	(4.2)	531	(4.9)	-13*	(3.7)
Manitoba	493	(5.0)	503	(4.1)	-10	(6.4)
Saskatchewan	510	(3.6)	521	(4.6)	-12*	(5.1)
Alberta	520	(5.2)	533	(5.5)	-13*	(4.3)
British Columbia	521	(6.6)	539	(5.0)	-18*	(6.6)
Quantity						
Canada	**511**	**(2.4)**	**520**	**(2.5)**	**-9***	**(2.3)**
Newfoundland and Labrador	482	(4.0)	488	(5.9)	-5	(6.2)
Prince Edward Island	473	(3.8)	476	(4.0)	-3	(5.1)
Nova Scotia	487	(5.8)	502	(4.7)	-15*	(6.6)
New Brunswick	502	(3.9)	507	(4.3)	-5	(6.0)
Quebec	531	(3.8)	537	(4.5)	-6	(4.5)
Ontario	506	(5.0)	516	(5.6)	-9*	(4.2)
Manitoba	484	(5.1)	492	(4.3)	-7	(6.3)
Saskatchewan	496	(4.1)	505	(4.5)	-8	(5.2)
Alberta	505	(5.7)	519	(5.7)	-13*	(4.5)
British Columbia	515	(6.6)	531	(5.9)	-16*	(6.6)
Space and Shape						
Canada	**505**	**(2.3)**	**515**	**(2.4)**	**-10***	**(2.2)**
Newfoundland and Labrador	477	(3.7)	477	(5.0)	0	(4.9)
Prince Edward Island	457	(3.4)	463	(3.6)	-6	(4.6)
Nova Scotia	475	(4.0)	490	(4.1)	-15*	(6.0)
New Brunswick	493	(3.3)	494	(4.3)	-2	(5.6)
Quebec	529	(4.4)	541	(4.9)	-12*	(4.7)
Ontario	500	(4.5)	509	(5.3)	-10*	(4.4)
Manitoba	478	(4.8)	489	(3.7)	-12*	(5.8)
Saskatchewan	496	(4.3)	499	(4.8)	-4	(5.2)
Alberta	505	(5.6)	513	(5.0)	-8*	(4.0)
British Columbia	505	(6.6)	518	(5.3)	-13*	(6.4)
Uncertainity and Data						
Canada	512	(2.0)	521	(2.2)	-9*	(2.1)
Newfoundland and Labrador	494	(4.4)	489	(7.3)	5	(6.8)
Prince Edward Island	488	(3.4)	488	(3.9)	0	(4.8)
Nova Scotia	500	(7.3)	506	(4.9)	-7	(5.8)
New Brunswick	501	(3.4)	495	(4.2)	5	(5.3)
Quebec	531	(3.7)	537	(4.4)	-6	(4.1)
Ontario	506	(4.2)	517	(4.9)	-11*	(3.9)
Manitoba	493	(4.5)	498	(3.7)	-5	(5.7)
Saskatchewan	505	(3.3)	510	(4.0)	-5	(4.6)
Alberta	511	(4.9)	523	(5.5)	-12*	(4.4)
British Columbia	516	(5.0)	527	(4.9)	-11	(5.7)

* Statistically significant differences.

Table B.1.17

Estimated average scores by gender for Canada and the provinces: PAPER-BASED MATHEMATICS PROCESS SUBSCALES

	Females		Males		Difference (Female-Male)	
Canada and provinces	average	standard error	average	standard error	difference	standard error
Employing						
Canada	**512**	**(2.2)**	**521**	**(2.1)**	**-10***	**(2.2)**
Newfoundland and Labrador	490	(4.2)	490	(5.4)	0	(5.8)
Prince Edward Island	478	(3.4)	481	(3.6)	-4	(4.9)
Nova Scotia	489	(5.2)	497	(3.9)	-8	(6.7)
New Brunswick	500	(3.6)	500	(4.1)	0	(5.4)
Quebec	531	(3.9)	540	(4.2)	-10*	(4.3)
Ontario	507	(4.4)	518	(4.8)	-11*	(3.7)
Manitoba	485	(4.5)	493	(4.2)	-8	(5.9)
Saskatchewan	502	(3.6)	508	(4.2)	-6	(4.6)
Alberta	510	(5.2)	519	(4.7)	-9*	(3.7)
British Columbia	517	(6.0)	527	(4.7)	-11	(5.9)
Formulating						
Canada	**510**	**(2.4)**	**522**	**(2.6)**	**-13***	**(2.4)**
Newfoundland and Labrador	479	(5.1)	485	(5.8)	-6	(6.1)
Prince Edward Island	472	(3.8)	480	(3.9)	-8	(5.3)
Nova Scotia	486	(8.8)	502	(5.4)	-16*	(7.1)
New Brunswick	502	(3.9)	505	(4.7)	-3	(6.4)
Quebec	533	(4.3)	544	(5.0)	-11*	(4.9)
Ontario	506	(4.6)	518	(5.6)	-12*	(4.1)
Manitoba	482	(4.8)	492	(4.3)	-10	(6.3)
Saskatchewan	495	(3.8)	508	(4.8)	-13*	(5.9)
Alberta	505	(6.0)	522	(6.1)	-17*	(4.6)
British Columbia	508	(7.0)	526	(5.7)	-18*	(7.2)
Interpreting						
Canada	**517**	**(2.3)**	**526**	**(2.3)**	**-9***	**(2.2)**
Newfoundland and Labrador	496	(4.3)	501	(5.3)	-5	(5.9)
Prince Edward Island	483	(3.6)	491	(4.0)	-8	(5.0)
Nova Scotia	501	(5.1)	513	(4.6)	-13*	(6.0)
New Brunswick	499	(3.8)	504	(4.2)	-5	(5.8)
Quebec	529	(4.0)	542	(4.3)	-13*	(4.6)
Ontario	513	(4.5)	520	(5.1)	-7	(3.8)
Manitoba	499	(4.7)	504	(3.8)	-6	(6.0)
Saskatchewan	505	(4.0)	511	(4.2)	-6	(5.3)
Alberta	517	(4.9)	529	(6.5)	-12*	(5.0)
British Columbia	523	(5.4)	533	(4.9)	-10	(6.0)

* Statistically significant differences.

Table B.1.18

Proportion of students who performed below Level 2 and at Levels 5 and 6, PISA 2003 and 2012, Canada and the provinces: PAPER-BASED MATHEMATICS

	Below Level 2						Levels 5 and 6					
	2003		2012		Difference 2003-2012		2003		2012		Difference 2003-2012	
Canada and provinces	%	standard error	%	standard error	difference	standard error	%	standard error	%	standard error	difference	standard error
Canada	**10.1**	**(0.5)**	**13.8**	**(0.5)**	**-3.7***	**(0.7)**	**20.3**	**(0.7)**	**16.4**	**(0.6)**	**3.9***	**(1.0)**
Newfoundland and Labrador	12.5	(1.0)	21.3	(2.0)	-8.8*	(2.3)	14.1	(1.0)	9.4	(1.0)	4.7*	(1.5)
Prince Edward Island	17.7	(1.2)	24.7	(1.3)	-7.0*	(1.8)	10.0	(0.8)	6.5	(0.9)	3.5*	(1.2)
Nova Scotia	13.4	(0.9)	17.7	(1.5)	-4.3*	(1.7)	14.2	(1.2)	9.0	(1.3)	5.2*	(1.8)
New Brunswick	14.4	(0.7)	16.3	(1.2)	-1.9	(1.3)	13.3	(0.7)	10.1	(1.2)	3.2*	(1.4)
Quebec	11.2	(1.2)	11.2	(1.0)	0.1	(1.6)	23.3	(1.6)	22.4	(1.3)	0.9	(2.1)
Ontario	9.6	(1.0)	13.8	(1.1)	-4.2*	(1.5)	18.3	(1.5)	15.1	(1.4)	3.3	(2.1)
Manitoba	10.9	(1.1)	21.2	(1.5)	-10.3*	(1.8)	18.9	(1.2)	10.3	(1.0)	8.6*	(1.6)
Saskatchewan	13.7	(1.4)	15.3	(1.1)	-1.7	(1.8)	14.8	(1.3)	12.2	(1.2)	2.7	(1.8)
Alberta	7.4	(0.9)	15.1	(1.5)	-7.8*	(1.8)	26.8	(1.9)	16.9	(1.5)	9.9*	(2.4)
British Columbia	8.4	(0.7)	12.3	(1.3)	-3.9*	(1.5)	21.6	(1.1)	16.5	(1.6)	5.1*	(1.9)

* Statistically significant differences.

Table B.1.19

Gender differences in student performance, PISA 2003 and 2012, Canada and the provinces: PAPER-BASED MATHEMATICS

	2003		2012	
Canada and provinces	Gender Difference (F-M)	standard error	Gender Difference (F-M)	standard error
Canada	**-11***	**(2.1)**	**-10***	**(2.0)**
Newfoundland and Labrador	-10*	(4.2)	-1	(5.6)
Prince Edward Island	1	(4.5)	-3	(4.9)
Nova Scotia	-11*	(3.9)	-11	(6.1)
New Brunswick	-6*	(2.9)	-3	(5.7)
Quebec	-7	(4.6)	-10*	(4.3)
Ontario	-11*	(4.0)	-10*	(3.7)
Manitoba	-14*	(5.0)	-6	(5.7)
Saskatchewan	3	(3.7)	-8	(4.5)
Alberta	-10*	(4.4)	-11*	(4.0)
British Columbia	-8*	(3.2)	-14*	(6.1)

* Statistically significant differences.

Table B.1.20

Proportion of males and females who performed below Level 2 and at Levels 5 and 6, PISA 2012, Canada and the provinces: PAPER-BASED MATHEMATICS

	Below Level 2						Levels 5 and 6					
	Female		Male		Difference (F-M)		Female		Male		Difference (F-M)	
Canada and provinces	%	standard error	%	standard error	difference	standard error	%	standard error	%	standard error	difference	standard error
Canada	**14.3**	**(0.7)**	**13.4**	**(0.7)**	**0.9**	**(0.8)**	**13.8**	**(0.7)**	**19.0**	**(0.9)**	**-5.2***	**(0.9)**
Newfoundland and Labrador	20.2	(2.6)	22.4	(2.6)	-2.2	(3.2)	8.6	(1.3)	10.2	(1.6)	-1.6	(2.1)
Prince Edward Island	24.0	(1.9)	25.4	(2.0)	-1.4	(2.9)	4.8	(1.1)	8.1	(1.2)	-3.2*	(1.6)
Nova Scotia	18.5	(2.1)	17.0	(2.0)	1.5	(2.8)	7.4	(1.5)	10.6	(1.8)	-3.2	(2.0)
New Brunswick	15.4	(1.6)	17.1	(1.9)	-1.7	(2.6)	9.3	(1.6)	10.8	(1.8)	-1.5	(2.4)
Quebec	11.8	(1.1)	10.5	(1.5)	1.3	(1.7)	19.5	(1.5)	25.3	(1.8)	-5.8*	(1.9)
Ontario	13.7	(1.2)	13.9	(1.5)	-0.2	(1.6)	12.0	(1.2)	18.2	(1.9)	-6.2*	(1.6)
Manitoba	21.6	(2.1)	20.8	(2.3)	0.9	(3.3)	8.5	(1.1)	11.9	(1.5)	-3.5*	(1.7)
Saskatchewan	16.0	(1.6)	14.7	(1.5)	1.3	(2.1)	11.0	(1.3)	13.3	(1.7)	-2.3	(1.9)
Alberta	16.6	(1.9)	13.8	(1.9)	2.8	(2.3)	14.3	(1.7)	19.3	(1.8)	-5.0*	(1.8)
British Columbia	13.6	(1.8)	10.9	(1.5)	2.6	(2.0)	14.1	(2.2)	18.9	(2.1)	-4.8	(2.9)

* Statistically significant differences.

Table B.1.21

Comparisons of performance, PISA 2003, 2006, 2009, and 2012, Canada and the provinces: PAPER-BASED MATHEMATICS

	2003		2006		2009		2012	
Canada and provinces	average	standard error	average	standard error	average	standard error	average	standard error
Canada	**532**	**(1.8)**	**527**	**(2.4)**	**527**	**(2.6)**	**518***	**(2.7)**
Newfoundland and Labrador	517	(2.5)	507*	(2.8)	503*	(3.5)	490*	(4.2)
Prince Edward Island	500	(2.0)	501	(2.7)	487*	(3.0)	479*	(3.2)
Nova Scotia	515	(2.2)	506*	(2.6)	512	(3.0)	497*	(4.5)
New Brunswick	511	(1.4)	506	(2.5)	504*	(3.0)	502*	(3.2)
Quebec	536	(4.5)	540	(4.4)	543	(4.0)	536	(3.9)
Ontario	530	(3.6)	526	(3.9)	526	(3.8)	514*	(4.5)
Manitoba	528	(3.1)	521	(3.5)	501*	(4.1)	492*	(3.5)
Saskatchewan	516	(3.9)	507	(3.6)	506	(3.8)	506	(3.6)
Alberta	549	(4.3)	530*	(4.0)	529*	(4.8)	517*	(5.0)
British Columbia	538	(2.4)	523*	(4.6)	523*	(5.0)	522*	(4.8)

* Statistically significant differences compared to PISA 2003.

Note: The linkage error is incorporated into the standard error for 2006, 2009, and 2012. Also, for some provinces, the standard errors from 2003 to 2006 and to 2009 differ from those in the previous PISA reports on trend results. These differences are due to the change of the method used by the OECD to compute the linkage error.

Table B.2.1

Estimated average scores and confidence intervals for countries, economies, and provinces: PRINT READING

Country, economy, or province	average	standard error	confidence interval – 95% lower limit	confidence interval – 95% upper limit
Shanghai-China	570	(2.9)	564	575
Hong Kong-China	545	(2.8)	539	550
Singapore	542	(1.4)	540	545
Japan	538	(3.7)	531	545
Korea	536	(3.9)	528	544
British Columbia	**535**	**(4.5)**	**527**	**544**
Ontario	**528**	**(4.4)**	**520**	**537**
Alberta	**525**	**(4.1)**	**517**	**533**
Finland	524	(2.4)	519	529
Ireland	523	(2.6)	518	528
Chinese Taipei	523	(3.0)	517	529
Canada	**523**	**(1.9)**	**519**	**527**
Quebec	**520**	**(3.6)**	**513**	**527**
Poland	518	(3.1)	512	524
Estonia	516	(2.0)	512	520
Liechtenstein	516	(4.1)	507	524
New Zealand	512	(2.4)	507	517
Australia	512	(1.6)	509	515
The Netherlands	511	(3.5)	504	518
Belgium	509	(2.2)	505	513
Switzerland	509	(2.6)	504	514
Macao-China	509	(0.9)	507	511
Nova Scotia	**508**	**(3.1)**	**502**	**514**
Vietnam	508	(4.4)	500	517
Germany	508	(2.8)	502	513
France	505	(2.8)	500	511
Saskatchewan	**505**	**(2.8)**	**500**	**511**
Norway	504	(3.2)	498	510
Newfoundland and Labrador	**503**	**(3.7)**	**496**	**510**
United Kingdom	499	(3.5)	492	506
United States	498	(3.7)	490	505
New Brunswick	**497**	**(2.6)**	**491**	**502**
Denmark	496	(2.6)	491	501
Manitoba	**495**	**(3.3)**	**489**	**502**
Czech Republic	493	(2.9)	487	499
Italy	490	(2.0)	486	494
Austria	490	(2.8)	484	495
Prince Edward Island	**490**	**(2.7)**	**484**	**495**
Latvia	489	(2.4)	484	493
Hungary	488	(3.2)	482	495
Spain	488	(1.9)	484	492
Luxembourg	488	(1.5)	485	491
Portugal	488	(3.8)	480	495
Israel	486	(5.0)	476	496
Croatia	485	(3.3)	478	491
Sweden	483	(3.0)	477	489
Iceland	483	(1.8)	479	486
Slovenia	481	(1.2)	479	484
Lithuania	477	(2.5)	472	482
Greece	477	(3.3)	471	484
Turkey	475	(4.2)	467	484
Russian Federation	475	(3.0)	469	481
Slovak Republic	463	(4.2)	455	471
Cyprus	449	(1.2)	447	451
Serbia	446	(3.4)	439	453
United Arab Emirates	442	(2.5)	437	447
Chile	441	(2.9)	436	447
Thailand	441	(3.1)	435	447
Costa Rica	441	(3.5)	434	447
Romania	438	(4.0)	430	445
Bulgaria	436	(6.0)	424	448
Mexico	424	(1.5)	421	427
Montenegro	422	(1.2)	420	424
Uruguay	411	(3.2)	405	418
Brazil	410	(2.1)	406	414
Tunisia	404	(4.5)	395	413
Colombia	403	(3.4)	397	410
Jordan	399	(3.6)	392	406
Malaysia	398	(3.3)	392	405
Indonesia	396	(4.2)	388	404
Argentina	396	(3.7)	389	403
Albania	394	(3.2)	388	400
Kazakhstan	393	(2.7)	387	398
Qatar	388	(0.8)	386	389
Peru	384	(4.3)	376	393

Note: The OECD average was 496, with a standard error of 0.5.

Table B.2.2

Estimated average scores and confidence intervals for countries, economies, and provinces: DIGITAL READING

Country, economy, or province	average	standard error	confidence interval – 95% lower limit	confidence interval – 95% upper limit
Singapore	567	(1.2)	565	569
Korea	555	(3.6)	548	562
Hong Kong-China	550	(3.6)	543	557
British Columbia	**548**	**(3.6)**	**541**	**556**
Japan	545	(3.3)	538	551
Ontario	**540**	**(5.5)**	**529**	**551**
Canada	**532**	**(2.3)**	**528**	**537**
Alberta	**532**	**(5.3)**	**521**	**542**
Nova Scotia	**531**	**(9.8)**	**512**	**551**
Shanghai-China	531	(3.7)	524	539
Estonia	523	(2.8)	517	528
Australia	521	(1.7)	517	524
Ireland	520	(3.0)	514	526
Chinese Taipei	519	(3.0)	514	525
Quebec	**519**	**(3.5)**	**513**	**526**
Saskatchewan	**517**	**(3.2)**	**510**	**523**
Newfoundland and Labrador	**516**	**(3.5)**	**509**	**523**
New Brunswick	**516**	**(2.2)**	**511**	**520**
Macao-China	515	(0.9)	513	517
United States	511	(4.5)	502	520
France	511	(3.6)	504	518
Manitoba	**510**	**(3.7)**	**503**	**518**
Italy	504	(4.3)	496	513
Belgium	502	(2.5)	497	507
Norway	500	(3.5)	493	507
Sweden	498	(3.4)	492	505
Denmark	495	(2.9)	489	500
Germany	494	(4.0)	486	501
Prince Edward Island	**491**	**(3.2)**	**485**	**498**
Portugal	486	(4.4)	477	494
Austria	480	(3.9)	472	488
Poland	477	(4.5)	468	486
Slovak Republic	474	(3.5)	467	481
Slovenia	471	(1.3)	469	474
Spain	466	(3.9)	459	474
Russian Federation	466	(3.9)	458	473
Israel	461	(5.1)	451	471
Chile	452	(3.6)	445	459
Hungary	450	(4.4)	442	459
Brazil	431	(4.8)	421	440
United Arab Emirates	407	(3.3)	400	413
Colombia	396	(4.0)	388	404

Note: The OECD average was 497, with a standard error of 0.7.

Table B.2.3

Estimated average scores and confidence intervals for countries, economies, and provinces: COMPOSITE READING

Country, economy, or province	average	standard error	confidence interval – 95% lower limit	confidence interval – 95% upper limit
Singapore	555	(1.3)	552	557
Shanghai-China	550	(3.1)	544	557
Hong Kong-China	547	(2.8)	542	553
Korea	545	(3.5)	539	552
British Columbia	**542**	**(3.3)**	**535**	**548**
Japan	541	(3.3)	535	548
Ontario	**534**	**(4.3)**	**526**	**543**
Alberta	**529**	**(4.1)**	**520**	**537**
Canada	**528**	**(1.8)**	**524**	**531**
Ireland	522	(2.4)	517	526
Chinese Taipei	521	(2.9)	516	527
Nova Scotia	**520**	**(5.1)**	**510**	**530**
Quebec	**520**	**(3.1)**	**514**	**526**
Estonia	520	(2.2)	515	524
Australia	516	(1.5)	513	519
Macao-China	512	(0.8)	511	514
Saskatchewan	**511**	**(2.6)**	**506**	**516**
Newfoundland and Labrador	**510**	**(3.4)**	**503**	**516**
France	508	(2.8)	503	514
New Brunswick	**506**	**(2.2)**	**502**	**510**
Belgium	506	(2.1)	502	510
United States	504	(3.9)	497	512
Manitoba	**503**	**(3.2)**	**496**	**509**
Norway	502	(2.8)	496	507
Germany	501	(3.1)	494	507
Poland	498	(3.5)	491	504
Italy	496	(3.8)	488	503
Denmark	495	(2.5)	491	500
Sweden	491	(2.9)	485	497
Prince Edward Island	**490**	**(2.3)**	**486**	**495**
Portugal	487	(3.8)	479	494
Austria	485	(3.0)	479	491
Slovenia	476	(1.1)	474	478
Spain	476	(2.7)	471	481
Israel	473	(4.8)	464	483
Russian Federation	470	(3.1)	464	476
Hungary	469	(3.5)	463	476
Slovak Republic	469	(3.7)	461	476
Chile	447	(3.0)	441	453
United Arab Emirates	424	(2.7)	419	429
Brazil	420	(4.1)	412	428
Colombia	400	(3.4)	393	406

Note: The OECD average was 498, with a standard error of 0.6.

Table B.2.4

Estimated average scores and confidence intervals for countries, economies, and provinces: SCIENCE

Country, economy, or province	average	standard error	confidence interval – 95% lower limit	confidence interval – 95% upper limit
Shanghai-China	580	(3.0)	574	586
Hong Kong-China	555	(2.6)	550	560
Singapore	551	(1.5)	549	554
Japan	547	(3.6)	540	554
Finland	545	(2.2)	541	550
British Columbia	**544**	**(3.9)**	**537**	**552**
Estonia	541	(1.9)	538	545
Alberta	**539**	**(4.7)**	**530**	**549**
Korea	538	(3.7)	531	545
Vietnam	528	(4.3)	520	537
Ontario	**527**	**(4.3)**	**518**	**535**
Poland	526	(3.1)	520	532
Canada	**525**	**(1.9)**	**522**	**529**
Liechtenstein	525	(3.5)	518	532
Germany	524	(3.0)	518	530
Chinese Taipei	523	(2.3)	519	528
The Netherlands	522	(3.5)	515	529
Ireland	522	(2.5)	517	527
Australia	521	(1.8)	518	525
Macao-China	521	(0.8)	519	522
Saskatchewan	**516**	**(2.9)**	**511**	**522**
Nova Scotia	**516**	**(3.0)**	**510**	**522**
New Zealand	516	(2.1)	511	520
Quebec	**516**	**(3.3)**	**509**	**522**
Switzerland	515	(2.7)	510	521
Newfoundland and Labrador	**514**	**(3.6)**	**507**	**521**
Slovenia	514	(1.3)	512	517
United Kingdom	514	(3.4)	508	521
Czech Republic	508	(3.0)	502	514
New Brunswick	**507**	**(2.6)**	**502**	**512**
Austria	506	(2.7)	500	511
Belgium	505	(2.1)	501	510
Manitoba	**503**	**(3.2)**	**496**	**509**
Latvia	502	(2.8)	497	508
France	499	(2.6)	494	504
Denmark	498	(2.7)	493	504
United States	497	(3.8)	490	505
Spain	496	(1.8)	493	500
Lithuania	496	(2.6)	491	501
Norway	495	(3.1)	488	501
Hungary	494	(2.9)	489	500
Italy	494	(1.9)	490	497
Croatia	491	(3.1)	485	497
Luxembourg	491	(1.3)	489	494
Prince Edward Island	**490**	**(2.7)**	**485**	**496**
Portugal	489	(3.7)	482	497
Russian Federation	486	(2.9)	481	492
Sweden	485	(3.0)	479	491
Iceland	478	(2.1)	474	482
Slovak Republic	471	(3.6)	464	478
Israel	470	(5.0)	460	480
Greece	467	(3.1)	461	473
Turkey	463	(3.9)	456	471
United Arab Emirates	448	(2.8)	443	454
Bulgaria	446	(4.8)	437	456
Chile	445	(2.9)	439	451
Serbia	445	(3.4)	438	451
Thailand	444	(2.9)	438	450
Romania	439	(3.3)	432	445
Cyprus	438	(1.2)	435	440
Costa Rica	429	(2.9)	424	435
Kazakhstan	425	(3.0)	419	431
Malaysia	420	(3.0)	414	425
Uruguay	416	(2.8)	410	421
Mexico	415	(1.3)	412	417
Montenegro	410	(1.1)	408	412
Jordan	409	(3.1)	403	415
Argentina	406	(3.9)	398	413
Brazil	405	(2.1)	401	409
Colombia	399	(3.1)	393	405
Tunisia	398	(3.5)	391	405
Albania	397	(2.4)	393	402
Qatar	384	(0.7)	382	385
Indonesia	382	(3.8)	374	389
Peru	373	(3.6)	366	380

Note: The OECD average was 501, with a standard error of 0.5.

Table B.2.5

Variation in student performance for countries, economies, and provinces: PRINT READING

Country, economy, or province	Percentiles												Difference in score points between the 10th and 90th percentiles
	5th		10th		25th		75th		90th		95th		
	score	standard error	score	standard error	score	standard error	score	standard error	score	standard error	score	standard error	
Vietnam	379	(9.6)	411	(8.2)	462	(5.4)	559	(3.9)	599	(5.0)	623	(5.3)	189
Kazakhstan	268	(4.0)	297	(4.4)	344	(3.1)	444	(3.4)	487	(3.5)	511	(4.1)	189
Costa Rica	315	(5.4)	344	(5.4)	391	(4.3)	490	(4.2)	536	(5.0)	563	(4.9)	191
Indonesia	270	(7.8)	299	(6.1)	346	(4.7)	447	(4.6)	492	(6.1)	517	(7.3)	193
Thailand	310	(5.0)	341	(4.4)	389	(3.5)	494	(3.7)	541	(4.4)	569	(6.2)	201
Chile	310	(4.6)	339	(4.2)	388	(3.8)	496	(3.3)	541	(3.3)	567	(3.4)	202
Shanghai-China	431	(5.1)	463	(4.6)	518	(3.6)	626	(2.8)	667	(3.5)	690	(4.7)	204
Mexico	288	(3.0)	319	(2.5)	370	(1.9)	479	(1.8)	525	(1.9)	552	(2.0)	206
Estonia	381	(4.4)	412	(3.4)	463	(3.0)	571	(2.4)	618	(2.8)	645	(4.3)	206
Macao-China	366	(3.3)	400	(2.4)	457	(1.8)	566	(1.4)	611	(1.6)	637	(2.1)	211
Colombia	262	(6.5)	295	(5.4)	348	(4.0)	460	(3.7)	509	(4.5)	540	(5.0)	215
Malaysia	255	(4.7)	288	(4.4)	343	(3.7)	457	(3.9)	503	(4.3)	530	(5.2)	215
Korea	382	(8.6)	424	(6.2)	483	(4.3)	596	(4.1)	640	(4.0)	665	(4.8)	216
Denmark	347	(6.9)	385	(5.1)	442	(3.5)	555	(2.4)	602	(2.8)	629	(4.4)	216
Hong Kong-China	391	(6.4)	430	(5.4)	493	(4.4)	604	(3.0)	648	(3.4)	672	(4.1)	218
Latvia	341	(5.9)	375	(5.6)	434	(3.0)	548	(2.9)	593	(2.8)	619	(4.1)	219
Ireland	373	(7.1)	410	(5.7)	469	(3.6)	582	(2.7)	631	(3.2)	659	(3.2)	221
Brazil	266	(3.5)	297	(2.8)	348	(2.4)	465	(2.6)	518	(3.1)	550	(3.7)	222
Lithuania	331	(5.1)	363	(4.0)	419	(3.9)	538	(2.8)	585	(3.1)	612	(3.6)	222
Poland	366	(5.9)	404	(4.6)	461	(3.2)	579	(3.6)	626	(4.8)	655	(6.2)	222
Turkey	335	(5.3)	365	(4.6)	417	(4.0)	534	(5.6)	588	(6.8)	620	(7.9)	223
Croatia	337	(5.9)	370	(5.1)	427	(4.4)	546	(3.8)	593	(4.9)	622	(5.1)	223
Czech Republic	344	(6.0)	378	(4.7)	434	(3.7)	554	(3.6)	604	(3.8)	634	(4.3)	226
Saskatchewan	**353**	**(6.8)**	**389**	**(6.6)**	**448**	**(4.1)**	**566**	**(4.2)**	**615**	**(6.5)**	**647**	**(5.4)**	**226**
Nova Scotia	**350**	**(10.9)**	**394**	**(9.8)**	**454**	**(6.5)**	**569**	**(5.5)**	**621**	**(6.3)**	**647**	**(8.8)**	**227**
British Columbia	**382**	**(11.4)**	**418**	**(7.3)**	**479**	**(5.4)**	**595**	**(4.6)**	**646**	**(6.6)**	**674**	**(6.8)**	**227**
Tunisia	252	(7.2)	286	(7.1)	346	(5.9)	466	(4.5)	515	(5.6)	543	(6.5)	229
Jordan	237	(8.4)	280	(6.4)	343	(4.5)	462	(3.2)	510	(4.6)	537	(6.4)	230
Romania	290	(5.3)	322	(4.4)	375	(4.4)	501	(5.5)	555	(5.3)	586	(6.3)	232
Russian Federation	323	(4.8)	359	(4.5)	415	(4.0)	537	(3.9)	592	(4.2)	623	(5.1)	233
Switzerland	352	(4.6)	388	(3.9)	451	(3.3)	573	(2.8)	622	(3.2)	648	(3.9)	233
New Brunswick	**342**	**(7.6)**	**378**	**(5.6)**	**440**	**(4.1)**	**557**	**(5.0)**	**612**	**(5.4)**	**639**	**(8.1)**	**234**
Spain	327	(4.6)	367	(3.6)	430	(2.6)	552	(2.1)	601	(2.3)	630	(2.1)	234
Ontario	**366**	**(7.7)**	**408**	**(5.7)**	**471**	**(5.5)**	**592**	**(5.0)**	**643**	**(5.7)**	**672**	**(5.8)**	**235**
Chinese Taipei	361	(5.5)	399	(5.2)	467	(4.4)	587	(2.8)	633	(3.6)	659	(4.7)	235
Alberta	**370**	**(8.9)**	**405**	**(6.9)**	**466**	**(5.3)**	**590**	**(4.4)**	**640**	**(3.8)**	**666**	**(4.3)**	**235**
Canada	**363**	**(3.4)**	**403**	**(2.8)**	**464**	**(2.2)**	**587**	**(2.2)**	**638**	**(2.6)**	**667**	**(2.7)**	**235**
United States	342	(7.2)	378	(4.8)	436	(4.5)	561	(3.9)	614	(4.0)	646	(4.7)	235
Slovenia	324	(2.9)	362	(2.5)	420	(1.9)	548	(2.1)	598	(2.5)	626	(3.7)	237
Germany	346	(5.2)	384	(4.8)	447	(3.6)	574	(3.1)	621	(3.2)	646	(3.3)	237
Quebec	**358**	**(6.4)**	**397**	**(5.3)**	**461**	**(4.5)**	**585**	**(3.9)**	**635**	**(4.5)**	**663**	**(6.9)**	**238**
Montenegro	267	(4.8)	301	(3.0)	360	(2.5)	487	(1.8)	540	(3.4)	571	(4.1)	238
Austria	329	(6.3)	365	(5.1)	427	(3.9)	557	(3.0)	603	(2.5)	629	(3.7)	238
The Netherlands	349	(8.3)	386	(6.6)	451	(5.1)	579	(3.7)	625	(3.6)	650	(3.8)	239
Liechtenstein	360	(9.7)	391	(9.5)	452	(7.8)	584	(6.9)	630	(10.6)	649	(13.7)	239

Table B.2.5 (continued)

Variation in student performance for countries, economies, and provinces: PRINT READING

Country, economy, or province	Percentiles												Difference in score points between the 10th and 90th percentiles
	5th		10th		25th		75th		90th		95th		
	score	standard error	score	standard error	score	standard error	score	standard error	score	standard error	score	standard error	
Prince Edward Island	**327**	**(7.4)**	**367**	**(5.6)**	**428**	**(4.3)**	**555**	**(4.6)**	**605**	**(3.6)**	**636**	**(7.1)**	**239**
Manitoba	**336**	**(8.7)**	**374**	**(5.6)**	**433**	**(5.0)**	**563**	**(4.4)**	**613**	**(4.6)**	**643**	**(8.5)**	**239**
Finland	360	(5.7)	399	(4.3)	463	(3.5)	590	(2.3)	639	(2.5)	669	(3.5)	240
Hungary	327	(6.0)	363	(5.2)	427	(4.6)	555	(3.3)	603	(3.9)	630	(4.7)	240
Serbia	290	(6.0)	325	(5.5)	384	(4.4)	509	(4.1)	566	(4.6)	596	(5.6)	241
Peru	231	(5.2)	263	(5.1)	319	(4.7)	447	(5.2)	504	(6.4)	540	(8.5)	241
Portugal	320	(6.9)	362	(6.0)	429	(4.9)	554	(3.5)	604	(3.5)	631	(3.8)	242
Argentina	233	(7.6)	274	(5.4)	332	(4.5)	462	(4.1)	516	(4.4)	549	(5.1)	243
Newfoundland and Labrador	**335**	**(10.7)**	**378**	**(6.3)**	**442**	**(6.6)**	**567**	**(5.2)**	**624**	**(6.5)**	**657**	**(7.1)**	**245**
United Arab Emirates	281	(3.9)	316	(3.7)	376	(3.1)	508	(2.8)	562	(3.1)	595	(3.4)	246
United Kingdom	330	(7.4)	372	(7.0)	438	(4.8)	567	(3.4)	619	(3.8)	650	(4.3)	247
Uruguay	248	(5.8)	285	(5.3)	348	(4.3)	477	(3.0)	534	(4.1)	564	(5.5)	248
Australia	347	(3.0)	386	(2.4)	448	(2.2)	579	(1.9)	634	(2.3)	664	(3.1)	249
Japan	364	(7.7)	409	(6.5)	475	(4.8)	607	(3.8)	658	(4.4)	689	(5.1)	249
Italy	317	(3.5)	359	(2.9)	427	(2.6)	559	(2.1)	609	(2.2)	636	(2.1)	250
Iceland	308	(5.7)	352	(4.1)	422	(2.9)	551	(2.9)	602	(2.4)	631	(3.2)	250
Greece	302	(8.8)	346	(6.0)	416	(4.5)	545	(3.4)	597	(3.9)	626	(4.5)	251
Norway	330	(8.1)	375	(4.8)	442	(4.0)	573	(3.4)	627	(3.9)	658	(4.2)	252
Singapore	369	(3.6)	408	(2.9)	475	(2.1)	614	(2.1)	668	(3.2)	698	(3.7)	260
Belgium	324	(6.5)	372	(4.3)	444	(3.2)	583	(2.7)	635	(2.3)	663	(2.6)	264
Slovak Republic	274	(10.4)	321	(8.4)	396	(6.8)	538	(4.1)	591	(5.2)	620	(5.5)	270
New Zealand	332	(4.7)	374	(4.9)	443	(3.2)	586	(3.1)	645	(4.0)	679	(4.9)	271
Sweden	297	(6.5)	343	(5.4)	416	(4.3)	558	(3.3)	614	(4.2)	647	(4.2)	272
Luxembourg	304	(3.8)	347	(2.7)	418	(2.4)	564	(2.2)	620	(2.3)	651	(2.4)	273
France	312	(7.7)	358	(5.4)	435	(4.3)	584	(3.6)	639	(3.9)	669	(5.0)	281
Cyprus	249	(4.0)	297	(3.3)	378	(2.4)	528	(2.1)	583	(2.6)	616	(3.3)	286
Albania	189	(9.0)	247	(7.2)	325	(4.8)	473	(3.2)	536	(3.4)	572	(4.3)	289
Qatar	203	(2.4)	242	(2.0)	310	(1.7)	465	(1.9)	535	(2.3)	575	(2.3)	293
Israel	282	(9.5)	329	(7.5)	414	(6.8)	568	(4.5)	624	(4.5)	656	(4.8)	295
Bulgaria	233	(9.2)	275	(8.0)	353	(8.2)	523	(6.0)	585	(6.1)	619	(6.3)	310
OECD average	**332**	**(1.1)**	**372**	**(0.9)**	**435**	**(0.7)**	**563**	**(0.6)**	**613**	**(0.6)**	**642**	**(0.7)**	**241**

Table B.2.6

Variation in student performance for countries, economies, and provinces: DIGITAL READING

Country, economy, or province	Percentiles												Difference in score points between the 10th and 90th percentiles
	5th		10th		25th		75th		90th		95th		
	score	standard error	score	standard error	score	standard error	score	standard error	score	standard error	score	standard error	
Macao-China	395	(2.9)	424	(2.5)	469	(1.5)	564	(1.6)	604	(2.0)	627	(3.5)	180
Korea	420	(5.9)	456	(4.4)	508	(3.8)	609	(4.4)	652	(5.1)	677	(6.1)	196
Japan	409	(7.8)	444	(5.5)	496	(3.9)	599	(3.0)	640	(4.1)	663	(4.2)	196
Chile	312	(5.8)	346	(5.6)	397	(4.2)	509	(4.2)	556	(3.8)	581	(3.7)	210
Ireland	375	(6.6)	412	(5.5)	469	(3.7)	578	(3.4)	622	(3.1)	647	(3.7)	210
Denmark	352	(5.4)	386	(5.1)	442	(3.6)	553	(3.3)	597	(3.2)	622	(4.5)	211
Shanghai-China	385	(7.8)	420	(7.1)	477	(4.8)	590	(3.8)	635	(4.7)	662	(4.9)	215
Ontario	**390**	**(9.4)**	**428**	**(7.5)**	**486**	**(6.2)**	**599**	**(6.2)**	**645**	**(5.8)**	**673**	**(6.9)**	**216**
Saskatchewan	**378**	**(5.8)**	**408**	**(5.4)**	**461**	**(4.2)**	**575**	**(5.1)**	**625**	**(4.7)**	**651**	**(6.5)**	**217**
New Brunswick	**362**	**(8.2)**	**405**	**(5.9)**	**463**	**(3.5)**	**573**	**(4.9)**	**623**	**(6.9)**	**650**	**(6.2)**	**218**
British Columbia	**401**	**(6.3)**	**435**	**(7.4)**	**494**	**(5.2)**	**606**	**(4.6)**	**653**	**(5.8)**	**684**	**(6.7)**	**218**
Canada	**379**	**(4.1)**	**418**	**(3.3)**	**478**	**(2.8)**	**592**	**(2.5)**	**639**	**(2.3)**	**667**	**(3.1)**	**221**
Russian Federation	321	(6.3)	354	(5.7)	409	(4.8)	525	(4.0)	576	(4.2)	604	(4.4)	222
Quebec	**356**	**(10.6)**	**401**	**(6.2)**	**470**	**(4.7)**	**580**	**(4.0)**	**624**	**(4.0)**	**646**	**(4.1)**	**222**
Nova Scotia	**378**	**(13.0)**	**415**	**(11.6)**	**475**	**(10.4)**	**595**	**(10.2)**	**638**	**(8.8)**	**669**	**(15.2)**	**223**
Manitoba	**353**	**(9.7)**	**394**	**(7.4)**	**456**	**(4.7)**	**571**	**(3.9)**	**618**	**(5.1)**	**645**	**(5.8)**	**224**
Chinese Taipei	361	(7.3)	401	(5.3)	464	(3.5)	582	(3.2)	627	(4.1)	651	(4.4)	226
United States	358	(8.8)	394	(8.3)	454	(5.8)	573	(4.2)	621	(4.5)	649	(5.1)	227
Portugal	330	(7.7)	367	(6.3)	427	(5.8)	550	(4.5)	595	(4.2)	619	(5.0)	227
Alberta	**379**	**(10.9)**	**417**	**(8.5)**	**473**	**(6.9)**	**595**	**(4.3)**	**646**	**(5.2)**	**674**	**(6.0)**	**229**
Colombia	247	(6.8)	280	(5.7)	336	(4.8)	457	(4.3)	512	(5.0)	546	(6.0)	232
Singapore	415	(3.4)	449	(2.6)	508	(1.8)	631	(2.2)	681	(2.0)	711	(3.1)	232
Hong Kong-China	381	(7.8)	427	(6.0)	493	(5.0)	615	(4.1)	663	(4.1)	690	(4.2)	237
Newfoundland and Labrador	**355**	**(9.7)**	**393**	**(10.0)**	**456**	**(6.5)**	**581**	**(4.4)**	**632**	**(6.0)**	**662**	**(7.6)**	**239**
Austria	314	(11.3)	361	(6.8)	424	(4.7)	549	(4.2)	600	(4.5)	626	(4.9)	239
Estonia	365	(5.9)	400	(5.6)	462	(3.9)	589	(3.5)	640	(4.0)	667	(4.0)	240
France	334	(13.1)	384	(8.1)	455	(4.5)	579	(3.6)	624	(4.1)	650	(5.5)	240
Brazil	271	(8.0)	308	(8.0)	369	(6.9)	497	(5.7)	550	(5.5)	580	(6.1)	242
Sweden	329	(7.8)	373	(5.2)	438	(4.1)	566	(3.3)	616	(3.7)	644	(4.2)	242
Slovak Republic	301	(8.0)	344	(9.1)	417	(5.8)	541	(3.2)	587	(4.1)	613	(5.8)	242
Italy	334	(10.3)	375	(8.3)	446	(6.1)	571	(4.2)	618	(4.0)	644	(4.4)	243
Poland	305	(8.8)	349	(7.3)	416	(5.0)	545	(4.3)	593	(5.0)	622	(5.5)	244
Australia	354	(3.1)	394	(2.6)	458	(2.2)	588	(2.2)	642	(3.0)	672	(3.0)	248
Norway	321	(10.2)	370	(6.9)	440	(4.4)	569	(3.2)	619	(3.8)	647	(4.9)	249
Spain	294	(9.2)	336	(7.3)	404	(5.0)	535	(3.7)	586	(3.8)	615	(3.9)	251
Slovenia	297	(3.7)	340	(3.3)	407	(2.4)	543	(2.3)	593	(3.4)	621	(4.7)	254
Belgium	321	(5.9)	367	(4.4)	441	(3.8)	574	(2.6)	622	(3.2)	649	(3.4)	255
Germany	318	(8.5)	358	(7.8)	431	(6.1)	564	(3.9)	613	(4.4)	639	(4.4)	255
Prince Edward Island	**302**	**(9.9)**	**349**	**(7.8)**	**426**	**(4.9)**	**564**	**(4.1)**	**624**	**(6.4)**	**663**	**(8.7)**	**275**
United Arab Emirates	226	(5.6)	265	(4.8)	331	(4.1)	481	(4.3)	550	(4.8)	591	(5.4)	286
Hungary	247	(13.2)	297	(10.6)	378	(5.5)	531	(4.8)	586	(5.6)	617	(5.7)	289
Israel	257	(9.0)	304	(7.9)	384	(6.7)	547	(5.6)	604	(6.5)	633	(5.7)	301
OECD average	**332**	**(1.7)**	**373**	**(1.4)**	**438**	**(1.0)**	**563**	**(0.8)**	**611**	**(0.9)**	**638**	**(1.0)**	**238**

Table B.2.7

Variation in student performance for countries, economies, and provinces: COMPOSITE READING

Country, economy, or province	Percentiles												Difference in score points between the 10th and 90th percentiles
	5th		10th		25th		75th		90th		95th		
	score	standard error	score	standard error	score	standard error	score	standard error	score	standard error	score	standard error	
Macao-China	387	(3.3)	417	(2.6)	466	(1.2)	562	(1.6)	602	(1.7)	623	(2.3)	184
Korea	410	(8.2)	448	(5.7)	499	(4.0)	599	(3.7)	639	(4.2)	660	(5.1)	191
Chile	319	(5.5)	348	(4.5)	396	(3.7)	500	(3.6)	543	(3.2)	568	(3.4)	195
Shanghai-China	414	(6.9)	446	(5.1)	500	(4.1)	606	(3.1)	647	(3.4)	669	(3.9)	201
Denmark	358	(5.6)	391	(4.4)	444	(3.2)	551	(2.3)	594	(2.9)	619	(3.8)	203
Ireland	383	(5.3)	416	(4.8)	471	(3.5)	577	(2.5)	622	(2.7)	645	(3.0)	205
Saskatchewan	**377**	**(5.4)**	**406**	**(5.1)**	**457**	**(3.0)**	**568**	**(4.0)**	**613**	**(4.9)**	**640**	**(5.6)**	**207**
British Columbia	**398**	**(8.8)**	**434**	**(6.7)**	**490**	**(4.5)**	**598**	**(3.0)**	**642**	**(5.6)**	**671**	**(5.7)**	**208**
Nova Scotia	**377**	**(9.4)**	**413**	**(7.7)**	**470**	**(8.2)**	**576**	**(5.5)**	**621**	**(4.4)**	**642**	**(5.3)**	**208**
Ontario	**389**	**(8.3)**	**426**	**(6.1)**	**482**	**(4.4)**	**589**	**(4.3)**	**635**	**(5.4)**	**662**	**(5.7)**	**209**
Prince Edward Island	**350**	**(5.8)**	**383**	**(5.0)**	**439**	**(3.7)**	**545**	**(3.0)**	**592**	**(4.1)**	**620**	**(5.5)**	**210**
Japan	393	(8.2)	432	(5.8)	489	(4.4)	600	(3.2)	643	(3.6)	667	(4.2)	210
Colombia	265	(5.6)	294	(4.8)	344	(4.1)	455	(3.8)	504	(4.2)	536	(5.0)	210
Russian Federation	334	(4.5)	365	(4.5)	416	(3.9)	527	(3.9)	576	(3.9)	602	(4.1)	211
Quebec	**370**	**(8.0)**	**408**	**(5.7)**	**470**	**(4.4)**	**578**	**(3.6)**	**620**	**(3.8)**	**644**	**(4.4)**	**212**
New Brunswick	**363**	**(5.3)**	**398**	**(5.1)**	**455**	**(3.9)**	**561**	**(3.5)**	**609**	**(5.7)**	**635**	**(5.7)**	**212**
Canada	**381**	**(3.1)**	**418**	**(2.5)**	**475**	**(2.1)**	**586**	**(1.9)**	**630**	**(2.1)**	**657**	**(2.9)**	**212**
Manitoba	**359**	**(8.2)**	**396**	**(6.2)**	**448**	**(4.0)**	**564**	**(3.8)**	**608**	**(5.1)**	**635**	**(5.9)**	**212**
Hong Kong-China	394	(6.8)	435	(6.1)	496	(4.0)	606	(2.9)	647	(3.3)	670	(3.2)	213
Estonia	380	(5.3)	410	(3.5)	464	(3.1)	578	(2.4)	623	(3.1)	649	(3.7)	213
Alberta	**384**	**(8.7)**	**420**	**(6.1)**	**472**	**(5.4)**	**591**	**(4.3)**	**637**	**(3.3)**	**663**	**(3.7)**	**218**
Chinese Taipei	365	(6.1)	405	(4.5)	468	(3.8)	583	(3.0)	625	(3.2)	649	(4.6)	220
Poland	344	(5.8)	383	(5.5)	442	(4.2)	558	(3.5)	604	(4.9)	631	(5.4)	221
Portugal	335	(6.6)	370	(5.9)	431	(5.1)	549	(3.4)	592	(3.6)	616	(3.8)	222
Brazil	277	(6.9)	308	(6.2)	362	(5.1)	480	(5.2)	530	(5.2)	559	(6.1)	222
United States	356	(7.2)	391	(6.2)	446	(4.5)	565	(3.7)	614	(3.8)	641	(4.7)	223
Newfoundland and Labrador	**363**	**(7.9)**	**395**	**(9.0)**	**453**	**(7.4)**	**570**	**(4.0)**	**618**	**(5.2)**	**646**	**(6.2)**	**224**
Spain	324	(5.1)	360	(4.9)	419	(3.4)	538	(2.6)	585	(3.2)	610	(3.0)	224
Austria	325	(9.5)	366	(5.7)	427	(4.2)	550	(3.0)	597	(3.4)	622	(3.9)	231
Italy	335	(9.6)	374	(7.5)	438	(5.3)	561	(3.6)	606	(3.3)	629	(4.5)	232
Germany	341	(6.7)	377	(6.3)	440	(4.7)	567	(3.0)	612	(3.2)	635	(4.1)	235
Slovenia	318	(2.4)	355	(2.4)	416	(2.0)	543	(2.2)	592	(2.3)	617	(2.8)	237
Singapore	398	(3.4)	433	(2.3)	494	(1.8)	619	(1.9)	670	(2.6)	699	(2.6)	237
Norway	335	(6.5)	377	(5.4)	444	(3.8)	568	(2.6)	617	(3.1)	644	(3.4)	239
Australia	355	(3.0)	394	(2.5)	456	(1.9)	581	(2.0)	633	(2.4)	662	(2.7)	240
Sweden	322	(6.4)	364	(4.8)	430	(3.9)	558	(2.9)	608	(3.3)	637	(2.9)	244
Belgium	332	(4.8)	376	(4.2)	444	(3.5)	576	(2.2)	622	(2.4)	648	(2.8)	247
Slovak Republic	292	(9.0)	336	(7.6)	407	(5.6)	537	(3.4)	585	(4.9)	610	(4.8)	249
France	330	(8.2)	374	(5.9)	445	(4.4)	579	(3.0)	627	(3.8)	652	(4.9)	252
United Arab Emirates	264	(4.0)	297	(3.5)	356	(3.4)	491	(3.3)	551	(3.7)	584	(3.6)	254
Hungary	296	(8.1)	334	(6.7)	403	(5.5)	542	(3.7)	589	(4.2)	616	(5.2)	255
Israel	281	(8.1)	326	(7.8)	401	(7.2)	554	(4.8)	606	(4.5)	634	(5.0)	281
OECD average	**341**	**(1.4)**	**379**	**(1.1)**	**440**	**(0.9)**	**562**	**(0.6)**	**608**	**(0.7)**	**634**	**(0.8)**	**229**

Table B.2.8

Variation in student performance for countries, economies, and provinces: SCIENCE

Country, economy, or province	Percentiles												Difference in score points between the 10th and 90th percentiles
	5th		10th		25th		75th		90th		95th		
	score	standard error	score	standard error	score	standard error	score	standard error	score	standard error	score	standard error	
Indonesia	271	(5.5)	297	(4.9)	336	(3.8)	427	(4.7)	471	(6.0)	497	(7.3)	174
Costa Rica	315	(4.1)	341	(3.3)	382	(3.6)	476	(3.6)	520	(4.9)	546	(5.5)	180
Mexico	300	(2.6)	325	(2.1)	368	(1.6)	462	(1.5)	505	(1.9)	532	(2.1)	180
Kazakhstan	303	(4.4)	330	(3.6)	375	(3.4)	475	(3.5)	521	(3.8)	547	(3.8)	190
Thailand	323	(4.3)	349	(3.4)	392	(2.6)	494	(3.8)	544	(5.4)	575	(6.0)	195
Colombia	273	(5.2)	302	(4.6)	347	(3.4)	449	(3.5)	497	(4.0)	525	(4.2)	196
Vietnam	398	(7.7)	428	(7.0)	478	(5.2)	580	(4.0)	625	(5.5)	652	(6.5)	197
Peru	248	(4.6)	275	(3.8)	321	(3.4)	425	(4.4)	475	(5.4)	504	(6.5)	200
Tunisia	267	(4.6)	296	(4.6)	345	(4.1)	452	(4.1)	497	(5.1)	527	(6.5)	201
Malaysia	293	(3.9)	319	(3.4)	365	(3.4)	473	(3.6)	521	(4.3)	550	(5.2)	202
Romania	316	(4.0)	340	(3.2)	383	(3.4)	492	(4.6)	543	(5.1)	573	(5.6)	202
Macao-China	383	(3.9)	416	(2.7)	469	(1.9)	575	(1.7)	619	(1.8)	643	(2.3)	203
Brazil	275	(3.1)	302	(2.4)	348	(1.9)	454	(2.7)	505	(3.5)	536	(4.5)	203
Latvia	370	(5.5)	400	(4.5)	449	(3.2)	557	(3.6)	603	(3.2)	628	(4.7)	203
Estonia	409	(3.0)	439	(3.3)	487	(2.7)	597	(2.6)	645	(3.1)	672	(4.5)	206
Korea	396	(6.3)	431	(4.9)	485	(4.0)	595	(4.1)	639	(4.3)	664	(5.3)	208
Chile	317	(4.1)	343	(3.8)	388	(3.3)	500	(3.6)	552	(3.7)	581	(3.7)	209
Shanghai-China	435	(6.2)	472	(5.4)	527	(3.7)	639	(3.2)	681	(3.2)	704	(3.3)	209
Hong Kong-China	403	(7.1)	446	(5.1)	505	(3.8)	613	(3.0)	655	(3.4)	679	(3.4)	210
Turkey	339	(3.6)	363	(3.5)	407	(3.5)	518	(5.8)	573	(6.3)	602	(5.9)	210
Jordan	271	(4.9)	303	(4.4)	355	(3.6)	466	(3.4)	514	(4.2)	542	(6.5)	211
Quebec	**371**	**(7.3)**	**406**	**(5.7)**	**462**	**(4.1)**	**575**	**(3.6)**	**619**	**(4.3)**	**645**	**(5.4)**	**213**
Chinese Taipei	379	(4.1)	411	(4.3)	469	(3.8)	582	(2.4)	626	(2.2)	652	(3.1)	215
Argentina	262	(7.9)	297	(5.1)	350	(4.6)	464	(4.7)	513	(4.7)	543	(5.2)	216
Nova Scotia	**371**	**(9.4)**	**407**	**(9.4)**	**460**	**(4.4)**	**574**	**(5.9)**	**625**	**(6.1)**	**653**	**(9.1)**	**218**
Russian Federation	347	(3.8)	377	(4.1)	428	(3.6)	544	(3.3)	596	(4.9)	627	(5.1)	218
Montenegro	274	(3.3)	302	(2.9)	352	(1.4)	468	(2.2)	522	(2.3)	552	(3.5)	220
Lithuania	352	(6.3)	383	(4.0)	438	(3.2)	555	(3.0)	605	(3.6)	634	(3.8)	221
Spain	349	(3.9)	384	(3.1)	440	(2.3)	557	(1.8)	605	(2.0)	632	(2.0)	221
Croatia	350	(4.9)	380	(4.0)	433	(3.3)	551	(4.2)	602	(5.2)	630	(5.9)	222
Poland	382	(4.7)	415	(4.0)	467	(3.3)	584	(4.0)	637	(5.0)	668	(4.9)	222
Serbia	303	(5.6)	333	(5.2)	385	(4.5)	504	(3.5)	558	(3.9)	590	(5.8)	224
New Brunswick	**360**	**(5.1)**	**392**	**(6.6)**	**451**	**(4.0)**	**565**	**(4.5)**	**617**	**(6.2)**	**651**	**(9.2)**	**225**
Greece	317	(5.2)	352	(5.1)	408	(4.5)	528	(3.5)	578	(3.6)	608	(4.1)	225
Saskatchewan	**366**	**(7.8)**	**405**	**(5.3)**	**458**	**(3.7)**	**579**	**(5.3)**	**630**	**(6.2)**	**659**	**(7.1)**	**225**
British Columbia	**392**	**(8.8)**	**430**	**(5.7)**	**485**	**(5.3)**	**605**	**(5.4)**	**656**	**(4.7)**	**687**	**(6.5)**	**226**
Liechtenstein	383	(11.1)	408	(10.0)	464	(8.4)	588	(8.2)	635	(9.3)	656	(12.2)	227
Prince Edward Island	**341**	**(6.7)**	**374**	**(4.9)**	**431**	**(4.4)**	**551**	**(4.1)**	**602**	**(4.8)**	**635**	**(5.0)**	**228**
Czech Republic	356	(7.2)	392	(5.5)	449	(4.0)	572	(3.2)	622	(3.7)	650	(3.1)	230
Portugal	337	(6.0)	372	(5.6)	430	(4.8)	551	(3.6)	602	(3.6)	630	(4.1)	231
Canada	**370**	**(3.3)**	**407**	**(2.7)**	**467**	**(2.1)**	**588**	**(2.4)**	**639**	**(2.6)**	**670**	**(3.3)**	**232**
Ireland	366	(5.8)	404	(4.8)	462	(3.1)	586	(2.4)	637	(2.6)	666	(3.4)	233
Hungary	345	(6.0)	376	(4.6)	432	(4.3)	558	(3.5)	610	(4.7)	639	(4.0)	233

Table B.2.8 (continued)

Variation in student performance for countries, economies, and provinces: SCIENCE

Country, economy, or province	Percentiles												Difference in score points between the 10th and 90th percentiles
	5th		10th		25th		75th		90th		95th		
	score	standard error	score	standard error	score	standard error	score	standard error	score	standard error	score	standard error	
Slovenia	364	(3.0)	397	(3.5)	451	(2.2)	578	(2.0)	631	(3.2)	661	(3.3)	235
Switzerland	358	(3.8)	394	(3.4)	455	(3.8)	579	(3.1)	630	(3.3)	658	(4.0)	236
Denmark	338	(5.9)	378	(4.3)	438	(3.8)	563	(3.2)	615	(4.1)	644	(3.7)	238
Finland	386	(5.7)	424	(3.9)	486	(2.8)	609	(2.4)	662	(2.9)	692	(2.6)	238
Ontario	**367**	**(6.1)**	**405**	**(5.8)**	**467**	**(4.9)**	**590**	**(5.3)**	**644**	**(5.7)**	**676**	**(7.9)**	**239**
Newfoundland and Labrador	**357**	**(9.7)**	**393**	**(7.0)**	**455**	**(5.6)**	**575**	**(4.9)**	**633**	**(6.9)**	**663**	**(6.0)**	**240**
Alberta	**377**	**(7.8)**	**417**	**(6.2)**	**478**	**(5.8)**	**604**	**(5.5)**	**657**	**(6.1)**	**688**	**(6.0)**	**240**
Italy	336	(3.2)	371	(2.8)	431	(2.5)	559	(2.0)	611	(2.5)	641	(2.6)	240
Austria	350	(4.9)	383	(5.3)	442	(3.5)	571	(3.1)	623	(3.4)	650	(3.3)	240
Manitoba	**347**	**(8.6)**	**381**	**(6.5)**	**438**	**(4.6)**	**568**	**(4.5)**	**623**	**(5.7)**	**652**	**(6.6)**	**242**
United States	344	(5.4)	377	(4.9)	431	(4.4)	563	(4.2)	619	(4.5)	652	(5.5)	242
Japan	379	(7.0)	421	(6.4)	485	(4.5)	614	(3.6)	664	(4.3)	693	(4.7)	243
United Arab Emirates	299	(3.0)	328	(3.2)	382	(3.5)	512	(3.5)	572	(3.4)	605	(3.7)	244
Germany	361	(5.6)	397	(4.8)	461	(3.8)	592	(3.1)	642	(3.9)	671	(3.7)	245
Albania	221	(7.0)	271	(5.2)	340	(3.5)	464	(3.0)	517	(3.3)	549	(5.2)	245
Uruguay	256	(4.8)	293	(4.2)	352	(3.8)	480	(3.4)	538	(4.3)	572	(5.3)	245
Cyprus	274	(3.3)	313	(2.9)	373	(2.0)	503	(2.4)	561	(2.5)	594	(3.4)	248
The Netherlands	357	(5.9)	393	(5.4)	458	(5.0)	591	(3.9)	641	(4.1)	667	(4.0)	248
Norway	325	(6.6)	365	(5.2)	429	(3.7)	564	(3.3)	620	(3.4)	651	(3.9)	254
United Kingdom	344	(5.8)	384	(4.9)	448	(4.6)	584	(3.5)	639	(3.9)	672	(5.0)	255
Iceland	310	(5.0)	348	(3.4)	413	(2.5)	548	(3.2)	603	(3.7)	635	(5.3)	255
France	323	(7.8)	366	(6.0)	433	(3.4)	570	(3.0)	622	(4.1)	651	(4.7)	256
Sweden	314	(5.3)	354	(4.7)	419	(4.1)	554	(3.2)	611	(3.4)	643	(3.1)	257
Australia	353	(3.5)	391	(2.6)	453	(2.1)	592	(2.5)	650	(2.7)	682	(2.9)	259
Slovak Republic	300	(8.5)	339	(5.7)	403	(5.2)	542	(4.0)	599	(4.9)	632	(6.3)	260
Belgium	326	(5.5)	369	(4.5)	439	(3.1)	579	(2.0)	630	(2.1)	658	(2.9)	261
Bulgaria	280	(7.5)	315	(5.3)	374	(5.6)	519	(5.1)	580	(6.1)	612	(6.2)	265
Singapore	374	(4.0)	412	(3.2)	480	(2.6)	627	(2.6)	681	(3.4)	714	(3.2)	269
Luxembourg	318	(3.6)	355	(3.1)	419	(2.2)	566	(1.9)	624	(2.9)	655	(2.9)	269
New Zealand	339	(4.5)	377	(4.5)	444	(3.0)	591	(3.1)	649	(3.0)	682	(3.9)	272
Qatar	222	(1.9)	254	(1.4)	309	(1.3)	453	(1.6)	530	(2.4)	573	(2.8)	275
Israel	286	(8.7)	328	(6.4)	396	(5.7)	548	(5.7)	608	(5.4)	640	(5.1)	281
OECD average	**344**	**(0.9)**	**380**	**(0.8)**	**439**	**(0.6)**	**566**	**(0.6)**	**619**	**(0.6)**	**648**	**(0.7)**	**239**

Table B.2.9

Estimated average scores by language of the school system for Canada and the provinces: PRINT READING, DIGITAL READING, AND COMPOSITE READING

Canada and provinces	Anglophone school system		Francophone school system		Difference between systems	
	average	standard error	average	standard error	difference	standard error
Print Reading						
Canada	**525**	**(2.4)**	**517**	**(3.6)**	**8**	**(4.7)**
Nova Scotia	509	(3.2)	486	(7.4)	23*	(8.2)
New Brunswick	505	(3.4)	471	(3.0)	34*	(4.5)
Quebec	518	(3.5)	520	(4.0)	-2	(5.0)
Ontario	530	(4.6)	487	(2.8)	43*	(5.3)
Manitoba	495	(3.4)	494	(5.6)	2	(6.8)
Alberta	525	(4.1)	506	(9.8)	20	(10.5)
British Columbia	535	(4.5)	509	(8.2)	26*	(9.8)
Digital Reading						
Canada	**537**	**(2.9)**	**515**	**(3.5)**	**22***	**(4.8)**
Nova Scotia	532	(9.9)	494	(5.5)	39*	(11.6)
New Brunswick	525	(3.0)	489	(2.7)	36*	(4.2)
Quebec	523	(3.7)	519	(3.9)	5	(5.5)
Ontario	542	(5.7)	478	(3.4)	65*	(6.5)
Manitoba	510	(3.8)	504	(5.0)	6	(6.2)
Alberta	532	(5.4)	488	(12.9)	45*	(13.7)
British Columbia	549	(3.6)	516	(7.1)	33*	(8.2)
Composite Reading						
Canada	**531**	**(2.3)**	**516**	**(3.1)**	**15***	(4.2)
Nova Scotia	521	(5.1)	490	(6.1)	31*	(8.3)
New Brunswick	515	(2.8)	480	(2.7)	35*	(4.0)
Quebec	521	(3.4)	520	(3.5)	1	(4.7)
Ontario	536	(4.5)	482	(2.8)	54*	(5.2)
Manitoba	503	(3.3)	499	(5.0)	4	(6.0)
Alberta	529	(4.2)	497	(9.2)	32*	(10.0)
British Columbia	542	(3.3)	512	(7.3)	30*	(8.3)

* Statistically significant differences.

Table B.2.10

Estimated average scores by language of the school system for Canada and the provinces: SCIENCE

Canada and provinces	Anglophone school system		Francophone school system		Difference between systems	
	average	standard error	average	standard error	difference	standard error
Science						
Canada	**529**	**(2.4)**	**513**	**(3.2)**	**16***	**(4.3)**
Nova Scotia	517	(3.1)	482	(5.3)	35*	(6.2)
New Brunswick	517	(3.3)	475	(3.1)	42*	(4.6)
Quebec	514	(3.6)	516	(3.6)	-2	(4.8)
Ontario	528	(4.5)	487	(3.1)	41*	(5.4)
Manitoba	503	(3.3)	496	(6.2)	7	(7.0)
Alberta	540	(4.7)	507	(6.5)	33*	(8.0)
British Columbia	545	(4.0)	517	(8.2)	28*	(9.6)

* Statistically significant differences.

Table B.2.11

Estimated average scores by gender for Canada and the provinces: PRINT READING, DIGITAL READING, AND COMPOSITE READING

Canada and provinces	Females		Males		Difference (Female-Male)	
	average	standard error	average	standard error	difference	standard error
Print Reading						
Canada	**541**	**(2.1)**	**506**	**(2.3)**	**35***	**(2.1)**
Newfoundland and Labrador	529	(4.0)	476	(5.2)	53*	(5.5)
Prince Edward Island	511	(3.5)	468	(4.0)	43*	(5.3)
Nova Scotia	529	(4.4)	489	(4.4)	40*	(6.5)
New Brunswick	521	(3.7)	473	(4.2)	49*	(6.0)
Quebec	537	(4.0)	502	(4.0)	36*	(4.1)
Ontario	546	(4.2)	510	(5.4)	36*	(3.9)
Manitoba	517	(4.6)	475	(4.2)	41*	(5.9)
Saskatchewan	525	(3.4)	487	(3.9)	37*	(4.6)
Alberta	541	(4.3)	511	(4.6)	29*	(3.7)
British Columbia	548	(5.5)	522	(5.1)	26*	(6.1)
Digital Reading						
Canada	**543**	**(2.5)**	**522**	**(2.5)**	**21***	**(1.8)**
Newfoundland and Labrador	532	(3.9)	500	(5.0)	32*	(5.4)
Prince Edward Island	507	(4.5)	476	(4.5)	31*	(6.4)
Nova Scotia	541	(8.9)	522	(11.3)	18*	(5.7)
New Brunswick	528	(3.2)	504	(3.7)	24*	(5.3)
Quebec	532	(3.6)	507	(4.1)	25*	(3.6)
Ontario	550	(5.7)	530	(5.9)	20*	(3.8)
Manitoba	521	(5.0)	501	(3.7)	20*	(4.4)
Saskatchewan	529	(4.1)	506	(3.9)	23*	(4.8)
Alberta	543	(4.4)	522	(6.6)	21*	(4.1)
British Columbia	555	(4.3)	541	(4.3)	14*	(4.6)
Composite Reading						
Canada	**542**	**(1.9)**	**514**	**(2.1)**	**28***	**(1.9)**
Newfoundland and Labrador	531	(3.6)	488	(4.9)	42*	(5.1)
Prince Edward Island	509	(3.2)	472	(3.3)	37*	(4.6)
Nova Scotia	535	(4.1)	506	(7.0)	29*	(5.6)
New Brunswick	524	(3.1)	488	(3.7)	36*	(5.3)
Quebec	535	(3.3)	504	(3.7)	30*	(3.5)
Ontario	548	(4.4)	520	(5.0)	28*	(3.6)
Manitoba	519	(4.6)	488	(3.6)	31*	(5.0)
Saskatchewan	527	(3.3)	496	(3.7)	30*	(4.5)
Alberta	542	(3.8)	517	(5.0)	25*	(3.6)
British Columbia	552	(4.2)	532	(4.1)	20*	(5.1)

* Statistically significant differences.

Table B.2.12

Estimated average scores by gender for Canada and the provinces: SCIENCE

	Females		Males		Difference (Female - Male)	
Canada and provinces	average	standard error	average	standard error	difference	standard error
Science						
Canada	**524**	**(2.0)**	**527**	**(2.4)**	**-3**	**(2.1)**
Newfoundland and Labrador	518	(4.0)	510	(5.0)	8	(5.5)
Prince Edward Island	494	(3.6)	487	(3.8)	7	(5.2)
Nova Scotia	515	(4.3)	518	(4.8)	-3	(6.7)
New Brunswick	510	(4.1)	504	(4.0)	6	(6.2)
Quebec	515	(3.5)	516	(3.9)	-2	(3.7)
Ontario	525	(4.0)	528	(5.4)	-3	(4.1)
Manitoba	502	(4.6)	503	(4.2)	-1	(5.9)
Saskatchewan	517	(3.5)	516	(4.0)	2	(4.8)
Alberta	537	(5.1)	542	(4.9)	-5	(3.6)
British Columbia	541	(5.4)	548	(4.7)	-7	(6.3)

* **Note:** No differences in this table are statistically significant.

Table B.2.13

Comparisons of performance, PISA 2000, 2003, 2006, 2009, and 2012, Canada and the provinces: READING

	2000		2003		2006		2009		2012	
Canada and provinces	average	standard error	average	standard error	average	standard error	average	standard error	average	standard error
Canada	**534**	**(1.6)**	**528**	**(5.6)**	**527**	**(5.5)**	**524**	**(5.2)**	**523**	**(6.2)**
Newfoundland and Labrador	517	(2.8)	521	(6.2)	514	(5.9)	506	(6.1)	503	(7.0)
Prince Edward Island	517	(2.4)	495	(5.8)*	497	(5.7)*	486	(5.5)*	490	(6.5)*
Nova Scotia	521	(2.3)	513	(5.8)	505	(6.1)*	516	(5.6)	508	(6.7)
New Brunswick	501	(1.8)	503	(5.6)	497	(5.5)	499	(5.5)	497	(6.5)
Quebec	536	(3.0)	525	(6.8)	522	(7.1)	522	(5.8)*	520	(6.9)*
Ontario	533	(3.3)	530	(6.4)	534	(6.8)	531	(5.8)	528	(7.4)
Manitoba	529	(3.5)	520	(6.3)	516	(6.1)	495	(6.1)*	495	(6.8)*
Saskatchewan	529	(2.7)	512	(6.8)*	507	(6.5)*	504	(6.0)*	505	(6.5)*
Alberta	550	(3.3)	543	(6.8)	535	(6.5)*	533	(6.8)*	525	(7.2)*
British Columbia	538	(2.9)	535	(5.9)	528	(7.5)	525	(6.5)	535	(7.4)

* Statistically significant differences compared to 2000.

Note: The linkage error is incorporated into the standard error for 2003, 2006, 2009, and 2012. Also, for some provinces, the standard errors from 2000 to 2003, 2006, and 2009 differ from those in the previous PISA reports on trend results. These differences are due to the change of method used by the OECD to compute the linkage error.

Table B.2.14

Comparisons of performance, PISA 2006, 2009, and 2012, Canada and the provinces: SCIENCE

	2006		2009		2012	
Canada and provinces	average	standard error	average	standard error	average	standard error
Canada	**534**	**(2.0)**	**529**	**(3.0)**	**525**	**(4.0)***
Newfoundland and Labrador	526	(2.5)	518	(4.0)	514	(5.0)*
Prince Edward Island	509	(2.7)	495	(3.5)*	490	(4.4)*
Nova Scotia	520	(2.5)	523	(3.7)	516	(4.6)
New Brunswick	506	(2.3)	501	(3.5)	507	(4.4)
Quebec	531	(4.2)	524	(4.1)	516	(4.8)*
Ontario	537	(4.2)	531	(4.2)	527	(5.6)
Manitoba	523	(3.2)	506	(4.7)*	503	(4.8)*
Saskatchewan	517	(3.6)	513	(4.5)	516	(4.6)
Alberta	550	(3.8)	545	(5.0)	539	(5.8)
British Columbia	539	(4.7)	535	(4.8)	544	(5.3)

* Statistically significant differences compared to PISA 2006.

Note: The linkage error is incorporated into the standard error for 2009 and 2012. Also, for some provinces, the standard errors from 2006 to 2009 slightly differ from those in the PISA 2009 report. These differences are due to the change of method used by the OECD to compute the linkage error.

Table B.3.1

Multiple comparisons of achievement for countries, economies, and provinces: OVERALL MATHEMATICS

Instructions: Choose a country, economy, or province from the left-hand column. Read across the row to compare its performance with that of Canada and the provinces, listed along the top of the chart. The symbols indicate whether its performance is above, below, or the same as* that of Canada and the provinces. For example, choose British Columbia from the left-hand column. Its performance is below that of Quebec; the same as that of Canada, Alberta and Ontario; and above that of all other provinces.

*(i.e., any difference is not statistically significant)

▲ Average achievement significantly higher than comparison province or Canada.

□ Average achievement not significantly different from comparison province or Canada.

▼ Average achievement significantly lower than comparison province or Canada.

Country, economy, or province	Average	Standard Error	Quebec	British Columbia	Canada	Alberta	Ontario	Saskatchewan	New Brunswick	Nova Scotia	Manitoba	Newfoundland and Labrador	Prince Edward Island
Shanghai-China	613	(3.3)	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Singapore	573	(1.3)	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Hong Kong-China	561	(3.2)	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Chinese Taipei	560	(3.3)	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Korea	554	(4.6)	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Macao-China	538	(1.0)		▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Japan	536	(3.6)		▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Quebec	536	(3.4)		▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Liechtenstein	535	(4.0)		▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Switzerland	531	(3.0)			▲	▲	▲	▲	▲	▲	▲	▲	▲
The Netherlands	523	(3.5)	▼					▲	▲	▲	▲	▲	▲
British Columbia	522	(4.4)	▼					▲	▲	▲	▲	▲	▲
Estonia	521	(2.0)	▼					▲	▲	▲	▲	▲	▲
Finland	519	(1.9)	▼					▲	▲	▲	▲	▲	▲
Canada	518	(1.8)	▼					▲	▲	▲	▲	▲	▲
Poland	518	(3.6)	▼					▲	▲	▲	▲	▲	▲
Alberta	517	(4.6)	▼					▲	▲	▲	▲	▲	▲
Belgium	515	(2.1)	▼					▲	▲	▲	▲	▲	▲
Ontario	514	(4.1)	▼						▲	▲	▲	▲	▲
Germany	514	(2.9)	▼						▲	▲	▲	▲	▲
Vietnam	511	(4.8)	▼							▲	▲	▲	▲
Saskatchewan	506	(3.0)	▼	▼	▼	▼					▲	▲	▲
Austria	506	(2.7)	▼	▼	▼	▼					▲	▲	▲
Australia	504	(1.6)	▼	▼	▼	▼	▼				▲	▲	▲
New Brunswick	502	(2.6)	▼	▼	▼	▼	▼				▲	▲	▲
Ireland	501	(2.2)	▼	▼	▼	▼	▼				▲	▲	▲
Slovenia	501	(1.2)	▼	▼	▼	▼	▼				▲	▲	▲
Denmark	500	(2.3)	▼	▼	▼	▼	▼				▲	▲	▲
New Zealand	500	(2.2)	▼	▼	▼	▼	▼				▲	▲	▲
Czech Republic	499	(2.9)	▼	▼	▼	▼	▼						▲
Nova Scotia	497	(4.1)	▼	▼	▼	▼	▼						▲
France	495	(2.5)	▼	▼	▼	▼	▼	▼	▼				▲
United Kingdom	494	(3.3)	▼	▼	▼	▼	▼	▼	▼				▲
Iceland	493	(1.7)	▼	▼	▼	▼	▼	▼	▼				▲
Manitoba	492	(2.9)	▼	▼	▼	▼	▼	▼	▼				▲
Latvia	491	(2.8)	▼	▼	▼	▼	▼	▼	▼				▲
Newfoundland and Labrador	490	(3.7)	▼	▼	▼	▼	▼	▼	▼				▲
Luxembourg	490	(1.1)	▼	▼	▼	▼	▼	▼	▼				▲
Norway	489	(2.7)	▼	▼	▼	▼	▼	▼	▼				▲

Table B.3.1 (continued)

Multiple comparisons of achievement for countries, economies, and provinces: OVERALL MATHEMATICS

Instructions: Choose a country, economy, or province from the left-hand column. Read across the row to compare its performance with that of Canada and the provinces, listed along the top of the chart. The symbols indicate whether its performance is above, below, or the same as* that of Canada and the provinces. For example, choose British Columbia from the left-hand column. Its performance is below that of Quebec; the same as that of Canada, Alberta and Ontario; and above that of all other provinces.

*(i.e., any difference is not statistically significant)

▲ Average achievement significantly higher than comparison province or Canada.

□ Average achievement not significantly different from comparison province or Canada.

▼ Average achievement significantly lower than comparison province or Canada.

Country, economy, or province	Average	Standard Error	Quebec	British Columbia	Canada	Alberta	Ontario	Saskatchewan	New Brunswick	Nova Scotia	Manitoba	Newfoundland and Labrador	Prince Edward Island
Portugal	487	(3.8)	▼	▼	▼	▼	▼	▼	▼				
Italy	485	(2.0)	▼	▼	▼	▼	▼	▼	▼	▼	▼		
Spain	484	(1.9)	▼	▼	▼	▼	▼	▼	▼	▼	▼		
Russian Federation	482	(3.0)	▼	▼	▼	▼	▼	▼	▼	▼	▼		
Slovak Republic	482	(3.4)	▼	▼	▼	▼	▼	▼	▼	▼	▼		
United States	481	(3.6)	▼	▼	▼	▼	▼	▼	▼	▼	▼		
Prince Edward Island	479	(2.5)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	
Lithuania	479	(2.6)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	
Sweden	478	(2.3)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	
Hungary	477	(3.2)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	
Croatia	471	(3.5)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	
Israel	466	(4.7)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Greece	453	(2.5)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Serbia	449	(3.4)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Turkey	448	(4.8)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Romania	445	(3.8)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Cyprus	440	(1.1)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Bulgaria	439	(4.0)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
United Arab Emirates	434	(2.4)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Kazakhstan	432	(3.0)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Thailand	427	(3.4)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Chile	423	(3.1)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Malaysia	421	(3.2)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Mexico	413	(1.4)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Montenegro	410	(1.1)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Uruguay	409	(2.8)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Costa Rica	407	(3.0)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Albania	394	(2.0)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Brazil	391	(2.1)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Argentina	388	(3.5)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Tunisia	388	(3.9)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Jordan	386	(3.1)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Colombia	376	(2.9)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Qatar	376	(0.8)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Indonesia	375	(4.0)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Peru	368	(3.7)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼

Note: significance tests were not adjusted for multiple comparisons.

Five percent of the comparisons would be statistically significant by chance alone.