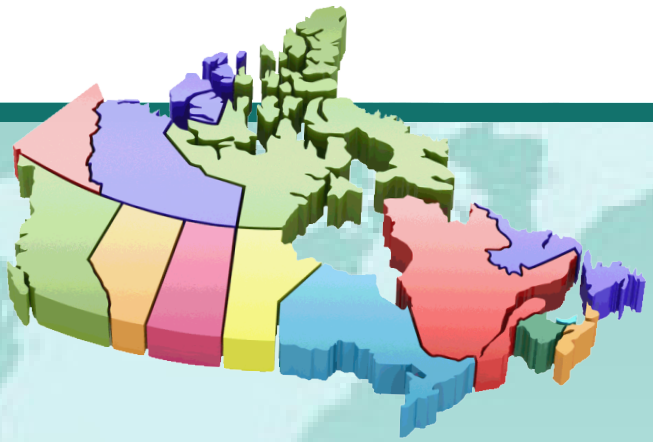
Measuring up: Canadian Results of the OECD PISA Study

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

2015 First Results for Canadians Aged 15



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Measuring up: Canadian Results of the OECD PISA Study

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

2015 First Results for Canadians Aged 15

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Canada

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

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

Note of appreciation

The Council of Ministers of Education (Canada) would like to thank the students, teachers, and administrators whose participation in the Programme for International Student Assessment ensured its success. The quality of your commitment has made this study possible. We are truly grateful for your contribution to a pan-Canadian understanding of educational policy and practices in science, reading, and mathematics of 15-year-olds.

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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 is driven by advances in information and communication technologies, by reduced trade barriers, and by the globalization of markets that have changed the type of knowledge and skills that the future economy requires. There is a demand for a strong set of foundational skills upon which further learning can be built.

Education systems play a central role in building this strong base. Students leaving secondary education without a strong foundation may experience difficulty accessing the postsecondary education system or 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 provide 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 entire education systems — successful. This tool is the Programme for International Student Assessment (PISA). It measures 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 to 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 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 for 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.

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

[1] The word *countries* will be used to denote countries and economies.

[2] OECD, *PISA 2015 assessment and analytical framework: Science, reading, mathematic and financial literacy* (Paris: OECD, 2016). Available at http://dx.doi.org/10.1787/9789264255425-en.

[3] Council of Ministers of Education, Canada, *PCAP-13 2007 report on the assessment of 13-year-olds in reading, mathematics, and science* (Toronto: CMEC, 2008).

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 scientific, mathematic, and reading literacy every three years and provides a more detailed look at one of those domains in the years when it is the major focus.

Why did Canada participate in PISA?

Canada's continued participation in PISA stems from many of the same questions that motivate other participating countries and economies. In Canada, provinces and territories responsible for education invest significant public resources in the provision of elementary and secondary education and Canadians are interested in the outcomes of compulsory education provided to their youth. How can resources be directed to the achievement of higher levels of knowledge and skills upon which lifelong learning is founded and to potentially reduce social inequality in life outcomes?

Elementary and secondary education systems play a key role in providing students with the knowledge and skills that form an essential 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. For example, results from the Youth in Transition Survey (YITS) show that there is a strong association between reading proficiency and education attainment.[4] 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 high quartile of reading score. In contrast, Canadian students in the top PISA level (Level 5) of reading performance were twenty times more likely to go to university that those in the lowest PISA level (at or below Level 1).[5]

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 be answered only by examining the distribution of competencies: who are the students at the lowest levels of achievement? 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.

What is PISA 2015?

In 2015 the sixth cycle of PISA was completed and it focuses on scientific literacy. While science was also assessed in previous PISA cycles, the domain was the major focus only in 2006. Students who participated in PISA 2015 entered primary school at about the same time as the PISA 2006 survey so the 2015 results provide an opportunity to relate policy changes to changes in learning outcomes using the benchmarks set by the original 2006 survey when science was also the major focus of assessment. With an emphasis on science in 2015, PISA reports on scientific literacy as well as three "competency" subscales related to explaining phenomena scientifically, evaluating and designing scientific enquiry, and interpreting data and evidence scientifically. Comparing country performance is based on knowledge of science content as well as procedural and epistemic knowledge of science.

"Content knowledge" refers to knowledge of facts, concepts, ideas, and theories about the natural world that science has established, while "procedural knowledge" refers to the knowledge of the practices and concepts on which empirical enquiry is based. "Epistemic knowledge" refers to an understanding of the role of specific constructs and defining features essential to the process of knowledge building in science. The three main areas

[4] OECD, *Pathways to success: How knowledge and skills at age 15 shape future lives in Canada* (Paris: OECD, 2010); OECD, *Learning beyond fifteen: Ten years after PISA* (Paris: OECD, 2012). Available at https://www.oecd.org/canada/49893598.pdf.

[5] OECD, *Pathways to success*.

of science knowledge are physical systems, living systems, and Earth and space systems.[6] As minor domains in PISA 2015, reading and mathematics are measured at only an overall, rather than detailed, level and as such are not reported by performance level or subscales. PISA 2015 also includes a collaborative problem solving and a financial literacy assessment for those countries that decided to participate in the computer-based assessment.[7]

Recognizing the pervasiveness of computer-based tools in the workplace and in everyday life in the 21st century, PISA 2015 assessed all subjects for the first time via computer, although paper-based assessment instruments were provided for countries that chose not to test their students by computer, albeit for reading, mathematics, and science trend items only. Prior to PISA 2015, the assessment was implemented through a paper-based format although the 2009 reading framework and the 2012 mathematics and problem-solving frameworks included electronic assessments and expanded the definition of "PISA literacies" beyond what can be measured by a traditional paper-and-pencil test.

Seventy-two countries participated in PISA 2015, including all 35 OECD countries.[8] Between 5,000 and 10,000 students aged 15 from at least 150 schools were typically tested in each country. In Canada, approximately 20,000 15-year-olds from about 900 schools participated across the ten provinces.[9]

The large Canadian sample was required to produce reliable estimates representative of each province and for both French- and English-language school systems in Nova Scotia, New Brunswick, Quebec, Ontario, Manitoba, Alberta, and British Columbia. PISA was administered in English and in French according to the respective school system.

The 2015 PISA assessment was administered in schools during regular school hours in April and May 2015. The assessment was a two-hour computer-based test. Students also completed a 35-minute student background questionnaire providing information about themselves and their home, while school principals completed a 20-minute questionnaire about their schools. As part of PISA 2015, international options could also be implemented. Canada chose to add a one-hour financial literacy assessment as well as a five-minute paper-based questionnaire to collect information on the attitudes of 15-year-old students toward trades; however, only some provinces chose to participate in these options.

An overview of PISA 2015 is given in the table below. It includes information on participants, test design and administration, and national and international options.

[6] OECD, *PISA 2015 assessment and analytical framework*, p. 19.

[7] Results of the collaborative problem-solving and financial literacy components will be released in 2017.

[8] OECD countries include Australia, Austria, Belgium, Canada, Chile, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Korea, Latvia, Luxembourg, Mexico, the Netherlands, New Zealand, Norway, Poland, Portugal, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey, United Kingdom, and United States. Partner countries and economies are: Albania, Algeria, Argentina, Beijing, Shanghai, Jiangsu, Guangdong (BSJG)–China, Brazil, Bulgaria, Chinese Taipei, Colombia, Costa Rica, Croatia, Cyprus, Dominican Republic, Georgia, Hong Kong–China, Indonesia, Jordan, Kazakhstan, Kosovo, Lebanon, Lithuania, Macao–China, Malaysia, Malta, Moldova, Montenegro, Peru, Qatar, Republic of Macedonia, Romania, Russian Federation, Singapore, Thailand, Trinidad and Tobago, Tunisia, United Arab Emirates, Uruguay, and Vietnam.

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

Table 1

Overview of PISA 2015

	International	Canada
Participating countries/ provinces	• 72 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 510,000 students	• Approximately 20,000 students
Domains	• Major: science • Minor: reading and mathematics • Computer-based collaborative problem solving	• Same
Languages in which the test was administered	• 47 languages	• English and French
International assessment	• Two hours of direct assessments of science, reading, mathematics, and collaborative problem solving • Thirty-five-minute contextual questionnaire administered to youth • Twenty-minute school questionnaire administered to school principals	• Same
International options	• Ten-minute optional questionnaire on information technology and communications familiarity administered to students • Ten-minute optional questionnaire on educational career administered to students • Twenty-minute optional questionnaire administered to parents • One-hour optional assessment of financial literacy • Thirty-minute optional teacher questionnaire	• One-hour optional assessment of financial literacy in Newfoundland and Labrador, Prince Edward Island, Nova Scotia, New Brunswick, Ontario, Manitoba, and British Columbia.
National options	• Other options were undertaken in a limited number of countries	• Five minutes of additional questions administered to students regarding their attitudes towards trades in Newfoundland and Labrador, Prince Edward Island, New Brunswick-English sector, Manitoba, Saskatchewan, and British Columbia.

Objectives of the report

This report provides the initial results from the PISA 2015 assessment for Canada and the provinces. It presents the national and provincial results in science, reading, and mathematics and complements the information presented in the PISA 2015 International report.[10] It also compares results to other participating countries and economies and across Canadian provinces.

Chapter 1 provides information on the performance of Canadian 15-year-old students on the PISA 2015 assessment in science. Chapter 2 presents results on the performance of Canada and the provinces in the minor domains of reading and mathematics. The major findings and opportunities for further study are discussed in the conclusion.

[10] The PISA 2015 International report is released in two volumes. Results presented in this report correspond to results presented in *PISA 2015 Results: Excellence and Equity in Education,* Volume I (Paris: OECD 2016).

Chapter 1

Canadian Students' Performance in Science in an International Context

The results of student performance on the science assessment are presented in this report in two ways: as the percentage of students attaining proficiency levels and as overall average scores. The performance of 15-year-olds for science overall is described in terms of seven PISA proficiency levels for Canada and the provinces. The average scores for science overall are then compared to those from the other countries and economies that participated in PISA 2015. Results are presented for Canada overall and by province, both for science overall and by the subscales of science (competencies and knowledge areas). Then the performance of students enrolled in anglophone and francophone school systems is presented for those provinces in which the two groups were sampled separately. This chapter also compares Canadian students' performance in science by gender. Given that science was assessed as a major domain for a second time in PISA (the first time was in 2006), change in science performance over time will also be discussed.

Defining science

Science education in primary and secondary school should prepare students so that by the time they leave school they can understand and engage in discussions about the science and technology-related issues that shape our world. They should also have the skills needed to participate in higher education in fields related to science if they wish to. Most current curricula for science education are designed on the assumption that an understanding of science is so important that the subject should be a central feature in every young person's education.[11]

In the PISA context, *science* refers to "scientific literacy" which is defined as the ability to engage with science-related issues, and with the ideas of science, as a reflective citizen. A scientifically literate person is willing to engage in reasoned discourse about science and technology, which requires the competencies to: explain phenomena scientifically, evaluate and design scientific enquiry, and interpret data and evidence scientifically.[12]

The science framework was originally developed for PISA 2006 and has kept its essential features in 2015 which allows participating countries to report on trends in performance over time. However, two major improvements were made to the 2006 framework: 1) "knowledge about science" has been defined more clearly and split into two components — procedural knowledge and epistemic knowledge; and 2) the move from a paper-based to a computer-based assessment. These two elements do not jeopardize the possibility of reporting on trends in science performance because they expand the information already available in PISA 2006.

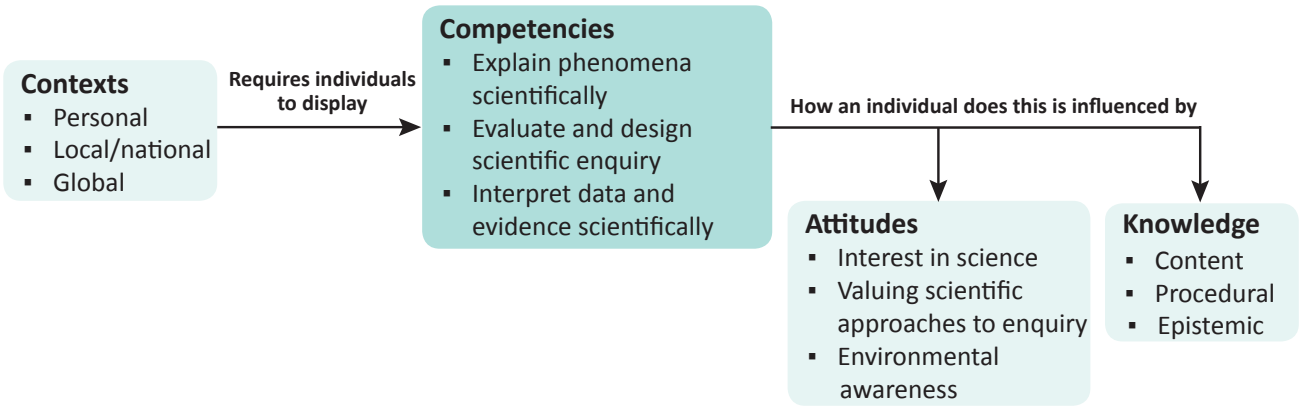
For PISA assessment purposes, the domain of science is divided into three competencies (explain phenomena scientifically, evaluate and design scientific enquiry, and interpret data and evidence scientifically); two knowledge types (content and procedural/epistemic); and three areas of knowledge of science (physical systems, living systems, and Earth and space systems). PISA 2015 also measured students' interest in and awareness of science and environmental issues as well as their perceived value of scientific approaches.

[11] OECD, *PISA 2015 Results: Excellence and Equity in Education,* Volume 1 (Paris: OECD, 2016)
[12] OECD, *PISA 2015 assessment and analytical framework: Science, reading, mathematic and financial literacy*, (Paris: OECD, 2016), available at http://dx.doi.org/10.1787/9789264255425-en.

The main features of the PISA 2015 science framework are presented in the following illustration.[13]

Figure 1

Main features of the PISA 2015 science framework



Three competencies are used in PISA 2015 to describe how a scientifically literate person engages in issues and ideas related to science. The competencies appear in Table 1.1.

Table 1.1

Competencies of science

Explain phenomena scientifically — being able to recognize, offer, and evaluate explanations for a range of natural and technological phenomena by demonstrating the ability to:

- Recall and apply appropriate scientific knowledge.
- Identify, use, and generate explanatory models and representations.
- Make and justify appropriate predictions.
- Offer explanatory hypotheses.
- Explain the potential implications of scientific knowledge for society.

Evaluate and design scientific enquiry — being able to describe and appraise scientific investigations and propose ways of addressing questions scientifically by demonstrating the ability to:

- Identify the question explored in a given scientific study.
- Distinguish questions that could be investigated scientifically.
- Propose a way of exploring a given question scientifically.
- Evaluate ways of exploring a given question scientifically.
- Describe and evaluate how scientists ensure the reliability of data, and the objectivity and generalizability of explanations.

Interpret data and evidence scientifically — being able to analyze and evaluate data, claims, and arguments in a variety of representations and draw appropriate scientific conclusions by demonstrating the ability to:

- Transform data from one representation to another.
- Analyze and interpret data and draw appropriate conclusions.
- Identify the assumptions, evidence, and reasoning in science-related texts.
- Distinguish between arguments that are based on scientific evidence and theory and those based on other considerations.
- Evaluate scientific arguments and evidence from different sources (e.g., newspapers, the Internet, journals).*

* Adapted from Figures 2.4 a, b, and c in OECD, *PISA 2015 assessment and analytical framework*.

[13] OECD, *PISA 2015 assessment and analytical framework*, p. 23.

Each of the scientific competencies requires some content knowledge (knowledge of theories, explanatory ideas, information, and facts), but also an understanding of how such knowledge has been derived (procedural knowledge) and of the nature of that knowledge (epistemic knowledge).

For PISA 2015, content knowledge was classified according to the three broad content areas central to the disciplines. Although their definitions and delineations may vary, these are very consistent with the way provincial curricula[14] as well as pan-Canadian[15] and other international assessments[16] are organized. Descriptions of these content areas appear in Table 1.2.

Table 1.2

Content knowledge of science
Physical systems that require knowledge of:
• structure of matter (e.g., particle model, bonds) • properties of matter (e.g., changes of state, thermal and electrical conductivity) • chemical changes of matter (e.g., chemical reactions, energy transfer, acids/bases) • motion and forces (e.g., velocity, friction) and action at a distance (e.g., magnetic, gravitational, and electrostatic forces) • energy and its transformation (e.g., conservation, dissipation, chemical reactions) • interactions between energy and matter (e.g., light and radio waves, sound and seismic waves)
Living systems that require knowledge of:
• cells (e.g., structures and function, DNA, plant and animal) • the concept of an organism (e.g., unicellular and multicellular) • humans (e.g., health; nutrition; subsystems such as digestion, respiration, circulation, excretion, and reproduction and their relationship) • populations (e.g., species, evolution, biodiversity, genetic variation) • ecosystems (e.g. food chains, matter, and energy flow) • biosphere (e.g., ecosystem services, sustainability)
Earth and space systems that require knowledge of:
• structures of the Earth systems (e.g., lithosphere, atmosphere, hydrosphere) • energy in the Earth systems (e.g., sources, global climate) • change in Earth systems (e.g., plate tectonics, geochemical cycles, constructive and destructive forces) • Earth's history (e.g., fossils, origin, and evolution) • Earth in space (e.g., gravity, solar systems, galaxies) • the history and scale of the universe and its history (e.g., light year, Big Bang theory).*

* Adapted from Figure 2.5 in OECD, *PISA 2015 assessment and analytical framework*.

For the reporting of knowledge in PISA 2015, procedural knowledge and epistemic knowledge were combined into one category. The examples listed in the table below convey the general features of the types of procedural and epistemic knowledge addressed in the assessment.

[14] For updated science curricula, please visit official jurisdictional Web sites.
[15] See K. O'Grady, and K. Hume, *PCAP 2013: Report on the pan-Canadian assessment of science, reading, and mathematics* (Toronto: Council of Ministers of Education, Canada, 2014).
[16] See I. Mullis, M. Martin, G. Ruddock, C. O'Sullivan, and C. Preuschoff. *TIMSS assessment frameworks* (Chestnut Hill, MA: Boston College, 2009), available at http://timssandpirls.bc.edu/timss2015/frameworks.html.

Table 1.3

Procedural and epistemic knowledge of science

Procedural knowledge requires an understanding of how scientific knowledge is derived. It includes:

- the concept of variables, including dependent, independent, and control variables;
- concepts of measurement, for example, quantitative (measurements), qualitative (observations), the use of a scale, categorical and continuous variables;
- ways of assessing and minimizing uncertainty, such as repeating and averaging measurements;
- mechanisms to ensure the replicability (closeness of agreement between repeated measures of the same quantity) and accuracy of data (the closeness of agreement between a measured quantity and a true value of the measure);
- common ways of abstracting and representing data using tables, graphs, and charts, and using them appropriately;
- the control-of-variables strategy and its role in experimental design or the use of randomized controlled trials to avoid confounded findings and identify possible causal mechanisms; and
- the nature of an appropriate design for a given scientific question, for example, experimental, field-based, or pattern-seeking.

Epistemic knowledge requires an understanding of the nature of knowledge in science.

It involves the constructs and defining features of science:

- the nature of scientific observations, facts, hypotheses, models, and theories;
- the purpose and goals of science (to produce explanations of the natural world) as distinguished from technology (to produce an optimal solution to human need), and what constitutes a scientific or technological question and appropriate data;
- The values of science, for example, a commitment to publication, objectivity, and the elimination of bias; and
- the nature of reasoning used in science, for example, deductive, inductive, inference to the best explanation (abductive), analogical, and model-based.

Epistemic knowledge requires a recognition of these constructs' and features' role in justifying the knowledge produced by science. That is:

- how scientific claims are supported by data and reasoning in science;
- the function of different forms of empirical enquiry in establishing knowledge, their goal (to test explanatory hypotheses or identify patterns), and their design (observation, controlled experiments, correlational studies);
- how measurement error affects the degree of confidence in scientific knowledge;
- the use and role of physical, system, and abstract models and their limits;
- the role of collaboration and critique, and how peer review helps to establish confidence in scientific claims; and
- the role of scientific knowledge, along with other forms of knowledge, in identifying and addressing societal and technological issues.*

* Adapted from Figures 2.6 and 2.7 in OECD, *PISA 2015 assessment and analytical framework*.

PISA achievement results by proficiency levels in science

PISA developed useful benchmarks relating a range of average scores in science to levels of knowledge and skills that are measured by the assessment. Although these levels are not linked directly to any specific program of study in science, they provide an overall picture of students' accumulated understanding at age 15. PISA science literacy is expressed on a seven-level proficiency scale in which tasks at the lower end of the scale (Level 1) are deemed easier and less complex than other tasks at the higher end (Level 6). This progression in task difficulty/complexity applies to both the overall science scale and for each competency and knowledge area. Table 1.4 provides a summary description of the tasks that students are able to do at the seven proficiency levels for overall science along with the corresponding lower limit for the level. It is assumed that students classified at a given proficiency level can perform most of that tasks at that level as well as those at the lower levels. Proficiency level achievement is reported for only the major domain in the Canadian report of the PISA 2015 assessment.

Table 1.4

PISA 2015 Science proficiency levels — Summary description*

Level	Lower score limit	Percentage of students able to perform tasks at this level or above	Task characteristics
6	707.93	1.1% of students across the OECD and 2.0% in Canada	Students at Level 6 of the PISA science assessment are able to successfully complete the most difficult PISA items. At Level 6, students can: • draw on a range of interrelated scientific ideas and concepts from the physical, life, Earth, and space sciences, link different information sources and representations, and move flexibly among them; • use content, procedural, and epistemic knowledge to offer explanatory hypotheses of novel scientific phenomena, events, and processes or to make predictions; • discriminate between relevant and irrelevant information and draw on knowledge external to the normal school curriculum when interpreting data and evidence; • distinguish between arguments that are based on scientific evidence and theory and those based on other considerations; and • evaluate competing designs of complex experiments, field studies, or simulations and justify their choices.
5	633.33	7.7% of students across the OECD and 12.4% in Canada	At Level 5, students can: • use abstract scientific ideas or concepts to explain unfamiliar and more complex phenomena, events, and processes involving multiple causal links; • apply more sophisticated epistemic knowledge to evaluate alternative experimental designs and justify their choices and use theoretical knowledge to interpret information or make predictions; and • evaluate ways of exploring a given question scientifically and identify limitations in interpretations of data sets, including sources and the effects of uncertainty in scientific data.
4	558.73	26.7% of students across the OECD and 38.4% in Canada	At Level 4, students can: • use more complex or more abstract content knowledge, which is either provided or recalled, to construct explanations of more complex or less familiar events and processes; • conduct experiments involving two or more independent variables in a constrained context; • justify an experimental design, drawing on elements of procedural and epistemic knowledge; and • interpret data drawn from a moderately complex data set or less familiar context, draw appropriate conclusions that go beyond the data, and provide justifications for their choices.
3	484.14	54.0% of students across the OECD and 68.7% in Canada	At Level 3, students can: • draw upon moderately complex content knowledge to identify or construct explanations of familiar phenomena; • construct explanations with relevant cueing or support in less familiar or more complex situations; • draw on elements of procedural or epistemic knowledge to carry out a simple experiment in a constrained context; and • distinguish between scientific and nonscientific issues and identify the evidence supporting a scientific claim.
2	409.54	78.8% of students across the OECD and 88.9% in Canada	Level 2 is considered the baseline level of science proficiency that is required to participate fully in modern society. At Level 2, students can: • draw on everyday content knowledge and basic procedural knowledge to identify an appropriate scientific explanation, interpret data, and identify the question being addressed in a simple experimental design; • use basic or everyday scientific knowledge to identify a valid conclusion from a simple data set; and • demonstrate basic epistemic knowledge by being able to identify questions that could be investigated scientifically.
1a	334.94	94.5% of students across the OECD and 98.0% in Canada	At Level 1a, students can: • use basic or everyday content and procedural knowledge to recognize or identify explanations of simple scientific phenomenon; • undertake structured scientific enquiries with no more than two variables with support; • identify simple causal or correlational relationships and interpret graphical and visual data that require a low level of cognitive demand; and • select the best scientific explanation for given data in familiar personal, local, and global contexts.
1b	260.54	99.4% of students across the OECD and 99.9% in Canada	At Level 1b, students can: • use basic or everyday scientific knowledge to recognize aspects of familiar or simple phenomenon; and • identify simple patterns in data, recognize basic scientific terms, and follow explicit instructions to carry out a scientific procedure.

* Adapted from OECD, *PISA 2015 Results: Excellence and Equity in Education*.
Note: Level 1 and Level 1a are used interchangeably. Level 1b is also referred to as below Level 1.

Canadian students achieve a high level of proficiency in science

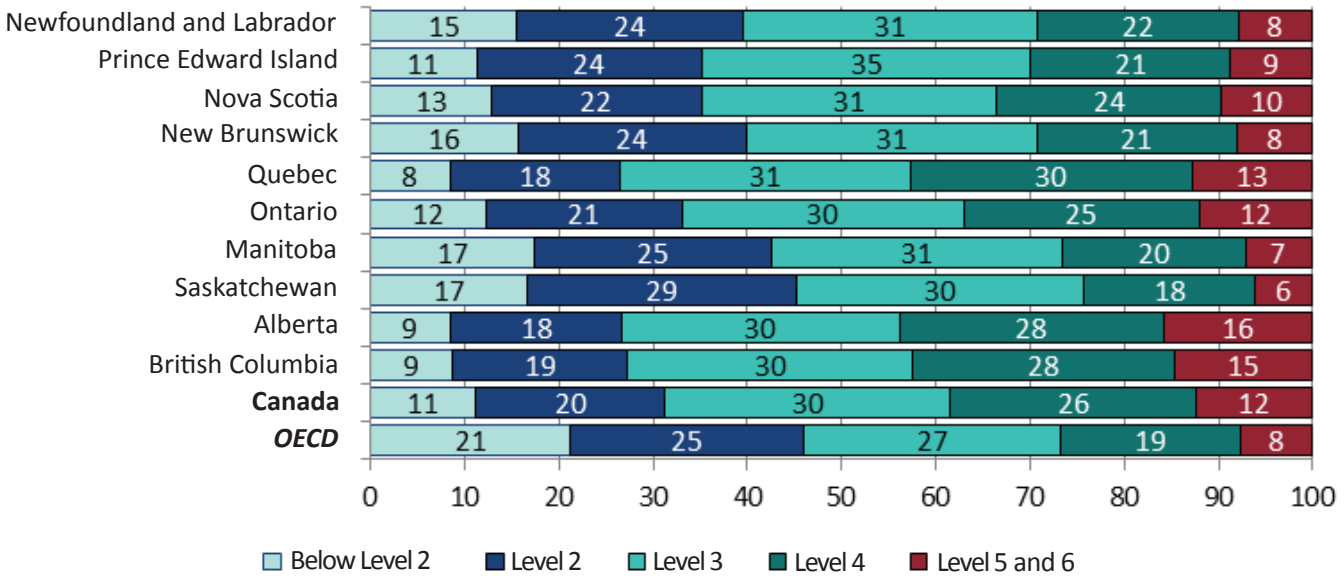
In PISA 2015, 89 per cent of Canadian students and 79 per cent of students in OECD countries performed at or above Level 2 in science, which is the baseline level of science proficiency (Appendix B.1.1). Across provinces, the percentage of Canadian students at or above the baseline level of performance ranges from 83 per cent in Saskatchewan and Manitoba to over 90 per cent in Quebec, Alberta, and British Columbia (Figure 1.1). By contrast, 11 per cent of Canadian students did not reach the baseline Level 2 in science, compared with 21 per cent for the OECD. More than 60 countries had a higher proportion of students performing at the lower level compared to Canada. Provincially, there is a lot of variability among the provinces. Quebec (8%), Alberta (9%), and British Columbia (9%) had a lower proportion of low achievers; Manitoba and Saskatchewan had a higher (17%) proportion of low achievers in science.

At the higher end of the PISA science scale, 12 per cent of Canadian students performed at Level 5 or above compared to 8 per cent performing at this level for the OECD. Although this is a higher proportion of students than in most other countries participating in PISA, seven countries and economies (Beijing, Shanghai, Jiangsu, Guangdong [BSJG]–China, Estonia, New Zealand, Australia, the Netherlands, United Kingdom, and Korea) had a similar proportion of students performing at Level 5 or above as Canada did, while four had a statistically higher proportion (Singapore, Chinese Taipei, Japan, and Finland). At the provincial level, the proportion of students achieving at this higher level is 10 per cent or more in Nova Scotia, Quebec, Ontario, Alberta, and British Columbia.

Across the OECD, 6 per cent of 15-year-olds did not achieve Level 1 while this proportion was 2 per cent in Canada. Provincially, 4 per cent of students in Manitoba did not achieve Level 1, compared to 1 percent of students in Quebec, Alberta, and British Columbia.

Figure 1.1

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



Note: Percentages may not add up to 100 due to rounding. Results for the province of Quebec in this table should be treated with caution because of a possible non-response bias (see Appendix A for further details).

PISA achievement results by average scores in science

The PISA scores for science are expressed on a scale with an average or mean of 500 points for the OECD countries and a standard deviation of 100. This average was established in 2006 and reestablished at 493 in 2015.[17] This means that approximately two-thirds of all students in OECD countries scored between 393 and 593 (i.e., within one standard deviation of the average) on this PISA 2015 assessment.

International studies such as PISA summarize student performance by comparing the relative standing of countries based on their average test scores. This approach can be misleading because there is a margin of error associated with each score (see note below). When interpreting average performances, only those differences between countries that are statistically significant should be taken into account.

A note on statistical comparisons

Because PISA's goal is to report results on the skills of 15-year-old students, a random sample of 15-year-old students was selected to complete PISA. The averages (for mean scores and for proficiency-levels proportions) were computed from the scores of random samples of students from each country and not from the population of 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. A degree of error is associated with the scores describing student performance because 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 that 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 per cent 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 error in each average should be considered to determine whether averages are significantly different from each other. Standard errors and confidence intervals may be used as the basis for performing these comparative statistical tests. Such tests can identify, with a known probability, whether 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 resulting from 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, an additional test of significance (t-test) was conducted 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.

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.

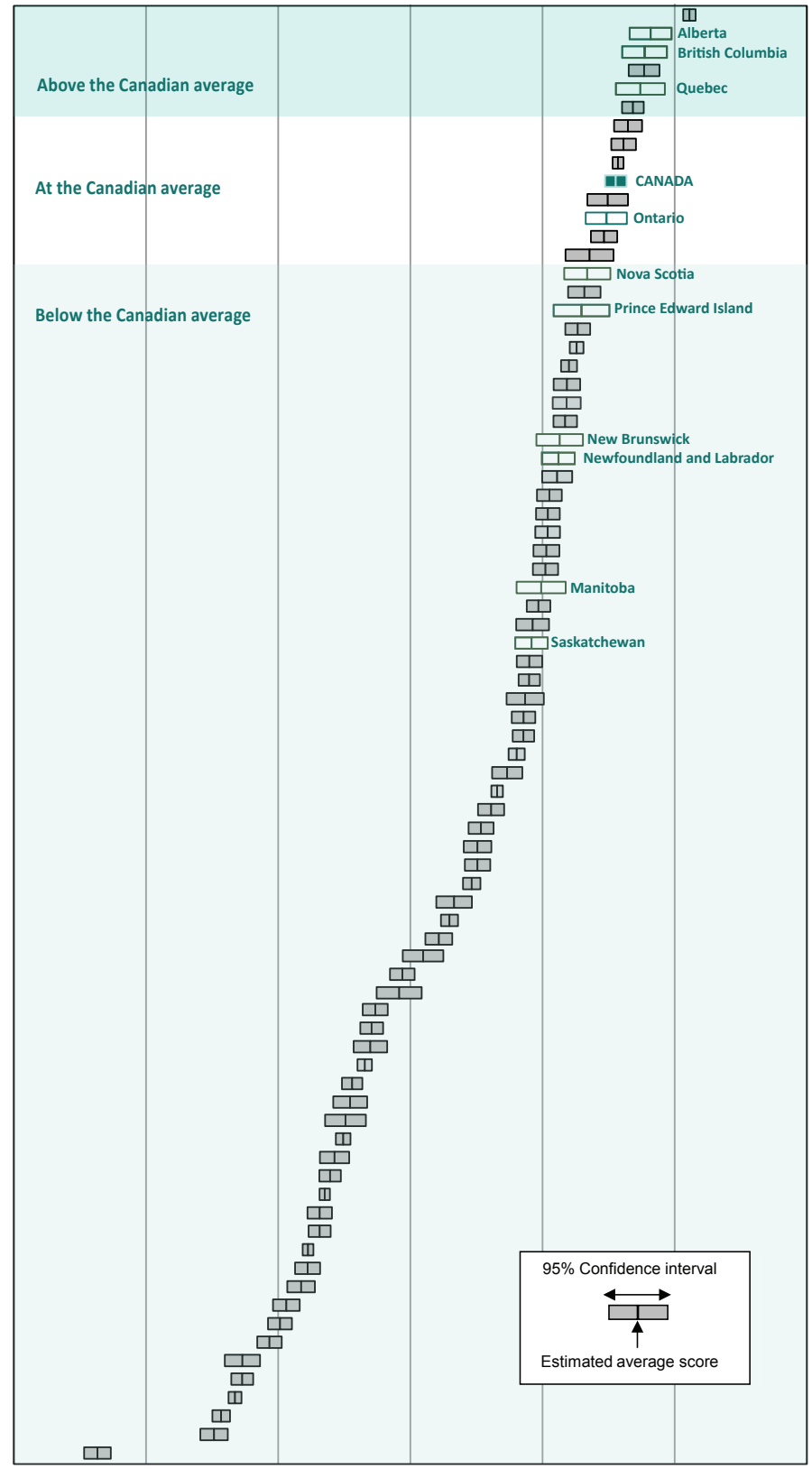
Canadian students perform well in science in a global context

Overall, Canadian 15-year-old students achieved a mean score of 528 which is 35 points over the OECD average. As Figure 1.2 illustrates, Canada was outperformed by Singapore, Japan, and Estonia, ranking third (along with Finland) among OECD countries and fourth (along with Chinese Taipei, Finland, Macao–China, Vietnam, Hong Kong–China, and BSJG–China) among all 72 participating countries and economies.

[17] Further details on the interpretation of change over time are provided in tables in separate sections of this report.

Figure 1.2

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



Countries and provinces	Average	S.E.
Singapore	556	(1.2)
Alberta	541	(4.0)
British Columbia	539	(4.3)
Japan	538	(3.0)
Quebec	537	(4.7)
Estonia	534	(2.1)
Chinese Taipei	532	(2.7)
Finland	531	(2.4)
Macao-China	529	(1.1)
CANADA	528	(2.1)
Vietnam	525	(3.9)
Ontario	524	(3.9)
Hong Kong-China	523	(2.5)
BSJG-China	518	(4.6)
Nova Scotia	517	(4.5)
Korea	516	(3.1)
Prince Edward Island	515	(5.4)
New Zealand	513	(2.4)
Slovenia	513	(1.3)
Australia	510	(1.5)
United Kingdom	509	(2.6)
Germany	509	(2.7)
The Netherlands	509	(2.3)
New Brunswick	506	(4.5)
Newfoundland and Labrador	506	(3.2)
Switzerland	506	(2.9)
Ireland	503	(2.4)
Belgium	502	(2.3)
Denmark	502	(2.4)
Poland	501	(2.5)
Portugal	501	(2.4)
Manitoba	499	(4.7)
Norway	498	(2.3)
United States	496	(3.2)
Saskatchewan	496	(3.1)
Austria	495	(2.4)
France	495	(2.1)
Sweden	493	(3.6)
Czech Republic	493	(2.3)
Spain	493	(2.1)
Latvia	490	(1.6)
Russian Federation	487	(2.9)
Luxembourg	483	(1.1)
Italy	481	(2.5)
Hungary	477	(2.4)
Lithuania	475	(2.7)
Croatia	475	(2.5)
Iceland	473	(1.7)
Israel	467	(3.4)
Malta	465	(1.6)
Slovak Republic	461	(2.6)
Greece	455	(3.9)
Chile	447	(2.4)
Bulgaria	446	(4.4)
United Arab Emirates	437	(2.4)
Uruguay	435	(2.2)
Romania	435	(3.2)
Cyprus	433	(1.4)
Moldova	428	(2.0)
Albania	427	(3.3)
Turkey	425	(3.9)
Trinidad and Tobago	425	(1.4)
Thailand	421	(2.8)
Costa Rica	420	(2.1)
Qatar	418	(1.0)
Colombia	416	(2.4)
Mexico	416	(2.1)
Montenegro	411	(1.0)
Georgia	411	(2.4)
Jordan	409	(2.7)
Indonesia	403	(2.6)
Brazil	401	(2.3)
Peru	397	(2.4)
Lebanon	386	(3.4)
Tunisia	386	(2.1)
Republic of Macedonia	384	(1.2)
Kosovo	378	(1.7)
Algeria	376	(2.6)
Dominican Republic	332	(2.6)

Note: OECD countries appear in italics. The OECD average was 493, with a standard error of 0.4. The results of Argentina, Kazakhstan, and Malaysia are excluded because of insufficient coverage to ensure comparability (see Appendix B.1.2 for these results). See Appendix B.3.1 for further comparisons between provinces and participating countries. Results for the province of Quebec in this table should be treated with caution because of a possible non-response bias (see Appendix A for further details).

When interpreting provincial and international 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, 88 per cent of students were at the Grade 10 (Secondary 4) level and they achieved a mean score of 532. Grade 9 students (10 per cent) achieved a mean score of 501. Small proportions of students participating in PISA 2015 were in lower or higher grades.

Table 1.5 lists those countries performing significantly better than or equally as well as Canada on the overall science scale (with all remaining countries that took part in PISA 2015 being statistically below the Canadian average). Science results are also reported for each competency, knowledge, and content area subscale. Students' facility at applying science to problems and issues is dependent on skills inherent in all three competencies. A closer analysis of results in each category can help inform policy-level discussions, curricular emphasis, or teaching practice.

Canadian results by scientific competency are similar, with an average score of 530 in *evaluating and designing scientific enquiry* and in *explaining phenomena scientifically,* and 525 in *interpreting data and evidence scientifically*. Across OECD countries, students scored 493 in all three competency subscales. Only Singapore achieved a higher average score than Canada in *evaluating and designing scientific enquiry* while Singapore and Japan outperformed Canada in *explaining phenomena scientifically*, and Singapore, Japan, Estonia, Chinese Taipei, and Macao–China outperformed Canada in *interpreting data and evidence scientifically*.

Canadian students achieved an average score of 528 in both the *content* and the *procedural and epistemic* knowledge subscales. Across OECD countries, students scored 493 on both knowledge subscales. *Content* knowledge was further reported for each of three important systems in science. At the Canadian level, there was no significant difference in achievement across the three system subscales. The scores across OECD countries varied slightly: *living systems* (492), *physical systems* (493), and *Earth and space systems* (494).

Table 1.5

Countries performing better than or as well as Canada – Science

	Better than Canada*	As well as Canada*
Science overall	Singapore, Japan, Estonia	Chinese Taipei, Finland, Macao–China, Vietnam, Hong Kong–China, BSJG–China
Science – Competency subscales		
Explain phenomena scientifically	Singapore, Japan	Chinese Taipei, Finland, Estonia, Macao–China, Hong Kong–China, BSJG–China
Evaluate and design scientific enquiry	Singapore	Japan, Estonia, Finland, Macao–China, Chinese Taipei, Hong Kong–China
Interpret data and evidence scientifically	Singapore, Japan, Estonia, Chinese Taipei, Macao–China	Finland, Korea, Hong Kong–China, BSJG–China
Science – Knowledge subscales		
Content	Singapore, Japan, Chinese Taipei	Finland, Estonia, Macao–China, Hong Kong–China, BSJG–China,
Procedural and epistemic	Singapore, Japan, Estonia	Macao–China, Chinese Taipei, Finland, Hong Kong–China
Science – Content area subscales		
Physical systems	Singapore, Japan, Estonia, Finland	Macao–China, Chinese Taipei, Hong Kong–China, BSJG–China,
Living systems	Singapore, Japan	Chinese Taipei, Estonia, Finland, Macao–China, Hong Kong–China
Earth and space systems	Singapore, Japan, Estonia	Finland, Chinese Taipei, Macao–China, Hong Kong–China, Korea

* Differences in scores are statistically significant only when confidence intervals do not overlap. If the confidence intervals overlap, an additional test of significance was conducted to determine whether the difference was statistically significant. Countries performing as well as Canada have a confidence interval that overlaps that of Canada.

There are marked variations between provinces

At the provincial level, 15-year-old students in Quebec, Alberta, and British Columbia performed above the Canadian average in overall science, with average scores of 537, 541, and 539, respectively. Only Singapore (556) had higher achievement than these three jurisdictions. Students in Ontario performed at the Canadian average while the other provinces were below the Canadian average. With the exception of Manitoba and Saskatchewan which scored at the OECD average, all provinces scored above the OECD average in science (Appendix B.1.2).

An analysis of results by scientific competencies also reveals provincial differences. As presented in Table 1.6 and Appendix B.1.3, Alberta was above the Canadian mean score and Ontario was at the mean score for all three scientific competencies. Quebec students achieved above the Canadian mean for the competencies of *evaluating and designing scientific enquiry* and *interpreting data and evidence scientifically* and at the Canadian mean for *explaining phenomena scientifically*. British Columbia students achieved above the Canadian mean for the competencies of *explaining phenomena scientifically* and *interpreting data and evidence scientifically* and at the Canadian mean for *evaluating and designing scientific enquiry*. Students in Nova Scotia performed at the

Canadian average in *interpreting data and evidence scientifically*. Students in all other provinces were below the Canadian average for all three scientific competencies.

There were also provincial differences in performance between the different knowledge subscales. Students in Alberta and British Columbia achieved scores above the Canadian average in both knowledge subscales while students in Ontario performed at the Canadian average in both knowledge subscales. Quebec students achieved above the Canadian average in *procedural and epistemic knowledge* and at the Canadian average in *content knowledge.* Students in Prince Edward Island scored at the Canadian average in *content knowledge* but below the Canadian average on the *procedural and epistemic* knowledge subscale. All other provinces were below the Canadian average on both knowledge subscales (Table 1.6 and Appendix B.1.4).

When it came to the different content areas at the provincial level, Alberta performed better than the Canadian average in all three content areas, while British Columbia performed better than the Canadian average in the *living systems* subscale and Quebec in *physical systems* and *Earth and space systems*. Students in British Columbia performed at the Canadian average in *physical systems* and *Earth and space systems,* while students in Quebec performed at the Canadian average in *living systems.* Students in Ontario performed at the Canadian average in all three content areas, while students achieved as well as the Canadian average in both *physical* and *living systems* in Prince Edward Island and Nova Scotia (Table 1.6 and Appendix B.1.5).

Table 1.6

Provincial results in science relative to the Canadian average

	Better than Canada*	**As well as Canada***
Science overall	Quebec, Alberta, British Columbia	Ontario
Science – Competency subscales		
Explain phenomena scientifically	Alberta, British Columbia	Quebec, Ontario
Evaluate and design scientific enquiry	Quebec, Alberta	Ontario, British Columbia
Interpret data and evidence scientifically	Quebec, Alberta, British Columbia	Nova Scotia, Ontario
Science – Knowledge subscales		
Content	Alberta, British Columbia	Prince Edward Island, Quebec, Ontario
Procedural and epistemic	Quebec, Alberta, British Columbia	Ontario
Science – Content area subscales		
Physical systems	Quebec, Alberta	Prince Edward Island, Nova Scotia, Ontario, British Columbia
Living systems	Alberta, British Columbia	Prince Edward Island, Nova Scotia, Quebec, Ontario
Earth and space systems	Quebec, Alberta	Ontario, British Columbia

* Differences in scores are statistically significant only when confidence intervals do not overlap. If the confidence intervals overlap, an additional test of significance was conducted to determine whether the difference was statistically significant. Results for the province of Quebec in this table should be treated with caution because of a possible non-response bias (see Appendix A for further details).

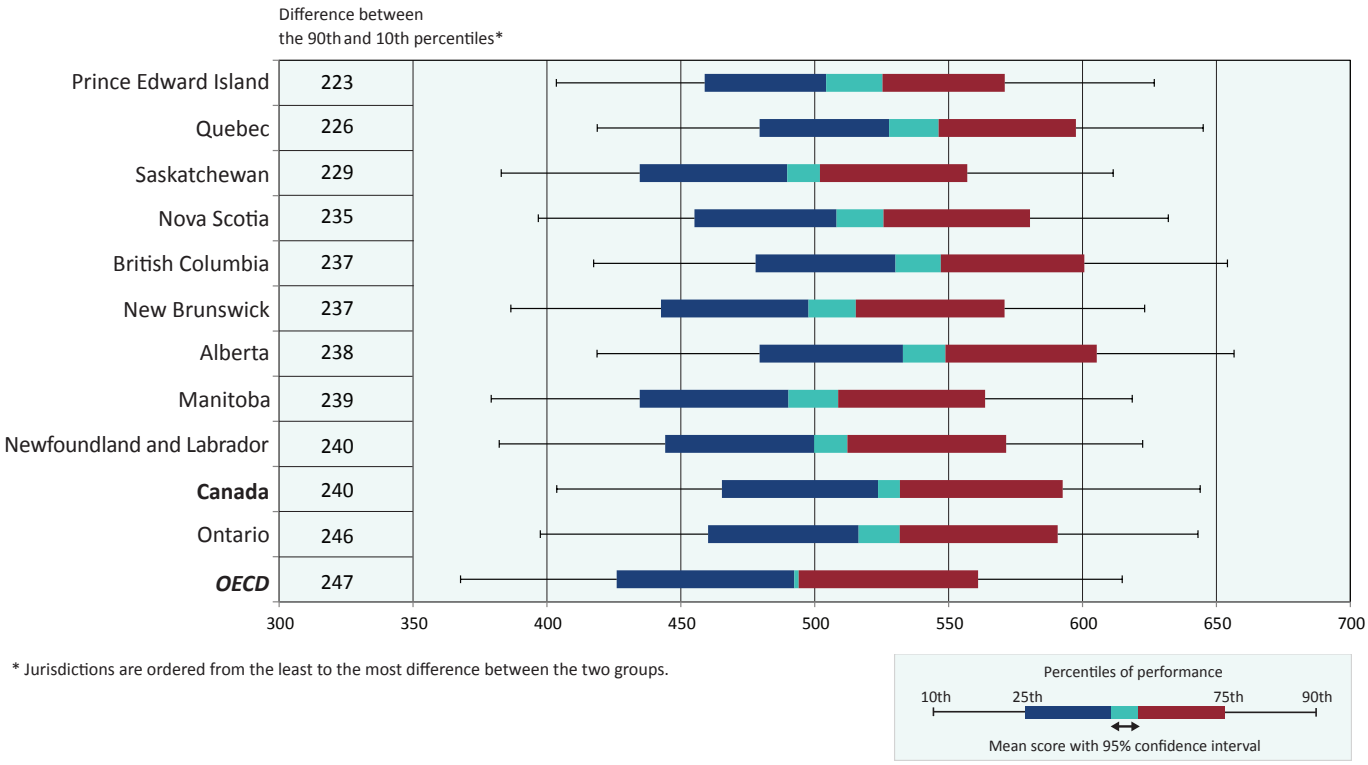
Canadian results in science are characterized by relatively high levels of equity

Another way of studying differences in achievement is to look at the distribution of scores within a population. The difference between the mean score of students at the 90th percentile and those at the 10th percentile is often used as a proxy for equity in educational outcomes whereby 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 1.3 shows the difference in average scores between lowest achievers and highest achievers in science in Canada and the provinces. For Canada overall, those in the highest decile scored 240 points higher compared to those in the lowest decile. This compares to 247 across OECD countries.

At the provincial level, the largest gap can be observed in Ontario (less equity) and the smallest in Prince Edward Island (more equity). Although high-achieving countries tend to have a larger gap, high achievement does not necessarily come at the cost of equity. Notably, Singapore and Japan achieved higher average scores comparable to Canada (556 and 538 respectively) (Appendix B.1.2) but only Japan has similar equity levels as seen by the difference in the achievement gap (271 and 243 respectively) (Appendix B.1.6).

Figure 1.3

PISA 2015 Science – Difference between high and low achievers, Canada, provinces, and OECD



* Jurisdictions are ordered from the least to the most difference between the two groups.

Note: Results for the province of Quebec in this table should be treated with caution because of a possible non-response bias (see Appendix A for further details).

In Canada, science results show significant differences by the school system's language

In seven Canadian provinces (Nova Scotia, New Brunswick, Quebec, Ontario, Manitoba, Alberta, and British Columbia), the sample was sufficiently large to allow for separate reporting for students in the anglophone and francophone school systems.[18]

No difference between the two language systems in science performance was found in Canada overall or in New Brunswick and British Columbia, as shown in Table 1.7 and Appendix B.1.7. The remaining provinces show a statistically different performance on the overall science scale between the anglophone and the francophone school systems. Students in the majority-language system (students in the anglophone school systems in Nova Scotia, Ontario, Manitoba, and Alberta and students in the francophone school system in Quebec) performed better than their counterparts in the minority-language system. The same pattern is found for the scientific competencies and knowledge subscales and for two content area subscales, living and physical systems. For Earth and space systems, there is higher achievement in francophone school systems for Canada overall (Table 1.8 and Appendices B.1.8 to B.1.10).

Table 1.7

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

	Anglophone school system		Francophone school system		Difference between systems*	
	Average	S.E.	Average	S.E.	Score difference	S.E.
Nova Scotia	518	(4.6)	477	(7.3)	**42**	(8.7)
New Brunswick	508	(5.7)	502	(4.9)	6	(7.1)
Quebec	514	(3.5)	540	(5.3)	**-26**	(6.2)
Ontario	526	(4.1)	486	(4.2)	**39**	(5.4)
Manitoba	501	(5.0)	473	(6.9)	**28**	(8.3)
Alberta	541	(4.1)	504	(8.9)	**37**	(10.6)
British Columbia	539	(4.3)	532	(15.8)	7	(15.9)
Canada	526	(2.2)	533	(4.7)	-7	(5.0)

* Results in bold indicate a statistical difference between the two systems. A negative difference means that the result for the francophone school system is higher. The Canadian results include students from all provinces. Results for the province of Quebec in this table should be treated with caution because of a possible non-response bias (see Appendix A for further details).

These results suggest that policy-makers may wish to analyze provincial results more closely, given that some of the largest differences between the majority- and the minority-language school systems amount to between 26 and 42 points for overall science scale and between 22 and 49 points on the PISA competency, knowledge, and content area subscales.

[18] Within anglophone school systems, students in French Immersion programs completed the science component in English.

Table 1.8

Summary of differences in provincial results between language systems in science competency, knowledge, and content area subscales

	Significantly higher* performance in anglophone school system	Significantly higher* performance in francophone school system	No significant differences between school systems
Science – Competency subscales			
Explain phenomena scientifically Evaluate and design scientific enquiry Interpret data and evidence scientifically	Nova Scotia, Ontario, Manitoba, Alberta	Quebec	Canada, New Brunswick, British Columbia
Science – Knowledge subscales			
Content Procedural and epistemic	Nova Scotia, Ontario, Manitoba, Alberta	Quebec	Canada, New Brunswick, British Columbia
Science – Content area subscales			
Physical systems Living systems	Nova Scotia, Ontario, Manitoba, Alberta	Quebec	Canada, New Brunswick, British Columbia
Earth and space systems	Nova Scotia, Ontario, Manitoba, Alberta	Canada, Quebec	New Brunswick, British Columbia

* Differences in scores are statistically significant only when confidence intervals do not overlap. If the confidence intervals overlap, an additional test of significance was conducted to determine whether the difference was statistically significant. Results for the province of Quebec in this table should be treated with caution because of a possible non-response bias (see Appendix A for further details).

There is no gender gap in science in Canada overall

Policy-makers have an interest in reducing gender disparities in education. Student motivation in school can have a significant impact on their later career choices and earning prospects.

In science overall, there was no difference in average achievement scores between boys and girls in Canada and the provinces (Appendix B.1.11). There was a small gender gap in OECD countries: boys outperformed girls in science by four points on average in PISA 2015, with much variability between participating countries: in over 20 countries, girls outperformed boys in science while boys outperformed girls in a similar number of countries.

In Canada, there was a higher proportion of boys than girls performing at the highest levels of proficiency (Levels 5 and 6) as well as at the lowest levels of proficiency (below Level 2) in science. Provincially, more boys than girls performed at the highest levels of proficiency in Newfoundland and Labrador and Quebec while no gender differences were observed in any of the provinces at the lowest levels of proficiency (Table 1.9 and Appendix B.1.12).

When looking at the different scientific competency, knowledge, and content area subscales, we see that performance was remarkably similar between 15-year-old boys and girls in Canada in the science competency of *interpreting data and evidence scientifically* and for all three content area subscales: *physical systems*, *living systems*, and *Earth and space systems* (Table 1.10). Girls outperformed boys in *evaluating and designing scientific enquiry* and in *procedural and epistemic* knowledge while boys outperformed girls in *explaining phenomena scientifically* and in *content* knowledge.

Table 1.9

Distribution of students on the overall science scale by proficiency level and gender

Levels 5 and 6		
Percentage of girls is significantly higher* than percentage of boys	**Percentage of boys is significantly higher* than percentage of girls**	**No significant differences in the percentage of boys and girls**
	Canada, Newfoundland and Labrador, Quebec	Prince Edward Island, Nova Scotia, New Brunswick, Ontario, Manitoba, Saskatchewan, Alberta, British Columbia
Below Level 2		
Percentage of girls is significantly higher* than percentage of boys	**Percentage of boys is significantly higher* than percentage of girls**	**No significant differences in the percentage of boys and girls**
	Canada	all provinces

* Differences in percentages at proficiency levels are statistically significant only when confidence intervals do not overlap. If the confidence intervals overlap, an additional test of significance was conducted to determine whether the difference was statistically significant.

Gender differences at the provincial level for science overall and by subscale are shown in Table 1.10 and in appendices B.1.13 to B.1.15.

Table 1.10

Summary of gender differences in average science scores for Canada and the provinces

	Girls performed significantly higher* than boys	Boys performed significantly higher* than girls	No significant differences between boys and girls
Science overall			Canada, all provinces
Science – Competency subscales			
Explain phenomena scientifically		Canada, Newfoundland and Labrador, Quebec, Saskatchewan, Alberta, British Columbia	Prince Edward Island, Nova Scotia, New Brunswick, Ontario, Manitoba
Evaluate and design scientific enquiry	Canada, Prince Edward Island, Ontario		Newfoundland and Labrador, Nova Scotia, New Brunswick, Quebec, Manitoba, Saskatchewan, Alberta, British Columbia
Interpret data and evidence scientifically			Canada, all provinces
Science – Knowledge subscales			
Content		Canada, Newfoundland and Labrador, Quebec, Saskatchewan	Prince Edward Island, Nova Scotia, New Brunswick, Ontario, Manitoba, Alberta, British Columbia
Procedural and epistemic	Canada, Ontario		Newfoundland and Labrador, Prince Edward Island, Nova Scotia, New Brunswick, Quebec, Manitoba, Saskatchewan, Alberta, British Columbia
Science – Content area subscales			
Physical systems		Quebec	Canada, Newfoundland and Labrador, Prince Edward Island, Nova Scotia, New Brunswick, Ontario, Manitoba, Saskatchewan, Alberta, British Columbia
Living systems			Canada, all provinces
Earth and space systems			Canada, all provinces

* Differences in scores are statistically significant only when confidence intervals do not overlap. If the confidence intervals overlap, an additional test of significance was conducted to determine whether the difference was statistically significant. Results for the province of Quebec in this table should be treated with caution because of a possible non-response bias (see Appendix A for further details).

The mean performance of Canadian students in science has remained stable over time

PISA 2015 provides the fourth assessment of science since 2006 when the first full assessment of science took place. As a result, PISA 2015 enables countries and provincial education systems to compare their own performance over time between 2006 and 2015. This important information can inform educational policy and instructional practices.

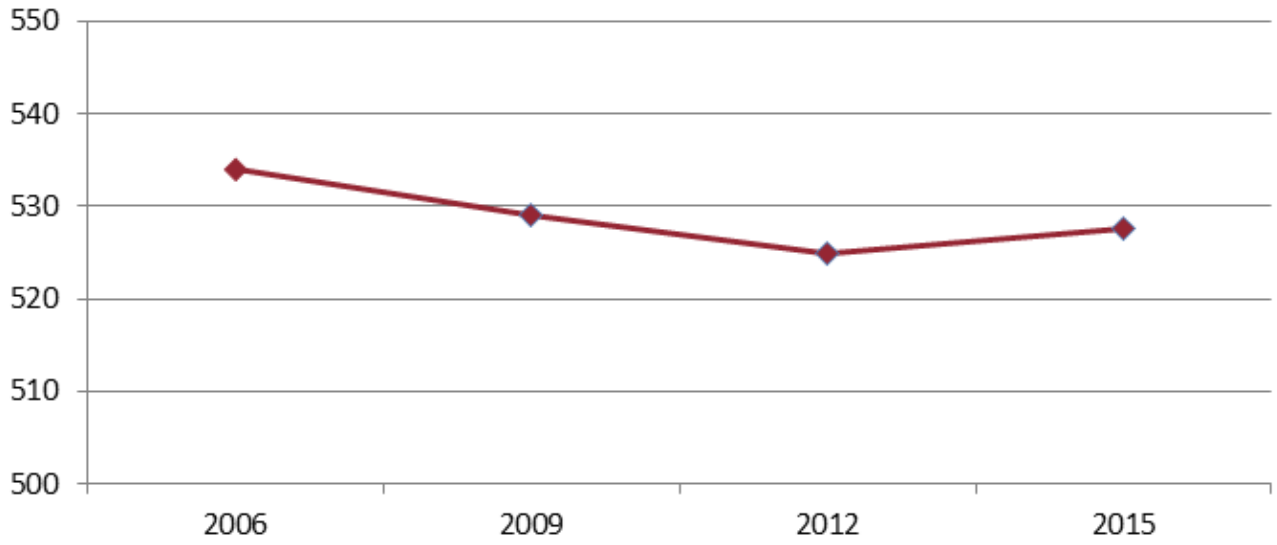
While this section looks at changes over time, performance differences should be interpreted with caution. It is possible to compare changes in student performance over time in each PISA domain because a number of common test questions are used in each survey. However, the limited number of such common test items used increases the chances of measurement error. To account for this, an extra error factor, known as the linking error, is introduced into the standard error. The standard errors with linking errors should be used whenever comparing performance across assessments (but not when comparing results across countries/economies or subpopulations within a particular assessment).[19] Consequently only those changes that are indicated as statistically significant should be considered.

In Canada, as well as across the OECD countries, science performance did not change between 2006 and 2015. However, there were changes in performance in some of the 57 countries that participated in both PISA 2006 and PISA 2015. In six countries (Qatar, Portugal, Macao–China, Romania, Norway, and Colombia) science performance improved on a statistically significant basis, while in 14 countries, science performance declined between the baseline year and 2015. No changes were observed in the remaining countries.

In 2006, Canada's average performance in science was at its highest with a score of 534 points: Canada ranked third, after Finland (563) and Hong Kong–China (542). Since then, Canadian results have remained very stable with average scores of 529, 525, and 528 points in 2009, 2012, and 2015 respectively (Figure 1.4). Although the lack of improvement is a cause for closer analysis, it is important to note that a significant change in science performance is observed only between 2006 and 2012. Compared to the baseline, there is no significant change between 2006 and 2009 or between 2006 and 2015.

Figure 1.4

PISA Canadian results over time, 2006–2015 science overall



Note: Difference compared with baseline (2006).

[19] See OECD, *PISA 2015 Results: Excellence and Equity in Education*, for information on linking errors.

Provincially, no significant change in science achievement was observed in most provinces, with the exception of Newfoundland and Labrador, Manitoba, and Saskatchewan where the average score decreased by approximately 20 points (Table 1.11 and Appendix B.1.16).

Table 1.11

Comparison of performance in science in PISA 2006–2015, Canada and the provinces

	2006		2009		2012		2015**	
	Average	Standard error	Average	Standard error	Average	Standard error	Average	Standard error
Newfoundland and Labrador	526	2.5	518	4.0	514*	5.0	506*	5.5
Prince Edward Island	509	2.7	495*	3.5	490*	4.4	515	7.0
Nova Scotia	520	2.5	523	3.7	516	4.6	517	6.3
New Brunswick	506	2.3	501	3.5	507	4.4	506	6.3
Quebec	531	4.2	524	4.1	516*	4.8	537	6.5
Ontario	537	4.2	531	4.2	527	5.6	524	6.0
Manitoba	523	3.2	506*	4.7	503*	4.8	499*	6.5
Saskatchewan	517	3.6	513	4.5	516	4.6	496*	5.5
Alberta	550	3.8	545	5.0	539	5.8	541	6.0
British Columbia	539	4.7	535	4.8	544	5.3	539	6.2
Canada	534	2.0	529	3.0	525*	4.0	528	4.9

* Significant difference compared with baseline (2006). The standard error of measurement includes a linking error to account for the comparison of results over time between the baseline (2006) and subsequent years.

** Results for the province of Quebec in this table should be treated with caution because of a possible non-response bias (see Appendix A for further details).

At the Canadian level, the proportion of low-performing (below Level 2) 15-year-old students remained stable in science between 2006 and 2015; however, the proportion of students achieving below Level 2 has increased in Newfoundland and Labrador and Manitoba. The proportion of students achieving Levels 5 and 6 also remained unchanged over the 2006–to–2015 period although provincially, the proportion decreased in Newfoundland and Labrador, Manitoba, and Saskatchewan (Appendix B.1.17).

With the exception of Newfoundland and Labrador where a gender gap in science achievement favoured girls in 2006, there have been no significant differences between girls and boys across Canada and in the other provinces over time in science (Appendix B.1.18)

Summary

Canada continues to perform well in science, with close to 90 per cent of Canadian students reaching the baseline level of science proficiency required to participate fully in modern society (Level 2) while almost one in ten students reached Levels 5 or 6. Globally, Canada ranked third among OECD countries and fourth among all participating countries and economies.

In spite of these strong results, PISA 2015 results in scientific literacy also suggest that there is cause for some concern. Almost one in ten Canadian students do not meet the benchmark level of science proficiency, a proportion which has not changed since the baseline year in 2006, and students in minority-language settings achieve lower results in science compared to their counterparts in majority-language settings.

Chapter 2

Canadian Students' Reading and Mathematics Performance in an International Context

This chapter presents the overall results of the PISA 2015 assessments in the minor domains of reading and mathematics. 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 2015. Next, it examines the performance of students enrolled in anglophone and francophone school systems for those provinces where the two groups were sampled sufficiently. This is followed by a comparison between the performance of boys and girls in Canada and the provinces. Changes over time are discussed.

Defining reading and mathematics

Since reading and mathematics were minor domains in PISA 2015, there were fewer assessment items in these two areas compared to the major domain of science. As a result, PISA 2015 allows for only an update on overall performance in reading and mathematics, and not on their sub-domains. Additionally, although paper-based assessments were provided for countries that chose not to test their students by computer, in Canada, computer was the primary mode of delivery for all domains in PISA 2015. Because the computer-based assessments of reading and mathematics were an optional domain in PISA 2012 and were not taken by all countries, they are not part of the reading and mathematical literacy trends.

With an emphasis on functional knowledge and skills that allow active participation in society, PISA defines reading and mathematics like this:[20]

- *Reading literacy* (hereafter referred to as reading) is an individual's capacity to understand, use, reflect on, and engage with written texts, to achieve one's goals, develop one's knowledge and potential, and participate in society.
- *Mathematical literacy* (hereafter referred to as mathematics) is 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.

As is the case for science, the scores for reading and mathematics 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 2003 for mathematics). Approximately two-thirds of the students in OECD countries scored between 400 and 600 (i.e., within one standard deviation of the average). Because participating countries and performance have changed over time, the OECD average scores for reading and mathematics in PISA 2015 differ slightly from 500.

[20] OECD, *PISA 2015 assessment and analytical framework: Science, reading, mathematic and financial literacy* (Paris: OECD 2016), available at http://dx.doi.org/10.1787/9789264255425-en.

Canadian students perform well in reading and mathematics 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 mathematics (Table 2.1 and Figures 2.1 and 2.2). Canadian students had an average score of 527 in reading and 516 in mathematics, well above the OECD average of 493 and 490, respectively. Table 2.1 shows the countries that performed significantly better than or the same as Canada in reading and mathematics. The averages of the students in all the remaining countries were significantly below those of Canada. Among the 72 countries that participated in PISA 2015, only one outperformed Canada in reading while six outperformed Canada in mathematics.

Table 2.1

Countries performing better than or as well as Canada in reading and mathematics

	Better than Canada*	As well as Canada*
Reading	Singapore	Hong Kong–China, Finland, Ireland
Mathematics	Singapore, Hong Kong–China, Macao–China, Chinese Taipei, Japan, BSJG–China	Korea, Switzerland, Estonia, the Netherlands, Denmark, Finland

* Differences in scores are statistically significant only when confidence intervals do not overlap. If the confidence intervals overlap, an additional test of significance was conducted to determine whether the difference was statistically significant.

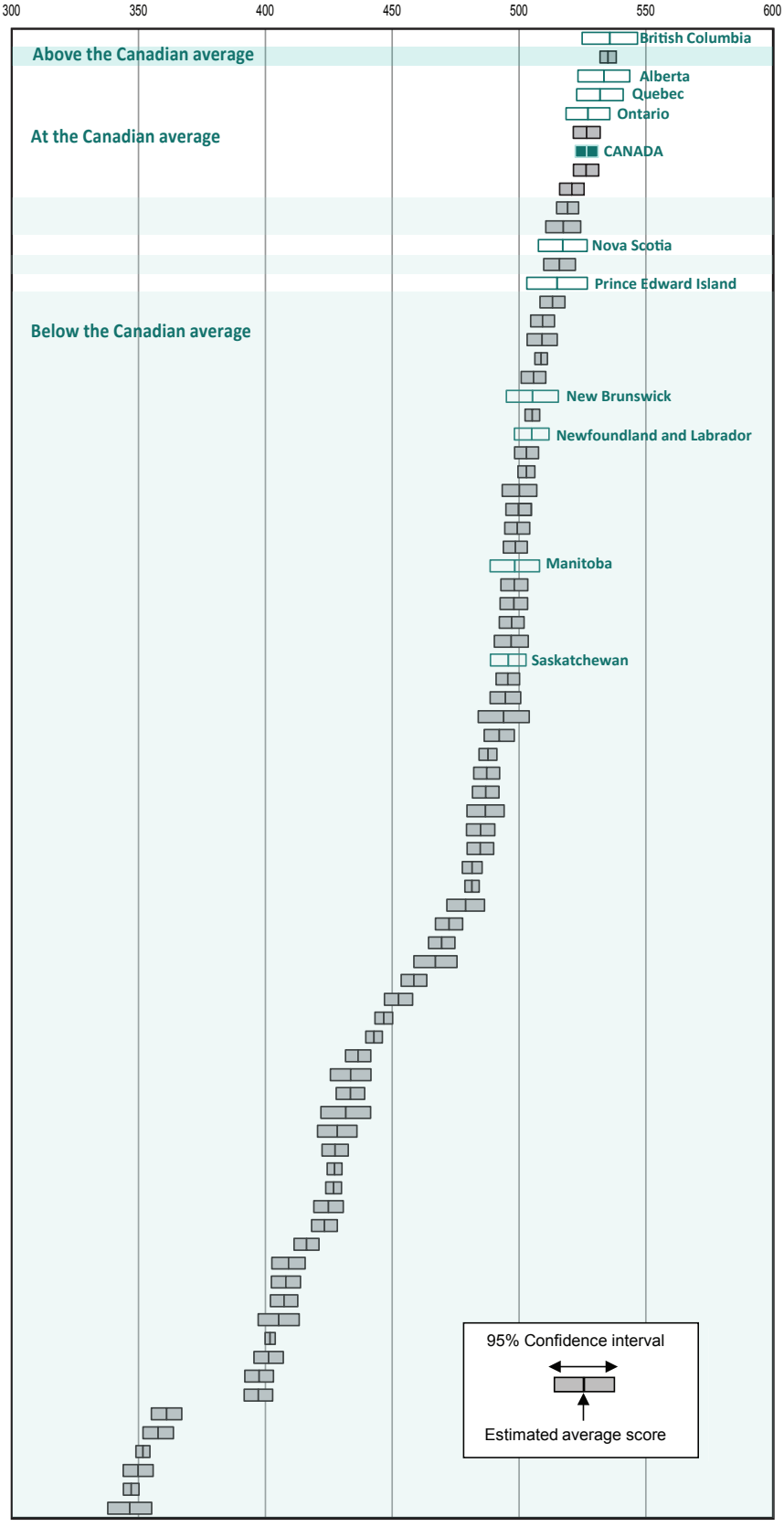
While average performance is useful in assessing the overall performance of students, it can mask significant variation within a jurisdiction. The gap that exists between students with the highest and those with the lowest levels of performance is an important indicator of the equity of educational outcomes.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

For Canada overall, those in the highest decile (90th percentile) scored 238 points higher in reading and 227 points higher in mathematics than those in the lowest decile (10th percentile). This compares to 249 points in reading and 232 points in mathematics across all OECD countries.

The amount of variation in performance within a country in reading and mathematics fluctuated widely (see Appendix tables B.2.3 and B.2.4). 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.

Figure 2.1

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

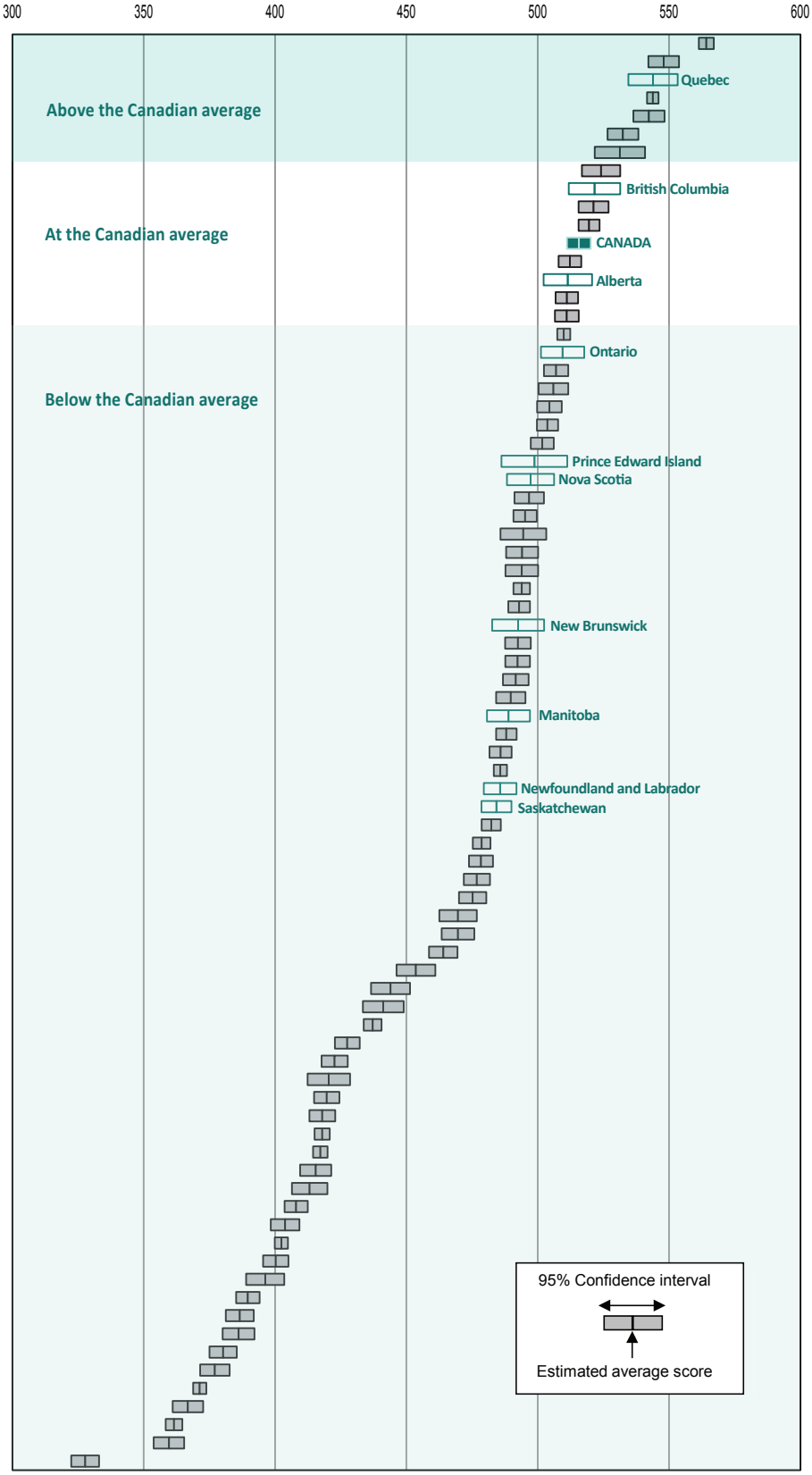


Countries and provinces	Average	S.E.
British Columbia	**536**	**(5.6)**
Singapore	535	(1.6)
Alberta	**533**	**(5.2)**
Quebec	**532**	**(4.7)**
Ontario	**527**	**(4.4)**
Hong Kong-China	527	(2.7)
CANADA	**527**	**(2.3)**
Finland	526	(2.5)
Ireland	521	(2.5)
Estonia	519	(2.2)
Korea	517	(3.5)
Nova Scotia	**517**	**(4.9)**
Japan	516	(3.2)
Prince Edward Island	**515**	**(6.1)**
Norway	513	(2.5)
New Zealand	509	(2.4)
Germany	509	(3.0)
Macao-China	509	(1.3)
Poland	506	(2.5)
New Brunswick	**505**	**(5.2)**
Slovenia	505	(1.5)
Newfoundland and Labrador	**505**	**(3.5)**
The Netherlands	503	(2.4)
Australia	503	(1.7)
Sweden	500	(3.5)
Denmark	500	(2.5)
France	499	(2.5)
Belgium	499	(2.4)
Manitoba	**498**	**(5.0)**
Portugal	498	(2.7)
United Kingdom	498	(2.8)
Chinese Taipei	497	(2.5)
United States	497	(3.4)
Saskatchewan	**496**	**(3.6)**
Spain	496	(2.4)
Russian Federation	495	(3.1)
BSJG-China	494	(5.1)
Switzerland	492	(3.0)
Latvia	488	(1.8)
Czech Republic	487	(2.6)
Croatia	487	(2.7)
Vietnam	487	(3.7)
Austria	485	(2.8)
Italy	485	(2.7)
Iceland	482	(2.0)
Luxembourg	481	(1.4)
Israel	479	(3.8)
Lithuania	472	(2.7)
Hungary	470	(2.7)
Greece	467	(4.3)
Chile	459	(2.6)
Slovak Republic	453	(2.8)
Malta	447	(1.8)
Cyprus	443	(1.7)
Uruguay	437	(2.5)
Romania	434	(4.1)
United Arab Emirates	434	(2.9)
Bulgaria	432	(5.0)
Turkey	428	(4.0)
Costa Rica	427	(2.6)
Trinidad and Tobago	427	(1.5)
Montenegro	427	(1.6)
Colombia	425	(2.9)
Mexico	423	(2.6)
Moldova	416	(2.5)
Thailand	409	(3.3)
Jordan	408	(2.9)
Brazil	407	(2.8)
Albania	405	(4.1)
Qatar	402	(1.0)
Georgia	401	(3.0)
Peru	398	(2.9)
Indonesia	397	(2.9)
Tunisia	361	(3.1)
Dominican Republic	358	(3.1)
Republic of Macedonia	352	(1.4)
Algeria	350	(3.0)
Kosovo	347	(1.6)
Lebanon	347	(4.4)

Notes: OECD countries appear in italics. The OECD average was 493, with a standard error of 0.5.
The results of Argentina, Kazakhstan, and Malaysia are excluded because of insufficient coverage to ensure comparability (see Appendix B.2.1 for these results). Results for the province of Quebec in this table should be treated with caution because of a possible non-response bias (see Appendix A for further details).

Figure 2.2

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



Countries and provinces	Average	S.E.
Singapore	564	(1.5)
Hong Kong-China	548	(3.0)
Quebec	**544**	**(4.8)**
Macao-China	544	(1.1)
Chinese Taipei	542	(3.0)
Japan	532	(3.0)
BSJG-China	531	(4.9)
Korea	524	(3.7)
British Columbia	**522**	**(5.0)**
Switzerland	521	(2.9)
Estonia	520	(2.0)
CANADA	**516**	**(2.3)**
The Netherlands	512	(2.2)
Alberta	**511**	**(4.7)**
Denmark	511	(2.2)
Finland	511	(2.3)
Slovenia	510	(1.3)
Ontario	**509**	**(4.2)**
Belgium	507	(2.4)
Germany	506	(2.9)
Poland	504	(2.4)
Ireland	504	(2.1)
Norway	502	(2.2)
Prince Edward Island	**499**	**(6.4)**
Nova Scotia	**497**	**(4.6)**
Austria	497	(2.9)
New Zealand	495	(2.3)
Vietnam	495	(4.5)
Russian Federation	494	(3.1)
Sweden	494	(3.2)
Australia	494	(1.6)
France	493	(2.1)
New Brunswick	**493**	**(5.1)**
United Kingdom	492	(2.5)
Czech Republic	492	(2.4)
Portugal	492	(2.5)
Italy	490	(2.8)
Manitoba	**489**	**(4.2)**
Iceland	488	(2.0)
Spain	486	(2.2)
Luxembourg	486	(1.3)
Newfoundland and Labrador	**486**	**(3.2)**
Saskatchewan	**484**	**(2.9)**
Latvia	482	(1.9)
Malta	479	(1.7)
Lithuania	478	(2.3)
Hungary	477	(2.5)
Slovak Republic	475	(2.7)
Israel	470	(3.6)
United States	470	(3.2)
Croatia	464	(2.8)
Greece	454	(3.8)
Romania	444	(3.8)
Bulgaria	441	(4.0)
Cyprus	437	(1.7)
United Arab Emirates	427	(2.4)
Chile	423	(2.5)
Turkey	420	(4.1)
Moldova	420	(2.5)
Uruguay	418	(2.5)
Montenegro	418	(1.5)
Trinidad and Tobago	417	(1.4)
Thailand	415	(3.0)
Albania	413	(3.4)
Mexico	408	(2.2)
Georgia	404	(2.8)
Qatar	402	(1.3)
Costa Rica	400	(2.5)
Lebanon	396	(3.7)
Colombia	390	(2.3)
Peru	387	(2.7)
Indonesia	386	(3.1)
Jordan	380	(2.7)
Brazil	377	(2.9)
Republic of Macedonia	371	(1.3)
Tunisia	367	(3.0)
Kosovo	362	(1.6)
Algeria	360	(3.0)
Dominican Republic	328	(2.7)

Notes: OECD countries appear in italics. The OECD average was 490, with a standard error of 0.4.
The results of Argentina, Kazakhstan, and Malaysia are excluded because of insufficient coverage to ensure comparability (see Appendix B.2.2 for these results).Results for the province of Quebec in this table should be treated with caution because of a possible non-response bias (see Appendix A for further details).

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

In reading, the performance of students in all provinces, was at or above the OECD average. In mathematics, students in Saskatchewan performed below the OECD average while students in all other provinces performed at or above the OECD average.

As Table 2.2 shows, students in Quebec performed above the Canadian average in mathematics and at the Canadian average in reading. Students in Alberta and British Columbia performed at the Canadian average in both minor domains. Students in Newfoundland and Labrador, New Brunswick, Manitoba, and Saskatchewan performed below the Canadian average in both minor domains. Students in Prince Edward Island, Nova Scotia, and Ontario performed below the Canadian average in mathematics and at the Canadian average in reading.

Table 2.2

Provincial results in reading and mathematics relative to the Canadian average

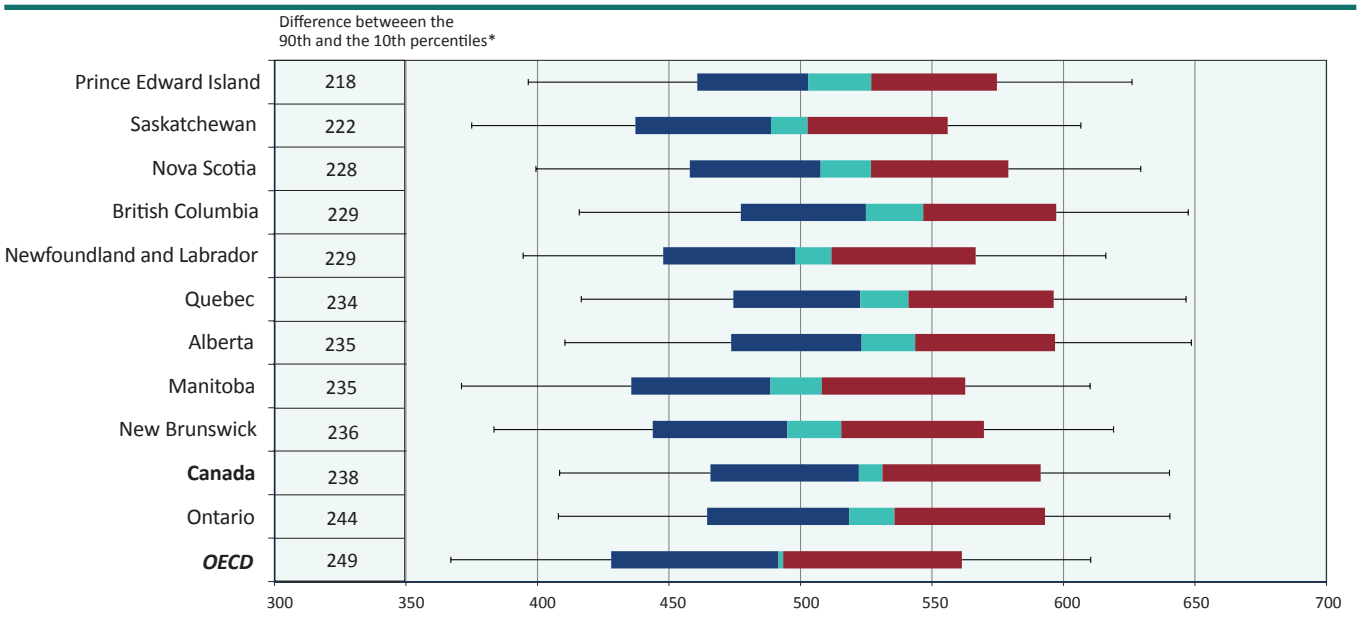
	Better than Canada*	As well as Canada*
Reading		Prince Edward Island, Nova Scotia, Quebec, Ontario, Alberta, British Columbia
Mathematics	Quebec	Alberta, British Columbia

* Differences in scores are statistically significant only when confidence intervals do not overlap. If the confidence intervals overlap, an additional test of significance was conducted to determine whether the difference was statistically significant. Results for the province of Quebec in this table should be treated with caution because of a possible non-response bias (see Appendix A for further details).

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 mathematics. For reading, differences range from 218 in Prince Edward Island to 244 in Ontario, while for mathematics, they ranged from 198 in Prince Edward Island to 227 in Quebec. In all provinces, the difference in performance between high achievers and low achievers was smaller than the OECD average. This indicates that Canada's education systems continue to achieve high degree of equity.

Figure 2.3

PISA 2015 Reading:
Difference between high and low achievers, Canada, provinces, and OECD

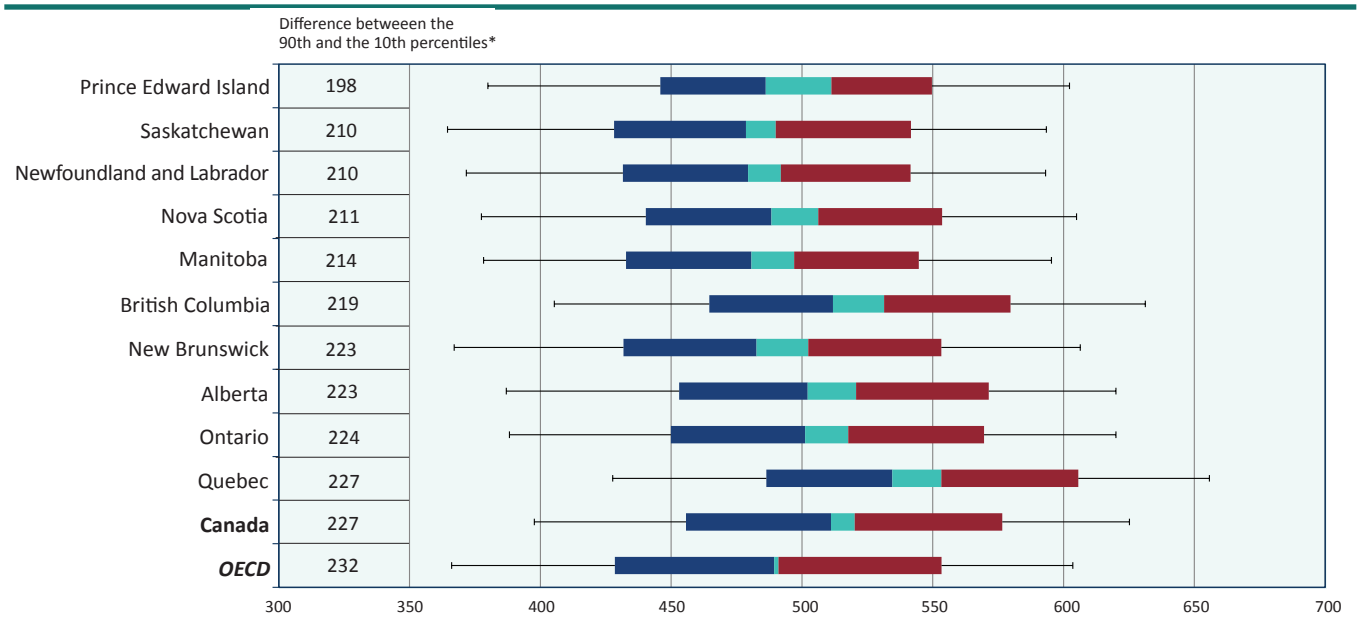


*Jurisdictions are ordered from the least to the most difference between the two groups.

Note: Results for the province of Quebec in this table should be treated with caution because of a possible non-response bias (see Appendix A for further details).

Figure 2.4

PISA 2015 Mathematics:
Difference between high and low achievers, Canada, provinces, and OECD



*Jurisdictions are ordered from the least to the most difference between the two groups.

Note: Results for the province of Quebec in this table should be treated with caution because of a possible non-response bias (see Appendix A for further details).

Across Canada, differences in reading and mathematics performance are seen between students attending majority-language school systems and those attending minority-language systems in reading and mathematics

Seven provinces had sufficiently large samples in the anglophone and francophone school systems (Nova Scotia, New Brunswick, Quebec, Ontario, Manitoba, Alberta, and British Columbia). The performance of the minority-language group (students in francophone school systems in Nova Scotia, New Brunswick, Ontario, Manitoba, Alberta, and British Columbia and students in the anglophone school system in Quebec) is compared to that of the majority-language group.

As Table 2.3 indicates, the relative performance of students in the two systems varied across provinces and by domain. Across Canada, the difference in reading performance between students in the anglophone school systems and those in the francophone school systems was not statistically significant. However, across the provinces, students in the majority-language school systems outperformed their peers in the minority-language school systems in four of the seven provinces. The differences between systems varied from 40 points in Manitoba to 57 points in Nova Scotia.

Table 2.3

Estimated average reading and mathematics 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	519	(5.1)	462	(7.6)	**57**	(9.2)
New Brunswick	509	(6.6)	493	(6.3)	16	(8.7)
Quebec	523	(6.0)	533	(5.3)	-10	(8.3)
Ontario	529	(4.5)	476	(5.0)	**54**	(6.4)
Manitoba	501	(5.3)	461	(8.1)	**40**	(9.6)
Alberta	534	(5.2)	487	(12.6)	**46**	(14.5)
British Columbia	536	(5.6)	516	(14.9)	20	(14.6)
Canada	527	(2.7)	526	(4.7)	1	(5.6)
Mathematics						
Nova Scotia	497	(4.7)	491	(8.3)	7	(8.7)
New Brunswick	488	(5.8)	505	(7.3)	**-17**	(8.5)
Quebec	505	(6.7)	549	(5.4)	**-44**	(9.0)
Ontario	510	(4.4)	496	(6.5)	14	(7.8)
Manitoba	489	(4.5)	482	(8.9)	8	(10.7)
Alberta	512	(4.7)	503	(12.4)	8	(12.8)
British Columbia	522	(5.0)	531	(16.0)	-9	(16.9)
Canada	509	(2.6)	542	(5.0)	**-34**	(5.5)

* Results in bold indicate a statistically significant difference between the two systems. A negative difference means that the result for the francophone school system is higher. The Canadian results include students from all provinces. Results for the province of Quebec in this table should be treated with caution because of a possible non-response bias (see Appendix A for further details).

In mathematics, Canadian students in the francophone school systems (542) outperformed their peers in the anglophone school systems (509) by 34 points, mainly as a result of the relatively strong performance of students in the francophone school system in Quebec. As Table 2.3 indicates, in only New Brunswick and Quebec did a statistically significant difference in mathematics performance exist between the two school systems. In both provinces, students from the francophone school system achieved a higher average in mathematics than their peers in the anglophone school system, although in Quebec, the francophone school system is a majority-language school system while in New Brunswick, it is a minority-language one.

Canadian girls outperformed boys in reading, while Canadian boys outperformed girls in mathematics

As was the case since PISA 2000, girls performed significantly better than boys in PISA 2015 on the reading test in all countries and in all provinces. On average across OECD countries, girls outperformed boys in reading by 27 points in PISA 2015, while in Canada, this difference was 26 points. At the provincial level, the gender gap favouring girls ranged from 18 points in Newfoundland and Labrador to 36 points in Prince Edward Island (Table 2.4, Appendix B.2.7).

In mathematics, on average across OECD countries, boys had a statistically significant higher score than girls, but the eight-point difference was small compared to the large gender gap in reading. In Canada, boys outperformed girls in mathematics by nine points. Across the provinces, a gender gap favouring boys was observed in Newfoundland and Labrador, Quebec, Ontario, Alberta, and British Columbia, with no significant gender differences in mathematics observed in the remaining provinces (Table 2.4, Appendix B.2.8).

Table 2.4

Summary of gender differences in average reading and mathematics scores for Canada and the provinces

	Girls performed significantly better* than boys	Boys performed significantly better* than girls	No significant differences between boys and girls
Reading	Canada, Newfoundland and Labrador, Prince Edward Island, Nova Scotia, New Brunswick, Quebec, Ontario, Manitoba, Saskatchewan, Alberta, British Columbia		
Mathematics		Canada, Newfoundland and Labrador, Quebec, Ontario, Alberta, British Columbia	Prince Edward Island, Nova Scotia, New Brunswick, Manitoba, Saskatchewan

* Differences in scores are statistically significant only when confidence intervals do not overlap. If the confidence intervals overlap, an additional test of significance was conducted to determine whether the difference was statistically significant. Results for the province of Quebec in this table should be treated with caution because of a possible non-response bias (see Appendix A for further details).

Canadian students' performance in reading remained relatively stable over time while performance in mathematics stabilized between 2012 and 2015

PISA 2015 is the sixth assessment of reading since 2000, when the first major assessment of reading took place, and the fifth assessment of mathematics since 2003, when the first major assessment of mathematics took place. Because a comprehensive analysis of trends in reading (between 2000 and 2012) and in mathematics (between 2003 and 2012) was included in the PISA 2012 national report,[21] this chapter focuses on changes in reading since 2009 and changes in mathematics since 2012 — the most recent cycles when reading and mathematics were major domains. Performance changes over time are always compared to a baseline year, an administration in which the subject was the major domain.

While this section looks at changes over time, performance differences should be interpreted with caution. It is possible to compare changes in student performance over time in each PISA domain because a number of common test questions are used in each survey. However, the limited number of such common test items used increases the chances of measurement error. To account for this, an extra error factor, known as the linking error, is introduced into the standard error. The standard errors with linking errors should be used whenever comparing performance across assessments (but not when comparing results across countries/economies or subpopulations within a particular assessment).[22] Only those changes that are indicated as statistically significant should be considered.

In Canada, as well as across the OECD countries, reading performance did not change between 2009 and 2015. However, there were changes in performance in some of the 59 countries that participated in both PISA 2009 and PISA 2015. In 19 countries[23] reading performance improved on a statistically significant basis, while in 11 countries[24] it declined, with the other countries maintaining their scores.

In mathematics, after a significant decline between 2003 and 2012, the performance of Canadian students in mathematics remained unchanged between 2012 and 2015. On average across OECD countries, mathematics performance also remained broadly stable over the 2012 to 2015 period, although changes in performance were observed in some of the 61 countries that participated in both cycles. Mathematics performance increased on a statistically significant basis in 10 countries[25] and decreased in 12,[26] with no statistically significant changes observed in the remaining countries.

Performance in reading and mathematics remained stable across the provinces with the following exceptions: reading performance improved in Prince Edward Island between 2009 and 2015 and mathematics performance improved in Prince Edward Island and decreased in Saskatchewan over the 2012-to-2015 period (Table 2.5).

[21] Brochu, P., Deussing, M.-P., Houme, K., & Chuy, M. (2013). *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*. Toronto: Council of Ministers of Education, Canada.
[22] See OECD, *PISA 2015 Results: Excellence and Equity in Education*, for information on linking errors.
[23] Albania, Austria, Colombia, Croatia, Estonia, Germany, Ireland, Luxembourg, Macao–China, Montenegro, Norway, Peru, Qatar, Russian Federation, Singapore, Slovenia, Spain, Trinidad and Tobago, and Uruguay.
[24] Australia, Greece, Hungary, Iceland, Korea, New Zealand, Slovak Republic, Thailand, Tunisia, Turkey, and United Arab Emirates (Dubai region only).
[25] Albania, Colombia, Denmark, Montenegro, Norway, Peru, Qatar, Russian Federation, Slovenia, and Sweden.
[26] Australia, Brazil, Chinese Taipei, Hong Kong–China, Korea, the Netherlands, Poland, Singapore, Tunisia, Turkey, United States, and Vietnam.

Table 2.5

Comparison of performance in reading in PISA 2009, 2012, and 2015, Canada and the provinces

	2009		2012		2015**	
	Average	Standard error	Average	Standard error	Average	Standard error
Reading						
Newfoundland and Labrador	506	(3.7)	503	(4.5)	505	(4.9)
Prince Edward Island	486	(2.4)	490	(3.7)	515*	(7.0)
Nova Scotia	516	(2.7)	508	(4.0)	517	(6.0)
New Brunswick	499	(2.5)	497	(3.7)	505	(6.3)
Quebec	522	(3.1)	520	(4.4)	532	(5.8)
Ontario	531	(3.0)	528	(5.1)	527	(5.6)
Manitoba	495	(3.6)	495	(4.2)	498	(6.0)
Saskatchewan	504	(3.3)	505	(3.8)	496	(4.9)
Alberta	533	(4.6)	525	(4.8)	533	(6.2)
British Columbia	525	(4.2)	535	(5.2)	536	(6.5)
Canada	524	(1.5)	523	(3.2)	527	(4.1)

* Significant difference compared with baseline (2009). The linkage error is incorporated into the standard error for 2012 and 2015 to account for the comparison of results over time, compared with baseline (2009).
** Results for the province of Quebec in this table should be treated with caution because of a possible non-response bias (see Appendix A for further details).

Table 2.6

Comparison of performance in mathematics in PISA 2012 and 2015, Canada and the provinces

	2012		2015**	
	Average	Standard error	Average	Standard error
Mathematics				
Newfoundland and Labrador	490	(3.7)	486	(4.8)
Prince Edward Island	479	(2.5)	499*	(7.3)
Nova Scotia	497	(4.1)	497	(5.8)
New Brunswick	502	(2.6)	493	(6.2)
Quebec	536	(3.4)	544	(5.9)
Ontario	514	(4.1)	509	(5.5)
Manitoba	492	(2.9)	489	(5.5)
Saskatchewan	506	(3.0)	484*	(4.6)
Alberta	517	(4.6)	511	(5.9)
British Columbia	522	(4.4)	522	(6.1)
Canada	518	(1.8)	516	(4.2)

* Significant difference compared with baseline (2012). The linkage error is incorporated into the standard error for 2015 to account for the comparison of results over time, compared with baseline (2012).
** Results for the province of Quebec in this table should be treated with caution because of a possible non-response bias (see Appendix A for further details).

Summary

Because reading and mathematics were minor domains in PISA 2015, a smaller proportion of students were assessed in them compared to the science assessment. Additionally, they made up a smaller number of items than in the science assessment. This chapter therefore provides an update on overall performance in each of these domains only, and not on their sub-domains as was done in previous years.

Canada continues to perform well internationally in reading and mathematics. Students in Canada scored well above the OECD average and were outperformed by students in only one country in reading and six in mathematics among the 72 countries that participated in PISA 2015. Among the provinces, students in Quebec, Ontario, Alberta, and British Columbia performed above the OECD average in both reading and mathematics. Students in Newfoundland and Labrador, Prince Edward Island, Nova Scotia, and New Brunswick performed above the OECD average in reading and at the average in mathematics. Students in Manitoba performed at the OECD average in reading and mathematics, while students in Saskatchewan performed at the average in reading and below the average in mathematics. Students in the anglophone, majority-language school systems in Nova Scotia, Ontario, Manitoba, and Alberta performed significantly better in reading than their peers in the francophone, minority-language school systems. In mathematics, students in the francophone school systems in Quebec and New Brunswick achieved a higher average score than their peers in the anglophone school systems. As was observed in past PISA assessments, girls continue to perform better than boys in reading. Boys performed better than girls in mathematics in Canada overall in half of the provinces; whereas there is no gender gap found in the other provinces.

Canada's overall mean performance in reading remained stable over the 2009 to 2015 period while at the same time its international standing among PISA participants improved. Among the countries that participated in both the 2009 and 2015 assessments, four countries outperformed Canada in 2009 while only one outperformed Canada in 2015. After seeing a decline in the mathematics performance of its students between 2003 and 2012, Canada's performance in mathematics remained stable between 2012 and 2015 and its relative standing improved among the countries that participated in both assessments, with five countries outperforming Canada in 2015 compared to eight in 2012.

Reading performance in all provinces except for Prince Edward Island remained stable since 2009. In Prince Edward Island, a significant improvement in reading performance was observed over the period. Consequently, Prince Edward Island went from performing below the OECD average in 2012 to performing above it in 2015. Only Prince Edward Island and Saskatchewan observed a change in the mathematics performance of their students since 2012. Saskatchewan experienced a significant decline in the mathematics performance of its students and consequently went from performing above the OECD average in 2012 to performing below the OECD average in 2015. On the other hand, Prince Edward Island had a significant increase in performance in mathematics and, as a result, went from performing below the OECD average in 2012 to performing at the OECD average in 2015.

Conclusion

The Program for International Student Assessment (PISA) is an international study that measures trends in learning outcomes in science, reading, and mathematics for students at age 15. The study has been conducted every three years under the aegis of the Organisation for Economic Cooperation and Development (OECD) since 2000. In 2015, it was administered in 72 countries and economies, including Canada. The major focus of PISA 2015 was science while reading, mathematics, and financial literacy were tested as minor domains. Over 20,000 students from approximately 900 schools took the PISA assessment in the 10 Canadian provinces in the spring of 2015.

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

Overview of results

Performance in science, reading, and mathematics

According to the results of PISA 2015, Canada remains one of the top-performing countries in science. Close to 90 per cent of Canadian students and 79 per cent of students in OECD countries performed at or above Level 2 in science, which is the baseline level of science proficiency required for people to take advantage of further learning opportunities and to participate fully in modern society. At the provincial level, the percentage of Canadian students at or above the baseline level of performance ranged from 83 per cent in Saskatchewan and Manitoba to over 90 per cent in Quebec, Alberta, and British Columbia. At the lower end of the PISA science scale, 11 per cent of Canadian students performed below the baseline compared with 21 per cent of students across the OECD countries.

Twelve per cent of Canadian students performed at the highest proficiency levels (Levels 5 and 6) in PISA 2015 compared to 8 per cent performing at this level for the OECD. The proportion of high-performing students was 10 per cent or more in Nova Scotia, Quebec, Ontario, Alberta, and British Columbia. However, in spite of Canada's strong performance in science, Singapore, the leading country in PISA 2015, had a much higher proportion of students performing at the highest levels (24 vs. 12%).

Overall, Canadian 15-year-old students achieved a mean score of 528 in overall science, 35 points above the OECD average, and were surpassed by students from only three countries. At the provincial level, with the exception of Manitoba and Saskatchewan which scored at the OECD average, all provinces performed above the OECD average. From a Canadian perspective, students in Quebec, Alberta, and British Columbia achieved higher average scores than the Canadian average, placing them among the top-performing participants globally.

Canadian results by scientific competency show some differences, with a higher average score in *explaining phenomena scientifically* and *evaluating and designing scientific enquiry* (530), and a lower score in *interpreting data and evidence scientifically* (525). Across OECD countries and economies, students scored 493 in all three competency subscales.

Canadian students achieved an average score of 528 in both the *content* and the *procedural and epistemic* knowledge subscales. The average score across OECD countries was 493 on both knowledge subscales.

At the Canadian level, there was no significant difference in student achievement across the three broad content areas assessed in PISA 2015 and the Canadian results were more than 30 points higher than the OECD averages in all three content subscales. The scores across OECD countries were also very similar in the three content areas.

Canada continues to perform well internationally in reading. Canadian students scored well above the OECD average and were outperformed by only one country in reading. At the provincial level, with the exception of Manitoba and Saskatchewan which scored at the OECD average, all provinces scored above the OECD average. Students in Prince Edward Island, Nova Scotia, Quebec, Ontario, Alberta, and British Columbia performed at the Canadian average in reading, whereas students in Newfoundland and Labrador, New Brunswick, Manitoba, and Saskatchewan performed below the Canadian average.

Canada also achieved a strong performance in mathematics. Canadian students scored well above the OECD average and were outperformed by only six countries in mathematics among the 72 countries that participated in PISA 2015. At the provincial level, Quebec students performed higher than the Canadian average while Alberta and British Columbia students performed at the Canadian average.

Performance by language of the school system

In 2015, there was no overall achievement difference in Canada between the anglophone and francophone school systems in science and reading. For those provinces where there was a significant difference in achievement between the two language systems in science and reading, students in majority-language settings (students in anglophone school systems in Nova Scotia, Ontario, Manitoba, and Alberta and students in the francophone school system in Quebec) performed better than their counterparts in the minority-language settings. The same pattern was found for most scientific competencies, knowledge, and content area subscales, with the exception that for Canada overall students in francophone schools achieved higher scores for the Earth and space systems subscale. For mathematics, Canadian students in francophone school systems performed better than their counterparts in the anglophone systems, with students in the francophone school systems in New Brunswick and Quebec outperforming those in the anglophone school systems. No significant differences were observed between the two school systems in the other provinces.

Performance by gender

No gender achievement gap for science was found in Canada or the provinces. This result is consistent with the most recent Pan-Canadian Assessment Program (PCAP) evaluation of science in 2013.[27]

As was the case internationally, Canadian girls continue to outperform boys in reading, and this was true in all provinces. In mathematics, boys continue to outperform girls in Canada overall and in Newfoundland and Labrador, Quebec, Ontario, Alberta, and British Columbia; no gender differences were found in other provinces.

Performance comparisons over time

For science, at the Canadian level and in most provinces, very few statistically significant differences were observed in the proportion of top-performing (Level 5 or above) and low-performing (below Level 2) 15-year-olds between the baseline year of 2006 and 2015. Science performance has not changed over the period in Canada although three provinces experienced significant declines. The average score decreased by approximately 20 points in Newfoundland and Labrador, Manitoba, and Saskatchewan.

[27] K. O'Grady, & K. Houme, *PCAP 2013 Report on the Pan-Canadian assessment of science, reading, and mathematics* (Toronto: Council of Ministers of Education, Canada, 2014). Available at http://www.cmec.ca/Publications/Lists/Publications/Attachments/337/PCAP-2013-Public-Report-EN.pdf

Between 2009 — the last time the major focus of PISA was reading — and 2015, reading performance in Canada and across most provinces remained stable. The only exception was Prince Edward Island which saw a significant improvement in its mean reading score. As well, after observing a decline in the mathematics performance of its students between the baseline year of 2003 and 2012, Canada's performance in mathematics remained stable between 2012 and 2015, with only two provinces experiencing a significant change. More specifically, students in Prince Edward Island saw a significant improvement in their mathematics performance between 2012 and 2015 while students in Saskatchewan saw a significant decline.

Equity in education

As a measure of equity in educational outcomes, PISA considers the difference between the average score of students at the 90th percentile and those at the 10th percentile. In all three domains assessed by PISA, the gap between high and low achievers was smaller in Canada than in OECD countries (indicating more equity). Provincially, Prince Edward Island and Saskatchewan show a relatively smaller gap in all three domains.

Final statement

The results of this assessment suggest that in Canada, a majority of students have attained a level of scientific literacy that enables them to use their knowledge and skills to engage with issues and ideas related to science.

The PISA 2015 results provide both affirmation and direction for Canadian jurisdictions and classrooms. While students appear to understand what is expected of them in science and appear to practise the key aspects when completing scientific tasks, there is room for improvement because there are numerous students below the baseline level (Level 2) for whom science remains a challenging subject.

Results from PISA 2015 provide an opportunity to confirm the success of our world-class education systems from a global perspective. Canada remains in the group of top-performing countries and achieves its standing with relatively equitable outcomes. The trend in decreasing average scores noted in past PISA cycles stabilized in 2015. However, results from PISA as well as other pan-Canadian and international assessments show that several provinces have experienced a decline in the skill levels of their youth over the past decade.

The comparative approach taken in this report does not lend itself to developing explanations for these changes. The report provides information for ministries and departments of education as well as for education partners to work together in validating current education policies, learning outcomes, teaching approaches and strategies, as well as resources to ensure that they continue meeting the needs of our society. Further analysis of the information collected through PISA will help readers gain a better understanding of the extent to which important background variables contribute to the differences in performance highlighted here. Reports on such secondary analysis will be available in forthcoming publications of *Assessment Matters!* (a series of articles available on the CMEC Web site).[28]

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

[28] *Assessment Matters!* is available at http://www.cmec.ca/131/Programs-and-Initiatives/Assessment/Overview/index.html

Appendix A

PISA 2015 sampling procedures, exclusion rates, 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 2015 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 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 42 students were then selected with equal probability. All 15-year-old students were selected if fewer than 42 were enrolled. 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 42 students were selected in some schools to meet sample-size requirements.

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. Tables A.1a and A.1b show the total number of excluded students by province who were then further described and classified into specific categories in accordance with the international standards. Students could be excluded based on three categories as determined by school staff: 1) students with a functional disability (i.e., the student has a moderate to severe permanent physical disability such that s/he cannot perform in the PISA testing situation); 2) students with an intellectual disability (the student has a mental or emotional disability and is cognitively delayed such that s/he cannot perform in the PISA testing situation); and 3) students with a limited proficiency in the assessment language (if the 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 6.9 per cent which is above the maximum exclusion rate of 5 per cent allowed by quality standards in PISA. The weighted student exclusion rate ranged from 3.8 per cent in Quebec to 14.3 per cent in Prince Edward Island. Across all provinces the vast majority of exclusions was a result of an intellectual disability (category 2 above). Compared with PISA 2012, the weighted student exclusion rates increased by more than 2 per cent in Prince Edward Island, Manitoba, Alberta, and British Columbia, and decreased by more than 2 per cent in Newfoundland and Labrador. Steps will be required in future PISA cycles to address the issue of high exclusion rates for schools and students in some provinces.

Table A.1a

PISA 2015 student exclusion rate

	Total number of eligible students sampled (participating, not participating, and excluded)		Total number of students excluded		Student exclusion rate	
Canada and provinces	**Unweighted***	**Weighted****	**Unweighted***	**Weighted****	**Unweighted***	**Weighted****
Newfoundland and Labrador	1,662	5,579	85	303	5.1	5.4
Prince Edward Island	543	1,625	80	233	14.7	14.3
Nova Scotia	2,014	9,594	153	754	7.6	7.9
New Brunswick	2,180	8,068	199	679	9.1	8.4
Quebec	5,734	72,433	145	2,743	2.5	3.8
Ontario	6,581	152,406	298	10,298	4.5	6.8
Manitoba	3,134	13,554	231	1,095	7.4	8.1
Saskatchewan	2,705	12,851	137	623	5.1	4.8
Alberta	3,312	42,814	200	3,366	6.0	7.9
British Columbia	2,944	47,475	302	5,247	10.3	11.1
Canada	**30,809**	**366,399**	**1,830**	**25,340**	**5.9**	**6.9**

* 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 2015 student exclusion rate by type of exclusion

	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****
Canada and provinces	**%**	**%**	**%**	**%**	**%**	**%**
Newfoundland and Labrador	0.3	0.6	4.5	4.4	0.4	0.5
Prince Edward Island	1.8	1.7	12.0	11.7	0.9	0.9
Nova Scotia	0.4	0.4	6.3	6.4	0.9	1.0
New Brunswick	1.4	0.9	7.5	7.4	0.2	0.2
Quebec	0.1	0.3	2.1	3.1	0.3	0.4
Ontario	0.3	0.3	3.4	5.2	0.9	1.2
Manitoba	0.4	0.5	5.0	5.0	2.0	2.6
Saskatchewan	0.4	0.3	3.5	3.5	1.2	1.0
Alberta	0.8	1.1	3.6	4.9	1.6	1.9
British Columbia	0.9	1.0	5.7	6.1	3.7	4.0
Canada	**0.5**	**0.5**	**4.2**	**4.9**	**1.2**	**1.5**

* 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.

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 per cent was required for schools initially selected. PISA 2015 also requires a minimum student participation rate of 80 per cent 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 1,010 schools were selected to participate in PISA 2015, and 703 of these initially selected schools participated. As such, the weighted school participation rate was 78.6 per cent for Canada which was slightly lower than the international standard.

Canada was required to complete a non-response bias analysis for school-response rate.

At the provincial level, school response rates after replacement ranged from 51.7 per cent in Quebec to 99.3 per cent in Prince Edward Island. Canada was required to conduct a non-response bias analysis to determine whether the data were of acceptable quality for inclusion in the PISA data set. Where the school response rates were below the international standard of 85 per cent, a non-response bias analysis was undertaken for Quebec, Ontario, and Alberta where weighted school response rates (after replacement) were 51.5, 81.9, and 80.4 per cent respectively.

The following measures related to school characteristics and student achievement were used for this analysis:

- In Quebec, these measures included school demographic data for all schools covered by PISA 2015 (type of funding of the school, language of the school, and size of the school), and average student-achievement scores for schools in science and reading.
- In Ontario, these measures included school demographic data for all schools covered by PISA 2015 (type of funding of the school, language of the school, and size of the school), and school success rate for a 2015 provincial assessment for schools selected for the PISA sample.
- In Alberta, these measures included school success rates for a provincial assessment covering the topics of math, reading, and science for all schools covered by PISA 2015 and demographic data for the full PISA sample.

Quebec non-response analysis revealed potential bias.

The results showed some differences by non-response in the percentage of English schools, the percentage of public schools, and the percentage of schools in each school size in Quebec.

Results from the average student-achievement scores for schools in science showed significant differences between non-responding schools for the adjusted estimates of the mean and the median (absolute differences are 2.15 and 2.81 per cent respectively), and the corresponding population parameters. There was no significant difference in reading.

Ontario non-response analysis revealed no potential bias.

In Ontario, absolute differences between the distribution of the population and the non-response adjusted sample were found for the results of the language of the school, for school funding type, and for school size. However, these differences are attributed to the sample design and weighting strategy, and not non-response bias. Likewise, the analysis using the success rate for the provincial assessment showed no difference between the non-response adjusted estimates and the population parameters.

Alberta non-response analysis revealed no potential bias.

In Alberta, differences between the distribution of the population and the non-response adjusted sample for the results of the language of the school and for school funding type were explained by small sample sizes for French and private schools. The differences found for the school size were attributed to the sample design and weighting strategy, and not non-response bias. In terms of the analysis using the success rate for the provincial assessment, very few statistically significant differences were observed between the non-response adjusted estimates and the population parameters estimates.

Non-response bias conclusion

Based on the non-response bias analysis, the PISA international consortium judged that the Canadian data overall were of suitable quality to be included fully in the PISA data sets without restrictions. However, the results from the province of Quebec are to be treated with caution because of a possible non-response bias, and should be annotated accordingly in all international regional analyses and national reporting.

At the student level, Canada's response rate after replacement was 80.8 per cent. Apart from Alberta and British Columbia, all provinces achieved a student response rate of 80 per cent or higher. Because Canada had undertaken a non-response bias analysis for schools, no additional analyses were required. The consortium deemed the Canadian and provincial data to be fully included in the PISA data sets.

Table A.2

PISA 2015 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	55	49	97.0	49	97.0	1,489	4,897	1,197	3,959	80.9
Prince Edward Island	21	18	99.3	18	99.3	448	1,323	392	1,164	88.0
Nova Scotia	59	53	98.6	54	98.7	1,758	8,505	1,414	6,882	80.9
New Brunswick	68	53	96.0	53	96.0	1,832	6,669	1,544	5,488	82.3
Quebec	180	78	40.3	93	51.7	3,543	35,531	2,885	28,941	81.5
Ontario	200	131	78.5	136	81.9	5,034	113,570	4,123	92,974	81.9
Manitoba	112	85	92.4	85	92.4	2,712	11,017	2,285	9,191	83.4
Saskatchewan	106	83	92.6	83	92.6	2,327	10,609	1,894	8,637	81.4
Alberta	114	80	80.4	80	80.4	2,558	30,495	1,973	23,559	77.3
British Columbia	95	73	89.9	75	92.3	2,425	37,770	1,897	29,678	78.6
Canada	**1,010**	**703**	**74.5**	**726**	**78.6**	**24,126**	**260,387**	**19,604**	**210,476**	**80.8**

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

Appendix B
PISA 2015 data tables

Table B.1.1

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

	Proficiency levels													
	Below Level 1		Level 1		Level 2		Level 3		Level 4		Level 5		Level 6	
Country, economy, or province	%	Standard error	%	Standard error	%	Standard error	%	Standard error	%	Standard error	%	Standard error	%	Standard error
Vietnam	0.2	(0.1)	5.7	(0.7)	25.3	(1.4)	36.6	(1.2)	23.9	(1.2)	7.1	(0.8)	1.2	(0.5)
Macao	1.2	(0.2)	6.9	(0.4)	20.6	(0.7)	34.2	(0.9)	28.0	(0.7)	8.3	(0.5)	0.9	(0.2)
Quebec	**1.4**	**(0.4)**	**7.0**	**(1.0)**	**18.0**	**(1.3)**	**30.8**	**(1.5)**	**29.9**	**(1.4)**	**11.0**	**(1.2)**	**1.8**	**(0.5)**
Alberta	**1.3**	**(0.3)**	**7.3**	**(0.9)**	**18.0**	**(1.4)**	**29.6**	**(1.6)**	**27.9**	**(1.6)**	**13.1**	**(1.3)**	**2.8**	**(0.5)**
British Columbia	**1.3**	**(0.4)**	**7.4**	**(1.2)**	**18.6**	**(1.4)**	**30.2**	**(1.7)**	**27.9**	**(1.6)**	**11.9**	**(1.4)**	**2.7**	**(0.5)**
Estonia	1.3	(0.2)	7.5	(0.6)	20.1	(0.7)	30.7	(0.9)	26.9	(0.9)	11.6	(0.7)	1.9	(0.3)
Hong Kong-China	1.6	(0.3)	7.8	(0.6)	19.7	(0.9)	36.1	(0.9)	27.4	(1.1)	6.9	(0.6)	0.4	(0.1)
Singapore	2.1	(0.2)	7.5	(0.5)	15.1	(0.5)	23.4	(0.6)	27.7	(0.7)	18.6	(0.7)	5.6	(0.4)
Japan	1.9	(0.3)	7.7	(0.6)	18.1	(0.8)	28.2	(0.9)	28.8	(0.9)	12.9	(0.8)	2.4	(0.4)
Canada	**2.0**	**(0.2)**	**9.1**	**(0.4)**	**20.2**	**(0.6)**	**30.3**	**(0.5)**	**26.1**	**(0.7)**	**10.4**	**(0.5)**	**2.0**	**(0.2)**
Prince Edward Island	**1.6**	**(0.8)**	**9.7**	**(2.0)**	**24.0**	**(2.9)**	**34.8**	**(3.4)**	**21.3**	**(3.2)**	**8.1**	**(1.9)**	**0.6**	**(0.7)**
Finland	2.6	(0.4)	8.9	(0.6)	19.1	(0.7)	29.2	(0.8)	26.0	(0.8)	11.9	(0.6)	2.4	(0.3)
Ontario	**2.3**	**(0.4)**	**10.0**	**(0.9)**	**20.7**	**(1.1)**	**30.0**	**(1.0)**	**25.0**	**(1.5)**	**10.0**	**(1.0)**	**2.0**	**(0.4)**
Chinese Taipei	3.0	(0.3)	9.4	(0.6)	18.1	(0.6)	27.0	(0.9)	27.1	(0.8)	12.7	(0.8)	2.7	(0.5)
Nova Scotia	**2.2**	**(0.7)**	**10.6**	**(1.3)**	**22.3**	**(1.3)**	**31.4**	**(1.8)**	**23.7**	**(2.0)**	**8.7**	**(1.0)**	**1.1**	**(0.4)**
Korea	3.3	(0.4)	11.1	(0.7)	21.7	(0.9)	29.2	(0.9)	24.0	(1.0)	9.2	(0.7)	1.4	(0.2)
Slovenia	3.1	(0.3)	11.9	(0.5)	23.3	(0.7)	29.1	(0.9)	22.1	(0.8)	9.1	(0.6)	1.5	(0.3)
Ireland	3.0	(0.4)	12.4	(0.8)	26.4	(0.9)	31.1	(0.9)	20.1	(0.8)	6.3	(0.4)	0.8	(0.2)
Newfoundland and Labrador	**3.0**	**(0.7)**	**12.5**	**(1.3)**	**24.1**	**(1.8)**	**31.1**	**(1.8)**	**21.5**	**(1.4)**	**7.0**	**(1.0)**	**0.7**	**(0.4)**
New Brunswick	**2.7**	**(0.8)**	**12.9**	**(1.6)**	**24.3**	**(1.7)**	**30.8**	**(2.2)**	**21.2**	**(1.6)**	**7.3**	**(1.0)**	**0.8**	**(0.3)**
Denmark	3.3	(0.3)	12.5	(0.7)	25.9	(0.9)	31.1	(1.1)	20.2	(0.8)	6.1	(0.5)	0.9	(0.2)
BSJG-China	4.4	(0.6)	11.8	(0.9)	20.7	(1.1)	25.8	(1.1)	23.8	(1.1)	11.5	(1.1)	2.1	(0.5)
Poland	2.9	(0.4)	13.3	(0.7)	26.6	(0.9)	29.9	(0.9)	19.9	(0.8)	6.3	(0.5)	1.0	(0.2)
Saskatchewan	**3.2**	**(0.7)**	**13.5**	**(1.2)**	**28.6**	**(1.5)**	**30.4**	**(1.6)**	**18.1**	**(1.2)**	**5.6**	**(0.7)**	**0.6**	**(0.3)**
Germany	4.2	(0.5)	12.8	(0.7)	22.7	(0.8)	27.7	(0.8)	22.0	(0.8)	8.8	(0.6)	1.8	(0.2)
Latvia	2.7	(0.3)	14.5	(0.7)	29.8	(0.8)	31.7	(0.8)	17.4	(0.8)	3.5	(0.4)	0.3	(0.1)
Portugal	3.4	(0.4)	14.0	(0.9)	25.4	(0.8)	28.8	(0.8)	21.0	(0.8)	6.7	(0.5)	0.7	(0.1)
United Kingdom	3.8	(0.3)	13.6	(0.7)	22.6	(0.7)	27.5	(0.7)	21.6	(0.7)	9.1	(0.6)	1.8	(0.2)
New Zealand	4.4	(0.3)	13.0	(0.8)	21.6	(0.8)	26.3	(0.8)	21.8	(0.8)	10.1	(0.6)	2.7	(0.4)
Manitoba	**3.6**	**(1.0)**	**13.9**	**(1.6)**	**25.1**	**(1.6)**	**30.8**	**(1.6)**	**19.5**	**(1.7)**	**6.3**	**(1.1)**	**0.8**	**(0.6)**
Australia	4.8	(0.3)	12.8	(0.5)	21.6	(0.5)	27.3	(0.5)	22.3	(0.5)	9.2	(0.4)	2.0	(0.2)
Russian Federation	3.0	(0.4)	15.2	(1.0)	31.2	(0.9)	30.9	(0.9)	16.0	(0.9)	3.5	(0.4)	0.2	(0.1)
Spain	4.0	(0.4)	14.3	(0.7)	26.5	(0.7)	31.3	(0.7)	18.9	(0.7)	4.7	(0.4)	0.3	(0.1)
Switzerland	4.5	(0.5)	13.9	(0.8)	22.8	(0.8)	26.3	(1.1)	22.7	(1.0)	8.6	(0.6)	1.1	(0.2)
The Netherlands	4.3	(0.5)	14.3	(0.7)	21.8	(0.9)	26.1	(0.9)	22.4	(0.8)	9.5	(0.5)	1.6	(0.2)
Norway	4.7	(0.4)	14.0	(0.7)	24.6	(0.8)	29.1	(0.8)	19.6	(0.8)	6.9	(0.5)	1.1	(0.2)
Belgium	5.4	(0.4)	14.4	(0.6)	21.9	(0.6)	26.8	(0.7)	22.5	(0.7)	8.0	(0.4)	1.0	(0.1)
United States	4.8	(0.5)	15.5	(0.8)	25.5	(0.8)	26.6	(0.9)	19.1	(0.9)	7.3	(0.6)	1.2	(0.2)
Czech Republic	4.6	(0.5)	16.1	(0.8)	25.9	(0.8)	27.7	(0.9)	18.4	(0.7)	6.3	(0.4)	0.9	(0.2)
Austria	5.0	(0.5)	15.8	(0.8)	23.9	(0.8)	28.1	(0.8)	19.5	(0.8)	6.8	(0.5)	0.9	(0.2)
Sweden	6.6	(0.6)	15.0	(0.9)	24.0	(0.9)	26.8	(0.9)	19.0	(0.9)	7.2	(0.6)	1.3	(0.2)
France	6.7	(0.6)	15.3	(0.6)	22.0	(0.9)	26.5	(0.8)	21.4	(0.8)	7.2	(0.5)	0.8	(0.1)
Italy	6.0	(0.6)	17.2	(0.8)	27.1	(0.9)	28.6	(1.0)	17.0	(0.7)	3.8	(0.4)	0.2	(0.1)

Table B.1.1 (cont'd)

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

	Proficiency levels													
	Below Level 1		Level 1		Level 2		Level 3		Level 4		Level 5		Level 6	
Country, economy, or province	%	Standard error	%	Standard error	%	Standard error	%	Standard error	%	Standard error	%	Standard error	%	Standard error
Croatia	5.5	(0.5)	19.2	(1.0)	29.5	(0.9)	27.5	(1.0)	14.4	(0.7)	3.6	(0.4)	0.4	(0.1)
Lithuania	5.9	(0.5)	18.9	(0.8)	29.7	(0.9)	26.3	(0.7)	15.1	(0.7)	3.9	(0.5)	0.3	(0.1)
Iceland	6.6	(0.5)	18.7	(0.9)	29.0	(1.0)	27.3	(0.9)	14.6	(0.8)	3.5	(0.4)	0.3	(0.1)
Luxembourg	6.9	(0.5)	18.9	(0.6)	24.8	(0.7)	25.1	(0.7)	17.3	(0.6)	6.0	(0.4)	0.9	(0.2)
Hungary	7.6	(0.7)	18.4	(0.9)	25.5	(0.8)	27.3	(0.9)	16.6	(0.8)	4.3	(0.4)	0.3	(0.1)
Kazakhstan	4.3	(0.6)	23.8	(1.3)	38.2	(1.2)	23.9	(1.3)	8.1	(0.9)	1.7	(0.5)	0.1	(0.1)
Slovak Republic	11.0	(0.9)	19.7	(0.8)	27.6	(0.8)	24.8	(0.7)	13.3	(0.6)	3.3	(0.3)	0.3	(0.1)
Israel	11.5	(0.9)	19.9	(0.9)	24.4	(0.8)	23.3	(1.0)	15.0	(0.8)	5.1	(0.5)	0.7	(0.1)
Malta	14.5	(0.6)	18.0	(0.9)	23.4	(0.8)	21.7	(0.9)	14.8	(0.9)	6.1	(0.4)	1.6	(0.3)
Greece	10.3	(1.1)	22.4	(1.1)	28.4	(1.1)	25.2	(1.1)	11.6	(0.9)	2.0	(0.3)	0.1	(0.1)
Malaysia	7.8	(0.8)	25.9	(1.2)	36.4	(1.0)	23.6	(1.1)	5.8	(0.6)	0.6	(0.2)	0.0	(0.0)
Chile	9.8	(0.6)	25.0	(0.9)	31.0	(1.0)	23.8	(0.9)	9.1	(0.7)	1.2	(0.2)	0.0	(0.0)
Bulgaria	15.1	(1.3)	22.8	(1.1)	25.2	(1.1)	22.6	(1.2)	11.4	(0.9)	2.7	(0.4)	0.2	(0.1)
Romania	10.2	(0.9)	28.4	(1.4)	35.0	(1.4)	19.9	(1.0)	5.9	(0.7)	0.7	(0.2)	0.0	(0.0)
Argentina	11.5	(0.9)	28.2	(1.0)	34.2	(1.0)	20.1	(1.1)	5.3	(0.5)	0.7	(0.2)	0.0	(0.0)
Uruguay	12.4	(0.8)	28.4	(0.9)	30.3	(0.8)	20.3	(0.8)	7.4	(0.5)	1.2	(0.2)	0.1	(0.0)
Albania	11.9	(0.9)	29.8	(1.2)	34.5	(1.0)	18.9	(1.3)	4.5	(0.6)	0.3	(0.1)	0.0	(0.0)
United Arab Emirates	15.6	(0.8)	26.1	(0.7)	26.9	(0.6)	19.0	(0.7)	9.5	(0.5)	2.5	(0.2)	0.2	(0.1)
Cyprus	15.3	(0.6)	26.9	(0.8)	28.6	(0.8)	19.6	(0.7)	8.1	(0.4)	1.5	(0.2)	0.1	(0.1)
Moldova	14.1	(0.8)	28.2	(0.8)	31.5	(1.2)	19.7	(0.9)	5.9	(0.6)	0.7	(0.1)	0.0	(0.0)
Turkey	12.9	(1.1)	31.6	(1.5)	31.3	(1.3)	19.1	(1.4)	4.8	(0.9)	0.3	(0.1)	0.0	(0.0)
Trinidad and Tobago	17.9	(0.7)	27.9	(0.9)	27.1	(0.8)	18.3	(0.7)	7.3	(0.5)	1.3	(0.2)	0.1	(0.1)
Costa Rica	10.8	(0.7)	35.6	(1.0)	35.5	(0.8)	15.2	(0.9)	2.7	(0.4)	0.1	(0.1)	0.0	(0.0)
Thailand	13.0	(0.8)	33.7	(1.1)	32.2	(0.9)	16.0	(0.8)	4.6	(0.6)	0.4	(0.2)	0.0	(0.0)
Mexico	12.8	(0.8)	35.0	(1.0)	34.7	(0.9)	15.1	(0.9)	2.3	(0.3)	0.1	(0.1)	0.0	(0.0)
Colombia	16.2	(1.0)	32.8	(0.9)	30.6	(0.9)	15.9	(0.7)	4.1	(0.4)	0.3	(0.1)	0.0	(0.0)
Jordan	19.4	(1.1)	30.4	(0.9)	30.9	(1.0)	16.1	(0.9)	3.1	(0.4)	0.2	(0.1)	0.0	(0.0)
Qatar	21.8	(0.5)	28.0	(0.6)	24.6	(0.5)	16.4	(0.5)	7.5	(0.3)	1.6	(0.1)	0.1	(0.0)
Georgia	20.3	(1.1)	30.5	(1.1)	28.2	(1.0)	15.2	(0.7)	4.9	(0.5)	0.8	(0.2)	0.1	(0.1)
Montenegro	18.9	(0.5)	32.1	(0.7)	29.0	(0.6)	15.1	(0.5)	4.4	(0.3)	0.5	(0.1)	0.0	(0.0)
Indonesia	15.6	(1.2)	40.4	(1.5)	31.7	(1.3)	10.6	(0.8)	1.6	(0.3)	0.1	(0.1)	0.0	(0.0)
Brazil	24.2	(0.8)	32.4	(0.6)	25.4	(0.6)	13.1	(0.6)	4.2	(0.4)	0.6	(0.1)	0.0	(0.0)
Peru	21.8	(1.0)	36.7	(1.0)	27.9	(1.0)	11.5	(0.7)	2.0	(0.3)	0.1	(0.1)	0.0	(0.0)
Lebanon	30.4	(1.6)	32.3	(1.2)	22.0	(1.2)	11.6	(0.9)	3.3	(0.4)	0.4	(0.1)	0.0	(0.0)
Republic of Macedonia	29.1	(0.8)	33.8	(0.9)	24.6	(0.7)	10.3	(0.5)	2.0	(0.3)	0.2	(0.1)	0.0	(0.0)
Tunisia	21.7	(1.2)	44.2	(1.1)	26.6	(1.1)	6.8	(0.6)	0.7	(0.3)	0.0	(0.0)	0.0	(0.0)
Kosovo	28.4	(1.1)	39.3	(1.1)	24.4	(1.0)	7.2	(0.7)	0.7	(0.2)	0.0	(0.0)	0.0	(0.0)
Algeria	28.0	(1.3)	42.8	(1.0)	22.7	(1.1)	5.6	(0.6)	0.9	(0.2)	0.0	(0.0)	0.0	(0.0)
Dominican Republic	55.4	(1.6)	30.4	(1.3)	11.3	(0.8)	2.6	(0.5)	0.3	(0.1)	0.0	(0.0)	0.0	(0.0)
OECD average	**5.5**	**(0.1)**	**15.7**	**(0.1)**	**24.8**	**(0.1)**	**27.2**	**(0.1)**	**19.0**	**(0.1)**	**6.7**	**(0.1)**	**1.1**	**(0.0)**

Note: Countries, economies, and provinces have been sorted in descending order by the total percentage of students who attained Level 2 or higher. BSJG-China represents Beijing, Shanghai, Jiangsu, and Guangdong. The coverage of Argentina, Kazakhstan, and Malaysia is too small to ensure comparability. See OECD, *PISA 2015 Results: Excellence and Equity in Education, Volume I* (Paris: OECD, 2016) for a note regarding Cyprus. Below Level 1 consists of students who scored at below Level 1 and Level 1b. Level 1 refers to Level 1a.

Table B.1.2

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
Singapore	556	(1.2)	553	558
Alberta	**541**	**(4.0)**	**533**	**549**
British Columbia	**539**	**(4.3)**	**530**	**547**
Japan	538	(3.0)	533	544
Quebec	**537**	**(4.7)**	**528**	**546**
Estonia	534	(2.1)	530	538
Chinese Taipei	532	(2.7)	527	538
Finland	531	(2.4)	526	535
Macao-China	529	(1.1)	526	531
Canada	**528**	**(2.1)**	**524**	**532**
Vietnam	525	(3.9)	517	532
Ontario	**524**	**(3.9)**	**516**	**532**
Hong Kong-China	523	(2.5)	518	528
BSJG-China	518	(4.6)	509	527
Nova Scotia	**517**	**(4.5)**	**508**	**526**
Korea	516	(3.1)	510	522
Prince Edward Island	**515**	**(5.4)**	**504**	**525**
New Zealand	513	(2.4)	509	518
Slovenia	513	(1.3)	510	515
Australia	510	(1.5)	507	513
United Kingdom	509	(2.6)	504	514
Germany	509	(2.7)	504	514
The Netherlands	509	(2.3)	504	513
New Brunswick	**506**	**(4.5)**	**498**	**515**
Newfoundland and Labrador	**506**	**(3.2)**	**500**	**512**
Switzerland	506	(2.9)	500	511
Ireland	503	(2.4)	498	507
Belgium	502	(2.3)	498	506
Denmark	502	(2.4)	497	507
Poland	501	(2.5)	497	506
Portugal	501	(2.4)	496	506
Manitoba	**499**	**(4.7)**	**490**	**509**
Norway	498	(2.3)	494	503
United States	496	(3.2)	490	502
Saskatchewan	**496**	**(3.1)**	**490**	**502**
Austria	495	(2.4)	490	500
France	495	(2.1)	491	499
Sweden	493	(3.6)	486	500
Czech Republic	493	(2.3)	488	497
Spain	493	(2.1)	489	497
Latvia	490	(1.6)	487	493
Russian Federation	487	(2.9)	481	492
Luxembourg	483	(1.1)	481	485
Italy	481	(2.5)	476	485
Hungary	477	(2.4)	472	481
Lithuania	475	(2.7)	470	481
Croatia	475	(2.5)	471	480
Iceland	473	(1.7)	470	477
Israel	467	(3.4)	460	473
Malta	465	(1.6)	462	468
Slovak Republic	461	(2.6)	456	466
Kazakhstan	456	(3.7)	449	464
Greece	455	(3.9)	447	463
Chile	447	(2.4)	442	452
Bulgaria	446	(4.4)	437	454
Malaysia	443	(3.0)	437	449
United Arab Emirates	437	(2.4)	432	441
Uruguay	435	(2.2)	431	440
Romania	435	(3.2)	429	441
Cyprus	433	(1.4)	430	435
Argentina	432	(2.9)	427	438
Moldova	428	(2.0)	424	432
Albania	427	(3.3)	421	434
Turkey	425	(3.9)	418	433
Trinidad and Tobago	425	(1.4)	422	427
Thailand	421	(2.8)	416	427
Costa Rica	420	(2.1)	416	424
Qatar	418	(1.0)	416	420
Colombia	416	(2.4)	411	420
Mexico	416	(2.1)	412	420
Montenegro	411	(1.0)	409	413
Georgia	411	(2.4)	406	416
Jordan	409	(2.7)	403	414
Indonesia	403	(2.6)	398	408
Brazil	401	(2.3)	396	405
Peru	397	(2.4)	392	401
Lebanon	386	(3.4)	380	393
Tunisia	386	(2.1)	382	391
Republic of Macedonia	384	(1.2)	381	386
Kosovo	378	(1.7)	375	382
Algeria	376	(2.6)	371	381
Dominican Republic	332	(2.6)	327	337

Note : The OECD average was 493, with a standard error of 0.4. Countries, economies, and provinces have been sorted in descending order by average score. BSJG-China represents Beijing, Shanghai, Jiangsu, and Guangdong. The coverage of Argentina, Kazakhstan, and Malaysia is too small to ensure comparability. See OECD, *PISA 2015 Results* for a note regarding Cyprus.

Table B.1.3

Estimated average scores and confidence intervals for Canada and the provinces: SCIENCE BY COMPETENCY SUBSCALES

	Canada and provinces	Average	Standard error	Confidence interval – 95% lower limit	Confidence interval – 95% upper limit
Explain phenomena scientifically					
	Canada	**530**	**(2.1)**	**526**	**534**
	Newfoundland and Labrador	509	(3.5)	502	516
	Prince Edward Island	516	(5.6)	505	527
	Nova Scotia	519	(4.9)	509	528
	New Brunswick	509	(4.5)	500	518
	Quebec	537	(5.2)	527	547
	Ontario	525	(3.8)	518	533
	Manitoba	504	(5.0)	494	514
	Saskatchewan	501	(3.3)	494	508
	Alberta	547	(4.6)	538	556
	British Columbia	542	(4.5)	533	550
	Note: The OECD average was 493, with a standard error of 0.5.				
Evaluate and design scientific enquiry					
	Canada	**530**	**(2.7)**	**524**	**535**
	Newfoundland and Labrador	506	(4.0)	498	514
	Prince Edward Island	515	(7.0)	502	529
	Nova Scotia	516	(6.1)	504	528
	New Brunswick	508	(5.6)	497	519
	Quebec	542	(5.5)	532	553
	Ontario	527	(5.0)	517	537
	Manitoba	498	(5.5)	487	509
	Saskatchewan	495	(3.9)	488	503
	Alberta	540	(4.9)	530	549
	British Columbia	537	(5.8)	526	549
	Note: The OECD average was 493, with a standard error of 0.5.				
Interpret data and evidence scientifically					
	Canada	**525**	**(2.7)**	**520**	**530**
	Newfoundland and Labrador	501	(3.5)	494	508
	Prince Edward Island	512	(6.1)	500	524
	Nova Scotia	514	(5.5)	503	525
	New Brunswick	503	(5.3)	493	513
	Quebec	536	(5.3)	525	546
	Ontario	521	(4.8)	512	530
	Manitoba	498	(4.7)	488	507
	Saskatchewan	491	(3.4)	485	498
	Alberta	537	(4.7)	527	546
	British Columbia	536	(5.8)	525	547
	Note: The OECD average was 493, with a standard error of 0.5.				

Table B.1.4

Estimated average scores and confidence intervals for Canada and the provinces: SCIENCE BY KNOWLEDGE SUBSCALES

	Canada and provinces	Average	Standard error	Confidence interval – 95% lower limit	Confidence interval – 95% upper limit
Content					
	Canada	**528**	**(2.2)**	**524**	**533**
	Newfoundland and Labrador	507	(3.4)	501	514
	Prince Edward Island	517	(6.7)	504	530
	Nova Scotia	517	(4.5)	509	526
	New Brunswick	508	(5.2)	498	518
	Quebec	537	(5.1)	527	546
	Ontario	523	(4.0)	516	531
	Manitoba	502	(4.7)	493	511
	Saskatchewan	499	(3.4)	492	505
	Alberta	545	(4.3)	537	554
	British Columbia	540	(4.4)	532	549
	Note: The OECD average was 493, with a standard error of 0.5.				
Procedural and epistemic					
	Canada	**528**	**(2.4)**	**523**	**532**
	Newfoundland and Labrador	504	(3.4)	498	511
	Prince Edward Island	514	(5.6)	503	525
	Nova Scotia	515	(4.9)	505	524
	New Brunswick	505	(5.0)	495	515
	Quebec	538	(5.1)	528	548
	Ontario	525	(4.4)	517	534
	Manitoba	498	(4.7)	489	507
	Saskatchewan	493	(3.3)	487	500
	Alberta	538	(4.5)	529	547
	British Columbia	537	(4.7)	528	547
	Note: The OECD average was 493, with a standard error of 0.4.				

Table B.1.5

Estimated average scores and confidence intervals for Canada and the provinces: SCIENCE BY CONTENT SUBSCALES

	Canada and provinces	Average	Standard error	Confidence interval – 95% lower limit	Confidence interval – 95% upper limit
Physical systems					
	Canada	**527**	**(2.4)**	**523**	**532**
	Newfoundland and Labrador	506	(4.6)	497	516
	Prince Edward Island	518	(6.3)	505	530
	Nova Scotia	517	(5.3)	507	527
	New Brunswick	505	(5.0)	495	515
	Quebec	537	(5.2)	526	547
	Ontario	524	(4.3)	515	532
	Manitoba	502	(5.0)	493	512
	Saskatchewan	498	(4.2)	489	506
	Alberta	543	(4.9)	533	553
	British Columbia	534	(5.2)	524	545
	Note: The OECD average was 493, with a standard error of 0.5.				
Living systems					
	Canada	**528**	**(2.4)**	**523**	**532**
	Newfoundland and Labrador	505	(3.6)	498	512
	Prince Edward Island	516	(6.0)	504	527
	Nova Scotia	518	(4.8)	509	528
	New Brunswick	507	(5.2)	497	517
	Quebec	535	(5.0)	525	545
	Ontario	525	(4.5)	516	533
	Manitoba	497	(4.8)	488	507
	Saskatchewan	493	(3.5)	486	500
	Alberta	539	(4.7)	530	548
	British Columbia	543	(4.9)	533	552
	Note: The OECD average was 492, with a standard error of 0.5.				
Earth and space systems					
	Canada	**529**	**(2.5)**	**524**	**534**
	Newfoundland and Labrador	503	(4.0)	495	511
	Prince Edward Island	516	(5.7)	505	528
	Nova Scotia	515	(5.1)	505	525
	New Brunswick	508	(5.6)	497	519
	Quebec	542	(5.4)	532	553
	Ontario	525	(4.3)	516	533
	Manitoba	500	(5.0)	491	510
	Saskatchewan	498	(4.1)	490	506
	Alberta	542	(5.2)	532	553
	British Columbia	538	(6.1)	526	550
	Note: The OECD average was 494, with a standard error of 0.5.				

Table B.1.6

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	
Tunisia	287	(3.1)	306	(2.6)	341	(2.2)	428	(2.5)	472	(3.8)	500	(5.3)	166
Algeria	268	(3.4)	291	(3.3)	329	(2.5)	419	(3.2)	465	(4.5)	496	(6.1)	174
Indonesia	296	(4.1)	319	(3.2)	356	(2.9)	447	(3.3)	493	(3.9)	522	(4.9)	175
Costa Rica	310	(2.6)	332	(2.3)	370	(2.3)	466	(2.8)	514	(3.3)	541	(3.7)	182
Mexico	301	(3.2)	325	(2.5)	366	(2.2)	464	(2.8)	510	(3.1)	535	(3.4)	185
Dominican Republic	224	(3.0)	244	(2.7)	281	(2.5)	376	(3.3)	429	(4.9)	461	(6.3)	185
Kosovo	266	(3.3)	289	(2.2)	328	(2.2)	426	(2.2)	474	(3.7)	501	(4.3)	185
Kazakhstan	340	(4.2)	363	(3.3)	403	(3.2)	505	(4.6)	558	(6.9)	590	(8.7)	195
Vietnam	404	(4.7)	428	(4.1)	470	(4.3)	576	(4.5)	624	(6.6)	655	(8.3)	196
Malaysia	320	(3.7)	345	(3.5)	389	(3.4)	496	(3.4)	541	(3.9)	568	(5.0)	196
Peru	278	(3.2)	301	(2.6)	342	(2.4)	448	(3.3)	500	(3.9)	529	(4.7)	198
Albania	301	(3.8)	328	(3.2)	373	(3.2)	481	(4.8)	530	(5.0)	558	(4.7)	202
Thailand	301	(2.7)	324	(2.9)	365	(2.6)	473	(3.6)	528	(4.9)	559	(6.0)	203
Romania	309	(4.2)	334	(3.8)	379	(3.6)	488	(4.1)	539	(5.1)	570	(5.4)	205
Turkey	301	(3.8)	325	(3.5)	368	(3.7)	482	(5.5)	532	(6.1)	560	(5.7)	207
Argentina	303	(4.1)	329	(3.5)	376	(3.4)	487	(3.4)	536	(3.7)	567	(4.1)	207
Colombia	291	(3.9)	315	(3.1)	357	(2.8)	471	(2.9)	524	(3.4)	554	(3.5)	208
Hong Kong-China	379	(5.5)	413	(4.5)	473	(3.5)	579	(2.6)	622	(2.7)	646	(3.2)	209
Macao-China	389	(3.6)	420	(2.3)	474	(1.7)	586	(1.8)	630	(2.0)	656	(3.2)	210
Latvia	355	(3.3)	382	(3.0)	432	(2.4)	548	(2.0)	596	(2.2)	623	(3.3)	214
Russian Federation	352	(4.1)	379	(3.8)	428	(3.4)	544	(3.3)	595	(3.5)	623	(3.7)	215
Jordan	268	(5.2)	299	(3.8)	351	(3.4)	468	(3.0)	517	(3.4)	544	(3.5)	217
Republic of Macedonia	248	(3.2)	277	(3.0)	325	(1.9)	440	(2.1)	496	(2.7)	528	(4.1)	219
Montenegro	277	(2.8)	304	(2.1)	352	(1.5)	468	(1.9)	526	(2.9)	558	(3.1)	221
Moldova	290	(4.0)	318	(3.0)	367	(2.6)	488	(2.9)	541	(3.1)	570	(3.8)	223
Prince Edward Island	**370**	**(15.7)**	**404**	**(10.3)**	**459**	**(7.6)**	**571**	**(8.7)**	**627**	**(13.1)**	**654**	**(10.2)**	**223**
Chile	308	(3.1)	336	(2.7)	385	(3.0)	509	(3.2)	560	(3.3)	589	(3.4)	225
Uruguay	301	(2.8)	326	(2.6)	372	(2.4)	496	(3.0)	552	(3.6)	583	(4.2)	226
Quebec	**383**	**(6.9)**	**419**	**(7.0)**	**479**	**(6.5)**	**598**	**(5.6)**	**645**	**(5.8)**	**673**	**(6.7)**	**226**
Saskatchewan	**352**	**(6.9)**	**383**	**(5.2)**	**435**	**(4.7)**	**557**	**(4.2)**	**611**	**(4.4)**	**643**	**(6.0)**	**229**
Ireland	356	(5.0)	387	(3.9)	441	(3.2)	565	(2.5)	618	(2.5)	648	(3.2)	231
Spain	344	(4.0)	374	(3.5)	432	(2.9)	556	(2.4)	605	(2.4)	633	(2.9)	231
Brazil	265	(2.4)	291	(2.1)	337	(1.9)	460	(3.3)	522	(4.1)	558	(4.6)	231
Estonia	384	(4.3)	416	(3.3)	473	(2.7)	597	(2.7)	648	(2.9)	677	(3.7)	233
Croatia	332	(3.5)	360	(3.3)	411	(3.4)	538	(2.8)	593	(3.3)	624	(3.9)	233
Georgia	267	(3.8)	297	(3.7)	348	(3.0)	471	(3.1)	531	(3.9)	566	(4.5)	233
Denmark	351	(3.8)	383	(3.6)	440	(3.1)	565	(2.8)	617	(3.2)	648	(4.0)	234
Lebanon	249	(4.6)	276	(3.9)	322	(3.6)	446	(5.1)	511	(4.9)	545	(5.2)	235
Poland	354	(4.3)	384	(3.4)	437	(2.9)	565	(3.1)	619	(3.5)	650	(4.0)	235
Nova Scotia	**366**	**(9.6)**	**397**	**(7.2)**	**455**	**(6.5)**	**580**	**(5.0)**	**632**	**(6.7)**	**662**	**(6.4)**	**235**
British Columbia	**381**	**(6.9)**	**417**	**(7.6)**	**478**	**(5.3)**	**601**	**(5.1)**	**654**	**(5.8)**	**686**	**(6.9)**	**237**
New Brunswick	**355**	**(9.5)**	**387**	**(9.4)**	**443**	**(7.2)**	**571**	**(5.4)**	**623**	**(5.8)**	**652**	**(6.7)**	**237**
Alberta	**384**	**(6.2)**	**419**	**(5.7)**	**479**	**(5.7)**	**605**	**(4.5)**	**657**	**(5.1)**	**685**	**(4.9)**	**238**

Table B.1.6 (cont'd)

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	
Iceland	324	(3.5)	354	(3.1)	408	(2.9)	538	(2.3)	593	(3.3)	622	(3.9)	238
Manitoba	**347**	**(8.9)**	**379**	**(6.5)**	**435**	**(6.2)**	**564**	**(6.0)**	**619**	**(7.1)**	**647**	**(7.7)**	**239**
Lithuania	329	(3.2)	357	(3.8)	410	(2.9)	540	(3.3)	597	(3.7)	626	(4.3)	240
Italy	328	(4.1)	359	(3.8)	415	(3.2)	547	(2.8)	599	(2.8)	626	(3.3)	240
Newfoundland and Labrador	**352**	**(7.4)**	**382**	**(6.8)**	**444**	**(5.3)**	**571**	**(4.6)**	**622**	**(4.8)**	**651**	**(6.9)**	**240**
Canada	**369**	**(3.3)**	**404**	**(2.9)**	**465**	**(2.5)**	**593**	**(2.2)**	**644**	**(2.6)**	**674**	**(2.7)**	**240**
Portugal	349	(3.8)	379	(3.2)	435	(3.4)	568	(2.7)	620	(3.1)	649	(3.1)	241
Greece	305	(5.7)	333	(5.6)	388	(5.2)	522	(3.8)	575	(4.1)	604	(4.5)	241
Cyprus	286	(2.9)	314	(2.4)	365	(2.1)	497	(2.2)	557	(2.8)	590	(4.1)	243
Japan	375	(5.3)	412	(4.4)	475	(3.9)	605	(3.2)	655	(4.0)	683	(4.7)	243
Trinidad and Tobago	279	(4.0)	306	(3.5)	356	(1.9)	491	(2.1)	551	(3.3)	585	(3.7)	244
Ontario	**364**	**(5.8)**	**398**	**(5.1)**	**460**	**(4.8)**	**591**	**(4.3)**	**643**	**(5.1)**	**674**	**(5.3)**	**246**
Korea	352	(4.7)	388	(4.5)	451	(3.8)	584	(3.3)	636	(3.7)	665	(3.9)	248
Finland	364	(4.6)	402	(4.2)	466	(3.5)	599	(2.5)	651	(2.7)	681	(3.5)	250
Slovenia	354	(3.1)	386	(2.6)	445	(2.1)	581	(2.1)	636	(3.0)	667	(3.6)	250
Czech Republic	338	(4.1)	367	(3.7)	424	(3.4)	561	(2.5)	618	(3.1)	650	(3.8)	251
Norway	338	(3.8)	370	(3.3)	432	(3.0)	566	(2.9)	622	(3.3)	655	(3.9)	251
Hungary	319	(4.0)	347	(4.1)	406	(3.5)	547	(3.0)	601	(3.5)	630	(3.7)	254
Austria	335	(3.8)	365	(3.4)	424	(3.6)	565	(2.8)	621	(3.0)	652	(3.6)	256
United States	336	(4.1)	368	(3.9)	425	(3.7)	567	(3.9)	626	(3.9)	658	(4.9)	258
Qatar	268	(1.9)	295	(1.8)	344	(1.3)	486	(2.1)	554	(1.9)	589	(2.4)	259
Slovak Republic	296	(5.3)	329	(4.6)	391	(3.6)	532	(2.8)	588	(3.2)	621	(3.7)	259
United Arab Emirates	284	(3.3)	312	(2.8)	364	(2.8)	505	(3.2)	571	(3.2)	608	(3.0)	259
Switzerland	339	(4.7)	373	(4.1)	433	(4.3)	580	(3.3)	632	(2.9)	662	(3.3)	259
Chinese Taipei	358	(4.6)	395	(4.6)	465	(3.5)	603	(3.5)	655	(4.2)	685	(4.9)	260
Germany	342	(4.4)	376	(4.3)	439	(3.6)	580	(2.8)	636	(2.9)	669	(3.8)	260
United Kingdom	345	(2.9)	377	(3.2)	438	(2.9)	581	(3.1)	638	(3.2)	670	(3.5)	261
Luxembourg	323	(2.9)	351	(2.6)	407	(2.2)	556	(1.7)	615	(2.3)	649	(3.1)	264
Belgium	332	(3.4)	364	(3.8)	429	(3.5)	577	(2.2)	629	(2.1)	657	(2.2)	265
Bulgaria	283	(4.8)	313	(4.8)	370	(5.3)	521	(5.1)	578	(5.2)	611	(5.6)	266
The Netherlands	341	(4.0)	372	(4.3)	434	(3.9)	583	(2.5)	638	(2.9)	668	(3.6)	266
Australia	336	(2.6)	372	(2.5)	438	(2.2)	583	(1.9)	639	(2.2)	672	(2.8)	267
France	322	(4.1)	355	(3.7)	421	(3.4)	571	(2.4)	623	(2.8)	652	(3.3)	268
Sweden	322	(4.7)	357	(4.6)	421	(4.2)	567	(4.2)	625	(4.0)	658	(4.4)	269
BSJG-China	341	(6.5)	377	(6.0)	445	(5.6)	595	(5.3)	649	(5.6)	677	(6.5)	271
Singapore	373	(3.7)	412	(2.8)	485	(2.2)	631	(1.8)	683	(2.2)	712	(3.1)	271
New Zealand	341	(3.5)	374	(3.8)	439	(3.8)	588	(2.8)	647	(3.5)	682	(3.8)	273
Israel	295	(4.9)	327	(4.6)	389	(4.4)	544	(4.1)	606	(3.7)	640	(3.5)	279
Malta	273	(4.2)	310	(4.3)	382	(3.4)	548	(2.8)	618	(3.4)	656	(4.4)	308
OECD average	**336**	**(0.7)**	**368**	**(0.6)**	**426**	**(0.6)**	**561**	**(0.5)**	**615**	**(0.5)**	**645**	**(0.6)**	**247**

Note: Countries, economies, and provinces have been sorted in ascending order by the difference in score points between the 10th and 90th percentiles. BSJG-China represents Beijing, Shanghai, Jiangsu, and Guangdong. The coverage of Argentina, Kazakhstan, and Malaysia is too small to ensure comparability. See OECD, *PISA 2015 Results* for a note regarding Cyprus.

Table B.1.7

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

	Anglophone school system		Francophone school system		Difference between systems	
Canada and provinces	**Average**	**Standard error**	**Average**	**Standard error**	**Difference**	**Standard error**
Canada	**526**	**(2.2)**	**533**	**(4.7)**	**-7**	**(5.0)**
Nova Scotia	518	(4.6)	477	(7.3)	42*	(8.7)
New Brunswick	508	(5.7)	502	(4.9)	6	(7.1)
Quebec	514	(3.5)	540	(5.3)	-26*	(6.2)
Ontario	526	(4.1)	486	(4.2)	39*	(5.4)
Manitoba	501	(5.0)	473	(6.9)	28*	(8.3)
Alberta	541	(4.1)	504	(8.9)	37*	(10.6)
British Columbia	539	(4.3)	532	(15.8)	7	(15.9)

* Statistically significant differences.

Table B.1.8

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

		Anglophone school system		Francophone school system		Difference between systems	
	Canada and provinces	Average	Standard error	Average	Standard error	Difference	Standard error
Explain phenomena scientifically							
	Canada	**529**	**(2.2)**	**533**	**(5.0)**	**-5**	**(5.2)**
	Nova Scotia	520	(5.0)	480	(8.0)	40*	(9.2)
	New Brunswick	511	(5.6)	504	(6.8)	7	(8.7)
	Quebec	512	(5.6)	540	(5.6)	-28*	(7.2)
	Ontario	527	(3.9)	489	(6.4)	38*	(7.2)
	Manitoba	506	(5.2)	478	(7.0)	28*	(8.3)
	Alberta	547	(4.7)	507	(10.2)	40*	(11.7)
	British Columbia	542	(4.5)	540	(16.1)	1	(16.3)
Evaluate and design scientific enquiry							
	Canada	**528**	**(3.1)**	**538**	**(5.5)**	**-10**	**(6.3)**
	Nova Scotia	517	(6.4)	479	(9.9)	37*	(12.8)
	New Brunswick	507	(6.7)	510	(7.4)	-3	(9.1)
	Quebec	521	(6.9)	545	(6.1)	-24*	(9.1)
	Ontario	529	(5.3)	490	(8.7)	39*	(10.6)
	Manitoba	499	(5.8)	474	(9.9)	25*	(11.6)
	Alberta	540	(5.0)	502	(11.8)	38*	(13.3)
	British Columbia	537	(5.8)	530	(19.3)	8	(19.4)
Interpret data and evidence scientifically							
	Canada	**523**	**(2.9)**	**531**	**(5.1)**	**-7**	**(5.5)**
	Nova Scotia	515	(5.8)	473	(8.5)	43*	(11.3)
	New Brunswick	506	(6.6)	493	(5.9)	13	(8.4)
	Quebec	516	(6.0)	538	(5.7)	-22*	(7.3)
	Ontario	523	(4.9)	481	(6.1)	42*	(6.8)
	Manitoba	499	(5.1)	468	(8.9)	32*	(11.2)
	Alberta	537	(4.7)	499	(11.6)	38*	(13.4)
	British Columbia	536	(5.8)	521	(15.2)	15	(15.4)

* Statistically significant differences.

Table B.1.9

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

		Anglophone school system		Francophone school system		Difference between systems	
	Canada and provinces	Average	Standard error	Average	Standard error	Difference	Standard error
Content							
	Canada	**527**	**(2.3)**	**534**	**(5.1)**	**-7**	**(5.5)**
	Nova Scotia	518	(4.7)	483	(8.1)	36*	(9.8)
	New Brunswick	509	(6.3)	503	(6.7)	6	(8.6)
	Quebec	510	(4.9)	540	(5.7)	-30*	(7.5)
	Ontario	525	(4.1)	491	(5.0)	34*	(6.5)
	Manitoba	504	(4.9)	481	(6.6)	23*	(8.2)
	Alberta	546	(4.3)	508	(11.3)	38*	(12.3)
	British Columbia	540	(4.4)	544	(17.9)	-3	(17.8)
Procedural and epistemic							
	Canada	**526**	**(2.6)**	**533**	**(5.1)**	**-7**	**(5.5)**
	Nova Scotia	516	(5.1)	477	(8.0)	39*	(9.4)
	New Brunswick	507	(6.4)	499	(5.8)	7	(8.5)
	Quebec	517	(5.1)	540	(5.7)	-23*	(7.3)
	Ontario	527	(4.5)	484	(5.0)	43*	(6.3)
	Manitoba	500	(5.0)	469	(6.8)	31*	(8.5)
	Alberta	538	(4.5)	499	(10.7)	39*	(12.5)
	British Columbia	537	(4.7)	526	(16.3)	12	(16.3)

* Statistically significant differences.

Table B.1.10

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

		Anglophone school system		Francophone school system		Difference between systems	
	Canada and provinces	Average	Standard error	Average	Standard error	Difference	Standard error
Physical systems							
	Canada	**526**	**(2.6)**	**533**	**(5.1)**	**-7**	**(5.6)**
	Nova Scotia	518	(5.4)	479	(8.7)	39*	(10.2)
	New Brunswick	505	(6.7)	503	(5.2)	2	(8.8)
	Quebec	516	(5.8)	539	(5.8)	-24*	(8.0)
	Ontario	525	(4.4)	489	(6.2)	36*	(7.2)
	Manitoba	504	(5.3)	479	(7.1)	25*	(9.0)
	Alberta	543	(5.0)	506	(10.1)	38*	(12.1)
	British Columbia	534	(5.2)	536	(17.1)	-2	(17.0)
Living systems							
	Canada	**527**	**(2.6)**	**531**	**(5.0)**	**-4**	**(5.4)**
	Nova Scotia	520	(5.0)	471	(7.8)	49*	(9.3)
	New Brunswick	511	(6.5)	496	(7.0)	14	(9.2)
	Quebec	514	(5.4)	538	(5.7)	-24*	(8.3)
	Ontario	526	(4.6)	482	(5.3)	44*	(6.6)
	Manitoba	499	(5.1)	464	(8.3)	35*	(9.5)
	Alberta	539	(4.7)	496	(9.1)	43*	(11.3)
	British Columbia	543	(4.9)	529	(17.2)	14	(17.6)
Earth and space systems							
	Canada	**527**	**(2.7)**	**539**	**(5.2)**	**-12***	**(5.8)**
	Nova Scotia	516	(5.3)	483	(7.7)	33*	(9.5)
	New Brunswick	508	(6.6)	506	(7.3)	2	(8.9)
	Quebec	515	(7.6)	546	(5.9)	-30*	(9.4)
	Ontario	526	(4.5)	490	(5.0)	36*	(6.4)
	Manitoba	502	(5.3)	480	(9.3)	22*	(11.0)
	Alberta	543	(5.2)	506	(10.6)	36*	(12.6)
	British Columbia	538	(6.1)	537	(17.8)	1	(18.2)

* Statistically significant differences.

Table B.1.11

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**
Canada	**527**	**(2.3)**	**528**	**(2.5)**	**-1**	**(2.4)**
Newfoundland and Labrador	502	(3.8)	510	(5.2)	-9	(6.5)
Prince Edward Island	521	(6.0)	509	(7.5)	12	(8.5)
Nova Scotia	518	(4.8)	516	(5.9)	2	(6.0)
New Brunswick	507	(4.5)	506	(6.2)	0	(6.3)
Quebec	533	(5.2)	541	(5.6)	-8	(5.1)
Ontario	525	(4.2)	523	(4.5)	2	(3.7)
Manitoba	500	(6.1)	499	(5.0)	0	(5.8)
Saskatchewan	493	(4.0)	498	(3.7)	-5	(4.6)
Alberta	539	(4.8)	542	(4.4)	-3	(4.3)
British Columbia	538	(4.2)	540	(6.0)	-2	(5.7)

Table B.1.12

Proportion of males and females who performed below Level 2 and at Levels 5 and 6, PISA 2015, Canada and the provinces: SCIENCE

	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	**10.1**	**(0.6)**	**12.0**	**(0.7)**	**-1.9***	**(0.7)**	**11.4**	**(0.7)**	**13.4**	**(0.8)**	**-2.0***	**(1.0)**
Newfoundland and Labrador	14.9	(1.8)	16.0	(1.9)	-1.0	(2.5)	5.4	(1.0)	10.3	(1.6)	-4.9*	(1.8)
Prince Edward Island	8.1	(2.3)	14.3	(3.0)	-6.2	(3.4)	7.5	(2.4)	9.9	(2.8)	-2.4	(3.4)
Nova Scotia	11.7	(2.0)	14.0	(1.8)	-2.3	(2.2)	9.7	(1.6)	9.8	(1.8)	-0.1	(2.3)
New Brunswick	14.1	(1.8)	17.0	(2.7)	-2.9	(2.6)	7.1	(1.5)	9.0	(1.6)	-1.9	(2.1)
Quebec	7.8	(1.2)	9.2	(1.3)	-1.4	(1.2)	10.4	(1.6)	15.4	(2.1)	-4.9*	(2.3)
Ontario	11.1	(1.2)	13.4	(1.2)	-2.2	(1.3)	11.6	(1.5)	12.5	(1.3)	-0.8	(1.6)
Manitoba	17.7	(2.4)	17.2	(2.0)	0.5	(2.8)	7.3	(1.6)	6.8	(1.1)	0.5	(1.7)
Saskatchewan	16.5	(1.9)	16.9	(1.7)	-0.5	(2.4)	5.0	(0.9)	7.2	(1.1)	-2.1	(1.4)
Alberta	7.7	(1.3)	9.4	(1.2)	-1.7	(1.6)	14.9	(1.7)	16.9	(1.7)	-2.0	(2.0)
British Columbia	7.8	(1.3)	9.6	(1.5)	-1.8	(1.5)	13.5	(1.6)	15.8	(1.9)	-2.3	(1.9)

* Statistically significant differences.

Table B.1.13

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

		Females		Males		Difference (female-male)	
	Canada and provinces	Average	Standard error	Average	Standard error	Difference	Standard error
Explain phenomena scientifically							
	Canada	**525**	**(2.4)**	**535**	**(2.6)**	**-10***	**(2.6)**
	Newfoundland and Labrador	500	(4.2)	518	(5.4)	-18*	(6.8)
	Prince Edward Island	518	(5.9)	515	(7.9)	3	(8.4)
	Nova Scotia	515	(5.2)	522	(6.5)	-7	(6.6)
	New Brunswick	504	(4.7)	513	(6.3)	-9	(6.4)
	Quebec	529	(5.3)	545	(6.1)	-16*	(4.8)
	Ontario	522	(4.4)	529	(4.3)	-6	(4.1)
	Manitoba	499	(6.1)	509	(5.4)	-9	(5.8)
	Saskatchewan	494	(4.3)	507	(4.1)	-13*	(5.1)
	Alberta	542	(5.3)	552	(5.0)	-10*	(4.5)
	British Columbia	536	(5.0)	548	(5.7)	-12*	(6.1)
Evaluate and design scientific enquiry							
	Canada	**535**	**(3.1)**	**525**	**(3.0)**	**10***	**(2.7)**
	Newfoundland and Labrador	508	(5.0)	505	(6.4)	3	(8.2)
	Prince Edward Island	527	(7.3)	504	(9.7)	24*	(10.2)
	Nova Scotia	522	(6.9)	509	(7.6)	13	(7.7)
	New Brunswick	514	(5.5)	502	(7.5)	12	(7.2)
	Quebec	542	(6.3)	542	(5.8)	0	(5.3)
	Ontario	535	(5.4)	520	(5.4)	15*	(4.1)
	Manitoba	503	(7.0)	493	(5.9)	10	(6.6)
	Saskatchewan	499	(5.2)	492	(4.3)	7	(5.4)
	Alberta	544	(5.6)	536	(5.6)	9	(5.3)
	British Columbia	541	(5.9)	533	(7.4)	8	(6.6)
Interpret data and evidence scientifically							
	Canada	**525**	**(2.8)**	**525**	**(3.2)**	**1**	**(2.8)**
	Newfoundland and Labrador	498	(4.5)	504	(5.4)	-6	(7.0)
	Prince Edward Island	519	(6.6)	504	(8.4)	15	(9.0)
	Nova Scotia	516	(6.2)	512	(6.6)	4	(6.5)
	New Brunswick	504	(4.9)	502	(7.2)	1	(6.6)
	Quebec	533	(5.8)	538	(6.1)	-5	(5.4)
	Ontario	523	(4.9)	519	(5.4)	3	(4.1)
	Manitoba	499	(6.3)	496	(5.0)	3	(6.4)
	Saskatchewan	491	(4.6)	492	(4.3)	-1	(5.8)
	Alberta	536	(5.6)	537	(4.9)	-1	(4.8)
	British Columbia	535	(5.4)	537	(7.7)	-3	(6.4)

* Statistically significant differences.

Table B.1.14

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

		Females		Males		Difference (female-male)	
	Canada and provinces	Average	Standard error	Average	Standard error	Difference	Standard error
Content							
	Canada	**524**	**(2.3)**	**533**	**(2.6)**	**-9***	**(2.5)**
	Newfoundland and Labrador	499	(3.8)	516	(5.2)	-17*	(6.1)
	Prince Edward Island	518	(7.2)	516	(8.9)	2	(9.2)
	Nova Scotia	514	(4.9)	520	(6.2)	-6	(6.7)
	New Brunswick	504	(4.9)	512	(6.9)	-8	(6.2)
	Quebec	528	(5.4)	546	(5.9)	-18*	(4.9)
	Ontario	521	(4.3)	526	(4.5)	-6	(3.9)
	Manitoba	499	(6.0)	506	(5.0)	-7	(5.9)
	Saskatchewan	493	(4.2)	504	(3.9)	-12*	(4.5)
	Alberta	541	(4.9)	550	(4.9)	-9	(4.6)
	British Columbia	535	(4.4)	546	(6.0)	-10	(5.9)
Procedural and epistemic							
	Canada	**530**	**(2.6)**	**525**	**(2.8)**	**6***	**(2.4)**
	Newfoundland and Labrador	504	(4.6)	505	(5.3)	-2	(7.2)
	Prince Edward Island	523	(6.6)	506	(8.0)	17	(9.4)
	Nova Scotia	519	(5.6)	510	(6.1)	9	(6.4)
	New Brunswick	508	(4.7)	501	(7.0)	7	(6.5)
	Quebec	537	(5.5)	538	(5.9)	-1	(5.0)
	Ontario	530	(4.6)	521	(5.1)	9*	(4.1)
	Manitoba	502	(6.1)	494	(5.0)	7	(5.9)
	Saskatchewan	495	(4.3)	491	(4.0)	3	(4.9)
	Alberta	539	(5.3)	536	(4.7)	3	(4.5)
	British Columbia	539	(4.4)	535	(6.6)	4	(6.0)

* Statistically significant differences.

Table B.1.15

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

		Females		Males		Difference (female-male)	
	Canada and provinces	Average	Standard error	Average	Standard error	Difference	Standard error
Physical systems							
	Canada	**525**	**(2.4)**	**530**	**(3.3)**	**-5**	**(3.3)**
	Newfoundland and Labrador	501	(4.7)	512	(6.9)	-12	(7.2)
	Prince Edward Island	522	(7.2)	513	(8.6)	8	(9.8)
	Nova Scotia	516	(5.5)	517	(6.8)	-1	(6.6)
	New Brunswick	504	(4.9)	506	(7.0)	-2	(6.8)
	Quebec	530	(5.6)	543	(6.1)	-13*	(5.3)
	Ontario	523	(4.6)	524	(5.2)	-2	(5.0)
	Manitoba	500	(6.5)	504	(5.4)	-5	(6.7)
	Saskatchewan	494	(4.9)	501	(4.8)	-8	(4.8)
	Alberta	541	(5.9)	545	(5.7)	-4	(6.1)
	British Columbia	533	(4.9)	537	(7.1)	-4	(6.3)
Living systems							
	Canada	**528**	**(2.6)**	**527**	**(2.9)**	**1**	**(2.6)**
	Newfoundland and Labrador	503	(4.5)	508	(5.5)	-5	(7.1)
	Prince Edward Island	522	(6.4)	509	(8.5)	13	(9.1)
	Nova Scotia	521	(5.6)	516	(5.8)	5	(6.2)
	New Brunswick	508	(5.3)	506	(6.8)	2	(6.5)
	Quebec	533	(5.3)	537	(5.9)	-4	(5.2)
	Ontario	527	(4.6)	522	(5.1)	4	(4.0)
	Manitoba	499	(6.4)	495	(4.9)	3	(5.9)
	Saskatchewan	492	(4.5)	494	(4.5)	-2	(5.8)
	Alberta	538	(6.0)	539	(4.6)	-1	(5.0)
	British Columbia	542	(4.9)	543	(6.4)	-1	(5.9)
Earth and space systems							
	Canada	**528**	**(2.7)**	**530**	**(3.0)**	**-2**	**(2.9)**
	Newfoundland and Labrador	498	(4.8)	508	(5.6)	-9	(6.8)
	Prince Edward Island	521	(6.2)	512	(8.1)	9	(9.0)
	Nova Scotia	514	(5.6)	515	(6.4)	-1	(6.3)
	New Brunswick	507	(5.6)	508	(7.3)	-1	(6.9)
	Quebec	538	(5.6)	546	(6.7)	-8	(6.0)
	Ontario	525	(4.5)	524	(5.2)	1	(4.4)
	Manitoba	501	(6.2)	500	(5.7)	1	(6.4)
	Saskatchewan	496	(5.5)	500	(4.4)	-5	(5.6)
	Alberta	540	(6.3)	545	(5.2)	-5	(5.0)
	British Columbia	537	(6.1)	540	(7.4)	-3	(5.9)

* Statistically significant differences.

Table B.1.16

Comparisons of performance, PISA 2006, 2009, 2012, and 2015, Canada and the provinces: SCIENCE

	2006		2009		2012		2015	
Canada and provinces	Average	Standard error	Average	Standard error	Average	Standard error	Average	Standard error
Canada	**534**	**(2.0)**	**529**	**(3.0)**	**525***	**(4.0)**	**528**	**(4.9)**
Newfoundland and Labrador	526	(2.5)	518	(4.0)	514*	(5.0)	506*	(5.5)
Prince Edward Island	509	(2.7)	495*	(3.5)	490*	(4.4)	515	(7.0)
Nova Scotia	520	(2.5)	523	(3.7)	516	(4.6)	517	(6.3)
New Brunswick	506	(2.3)	501	(3.5)	507	(4.4)	506	(6.3)
Quebec	531	(4.2)	524	(4.1)	516*	(4.8)	537	(6.5)
Ontario	537	(4.2)	531	(4.2)	527	(5.6)	524	(6.0)
Manitoba	523	(3.2)	506*	(4.7)	503*	(4.8)	499*	(6.5)
Saskatchewan	517	(3.6)	513	(4.5)	516	(4.6)	496*	(5.5)
Alberta	550	(3.8)	545	(5.0)	539	(5.8)	541	(6.0)
British Columbia	539	(4.7)	535	(4.8)	544	(5.3)	539	(6.2)

* Statistically significant differences compared to PISA 2006.

Note: The linkage error is incorporated into the standard error for 2009, 2012, and 2015. Also, for some provinces, the standard errors from 2006 to 2009 and to 2012 differ from those in the previous PISA reports on trend results. These differences result from the change of the method used by the OECD to compute the linkage error.

Table B.1.17

Proportion of students who performed below Level 2 and at Levels 5 and 6, in PISA 2006 and 2015, Canada and the provinces: SCIENCE

	Below Level 2						Levels 5 and 6					
	2006		2015		Difference 2006-2015		2006		2015		Difference 2006-2015	
Canada and provinces	%	Standard error	%	Standard error	difference	Standard error	%	Standard error	%	Standard error	difference	Standard error
Canada	**10.0**	**(0.6)**	**11.1**	**(0.5)**	**1.1**	**(1.0)**	**14.4**	**(0.5)**	**12.4**	**(0.6)**	**-2.1***	**(1.8)**
Newfoundland and Labrador	11.9	(0.9)	15.5	(1.3)	3.5*	(1.7)	13.5	(1.1)	7.8	(1.0)	-5.8*	(2.2)
Prince Edward Island	16.0	(1.2)	11.3	(2.1)	-4.7	(2.5)	9.8	(1.0)	8.7	(2.0)	-1.0	(2.7)
Nova Scotia	11.8	(1.2)	12.8	(1.5)	1.0	(2.0)	10.2	(0.9)	9.8	(1.2)	-0.4	(2.2)
New Brunswick	15.3	(1.0)	15.6	(1.9)	0.3	(2.3)	7.9	(0.8)	8.1	(1.1)	0.1	(2.1)
Quebec	11.3	(1.2)	8.5	(1.1)	-2.8	(1.8)	14.3	(1.1)	12.8	(1.5)	-1.5	(2.4)
Ontario	9.5	(1.2)	12.3	(1.0)	2.8	(1.7)	14.2	(1.1)	12.1	(1.1)	-2.1	(2.2)
Manitoba	12.5	(1.2)	17.4	(1.7)	5.0*	(2.2)	12.4	(1.1)	7.1	(1.1)	-5.3*	(2.2)
Saskatchewan	13.6	(1.3)	16.7	(1.4)	3.1	(2.0)	10.8	(1.1)	6.2	(0.7)	-4.6*	(2.1)
Alberta	6.2	(0.9)	8.6	(1.0)	2.4	(1.4)	18.3	(1.2)	15.9	(1.4)	-2.5	(2.4)
British Columbia	9.1	(1.2)	8.7	(1.2)	-0.4	(1.8)	15.9	(1.5)	14.7	(1.5)	-1.2	(2.6)

* Statistically significant differences.

Table B.1.18

Gender differences in student performance, PISA 2006 and 2015, Canada and the provinces: SCIENCE

	2006		2015	
Canada and provinces	**Gender difference (F-M)**	**Standard error**	**Gender difference (F-M)**	**Standard error**
Canada	**-4**	**(2.2)**	**-1**	**(2.4)**
Newfoundland and Labrador	12*	(4.9)	-9	(6.5)
Prince Edward Island	3	(5.0)	12	(8.5)
Nova Scotia	-1	(4.9)	2	(6.0)
New Brunswick	-1	(4.1)	0	(6.3)
Quebec	-8	(4.2)	-8	(5.1)
Ontario	-4	(4.1)	2	(3.7)
Manitoba	-4	(5.3)	0	(5.8)
Saskatchewan	5	(5.7)	-5	(4.6)
Alberta	-4	(4.7)	-3	(4.3)
British Columbia	-5	(5.4)	-2	(5.7)

* Statistically significant differences.

Table B.2.1

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

Country, economy, or province	Average	Standard error	Confidence interval – 95% lower limit	Confidence interval – 95% upper limit
British Columbia	**536**	**(5.6)**	**525**	**547**
Singapore	535	(1.6)	532	538
Alberta	**533**	**(5.2)**	**523**	**544**
Quebec	**532**	**(4.7)**	**523**	**541**
Ontario	**527**	**(4.4)**	**519**	**536**
Hong Kong-China	527	(2.7)	521	532
Canada	**527**	**(2.3)**	**522**	**531**
Finland	526	(2.5)	521	531
Ireland	521	(2.5)	516	526
Estonia	519	(2.2)	515	523
Korea	517	(3.5)	511	524
Nova Scotia	**517**	**(4.9)**	**508**	**527**
Japan	516	(3.2)	510	522
Prince Edward Island	**515**	**(6.1)**	**503**	**527**
Norway	513	(2.5)	508	518
New Zealand	509	(2.4)	505	514
Germany	509	(3.0)	503	515
Macao-China	509	(1.3)	506	511
Poland	506	(2.5)	501	511
New Brunswick	**505**	**(5.2)**	**495**	**516**
Slovenia	505	(1.5)	502	508
Newfoundland and Labrador	**505**	**(3.5)**	**498**	**512**
The Netherlands	503	(2.4)	498	508
Australia	503	(1.7)	500	506
Sweden	500	(3.5)	493	507
Denmark	500	(2.5)	495	505
France	499	(2.5)	494	504
Belgium	499	(2.4)	494	503
Manitoba	**498**	**(5.0)**	**489**	**508**
Portugal	498	(2.7)	493	503
United Kingdom	498	(2.8)	493	503
Chinese Taipei	497	(2.5)	492	502
United States	497	(3.4)	490	504
Saskatchewan	**496**	**(3.6)**	**489**	**503**
Spain	496	(2.4)	491	500
Russian Federation	495	(3.1)	489	501
BSJG-China	494	(5.1)	484	504
Switzerland	492	(3.0)	486	498
Latvia	488	(1.8)	484	491
Czech Republic	487	(2.6)	482	492
Croatia	487	(2.7)	482	492
Vietnam	487	(3.7)	479	494
Austria	485	(2.8)	479	490
Italy	485	(2.7)	480	490
Iceland	482	(2.0)	478	485
Luxembourg	481	(1.4)	479	484
Israel	479	(3.8)	472	486
Lithuania	472	(2.7)	467	478
Hungary	470	(2.7)	464	475
Greece	467	(4.3)	459	476
Chile	459	(2.6)	454	464
Slovak Republic	453	(2.8)	447	458
Malta	447	(1.8)	443	450
Cyprus	443	(1.7)	440	446
Uruguay	437	(2.5)	432	442
Romania	434	(4.1)	426	442
United Arab Emirates	434	(2.9)	428	439
Bulgaria	432	(5.0)	422	442
Malaysia	431	(3.5)	424	437
Turkey	428	(4.0)	421	436
Costa Rica	427	(2.6)	422	433
Trinidad and Tobago	427	(1.5)	424	430
Kazakhstan	427	(3.4)	420	434
Montenegro	427	(1.6)	424	430
Argentina	425	(3.2)	419	432
Colombia	425	(2.9)	419	431
Mexico	423	(2.6)	418	428
Moldova	416	(2.5)	411	421
Thailand	409	(3.3)	403	416
Jordan	408	(2.9)	402	414
Brazil	407	(2.8)	402	413
Albania	405	(4.1)	397	413
Qatar	402	(1.0)	400	404
Georgia	401	(3.0)	395	407
Peru	398	(2.9)	392	403
Indonesia	397	(2.9)	392	403
Tunisia	361	(3.1)	355	367
Dominican Republic	358	(3.1)	352	364
Republic of Macedonia	352	(1.4)	349	355
Algeria	350	(3.0)	344	356
Kosovo	347	(1.6)	344	350
Lebanon	347	(4.4)	338	355

Note: The OECD average was 493, with a standard error of 0.5. Countries, economies, and provinces have been sorted in descending order by average score. BSJG-China represents Beijing, Shanghai, Jiangsu, and Guangdong. The coverage of Argentina, Kazakhstan, and Malaysia is too small to ensure comparability. See OECD, *PISA 2015 Results* for a note regarding Cyprus.

Table B.2.2

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

Country, economy, or province	Average	Standard error	Confidence interval – 95% lower limit	Confidence interval – 95% upper limit
Singapore	564	(1.5)	561	567
Hong Kong-China	548	(3.0)	542	554
Quebec	**544**	**(4.8)**	**535**	**553**
Macao-China	544	(1.1)	542	546
Chinese Taipei	542	(3.0)	536	548
Japan	532	(3.0)	527	538
BSJG-China	531	(4.9)	522	541
Korea	524	(3.7)	517	531
British Columbia	**522**	**(5.0)**	**512**	**531**
Switzerland	521	(2.9)	516	527
Estonia	520	(2.0)	516	524
Canada	**516**	**(2.3)**	**511**	**520**
The Netherlands	512	(2.2)	508	517
Alberta	**511**	**(4.7)**	**502**	**521**
Denmark	511	(2.2)	507	515
Finland	511	(2.3)	507	516
Slovenia	510	(1.3)	507	512
Ontario	**509**	**(4.2)**	**501**	**518**
Belgium	507	(2.4)	502	512
Germany	506	(2.9)	500	512
Poland	504	(2.4)	500	509
Ireland	504	(2.1)	500	508
Norway	502	(2.2)	497	506
Prince Edward Island	**499**	**(6.4)**	**486**	**511**
Nova Scotia	**497**	**(4.6)**	**488**	**506**
Austria	497	(2.9)	491	502
New Zealand	495	(2.3)	491	500
Vietnam	495	(4.5)	486	503
Russian Federation	494	(3.1)	488	500
Sweden	494	(3.2)	488	500
Australia	494	(1.6)	491	497
France	493	(2.1)	489	497
New Brunswick	**493**	**(5.1)**	**483**	**502**
United Kingdom	492	(2.5)	488	497
Czech Republic	492	(2.4)	488	497
Portugal	492	(2.5)	487	497
Italy	490	(2.8)	484	495
Manitoba	**489**	**(4.2)**	**481**	**497**
Iceland	488	(2.0)	484	492
Spain	486	(2.2)	482	490
Luxembourg	486	(1.3)	483	488
Newfoundland and Labrador	**486**	**(3.2)**	**479**	**492**
Saskatchewan	**484**	**(2.9)**	**479**	**490**
Latvia	482	(1.9)	479	486
Malta	479	(1.7)	475	482
Lithuania	478	(2.3)	474	483
Hungary	477	(2.5)	472	482
Slovak Republic	475	(2.7)	470	480
Israel	470	(3.6)	463	477
United States	470	(3.2)	463	476
Croatia	464	(2.8)	459	469
Kazakhstan	460	(4.3)	451	468
Greece	454	(3.8)	446	461
Malaysia	446	(3.3)	440	452
Romania	444	(3.8)	437	451
Bulgaria	441	(4.0)	433	449
Cyprus	437	(1.7)	434	441
United Arab Emirates	427	(2.4)	423	432
Chile	423	(2.5)	418	428
Turkey	420	(4.1)	412	429
Moldova	420	(2.5)	415	424
Uruguay	418	(2.5)	413	423
Montenegro	418	(1.5)	415	421
Trinidad and Tobago	417	(1.4)	414	420
Thailand	415	(3.0)	410	421
Albania	413	(3.4)	406	420
Argentina	409	(3.1)	403	415
Mexico	408	(2.2)	404	412
Georgia	404	(2.8)	398	409
Qatar	402	(1.3)	400	405
Costa Rica	400	(2.5)	395	405
Lebanon	396	(3.7)	389	403
Colombia	390	(2.3)	385	394
Peru	387	(2.7)	381	392
Indonesia	386	(3.1)	380	392
Jordan	380	(2.7)	375	385
Brazil	377	(2.9)	371	383
Republic of Macedonia	371	(1.3)	369	374
Tunisia	367	(3.0)	361	373
Kosovo	362	(1.6)	358	365
Algeria	360	(3.0)	354	365
Dominican Republic	328	(2.7)	322	333

Note: The OECD average was 490, with a standard error of 0.4. Countries, economies and provinces have been sorted in descending order by average score. BSJG-China represents Beijing, Shanghai, Jiangsu, and Guangdong. The coverage of Argentina, Kazakhstan, and Malaysia is too small to ensure comparability. See OECD, *PISA 2015 Results* for a note regarding Cyprus.

Table B.2.3

Variation in student performance for countries, economies, and provinces: 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	
Algeria	232	(4.1)	258	(4.1)	301	(2.6)	397	(3.8)	443	(4.8)	472	(5.4)	185
Vietnam	367	(5.2)	393	(4.9)	438	(4.3)	537	(4.2)	580	(5.3)	605	(6.2)	187
Indonesia	272	(5.9)	300	(5.1)	346	(3.7)	448	(3.0)	495	(3.3)	522	(4.0)	195
Mexico	292	(3.8)	321	(3.6)	370	(3.0)	478	(3.2)	523	(3.9)	549	(4.2)	202
Kosovo	215	(4.3)	243	(2.8)	294	(2.5)	403	(2.3)	447	(2.6)	471	(3.0)	204
Costa Rica	298	(4.0)	326	(3.5)	374	(3.0)	480	(3.2)	530	(3.8)	560	(4.8)	204
Thailand	281	(4.0)	308	(3.3)	354	(3.7)	463	(4.2)	514	(4.9)	543	(5.9)	206
Kazakhstan	299	(4.4)	325	(4.1)	372	(3.4)	481	(4.7)	533	(5.3)	563	(6.6)	207
Malaysia	290	(5.7)	322	(5.0)	377	(4.1)	488	(3.7)	531	(3.9)	556	(5.3)	209
Tunisia	228	(6.0)	257	(4.7)	305	(3.6)	416	(3.2)	467	(3.6)	496	(5.1)	209
Macao-China	365	(3.7)	399	(2.6)	456	(2.0)	566	(2.0)	610	(2.8)	635	(3.4)	212
Turkey	291	(4.8)	322	(4.9)	372	(4.4)	487	(5.2)	535	(5.9)	561	(6.1)	213
Prince Edward Island	**367**	**(20.6)**	**404**	**(10.4)**	**461**	**(8.7)**	**575**	**(8.4)**	**622**	**(9.8)**	**648**	**(14.1)**	**218**
Hong Kong-China	372	(5.6)	412	(4.5)	473	(3.7)	587	(2.5)	632	(3.1)	656	(3.5)	220
Dominican Republic	226	(4.5)	250	(3.8)	297	(3.5)	416	(4.1)	471	(5.1)	503	(5.8)	220
Latvia	341	(3.8)	374	(3.4)	431	(3.0)	548	(2.0)	595	(2.5)	621	(3.6)	221
Saskatchewan	**355**	**(7.3)**	**384**	**(5.9)**	**437**	**(5.4)**	**556**	**(4.7)**	**605**	**(4.5)**	**633**	**(5.8)**	**222**
Ireland	373	(4.6)	406	(4.1)	463	(3.1)	582	(2.7)	629	(2.8)	657	(4.1)	222
Spain	343	(4.5)	379	(3.9)	438	(3.3)	558	(2.7)	603	(2.9)	629	(3.5)	224
Denmark	347	(4.1)	383	(4.3)	443	(3.2)	561	(2.6)	608	(3.4)	635	(3.6)	225
Estonia	369	(4.2)	404	(4.0)	460	(2.8)	581	(2.6)	630	(2.9)	659	(3.2)	226
Russian Federation	350	(4.4)	381	(3.9)	434	(3.9)	556	(3.5)	608	(3.5)	637	(3.7)	227
Nova Scotia	**366**	**(9.4)**	**401**	**(8.4)**	**458**	**(5.9)**	**579**	**(5.3)**	**628**	**(6.5)**	**657**	**(8.6)**	**228**
British Columbia	**381**	**(8.7)**	**419**	**(7.6)**	**477**	**(6.1)**	**597**	**(7.0)**	**648**	**(7.1)**	**678**	**(6.9)**	**229**
Newfoundland and Labrador	**353**	**(9.7)**	**387**	**(7.5)**	**448**	**(4.9)**	**567**	**(5.4)**	**616**	**(6.8)**	**641**	**(7.3)**	**229**
Chile	310	(4.9)	342	(3.7)	398	(3.3)	521	(3.2)	572	(3.5)	599	(3.7)	229
Argentina	277	(5.5)	309	(4.3)	364	(4.2)	487	(3.6)	538	(3.9)	569	(4.7)	230
Poland	349	(5.1)	386	(3.7)	446	(3.5)	570	(2.8)	617	(3.5)	644	(4.6)	231
Peru	253	(3.3)	281	(3.2)	333	(3.2)	462	(3.9)	514	(4.5)	543	(5.1)	233
Quebec	**368**	**(9.0)**	**410**	**(7.7)**	**474**	**(5.9)**	**596**	**(5.1)**	**644**	**(5.7)**	**672**	**(7.0)**	**234**
Colombia	278	(4.9)	308	(4.4)	361	(4.0)	489	(3.3)	542	(3.1)	572	(3.0)	235
Alberta	**377**	**(8.6)**	**412**	**(7.5)**	**474**	**(6.3)**	**597**	**(6.1)**	**647**	**(5.8)**	**675**	**(7.5)**	**235**
Manitoba	**345**	**(8.8)**	**378**	**(7.5)**	**436**	**(6.8)**	**563**	**(5.3)**	**613**	**(6.4)**	**642**	**(7.4)**	**235**
New Brunswick	**350**	**(11.0)**	**383**	**(12.0)**	**444**	**(7.8)**	**570**	**(5.4)**	**619**	**(6.3)**	**645**	**(7.0)**	**236**
Croatia	334	(4.6)	367	(4.2)	424	(3.8)	553	(3.1)	603	(3.3)	632	(3.6)	237
Japan	352	(7.0)	391	(5.8)	457	(4.2)	581	(3.4)	629	(3.7)	656	(3.8)	238
Canada	**366**	**(4.3)**	**404**	**(3.6)**	**466**	**(2.8)**	**591**	**(2.4)**	**642**	**(2.7)**	**671**	**(2.8)**	**238**
Slovenia	346	(4.1)	382	(2.7)	444	(2.3)	570	(2.1)	621	(3.4)	648	(3.9)	239
Finland	359	(5.4)	401	(4.7)	469	(3.7)	592	(2.7)	640	(2.6)	668	(3.8)	239
Portugal	339	(4.7)	374	(3.7)	436	(4.2)	564	(2.8)	614	(3.1)	641	(3.3)	240
Chinese Taipei	331	(4.5)	371	(4.2)	437	(3.4)	563	(3.0)	611	(3.8)	638	(4.8)	240
Jordan	241	(6.3)	281	(5.4)	348	(3.7)	475	(3.1)	522	(2.9)	549	(3.1)	242

Table B.2.3 (cont'd)

Variation in student performance for countries, economies, and provinces: 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	
Ontario	**364**	**(7.1)**	**401**	**(6.2)**	**465**	**(5.5)**	**593**	**(4.7)**	**645**	**(4.5)**	**675**	**(5.8)**	**244**
Italy	323	(4.8)	359	(4.2)	421	(3.7)	552	(3.1)	602	(2.9)	631	(3.5)	244
Montenegro	271	(3.5)	304	(2.5)	361	(2.5)	493	(2.4)	549	(2.8)	581	(3.0)	245
Romania	276	(6.3)	310	(5.4)	370	(5.0)	499	(4.7)	555	(5.4)	588	(6.1)	245
Lithuania	312	(4.6)	347	(3.5)	407	(3.0)	541	(3.6)	593	(4.4)	622	(3.7)	246
United Kingdom	336	(4.4)	372	(4.0)	432	(3.2)	565	(3.0)	621	(3.6)	653	(4.1)	249
Albania	244	(5.1)	279	(5.2)	340	(4.7)	472	(4.7)	528	(5.2)	561	(5.6)	250
Korea	345	(7.3)	386	(5.6)	455	(4.4)	586	(3.9)	637	(4.3)	666	(4.1)	251
Moldova	253	(4.2)	289	(3.7)	349	(3.1)	485	(3.3)	541	(4.1)	574	(5.0)	252
Uruguay	280	(3.7)	311	(3.1)	368	(3.3)	504	(3.1)	563	(4.6)	597	(5.5)	252
Switzerland	322	(5.6)	360	(5.0)	426	(4.0)	563	(3.6)	614	(3.6)	643	(3.7)	254
Hungary	306	(5.3)	338	(4.2)	399	(3.9)	541	(3.1)	593	(3.2)	620	(3.4)	255
Norway	342	(5.2)	381	(4.0)	449	(3.3)	583	(2.9)	636	(3.0)	666	(3.7)	255
Greece	296	(7.6)	334	(8.2)	400	(6.1)	539	(3.6)	590	(3.7)	618	(3.8)	256
Iceland	310	(4.9)	350	(4.3)	417	(3.2)	552	(2.6)	607	(4.0)	638	(5.0)	256
Singapore	362	(4.4)	400	(3.7)	470	(2.6)	607	(2.0)	657	(2.6)	686	(3.3)	257
Republic of Macedonia	187	(3.7)	222	(3.3)	284	(2.4)	421	(2.2)	480	(3.3)	513	(4.3)	258
Germany	334	(5.2)	375	(5.3)	442	(3.8)	581	(3.1)	634	(3.4)	664	(3.2)	258
United States	326	(6.0)	364	(5.4)	430	(4.7)	568	(3.9)	624	(3.8)	655	(3.7)	259
Brazil	247	(3.4)	279	(2.8)	336	(3.0)	477	(3.2)	539	(3.9)	576	(4.6)	260
Sweden	321	(6.0)	364	(4.6)	433	(4.4)	573	(3.8)	625	(3.6)	655	(4.4)	262
The Netherlands	330	(5.3)	368	(4.6)	434	(4.0)	577	(2.8)	630	(3.1)	658	(3.5)	262
Czech Republic	315	(5.7)	352	(4.8)	418	(4.0)	559	(2.8)	614	(3.5)	645	(3.6)	262
Belgium	323	(3.8)	360	(3.9)	429	(3.8)	573	(2.2)	623	(2.5)	650	(2.9)	263
Austria	308	(5.1)	347	(5.1)	417	(4.0)	559	(3.1)	611	(3.0)	641	(3.5)	265
Australia	324	(3.0)	365	(2.7)	435	(2.4)	576	(2.0)	631	(2.2)	662	(2.6)	265
Georgia	226	(5.7)	266	(4.2)	332	(3.9)	474	(3.3)	533	(4.5)	568	(4.9)	268
Cyprus	268	(3.7)	305	(2.7)	372	(2.8)	516	(2.6)	573	(3.4)	606	(4.2)	269
Trinidad and Tobago	256	(4.4)	291	(3.2)	353	(2.8)	502	(2.3)	561	(3.5)	596	(4.6)	270
Slovak Republic	269	(6.5)	312	(4.6)	382	(4.1)	528	(3.1)	583	(3.2)	613	(4.1)	271
New Zealand	327	(4.8)	368	(4.5)	439	(3.6)	584	(3.3)	643	(4.3)	674	(4.4)	274
United Arab Emirates	258	(3.9)	295	(3.9)	359	(3.5)	509	(3.4)	572	(3.1)	605	(3.2)	277
Luxembourg	299	(3.3)	336	(2.9)	405	(2.1)	561	(2.1)	616	(2.5)	647	(3.8)	279
BSJG-China	304	(8.7)	346	(7.2)	420	(6.1)	573	(5.7)	630	(6.3)	661	(7.3)	283
Qatar	221	(2.2)	256	(1.8)	321	(1.8)	483	(2.2)	547	(2.2)	581	(2.7)	291
France	299	(6.6)	344	(5.7)	423	(3.7)	583	(3.1)	637	(3.0)	666	(3.6)	293
Israel	284	(7.1)	326	(5.8)	401	(5.1)	562	(4.3)	621	(4.3)	655	(5.1)	295
Bulgaria	241	(6.2)	277	(6.6)	347	(7.0)	517	(5.5)	578	(5.0)	611	(5.4)	300
Lebanon	167	(5.5)	203	(5.8)	265	(4.9)	426	(6.2)	503	(7.0)	546	(7.6)	301
Malta	236	(5.6)	284	(4.9)	366	(3.7)	533	(2.7)	595	(3.1)	631	(3.8)	311
OECD average	**326**	**(0.9)**	**364**	**(0.8)**	**428**	**(0.6)**	**561**	**(0.5)**	**613**	**(0.6)**	**642**	**(0.7)**	**249**

Note: Countries, economies, and provinces have been sorted in ascending order by the difference in score points between the 10th and 90th percentiles. BSJG-China represents Beijing, Shanghai, Jiangsu, and Guangdong. The coverage of Argentina, Kazakhstan, and Malaysia is too small to ensure comparability. See OECD, *PISA 2015 Results* for a note regarding Cyprus.

Table B.2.4

Variation in student performance for countries, economies, and provinces: 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	292	(2.7)	315	(2.9)	353	(2.5)	445	(3.0)	489	(4.2)	517	(5.0)	174
Dominican Republic	220	(4.3)	243	(3.9)	281	(3.2)	373	(3.6)	418	(4.7)	446	(7.0)	175
Algeria	247	(4.2)	271	(3.8)	312	(3.0)	405	(3.6)	452	(4.4)	481	(5.2)	181
Mexico	284	(4.1)	312	(2.6)	357	(2.5)	459	(2.9)	505	(3.5)	533	(3.6)	193
Kosovo	238	(3.5)	265	(2.9)	310	(2.3)	413	(2.6)	460	(4.2)	487	(4.3)	195
Prince Edward Island	**375**	**(11.5)**	**401**	**(10.7)**	**446**	**(8.6)**	**550**	**(9.4)**	**599**	**(11.2)**	**624**	**(12.7)**	**198**
Colombia	269	(3.7)	293	(3.1)	335	(2.9)	441	(2.7)	492	(3.3)	522	(3.8)	199
Latvia	353	(4.4)	382	(3.0)	430	(2.7)	536	(2.1)	582	(2.9)	608	(3.1)	200
Indonesia	264	(4.1)	289	(4.1)	331	(3.5)	436	(3.9)	492	(5.4)	528	(6.2)	203
Macao-China	408	(4.4)	439	(2.4)	491	(1.7)	599	(1.9)	643	(2.5)	669	(4.0)	204
Ireland	371	(4.4)	400	(3.8)	450	(2.7)	559	(2.2)	606	(2.6)	633	(2.7)	206
Malaysia	315	(4.4)	343	(3.9)	391	(3.4)	501	(3.9)	549	(4.5)	577	(5.3)	207
Argentina	280	(4.3)	306	(3.4)	354	(3.5)	463	(3.7)	514	(4.1)	545	(4.7)	207
Thailand	286	(4.1)	313	(3.7)	360	(3.1)	468	(4.0)	521	(5.2)	555	(6.3)	208
Estonia	386	(3.7)	415	(3.1)	464	(2.6)	576	(2.6)	623	(2.7)	650	(3.4)	209
Denmark	376	(3.3)	405	(3.2)	457	(2.9)	567	(2.5)	614	(2.9)	639	(3.5)	209
Saskatchewan	**350**	**(7.9)**	**379**	**(6.8)**	**428**	**(4.4)**	**542**	**(4.5)**	**589**	**(5.2)**	**618**	**(5.4)**	**210**
Newfoundland and Labrador	**348**	**(7.6)**	**379**	**(6.9)**	**432**	**(4.5)**	**542**	**(4.6)**	**589**	**(6.2)**	**617**	**(6.9)**	**210**
Finland	372	(5.1)	404	(3.8)	456	(3.1)	568	(2.4)	614	(2.9)	642	(3.5)	210
Kazakhstan	329	(5.8)	357	(4.9)	403	(4.7)	513	(5.1)	567	(6.3)	600	(7.4)	211
Nova Scotia	**360**	**(8.3)**	**390**	**(7.2)**	**440**	**(5.3)**	**554**	**(5.1)**	**602**	**(7.2)**	**632**	**(6.6)**	**211**
Peru	254	(3.5)	283	(2.6)	329	(2.7)	442	(4.0)	495	(4.3)	526	(4.5)	212
Turkey	291	(4.8)	317	(3.9)	363	(3.8)	477	(6.0)	529	(6.3)	559	(7.5)	212
Tunisia	235	(4.7)	263	(4.6)	310	(3.3)	421	(3.6)	476	(5.0)	510	(7.2)	213
Russian Federation	357	(5.5)	387	(4.6)	437	(3.4)	552	(3.4)	601	(3.8)	629	(4.2)	214
Manitoba	**354**	**(8.6)**	**382**	**(7.4)**	**433**	**(5.2)**	**545**	**(5.4)**	**597**	**(6.7)**	**624**	**(8.5)**	**214**
Vietnam	361	(5.9)	388	(5.4)	436	(4.7)	551	(4.9)	604	(6.9)	636	(8.3)	215
Jordan	238	(6.1)	271	(4.0)	324	(3.2)	439	(3.2)	489	(3.2)	519	(3.9)	219
British Columbia	**380**	**(8.5)**	**412**	**(6.0)**	**465**	**(6.2)**	**580**	**(5.7)**	**631**	**(6.5)**	**663**	**(7.8)**	**219**
Norway	359	(4.0)	391	(3.4)	444	(2.5)	561	(2.7)	610	(3.0)	638	(3.0)	219
Spain	342	(3.8)	374	(3.4)	428	(2.8)	546	(2.5)	593	(3.3)	621	(3.7)	220
Chile	284	(4.0)	313	(3.5)	363	(2.9)	483	(3.5)	534	(3.6)	563	(3.7)	221
Albania	272	(5.7)	303	(4.3)	354	(4.0)	472	(4.2)	525	(4.4)	556	(5.0)	221
New Brunswick	**351**	**(10.7)**	**380**	**(9.3)**	**432**	**(6.4)**	**553**	**(5.4)**	**602**	**(6.8)**	**628**	**(7.3)**	**223**
Alberta	**365**	**(8.0)**	**398**	**(6.5)**	**453**	**(5.8)**	**571**	**(5.3)**	**621**	**(5.6)**	**650**	**(6.2)**	**223**
Romania	305	(5.1)	334	(4.6)	384	(4.3)	502	(4.6)	557	(5.4)	590	(5.9)	223
Montenegro	279	(3.5)	308	(2.8)	358	(2.2)	477	(2.4)	531	(2.3)	563	(3.3)	223
Ontario	**365**	**(5.6)**	**395**	**(5.2)**	**450**	**(5.2)**	**570**	**(4.7)**	**619**	**(5.4)**	**649**	**(6.3)**	**224**
Uruguay	281	(3.5)	309	(2.7)	357	(3.3)	477	(3.4)	532	(3.6)	565	(5.2)	224
Lithuania	337	(3.8)	365	(3.8)	419	(3.0)	539	(2.9)	590	(3.5)	620	(4.0)	225
Poland	363	(4.5)	391	(4.1)	443	(3.0)	565	(3.0)	617	(3.6)	649	(4.8)	226
Quebec	**392**	**(7.0)**	**426**	**(6.0)**	**486**	**(5.8)**	**606**	**(6.0)**	**652**	**(6.5)**	**681**	**(6.9)**	**227**

Table B.2.4 (cont'd)

Variation in student performance for countries, economies, and provinces: 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	
Japan	381	(5.6)	416	(4.4)	474	(3.5)	594	(3.5)	643	(4.2)	672	(5.4)	227
Canada	**368**	**(3.7)**	**400**	**(3.2)**	**456**	**(2.9)**	**577**	**(2.6)**	**627**	**(3.2)**	**657**	**(3.6)**	**227**
Slovenia	363	(3.5)	394	(2.5)	449	(2.1)	572	(1.9)	622	(3.0)	651	(4.1)	228
Brazil	240	(3.0)	267	(3.3)	315	(3.1)	434	(3.7)	496	(4.7)	533	(5.5)	229
Croatia	322	(4.6)	351	(4.2)	402	(3.7)	525	(3.3)	580	(3.6)	612	(4.5)	229
United States	323	(4.7)	355	(3.9)	408	(3.9)	532	(3.5)	585	(4.2)	613	(5.0)	230
Germany	356	(4.9)	389	(4.1)	445	(3.5)	568	(3.4)	620	(3.4)	650	(3.9)	230
Hong Kong-China	389	(5.8)	426	(5.0)	490	(4.3)	611	(2.8)	659	(3.5)	687	(4.6)	232
Sweden	342	(5.0)	376	(4.4)	433	(3.8)	557	(4.0)	609	(3.9)	638	(4.7)	233
Moldova	271	(4.8)	303	(3.7)	358	(3.4)	482	(3.3)	536	(4.1)	568	(4.2)	233
Greece	306	(5.7)	336	(5.3)	391	(5.0)	517	(4.0)	570	(3.7)	598	(4.2)	234
Czech Republic	340	(4.8)	373	(4.2)	431	(3.4)	555	(2.9)	608	(3.6)	639	(4.4)	235
The Netherlands	356	(3.9)	390	(3.9)	449	(3.3)	579	(2.4)	627	(3.1)	655	(3.6)	237
New Zealand	342	(3.8)	375	(3.8)	431	(3.2)	560	(2.8)	613	(3.1)	646	(4.4)	238
United Kingdom	337	(4.3)	371	(3.7)	430	(3.2)	556	(3.1)	610	(3.1)	641	(4.0)	239
Georgia	250	(4.9)	285	(4.3)	341	(3.6)	467	(3.4)	525	(4.7)	559	(6.3)	240
Italy	334	(4.7)	368	(3.8)	426	(3.3)	555	(3.6)	610	(3.8)	640	(4.4)	241
Iceland	333	(3.9)	367	(3.6)	424	(3.0)	553	(2.7)	608	(4.0)	640	(4.3)	241
Cyprus	286	(3.4)	317	(3.5)	373	(2.2)	501	(2.2)	558	(3.0)	590	(3.9)	241
Australia	339	(2.8)	371	(2.5)	430	(2.0)	559	(2.1)	613	(2.8)	645	(3.3)	242
Luxembourg	334	(2.8)	363	(2.2)	417	(2.1)	553	(2.0)	607	(2.5)	638	(3.7)	244
Republic of Macedonia	217	(4.5)	251	(3.0)	306	(2.0)	434	(2.4)	496	(3.4)	533	(4.4)	245
Hungary	321	(4.0)	351	(4.1)	411	(3.7)	543	(3.2)	598	(3.5)	627	(4.0)	246
Singapore	399	(2.8)	436	(2.6)	500	(2.4)	632	(1.6)	682	(2.4)	711	(3.4)	247
Austria	337	(5.7)	370	(4.5)	431	(3.9)	564	(3.4)	618	(3.7)	648	(4.2)	247
Slovak Republic	312	(5.4)	349	(4.2)	412	(3.9)	543	(2.8)	596	(3.3)	625	(3.9)	247
Switzerland	358	(5.1)	394	(4.4)	455	(3.9)	590	(3.4)	641	(3.4)	671	(3.9)	247
Portugal	332	(4.4)	365	(3.8)	424	(3.1)	561	(2.8)	614	(3.6)	644	(4.1)	249
France	331	(4.5)	364	(3.9)	425	(3.3)	564	(2.6)	613	(2.7)	639	(3.3)	249
United Arab Emirates	275	(3.8)	306	(3.3)	360	(2.9)	493	(3.2)	557	(3.5)	593	(3.6)	251
Trinidad and Tobago	265	(3.6)	294	(3.0)	348	(2.4)	484	(2.1)	545	(3.3)	578	(3.5)	251
Bulgaria	284	(5.6)	315	(5.2)	371	(4.7)	509	(4.9)	568	(5.6)	601	(5.8)	253
Belgium	341	(4.4)	374	(3.9)	438	(3.5)	579	(2.5)	630	(2.5)	657	(2.7)	255
Korea	353	(5.9)	391	(5.5)	458	(4.5)	594	(4.2)	649	(4.3)	681	(4.8)	258
Qatar	248	(2.6)	278	(2.0)	331	(1.8)	470	(1.6)	536	(2.0)	573	(2.8)	258
Lebanon	236	(5.5)	268	(5.2)	324	(4.7)	464	(4.6)	531	(5.5)	568	(6.2)	263
Chinese Taipei	364	(4.4)	404	(4.2)	474	(3.6)	616	(3.6)	670	(4.6)	701	(6.2)	266
Israel	296	(5.3)	332	(4.7)	396	(4.3)	545	(4.3)	601	(4.9)	634	(6.1)	269
BSJG-China	351	(6.7)	388	(5.9)	458	(5.9)	609	(5.8)	664	(5.6)	695	(6.2)	276
Malta	289	(5.9)	331	(3.5)	405	(2.5)	558	(2.5)	616	(3.0)	648	(4.3)	285
OECD average	**340**	**(0.8)**	**373**	**(0.7)**	**428**	**(0.6)**	**553**	**(0.5)**	**605**	**(0.6)**	**634**	**(0.7)**	**232**

Note: Countries, economies, and provinces have been sorted in ascending order by the difference in score points between the 10th and 90th percentiles. BSJG-China represents Beijing, Shanghai, Jiangsu, and Guangdong. The coverage of Argentina, Kazakhstan, and Malaysia is too small to ensure comparability. See OECD, *PISA 2015 Results* for a note regarding Cyprus.

Table B.2.5

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

	Anglophone school system		Francophone school system		Difference between systems	
Canada and provinces	**Average**	**Standard error**	**Average**	**Standard error**	**Difference**	**Standard error**
Canada	**527**	**(2.7)**	**526**	**(4.7)**	**1**	**(5.6)**
Nova Scotia	519	(5.1)	462	(7.6)	57*	(9.2)
New Brunswick	509	(6.6)	493	(6.3)	16	(8.7)
Quebec	523	(6.0)	533	(5.3)	-10	(8.3)
Ontario	529	(4.5)	476	(5.0)	54*	(6.4)
Manitoba	501	(5.3)	461	(8.1)	40*	(9.6)
Alberta	534	(5.2)	487	(12.6)	46*	(14.5)
British Columbia	536	(5.6)	516	(14.9)	20	(14.6)

* Statistically significant differences.

Table B.2.6

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

	Anglophone school system		Francophone school system		Difference between systems	
Canada and provinces	**Average**	**Standard error**	**Average**	**Standard error**	**Difference**	**Standard error**
Canada	**509**	**(2.6)**	**542**	**(5.0)**	**-34***	**(5.5)**
Nova Scotia	497	(4.7)	491	(8.3)	7	(8.7)
New Brunswick	488	(5.8)	505	(7.3)	-17*	(8.5)
Quebec	505	(6.7)	549	(5.4)	-44*	(9.0)
Ontario	510	(4.4)	496	(6.5)	14	(7.8)
Manitoba	489	(4.5)	482	(8.9)	8	(10.7)
Alberta	512	(4.7)	503	(12.4)	8	(12.8)
British Columbia	522	(5.0)	531	(16.0)	-9	(16.9)

* Statistically significant differences.

Table B.2.7

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

	Females		Males		Difference (female-male)	
Canada and provinces	**Average**	**Standard error**	**Average**	**Standard error**	**Difference**	**Standard error**
Canada	**540**	**(2.5)**	**514**	**(2.6)**	**26***	**(2.1)**
Newfoundland and Labrador	514	(4.5)	496	(5.3)	18*	(6.8)
Prince Edward Island	534	(6.3)	497	(8.3)	36*	(8.6)
Nova Scotia	531	(5.3)	503	(6.0)	28*	(5.5)
New Brunswick	518	(4.9)	494	(7.0)	24*	(6.6)
Quebec	541	(5.0)	522	(5.9)	19*	(5.7)
Ontario	542	(4.7)	512	(4.8)	30*	(3.7)
Manitoba	512	(6.2)	486	(5.4)	26*	(5.8)
Saskatchewan	508	(4.5)	485	(4.0)	23*	(4.7)
Alberta	545	(6.1)	521	(5.2)	24*	(4.8)
British Columbia	549	(5.3)	522	(6.9)	27*	(4.9)

* Statistically significant differences.

Table B.2.8

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

	Females		Males		Difference (female-male)	
Canada and provinces	**Average**	**Standard error**	**Average**	**Standard error**	**Difference**	**Standard error**
Canada	**511**	**(2.6)**	**520**	**(2.9)**	**-9***	**(2.8)**
Newfoundland and Labrador	477	(3.8)	494	(5.0)	-17*	(6.3)
Prince Edward Island	499	(7.1)	499	(8.9)	0	(9.7)
Nova Scotia	494	(4.8)	500	(5.7)	-6	(5.3)
New Brunswick	490	(4.8)	495	(6.8)	-5	(6.1)
Quebec	538	(5.2)	550	(5.7)	-13*	(5.2)
Ontario	505	(4.7)	514	(4.7)	-8*	(4.2)
Manitoba	485	(5.4)	493	(4.6)	-8	(5.5)
Saskatchewan	479	(4.1)	489	(3.9)	-10	(5.5)
Alberta	506	(5.2)	517	(5.2)	-11*	(4.4)
British Columbia	517	(5.2)	527	(6.0)	-10*	(4.9)

* Statistically significant differences.

Table B.2.9a

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

	2000		2003		2006		2009		2012		2015	
Canada and provinces	Average	Standard error	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)**	**527**	**(7.2)**
Newfoundland and Labrador	517	(2.8)	521	(6.2)	514	(5.9)	506	(6.1)	503	(7.0)	505	(7.6)
Prince Edward Island	517	(2.4)	495*	(5.8)	497*	(5.7)	486*	(5.5)	490*	(6.5)	515	(9.1)
Nova Scotia	521	(2.3)	513	(5.8)	505*	(6.1)	516	(5.6)	508	(6.7)	517	(8.4)
New Brunswick	501	(1.8)	503	(5.6)	497	(5.5)	499	(5.5)	497	(6.5)	505	(8.6)
Quebec	536	(3.0)	525	(6.8)	522	(7.1)	522*	(5.8)	520*	(6.9)	532	(8.3)
Ontario	533	(3.3)	530	(6.4)	534	(6.8)	531	(5.8)	528	(7.4)	527	(8.1)
Manitoba	529	(3.5)	520	(6.3)	516	(6.1)	495*	(6.1)	495*	(6.8)	498*	(8.4)
Saskatchewan	529	(2.7)	512*	(6.8)	507*	(6.5)	504*	(6.0)	505*	(6.5)	496*	(7.7)
Alberta	550	(3.3)	543	(6.8)	535*	(6.5)	533*	(6.8)	525*	(7.2)	533	(8.6)
British Columbia	538	(2.9)	535	(5.9)	528	(7.5)	525	(6.5)	535	(7.4)	536	(8.8)

* Statistically significant differences compared with PISA 2000.

Note: The linkage error is incorporated into the standard error for 2003, 2006, 2009, 2012, and 2015. Also, for some provinces, the standard errors from 2000 to 2003, to 2006, and to 2009 differ from those in the previous PISA reports on trend results. These differences result from the change of the method used by the OECD to compute the linkage error.

Table B.2.9b

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

	2009		2012		2015	
Canada and provinces	Average	Standard error	Average	Standard error	Difference	Standard error
Canada	**524**	**(1.5)**	**523**	**(3.2)**	**527**	**(4.1)**
Newfoundland and Labrador	506	(3.7)	503	(4.5)	505	(4.9)
Prince Edward Island	486	(2.4)	490	(3.7)	515*	(7.0)
Nova Scotia	516	(2.7)	508	(4.0)	517	(6.0)
New Brunswick	499	(2.5)	497	(3.7)	505	(6.3)
Quebec	522	(3.1)	520	(4.4)	532	(5.8)
Ontario	531	(3.0)	528	(5.1)	527	(5.6)
Manitoba	495	(3.6)	495	(4.2)	498	(6.0)
Saskatchewan	504	(3.3)	505	(3.8)	496	(4.9)
Alberta	533	(4.6)	525	(4.8)	533	(6.2)
British Columbia	525	(4.2)	535	(5.2)	536	(6.5)

* Statistically significant differences compared with PISA 2009.

Note: The linkage error is incorporated into the standard error for 2012 and 2015.

Table B.2.10a

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

	2003		2006		2009		2012		2015	
Canada and provinces	Average	Standard error	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)**	**516***	**(6.1)**
Newfoundland and Labrador	517	(2.5)	507*	(2.8)	503*	(3.5)	490*	(4.2)	486*	(6.4)
Prince Edward Island	500	(2.0)	501	(2.7)	487*	(3.0)	479*	(3.2)	499	(8.5)
Nova Scotia	515	(2.2)	506*	(2.6)	512	(3.0)	497*	(4.5)	497*	(7.2)
New Brunswick	511	(1.4)	506	(2.5)	504*	(3.0)	502*	(3.2)	493*	(7.5)
Quebec	536	(4.5)	540	(4.4)	543	(4.0)	536	(3.9)	544	(7.4)
Ontario	530	(3.6)	526	(3.9)	526	(3.8)	514*	(4.5)	509*	(7.0)
Manitoba	528	(3.1)	521	(3.5)	501*	(4.1)	492*	(3.5)	489*	(7.0)
Saskatchewan	516	(3.9)	507	(3.6)	506	(3.8)	506	(3.6)	484*	(6.3)
Alberta	549	(4.3)	530*	(4.0)	529*	(4.8)	517*	(5.0)	511*	(7.3)
British Columbia	538	(2.4)	523*	(4.6)	523*	(5.0)	522*	(4.8)	522*	(7.5)

* Statistically significant differences compared with PISA 2003.

Note: The linkage error is incorporated into the standard error for 2006, 2009, 2012, and 2015. 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 result from the change of the method used by the OECD to compute the linkage error.

Table B.2.10b

Comparisons of performance, PISA 2012, Canada and the provinces: MATHEMATICS

	2012		2015	
Canada and provinces	Average	Standard error	difference	Standard error
Canada	**518**	**(1.8)**	**516**	**(4.2)**
Newfoundland and Labrador	490	(3.7)	486	(4.8)
Prince Edward Island	479	(2.5)	499*	(7.3)
Nova Scotia	497	(4.1)	497	(5.8)
New Brunswick	502	(2.6)	493	(6.2)
Quebec	536	(3.4)	544	(5.9)
Ontario	514	(4.1)	509	(5.5)
Manitoba	492	(2.9)	489	(5.5)
Saskatchewan	506	(3.0)	484*	(4.6)
Alberta	517	(4.6)	511	(5.9)
British Columbia	522	(4.4)	522	(6.1)

* Statistically significant differences compared with PISA 2012.

Note: The linkage error is incorporated into the standard error for 2015.

Table B.3.1

Multiple comparisons of achievement for countries, economies, and provinces: SCIENCE

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 Ontario from the left-hand column. Its performance is below that of Alberta, British Columbia, and Quebec; the same as that of Canada, Nova Scotia, and Prince Edward Island; 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	Alberta	British Columbia	Quebec	Canada	Ontario	Nova Scotia	Prince Edward Island	New Brunswick	Newfoundland and Labrador	Manitoba	Saskatchewan
Singapore	556	(1.2)	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Alberta	**541**	**(4.0)**				▲	▲	▲	▲	▲	▲	▲	▲
British Columbia	**539**	**(4.3)**				▲	▲	▲	▲	▲	▲	▲	▲
Japan	538	(3.0)				▲	▲	▲	▲	▲	▲	▲	▲
Quebec	**537**	**(4.7)**				▲	▲	▲	▲	▲	▲	▲	▲
Estonia	534	(2.1)				▲	▲	▲	▲	▲	▲	▲	▲
Chinese Taipei	532	(2.7)						▲	▲	▲	▲	▲	▲
Finland	531	(2.4)	▼					▲	▲	▲	▲	▲	▲
Macao-China	529	(1.1)	▼	▼				▲	▲	▲	▲	▲	▲
Canada	**528**	**(2.1)**	▼	▼	▼			▲	▲	▲	▲	▲	▲
Vietnam	525	(3.9)	▼	▼	▼					▲	▲	▲	▲
Ontario	**524**	**(3.9)**	▼	▼	▼					▲	▲	▲	▲
Hong Kong-China	523	(2.5)	▼	▼	▼					▲	▲	▲	▲
BSJG-China	518	(4.6)	▼	▼	▼						▲	▲	▲
Nova Scotia	**517**	**(4.5)**	▼	▼	▼	▼					▲	▲	▲
Korea	516	(3.1)	▼	▼	▼	▼					▲	▲	▲
Prince Edward Island	**515**	**(5.4)**	▼	▼	▼	▼						▲	▲
New Zealand	513	(2.4)	▼	▼	▼	▼	▼					▲	▲
Slovenia	513	(1.3)	▼	▼	▼	▼	▼				▲	▲	▲
Australia	510	(1.5)	▼	▼	▼	▼	▼					▲	▲
United Kingdom	509	(2.6)	▼	▼	▼	▼	▼						▲
Germany	509	(2.7)	▼	▼	▼	▼	▼						▲
The Netherlands	509	(2.3)	▼	▼	▼	▼	▼						▲
New Brunswick	**506**	**(4.5)**	▼	▼	▼	▼	▼						
Newfoundland and Labrador	**506**	**(3.2)**	▼	▼	▼	▼	▼	▼					▲
Switzerland	506	(2.9)	▼	▼	▼	▼	▼	▼					▲
Ireland	503	(2.4)	▼	▼	▼	▼	▼	▼	▼				
Belgium	502	(2.3)	▼	▼	▼	▼	▼	▼	▼				
Denmark	502	(2.4)	▼	▼	▼	▼	▼	▼	▼				
Poland	501	(2.5)	▼	▼	▼	▼	▼	▼	▼				
Portugal	501	(2.4)	▼	▼	▼	▼	▼	▼	▼				
Manitoba	**499**	**(4.7)**	▼	▼	▼	▼	▼	▼	▼				
Norway	498	(2.3)	▼	▼	▼	▼	▼	▼	▼				
United States	496	(3.2)	▼	▼	▼	▼	▼	▼	▼		▼		
Saskatchewan	**496**	**(3.1)**	▼	▼	▼	▼	▼	▼	▼		▼		
Austria	495	(2.4)	▼	▼	▼	▼	▼	▼	▼	▼	▼		
France	495	(2.1)	▼	▼	▼	▼	▼	▼	▼	▼	▼		
Sweden	493	(3.6)	▼	▼	▼	▼	▼	▼	▼	▼	▼		
Czech Republic	493	(2.3)	▼	▼	▼	▼	▼	▼	▼	▼	▼		
Spain	493	(2.1)	▼	▼	▼	▼	▼	▼	▼	▼	▼		
Latvia	490	(1.6)	▼	▼	▼	▼	▼	▼	▼	▼	▼		
Russian Federation	487	(2.9)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼

Table B.3.1 (cont'd)

Multiple comparisons of achievement for countries, economies, and provinces: SCIENCE

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 Ontario from the left-hand column. Its performance is below that of Alberta, British Columbia, and Quebec; the same as that of Canada, Nova Scotia, and Prince Edward Island; 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	Alberta	British Columbia	Quebec	Canada	Ontario	Nova Scotia	Prince Edward Island	New Brunswick	Newfoundland and Labrador	Manitoba	Saskatchewan
Luxembourg	483	(1.1)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Italy	481	(2.5)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Hungary	477	(2.4)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Lithuania	475	(2.7)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Croatia	475	(2.5)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Iceland	473	(1.7)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Israel	467	(3.4)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Malta	465	(1.6)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Slovak Republic	461	(2.6)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Greece	455	(3.9)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Chile	447	(2.4)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Bulgaria	446	(4.4)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
United Arab Emirates	437	(2.4)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Uruguay	435	(2.2)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Romania	435	(3.2)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Cyprus	433	(1.4)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Moldova	428	(2.0)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Albania	427	(3.3)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Turkey	425	(3.9)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Trinidad and Tobago	425	(1.4)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Thailand	421	(2.8)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Costa Rica	420	(2.1)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Qatar	418	(1.0)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Colombia	416	(2.4)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Mexico	416	(2.1)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Montenegro	411	(1.0)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Georgia	411	(2.4)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Jordan	409	(2.7)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Indonesia	403	(2.6)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Brazil	401	(2.3)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Peru	397	(2.4)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Lebanon	386	(3.4)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Tunisia	386	(2.1)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Republic of Macedonia	384	(1.2)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Kosovo	378	(1.7)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Algeria	376	(2.6)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Dominican Republic	332	(2.6)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼

Note: Significance tests were not adjusted for multiple comparisons. Five per cent of the comparisons would be statistically significant by chance alone. The results of Argentina, Kazakhstan, and Malaysia are excluded because of insufficient coverage to ensure comparability (see Appendix B.1.2 for these results).