Education
Quality and
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Office

Organisation for Economic Co-operation and Development
Programme for International Student Assessment and Youth in Transition Survey

2003 Ontario Report

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Introduction

The Organisation for Economic Co-operation and Development (OECD) is interested in understanding what makes young people, as well as education systems, succeed. To this end, OECD member countries developed the Programme for International Student Assessment (PISA), an assessment tool that monitors student achievement. Human Resources Development Canada, the Council of Ministers of Education, Canada and Statistics Canada collaborated to coordinate a Canadian PISA and to administer the assessment simultaneously with the Youth in Transition Survey (YITS).

What Is PISA?

PISA is designed to provide international indicators of the skills and knowledge of 15-year-old students. It aims to assess the degree to which students approaching the end of their compulsory education have acquired the knowledge and skills essential for full participation in society. Three PISA cycles have been planned, each focusing on a different literacy domain: reading literacy (2000), mathematical literacy (2003) and scientific literacy (2006).

What Is YITS?

YITS is a Canadian survey designed to examine the patterns of major transitions in young people's lives—particularly those between education, training and work—and the effects of these transitions on young people. YITS examines key transitions in the lives of youth, such as the transition from high school to post-secondary education, from schooling to the labour market or from the labour market to schooling. The survey is of two different age groups—a 15-year-old cohort and an 18- to 20-year-old cohort.

Participants

Forty-one countries participated in PISA 2003. In most countries, between 5000 and 10 000 youth aged 15 and from at least 150 schools participated. A total of close to 272 000 students participated worldwide. The data from the following 40 countries are included in this report. (The United Kingdom is not included, as it had some difficulties with the administration of the PISA 2003 assessment.)

Australia	Greece	Liechtenstein	Serbia and Montenegro
Austria	Hong Kong—China	Luxembourg	Slovak Republic
Belgium	Hungary	Macao—China	Spain
Brazil	Iceland	Mexico	Sweden
Canada	Indonesia	Netherlands	Switzerland
Czech Republic	Ireland	New Zealand	Thailand
Denmark	Italy	Norway	Tunisia
Finland	Japan	Poland	Turkey
France	Korea	Portugal	United States
Germany	Latvia	Russian Federation	Uruguay

The Canadian Context

In Canada, approximately 28 000 students from the 10 provinces participated. A large Canadian sample was drawn, so that estimates could be provided at both the national and provincial levels. Sufficient data were collected from both official language groups in Manitoba, Ontario, Quebec, New Brunswick and Nova Scotia to provide information on the achievement of Canadian students by school-system language. In Ontario, more than 3000 students from 138 English-language and French-language schools participated in the assessment.

Data Sources

PISA 2003 included a two-hour assessment of mathematics, reading and science skills. Students completed a 30-minute questionnaire that provided background information on factors contributing to student achievement. Finally, PISA 2003 included a questionnaire for school principals that collected information about characteristics of the school.

In addition to the assessment and questionnaire, a 20-minute contextual YITS questionnaire was administered to students to collect more information on their school experiences, their work activities and their relationships with others. As well, Statistics Canada conducted a 30-minute interview with a parent of each youth involved in PISA/YITS.

The PISA Domains

The assessment measured three domains: mathematical literacy, reading literacy and scientific literacy. In addition, PISA 2003 measured problem-solving skills. The domains were defined by international experts, who emphasized functional knowledge and skills that allow active participation in society.

> *Mathematical literacy:* an individual's capacity to identify and understand the role that mathematics plays in the world, to make well-founded judgments and to use and engage with mathematics in ways that meet the needs of that individual's life as a constructive, concerned and reflective citizen.
>
> *Reading literacy:* an individual's capacity to understand, use and reflect on written texts, in order to achieve one's goals, to develop one's knowledge and potential and to participate in society.
>
> *Scientific literacy:* an individual's capacity to use scientific knowledge, to identify questions and to draw evidence-based conclusions in order to understand and help make decisions about the natural world and the changes made to it through human activity.
>
> *Problem-solving skills:* an individual's capacity to use cognitive processes to confront and resolve real, cross-disciplinary situations where the solution path is not immediately obvious and where the literacy domains or curricular areas that might be applicable are not within a single domain of mathematics, science or reading. [1]

Reporting Scales

The performance of the students was expressed as a score on a scale from 0 to 1000. The average score for students in all participating OECD countries was 500 and the standard deviation was 100. This means that, internationally, about two-thirds of students scored between 400 and 600 on the scale.

Mathematics achievement was divided into six levels. In order to reach a given level, a student had to answer correctly the majority of items at that level. Therefore, a student at a given level could be assumed to be able to answer questions correctly at all lower levels. To help in interpretation, these levels were linked to specific score ranges on the original scale. The abilities associated with each proficiency level are described below.

Level 6 (score above 668)

At Level 6, students can conceptualise, generalise, and utilise information based on their investigations and modelling of complex problem situations. They can link different information sources and representations and flexibly translate among them. Students at this level are capable of advanced mathematical thinking and reasoning. These students can apply this insight and understandings along with a mastery of symbolic and formal mathematical operations and relationships to develop new approaches and strategies for attacking novel situations. Student at this level can formulate and precisely communicate their actions and reflections regarding their findings, interpretations, arguments, and the appropriateness of these to the original situations.

Level 5 (score from 607 to 668)

At Level 5, students can develop and work with models for complex situations, identifying constraints and specifying assumptions. They can select, compare, and evaluate appropriate problem-solving strategies for dealing with complex problems related to these models. Students at this level can work strategically using broad, well-developed thinking and reasoning skills, appropriate linked representations, symbolic and formal characterisations, and insight pertaining to these situations. They can reflect on their actions and formulate and communicate their interpretations and reasoning.

Level 4 (score from 545 to 606)

At Level 4, students can work effectively with explicit models for complex concrete situations that may involve constraints or call for making assumptions. They can select and integrate different representations, including symbolic, linking them directly to aspects of 22 real-world situations. Students at this level can utilise well-developed skills and reason flexibly, with some insight, in these contexts. They can construct and communicate explanations and arguments based on their interpretations, arguments, and actions.

Level 3 (score from 483 to 544)

At Level 3, students can execute clearly described procedures, including those that require sequential decisions. They can select and apply simple problem-solving strategies. Students at this level can interpret and use representations based on different information sources and reason directly from them. They can develop short communications reporting their interpretations, results, and reasoning.

Level 2 (score from 421 to 482)

At Level 2, students can interpret and recognise situations in contexts that require no more than direct inference. They can extract relevant information from a single source and make use of a single representational mode. Students at this level can employ basic algorithms, formulae, procedures, or conventions. They are capable of direct reasoning and making literal interpretations of the results.

Level 1 (score from 359 to 420)

At Level 1, students can answer questions involving familiar contexts where all relevant information is present and the questions are clearly defined. They are able to identify information and to carry out routine procedures according to direct instructions in explicit situations. They can perform actions that are obvious and follow immediately from the given stimuli. [2]

Below Level 1 (score below 358)

Students performing below Level 1 are not able to show routinely the most basic type of knowledge and skills that PISA seeks to measure. Such students have serious difficulties in using mathematics as a tool to advance their knowledge and skills in other areas. Placement at this level does not mean that these students have no mathematical literacy. Most of these students are able to complete correctly some of the PISA items. Their pattern of responses to the assessment is such that they would be expected to solve fewer than half the tasks from a test composed of only Level 1 items.

Scope

Mathematics performance as measured by PISA involved more than the ability to perform mathematics computations. The assessment items also emphasized mathematical knowledge put to functional use in a variety of situations and contexts. This emphasis was reflected in PISA's definition of mathematics: "an individual's capacity to identify and understand the role that mathematics plays in the world, to make well-founded judgments and to use and engage with mathematics in ways that meet the needs of that individual's life as a constructive, concerned and reflective citizen."[3]

Because mathematics was the major emphasis of PISA 2003, the results are presented not only in terms of students' overall mathematics performance but also in terms of the four content areas measured across the range of mathematics 15-year-old students need as a foundation for life and for further studies in mathematics. The OECD definitions of the four content areas for mathematics can be found in Appendix C.

Test Structure

The assessment was a pencil-and-paper test made up of multiple-choice, short answer, complex multiple-choice and open, constructed-response questions. The items were based on a passage describing a real-life situation. The major component of the PISA 2003 assessment was mathematics, which permitted reporting in the four content areas. The test was also made up of a reading, a science and a problem-solving component; however, since the number of test items was relatively small, each of these subject areas was reported with a single score.

A few examples of PISA 2003 mathematics, reading, science and problem-solving test items can be found in Appendix B of this report.

Curriculum Match

Half of the PISA 2003 test items matched the Ontario mathematics Grades 7 and 8 curricula. A few items, about 12%, reflected the Grade 9 curriculum. The remaining items matched the Grades 3 to 6 curricula. Appendix C shows the match-up. Some elements of *The Ontario Curriculum* were not directly assessed in PISA.

Achievement Results

- Ontario 15-year-old students were part of a cluster of jurisdictions near the top in reading literacy, mathematical literacy and the content areas of scientific literacy and problem solving.

- Only Alberta, Finland and Hong Kong—China performed significantly better than Ontario in mathematics overall.

- Alberta and Finland performed significantly better than Ontario in reading.

- Alberta, Finland, Hong Kong—China, Japan and Korea performed significantly better than Ontario in science.

- Alberta, Finland, Hong Kong—China, Japan and Korea performed significantly better than Ontario in problem solving.

- In all components of the assessment, Ontario students performed significantly better than the international average.

- Ontario performed the same as Canada in all components of the assessment. This is an improvement over PISA 2000, when Canada performed better then Ontario in mathematics.

- In overall mathematics achievement, boys outperformed girls in most jurisdictions. This trend was also observed in Ontario.

- The observed trend of girls outperforming boys in reading was maintained in PISA 2003 for all jurisdictions except Liechtenstein. In Ontario, the difference between girls' and boys' performance was among the smallest among all participating jurisdictions.

- For science achievement, there was no significant difference between girls' and boys' performance for most countries or provinces. Manitoba, Ontario and Nova Scotia were the provinces with a significant difference, favouring the boys.

- In all provinces except Ontario, students enrolled in minority-language education systems performed at the same level in mathematics overall as the students enrolled in the majority-language education system. In reading and science, Ontario, Manitoba, Nova Scotia and New Brunswick francophone students performed significantly lower then their anglophone counterparts. Francophone students in Ontario, Nova Scotia and New Brunswick performed lower then their anglophone counterparts in problem solving. The minority-language population in Québec performed the same as the majority language students.

More information about 15-year-old students' achievement in reading, mathematics, science and problem solving can be found in Appendix A.

Achievement Charts

The PISA results for other countries and for Canada's provinces are compared with Ontario's overall English- and French-language results; the charts show the jurisdictions that performed the same as, higher than or lower than Ontario. Within these categories, jurisdictions are listed in alphabetical order.

Countries' and Provinces' Overall Mathematics Achievement Compared to Ontario's*

Higher Than Ontario	Same As Ontario	Lower Than Ontario
Alberta 549 (4.3)	Australia 524 (2.1)	Austria 506 (3.3)
Finland 544 (1.9)	Belgium 529 (2.3)	Brazil 356 (4.8)
Hong Kong—China 550 (4.5)	*British Columbia 538 (2.4)*	Denmark 514 (2.7)
	Canada 532 (1.8)	France 511 (2.5)
	Czech Republic 516 (3.5)	Germany 503 (3.3)
	Japan 534 (4.0)	Greece 445 (3.9)
	Korea 542 (3.2)	Hungary 490 (2.8)
	Liechtenstein 536 (4.1)	Iceland 515 (1.4)
	Macao—China 527 (2.9)	Indonesia 360 (3.9)
	Manitoba 528 (3.1)	Ireland 503 (2.4)
	Newfoundland and Labrador 517 (2.5)	Italy 466 (3.1)
	New Zealand 523 (2.3)	Latvia 483 (3.7)
	Netherlands 538 (3.1)	Luxembourg 493 (1.0)
	Ontario 530 (3.6)	Mexico 385 (3.6)
	Ontario (E) 531 (3.6)	*New Brunswick 512 (1.8)*
	Quebec 537 (4.7)	Norway 495 (2.4)
	Saskatchewan 516 (3.9)	*Nova Scotia 515 (2.2)*
	Switzerland 527(3.4)	***Ontario (F) 504 (4.3)***
		Poland 490 (2.5)
		Portugal 466 (3.4)
		Prince Edward Island 500 (2.0)
		Russian Federation 468 (4.2)
		Serbia and Montenegro (Ser.) 437 (3.8)
		Slovak Republic 498 (3.3)
		Spain 485 (2.4)
		Sweden 509 (2.6)
		Thailand 417 (3.0)
		Tunisia 359 (2.5)
		Turkey 423 (6.7)
		United States 483 (2.9)
		Uruguay 422 (3.3)

* Mathematics achievement scale scores are provided for each jurisdiction; standard error statistics are provided in parentheses. The 95% confidence interval for each jurisdiction can be calculated by first multiplying the standard error by 1.96, then adding and subtracting the resulting statistic to and from each reported mean score. This means that we can be 95% sure (19 times out of 20) that the true mean for a given jurisdiction lies within the confidence interval. If the confidence intervals of two jurisdictions overlap, we can conclude there is no significant difference in their achievement scores.

The achievement scale scores and standard error statistics in the above chart are rounded figures. The international mean is 500.

Countries' and Provinces' Mathematics Achievement, by Subtest Score, Compared to Ontario's*

Space and Shape

Higher Than Ontario	Same As Ontario	Lower Than Ontario
Alberta 534 (4.3)	Australia 521 (2.3)	Brazil 350 (4.1)
Belgium 530 (2.3)	Austria 515 (3.5)	Greece 437 (3.8)
Finland 539 (2.0)	*British Columbia 523 (2.6)*	Hungary 479 (3.3)
Hong Kong—China 558 (4.8)	*Canada 518 (1.8)*	Indonesia 361 (3.7)
Japan 553 (4.3)	Czech Republic 527 (4.1)	Ireland 476 (2.4)
Korea 552 (3.8)	Denmark 512 (2.8)	Italy 470 (3.1)
Liechtenstein 538 (4.6)	France 508 (3.0)	Latvia 486 (4.0)
Macao—China 528 (3.3)	Germany 500 (3.3)	Luxembourg 488 (1.4)
Switzerland 540 (3.5)	Iceland 504 (1.5)	Mexico 382 (3.2)
	Manitoba 513 (3.5)	*New Brunswick 498 (1.7)*
	Netherlands 526 (2.9)	*Newfoundland and Labrador 498 (2.7)*
	New Zealand 525 (2.3)	Norway 483 (2.5)
	Ontario 512 (3.6)	*Nova Scotia 498 (2.4)*
	Ontario (E) 513 (3.7)	***Ontario (F) 491(4.9)***
	Quebec 528 (4.5)	Poland 490 (2.7)
	Saskatchewan 500 (3.7)	Portugal 450 (3.4)
	Slovak Republic 505 (4.0)	*Prince Edward Island 480 (2.5)*
		Russian Federation 474 (4.7)
		Serbia and Montenegro (Ser.) 432 (3.9)
		Spain 476 (2.6)
		Sweden 498 (2.6)
		Thailand 424 (3.3)
		Tunisia 359 (2.6)
		Turkey 417 (6.3)
		United States 472 (2.8)
		Uruguay 412 (3.0)

* Mathematics subtest achievement scale scores are provided for each jurisdiction; standard error statistics are provided in parentheses. The 95% confidence interval for each jurisdiction can be calculated by first multiplying the standard error by 1.96, then adding and subtracting the resulting statistic to and from each reported mean score. This means that we can be 95% sure (19 times out of 20) that the true mean for a given jurisdiction lies within the confidence interval. If the confidence intervals of two jurisdictions overlap, we can conclude there is no significant difference in their achievement scores.

The achievement scale scores and standard error statistics in the above chart are rounded figures. The international mean is 500.

Countries' and Provinces' Mathematics Achievement, by Subtest Score, Compared to Ontario's* (Continued)

Change and Relationships

Higher Than Ontario	Same As Ontario	Lower Than Ontario
Alberta 554 (4.4)	Australia 525 (2.3)	Austria 500 (3.6)
Netherlands 551 (3.1)	Belgium 535 (2.4)	Brazil 333 (6.0)
	British Columbia 543 (2.5)	Czech Republic 515 (3.5)
	Canada 537 (1.9)	Denmark 509 (3.0)
	Finland 543 (2.2)	France 520 (2.6)
	Hong Kong—China 540 (4.7)	Germany 507 (3.7)
	Japan 536 (4.3)	Greece 436 (4.3)
	Korea 548 (3.5)	Hungary 495 (3.1)
	Liechtenstein 540 (3.7)	Iceland 509 (1.4)
	Manitoba 532 (3.2)	Indonesia 334 (4.6)
	New Zealand 526 (2.4)	Ireland 506 (2.4)
	Newfoundland and Labrador 521 (2.6)	Italy 452 (3.2)
	Ontario 536 (3.8)	Latvia 487 (4.4)
	Ontario (E) 537 (3.9)	Luxembourg 487 (1.2)
	Quebec 538 (5.0)	Macao—China 519 (3.5)
	Saskatchewan 520 (4.1)	Mexico 364 (4.1)
	Switzerland 523 (3.7)	*New Brunswick 513 (1.9)*
		Norway 488 (2.6)
		Nova Scotia 517 (2.2)
		Ontario (F) 505 (4.8)
		Poland 484 (2.7)
		Portugal 468 (4.0)
		Prince Edward Island 502 (2.0)
		Russian Federation 477 (4.6)
		Serbia and Montenegro (Ser.) 419 (4.0)
		Slovak Republic 494 (3.5)
		Spain 481 (2.8)
		Sweden 505 (2.9)
		Thailand 405 (3.4)
		Tunisia 337 (2.8)
		Turkey 423 (7.6)
		United States 486 (3.0)
		Uruguay 417 (3.6)

* Mathematics subtest achievement scale scores are provided for each jurisdiction; standard error statistics are provided in parentheses. The 95% confidence interval for each jurisdiction can be calculated by first multiplying the standard error by 1.96, then adding and subtracting the resulting statistic to and from each reported mean score. This means that we can be 95% sure (19 times out of 20) that the true mean for a given jurisdiction lies within the confidence interval. If the confidence intervals of two jurisdictions overlap, we can conclude there is no significant difference in their achievement scores.

The achievement scale scores and standard error statistics in the above chart are rounded figures. The international mean is 500.

Countries' and Provinces' Mathematics Achievement, by Subtest Score, Compared to Ontario's[*] (Continued)

Quantity

Higher Than Ontario	Same As Ontario	Lower Than Ontario
Alberta 545 (4.0)	Australia 517 (2.1	Austria 513 (3.0)
Finland 549 (1.8)	Belgium 530 (2.3)	Brazil 360 (5.0)
Hong Kong – China 545 (4.2)	*British Columbia 533 (2.3)*	France 507 (2.5)
	Canada 528 (1.8)	Greece 446 (4.0)
	Czech Republic 528 (3.5)	Hungary 496 (2.7)
	Denmark 516 (2.6)	Iceland 513 (1.5)
	Germany 514 (3.4)	Indonesia 357 (4.3)
	Japan 527 (3.8)	Ireland 502 (2.5)
	Korea 537 (3.0)	Italy 475 (3.4)
	Liechtenstein 534 (4.1)	Latvia 482 (3.6)
	Macao—China 533 (3.0)	Luxembourg 501 (1.1)
	Manitoba 523 (3.2)	Mexico 394 (3.9)
	Netherlands 528 (3.1)	*New Brunswick 507 (2.1)*
	Ontario 526 (3.8)	New Zealand 511 (2.2)
	Ontario (E) 527 (3.8)	*Newfoundland and Labrador 512 (2.6)*
	Quebec 531 (4.7)	Norway 494 (2.2)
	Switzerland 533 (3.1)	*Nova Scotia 511 (2.2)*
		Ontario (F) 501 (4.5)
		Poland 492 (2.5)
		Portugal 465 (3.5)
		Prince Edward Island 496 (2.2)
		Russian Federation 472 (4.0)
		Saskatchewan 513 (3.9)
		Serbia and Montenegro (Ser.) 456 (3.8)
		Slovak Republic 513 (3.4)
		Spain 492 (2.5)
		Sweden 514 (2.5)
		Thailand 415 (3.1)
		Tunisia 364 (2.8)
		Turkey 413 (6.8)
		United States 476 (3.2)
		Uruguay 430 (3.2)

[*] Mathematics subtest achievement scale scores are provided for each jurisdiction; standard error statistics are provided in parentheses. The 95% confidence interval for each jurisdiction can be calculated by first multiplying the standard error by 1.96, then adding and subtracting the resulting statistic to and from each reported mean score. This means that we can be 95% sure (19 times out of 20) that the true mean for a given jurisdiction lies within the confidence interval. If the confidence intervals of two jurisdictions overlap, we can conclude there is no significant difference in their achievement scores.

The achievement scale scores and standard error statistics in the above chart are rounded figures. The international mean is 500.

Countries' and Provinces' Mathematics Achievement, by Subtest Score, Compared to Ontario's[*] (Continued)

Uncertainty

Higher Than Ontario	Same As Ontario	Lower Than Ontario
Hong Kong—China 558 (4.6)	*Alberta 556 (4.4)* Australia 531 (2.2) *British Columbia 550 (2.4)* *Canada 542 (1.8)* Finland 545 (2.1) Japan 528 (3.9) Korea 538 (3.0) Macao—China 532 (3.2) *Manitoba 538 (3.0)* Netherlands 549 (3.0) New Zealand 532 (2.3) *Newfoundland and Labrador 530 (2.5)* ***Ontario 540 (3.6)*** ***Ontario (E) 541 (3.7)*** *Quebec 542 (4.8)*	Austria 494 (3.1) Belgium 526 (2.2) Brazil 377 (3.9) Czech Republic 500 (3.1) Denmark 516 (2.8) France 506 (2.4) Germany 493 (3.3) Greece 458 (3.5) Hungary 489 (2.6) Iceland 528 (1.5) Indonesia 385 (2.9) Ireland 517 (2.6) Italy 463 (3.0) Latvia 474 (3.3) Liechtenstein 523 (3.7) Luxembourg 492 (1.1) Mexico 390 (3.3) *New Brunswick 523 (1.8)* Norway 513 (2.6) *Nova Scotia 528 (2.2)* ***Ontario (F) 512 (4.4)*** Poland 494 (2.3) Portugal 471 (3.4) *Prince Edward Island 515 (2.2)* Russian Federation 436 (4.0) *Saskatchewan 526 (4.0)* Serbia and Montenegro (Ser.) 428 (3.5) Slovak Republic 476 (3.2) Spain 489 (2.4) Sweden 511 (2.7) Switzerland 517 (3.3) Thailand 423 (2.5) Tunisia 363 (2.3) Turkey 443 (6.2) United States 491 (3.0) Uruguay 419 (3.1)

[*] Mathematics subtest achievement scale scores are provided for each jurisdiction; standard error statistics are provided in parentheses. The 95% confidence interval for each jurisdiction can be calculated by first multiplying the standard error by 1.96, then adding and subtracting the resulting statistic to and from each reported mean score. This means that we can be 95% sure (19 times out of 20) that the true mean for a given jurisdiction lies within the confidence interval. If the confidence intervals of two jurisdictions overlap, we can conclude there is no significant difference in their achievement scores.

The achievement scale scores and standard error statistics in the above chart are rounded figures. The international mean is 500.

Countries' and Provinces' Reading Achievement Compared to Ontario's*

Higher Than Ontario	Same As Ontario	Lower Than Ontario
Alberta 543 (4.3)	Australia 525 (2.1)	Austria 491 (3.8)
Finland 543 (1.6)	*British Columbia 535 (2.5)*	Belgium 507 (2.6)
	Canada 528 (1.7)	Brazil 403 (4.6)
	Ireland 515 (2.6)	Czech Republic 489 (3.5)
	Korea 534 (3.1)	Denmark 492 (2.8)
	Liechtenstein 525 (3.6)	France 496 (2.7)
	Manitoba 520 (3.3)	Germany 491 (3.4)
	New Zealand 522 (2.5)	Greece 472 (4.1)
	Newfoundland and Labrador 521 (3.2)	Hong Kong—China 510 (3.7)
	Ontario 530 (3.5)	Hungary 482 (2.5)
	Ontario (E) 531 (3.6)	Iceland 492 (1.6)
	Quebec 525 (4.3)	Indonesia 382 (3.4)
		Italy 476 (3.0)
		Japan 498 (3.9)
		Latvia 491 (3.7)
		Luxembourg 479 (1.5)
		Macao—China 498 (2.2)
		Mexico 400 (4.1)
		Netherlands 513 (2.9)
		New Brunswick 503 (2.1)
		Norway 500 (2.8)
		Nova Scotia 513 (2.3)
		Ontario (F) 495 (4.8)
		Poland 497 (2.9)
		Portugal 478 (3.7)
		Prince Edward Island 495 (2.3)
		Russian Federation 442 (3.9)
		Saskatchewan 512 (4.2)
		Serbia and Montenegro (Ser.) 412 (3.6)
		Slovak Republic 469 (3.1)
		Spain 481 (2.6)
		Sweden 514 (2.4)
		Switzerland 499 (3.3)
		Thailand 420 (2.8)
		Tunisia 375 (2.8)
		Turkey 441 (5.8)
		United States 495 (3.2)
		Uruguay 434 (3.4)

* Reading achievement scale scores are provided for each jurisdiction; standard error statistics are provided in parentheses. The 95% confidence interval for each jurisdiction can be calculated by first multiplying the standard error by 1.96, then adding and subtracting the resulting statistic to and from each reported mean score. This means that we can be 95% sure (19 times out of 20) that the true mean for a given jurisdiction lies within the confidence interval. If the confidence intervals of two jurisdictions overlap, we can conclude there is no significant difference in their achievement scores.

The achievement scale scores and standard error statistics in the above chart are rounded figures. The international mean is 500.

Countries' and Provinces' Science Achievement Compared to Ontario's*

Higher Than Ontario	Same As Ontario	Lower Than Ontario
Alberta 539 (5.6)	Australia 525 (2.1)	Austria 491 (3.4)
Finland 548 (1.9)	Belgium 509 (2.5)	Brazil 390 (4.3)
Hong Kong—China 539 (4.3)	*British Columbia 527 (2.8)*	Denmark 475 (3.0)
Japan 548 (4.1)	*Canada 519 (2.0)*	Greece 481 (3.8)
Korea 538 (3.5)	Czech Republic 523 (3.4)	Iceland 495 (1.5)
	France 511 (3.0)	Indonesia 395 (3.2)
	Germany 502 (3.6)	Italy 486 (3.1)
	Hungary 503 (2.8)	Latvia 489 (3.9)
	Ireland 505 (2.7)	Luxembourg 483 (1.5)
	Liechtenstein 525 (4.3)	Mexico 405 (3.5)
	Macao—China 525 (3.0)	*New Brunswick 498 (2.2)*
	Manitoba 512 (3.7)	Norway 484 (2.9)
	Netherlands 524 (3.1)	***Ontario (F) 479 (4.7)***
	New Zealand 521 (2.4)	Poland 498 (2.9)
	Newfoundland and Labrador 514 (2.9)	Portugal 468 (3.5)
	Nova Scotia 505 (2.4)	*Prince Edward Island 489 (2.6)*
	Ontario 515 (3.9)	Russian Federation 489 (4.1)
	Ontario (E) 517 (3.6)	Serbia and Montenegro (Ser.) 436 (3.5)
	Quebec 520 (5.2)	Slovak Republic 495 (3.7)
	Saskatchewan 506 (4.6)	Spain 487 (2.6)
	Sweden 506 (2.7)	Thailand 429 (2.7)
	Switzerland 513 (3.7)	Tunisia 385 (2.6)
		Turkey 434 (5.9)
		United States 491 (3.1)
		Uruguay 438 (2.9)

* Science achievement scale scores are provided for each jurisdiction; standard error statistics are provided in parentheses. The 95% confidence interval for each jurisdiction can be calculated by first multiplying the standard error by 1.96, then adding and subtracting the resulting statistic to and from each reported mean score. This means that we can be 95% sure (19 times out of 20) that the true mean for a given jurisdiction lies within the confidence interval. If the confidence intervals of two jurisdictions overlap, we can conclude there is no significant difference in their achievement scores.

The achievement scale scores and standard error statistics in the above chart are rounded figures. The international mean is 500.

Countries' and Provinces' Problem-Solving Achievement Compared to Ontario's*

Higher Than Ontario	Same As Ontario	Lower Than Ontario
Alberta 546 (4.3)	Australia 530 (2.0)	Austria 506 (3.2)
Finland 548 (1.9)	*British Columbia 536 (2.4)*	Belgium 510 (2.4)
Hong Kong—China 548 (4.2)	*Canada 529 (1.7)*	Brazil 371 (4.8)
Japan 547 (4.1)	Czech Republic 516 (3.4)	Germany 513 (3.2)
Korea 550 (3.1)	Denmark 517 (2.5)	Greece 449 (4.0)
	France 519 (2.7)	Hungary 501 (2.9)
	Liechtenstein 529 (3.9)	Iceland 505 (1.4)
	Macao—China 532 (2.5)	Indonesia 361 (3.3)
	Manitoba 527 (2.9)	Ireland 498 (2.3)
	Netherlands 520 (3.0)	Italy 470 (3.1)
	New Zealand 533 (2.2)	Latvia 483 (3.9)
	Newfoundland and Labrador 517 (3.2)	Luxembourg 494 (1.4)
	Ontario 527 (3.4)	Mexico 384 (4.3)
	Ontario (E) 528 (3.3)	*New Brunswick 508 (2.2)*
	Quebec 531 (4.3)	Norway 490 (2.6)
	Saskatchewan 516 (4.0)	*Nova Scotia 514 (2.3)*
	Switzerland 521 (3.0)	***Ontario (F) 506 (4.1)***
		Poland 487 (2.8)
		Portugal 470 (3.9)
		Prince Edward Island 498 (2.2)
		Russian Federation 479 (4.6)
		Serbia and Montenegro (Ser.) 420 (3.3)
		Slovak Republic 492 (3.4)
		Spain 482 (2.7)
		Sweden 509 (2.4)
		Thailand 425 (2.7)
		Tunisia 345 (2.1)
		Turkey 408 (6.0)
		United States 477 (3.1)
		Uruguay 411 (3.7)

* Problem solving achievement scale scores are provided for each jurisdiction; standard error statistics are provided in parentheses. The 95% confidence interval for each jurisdiction can be calculated by first multiplying the standard error by 1.96, then adding and subtracting the resulting statistic to and from each reported mean score. This means that we can be 95% sure (19 times out of 20) that the true mean for a given jurisdiction lies within the confidence interval. If the confidence intervals of two jurisdictions overlap, we can conclude there is no significant difference in their achievement scores.

The achievement scale scores and standard error statistics in the above chart are rounded figures. The international mean is 500.

Appendix A

In the following tables, all statistically significant differences are in bold.

Average Mathematics, Reading, Science and Problem-Solving Scores by Province and Language of the School System

Domain Province	English-Language School System		French-Language School System	
	Average	(SE)	Average	(SE)
Mathematics—combined				
Nova Scotia	515	(2.2)	500	(7.6)
New Brunswick	514	(2.0)	505	(3.1)
Quebec	541	(5.4)	536	(5.3)
Ontario	**531**	(3.6)	**505**	(4.3)
Manitoba	528	(3.1)	522	(5.2)
Mathematics—space and shape				
Nova Scotia	498	(2.3)	485	(7.8)
New Brunswick	498	(2.1)	495	(3.4)
Quebec	526	(5.4)	528	(5.5)
Ontario	**513**	(3.9)	**491**	(4.8)
Manitoba	513	(3.3)	509	(5.8)
Mathematics—change and relationships				
Nova Scotia	**518**	(2.4)	**497**	(8.6)
New Brunswick	**516**	(2.1)	**505**	(3.3)
Quebec	543	(5.3)	536	(5.0)
Ontario	**537**	(3.7)	**505**	(4.9)
Manitoba	532	(3.5)	522	(7.0)
Mathematics—quantity				
Nova Scotia	511	(2.2)	495	(7.3)
New Brunswick	509	(2.0)	500	(3.1)
Quebec	535	(5.3)	530	(5.3)
Ontario	**527**	(3.7)	**500**	(4.4)
Manitoba	523	(3.1)	516	(5.4)
Mathematics—uncertainty				
Nova Scotia	528	(2.3)	514	(8.6)
New Brunswick	**527**	(2.3)	**514**	(3.5)
Quebec	547	(5.4)	541	(5.2)
Ontario	**541**	(3.8)	**512**	(4.5)
Manitoba	538	(3.3)	531	(6.2)
Reading				
Nova Scotia	**514**	(2.2)	**467**	(6.9)
New Brunswick	**510**	(2.2)	**485**	(3.9)
Quebec	530	(5.2)	524	(5.2)
Ontario	**531**	(3.7)	**495**	(4.8)
Manitoba	**521**	(3.3)	**494**	(6.8)
Science				
Nova Scotia	**506**	(2.4)	**465**	(7.7)
New Brunswick	**505**	(2.2)	**480**	(3.7)
Quebec	523	(5.4)	518	(5.4)
Ontario	**517**	(3.6)	**479**	(4.7)
Manitoba	**513**	(3.2)	**490**	(7.1)
Problem solving				
Nova Scotia	**514**	(2.0)	**493**	(7.0)
New Brunswick	**511**	(2.0)	**497**	(3.2)
Quebec	538	(4.6)	529	(5.1)
Ontario	**528**	(3.3)	**504**	(4.1)
Manitoba	527	(3.1)	516	(5.9)

Gender Differences (Overall Mathematics Achievement) for Countries and Provinces

	Females		Males		Difference (M—F)	
Countries and Provinces	**Mean Score**	**(SE)**	**Mean Score**	**(SE)**	**Score Dif.**	**(SE)**
Alberta	544	(4.2)	554	(5.3)	**10**	(4.4)
Australia	522	(2.7)	527	(3.0)	5	(3.8)
Austria	502	(4.0)	509	(4.0)	8	(4.4)
Belgium	525	(3.2)	533	(3.4)	8	(4.8)
Brazil	348	(4.4)	365	(6.1)	**16**	(4.1)
British Columbia	534	(2.2)	542	(3.4)	**8**	(3.2)
Canada	530	(1.9)	541	(2.1)	**11**	(2.1)
Czech Republic	509	(4.4)	524	(4.3)	**15**	(5.1)
Denmark	506	(3.0)	523	(3.4)	**17**	(3.2)
Finland	541	(2.1)	548	(2.5)	**7**	(2.7)
France	507	(2.9)	515	(3.6)	**9**	(4.2)
Germany	499	(3.9)	508	(4.0)	**9**	(4.4)
Greece	436	(3.8)	455	(4.8)	**19**	(3.6)
Hong Kong—China	548	(4.6)	552	(6.5)	4	(6.6)
Hungary	486	(3.3)	494	(3.3)	**8**	(3.5)
Iceland	523	(2.2)	508	(2.3)	–15	(3.5)
Indonesia	358	(4.6)	362	(3.9)	3	(3.4)
Ireland	495	(3.4)	510	(3.0)	**15**	(4.2)
Italy	457	(3.8)	475	(4.6)	**18**	(5.9)
Japan	530	(4.0)	539	(5.8)	8	(5.9)
Korea	528	(5.3)	552	(4.4)	**23**	(6.8)
Latvia	482	(3.6)	485	(4.8)	3	(4.0)
Liechtenstein	521	(6.3)	550	(7.2)	**29**	(10.9)
Luxembourg	485	(1.5)	502	(1.9)	**17**	(2.8)
Macao—China	517	(3.3)	538	(4.8)	**21**	(5.8)
Manitoba	521	(3.9)	535	(4.1)	**14**	(5.0)
Mexico	380	(4.1)	391	(4.3)	**11**	(3.9)
Netherlands	535	(3.5)	540	(4.1)	5	(4.3)
New Brunswick	509	(1.9)	515	(2.7)	**6**	(2.9)
New Zealand	516	(3.2)	531	(2.8)	**14**	(3.9)
Newfoundland and Labrador	512	(3.0)	522	(3.5)	**10**	(4.2)
Norway	492	(2.9)	498	(2.8)	6	(3.2)
Nova Scotia	509	(2.9)	521	(3.0)	**11**	(3.9)
OECD average	496	(0.8)	508	(0.7)	**13**	(0.8)
Ontario	524	(3.6)	536	(4.6)	**11**	(4.0)
Poland	487	(2.9)	493	(3.0)	6	(3.1)
Portugal	460	(3.4)	472	(4.2)	**12**	(3.3)
Prince Edward Island	501	(2.7)	500	(3.3)	–1	(4.5)
Quebec	534	(4.7)	541	(5.7)	7	(4.6)
Russian Federation	463	(4.2)	473	(5.3)	**10**	(4.4)
Saskatchewan	518	(4.2)	515	(4.4)	–3	(3.7)
Serbia and Montenegro (Ser.)	436	(4.5)	437	(4.2)	1	(4.4)
Slovak Republic	489	(3.6)	507	(3.9)	**19**	(3.7)
Spain	481	(2.2)	490	(3.4)	**9**	(3.0)
Sweden	506	(3.1)	512	(3.0)	**7**	(3.3)
Switzerland	518	(3.6)	535	(4.7)	**17**	(4.9)
Thailand	419	(3.4)	415	(4.0)	– 4	(4.2)
Tunisia	353	(2.9)	365	(2.7)	**12**	(2.5)
Turkey	415	(6.7)	430	(7.9)	**15**	(6.2)
United States	480	(3.2)	486	(3.3)	**6**	(2.9)
Uruguay	416	(3.8)	428	(4.0)	**12**	(4.2)

Gender Differences (Reading) for Countries and Provinces

	Females		Males		Difference (M—F)	
Countries and Provinces	**Mean Score**	**(SE)**	**Mean Score**	**(SE)**	**Score Dif.**	**(SE)**
Alberta	559	(4.4)	527	(5.3)	**– 33**	(4.5)
Australia	545	(2.6)	506	(2.8)	**– 39**	(3.6)
Austria	514	(4.2)	467	(4.5)	**– 47**	(5.2)
Belgium	526	(3.3)	489	(3.8)	**– 37**	(5.1)
Brazil	419	(4.1)	384	(5.8)	**– 35**	(3.9)
British Columbia	551	(2.6)	519	(3.5)	**– 32**	(3.7)
Canada	546	(1.8)	514	(2.0)	**– 32**	(2.0)
Czech Republic	504	(4.4)	473	(4.1)	**– 31**	(4.9)
Denmark	505	(3.0)	479	(3.3)	**– 25**	(2.9)
Finland	565	(2.0)	521	(2.2)	**– 44**	(2.7)
France	514	(3.2)	476	(3.8)	**– 38**	(4.5)
Germany	513	(3.9)	471	(4.2)	**– 42**	(4.6)
Greece	490	(4.0)	453	(5.1)	**– 37**	(4.1)
Hong Kong—China	525	(3.5)	494	(5.3)	**– 32**	(5.5)
Hungary	498	(3.0)	467	(3.2)	**– 31**	(3.8)
Iceland	522	(2.2)	464	(2.3)	– 58	(3.5)
Indonesia	394	(3.9)	369	(3.4)	**– 24**	(2.8)
Ireland	530	(3.7)	501	(3.3)	**– 29**	(4.6)
Italy	495	(3.4)	455	(5.1)	**– 39**	(6.0)
Japan	509	(4.1)	487	(5.5)	**– 22**	(5.4)
Korea	547	(4.3)	525	(3.7)	**– 21**	(5.6)
Latvia	509	(3.7)	470	(4.5)	**– 39**	(4.2)
Liechtenstein	534	(6.5)	517	(7.2)	– 17	(11.9)
Luxembourg	496	(1.8)	463	(2.6)	**– 33**	(3.4)
Macao—China	504	(2.8)	491	(3.6)	**– 13**	(4.8)
Manitoba	535	(3.7)	505	(4.7)	**– 29**	(5.1)
Mexico	410	(4.6)	389	(4.6)	**– 21**	(4.4)
Netherlands	524	(3.2)	503	(3.7)	**– 21**	(3.9)
New Brunswick	523	(2.0)	483	(2.8)	**– 40**	(3.0)
New Zealand	535	(3.3)	508	(3.1)	**– 28**	(4.4)
Newfoundland and Labrador	538	(3.9)	503	(4.0)	**– 34**	(4.9)
Norway	525	(3.4)	475	(3.4)	– 49	(3.7)
Nova Scotia	529	(3.3)	497	(3.1)	**– 32**	(4.5)
OECD average	477	(0.7)	511	(0.7)	– 34	(0.8)
Ontario	542	(3.6)	517	(4.4)	**– 25**	(4.1)
Poland	516	(3.2)	477	(3.6)	**– 40**	(3.7)
Portugal	495	(3.7)	459	(4.3)	**– 36**	(3.3)
Prince Edward Island	517	(2.8)	469	(3.7)	**– 48**	(4.8)
Quebec	542	(4.2)	508	(5.5)	**– 34**	(4.6)
Russian Federation	456	(3.7)	428	(4.7)	**– 29**	(3.9)
Saskatchewan	535	(4.3)	489	(4.7)	**– 46**	(3.8)
Serbia and Montenegro (Ser.)	433	(3.9)	390	(3.7)	**– 43**	(3.9)
Slovak Republic	486	(3.3)	453	(3.8)	**– 33**	(3.5)
Spain	500	(2.5)	461	(3.8)	**– 39**	(3.9)
Sweden	533	(2.9)	496	(2.8)	**– 37**	(3.2)
Switzerland	517	(3.1)	482	(4.4)	**– 35**	(4.7)
Thailand	439	(3.0)	396	(3.7)	**– 43**	(4.1)
Tunisia	387	(3.3)	362	(3.3)	**– 25**	(3.6)
Turkey	459	(6.1)	426	(6.8)	**– 33**	(5.8)
United States	511	(3.5)	479	(3.7)	**– 32**	(3.3)
Uruguay	453	(3.7)	414	(4.5)	**– 39**	(4.7)

Gender Differences (Science) for Countries and Provinces

	Females		Males		Difference (M—F)	
Countries and Provinces	**Mean Score**	**(SE)**	**Mean Score**	**(SE)**	**Score Dif.**	**(SE)**
Alberta	535	(5.1)	543	(7.1)	8	(5.5)
Australia	525	(2.8)	525	(2.9)	0	(3.8)
Austria	492	(4.2)	490	(4.3)	– 3	(5.0)
Belgium	509	(3.5)	509	(3.6)	0	(5.0)
Brazil	387	(4.3)	393	(5.3)	6	(3.9)
British Columbia	522	(3.2)	532	(4.0)	10	(4.7)
Canada	516	(2.2)	527	(2.3)	**11**	(2.6)
Czech Republic	520	(4.1)	526	(4.3)	6	(4.9)
Denmark	467	(3.2)	484	(3.6)	**17**	(3.2)
Finland	551	(2.2)	545	(2.6)	**– 6**	(2.8)
France	511	(3.5)	511	(4.1)	0	(4.8)
Germany	500	(4.2)	506	(4.5)	6	(4.8)
Greece	475	(3.9)	487	(4.8)	**12**	(4.2)
Hong Kong—China	541	(4.2)	538	(6.1)	– 3	(6.0)
Hungary	504	(3.3)	503	(3.3)	– 1	(3.7)
Iceland	500	(2.4)	490	2.4	**– 10**	(3.8)
Indonesia	394	(3.8)	396	(3.1)	1	(2.7)
Ireland	504	(3.9)	506	(3.1)	2	(4.5)
Italy	484	(3.6)	490	(5.2)	6	(6.3)
Japan	546	(4.1)	550	(6.0)	4	(6.0)
Korea	527	(5.5)	546	(4.7)	**18**	(7.0)
Latvia	491	(3.9)	487	(5.1)	– 4	(4.7)
Liechtenstein	512	(7.3)	538	(7.7)	**26**	(12.5)
Luxembourg	477	(1.9)	489	(2.5)	**13**	(3.3)
Macao—China	521	(4.0)	529	(5.0)	8	(6.8)
Manitoba	504	(4.0)	521	(5.2)	**17**	(5.6)
Mexico	400	(4.2)	410	(3.9)	**9**	(4.1)
Netherlands	522	(3.6)	527	(4.2)	5	(4.7)
New Brunswick	495	(2.6)	501	(3.1)	6	(3.6)
New Zealand	513	(3.4)	529	(3.0)	**16**	(4.2)
Newfoundland and Labrador	510	(3.6)	518	(4.3)	9	(5.5)
Norway	483	(3.3)	485	(3.5)	2	(3.6)
Nova Scotia	500	(3.4)	511	(3.4)	**11**	(4.8)
OECD average	497	(0.8)	503	(0.7)	**6**	(0.9)
Ontario	510	(4.1)	521	(5.1)	**11**	(4.8)
Poland	494	(3.4)	501	(3.2)	**7**	(3.3)
Portugal	465	(3.6)	471	(4.0)	**6**	(3.2)
Prince Edward Island	489	(3.1)	488	(4.6)	– 1	(5.7)
Quebec	516	(5.2)	523	(6.3)	7	(4.9)
Russian Federation	485	(4.0)	494	(5.3)	**9**	(4.3)
Saskatchewan	508	(4.8)	503	(5.2)	– 5	(4.1)
Serbia and Montenegro (Ser.)	439	(4.2)	434	(3.7)	– 5	(3.8)
Slovak Republic	487	(3.9)	502	(4.3)	**15**	(3.7)
Spain	485	(2.6)	489	(3.9)	4	(3.9)
Sweden	504	(3.5)	509	(3.1)	5	(3.6)
Switzerland	508	(3.9)	518	(5.0)	**10**	(5.0)
Thailand	433	(3.1)	425	(3.7)	– 8	(4.2)
Tunisia	390	(3.0)	380	(2.7)	**– 10**	(2.6)
Turkey	434	(6.4)	434	(6.7)	0	(5.8)
United States	489	(3.5)	494	(3.5)	5	(3.3)
Uruguay	436	(3.6)	441	(3.7)	4	(4.4)

Gender Differences (Problem Solving) for Countries and Provinces

Countries and Provinces	Females Mean Score	(SE)	Males Mean Score	(SE)	Difference (M—F) Score Dif.	(SE)
Alberta	546	(4.4)	547	(5.3)	1	(4.8)
Australia	533	(2.5)	527	(2.7)	-6	(3.3)
Austria	508	(3.8)	505	(3.9)	-3	(4.3)
Belgium	527	(3.2)	524	(3.1)	-3	(4.5)
Brazil	368	(4.3)	374	(6.0)	5	(3.7)
British Columbia	537	(2.2)	535	(3.5)	-2	(3.5)
Canada	532	(1.8)	533	(2.0)	0	(2.1)
Czech Republic	513	(4.3)	520	(4.1)	7	(5.0)
Denmark	514	(2.9)	519	(3.1)	5	(3.2)
Finland	553	(2.2)	543	(2.5)	**-10**	(3.0)
France	520	(2.9)	519	(3.8)	-1	(4.1)
Germany	517	(3.7)	511	(3.9)	-6	(3.9)
Greece	448	(4.1)	449	(4.9)	2	(4.4)
Hong Kong - China	550	(4.0)	545	(6.2)	-5	(6.3)
Hungary	503	(3.4)	499	(3.4)	-4	(3.7)
Iceland	520	(2.5)	490	2.2	**-30**	(3.9)
Indonesia	365	(4.0)	358	(3.1)	**7**	(3.0)
Ireland	498	(3.5)	499	(2.8)	1	(4.2)
Italy	471	(3.5)	467	(5.0)	-4	(6.0)
Japan	548	(4.1)	546	(5.7)	-2	(5.7)
Korea	546	(4.8)	554	(4.0)	8	(6.1)
Latvia	484	(4.0)	481	(5.1)	-3	(4.6)
Liechtenstein	524	(5.9)	535	(6.6)	12	(9.8)
Luxembourg	492	(1.9)	495	(2.4)	2	(3.3)
Macao - China	527	(3.2)	538	(4.3)	**11**	(5.5)
Manitoba	525	(3.7)	529	(4.4)	3	(5.7)
Mexico	382	(4.7)	387	(5.0)	5	(4.5)
Netherlands	518	(3.6)	522	(3.6)	4	(4.1)
New Brunswick	511	(2.1)	504	(3.3)	-6	(3.3)
New Zealand	534	(3.1)	531	(2.6)	-3	(3.8)
Newfoundland and Labrador	518	(3.9)	516	(4.2)	-2	(4.8)
Norway	494	(3.2)	486	(3.1)	**-8**	(3.6)
Nova Scotia	515	(3.3)	513	(3.0)	-2	(4.2)
OECD average	501	(0.8)	499	(0.7)	**-2**	(0.8)
Ontario	527	(3.4)	528	(4.3)	1	(3.9)
Poland	487	(3.0)	486	(3.4)	-1	(3.1)
Portugal	470	(3.9)	470	(4.6)	0	(3.5)
Prince Edward Island	503	(2.8)	491	(3.7)	**-13**	(4.8)
Quebec	532	(4.2)	530	(5.4)	-3	(4.4)
Russian Federation	477	(4.4)	480	(5.9)	2	(4.9)
Saskatchewan	524	(4.4)	508	(4.6)	**-16**	(4.2)
Serbia and Montenegro (Ser.)	424	(3.9)	416	(3.8)	-7	(4.1)
Slovak Republic	488	(3.6)	495	(4.1)	7	(3.7)
Spain	485	(2.6)	479	(3.6)	-6	(3.1)
Sweden	514	(2.8)	504	(3.0)	**-10**	(3.1)
Switzerland	523	(3.3)	520	(4.0)	-2	(4.1)
Thailand	431	(3.1)	418	(3.9)	**-12**	(4.3)
Tunisia	343	(2.5)	346	(2.5)	3	(2.6)
Turkey	406	(5.8)	408	(7.3)	2	(5.8)
United States	478	(3.5)	477	(3.4)	-1	(3.0)
Uruguay	409	(4.2)	412	(4.6)	3	(4.8)

Comparison of Average Performance in Selected Mathematics Content Areas, Reading and Science PISA 2000 and PISA 2003 for Canada and the Provinces

Domain Province	**PISA 2000 Mean score**	**(SE)**	**PISA 2003 Mean score**	**(SE)**
Mathematics—space and shape				
Newfoundland and Labrador	489	(3.8)	498	(2.7)
Prince Edward Island	**500**	(4.3)	**480**	(2.5)
Nova Scotia	498	(3.6)	498	(2.3)
New Brunswick	497	(3.7)	498	(1.4)
Quebec	536	(2.3)	528	(4.3)
Ontario	504	(3.2)	512	(3.6)
Manitoba	517	(4.9)	513	(3.4)
Saskatchewan	507	(3.6)	500	(3.6)
Alberta	523	(3.5)	534	(4.2)
British Columbia	519	(3.0)	523	(2.6)
Canada	515	(1.5)	518	(1.8)
Mathematics—change and relationships				
Newfoundland and Labrador	**497**	(3.1)	**521**	(2.6)
Prince Edward Island	506	(3.4)	502	(2.0)
Nova Scotia	505	(2.8)	513	(1.4)
New Brunswick	**497**	(2.3)	**517**	(2.2)
Quebec	529	(2.6)	538	(4.7)
Ontario	**513**	(2.7)	**536**	(3.8)
Manitoba	523	(4.1)	532	(4.1)
Saskatchewan	517	(3.0)	520	(3.2)
Alberta	**533**	(3.0)	**554**	(4.4)
British Columbia	**525**	(2.9)	**543**	(2.5)
Canada	**520**	(1.3)	**537**	(1.9)
Reading				
Newfoundland and Labrador	517	(2.8)	521	(3.0)
Prince Edward Island	**517**	(2.4)	**495**	(2.1)
Nova Scotia	521	(2.3)	513	(2.1)
New Brunswick	501	(1.8)	503	(1.5)
Quebec	536	(3.0)	525	(4.5)
Ontario	533	(3.3)	530	(3.6)
Ontario (E)	535	(3.4)	531	(3.7)
Ontario (F)	474	(7.4)	495	(4.8)
Manitoba	529	(3.5)	520	(3.2)
Saskatchewan	**529**	(2.7)	**512**	(4.0)
Alberta	550	(3.3)	543	(4.4)
British Columbia	538	(2.9)	535	(2.4)
Canada	534	(1.6)	528	(1.7)
Science				
Newfoundland and Labrador	516	(3.4)	514	(3.2)
Prince Edward Island	**508**	(2.7)	**489**	(2.4)
Nova Scotia	516	(3.0)	505	(2.3)
New Brunswick	497	(2.3)	498	(1.7)
Quebec	**541**	(3.4)	**520**	(4.6)
Ontario	522	(3.4)	515	(3.5)
Ontario (E)	524	(3.6)	517	(3.6)
Ontario (F)	479	(7.3)	479	(4.7)
Manitoba	**527**	(3.6)	**512**	(3.1)
Saskatchewan	**522**	(3.0)	**506**	(4.1)
Alberta	546	(3.5)	539	(5.1)
British Columbia	533	(3.2)	527	(2.6)
Canada	**529**	(1.6)	**519**	(2.0)

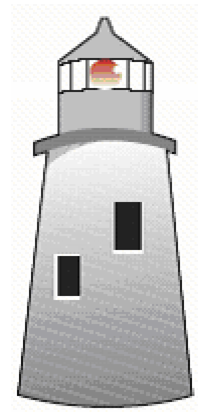
Appendix B

Sample Test Items

Appendix B provides a few examples of PISA 2003 mathematics, reading and science test items. For each item, the subskill or subdomain assessed is given together with the expected or target performance level (of the six levels of reading proficiency). Additional PISA example items can be viewed at the Canadian PISA Web site, www.pisa.gc.ca.

Mathematics Example Item 1

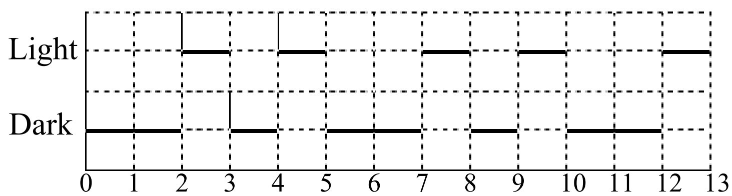
Lighthouse



Lighthouses are towers with a light beacon on top. Lighthouses assist sea ships in finding their way at night when they are sailing close to the shore.

A lighthouse beacon sends out light flashes with a regular fixed pattern. Every lighthouse has its own pattern.

In the diagram below you see the pattern of a certain lighthouse. The light flashes alternate with dark periods.



It is a regular pattern. After some time the pattern repeats itself. The time taken by one complete cycle of a pattern, before it starts to repeat, is called the *period*. When you find the period of a pattern, it is easy to extend the diagram for the next seconds or minutes or even hours.

Question 1: Which of the following could be the period of the pattern of this light house?

A. 2 seconds.
B. 3 seconds.
C. 5 seconds.
D. 12 seconds.

Scoring and comments

Full credit:

Code 1: Response C: 5 seconds.

No Credit:

Code 0: Other responses.

Item type: Multiple– choice
Competency cluster: Connections
Overarching idea: Change and relationships
Situation: Public

Question 2: For how many seconds does the lighthouse send out light flashes in 1 minute?

A. 4
B. 12
C. 20
D. 24.

Scoring and comments

Full credit:

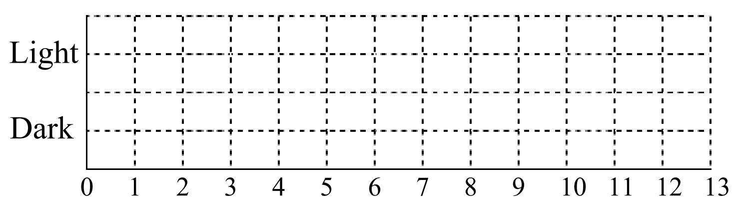
Code 1: Response D: 24

No Credit:

Code 0: Other responses.

Item type: Multiple– choice
Competency cluster: Connections
Overarching idea: Change and relationships
Situation: Public

Question 3: In the diagram below, make a graph of a possible pattern of light flashes of a lighthouse that sends out light flashes for 30 seconds per minute. The period of this pattern must be equal to 6 seconds.



Scoring and comments

Full credit

Code 2: Answers in which the graph shows a pattern of light and dark with flashes for 3 seconds in every 6 seconds, and with a period of 6 seconds. This can be done in the following ways:

- 1 one– second flash and 1 two– second flash (and this can be shown in several ways), or
- 1 three– second flash (which can be shown in four different ways).
- If 2 periods are shown, the pattern must be identical for each period.

Partial Credit

Code 1: Answers in which the graph shows a pattern of light and dark with flashes for 3 seconds in every 6 seconds, but the period is not 6 seconds. If 2 periods are shown, the pattern must be identical for each period.

- 3 one– second flashes, alternating with 3 one– second dark periods.

No Credit:

Code 0: Other answers.

Item type: Open constructed– response
Competency cluster: Reflection
Overarching idea: Change and relationships
Situation: Public

Mathematics Example Item 2

Payment by Area

People living in an apartment building decide to buy the building. They will put their money together in such a way that each will pay an amount that is proportional to the size of their apartment.

For example, a man living in an apartment that occupies one fifth of the floor area of all apartments will pay one fifth of the total price of the building.

Question 1: Circle Correct or Incorrect for each of the following statements.

Statement	Correct / Incorrect
A person living in the largest apartment will pay more money for each square metre of his apartment than the person living in the smallest apartment.	Correct / Incorrect
If we know the areas of two apartments and the price of one of them we can calculate the price of the second.	Correct / Incorrect
If we know the price of the building and how much each owner will pay, then the total area of all apartments can be calculated.	Correct / Incorrect
If the total price were reduced by 10%, each of the owners would pay 10% less.	Correct / Incorrect

Scoring and Comments

Full credit:

Code 1: Answers which specify: Incorrect, Correct, Incorrect, Correct, in this order.

No Credit:

Code 0: Any other combination of answers.

Item type: Complex multiple– choice
Competency cluster: Connections
Overarching idea: Change and relationships
Situation: Public

Question 2: There are three apartments in the building. The largest, apartment 1, has a total area of $95m^2$. Apartment 2 and 3 have areas of 85 m^2 and 70 m^2 respectively. The selling price for the building is 3000 000 zeds.

How much should the owner of apartment 2 pay? Show your work.

Scoring and Comments

Full credit

Code 2: Answers which specify 102 000 zeds, with or without the calculation shown. Unit not required.

- Apartment 2: 102 000 zeds
- Apt. 2: 85/250 x 300 000 = 102 000 zeds
- 300 000/250 = 1200 zeds for each square metre, so apartment 2 is 102 000.

Partial Credit

Code 1: Answers in students applied the correct method, but present minor computational errors.

- Apt. 2: 85/250 x 300 000 = 10 200 zeds

No Credit:

Code 0: Other answers.

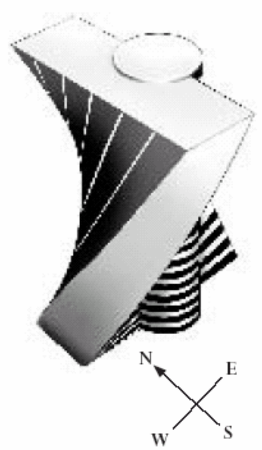
Item type: Open constructed– response
Competency cluster: Connections
Overarching idea: Quantity
Situation: Public

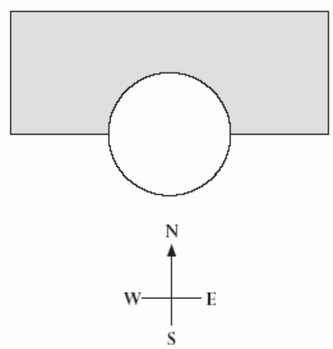
Mathematics Example Item 3

Twisted Building

In modern architecture, buildings often have unusual shapes. The picture below shows a computer model of a "twisted building" and a plan of the ground floor.

The compass points show the orientation of the building.





The ground floor of the building contains the main entrance and has rooms for shops. Above the ground floor there are 20 stories containing apartments.

The plan of each storey is similar to the plan of the ground floor, but each has a slightly different orientation from the storey below. The cylinder contains the elevator shaft and a landing on each floor.

Question 1: Estimate the total height of the building in metres. Explain how you found your answer.

Scoring and Comments

Full credit

Code 2: Answers ranging from 50 to 90 metres, accompanied buy a correct explanation. For example:

- One floor of the building has a height of about 2.5 metres. There is some extra room between floors. Therefore an estimate is 21 x 3 = 63 metres.
- Allow 4 m for each story. 20 of these equals 80 m, plus 10 m for the ground floor, gives a total of 90 m.

Partial Credit

Code 1: Answers which present the correct calculation method and explanation, but using 20 stories instead of 21. For example:

- Each apartment could be 3.5 metres high; 20 stories of 3.5 metres gives a total height of 70 m.

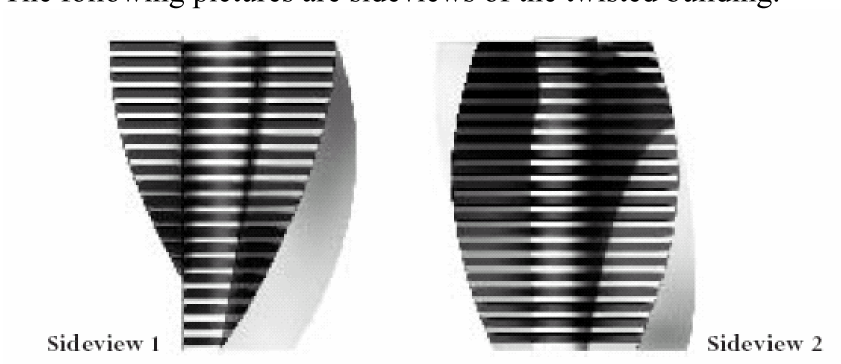
No Credit:

Code 0: Other answers, including answers without explanation, answers with other incorrect numbers of floors, and answers with unreasonable estimates of the height of each floor (4 m would be the upper limit).

- Each floor is around 5 m high, so 5 x 21 equals 105 metres.
- 60 m.

Item type: Open constructed– response
Competency cluster: Connections
Overarching idea: Space and shape
Situation: Public

The following pictures are sideviews of the twisted building.



Question 2: From which direction has Sideview 1 been drawn?

A. From the North.
B. From the West.
C. From the East.
D. From the South.

Scoring and Comments

Full credit:

Code 1: Response C: From the East

No Credit:

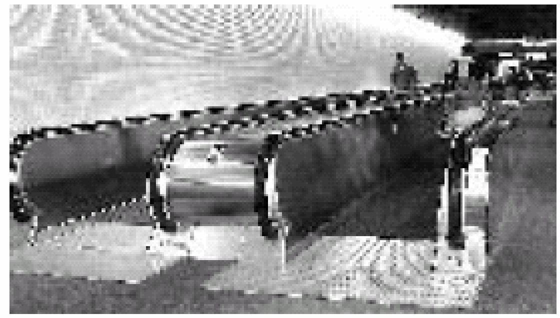
Code 0: Other responses.

Item type: Multiple– choice
Competency cluster: Connections
Overarching idea: Space and shape
Situation: Public

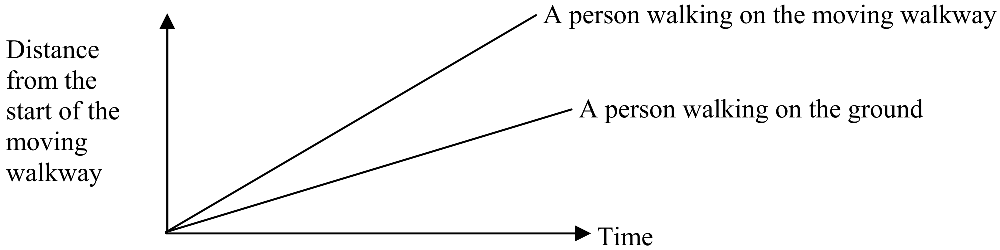
Mathematics Example Item 4

Moving Walkways

On the right is a photograph of moving walkways.



The following Distance– Time graph shows a comparison between "walking on the moving walkway" and "walking on the ground next to the moving walkway."

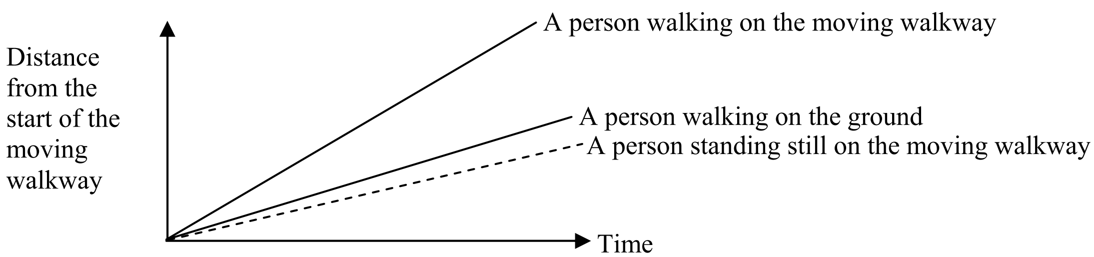


Question 1: Assuming that, in the above graph, the walking pace is about the same for both persons, add a line to the graph that would represent the distance versus time for a person who is standing still on the moving walkway.

Scoring and Comments

Full credit:

Code 1: Answers which show a line below the two lines, but it must be closer to the line of "a person walking on the ground" that to the baseline.



No Credit:

Code 0: Other answers.

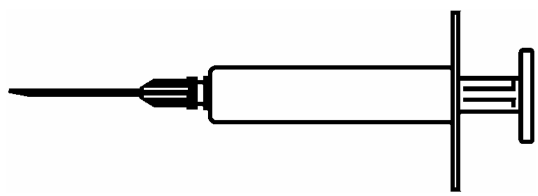
Item type: Open constructed– response
Competency cluster: Reflection
Overarching idea: Change and relationships
Situation: Scientific

Reading Example Item

ACOL VOLUNTARY FLU IMMUNISATION PROGRAM

As you are no doubt aware the flu can strike rapidly and extensively during winter. It can leave its victims ill for weeks.

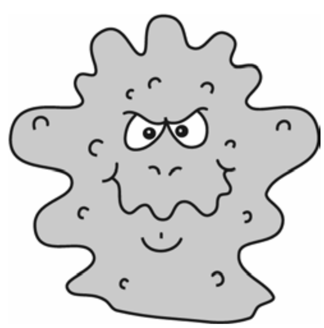
The best way to fight the virus is to have a fit and healthy body. Daily exercise and a diet including plenty of fruit and vegetables are highly recommended to assist the immune system to fight this invading virus.



ACOL has decided to offer staff the opportunity to be immunised against the flu as an additional way to prevent this insidious virus from spreading amongst us. ACOL has arranged for a nurse to administer the immunisations at ACOL, during a half– day session in work hours in the week of November 13. This program is free and available to all members of staff.

Participation is voluntary. Staff taking up the option will be asked to sign a consent form indicating that they do not have any allergies, and that they understand they may experience minor side effects.

Medical advice indicates that the immunisation does not produce influenza. However, it may cause some side effects such as fatigue, mild fever and tenderness of the arm.



WHO SHOULD BE IMMUNISED?

Anyone interested in being protected against the virus.

This immunisation is especially recommended for people over the age of 65. But regardless of age, ANYONE who has a chronic debilitating disease, especially cardiac, pulmonary, bronchial or diabetic conditions.

In an office environment ALL staff are at risk of catching the flu.

WHO SHOULD NOT BE IMMUNISED?

Individuals hypersensitive to eggs, people suffering from an acute feverish illness and pregnant women.

Check with your doctor if you are taking any medication or have had a previous reaction to a flu injection.

If you would like to be immunised in the week of November 13 please advise the personnel officer, Fiona McSweeney, by Friday November 3. The date and time will be set according to the availability of the nurse, the number of participants and the time convenient for most staff. If you would like to be immunised for this winter but cannot attend at the arranged time please let Fiona know. An alternative session may be arranged if there are sufficient numbers.

For further information please contact Fiona on ext. 5577.

Enjoy Good Health

Fiona McSweeney, the personnel officer at a company called ACOL, prepared the information sheet on the previous two pages for ACOL staff. Refer to the information sheet to answer the questions which follow.

Question 1: FLU

Which one of the following describes a feature of the ACOL flu immunisation program?

A Daily exercise classes will be run during the winter.
B Immunisations will be given during working hours.
C A small bonus will be offered to participants.
D A doctor will give the injections.

Item type: Multiple– choice
Sub– Domain Assessed: Retrieving

Question 2: FLU

We can talk about the **content** of a piece of writing (what it says).

We can talk about its **style** (the way it is presented).

Fiona wanted the **style** of this information sheet to be friendly and encouraging.

Do you think she succeeded?

Explain your answer by referring in detail to the layout, style of writing, pictures or other graphics.

....

....

Item type: Open constructed– response
Sub– Domain Assessed: Reflecting

Question 3: FLU

This information sheet suggests that if you want to protect yourself against the flu virus, a flu injection is

A more effective than exercise and a healthy diet, but more risky.
B a good idea, but not a substitute for exercise and a healthy diet.
C as effective as exercise and a healthy diet, and less troublesome.
D not worth considering if you have plenty of exercise and a healthy diet.

Item type: Multiple– choice
Sub– Domain Assessed: Interpreting

Question 4: FLU

Part of the information sheet says:

WHO SHOULD BE IMMUNISED?
Anyone interested in being protected against the virus.

After Fiona had circulated the information sheet, a colleague told her that she should have left out the words "Anyone interested in being protected against the virus" because they were misleading.

Do you agree that these words are misleading and should have been left out?

Explain your answer.

....

....

....

....

Item type: Open constructed– response
Sub– Domain Assessed: Reflecting

Question 5: FLU

According to the information sheet which one of these staff members should contact Fiona?

A Steve from the store, who does not want to be immunised because he would rather rely on his natural immunity.
B Julie from sales, who wants to know if the immunisation program is compulsory.
C Alice from the mailroom who would like to be immunised this winter but is having a baby in two months.
D Michael from accounts who would like to be immunised but will be on leave in the week of November 13.

Item type: Multiple– choice
Sub– Domain Assessed: Interpreting, Level 4

Science Example Item

Peter Cairney

The following two items are part of a unit for which the stimulus material is a passage about Peter Cairney, who works for the Australian Road Research Board. The stimulus material is presented below.

> …Another way that Peter gathers information to improve road safety is by the use of a TV camera on a 13 metre pole to film the traffic on a narrow road. The pictures tell the researchers such things as how fast the traffic is going, how far apart the cars travel, and what part of the road the traffic uses. Then after a time, lane lines are painted on the road. The researchers can then use the TV camera to see whether the traffic is now different. Does the traffic now go faster or slower? Are the cars close together or further apart than before? Do the motorists drive closer to the edge of the road or closer to the centre now that the lines are there? When Peter knows these things he can give advice about whether or not to paint lines on narrow roads.

Question 1: If Peter wants to be sure that he is giving good advice, he might collect some other information as well beyond filming the narrow road. Which of these things would help him to be more sure about his advice concerning the effect of painting lines on narrow roads?

A. Doing the same on other narrow roads	Yes / No
B. Doing the same on wide roads	Yes / No
C. Checking the number of accidents in a certain time period before and after painting the lines	Yes / No
D. Checking the number of cars using the road before and after painting the lines	Yes / No

Scoring and Comments

Full credit

- Code 2: Answers that specify Yes, No, Yes, No, in that order.

Partial Credit

- Code 1: Answers that specify Yes, No, No, No in that order.

No Credit:

- Code 0: Any other combination of answers.

Item type: Complex multiple– choice
Competency cluster: Understanding scientific investigation
Overarching idea: Forces and movement

Situation: Science in technology

Question 2: Suppose that one stretch of narrow road Peter finds that after the lane lines are painted the traffic changes as below

Speed	Traffic moves more quickly
Position	Traffic keeps nearer edges of road
Distance	No change

On the basis of these results it was decided that lane lines should be painted on all narrow roads. Do you think this was the best decision? Give reasons for agreeing or disagreeing.

Agree: ________
Disagree: ______
Reason:____

Scoring and Comments

Full credit

Code 1: Answers that agree or disagree with the decision for reasons that are consistent with the given information. For example:

- agree because there is less chance of collisions if the traffic is keeping near the edges of the road, even if it is moving faster;
- agree because if traffic is moving faster, there is less incentive to overtake;
- disagree because if traffic is moving faster and keeping the same distance apart, this may mean that the drivers don't have enough room to stop in an emergency.

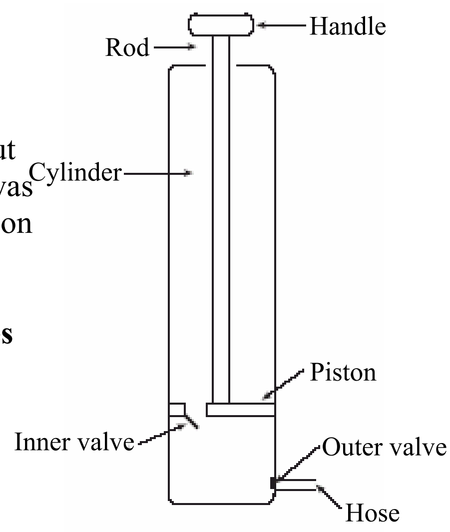
No Credit:

- Code 0: Answers that agree or disagree without specifying the reasons, or provide reasons unrelated to the problem.

Item type: Open constructed– response
Competency cluster: Interpreting scientific evidence and conclusions
Overarching idea: Forces and movement
Situation: Science in technology

Problem-solving Example Item

Bicycle pump



Jane had some trouble with her bicycle pump yesterday. She repeatedly pulled up and pushed down on the handle of the pump, but no air came out of the hose. She wanted to find out what was wrong, so she looked in the box where the pump was kept and found a piece of paper with the following information on it.

When the handle– piston assembly is pulled up, air passes through the inner valve and fills the space between the piston and the outer valve. When the handle– piston assembly is pushed down, the inner valve closes and the piston forces the air beneath the piston out through the outer valve.

Question 1: Explain how the movement of the valves enables the operation of the bicycle pump when the handle– piston assembly is in different positions.

Scoring

Full credit

Code 2: Answers that describe what happens with both movements of the handle– piston assembly.

- When the handle– piston assembly is pushed down, the inner valve closes and the outer valve opens.

AND

- When the handle– piston assembly is pulled up, the inner valve opens and the outer valve closes.

Partial Credit

Code 1: Answers that describe what happens with the movement of the handle– piston assembly in one direction only.

- When the handle– piston assembly is pushed down, the inner valve closes and the outer valve opens.

OR

- When the handle– piston assembly is pulled up, the inner valve opens and the outer valve closes.

No Credit:

Code 0: Other answers

Question 2: Identify two possible reasons that would result in no air coming from the hose. Give an argument supporting the possibility of each of your reasons.

Scoring

Possible reasons and explanations:

- inner valve is stuck closed and thus no air can come into the cylinder beneath the piston;
- outer valve is stuck closed and does not allow air to get out of the hose;
- piston is worn and thus there is no compression to force air to the hose;
- there is a leak in the cylinder wall below the piston, defeating compression;
- there is a leak in the hose, allowing air to escape;
- no air intake to cylinder.

Full credit

Code 2: Answers that mentions TWO reasons with explanations.

Partial credit

Code 1: Answers that mentions only ONE reason with an explanation.

No credit

Code 0: Other answers.

Appendix C

OECD PISA (2003) CURRICULUM-TEST MATCH

The Organisation for Economic Co-operation and Development (OECD) has developed the Programme for International Student Assessment (PISA), an assessment that was administered to 15– year– old students in 41 countries in the year 2003. The Canadian sample consisted of approximately 28 000 students, with Ontario's contingent consisting of approximately 3000 students.

The conceptual framework on which PISA 2003 is based presents three domains of "literacy": reading literacy, mathematical literacy and scientific literacy. For the PISA 2003 study, mathematical literacy accounted for 60% of the test items, while reading and science each accounted for 20% of the test items. In the next round of PISA, science will consist of 60% of the test items. The curriculum-test match that follows is based on the Ontario mathematics curriculum.

PISA defines reading literacy as follows: "The capacity to understand, use and reflect on written texts, in order to achieve one's goals, to develop one's knowledge and potential, and to participate in society."

Mathematical literacy is concerned with the ability of students to analyze, reason and communicate ideas effectively as they pose, formulate, solve and interpret solutions to mathematical problems in a variety of situations. Mathematical literacy is assessed in relation to the following:

- The mathematical *context*, as defined mainly in terms of four "overarching ideas" (*space and shape*, *change and relationships*, *quantity*, and *uncertainty*) and only secondarily in relation to "curricular strands" (such as numbers, algebra and geometry). The OECD defined the four "overarching ideas" or "content areas" for mathematics as follows:
    - *Space and shape* relates to spatial and geometric phenomena and relationships, drawing on the discipline of geometry. It requires looking for similarities and differences when analysing the components of shapes, recognising shapes in different representations and different dimensions as well as understanding the properties of objects and their relative positions.
    - *Change and relationships* involves mathematical manifestations of change as well as functional relationships and dependency among variables. It relates most closely to algebra. Mathematical relationships often take the shape of equations or inequalities, but relationships of a more general nature (e.g., equivalence, divisibility, inclusion, to mention but a few) are relevant as well. Relationships are given a variety of different representations, including symbolic, algebraic, graphical, tabular and geometrical representations. Since different representations may serve different purposes and have different properties, translation between representations often is of key importance in dealing with situations and tasks.
    - *Quantity* involves numeric phenomena as well as quantitative relationships and patterns. It relates to the understanding of relative size, the recognition of

numerical patterns, and the use of numbers to represent quantities and quantifiable attributes of real– world objects (counts and measures). Furthermore, *quantity* deals with the processing and understanding of numbers that are represented in various ways. An important aspect of dealing with quantity is also *quantitative reasoning*, which involves number sense, representing numbers, understanding the meaning of operations, mental arithmetic and estimating. The most common curricular branch of mathematics with which it is associated is arithmetic.

  - *Uncertainty* involves probabilistic and statistical phenomena and relationships that become increasingly relevant in the information society. These phenomena are the subject of mathematical study in statistics and probability. In sum, mathematics in PISA seeks to measure how well students are able to apply a variety of mathematics processes to an assortment of situations.

In addition to presenting results in terms of an overall, or combined, mathematics score, further insight can be provided by examining student performance in the four sub–domains corresponding to the four content areas of mathematics, namely space and shape, change and relationships, quantity and uncertainty.

- The *process* of mathematics as defined by general mathematical competencies. These include the use of mathematical language, modelling and problem-solving skills. Such skills, however, are not separated out in different test items, since it is assumed that a range of competencies will be needed to perform any given mathematical task. Rather, questions are organized in terms of “competency clusters” defining the type of thinking skill needed. There are three of these “competency clusters” describing the cognitive activities that the competencies encompass.
  - The *reproduction* cluster is made up of those competencies that involve the reproduction of practised knowledge. They include those most commonly used in standardized assessments and classroom tests. These competencies are knowledge of facts and of common problem representations, recognition of equivalents, recollection of familiar mathematical objects and properties, performance of routine procedures, application of standard algorithms and technical skills, manipulation of expressions containing symbols and formulae in standard form and carrying out computations.
  - The *connections* cluster includes competencies that build on the reproduction cluster competencies in taking problem–solving to situations that are not simply routine, but still involve familiar, or quasi– familiar, settings.
  - The *reflection* cluster includes competencies that ask the student to reflect on the processes needed to or used to solve a problem. They relate to students’ abilities tom plan solution strategies and implement them in problem settings that contain more elements and may be more original or unfamiliar that those in the connections cluster.
- The *situations* in which mathematics is used, based on their distance to the student. The framework identifies five situations: personal, educational, occupational, public and scientific (OECD).

The following table maps the PISA 2003 mathematics items to the Ontario Grades 1 to 8 and Grades 9 and 10 mathematics curricula.

OECD PISA (2003) Test Items and Their Relationship to the Ontario Curriculum

Question	Item Format	Strand	Context	Competency Cluster	Ontario Curriculum
M033Q01	MC	Geo	Space and Shape	Reproduction	Grade 8: page 51, overall 2, specific 1
M467Q01	MC	Num	Uncertainty	Reproduction	Grade 6: page 23, overall 2, specific 13
M810Q01	SR	Num	Quantity	Connections	Grade 7: page 68, overall 1, specific 12
M810Q02	SR	Num	Quantity	Connections	Grade 7: page 59, overall 2, specific 2
M810Q03	OCR	Num	Change and Relationships	Reflection	Grade 9: page 10, overall 1, specific 3
M833Q01	CMC	Geo	Spatial Sense	Connections	Grade 8: page 51, overall 2, specific 1
M402Q01	SR	Num	Change and Relationships	Connections	Grade 6: page 38, overall 2, specific 4
M402Q02	SR	Num	Change and Relationships	Reflection	Grade 6: page 38, overall 2, specific 4
M179Q01	OCR	Stat	Uncertainty	Connections	Grade 7: page 68, overall 7, specific 16
M464Q01	SR	Geo	Space and Shape	Connections	Grade 6: page 38, overall 3, specific 14
M564Q01	MC	Num	Quantity	Reproduction	Grade 6: page 38, overall 2
M564Q02	MC	Num	Uncertainty	Reflection	Grade 6: page 23, overall 2, specific 13
M145Q01	CCR	Num	Space and Shape	Reproduction	Grade 8: page 51, overall 2, specific 1
M408Q01	CMC	Stat	Uncertainty	Connections	Grade 7: page 68, overall 8
M520Q01	SR	Num	Quantity	Reproduction	Grade 4: page 18, overall 7
M520Q02	MC	Stat	Quantity	Reproduction	Grade 6: page 67, overall 1, specific 11
M520Q03	SR	Num	Quantity	Connections	Grade 6: page 23, specific 25
M446Q01	SR	Num	Change and Relationships	Reproduction	Grade 4: page 18, overall 7, specific 23
M446Q02	OCR	Algebra	Change and Relationships	Reflection	Grade 8: page 60, specific 9
M192Q01	CMC	Algebra	Change and Relationships	Connections	Grade 9: page 12, overall 3, specific 11
M702Q01	OCR	Stat	Uncertainty	Connections	Grade 9: page 12, overall 1, specific 2
M034Q01	CCR	Geo	Space and Shape	Connections	Grade 4: page 46, overall 1, specific 8
M423Q01	MC	Stat	Uncertainty	Reproduction	Grade 7: page 68, overall 8
M555Q02	CMC	Geo	Space and Shape	Connections	Grade 6: page 48, overall 2, specific 3
M800Q01	MC	Num	Quantity	Reproduction	Grade 4: page 18, overall 7, specific 23

Question	Item Format	Strand	Context	Competency Cluster	Ontario Curriculum
M421Q01	OCR	Stat	Uncertainty	Reproduction	Grade 8: page 70, specific 7
M421Q02	CMC	Stat	Uncertainty	Reflection	Grade 8: page 70, specific 7
M421Q03	MC	Stat	Uncertainty	Reflection	Grade 8: page 70, specific 7
M704Q01	SR	Stat	Uncertainty	Connections	Grade 7: page 59, overall 3, specific 7
M704Q02	OCR	Algebra	Change and Relationships	Reflection	Grade 9: page 10, overall 3, specific 1
M571Q01	MC	Algebra	Change and Relationships	Reflection	Grade 9: page 10, overall 4, specific 5
M559Q01	MC	Num	Quantity	Reflection	Grade 9: page 10, overall 4, specific 5
M144Q01	CCR	Geo	Space and Shape	Reproduction	Grade 6: page 38, overall 4, specific 16 and 17
M144Q02	CCR	Geo	Space and Shape	Connections	Grade 9 : page 16, overall 2, specific 6
M144Q03	MC	Geo	Space and Shape	Connections	Grade 9: page 16, overall 2, specific 6
M144Q04	CCR	Geo	Space and Shape	Connections	Grade 9: page 16, overall 2, specific 6
M305Q01	MC	Geo	Space and Shape	Connections	Social Studies: Geography
M510Q01	SR	Stat	Quantity	Connections	Grade 6: page 67, overall 1, specific 11
M474Q01	CCR	Num	Quantity	Reproduction	Grade 6: page 22, overall 2, specific 5
M124Q01	OCR	Algebra	Change and Relationships	Reproduction	Grade 8: page 60, overall 4, specific 8
M124Q03	OCR	Algebra	Change and Relationships	Connections	Grade 8: page 60, overall 4, specific 8
M434Q01	SR	Num	Quantity	Connections	Grade 3: page 16, overall 8
M505Q01	OCR	Stat	Uncertainty	Reflection	Grade 6: page 67, overall 1, specific 6
M462Q01	OCR	Geo	Space and Shape	Reflection	Grade 9: page 16, overall 3, specific 11
M438Q01	CCR	Stat	Uncertainty	Reproduction	Grade 7: page 68, overall 6, specific 12
M438Q02	MC	Stat	Uncertainty	Connections	Grade 7: page 68, overall 6, specific 12
M547Q01	SR	Num	Space and Shape	Reproduction	Grade 4: page 18, overall 7
M806Q01	SR	Algebra	Quantity	Reproduction	Grade 4: page 56, overall 2, specific 3
M413Q01	SR	Num	Quantity	Reproduction	Grade 4: page 56, overall 2, specific 3
M413Q02	SR	Num	Quantity	Reproduction	Grade 4: page 56, overall 2, specific 3
M413Q03	OCR	Num	Quantity	Reflection	Grade 6: page 22, overall 1, specific 14
M406Q01	OCR	Geo	Space and Shape	Connections	Grade 8: page 41, overall 3, specific 9

Question	Item Format	Strand	Context	Competency Cluster	Ontario Curriculum
M406Q02	OCR	Geo	Space and Shape	Connections	Grade 8: page 41, overall 3, specific 9
M406Q03	OCR	Geo	Space and Shape	Reflection	Grade 8: page 41, overall 3, specific 9
M150Q01	CCR	Num	Change and Relationships	Reproduction	Grade 4: page 18, overall 6, specific 22
M150Q02	CCR	Stat	Change and Relationships	Reproduction	Grade 8: page 70, overall 3, specific 8
M150Q03	OCR	Stat	Change and Relationship	Connections	Grade 8: page 70, overall 3, specific 8
M598Q01	CCR	Geo	Space and Shape	Reflection	Grade 7: page 50, overall 2, specific 1
M710Q01	MC	Stat	Uncertainty	Connections	Grade 8: page 70, overall 5, specific 20
M411Q01	SR	Num	Quantity	Reproduction	Grade 5: page 20, overall 5, specific 23
M411Q02	MC	Stat	Uncertainty	Connections	Grade 8: page 70, specific 7
M496Q01	CMC	Num	Quantity	Connections	Grade 6: page 22, overall 8, specific 25
M496Q02	SR	Num	Quantity	Connections	Grade 6: page 22, overall 8, specific 25
M484Q01	SR	Num	Quantity	Connections	Grade 6: page 22, overall 8, specific 25
M155Q01	OCR	Stat	Change and Relationships	Connections	Grade 8: page 70, overall 3, specific 12
M155Q02	OCR	Stat	Change and Relationships	Connections	Grade 8: page 70, overall 3, specific 12
M155Q03	OCR	Stat	Change and Relationships	Connections	Grade 8: page 70, overall 4, specific 12
M155Q04	OCR	Stat	Change and Relationships	Reflection	Grade 8: page 70, overall 4, specific 12
M442Q02	CCR	Num	Quantity	Reflection	Grade 5: page 20, overall 2
M509Q01	MC	Stat	Uncertainty	Reflection	Grade 8: page 70, overall 5, specific 20
M420Q01	CMC	Stat	Uncertainty	Reflection	Grade 8: page 70, overall 4, specific 7
M468Q01	SR	Num	Uncertainty	Reproduction	Grade 5: page 66, specific 5
M447Q01	MC	Geo	Space and Shape	Reproduction	Grade 7: page 50, overall 5, specific 10
M302Q01	CCR	Stat	Change and Relationships	Reproduction	Grade 8: page 70, overall 3, specific 12
M302Q02	CCR	Stat	Change and Relationships	Connections	Grade 8: page 70, overall 3, specific 12
M302Q03	OCR	Stat	Change and Relationships	Reflection	Grade 8: page 70, overall 3, specific 12
M603Q01	CMC	Num	Quantity	Connections	Grade 5: page 20, overall 7, specific 25
M603Q02	SR	Num	Quantity	Connections	Grade 5: page 20, overall 7, specific 25

Question	Item Format	Strand	Context	Competency Cluster	Ontario Curriculum
M266Q01	CMC	Geo	Space and Shape	Connections	Grade 7: page 40, overall 3, specific 6
M513Q01	OCR	Stat	Uncertainty	Connections	Grade 8: page 70, overall 4, specific 16 and 17
M828Q01	OCR	Stat	Change and Relationships	Reproduction	Grade 8: page 70, overall 3, specific 12
M828Q02	SR	Stat	Uncertainty	Connections	Grade 8: page 70, overall 3, specific 12
M828Q03	SR	Num	Quantity	Connections	Grade 8: page 70, overall 3, specific 12
M803Q01	SR	Stat	Uncertainty	Connections	Grade 7: page 68, overall 7, specific 7
M273Q1	CMC	Geo	Space and Shape	Connections	Grade 8: page 51, overall 4 and 5, specific 5

Item format:
MC = Multiple-choice
CMC = Complex multiple-choice
OCR = Open constructed-response
CCR = Closed constructed-response
SR = Short response

Strand
Num = Number Sense and Numeration
Geo = Geometry and Spatial Sense
Stat = Data management and Probability
Algebra = Patterning and Algebra

References

Government of Ontario, Ministry of Education. *The Ontario Curriculum, Grades 1–8: Mathematics,* Toronto (1997)

Government of Ontario, Ministry of Education. *The Ontario Curriculum, Grades 9 and 10: Mathematics,* Toronto (1999)

Endnotes

1. Organisation for Economic Co-operation and Development. *The PISA 2003 Assessment Framework—Mathematics, Reading, Science and Problem-Solving Knowledge and Skills,* Paris (2003)

2. Statistics Canada. *Measuring Up: The performance of Canada's youth in mathematics, reading, science and problem-solving. OECD PISA Study—PISA 2003 first results for Canadians aged 15* (draft), Ottawa (2004)

3. Organisation for Economic Co-operation and Development. *The PISA 2003 Assessment Framework–Mathematics, Reading, Science and Problem-Solving Knowledge and Skills,* Paris (2003)