



The Grade 9 Assessment of Mathematics, 2001–2002

Report of Provincial Results

December 2002

© 2002 Queen's Printer for Ontario

ISBN: 0-7794-4027-7

ISSN: 1705-2777

Contents

Results at a Glance.....	2
The Grade 9 Assessment of Mathematics, 2001–2002	4
Introduction	4
Applied and Academic Courses	4
Semestered and Full-Year Schools	4
Development of the Assessment	4
Content of the Assessment.....	5
Participation in the Assessment	5
Administration of the Assessment	6
Marking the Assessment.....	6
Reporting Results	6
Collection of Questionnaire Data.....	8
Profile of Students Who Wrote the Assessment — Applied.....	9
Overall Achievement — Applied.....	10
Profile of Students Who Wrote the Assessment — Academic	17
Overall Achievement — Academic	18
Recommendations	26
Planning for Improvement	26
Support for Teachers	26
Appendix A — Definitions of Categories and Strands	28

Results at a Glance

Overall Results and Data Comparisons with 2000–2001 (Method 1*) Applied

	2001–2002 (# = 47 220)	2000–2001 (# = 41 708)
Exempted	2%	3%
No Data	7%	6%
Insufficient Information to Score	6%	15%
Below Level 1	8%	16%
Level 1	19%	24%
Level 2	37%	25%
Level 3	21%	13%
Level 4	<1%	<1%

Overall Results and Data Comparisons with 2000–2001 (Method 1*) Academic

	2001–2002 (# = 99 094)	2000–2001 (# = 95 312)
Exempted	<1%	1%
No Data	1%	1%
Insufficient Information to Score	3%	3%
Below Level 1	<1%	6%
Level 1	14%	14%
Level 2	17%	26%
Level 3	58%	44%
Level 4	5%	5%

* See page 6 for a description of Method 1.

Key Messages

- The results of the Grade 9 Assessment of Mathematics, 2001–2002 are very encouraging. There has been a marked improvement in achievement results from 2000–2001 in both the applied and academic programs; more students achieved the provincial standard in 2001–2002.
- Teachers have been making mathematics a high priority, and their efforts and growing experience with the mathematics curriculum and assessment are showing positive results in student achievement.
- The Grade 9 mathematics results should be used to improve teaching and learning, not to rank schools. Ranking provides no information about why scores are high or low, and it invites simplistic and misleading comparisons that ignore the particular circumstances affecting achievement in each school. Ranking distracts people from addressing the more critical issue of how to improve learning for all students.

Key Recommendations

- That **school boards**, in consultation with their communities, incorporate the overall, category and strand data from the Grade 9 Assessment of Mathematics, 2001–2002 into their current board improvement plans and develop further strategies for improving student achievement in mathematics.
- That **school boards, principals and teachers** examine achievement results from the 2000–2001 and 2001–2002 assessments to determine where improvement has occurred and which improvement strategies have had the greatest impact.
- That **school boards** analyze disaggregated as well as aggregated achievement and contextual data in planning for improvement and identify strategies that target areas and groups in need of additional support, motivation and improvement, especially those students not yet achieving the provincial standard.
- That the **Ministry of Education, faculties of education, the Ontario College of Teachers** (through Professional Learning Program providers), **mathematics associations** and **school boards** continue to support new and experienced teachers and provide them with professional development opportunities related to teaching and assessing mathematics.

The Grade 9 Assessment of Mathematics, 2001–2002

Introduction

The purpose of the Education Quality and Accountability Office (EQAO) is to promote greater accountability in the publicly funded education system in Ontario and to improve the quality of education in the province. In order to fulfill its mandate, EQAO conducts several province-wide assessments, among them the Grade 9 Assessment of Mathematics.

The Grade 9 Assessment of Mathematics measures how well students have met the expectations in *The Ontario Curriculum, Grades 9 and 10: Mathematics*. The assessment is based on the expectations of the Grade 9 curriculum for applied and academic mathematics courses.

Students in locally developed courses do not take part in this assessment. Locally developed courses are developed within school boards to meet educational needs that are not met by courses outlined in the provincial curriculum policy documents.

The results of these assessments provide individual, school and school board data on student achievement. Parents receive an Individual Student Report that provides information on their child's achievement on the assessment. Schools and boards create their own reports, based on EQAO data, for distribution to parents and other stakeholders in the community. EQAO posts board and school results on its Web site for access by the general public.

Applied and Academic Courses

In Grades 9 and 10, students choose between two types of courses: applied and academic. EQAO develops separate versions of the assessment for students in applied and academic courses. Since some of the expectations for applied and academic courses overlap, approximately 40% of the assessment items are common to both the applied and academic versions.

Semestered and Full-Year Schools

Schools have the option of offering semestered courses or courses over the full year. EQAO develops separate versions for administration in January and May/June.

Development of the Assessment

The assessment was developed to serve the following purposes:

- to provide valid and reliable information about student achievement;
- to provide a broad window on students' knowledge and skills in mathematics and
- to contribute to student learning.

Teams of classroom teachers from across the province developed items for the assessment and, as part of the development process, tried out items in their classes.

Items for future assessments were piloted and field tested during the January and May/June administrations. At various stages, teachers provide feedback on the assessment items. EQAO used such feedback to revise and finalize the assessment materials for the administrations in January and May/June 2002.

The assessment was validated by educators with expertise in mathematics, in-depth knowledge of the mathematics expectations for Grade 9 (as outlined in *The Ontario Curriculum, Grades 9-10: Mathematics*), experience with equity issues, knowledge of the special needs of some students and technical expertise in the areas of assessment validity and reliability.

Content of the Assessment

The assessment included a multiple-choice component, a short-answer component and performance-based tasks.

Multiple-Choice Component

Students were asked to complete 24 questions during a 30-minute period. Each multiple-choice question was related to a single strand and a single category. (See the strand and category definitions in Appendix A.) The multiple-choice component allowed students to demonstrate their understanding of mathematical concepts without having to show their work or write responses.

Short-Answer Component

Students were asked to complete 10 items during a 30-minute period. Each short-answer item was related to a single strand and a single category. These items required students to think mathematically but required minimal written response.

Performance-Based Tasks

Students were asked to complete a total of six tasks. Each task was a collection of related questions based on one or two strands from the curriculum. Each task was scored for achievement across all four categories and the strands related to the task.

Additional Component

Students completed an additional 30-minute component that was scored but did not count toward their results. This component included items that were used to establish comparability between the assessments administered in January and May/June and between the 2000–2001 and 2001–2002 assessments. It also included items that were being pilot-tested or field-tested for future use.

Participation in the Assessment

All Grade 9 students who are enrolled in an applied or academic mathematics course are expected to participate in this annual assessment. An accommodation policy is in place to support students

with special needs and students who require special provisions due to a lack of proficiency in English.

Principals and teachers are responsible for accommodating students with special needs identified in an Individual Education Plan so that these students can take part in the assessment. The list of permitted accommodations appears on the CD-ROM used for training to administer; the list also appears on the Web site: www.eqao.com.

Principals and teachers are able to make special provisions for students enrolled in English as a Second Language (ESL)/English Literacy Development (ELD) programs. The list of permitted special provisions appears in the administration guide.

The principal may consider exempting any student who, despite the permitted accommodations and special provisions, would not be able to provide evidence of learning.

Decisions about accommodations, special provisions and exemptions must be made by the principal on an individual basis and in consultation with the student, his or her parents/guardians and appropriate staff. Parental consent is required for an exemption.

Administration of the Assessment

The assessment was administered during the period January 9–22, 2002, to students in first-semester mathematics courses and from May 27–June 13, 2002, to students in second-semester and full-year courses.

Principals had the option of administering the assessment over three or five days.

Marking the Assessment

Teachers trained in marking scored the short-answer and performance-based items, using a scoring scale that had three to six possible codes for each item. The multiple-choice items were machine-scored. The multiple-choice scores were combined with the short-answer and performance-based scores to produce category, strand and overall scores. With the aid of a statistical procedure that took into account the degree of difficulty of each test item and the input of the markers, the category, strand and overall scores were then mapped onto EQAO's reporting scale.

This scoring procedure results in precise scoring and allows for the comparability of the category, strand and overall results from administration to administration and from year to year.

Reporting Results

Achievement results are reported in two ways — Method 1 and Method 2.

Method 1

In Method 1, all data are reported. Method 1 expresses the number of students achieving each level as a percentage of all of the students in the course, including students who scored below

Level 1, those who produced insufficient information to score, those who produced no data and those who were exempted.

Method 1 is EQAO's primary method of reporting, because publicly funded schools are accountable for the achievement and progress of all students. Schools and school boards are required to use this method to ensure the consistency of reporting across the province.

Method 2

Method 2 is an alternative way of presenting the data. Method 2 expresses student results as a percentage of those students who actually took part in the assessment and produced some work. Students who were exempted or for whom there were no performance data are excluded.

Method 2 highlights the results achieved by students with at least some scorable work.

Achievement Levels

EQAO reports on student achievement in Grade 9 mathematics using a four-level scale. This four-level scale is aligned with the scale used in *The Ontario Curriculum, Grades 9 and 10: Mathematics* and the Provincial Report Card, Grades 9–12.

Overall Achievement

The overall achievement level provides a general picture of students' achievement of the curriculum expectations in mathematics. The overall level reflects achievement across all of the categories and strands.

Due to rounding, percentages in the achievement tables may not total 100 exactly.

Strand and Category Achievement

The strand and category achievement levels provide more detailed information about students' knowledge and skills in specific areas of the mathematics curriculum. The strands and categories are based on those in *The Ontario Curriculum*. The four strands provide information on students' strengths and weaknesses in the major content areas of mathematics (number sense and algebra, relationships, measurement and geometry, analytic geometry). The four categories (knowledge and understanding; thinking, inquiry and problem solving; application; communication) provide information on strengths and weaknesses in specific knowledge and skill areas that apply to all four strands.

Provincial Standard

The Ontario Curriculum establishes Level 3 as the provincial standard. As stated in the curriculum, this is a high level of achievement, and students who are achieving this level or above can be confident that they are "well prepared for work in the next grade or the next course."

The Ontario Curriculum identifies Level 1 as a "passable level of achievement."

Exempted or No Data

These designations include students who were formally exempted from participation in one or more components of the assessment and students from whom EQAO did not receive completed assessment booklets.

Not Enough Information to Score (NEIS)

This designation represents student work that could not be scored, because large sections were missing or illegible.

Below Level 1

Below Level 1 identifies insufficient achievement of the curriculum expectations.

Level 1

Level 1 identifies a passable level of achievement. Achievement is below the provincial standard.

Level 2

Level 2 identifies a moderate level of achievement. Achievement is below but approaching the provincial standard.

Level 3

Level 3 identifies a high level of achievement. Achievement is at the provincial standard.

Level 4

Level 4 identifies a very high to outstanding level of achievement. Achievement is above the provincial standard.

Collection of Questionnaire Data

During both the January 2002 and the May/June 2002 administrations, teachers and students of both applied and academic courses were asked to complete detailed, anonymous questionnaires. Their responses were tabulated. Except in cases where a student's or teacher's privacy would be compromised, EQAO tabulates student questionnaire data for the province as a whole and by school and school board, and it tabulates teacher questionnaire data for the province as a whole and by school board. The provincial questionnaire data in this report, together with the wide range of contextual data that schools and school boards collect locally, should be referred to when interpreting the achievement results.

Profile of Students Who Wrote the Assessment — Applied*

Number of Students

First Semester	Second Semester	Full Year	Total**
20 956	14 632	4526	47 220

Gender	Percentage
Male	54%
Female	44%
No Response	2%

Place of Birth	Percentage
Inside Canada	82%
Outside Canada	17%
No Response	1%

Year of Birth	Percentage
1985 or Before	7%
1986	24%
1987	68%
1988	<1%
No Response	<1%

Language(s) Spoken at Home	Percentage
Only English	70%
Mostly English	14%
English as Often as Another Language	9%
Mostly Another Language	4%
Only Another Language	2%
No Response	1%

Observations

- Many students in the applied program appear to be one year older than their cohort.
- 17% of the students in the applied program were born outside Canada.
-
-

* “Applied courses focus on the essential concepts of a subject, and develop students’ knowledge and skills through practical applications and concrete examples. Familiar situations are used to illustrate ideas, and students are given more opportunities to experience hands-on applications of the concepts and theories they study.” *The Ontario Curriculum, Grades 9 to 12: Program Planning and Assessment, 2000*

** Some schools did not indicate whether students were enrolled in a semestered or full-year course. As a result, there are students included in the total who are not counted as part of the first-semester, second-semester or full-year statistics.

Accommodations and Special Provisions — Applied

	Percentage
Students Who Received Accommodations and Special Provisions	2%
Students Who Received Accommodations	16%
Students Who Received Special Provisions	2%
Students Who Received No Accommodations or Special Provisions	78%
Students for Whom Information Is Missing	<1%

Participation — Applied

	Eligible Population	Percentage No Data	Percentage Exempted	Percentage Fully Participating
All Applied Students	47 220	7%	2%	91%
Gender				
Female	20 786	6%	2%	92%
Male	25 615	6%	3%	91%
Student Status				
ESL/ELD	2 094	3%	23%	74%
Special Needs	8 869	5%	5%	90%

Observations

- 44% of applied students were female, 54% were male and 2% were unspecified.
- 4% of applied students were identified as ESL/ELD.
- 19% of applied students were identified as special needs students.
- 7% of ESL/ELD students and 5% of special needs students were exempted.

Overall Achievement — Applied

	Exempted	No Data	NEIS	Below Level 1	Level 1	Level 2	Level 3	Level 4
Method 1 (# = 47 220)	2%	7%	6%	8%	19%	37%	21%	<1%
Method 2 (# = 42 975)	N/A	N/A	7%	9%	21%	40%	23%	<1%

By Program — Applied

	Exempted	No Data	NEIS	Below Level 1	Level 1	Level 2	Level 3	Level 4
Semester 1 (# = 20 956)								
Method 1	2%	6%	6%	9%	19%	37%	21%	<1%
Semester 2 (# = 14 632)								
Method 1	2%	7%	6%	8%	19%	37%	20%	<1%
Full Year (# = 4526)								
Method 1	3%	6%	8%	8%	19%	34%	21%	<1%

Observations

- The percentages of students at or above the provincial standard were about the same for students in semestered and full-year programs.

By Gender — Applied

	Exempted	No Data	NEIS	Below Level 1	Level 1	Level 2	Level 3	Level 4
Girls (# = 20 786)								
Method 1	2%	6%	5%	8%	20%	38%	20%	<1%
Boys (# = 25 615)								
Method 1	3%	6%	7%	8%	19%	36%	21%	<1%

Observations

- Boys and girls performed almost equally well.

Note: Results for gender are based upon the number of students for whom gender data were reported.

By Student Status (ESL/ELD) — Applied

	Exempted	No Data	NEIS	Below Level 1	Level 1	Level 2	Level 3	Level 4
Non-ESL/ELD (# = 45 126)								
Method 1	1%	7%	6%	8%	19%	37%	21%	<1%
ESL/ELD (# = 2094)								
Method 1	23%	3%	6%	18%	19%	21%	9%	<1%

Observations

- 9% of ESL/ELD students were at Level 3 or above.
- 23% were exempted.

By Special Education Support (Excluding Gifted) — Applied

	Exempted	No Data	NEIS	Below Level 1	Level 1	Level 2	Level 3	Level 4
Not Receiving Support (# = 38 351)								
Method 1	2%	7%	6%	7%	18%	37%	23%	<1%
Receiving Support (# = 8869)								
Method 1	5%	5%	8%	13%	24%	33%	13%	<1%

Observations

- 13% of special needs students were at Level 3 or above.
- Only 5% were exempted.

Overall Achievement by Category — Applied

See Appendix A for definitions of the categories.

Knowledge/Skills Categories	Exempted	No Data	NEIS	Below Level 1	Level 1	Level 2	Level 3	Level 4
Knowledge/Understanding								
Method 1 (# = 47 220)	2%	7%	4%	9%	19%	34%	24%	<1%
Method 2 (# = 42 975)	N/A	N/A	5%	10%	21%	38%	26%	<1%
Application								
Method 1 (# = 47 220)	2%	7%	4%	24%	21%	27%	13%	2%
Method 2 (# = 42 975)	N/A	N/A	4%	26%	23%	30%	15%	2%
Thinking/Inquiry/Problem Solving								
Method 1 (# = 47 220)	2%	7%	5%	3%	37%	26%	20%	1%
Method 2 (# = 42 975)	N/A	N/A	5%	3%	40%	29%	21%	1%
Communication								
Method 1 (# = 47 220)	2%	7%	5%	6%	13%	54%	12%	<1%
Method 2 (# = 42 975)	N/A	N/A	6%	7%	14%	60%	14%	<1%

Observations

- Overall student achievement in the categories was higher than last year.
- 24% achieved the provincial standard or above in knowledge and understanding.
- 20% achieved the provincial standard or above in thinking, inquiry and problem solving.
- Only 15% of the students achieved the provincial standard or above in application, and 12% in communication.

Overall Achievement by Strand — Applied

See Appendix A for definitions of the strands.

Knowledge/Skills Categories	Exempted	No Data	NEIS	Below Level 1	Level 1	Level 2	Level 3	Level 4
Number Sense and Algebra								
Method 1 (# = 47 220)	2%	7%	5%	17%	12%	34%	23%	<1%
Method 2 (# = 42 975)	N/A	N/A	5%	18%	13%	38%	26%	1%
Relationships								
Method 1 (# = 47 220)	2%	7%	7%	2%	19%	45%	17%	<1%
Method 2 (# = 42 975)	N/A	N/A	7%	3%	21%	50%	19%	<1%
Analytic Geometry								
Method 1 (# = 47 220)	2%	7%	7%	6%	22%	34%	22%	1%
Method 2 (# = 42 975)	N/A	N/A	8%	6%	24%	37%	24%	1%
Measurement and Geometry								
Method 1 (# = 47 220)	2%	7%	6%	12%	17%	39%	17%	<1%
Method 2 (# = 42 975)	N/A	N/A	7%	13%	19%	42%	18%	<1%

Observations

- Overall student achievement in the strands was higher than last year.
- 23% achieved the provincial standard or above in both number sense and algebra, and analytic geometry.
- In both relationships, and measurement and geometry, 17% of the students achieved the provincial standard or above.

Student Questionnaire Data — Applied

	Percentage
How often in the past month have you been absent from mathematics class?	
Never	22%
1–2 Times	38%
3–4 Times	20%
5 or More Times	18%

Observations

- 18% of the students indicated that they had been absent from mathematics class five or more times in the past month.

	Yes	No
Do you have a computer at home that you use for school work?	80%	19%
Do you have a scientific calculator at home that you use for school work?	75%	24%
Do you have a graphing calculator at home that you use for school work?	5%	94%

Observations

- 80% of the students indicated that they had a computer at home to use for school work.

Teacher Questionnaire Data — Applied

In general, how often do your Grade 9 mathematics students have access to the following items at school (either during or after class)?

	Daily	A Few Times a Week	A Few Times a Month	A Few Times During the Course	Never or Hardly Ever
Computers	19%	4%	8%	33%	32%
Graphing Calculators	18%	8%	19%	38%	14%

Observations

- 65% of the teachers indicated that their students had access to computers at school (either during or after class) only a few times during the course, or never or hardly ever.
- 52% of the teachers indicated that their students had access to graphing calculators at school (either during or after class) only a few times during the course, or never or hardly ever.

How often did you have your Grade 9 mathematics students

	Daily	A Few Times a Week	A Few Times a Month	A Few Times During the Course	Never or Hardly Ever
use concrete materials to investigate and gain an understanding of new concepts?	3%	15%	31%	39%	10%
use graphing calculators to explore and investigate mathematical ideas and relationships?	2%	4%	16%	49%	25%
use dynamic geometry software (e.g., The Geometer's Sketchpad, Cabri)?	<1%	1%	5%	37%	54%

Observations

- 49% of teachers indicated that they had used concrete materials; 22% indicated that they had used graphing calculators; and 6% indicated that they had used dynamic geometry software at least a few times a month.

In the past semester/year, what percentage of course time did you spend teaching the following mathematics strands?

	1–20%	21–40%	41–60%	61–80%	81–100%
Number Sense and Algebra	10%	63%	19%	3%	1%
Relationships	14%	66%	13%	2%	<1%
Analytic Geometry	38%	53%	4%	1%	<1%
Measurement and Geometry	54%	40%	2%	1%	<1%

How often did you have your Grade 9 mathematics students engage in activities related to the following achievement categories?

	Daily	A Few Times a Week	A Few Times a Month	A Few Times During the Course	Never or Hardly Ever
Knowledge/Understanding	65%	21%	8%	3%	<1%
Application	23%	40%	25%	9%	1%
Problem Solving	27%	34%	25%	9%	1%
Communication	30%	41%	19%	6%	1%

Including this year, for how many years have you been teaching

	5 Years or Less	6–10 Years	11 Years or More
mathematics at the secondary level?	52%	14%	31%
Grade 9 mathematics?	67%	14%	17%

Observations

- 52% of the teachers reported they had been teaching at the secondary level for five years or less.
- 67% indicated they had been teaching Grade 9 mathematics for five years or less.

While studying to obtain your bachelor's degree (or equivalent), what was your

	Mathematics	Math-Related Subject	Other
major area of study?	31%	33%	32%
minor area of study?	19%	40%	34%

Observations

- 32% of teachers indicated that their major area of study was one other than mathematics or a mathematics-related subject.

Which of the following have you completed or are you presently working towards?

	Yes	No
Additional Basic Qualifications in Mathematics	28%	61%
Three-Session Qualifications in Mathematics — Intermediate and Senior Education	22%	66%
Honours Specialist Qualifications in Mathematics	22%	68%

Observations

- Only 22% of teachers indicated that they had completed or were presently working toward additional basic qualifications in mathematics; 22% indicated that they had completed or were working toward intermediate and senior qualifications; and 22% indicated that they had completed or were working toward honours specialist qualifications in mathematics.

Profile of Students Who Wrote the Assessment — Academic*

Number of Students

First Semester	Second Semester	Full Year	Total**
40 865	30 198	12 265	99 094

Gender	Percentage
Male	49%
Female	50%
No Response	2%

Place of Birth	Percentage
Inside Canada	80%
Outside Canada	20%
No Response	<1%

Year of Birth	Percentage
1985 or Before	1%
1986	5%
1987	93%
1988	1%
No Response	<1%

Language(s) Spoken at Home	Percentage
Only English	62%
Mostly English	18%
English as Often as Another Language	11%
Mostly Another Language	7%
Only Another Language	2%
No Response	<1%

Observations

- 20% of the students were born outside Canada.
- 93% of the students appear to be at the age expected for the cohort.

* “Academic courses develop students’ knowledge and skills through the study of theory and abstract problems. These courses focus on the essential concepts of a subject and explore related concepts as well. They incorporate practical applications as appropriate.” *The Ontario Curriculum, Grades 9 to 12: Program Planning and Assessment, 2000*

** Some schools did not indicate whether students were enrolled in a semestered or full-year course. As a result, there are students who are not counted as part of the first-semester, second-semester or full-year statistics.

Accommodations and Special Provisions — Academic

	Percentage
Students Who Received Accommodations and Special Provisions	<1%
Students Who Received Accommodations	2%
Students Who Received Special Provisions	1%
Students Who Received No Accommodations or Special Provisions	95%
Students for Whom Information Is Missing	<1%

Participation — Academic

	Eligible Population	Percentage No Data	Percentage Exempted	Percentage Fully Participating
All Academic Students	99 094	1%	<1%	98%
Gender				
Female	49 772	1%	<1%	99%
Male	48 181	1%	1%	98%
Student Status				
ESL/ELD	2 693	1%	12%	87%
Special Needs	2 386	2%	2%	96%

Observations

- 50% of academic students were female; 49% were male and 1% were unspecified.
- 3% of academic students were identified as ESL/ELD.
- 2% of academic students were identified as special needs students.
- 12% of students identified as ESL/ELD were exempted.

Overall Achievement — Academic

	Exempted	No Data	NEIS	Below Level 1	Level 1	Level 2	Level 3	Level 4
Method 1 (# = 99 094)	<1%	1%	3%	<1%	14%	17%	58%	5%
Method 2 (# = 97 252)	N/A	N/A	3%	<1%	14%	18%	59%	5%

By Program — Academic

	Exempted	No Data	NEIS	Below Level 1	Level 1	Level 2	Level 3	Level 4
Semester 1 (# = 40 865)								
Method 1	1%	1%	3%	<1%	14%	17%	58%	5%
Semester 2 (# = 30 198)								
Method 1	<1%	2%	3%	<1%	14%	18%	58%	5%
Full Year (# = 12 265)								
Method 1	<1%	1%	4%	<1%	12%	15%	59%	8%

Observations

- The percentages of students at or above the provincial standard were approximately the same for students in semestered and full-year programs.

By Gender — Academic

	Exempted	No Data	NEIS	Below Level 1	Level 1	Level 2	Level 3	Level 4
Girls (# = 49 772)								
Method 1	<1%	1%	3%	<1%	15%	18%	58%	5%
Boys (# = 48 181)								
Method 1	1%	1%	3%	1%	13%	16%	59%	6%

Observations

- Girls and boys performed almost equally well.

Note: Results for gender are based upon the number of students for whom gender data were reported.

By Student Status (ESL/ELD) — Academic

	Exempted	No Data	NEIS	Below Level 1	Level 1	Level 2	Level 3	Level 4
Non-ESL/ELD (# = 96 401)								
Method 1	<1%	1%	3%	<1%	14%	17%	59%	5%
ESL/ELD (# = 2693)								
Method 1	12%	1%	3%	2%	23%	15%	38%	6%

Observations

- 44% of students identified as ESL/ELD performed at Level 3 or above.
- 12% of students identified as ESL/ELD were exempted.

By Special Education Support (Excluding Gifted) — Academic

	Exempted	No Data	NEIS	Below Level 1	Level 1	Level 2	Level 3	Level 4
Not Receiving Support (# = 96 708)								
Method 1	<1%	1%	3%	<1%	14%	17%	59%	5%
Receiving Support (# = 2386)								
Method 1	2%	2%	4%	2%	26%	22%	41%	2%

Observations

- 43% of students identified as having special needs performed at Level 3 or above.
- Only 2% of students identified as having special needs were exempted.

Overall Achievement by Category — Academic

See Appendix A for definitions of the categories.

Knowledge/Skills Categories	Exempted	No Data	NEIS	Below Level 1	Level 1	Level 2	Level 3	Level 4
Knowledge/Understanding								
Method 1 (# = 99 094)	<1%	1%	3%	<1%	14%	14%	63%	4%
Method 2 (# = 97 252)	N/A	N/A	3%	<1%	14%	14%	64%	4%
Application								
Method 1 (# = 99 094)	<1%	1%	2%	4%	14%	11%	58%	10%
Method 2 (# = 97 252)	N/A	N/A	2%	4%	14%	11%	59%	10%
Thinking/Inquiry/Problem Solving								
Method 1 (# = 99 094)	<1%	1%	1%	1%	28%	15%	44%	8%
Method 2 (# = 97 252)	N/A	N/A	1%	1%	28%	15%	45%	8%
Communication								
Method 1 (# = 99 094)	<1%	1%	2%	<1%	6%	35%	54%	1%
Method 2 (# = 97 252)	N/A	N/A	2%	<1%	6%	36%	55%	1%

Observations

- Overall student achievement in the categories was higher than last year.
- 67% achieved the provincial standard or above in knowledge and understanding.
- 68% achieved the provincial standard or above in application.
- 52% achieved the provincial standard or above in thinking, inquiry and problem solving.
- 55% achieved the provincial standard or above in communication.
-

Overall Achievement by Strand — Academic

See Appendix A for definitions of the strands.

Knowledge/Skills Categories	Exempted	No Data	NEIS	Below Level 1	Level 1	Level 2	Level 3	Level 4
Number Sense and Algebra								
Method 1 (# = 99 094)	<1%	1%	2%	<1%	12%	20%	60%	4%
Method 2 (# = 97 252)	N/A	N/A	2%	<1%	12%	20%	61%	4%
Relationships								
Method 1 (# = 99 094)	<1%	1%	3%	<1%	10%	19%	52%	13%
Method 2 (# = 97 252)	N/A	N/A	3%	<1%	10%	20%	53%	14%
Analytic Geometry								
Method 1 (# = 99 094)	<1%	1%	2%	<1%	12%	30%	51%	2%
Method 2 (# = 97 252)	N/A	N/A	2%	<1%	12%	31%	52%	3%
Measurement and Geometry								
Method 1 (# = 99 094)	<1%	1%	2%	2%	15%	18%	59%	2%
Method 2 (# = 97 252)	N/A	N/A	3%	2%	15%	19%	60%	2%

Observations

- Overall student achievement in the strands was higher than last year.
- 64% achieved the provincial standard or above in number sense and algebra.
- 65% achieved the provincial standard or above in relationships.
- 53% achieved the provincial standard or above in analytic geometry.
- 61% achieved the provincial standard or above in measurement and geometry.

Student Questionnaire Data — Academic

	Percentage
What language(s) do you speak at home?	
Only English	62%
Mostly English	18%
English as Often as Another Language (or Languages)	11%
Mostly Another Language (or Other Languages)	7%
Only Another Language (or Other Languages)	2%
How often in the past month have you been absent from mathematics class?	
Never	32%
1–2 Times	44%
3–4 Times	15%
5 or More Times	8%

Observations

- 8% of the students indicated that they had been absent from mathematics class five or more times in the past month.

	Yes	No
Do you have a computer at home that you use for school work?	95%	5%
Do you have a scientific calculator at home that you use for school work?	88%	11%
Do you have a graphing calculator at home that you use for school work?	5%	94%

Observations

- 95% of students indicated that they had a computer at home to use for school work.

Teacher Questionnaire Data — Academic

In general, how often do your Grade 9 mathematics students have access to the following items at school (either during or after class)?

	Daily	A Few Times a Week	A Few Times a Month	A Few Times During the Course	Never or Hardly Ever
Computers	20%	6%	10%	39%	24%
Graphing Calculators	21%	11%	24%	37%	4%

Observations

- 63% of teachers indicated that their students had access to computers at school (either during or after class) only a few times during the course, or never or hardly ever.
- 41% of teachers indicated that their students had access to graphing calculators at school (either during or after class) only a few times during the course, or never or hardly ever.

How often did you have your Grade 9 mathematics students

	Daily	A Few Times a Week	A Few Times a Month	A Few Times During the Course	Never or Hardly Ever
use concrete materials to investigate and gain an understanding of new concepts?	3%	11%	29%	42%	13%
use graphing calculators to explore and investigate mathematical ideas and relationships?	1%	6%	27%	53%	10%
use dynamic geometry software (e.g., The Geometer's Sketchpad, Cabri)?	1%	1%	6%	51%	39%

Observations

- 43% of teachers indicated that they had used concrete materials; 34% indicated that they had used graphing calculators; and 8% indicated that they had used dynamic geometry software at least a few times a month.

In the past semester/year, what percentage of course time did you spend teaching the following mathematics strands?

	1–20%	21–40%	41–60%	61–80%	81–100%
Number Sense and Algebra	14%	65%	14%	3%	1%
Relationships	12%	67%	13%	4%	1%
Analytic Geometry	28%	61%	7%	1%	<1%
Measurement and Geometry	55%	38%	2%	<1%	<1%

How often did you have your Grade 9 mathematics students engage in activities related to the following achievement categories?

	Daily	A Few Times a Week	A Few Times a Month	A Few Times During the Course	Never or Hardly Ever
Knowledge/Understanding	72%	17%	7%	2%	<1%
Application	28%	42%	21%	6%	<1%
Problem Solving	37%	34%	20%	6%	1%
Communication	40%	39%	15%	4%	<1%

Including this year, for how many years have you been teaching

	5 Years or Less	6–10 Years	11 Years or More
mathematics at the secondary level?	44%	16%	37%
Grade 9 mathematics?	59%	16%	23%

Observations

- 44% of the teachers reported they had been teaching at the secondary level five years or less.
- 59% indicated they had been teaching Grade 9 mathematics for five years or less.

While studying to obtain your bachelor's degree (or equivalent), what was your

	Mathematics	Math-Related Subject	Other
major area of study?	41%	33%	22%
minor area of study?	24%	42%	29%

Observations

- 22% of teachers indicated their major area of study was one other than mathematics or a mathematics-related subject.

Which of the following have you completed or are you presently working towards?

	Yes	No
Additional Basic Qualifications in Mathematics	33%	55%
Three-Session Qualifications in Mathematics — Intermediate and Senior Education	23%	63%
Honours Specialist Qualifications in Mathematics	29%	62%

Observations

- Only 33% of teachers indicated that they had completed or were presently working toward additional basic qualifications in mathematics; 23% indicated that they had completed or were presently working toward intermediate and senior qualifications; and 29% indicated that they had completed or were presently working toward honours specialist qualifications in mathematics.

Recommendations

Planning for Improvement

EQAO recommends

- that **school boards**, in consultation with their communities, incorporate the overall, category and strand data from the Grade 9 Assessment of Mathematics, 2001–2002 into their current board improvement plans and develop further strategies for improving student achievement in mathematics.
- that **school boards, principals and teachers** consult with students, parents and school councils to examine the category and strand information in order to identify areas in the mathematics curriculum in which students are demonstrating strengths and areas in which improvements are required.
- that **school boards, principals and teachers** examine achievement results from the 2000–2001 and 2001–2002 assessments to determine where improvement has occurred and which improvement strategies have had the greatest impact.
- that **school boards** analyze aggregated as well as disaggregated achievement and contextual data in planning for improvement and identify strategies that target areas and groups in need of additional support, motivation and improvement, especially those students not yet achieving the provincial standard.
- that **school boards, principals and teachers** examine the teacher and student questionnaire data for applied and academic courses to ensure that the strategies and resources being used to teach and assess each course appropriately reflect the needs and motivation of students.

Support for Teachers

EQAO recommends

- that the **Ministry of Education, faculties of education, the Ontario College of Teachers** (through Professional Learning Program providers), **mathematics associations** and **school boards** continue to support new and experienced teachers and provide them with professional development opportunities related to teaching and assessing mathematics.
- that **school boards and principals** establish mentoring programs for teachers new to teaching Grade 9 mathematics.
- that **schools boards and principals**, in co-operation with the **Ministry of Education**, develop teaching strategies to improve learning and assessment and provide opportunities for teachers to add additional teaching and assessment strategies to their repertoire.

- that **teachers** continue to use the sample questions, tasks and student work from the 2000–2001 and the 2001–2002 assessments (available on EQAO’s Web site) to help students understand how questions and tasks relate to the category and strand expectations in the mathematics curriculum.
- that **school boards and principals**, in co-operation with the Ministry of Education, continue to ensure that the necessary concrete materials (e.g., algebra tiles) and technology (e.g., graphing calculators, dynamic geometry software) are available to students and teachers.

Appendix A — Definitions of Categories and Strands

Categories

Categories
Knowledge and Understanding – understanding of concepts – performing algorithms, operations and procedures
Application – selecting concepts, formulas, algorithms and tools to fit the information given
Thinking, Inquiry and Problem Solving – reasoning – applying the steps of an inquiry or problem-solving process
Communication – explaining reasoning – using mathematical language, symbols, visuals and conventions

Strands
Number Sense and Algebra – applying essential numeric skills in solving new problems within a context (rather than in isolation) – applying algebraic concepts and skills (basic exponent rules, operations with first-degree polynomials and solving first-degree equations) necessary for the study and application of relations (e.g., consolidating numerical skills by using them in a variety of contexts)
Relationships – identifying and understanding the properties of linear relations through the collection and interpretation of data from a variety of real-life situations and the creation of algebraic models for the data (e.g., determining relationships between two variables by collecting and analyzing data)
Analytic Geometry – using various mathematical forms to demonstrate understanding of the geometry of the xy-plane, with a focus on linear relations and properties of slope (e.g., graphing a line and writing the equation of a line from given information)
Measurement and Geometry – understanding and using formulas and applications of three-dimensional figures to explore the relationships between measurement and geometry (e.g., relationship between volume and surface area, varying of one dimension on a measure) – demonstrating an understanding of some properties of triangles and quadrilaterals (e.g., determining the optimal values of various measurements through investigations facilitated by the use of concrete materials, diagrams and calculators or computer software)