
GENERAL COMMENTS

Grade 12 Applied Mathematics Achievement Test (June 2015)

Student Performance—Observations

The following observations are based on local marking results and on comments made by markers during the sample marking session. These comments refer to common errors made by students at the provincial level and are not specific to school jurisdictions.

Information regarding how to interpret the provincial test and assessment results is provided in the document *Interpreting and Using Results from Provincial Tests and Assessments* available at www.edu.gov.mb.ca/k12/assess/support/results/index.html.

Various factors impact changes in performance over time: classroom-based, school-based, and home-based contexts, changes to demographics, and student choice of mathematics course. In addition, Grade 12 provincial tests may vary slightly in overall difficulty although every effort is made to minimize variation throughout the test development and pilot testing processes.

When considering performance relative to specific areas of course content, the level of difficulty of the content and its representation on the provincial test vary over time according to the type of test questions and learning outcomes addressed. Information regarding learning outcomes is provided in the document *Grades 9 to 12 Mathematics: Manitoba Curriculum Framework of Outcomes* (2014).

Summary of Test Results (Province)

June 2015	January 2015	June 2014	January 2014
54.9%	58.2%	55.0%	62.1%

Relations and Functions (provincial mean: 55.3%)

Conceptual knowledge

Students did not consider the context (blood sugar concentration, in this case) or misinterpreted the exponential expression $\left[c = 9(0.995)^t \right]$ when identifying domain and/or range (e.g., used \leq instead of $<$ or vice versa).

Some students made an incorrect substitution when determining the intersect of a cubic regression equation (e.g., used value as x instead of y).

Some students used the period as the b value in their sinusoidal equation.

Procedural skill

The shape of functions were reversed or not drawn well.

Communication

On a question where students had to identify the incorrect statements, students negated (e.g., added “does not”) or corrected the statement without providing a counterexample.

Students rounded coefficients either incorrectly or not to a minimum of two decimal places.

Some final answers did not include the unit of measure.

Students did not use the contextual variables given in the question (e.g., used x and y without defining them).

Labels or scales were missing on graphs.

Probability (provincial mean: 56.9%)

Conceptual knowledge

Students only considered one case when the question indicated that there was more than one (e.g., *at least* one worker to the task).

Procedural skill

Some students incorrectly interpreted the relationship between percent and decimal value (e.g., 9% expressed as 0.9) and also between factorial and exponent (e.g., $9!$ calculated as 9^9).

Communication

Students calculated odds against as a single value (e.g., 40% or 0.4) or expressed it as a proportion (e.g., 40 : 100) or fraction $\left(\frac{40}{60}\right)$ instead of part : part (40 : 60 or 2 : 3).

When asked to create a scenario appropriate for the product of two combinations (i.e., ${}_a C_b \times {}_c C_d$), students provided details instead of writing it in the form of a question, or carried out the calculation without a scenario. Some students also wrote out an independent situation for each combination without a connection.

When expressing answers in percent, final answers were often not given to a minimum of two decimal places.

Financial Mathematics (provincial mean: 62.7%)

Conceptual knowledge

When determining the annual interest rate, students did not subtract the principal from the future value.

Procedural skill

When asked for suggestions to strengthen a portfolio, students added information that was not given in the question (e.g., delay retirement or include external sources of money instead of transferring within the portfolio).

When using the Rule of 72, students used the interest rate as a decimal, which made their final answer off by a factor of 100.

For a 4-year lease, students did not calculate the allowed kilometrage over the four years or forgot to subtract the down payment.

Communication

When asked to justify which was the better option, some students wrote that it was cheaper without explaining why it was cheaper.

Design and Measurement (provincial mean: 55.5%)

Conceptual knowledge

No comments.

Procedural skill

Many students struggled with the calculation of the resulting area when a rectangular area is removed from a larger rectangle.

Some students had difficulty with calculating volume when different units were given in the question (e.g., did not convert all values to a common unit).

Communication

No comments.

Logical Reasoning (provincial mean: 34.2%)

Conceptual knowledge

Some students made incorrect assumptions about number properties that led to an incorrect counterexample (e.g., that the square of a negative number was negative).

Students also were not familiar with mathematical terms from previous grades (e.g., did not know what a prime number was).

Students confused \cup and \cap .

Procedural skill

Students did not know how to determine P' .

Students identified the set of elements instead of the number of elements when asked for $n(O \cap P')$.

Students placed elements in a Venn diagram multiple times.

Communication

No comments.

Communication Errors

Errors that are not related to the concepts within a question are called “Communication Errors” and these were indicated on the *Scoring Sheet* in a separate section. There was a maximum 0.5 mark deduction for each type of communication error committed, regardless of the number of errors committed for a certain type (i.e., committing a second error for any type did not further affect a student’s mark).

The following table indicates the percentage of students who had at least one error for each type.

E1	Notation	21.6%
E2	Units	21.7%
E3	Transcription/Transposition	16.5%
E4	Final Answer	25.3%
E5	Rounding	45.9%
E6	Whole Units	6.7%

Marking Accuracy and Consistency

Information regarding how to interpret the marking accuracy and consistency reports is provided in the document *Interpreting and Using Results from Provincial Tests and Assessments* available at www.edu.gov.mb.ca/k12/assess/support/results/index.html.

These reports include a chart comparing the local marking results to the results from the departmental re-marking of sample test booklets. Provincially, 47.9% of the test booklets sampled were given nearly identical total scores. In 37.3% of the cases, local marking resulted in a higher score than those given at the department; in 12.7% of the cases, local marking resulted in a lower score. On average, the difference was approximately 1.1% with local marking resulting in the slightly higher average score.

Survey Results

Teachers who supervised the Grade 12 Applied Mathematics Achievement Test in June 2015 were invited to complete a feedback form regarding the test and its administration. A total of 120 forms were received. A summary of their comments is provided below.

After adjusting for non-responses:

- 86.7% of teachers indicated that all of the topics in the test were taught by the time the test was written.
- 98.2% of teachers thought that the test content was consistent with the learning outcomes outlined in the curriculum documents and 92.9% thought that the difficulty of the test was appropriate.
- 95.8% of teachers indicated that their students used a study sheet during the semester and 79.8% of teachers indicated that all of their students used a study sheet during the test. 76.7% of teachers indicated that the study sheets were made during class.

- 80.8% of teachers indicated that their students used the formula sheet during the semester and 83.3% of teachers indicated that their students used the formula sheet during the test.
- During the test, 90.4% of the teachers indicated that all of their students used a graphing calculator, 9.8% of teachers indicated that at least some of their students used computer software, 7.1% indicated that at least some of their students used Internet tools, and 4.4% indicated that at least some of their students used apps on a mobile device.
- 93.6% of teachers indicated that students were able to complete the test in the time allowed.

