GENERAL COMMENTS

Grade 12 Applied Mathematics Achievement Test (June 2014)

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* (2009).

Relations and Functions

Conceptual knowledge

Students made inclusive errors when stating the domain and/or the range (e.g., used < instead of ≤ or vice versa).

Procedural skill

Students did not show key characteristics of the function in their graph (e.g., maximum, minimum, asymptotes, intercepts). In some cases, the scale was not appropriately considered in relationship to the data on the graph.

When solving an algebraic equation, some students did not correctly apply parentheses, which led to an incorrect final answer.

Communication

Units were omitted in some students' final answers.

Some students did not use contextual variables (e.g., used *x* and *y* instead of *P* and *t*).

When using set notation, some students did not enclose the set with braces.

Some students did not label the curves on a graph involving two functions.

There were observed instances of incorrectly rounded final answers, depending on the context of the question.

Probability

Conceptual knowledge

Students performed addition errors when solving permutation problems involving routes (pathways).

Concepts in this unit that were commonly misunderstood included the concept of "odds against" and permutations with restrictions.

Frequently, students incorrectly used permutations instead of combinations.

Procedural skill

Some students did not subtract or forgot to subtract the overlapping portion of the Venn diagram as part of the solution.

Communication

In some instances, students provided a tree diagram as a graphic organizer without any other work.

Financial Mathematics

Conceptual knowledge

Some students simply added all the values together when determining the net worth rather than considering which ones were assets and which were liabilities.

Procedural skill

Students did not subtract the down payment when solving a car lease or purchase problem. In some cases, students used a TVM calculator to determine investment growth instead of calculating the payment.

Some students forgot to consider the residual value when calculating the total cost.

Communication

Some students simply wrote that "it is cheaper" when evaluating a lease or purchase decision.

In their final answers, students forgot to include the percentage sign in questions involving debt to equity or rate of return.

Design and Measurement

Conceptual knowledge
No comments.

Procedural skill
Students incorrectly applied sales taxes (e.g., calculating 13% on the subtotal instead of 5% for GST and 8% for PST on the subtotal).

Students had difficulty converting imperial units.

Some students did not consider all components of a project (e.g., forgetting that a highway has two shoulders).

Communication
Some students did not round up to whole units (based on the context of the question).

Some students rounded values too early in a multi-step question.

Logical Reasoning

Conceptual knowledge
Students explained the inverse of a statement instead of the converse.

Procedural skill
No comments.

Communication
In some cases, students wrote out the definition of a biconditional statement instead of using the definition to explain if a statement was biconditional.

When using set notation, some students did not enclose the set with braces.

Students did not clearly identify their answer within a Venn diagram.

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	Student does not include one of the following in the equation: "$y =$", "sin", "ln", or "x", or writes parameters separately from the equation.	7.8%
E2	Student does not include the units in the final answer.	27.6%
E3	Student does not include one of the following on the graph: labels for the axes, units for the axes, or scales for the axes.	18.0%
E4	Student does not state or incorrectly states the final answer.	54.4%
E5	Student rounds too soon or rounds incorrectly.	65.1%
E6	Student does not use whole units appropriately (e.g., in the context of purchasing supplies such as paint, which must be purchased in whole units).	9.5%
E7	Student makes a transcription or transposition error.	15.6%

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, 44.1% of the test booklets sampled were given nearly identical total scores. In 46.0% of the cases, local marking resulted in a higher score than those given at the department; in 9.9% of the cases, local marking resulted in a lower score. On average, the difference was approximately 2.0% with local marking resulting in the slightly higher average score.

Survey Results

Teachers who supervised the Grade 12 Applied Mathematics Achievement Test in June 2014 were invited to complete a feedback form regarding the test and its administration. A total of 119 forms were received. A summary of their comments is provided below.

After adjusting for non-responses:

- 87.1% of the teachers indicated that all of the topics in the test were taught by the time the test was written.

- 88.8% of the teachers thought that the test content was consistent with the learning outcomes outlined in the curriculum documents and 92.1% thought that the difficulty of the test was appropriate.

- 90.6% of the teachers indicated that their students used a study sheet during the semester and 84.7% of the teachers indicated that all of their students used a study sheet during the test. 81.4% of the teachers indicated that the study sheets were made during class.

- 70.0% of the teachers indicated that their students used the formula sheet during the semester and 96.6% of teachers indicated that their students used the formula sheet during the test.

- During the test, 89.8% of the teachers indicated that all of their students used a graphing calculator, 11.6% of the teachers indicated that at least some of their students used computer software, and 8.8% indicated that at least some of their students used Internet tools.

- 94.2% of the teachers indicated that students were able to complete the test in the time allowed.