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# GENERAL COMMENTS

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## Grade 12 Essential Mathematics Achievement Test (January 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](http://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)

January 2014	June 2014	January 2015
57.55%	57.1%	55.9%

### Unit: Home Finance (provincial mean: 55.9%)

#### Conceptual Knowledge

The factors that affect homeowner's insurance were unclear for some students. Water savings was stated as an energy-efficient upgrade. Portioned assessment was mistaken for mortgage amount.

#### Procedural Skill

The table value for determining mortgage payment was used incorrectly as a percentage. The education tax was mistakenly calculated when already given. The local improvement tax was not calculated. The property tax credit was treated as an expense. The calculation of monthly mortgage payment was unclear for some.

#### Communication

Rounding was an issue when reporting money (e.g., \$ 1148.175). The definition of tenant insurance was unclear. There was confusion regarding insurance premium differences when owning versus renting a property. The explanation of additional (one-time) home costs was unclear for some.

## **Unit: Vehicle Finance (provincial mean: 59.4%)**

### **Conceptual Knowledge**

When stating advantages and disadvantages of leasing a vehicle, some students wrote that leasing a vehicle made it easier to trade it in for a new one. Most students were unable to earn full marks on the private purchase of a vehicle question due to a lack of conceptual understanding. Many students also demonstrated insufficient understanding of purchasing a new vehicle, incorrectly subtracting the down payment before calculating tax or not calculating tax. When calculating the monthly lease payments, some students did not subtract the down payment or added it instead. Although few student achieved full marks, many students correctly divided by 36 payments. Furthermore, some students divided by 36 first, and then subtracted or added the down payment. Most students assumed being in an accident meant being at fault. When preparing a vehicle repair bill, many students correctly calculated the subtotal but some students did not apply tax to the \$60 basic fee or used different tax rates for parts and labour.

### **Procedural Skill**

When purchasing a car privately, many students used the wrong value, wrong tax rate, or added tax to the wrong value. Some students flipped the fuel efficiency rate. Student work was difficult to follow when solving  $I = Prt$ . The interest rate was often applied as a percent instead of as a decimal. Sometimes students divided the principal by 1000, perhaps as in finding the monthly payment. Time was often missing or incorrect, for example, noting time in years or total number of months. For vehicle depreciation, some students only calculated the depreciation, and not the car value after depreciation. When preparing a vehicle repair bill, some students calculated tax incorrectly by using an incorrect rate (5%, 7%, 8%, or 12%).

### **Communication**

When stating advantages and disadvantages of leasing a vehicle, some students' responses were vague ('cheaper'). When calculating the fuel efficiency rate, some students stated incorrect units, for instance L, \$/L, \$/100km.

## **Unit: Precision Measurement (provincial mean: 41.2%)**

### **Conceptual Knowledge**

Students consistently defined precision and uncertainty for tolerance. Precision was not well understood as it was not related to the smallest measurement on any device. Accuracy questions were done well, and tolerance was understood as a range of acceptable values.

### **Procedural Skill**

Students understood that uncertainty is half of precision, and follow-through marks were prevalent. When tolerance was given as a whole number, it was common for the students not to take half and find a maximum and minimum. Instead the whole tolerance was used to find the maximum and minimum levels. Tolerance forms were not well done. Many students used the nominal value as always being the midpoint.

### **Communication**

Maximum and minimum values were commonly misplaced. Examples that students came up with for tolerance in the real world were good, but there was some weakness in trying to connect the examples to how tolerance is used.

## **Unit: Probability (provincial mean: 62.6%)**

### **Conceptual Knowledge**

Many students had difficulty when calculating odds. They did not make the comparison between odds for and odds against. They referred to the probability in the question and did not calculate odds correctly. Students had some difficulty when calculating fractions—they reduced incorrectly. Students had some difficulty when calculating experimental probability. Students had various amounts of success with expected value.

### **Procedural Skill**

Students would present odds against as probability for the event not occurring. Students did not substitute the values properly into the given formula.

### **Communication**

No comments.

## **Unit: Geometry and Trigonometry (provincial mean: 51.0%)**

### **Conceptual Knowledge**

Students generally could not calculate the number of diagonals in a polygon. They did understand they needed to use sine law to solve for a missing side. Students did understand they needed to connect the idea of polygons to the real world and did try to bring in examples they would see in everyday life. Many of the examples, however, were copied from old marking guides without evidence of understanding. Students had trouble with the words “top view” when used to describe the visual of a chocolate bar and this focused their attention away from the properties to simply describing the chocolate bar.

### **Procedural Skill**

While most students were successful in identifying the need for sine law and setting up the correct sides and angles, many students failed in their execution of the work. Students struggled in connecting diagrams to real-world situations. Many students successfully solved for the base using sine law or cosine law, rather than using the properties of polygons. They got the correct answer, but did far more work. Students preferred to use trigonometry over the properties of polygons, given the choice. Most students had difficulties referring to properties of polygons. Many students believed that “equal sides” would be considered two properties.

### **Communication**

Generally, there were few issues with the communication of ideas in this unit. In some cases, it seems that students did not thoroughly read the question, and would provide two diagrams instead of one diagram and an explanation. When reporting properties of polygons, many students would say “two equal sides” when they mean “two pairs of opposite equal sides.”

## **Unit: Statistics (provincial mean: 65.7%)**

### **Conceptual Knowledge**

Students had a misunderstanding of the mode—if a number appeared more than once it was counted as mode. Students struggled with percentile ranking conceptually.

### **Procedural Skill**

Students could substitute the information into the formula but had difficulty when expressing their response as a percentile rank—many expressed their answer as a percentage. Some students were still using the old percentile rank formula. When calculating weighted mean, students made a variety of calculation errors.

### **Communication**

Students used a percent sign in their final answer for percentile rank. When answering trimmed mean, some students gave a final answer with no work while others showed a division symbol by the table indicating to divide the entire table by 10. There was no evidence of process provided.

### **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](http://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, 44.52% of the test booklets sampled were given nearly identical total scores. In 36.57% of the cases, local marking resulted in a higher score than those given at the department; in 18.9% of the cases, local marking resulted in a lower score. On average, the difference was approximately 1.8% with local marking resulting in the slightly higher average score.

### **Survey Results**

Teachers who supervised the Grade 12 Essential Mathematics Achievement Test in January 2015 were invited to provide comments regarding the test and its administration. A total of 175 teachers responded to the survey. A summary of their comments is provided below.

After adjusting for non-responses:

- 93.3% of the teachers indicated that the test content was consistent with the learning outcomes as outlined in the curriculum document.
- 93.9% of teachers indicated that the reading level of the test was appropriate and 92.1% of them indicated the difficulty level of the test was appropriate.
- 88.8% of the teachers indicated that students were able to complete the entire test in the allotted time.
- 99.4% of the teachers indicated that their students used a study sheet throughout the semester and 99.4% of teachers indicated that their students used a study sheet during the test.