2010–2011 Elementary Mathematical Literacy Assessment (EMLA) Common Errors

Analysis of common errors is based on the statistical analysis of each question and looking at the student work. There was very little difference in student performance from the 2009-2010 EMLA. The observations and suggestions about the student work already provided and posted on the EMLA web site continue to apply. Below is a brief list of common errors noticed this year.

General Observations

- Students didn't seem to know place value; specifically, they struggled identifying/interpreting the difference between tenths, hundredths and thousandths often confusing them with whole number place values. Working with very large numbers (hundred thousands, millions and above) was also an issue.
- Students had great difficulty with questions targeting the visualization process; for example, any question requiring conceptualization of geometric properties, transformations of two dimensional objects or the characteristics of a three dimensional object.
- Lack of mathematical vocabulary hindered performance, for example, product, difference, parallelogram, rhombus, regular, similar, congruent, diagonal, perpendicular bisector, translation, isosceles, scalene, equilateral, capacity, range, mean.
- Lack of knowledge of basic concepts such as fractions, ratio, and percent, impeded success. Benchmarks/referents (100%, 50% and 0% as well as 1, ½ and 0) were not well used when doing so would have been a useful starting point.
- Difficulties with patterns and relationships suggest many opportunities are needed to identify and apply a pattern rule and to determine missing elements in a pattern especially 'growing' patterns. Students should look for, develop, generalize and describe a wide variety of patterns orally, symbolically, graphically and in written form.

Basic Facts

- Weaker performance when multiplying by 0 and 1 and dividing by 1.
- Some performed the inverse operation; for example $8 \div 8 = 64$.

Operations

- Fact knowledge was an issue in all calculations. For example, in questions requiring division, the mistakes were often made in subtractions or multiplication rather than the process of division. Frequently numbers were incorrectly manipulated for easy subtraction. For example, $70 - 19 = 69$ continues to be a common error.
- Many different computation strategies were used – some were not very efficient. Many did not estimate to check the reasonableness of their answers. Estimation, number sense, and use of efficient computation strategies need to be an ongoing instructional focus.
- Identifying the correct operation to use was problematic in multi–step word problems and problem solving.
- Many students did not seem to know the meaning of 'product' or 'difference'.

Decimals

- Operations with decimals were not well done and were often omitted. Place value seemed to be the issue. Students demonstrated a lack of place value knowledge and as a result frequently misaligned and misplaced decimals in the answers. Zeros were ignored and extra zeros were added for convenience. Many students did not know how to treat whole numbers when working with decimals. Once again checking the reasonableness of answers was not evident.

  For example, $0.5 \times 12.44 = 62.2$ was a common error. Thinking of 0.5 as equivalent to one half and finding 'half of' 12.44 is 6.22 is an easy mental computation.

Measurement and Problem Solving
- Students had difficulty distinguishing between area, perimeter and working with volume, capacity.
- Students did not often use/create/label diagrams to assist with problem solving solutions.
- Students often did not show their thinking – explanations were often unclear or omitted.
- Different components of the problems were ignored; students solved only one part of the problem.
- Students need to be encouraged to communicate their reasoning to extend beyond superficial explanations.

The most challenging questions for students on the 2010-2011 EMLA involved the following:
1. Rounding decimal numerals to a specified place value
2. Computational and measurement estimations
3. Interpreting points on the number line representing integer values or improper fractions
4. Distinguishing a prime number
5. Visualizing square numbers, recognizing a pattern, extending the pattern
6. Representing an expression using open frames (e.g. three more than a number is 12)
7. Determining a length using the given information and picture of a ruler provided
8. Determining a correct method for finding perimeter
9. Determining area to be able to solve a related problem
10. Calculating range and mean for a data set
11. Knowing the three angles in a triangle add to 180 degrees
12. Knowing the relationship between millilitres and cubic centimetres
13. Subtracting a decimal from a whole number
14. Multiplying two decimal numerals
15. Placing a fraction between 0 and ½ or ½ and 1
16. Determining the 'best buy' from several options
17. Interpreting a base 10 representation of division involving a decimal
18. Finding the area of a composite figure
19. Finding the capacity of a carton
20. Identifying an isosceles triangle
21. Identifying a three quarter turn
22. Identifying the edges on a prism