Daily Math and Problem Solving   **OLE.3**

TIME
15 minutes, daily

OVERVIEW
Students practise daily estimation, mental math, and problem-solving skills without the use of computational aids. Discussion about strategies used in the computational process is an integral part of mental math, and students are encouraged to use the strategies with which they are most comfortable. They keep a record of their results using a spreadsheet.

Students select a Problem of the Week from the Internet and work as a collaborative group to find a solution to the problem. They create a similar problem, post it on the class website, and give feedback to persons who write to them with a solution.

Students record comments about their estimation, mental math, and problem-solving experiences in their Math Journals.

LEARNING OUTCOMES
Through this learning experience (LE), students will achieve specific learning outcomes (SLOs) in various subject areas. Consider the intent of this LE and your choice of instructional and assessment strategies to determine which SLOs students may achieve, in addition to those identified.

English Language Arts
Consider the intent of this LE and your choice of instructional and assessment strategies to determine which SLOs students may achieve, in addition to those identified below:
- 1.2.2   *Explain Opinions*—Express new concepts and understanding in own words and explain their importance.

Mathematics
Consider the intent of this LE and your choice of instructional and assessment strategies to determine which SLOs students may achieve, in addition to those identified below:

Number
- 4.N.3. Demonstrate an understanding of addition of numbers with answers to 10 000 and their corresponding subtractions (limited to 3- and 4-digit numerals) by
  — using personal strategies for adding and subtracting
  — estimating sums and differences
  — solving problems involving addition and subtraction
  [C, CN, ME, PS, R]
- 4.N.5. Describe and apply mental mathematics strategies, such as
  — skip-counting from a known fact
  — using doubling or halving
  — using doubling and adding or subtracting one more group
  — using patterns in the 9s facts
  — using repeated doubling
  to develop recall of basic multiplication facts to 9 x 9 and related division facts.
  [C, CN, ME, PS, R]

Statistics and Probability
- 4.SP.2 Construct and interpret pictographs and bar graphs involving many-to-one
  correspondence to draw conclusions.
  [C, PS, R, V]

ICT LITERACY SKILLS AND COMPETENCIES
Consider the intent of this LE and your choice of instructional and assessment strategies to determine which skills and competencies students may achieve, in addition to those identified below:
- basic operating skills
- communicating electronically
- inquiry using electronic sources
- spreadsheet analysis
- web page authoring
- word processing

SUGGESTED LEARNING RESOURCES
Software
- spreadsheet
- word processing
- web authoring

Internet
- IMYM Links Database. <www.edu.gov.mb.ca/k12/tech/imym/resources/links.html>.
- Do an Internet search using the terms "math problem solving" or "grade 4 math problem solving."

Print
- Appendix C: Index of Teaching, Learning, and Assessment Strategies
- Jones, Grant. *Problem-Solving: What to Do When You Don't Know What to Do.* Barrie, ON: Exclusive Educational Products, 1991.
- Lipke, Barbara. *Figures, Facts, and Fables: Telling Tales in Science and Math.* Portsmouth, NH: Heinemann, 1996.
- Manitoba Education, Citizenship and Youth. *Kindergarten to Grade 8 Mathematics: Manitoba Curriculum Framework of Outcomes.* Winnipeg, MB: Manitoba Education, Citizenship and Youth, 2008. Available online at <www.edu.gov.mb.ca/k12/cur/math/framework_k-8/>.

BLMs
- BLM OLE.3#1 Problem-Solving Learning Centre
- BLM OLE.3#2: Problem-of-the-Week Chart

SUGGESTIONS FOR INSTRUCTION

MENTAL MATHEMATICS
Mental mathematics is described in *Kindergarten to Grade 8 Mathematics: Manitoba Curriculum Framework of Outcomes* as one of the critical components that students encounter in mathematics.

The purpose of this OLE is to ensure that students have daily opportunities to practise math skills. Select mental math activities or skills related to the math strand currently being taught in the class or appropriate for the *Community and Diversity* interdisciplinary unit.

Preparation and Set-up
- Become familiar with the computational mental math, estimation, and thinking strategies discussed in *Kindergarten to Grade 8 Mathematics: Manitoba Curriculum Framework of Outcomes.*
- Decide on a daily format and prepare transparencies for overhead presentation or an electronic document for use with a computer and a projection system.
- Become familiar with creating a spreadsheet and using its graphing/charting function.
- Set up bookmarks or favourites of links to suitable mathematics websites found on the IMYM Links Database for students to access throughout the school year, or place the links on the class website.

Activating Strategies
- Explain that mental math usually requires non-traditional computational processes and review the principles of arithmetic. Discuss strategies that students use when they are estimating or using mental math.
- Conduct a mental math card game.
  OR
- Using a transparency or an electronic document on a computer with a projection system, display a suitable mental math question. Student volunteers suggest some strategies they might use to answer the question.

Acquiring Strategies
- Post another similar mental math question for students to answer on their own.
- Invite students to demonstrate the method they used when solving the question of the day. Discuss the strategies that students demonstrate.

Applying Strategies
- Provide short daily mental math sessions during which students answer the posted questions and discuss, as a class or in collaborative groups, the computing and thinking strategies they use.
- Students record their daily results in a table in their Math Journals or on spreadsheet software and create a monthly graph of their results.
- Students keep a Math Journal of their own responses and observations of their progress in mental math and estimation based on the graphed results, comparing their monthly results as the school year progresses. Students should be able to explain why their average results change when attempting a new strategy.

PROBLEM SOLVING
Preparation and Set-up
- Become familiar with the mental math strategies discussed in *Kindergarten to Grade 8 Mathematics: Manitoba Curriculum Framework of Outcomes*.
- Access one of the Math Problem Solving websites listed on the IMYM Links Database and find a suitable math problem. It could be related to the current strand being taught in class. Place the link on the class website.

Activating Strategies
- Review problem-solving strategies related to the chosen problem of the week.
- Access a Math Problem Solving website for weekly problem-solving questions. Use these websites for classroom instruction or in a learning centre (see Connection to Learning Centre).

Acquiring Strategies
- In collaborative groups, students attempt to solve the problem of the week.
- Students discuss their proposed solution and record the problem-solving process they followed to achieve it.

Applying Strategies
- In collaborative groups, students write a similar problem and post it in the classroom or on the class website for the class to access and solve. They include a contact email address for replies.
- Other students in the class access the website, attempt to solve the problem, and email their answer and solution.

Variations/Extensions
- Students exchange problems with their key pals.
- Once a week, students take home a problem and involve their families in solving the problem.
- Students post problems on a Grade 4 Math Problem of the Week web page they create on their class website, and take responsibility for answering the email they receive.

SUGGESTIONS FOR ASSESSMENT
- Read students' Math Journals to determine whether they recognized any patterns in their daily mental math scores relating to the mental math/estimation and problem-solving strategies used. Confer with students on their achievements and answer their questions.

CONNECTION TO **COMMUNITY AND DIVERSITY**
- Students continue working with Daily Math and Problem Solving throughout the interdisciplinary unit.

CONNECTION TO LEARNING CENTRE
- Students solve the selected math problem of the week from a Math Problem Solving website and submit their answer by email.
- Use BLM OLE.3#1: Problem-Solving Learning Centre as a guide for students.
- Consider creating other learning centres focusing on approved problem-solving software.

BLM OLE.3#1: Problem-Solving Learning Centre

Overview
At this learning centre, you will work together with your group to solve the selected math problem.

Resources
- math problem solving website
- BLM OLE.3#2: Problem-of-the-Week Chart

Tasks
- Check the class website for the problems to solve.
- Discuss the selected problem with group members and record the solution.
- Use BLM OLE.3#2: Problem-of-the-Week Chart to record the group's answer and describe how the group solved the problem.

Suggestions for Collaboration
- Group members decide who works at the keyboard and who records the problem and solution. Ensure that all members take turns with each role.

What to Do with the Results of This Learning Centre
- File the BLM OLE.3#2: Problem-of-the-Week Chart in the Personal OLE Binder.

Assessment Criteria
- Group members stay on task and work together.
- The problem is completed correctly, and a description of the strategies used to solve the problem is provided.

BLM OLE.3#2: Problem-of-the-Week Chart

Name _____   Date _____

Group Members _____   _____

_____   _____

Summary of the Problem	
Group's Answer	
Computational Strategies Used to Solve the Problem	**Correct Answer** (If Different from the Above)