Summary of Clarifications to:
Alberta Mathematics Kindergarten to Grade 9 Program of Studies

This document includes all the updates to the Alberta Mathematics Kindergarten to Grade 9 Program of Studies (P of S). Updates are highlighted on the following pages, and excerpts from the 2007 version are included for comparison.

- The Number Sense section has been updated (page 7, P of S).
- The Outcomes section has been updated (page 9, P of S).
- The Instructional Focus section has been updated (page 10, P of S).
- Some specific outcomes in the grades 1–5 Number strand have been updated (pages 14, 17, 21, 24, 27, P of S).
- An appendix, General and Specific Outcomes by Strand, has been added (see Appendix 1, page 46, P of S).

2007
Number Sense Number sense, which can be thought of as intuition about numbers, is the most important foundation of numeracy (British Columbia Ministry of Education, 2000, p. 146). A true sense of number goes well beyond the skills of simply counting, memorizing facts and the situational rote use of algorithms. Mastery of number facts is expected to be attained by students as they develop their number sense. This mastery allows for facility with more complex computations but should not be attained at the expense of an understanding of number. Number sense develops when students connect numbers to their own real-life experiences and when students use benchmarks and referents. This results in students who are computationally fluent and flexible with numbers and who have intuition about numbers. The evolving number sense typically comes as a by-product of learning rather than through direct instruction. However, number sense can be developed by providing rich mathematical tasks that allow students to make connections to their own experiences and their previous learning.

2014
Number Sense Number sense is an intuition about numbers. Number sense develops when students connect numbers to their own real-life experiences and when students use benchmarks and referents. This results in students who are computationally fluent and flexible with numbers. A true sense of number includes and goes beyond the skills of counting, memorizing facts and the situational rote use of algorithms. Mastery of number facts occurs when students understand and recall facts and is expected to be attained by students as they develop their number sense. This mastery allows for application of number facts and facility with more complex computations. Number sense can be developed by providing rich mathematical tasks that allow students to make connections to their own experiences and their previous learning.

2007
Outcomes The program of studies is stated in terms of general outcomes and specific outcomes. **General outcomes** are overarching statements about what students are expected to learn in each strand/substrand. The general outcome for each strand/substrand is the same throughout the grades. **Specific outcomes** are statements that identify the specific skills, understanding and knowledge that students are required to attain by the end of a given grade. In the specific outcomes, the word *including* indicates that any ensuing items must be addressed to fully meet the learning outcome. The phrase *such as* indicates that the ensuing items are provided for illustrative purposes or clarification, and are not requirements that must be addressed to fully meet the learning outcome.

2014
Outcomes The program of studies is stated in terms of general outcomes and specific outcomes. **General outcomes** are overarching statements about what students are expected to learn in each strand/substrand. The general outcome for each strand/substrand is the same throughout the grades. **Specific outcomes** are statements that identify the specific skills, understanding and knowledge that students are required to attain by the end of a given grade. In the specific outcomes, the word *including* indicates that any ensuing items must be addressed to fully meet the learning outcome. The phrase *such as* indicates that the ensuing items are provided for illustrative purposes or clarification, and are not requirements that must be addressed to fully meet the learning outcome. Students investigate a variety of strategies and become proficient in at least one appropriate and efficient strategy that they understand. Strategies may include traditional algorithms such as long division and vertical addition; however, specific strategies are not prescribed in the outcomes. The teaching professional has the flexibility and responsibility to meet the learning needs of each of his or her students. Over time, students refine their strategies to increase their accuracy and efficiency.

2007
Instructional Focus The program of studies is arranged into four strands. These strands are not intended to be discrete units of instruction. The integration of outcomes across strands makes mathematical experiences meaningful. Students should make the connection between concepts both within and across strands. Consider the following when planning for instruction: • Integration of the mathematical processes within each strand is expected. • By decreasing emphasis on rote calculation, drill and practice, and the size of numbers used in paper and pencil calculations, more time is available for concept development. • Problem solving, reasoning and connections are vital to increasing mathematical fluency and must be integrated throughout the program. • There is to be a balance among mental mathematics and estimation, paper and pencil exercises, and the use of technology, including calculators and computers. Concepts should be introduced using manipulatives and be developed concretely, pictorially and symbolically. • Students bring a diversity of learning styles and cultural backgrounds to the classroom. They will be at varying developmental stages.

2014
Instructional Focus The program of studies is arranged into four strands. These strands are not intended to be discrete units of instruction. The integration of outcomes across strands makes mathematical experiences meaningful. Students should make the connection between concepts both within and across strands. Consider the following when planning for instruction: • Integration of the mathematical processes within each strand is expected. • Learning mathematics includes a balance between understanding, recalling and applying mathematical concepts. • Problem solving, reasoning and connections are vital to increasing mathematical fluency and must be integrated throughout the program. • There is to be a balance among mental mathematics and estimation, paper and pencil exercises, and the use of technology, including calculators and computers. Concepts should be introduced using manipulatives and be developed concretely, pictorially and symbolically. • Students bring a diversity of learning styles and cultural backgrounds to the classroom. They will be at varying developmental stages.

Mathematical Processes:

C – Communication
CN – Connections
ME – Mental Mathematics and Estimation
PS – Problem Solving
R – Reasoning
T – Technology
V – Visualization

2007	Specific Outcome
Grade 1 Number	10. Describe and use mental mathematics strategies (memorization not intended), such as: • counting on and counting back • making 10 • using doubles • thinking addition for subtraction for basic addition facts and related subtraction facts to 18. [C, CN, ME, PS, R, V]

2014	Specific Outcome
Grade 1 Number	10. Describe and use mental mathematics strategies, such as: • counting on and counting back • making 10 • using doubles • thinking addition for subtraction for basic addition facts and related subtraction facts to 18. [C, CN, ME, PS, R, V] Understand and apply strategies for addition and related subtraction facts to 18. Recall addition and related subtraction facts to 5.

2007	Specific Outcome
Grade 2 Number	10. Apply mental mathematics strategies, such as: • using doubles • making 10 • one more, one less • two more, two less • building on a known double • thinking addition for subtraction for basic addition facts and related subtraction facts to 18. [C, CN, ME, PS, R, V]

2014	Specific Outcome
Grade 2 Number	10. Apply mental mathematics strategies, such as: • using doubles • making 10 • one more, one less • two more, two less • building on a known double • thinking addition for subtraction for basic addition facts and related subtraction facts to 18. [C, CN, ME, PS, R, V] Understand and apply strategies for addition and related subtraction facts to 18. Recall addition and related subtraction facts to 10.

2007	Specific Outcome
Grade 3 Number	10. Apply mental mathematics strategies and number properties, such as: • using doubles • making 10 • using the commutative property • using the property of zero • thinking addition for subtraction for basic addition facts and related subtraction facts to 18. [C, CN, ME, PS, R, V]

2014	Specific Outcome
Grade 3 Number	10. Apply mental mathematics strategies and number properties, such as: • using doubles • making 10 • using the commutative property • using the property of zero • thinking addition for subtraction in order to understand and recall basic addition facts and related subtraction facts to 18. [C, CN, ME, PS, R, V] Understand, recall and apply addition and related subtraction facts to 18.

2007	Specific Outcome
Grade 3 Number	11. Demonstrate an understanding of multiplication to 5×5 by: • representing and explaining multiplication using equal grouping and arrays • creating and solving problems in context that involve multiplication • modelling multiplication using concrete and visual representations, and recording the process symbolically • relating multiplication to repeated addition • relating multiplication to division. [C, CN, PS, R]

2014	Specific Outcome
Grade 3 Number	11. Demonstrate an understanding of multiplication to 5×5 by: • representing and explaining multiplication using equal grouping and arrays • creating and solving problems in context that involve multiplication • modelling multiplication using concrete and visual representations, and recording the process symbolically • relating multiplication to repeated addition • relating multiplication to division. [C, CN, PS, R] Understand and recall multiplication facts to 5×5.

2007	Specific Outcome
Grade 3 Number	12. Demonstrate an understanding of division (limited to division related to multiplication facts up to 5×5) by: • representing and explaining division using equal sharing and equal grouping • creating and solving problems in context that involve equal sharing and equal grouping • modelling equal sharing and equal grouping using concrete and visual representations, and recording the process symbolically • relating division to repeated subtraction • relating division to multiplication. [C, CN, PS, R]

2014	Specific Outcome
Grade 3 Number	12. Demonstrate an understanding of division (limited to division related to multiplication facts up to 5×5) by: • representing and explaining division using equal sharing and equal grouping • creating and solving problems in context that involve equal sharing and equal grouping • modelling equal sharing and equal grouping using concrete and visual representations, and recording the process symbolically • relating division to repeated subtraction • relating division to multiplication. [C, CN, PS, R] Understand and recall division facts related to multiplication facts to 5×5.

2007	Specific Outcome
Grade 4 Number	5. Describe and apply mental mathematics strategies, such as: • skip counting from a known fact • using doubling or halving • using doubling or halving and adding or subtracting one more group • using patterns in the 9s facts • using repeated doubling to determine basic multiplication facts to 9×9 and related division facts. [C, CN, ME, R]

2014	Specific Outcome
Grade 4 Number	5. Describe and apply mental mathematics strategies, such as: • skip counting from a known fact • using doubling or halving • using doubling or halving and adding or subtracting one more group • using patterns in the 9s facts • using repeated doubling to determine basic multiplication facts to 9×9 and related division facts. [C, CN, ME, R] Understand and apply strategies for multiplication and related division facts to 9×9. Recall multiplication and related division facts to 7×7.

2007	Specific Outcome
Grade 5 Number	3. Apply mental mathematics strategies and number properties, such as: • skip counting from a known fact • using doubling or halving • using patterns in the 9s facts • using repeated doubling or halving to determine, with fluency, answers for basic multiplication facts to 81 and related division facts. [C, CN, ME, R, V]

2014	Specific Outcome
Grade 5 Number	3. Apply mental mathematics strategies and number properties, such as: • skip counting from a known fact • using doubling or halving • using patterns in the 9s facts • using repeated doubling or halving in order to understand and recall basic multiplication facts (multiplication tables) to 81 and related division facts. [C, CN, ME, R, V] Understand, recall and apply multiplication and related division facts to 9×9.