ADDITION

"Once someone learns a fast and efficient method for solving a problem, it's hard to work backward and explain why it works. So, instead we teach the ***why*** first, allowing kids to explore the math and determine rules and procedures for themselves."

Kreisberg & Beyranevand, *Adding Parents to the Equation*, 2019.

What is Addition?

Addition is the process of combining two or more things together.

Addend + Addend = Sum

Where is Addition in the Sask Curriculum?

Grade One

Demonstrate an understanding of addition of numbers with answers to 20.

Grade Two

Demonstrate an understanding of addition (limited to 1 and 2-digit numbers) with answers to 100.

Grade Three

Demonstrate an understanding of addition of whole numbers with answers to 1000 (limited to 1, 2, and 3-digit numbers).

Grade Four

Demonstrate an understanding of addition of whole numbers with answers to 10 000 (limited to 3 and 4-digit numerals)

Grade Five

Demonstrate an understanding of addition of decimals (limited to thousandths).

Grade Six

Demonstrate understanding of the order of operation on whole numbers (excluding exponents) with and without technology.

What are the Common Properties of Addition?

COMMUTATIVE

The order of the addends **does not** matter when finding the sum.

If you count 5 buttons first, then three buttons it **is the same amount** as if you counted 3 buttons first then five buttons.

Ex) 5 + 3 = 3 + 5

ASSOSCIATIVE

The sum is the same regardless how the addends are grouped.

If you add 4 blocks and two blocks together, then add one more you get the same amount as if you add 2 blocks and 1 block together, then add 4 more blocks.

Ex) (4 + 2) + 1 = 4 + (2 + 1)

IDENTITY

The sum of any number and zero is the original number. Ex) $6 + 0 = 6$

Strategies vs Models

Strategies and models are not the same thing when solving a math problem. When we solve problems mentally, we need a way to show others how we solved the problem which we do through models.

A **strategy** is how you solve the problem.

A **model** is how you show the problem or your strategy.

For example, I may use a chunking strategy (see below) to add two numbers mentally and model my strategy on an open number line.

What are the Common Strategies of Addition?

The order and sequence of the following strategies is not how they should be introduced or instructed to children. Sharing the various strategies will help you identify the method in which your child might be solving problems in order to engage in conversation with your child confidently and comfortably about their strategy.

The addition strategies below should be taught through the Concrete - Representational – Abstract approach, which allows students to build conceptual understanding first through concrete manipulatives, then drawings and representations and finally with abstract numbers. Skipping these steps and moving quickly to rote memorization will result in students having procedural understanding of subtraction which may result in coming to the correct answer, however the student will be unable to be flexible and efficient in transferring their understanding to other problems.

There is no expectation that your child will use or learn all the strategies below but rather should be exposed to a variety of strategies that they understand and can use depending on the situation.

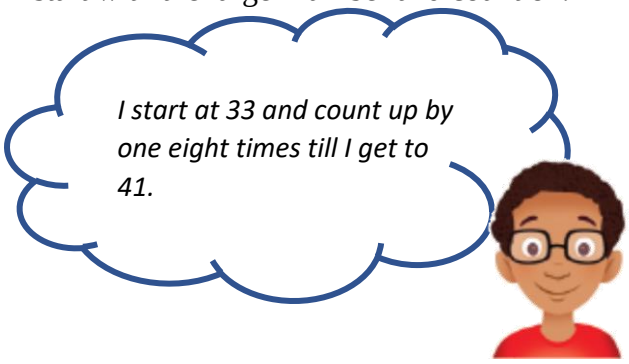
Single Digit Addition Strategies

Counting on

This strategy is primarily used in primary grades or with smaller amounts. Students will start from the first number and count on or students will start with the larger number and count on.

Example: 33 + 8

33…34, 35, 36, 37, 38, 39, 40, 41

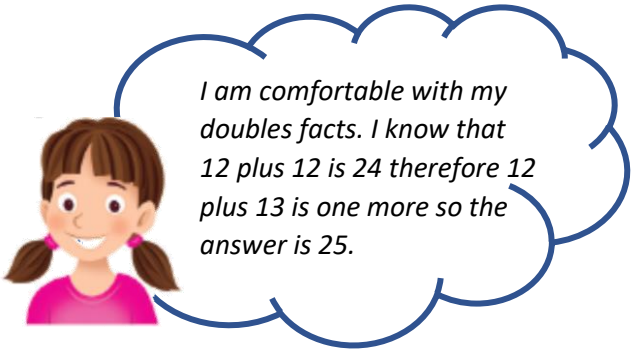


Doubles / Near Doubles

Students can recall sums for many doubles early on. Students build on this knowledge and adjust one or both numbers to make a doubles or near doubles combination.

Example: 12 + 13

12 + (12 + 1)
(12 + 12) + 1
24 + 1 = 25



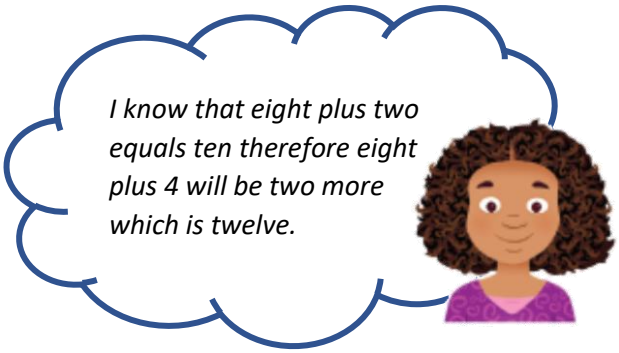
Known Facts

Students use their experience and knowledge of known facts that they can recall to help them solve other addition questions.

Example: 8 + 4

8 + 2 = 10

8 + 4 = 12



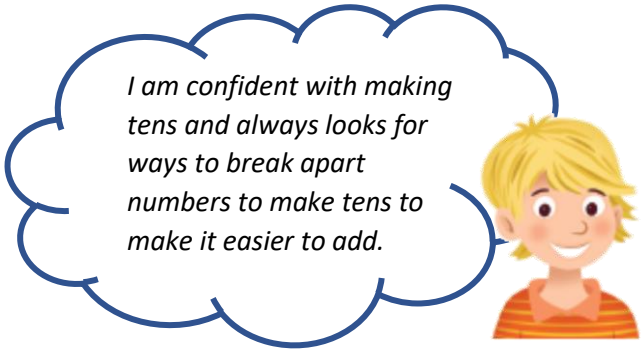
Multi-Digit Addition Strategies

Making Tens

Combination of numbers that make tens is an important concept for students in primary grades. Students should be able to break numbers apart to make tens with ease to use this strategy efficiently and flexibly.

Example: 116 + 118

(110 + 4 + 2) + (110 + 8)
110 + 110 + (2 + 8) + 4
110 + 110 + 10 + 4
230 + 4 = 234



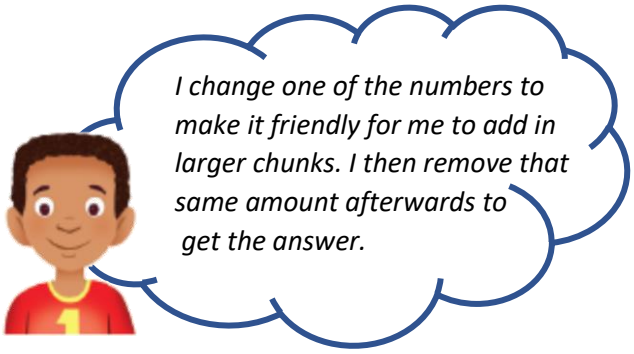
Landmark / Friendly Numbers

These are numbers that are easy to use in mental computation. These numbers may vary from student to student but are typically multiples of ten, hundred, and so on. Students may adjust one or both addends by adding or subtracting amounts to make a friendly number.

Example: 127 + 218

127 + 218
+ 2

127 + 220 = 327
327 – 2 = 325

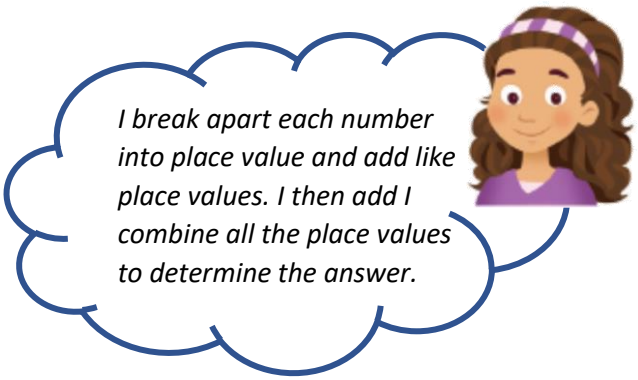


Place Value

Students will use this strategy when they begin to understand place value. Each added is broken up into expanded form and like place value amounts are combined. Students can work from left to right or right to left when combining like place value amounts.

Example: 237 + 148

(200 + 30 + 7) + (100 + 40 +8)
200 + 100 = 300
30 + 40 = 70
7 + 8 = 15
300 + 70 + 15 = 385

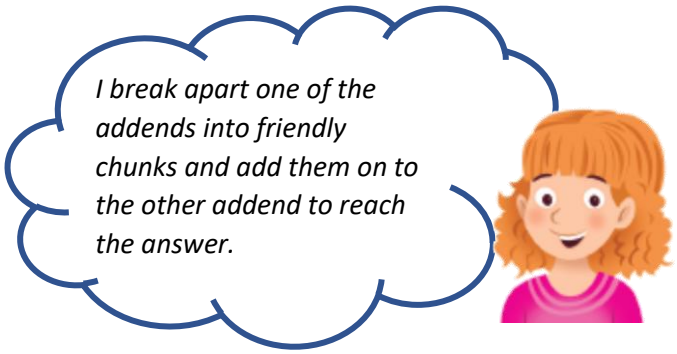


Adding up in Chunks

This is a similar strategy to Place Value except students keep one addend whole and break apart the second number into easy to use chunks (the chunks will vary based on student understanding).

Example: 126 + 58

126 + (50 + 4 + 4)
126 + 50 = 176
176 + 4 = 180
180 + 4 = 184



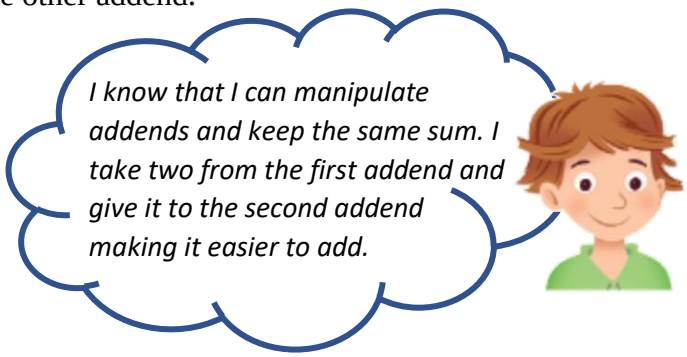
Compensation

This is a similar strategy to Friendly/Landmark Numbers. Students manipulate the numbers into easier, friendlier numbers to add. The difference is that students remove a specific amount from one addend and give that exact amount to the other addend.

Example: 237 + 148

- 2 + 2

235 + 150 = 385

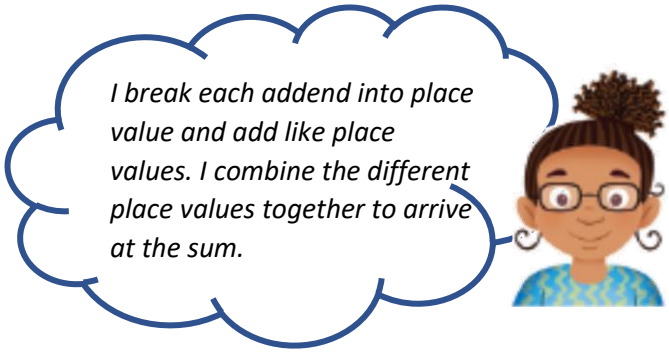


Expanded Algorithm 1

This strategy is similar to Place Value, except it is written in a different way as students move to a more efficient way of writing their thinking. This strategy explicitly shows that students understand place value of each digit in the addends.

Example: 137 + 256

100 + 30 + 7
\+ 200 + 50 + 6
300 + 80 + 13 = 393

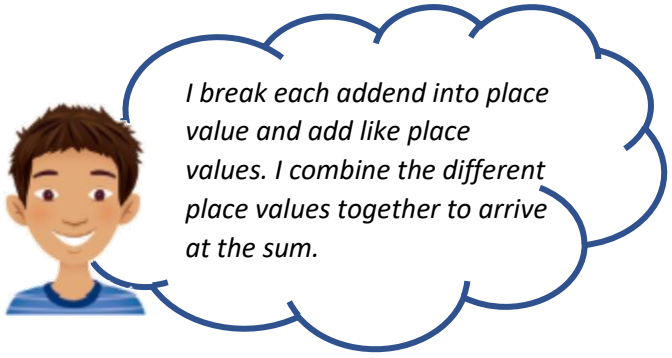


Expanded Algorithm 2

Students add like place value amounts. This strategy explicitly shows the addition of each like place value. Students then add up the remaining amounts and the ways they add them up may differ depending on amounts and understanding.

Example: 137 + 256

$$\begin{array}{r} 137 \\ +\,256 \\ \hline 300 \\ 80 \\ 13 \\ \hline 393 \end{array}$$



Standard Algorithm

Students work from the right to the left adding each like place value amount and efficiently notes what they are doing. Students may turn multi-digit addition into single digit addition for each place value amount. The difference here is that students understand what they are doing throughout the algorithm as they have come to this strategy with understanding as they constructed their knowledge of other strategies. When asked to explain their strategy, they can explain using correct language and understanding.

Example: 137 + 256

$$\begin{array}{r} {\scriptstyle 1} \\ 137 \\ +\,256 \\ \hline 393 \end{array}$$