NC COLLABORATIVE FOR MATHEMATICS LEARNING

NC²ML STANDARDS BRIEF

Multi-digit Addition and Subtraction- Grade 2

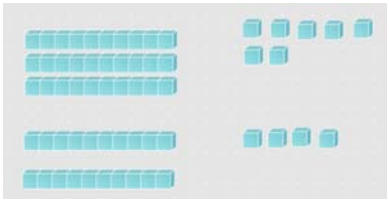
MULTI-DIGIT ADDITION AND SUBTRACTION: AN OVERVIEW

In Grade 2 students begin to explore and develop an understanding of strategies to add and subtract multi-digit numbers. Tasks should include numbers within 100 with various strategies as well as numbers within 999 with strategies focused on concrete models and pictorial representation. The expectation of using the U.S. standard algorithm is not a standard until Grade 4. In Grade 3 students are expected to solve addition and subtraction tasks using expanded form and other pictorial and place-value based strategies.

CONCRETE REPRESENTATIONS OF ADDITION AND SUBTRACTION

What would it look like for a second grade student to solve the task, "There are 37 boys and 24 girls in the cafeteria. How many children are there?"

A concrete representation with base ten (place value) blocks may look like this with groups of 37 and 24.



Students could group together the tens and ones in any order they prefer. After counting they would have 5 tens and 11 ones. Based on place value research some students will need to count the tens and then count all of the ones until they reached 61, while some students may recognize that they could make a new 10 out of the 11 ones (van de Walle et al., 2018). In Kindergarten students worked with teen numbers to develop an understanding that a teen number is a group of ten ones with some leftovers, also sometimes talked about as a combination of a ten and some ones. In first grade, this work continues and students develop an understanding of unitizing, that is, understanding that a group of ten ones is the same as a ten (yyyy). This is important to think about in Second Grade, as some students may not have a complete understanding of unitizing ten ones into a ten yet.

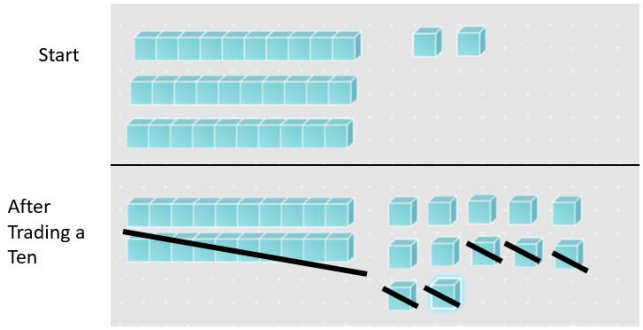
QUESTIONS TO CONSIDER

What do the Standards and Cluster information emphasize related to multi-digit addition and subtraction?

What manipulatives and supports are likely to help my students' understanding?

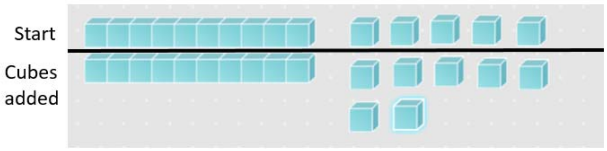
How can I leverage my students' understanding of place value to support multi-digit addition and subtraction?

If we wanted to examine subtraction with base ten blocks here is the task, "There are 32 children on the playground. If 15 leave then how many students are still there?"



In the representation above, a student trades in a ten for ten ones before they begin removing 15 (32-15 = __). Another possible strategy for solving this task with base ten

blocks is below. The student starts with a pile of 15 blocks and then adds blocks to that pile until they have 32 blocks (15 + __ = 32).



Pictorial strategies for addition and subtraction could include students doing these same strategies shown above, but by drawing pictures of base ten blocks instead of using physical base ten blocks.

ADDING AND SUBTRACTING IN PARTS

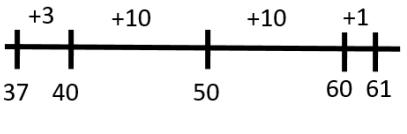
When exploring addition and subtraction situations students progress from concrete strategies with base ten blocks to pictorial representations to other strategies that involve decomposing the numbers in the task. These strategies are sometimes refered to as adding and subtracting in parts, since students decompose one or both of the numbers into smaller numbers or parts to find the answer.

Let's examine what this may look like for the original task, "There are 37 boys and 24 girls in the cafeteria. How many children are there?"

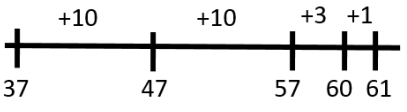
Decomposing One Number and Keeping One Whole

When adding two numbers where students decompose an addend, they tend to decompose the smaller addend. This work can be done on a hundreds board, number line, or as a series of equations.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70

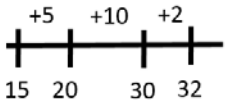


37 + 3 = 40
40 + 10 = 50
50 + 10 = 60
60 + 1 = 61

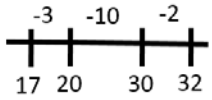


37 + 10 = 47
47 + 10 = 57
57 + 3 = 60
60 + 1 = 61

Let's look at how both adding and subtracting in parts can be used for the following task: "There are 32 children on the playground. If 15 leave then how many students are still there?" In the top number line and series of equations the student starts at 15 and is adding in parts until they reach 32. The answer 17 is the distance traveled or the sum of numbers above the number line.



15 + 5 = 20
20 + 10 = 30
30 + 2 = 32



32 – 2 = 30
30 – 10 = 20
20 – 3 = 17

In the bottom number line and series of equations the student started at 32 and moved backwards 15 to land at 17. In this case the answer is the spot on the number line where they landed. These same strategies work as well with 3-digit addition and subtraction.

LAYING THE FOUNDATION BEFORE THE U.S STANDARD ALGORITHM

Remember the U.S. Standard algorithm for addition and subtraction is not in the Standards until Grade 4. After adding in parts, students in Grades 2 and 3 may use expanded form, which looks similar to the algorithm in that numbers are written on top of one another. However, in expanded form the value of each digit is clearly visible.

This strategy sometimes gets written by stacking the addends in expanded form, so it looks like the U.S. Standard algorithm:

30 + 7	20 12
+ 20 + 4	~~30~~ + ~~2~~
50 + 11 = 61	-10 + 5
	10 + 7 = 17

Van de Walle, J. A., Karp, K. S., & Bay-Williams, J. M. (2015). Elementary and Middle School Mathematics: Teaching Developmentally. New York: Pearson.

LEARN MORE

Join us as we journey together to support teachers and leaders in implementing mathematics instruction that meets needs of North Carolina students.

TOOLS 4 NC TEACHERS

For more information and resources for Grades Kindergarten through Grade 5 please visit www.tools4ncteachers.com.

North Carolina Collaborative for Mathematics Learning

www.nc2ml.org