



# stage 10:

## addition & subtraction with 100s

### Big Idea: Hierarchical Groupings with Parts-to-Whole

As its name implies, Hierarchical Groupings with Parts-to-Whole is a complex idea -- one that involves the coordination of two earlier big ideas. It also illustrates the hierarchal nature of mathematics and how a poor foundation is likely to interfere with the learning of later concepts. For this big idea students must coordinate their knowledge of Hierarchal Groupings and Parts-to-Whole. Hierarchical Groupings is the idea that amounts can be grouped into a system of sets and subsets. These sets can be combined to form a whole, an amount that is equal to the sum of its parts.

### Why is this So Important?

The Part-to-Whole combinations in Stage 10 highlight the structure of numbers, which students will be able to use when performing more complex operations with larger numbers. In Stage 10, Symphony Math extends the idea of one hundred as a unit to multiple groups of one hundred making many such units. One hundred is a benchmark number, and combinations with multiples of one hundred are scaffolded in such way to elucidate how 'one hundred and some tens more' form the numbers 100-1000. Stage 10 extends the behavior of one hundred as a benchmark number in order to compose and decompose numbers 100-1000. Making hundreds is a key strategy children are encouraged to use; and multiples of 100 behave much as one hundred does-make as many bundles of one hundred as possible, and then add on the leftovers. Students add and subtract with multiples of 100, and experience how quantities change, without needing to recombine using place value concepts of exchange.

### Stage 10 Learning Progression

Concept	Standard	Example	Description
10.1: Place Value Addition: Missing Result	2.NBT.7	$200 + 30 = ?$	Symphony Math models provide the visual manipulatives in which groups of one hundred are distinguishable from groups of tens. When a student shows she is ready not to have to count all, combining hundreds and some tens becomes automatic; looking at a visual representation of 270, she is able to count 2 hundreds, and know the '2' references 2 bundles of one hundred or two hundred. The leftover tens appear physically different than the representation of hundreds. Thus the total becomes increasingly automatic.
10.2: Place Value Addition: Missing Change	2.MD.6	$200 + ? = 230$	Given the whole, the student uses what she's learned regarding the relationship between addition and subtraction, hierarchical grouping, and making groups of hundreds and tens, in order to find the missing part. She is called on to demonstrate that she can identify how tens and tens combine, separately from hundreds and hundreds. She can complete the part that makes the equation between the three whole numbers true, thus showing that she sees the relationship of the three numbers to each other.
10.3: Place Value Subtraction: Missing Result	2.NBT.7	$230 - 30 = ?$	As her experiences with combinations of parts and wholes continues, as well as her grasp on the structure of one hundred and groups of ten, the student can work on 10.3 with good understanding. She is asked to think of subtracting tens from a given group of hundreds combined with that same number of tens ( $470 - 70$ ). Symphony Math's visual tools model how groups of hundreds and some tens leave those same groups of hundreds, once the tens are taken away ( $470 - 70 = 400$ ).



10.4: Place Value Subtraction: Missing Change	2.MD.6	$230 - ? = 200$	Given the whole, the student uses what he's learned regarding the relationship between addition and subtraction, making groups of ten, and hierarchical groupings in order to find the missing part. He can complete the part that makes the equation between the three whole numbers true, showing that he sees the relationship of the three numbers to each other.
10.5: Parts-to-Whole with 1s, 10s, and 100s	2.NBT.5	$563 = 200 + ? + ?$	Stage 10.5 challenges the student to decompose a 3-digit number into varying parts of hundreds, tens and ones, in a multitude of ways. Based on place value, properties of operations, and the relationship between addition and subtraction, he has the chance to put his knowledge of number composition to the test. Given a number 743, he may need to find 2 missing addends + 3 that combine to make the whole; or 2 additional missing addends + 30 to compose that same whole. Thus the student is challenged to demonstrate that numbers are more than place holders; they are instead able to be reorganized in more than one way while still maintaining their same value.
10.6: Parts-to-Whole with 1s, 10s, 100s (+100)	2.NBT.8	$690 + 100 = ?$	Given any 3-digit number, students are asked to show they can add 1 hundred more. Stage 10.6 highlights how one hundred is not an ordinary number; they are not adding 1 more, but an additional 1 group of 1 hundred. The significant properties of 100 make a difference to the structure of the original number. The visual tools in Symphony Math make the results of this action apparent, thus omitting the need to count to find the answer. Adding 100 becomes a mental strategy.
10.7: Parts-to-Whole with 1s, 10s, 100s (-100)	2.NBT.8	$560 - 100 = ?$	Given any 2-digit number, students are asked to show they can take away 100. As in Stage 10.6, 100 is highlighted as a special number, one that behaves differently than subtracting 1. With the initial aid of visual manipulatives, students can subtract 100 and see the results without counting. 'Minus 100' is a developmentally sophisticated strategy students use to subtract. Through the examples in Symphony Math, subtracting 100 becomes an action students can do mentally.
10.8: Comparing 3-Digit Numbers	2.NBT.4	$? < 463$	Students compare two 3-digit numbers based on meanings of hundreds, tens and ones digits, and show the results using symbols $>$ , $=$ , $<$ . They use their understanding of the hierarchical order of groups, and the order of digits to compare two sets of numbers based on each's amounts of hundreds, tens and ones.

## Using the Guided Practice Materials

When students struggle with a concept, you will see suggested Guided Practice materials in your HELP data view of your Symphony Math Dashboard. These materials provide extended practice using the Multiples Ways of Knowing from the Symphony Math program:

Worksheet	Purpose	Instructions
Manipulatives	Use a visual model to represent the concept.	Create bars, dot cards, or number lines for each item.
Bridge	Connect symbols to their visual representations.	Create objects, numbers, and symbols to complete each item.
Symbols	Understand the concept at the abstract level.	Create numbers and symbols to complete each item.
Apply	Extend understanding to real-life problem solving.	<ol style="list-style-type: none"> <li>1) Read the story presented at the top of the page.</li> <li>2) Create a number model of the full solution.</li> <li>3) Write the number sentence that matches the model.</li> </ol>

## Group Learning

The Symphony Math Extra Practice materials are designed to promote a conversation about the Big Ideas in math. One-on-one or small group instruction with the materials is recommended for students who need more time to make connections between the mathematical concepts in the Stage and the application of those concepts in their math curriculum.



## Stage Checkpoint

When students complete a Stage, they come to a Checkpoint. Checkpoints provide students an opportunity to draw and create models in their offline journals. When they are done, you can evaluate their work and make sure they are ready to move on in the Symphony Math curriculum. Here is a short checklist to guide your evaluation:

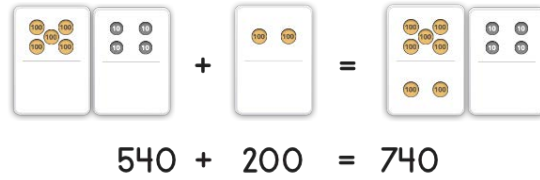
- All Checkpoint steps have been attempted
- Student demonstrates understanding of models
- Solutions are correct, or intervention has led to self-correction
- Student can talk about their work using mathematical language

Students' math understanding is evolving. Their work at Checkpoints gives them a chance to transfer their new skills to another context (an offline journal). It is also an opportunity for reflection. Be sure to allow students to create more pages if they need it. When you are confident they are ready, accept the student checkpoint from your Symphony Dashboard.

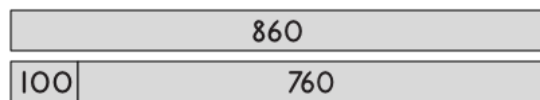


## Stage 10: Teacher Reference

Dot Cards:



Number Bars:



$$860 - 100 = 760$$

Number Line:



$$697 < 805$$

Create Your Own:


Read the story.

Daria drove a car 489 miles. If 100 of those miles were uphill, how many miles were not uphill?

My number model:

My number sentence:

Solution: \_\_\_\_\_

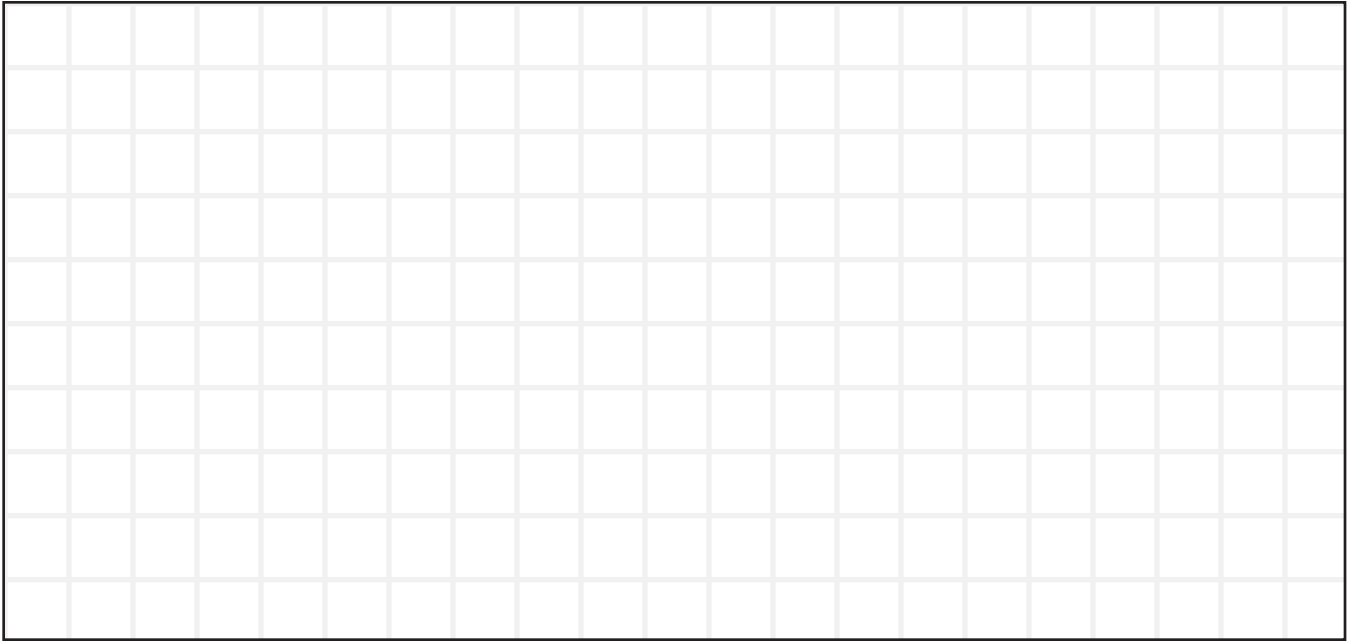



Name: \_\_\_\_\_ Date: \_\_\_\_\_

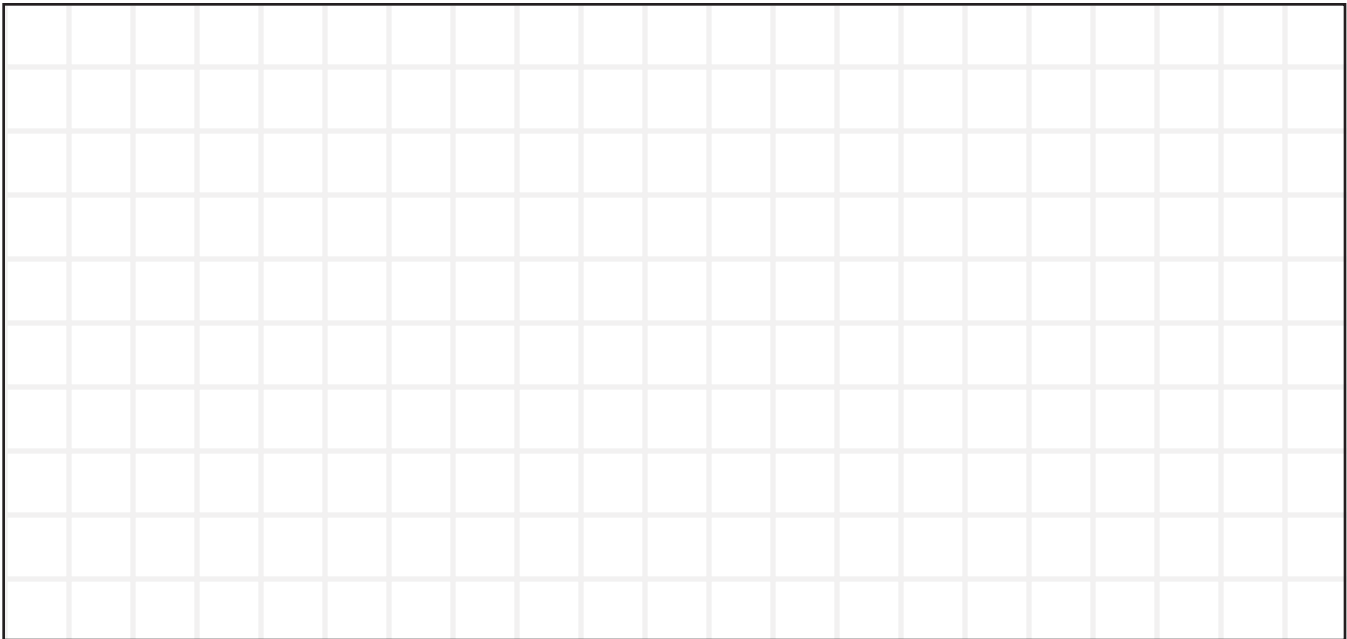


## Stage 10: Add & Subtract with 100s

Dot Cards:



Number Bars:



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