stage 12:
regrouping with 2- and 3-digits

Big Idea: Hierarchical Groupings with Parts-to-Whole

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. Let's look at the following problem: 268 + 453 = ?

Two hundred sixty eight is one part. The other part is 453. Combined they form the whole. Conceptually the student needs to understand she is looking for a missing whole. Procedurally, she must understand that when she combines the 8 and the 3 this yields a 10 and a 1. The ten will be combined with the other tens (6 and 5). Or, she will make the most amount of hundreds possible by combining the 200 and the 400, and seeing if 60 and 50 together can yield an additional group of 100. Having established that another 100 is possible, with 10 left over, she then looks to see if the 8 and the 3 make a ten, which they do. She combines the two tens, the most that is possible, and sees what is leftover. And so on. She can see that her method of parts composition, 700 + 20 + 1 will sum to a whole of 721. In these ways, the student is working with both the Hierarchical Groupings idea and the Part-to-Whole idea. Not only is solving multi-digit addition and subtraction problems procedurally complex, but it is also conceptually complex relative to the preceding concepts in the curriculum. It is one of the first periods in mathematical learning where many students begin to apply complex procedures they do not fully understand.

Why is Parts to Whole Important?

The student who has not developed an in-depth understanding of these big ideas is likely to rely only on the step-by-step application of procedures without the supporting understanding of what these procedures mean and why they work. When he produces a nonsensical answer, the mistake is not apparent because he has stopped looking at the numbers as representing meaningful quantities. He is simply manipulating symbols as best he can according to that procedure.

With the groundwork established especially in Stages 7 - 10, students understand the structure of tens and hundreds, and thus can apply their knowledge in a way that makes sense when solving problems.

Stage 12 Learning Progression

Concept	Standard	Example	Description
12.1: Regrouping with 1- and 2-digits	2.OA.1	19 + 5 = 20 + ?	Students complete equations with unknowns in different positions, and must solve by composing tens first. For example, 13 + 9 = 20 + ?. Combining tens first is recommended as a preferred place value strategy, as is decomposing into tens.
12.2: Regrouping to 100	2.NBT.5	60 + ? = 47 + 19	Students complete equations by regrouping, using a place value strategy of combining all the tens first. With the unknown moving from position to position, the progression of challenges follow 12.1.
12.3: Regrouping with 2-digits: Subtraction	2.NBT.5	33 - 5 = 20 + ?	Students complete subtraction equations, presented as in 12.2, in which they first need to attend to the resulting tens.

Concept	Standard	Example	Description
12.4: Regrouping with 2-Digit Numbers: Missing Change	2.NBT.5	39 + ? = 60 + 8	The unknown in 12.4 is the missing change, for example: 75 + ? = 90 + 7 Students are challenged to understand how the tens and some ones are composed in the equation, given an initial amount with which to work. They may decompose into tens, or think addition, for examples of solution strategies.
12.5: Subtracting 2-Digit Numbers: Missing Change	2.NBT.5	50 + 7 = 71 - ?	In the challenge of 12.5, students may combine one side of the equality in order to determine the relationship of addition and subtraction quantities, or, solve by decomposing tens first.
12.6: Regrouping to 1000: Addition	2.NBT.7	247 + 386 = 600 + ? + 3	Students extend the work from 12.1-12.5 to two 3-digit numbers. As always in the Symphony Math progression, students have ample experiences using concrete materials and pictorial representations to support their work. 12.6 also references composing and decomposing tens, making a 100, breaking apart a 10, or creating an easier problem.
12.7: Regrouping to 1000: Subtraction	2.NBT.7	712 - 30 = 600 + ? + 2	Students are challenged in a few ways in Stage 12.7. They are using their understanding of the relationship between addition and subtraction to construct both a quantity and an equality. They are demonstrating their knowledge of hundreds, tens and ones and how such parts combine to make a whole. And, they must analyze the result of number decomposition in order to successfully compute the answer in an unorthodox-looking way.

Using the Extra Practice Worksheets

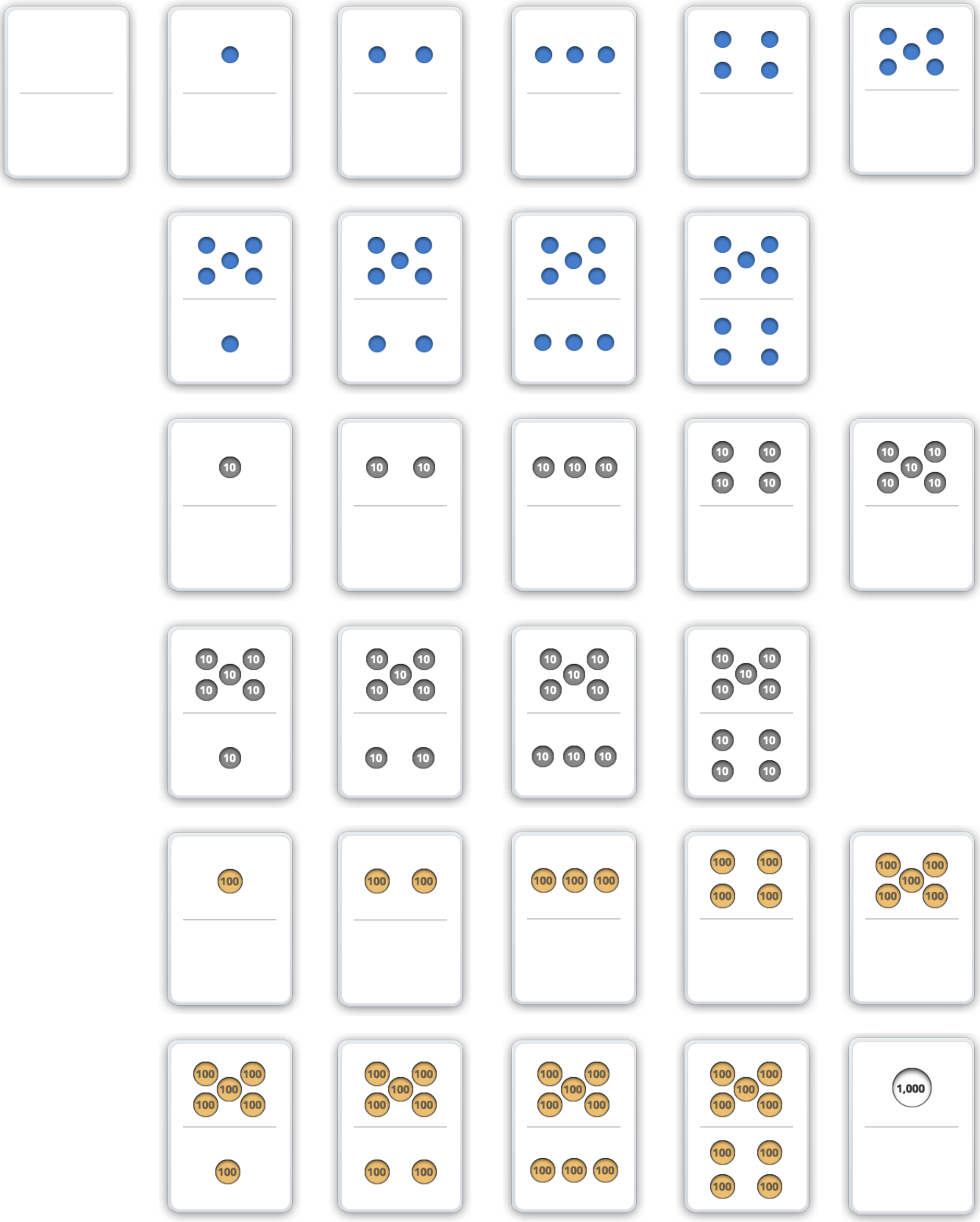
The Symphony Math Worksheets provide extended practice using the Multiples Ways of Knowing from the Symphony Math program. Students should work through all worksheets in the order given:

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.	1) Read the story presented at the top of the page. 2) Create a number model of the full solution. 3) Write the number sentence that matches the model.

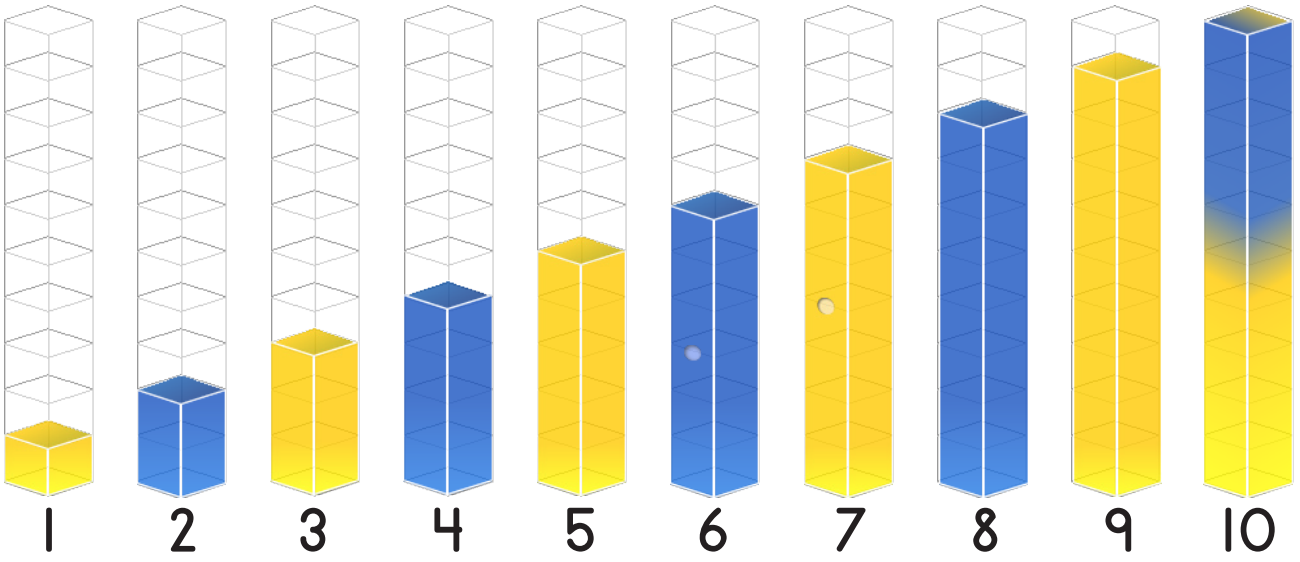
Group Learning

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.

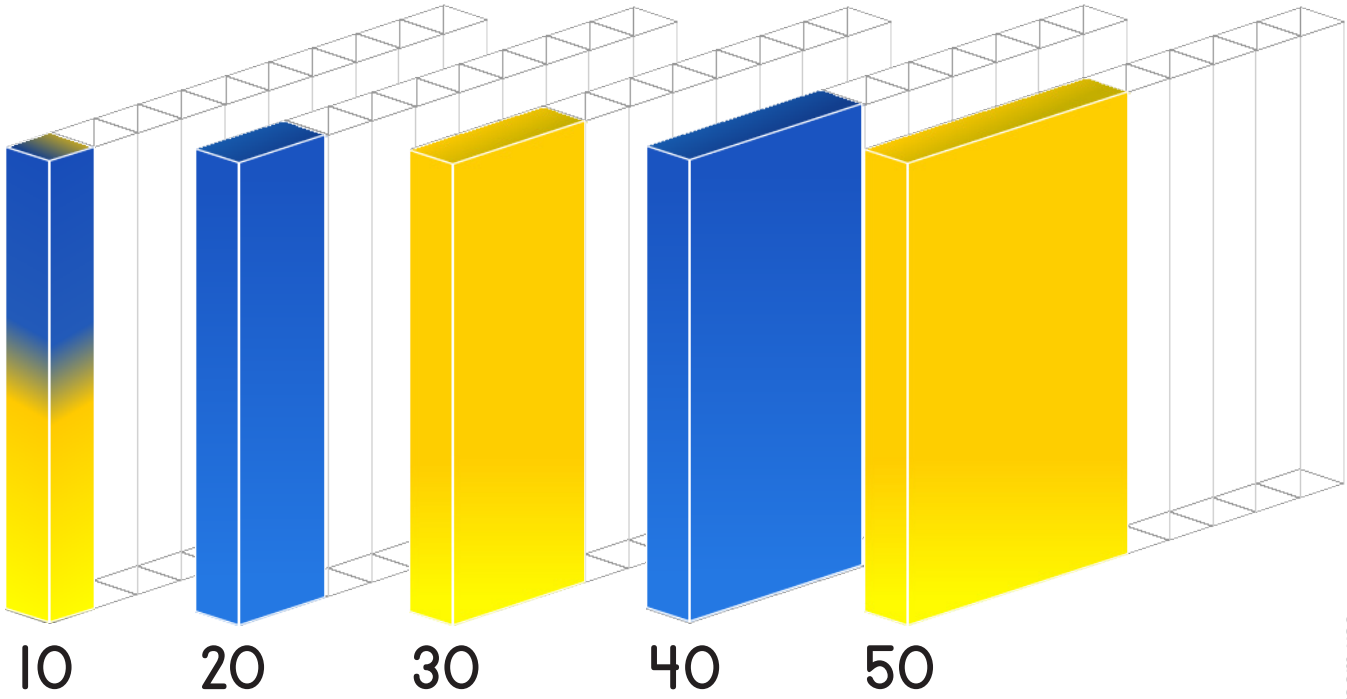
Dot Cards

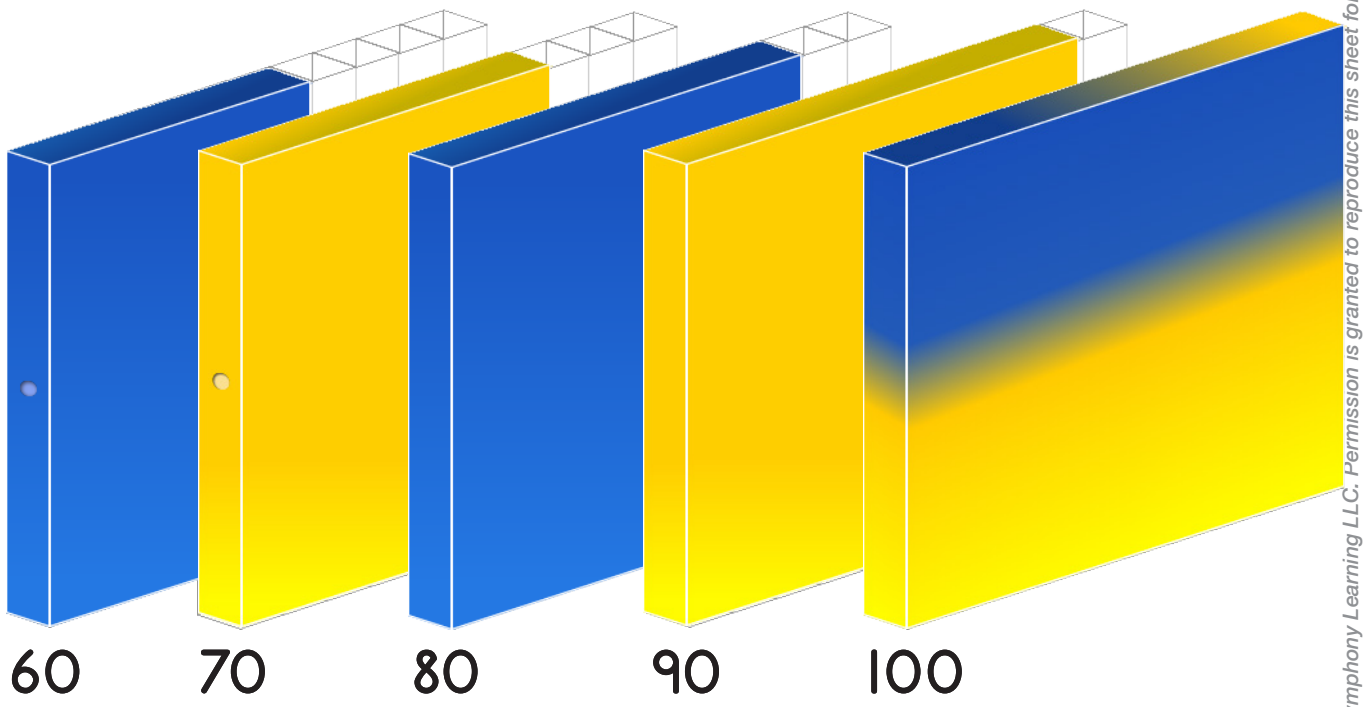


Symphony Bars: Ones & 10



Symphony Bars: Tens





Symphony Bars: Hundreds