

The eight Mathematical Practices are a critical part of students' mathematics learning. Mathematical Practice Notes are included throughout the unit to indicate opportunities for engaging students in these practices. Each unit focuses specifically on two Mathematical Practices.

In this unit, the highlighted practices are MP7, Look for and make use of structure, and MP2, Reason abstractly and quantitatively. This essay describes each of these practices and provides examples from the unit of how to engage Grade 3 students in them.

MP7 Look for and make use of structure.

Mathematically proficient students at the elementary grades use structures such as place value, the properties of operations, other generalizations about the behavior of the operations (for example, the less you subtract, the greater the difference), and attributes of shapes to solve problems.

(Illustrative Mathematics, *Standards for Mathematical Practice: Commentary and Elaborations for K–5*)

Central to our system of numbers is its base-10 structure. A component of all multidigit computation procedures involves decomposing numbers by place and working with the single digits that represent the number of ones, tens, hundreds, etc. The compactness of this system is what makes it powerful, but that very compactness means that it is dense with ideas that young students must put together. As students explore different calculation strategies, they encounter different aspects of base-10 decomposition of numbers and deepen their understanding of place value.

Students have been working on different aspects of the base-ten composition of numbers since Kindergarten, and there is still much to learn. In this Grade 3 unit, they extend what they have learned about numbers up to 100 to consider numbers up to 1,000, work with representations that highlight the base-10 structure of numbers, and learn how to make use of that structure when adding and subtracting multidigit numbers. For example, consider students' strategies for adding $374 + 122$.

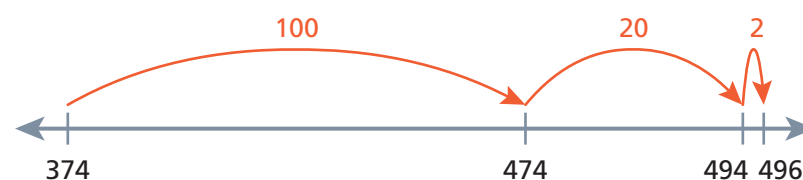
Phillip	Kelly	Benjamin
$300 + 100 = 400$	$374 + 100 = 474$	$374 + 26 = 400$
$70 + 20 = 90$	$474 + 20 = 494$	$400 + 96 = 496$
$4 + 2 = 6$	$494 + 2 = 496$	
$400 + 90 + 6 = 496$		

All three students correctly solved the problem, but each made use of a different aspect of the base-10 structure of numbers. Phillip decomposed both addends by place, added like parts (hundreds, tens, and ones), and then added those sums. In adding like parts, he could easily call on single-digit facts: Since $3 + 1 = 4$, $300 + 100 = 400$, etc. Phillip's strategy can be represented with a place-value model.



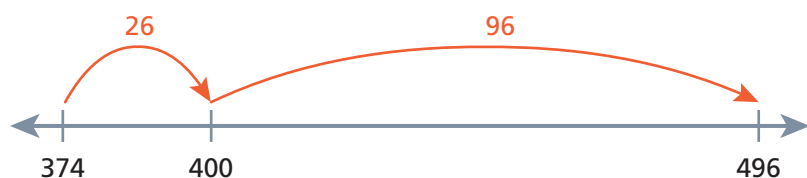
Kelly decomposed the second addend by place and added it onto the first addend in parts. She knew that adding on hundreds leaves the tens and ones places unchanged, and adding on tens leaves the ones place unchanged: $374 + 100 = 474$; $474 + 20 = 494$; $494 + 2 = 496$.

Kelly's strategy can be represented on a number line.





Benjamin decomposed the second addend in a different way. He thought about what he could add to 374 to get to the nearest 100: $374 + 26 = 400$. Since $122 = 26 + 96$, he still needed to add the 96. Benjamin's strategy can be represented on a number line.



Note that Benjamin's strategy is a variation of one that students began using when they started learning single-digit addition. For example, when adding $8 + 6$, a student might think, "I need 2 to get from 8 to 10, and then I still need to add on 4 from the 6, so 14." Benjamin is using the same idea of aiming for a landmark, but now with greater numbers.

In this unit, students learn different aspects of the base-10 structure of numbers through such activities as building a 1,000 Chart from ten 100 Charts, decomposing numbers into a variety of base-10 decompositions (57 is 5 tens and 7 ones as well as 4 tens and 17 ones), and creating smallest and largest numbers from a given set of digits. They deepen their understanding in the context of implementing different computation strategies and representing those strategies with different models. As teachers bring students' attention to how the base-10 structure appears in a variety of contexts, students learn to look for structure, notice where it appears, and use it in solving problems.

The following chart shows where Mathematical Practices Notes specifically address MP7 and when that mathematical practice is assessed.

 MP7 Look for and make use of structure.		
SESSION	MPN	 ASSESSMENT CHECKLIST
1.2	•	
1.3	•	
1.4	•	
1.5	•	
2.1	•	
2.2	•	
2.3	•	
3.2	•	•
3.3	•	
3.4	•	
4.2	•	
5.2	•	
5.4	•	
5.5	•	