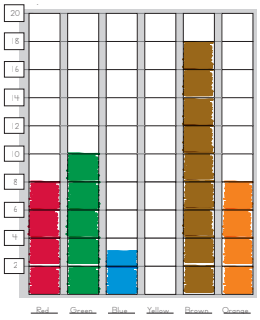
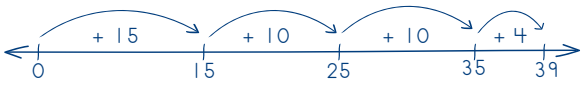
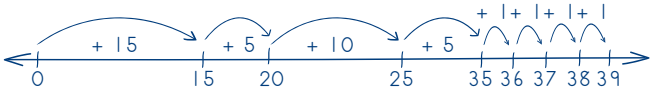
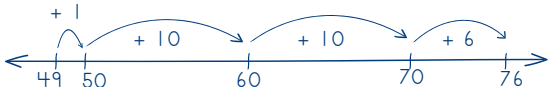
Bridges in Mathematics, Grade 2

Unit 3: Addition & Subtraction Within One Hundred

In this unit your child will:

- Make graphs and answer questions about the graphs
- Solve addition and subtraction story problems
- Add and subtract 2-digit numbers using efficient strategies
- Represent addition and subtraction on a number line

Your child will practice these skills by solving problems like those shown below.

PROBLEM	COMMENTS
Write a question about the graph that can be solved using an equation. *"I see there are way more browns than blues. My question is: How many more browns than blues?"* *"I know you can find the difference by solving 18 – 4 = 14."*  	**Making graphs and answering questions about them** Students organize data in a bar graph and share their observations. Then they write questions and solve problems using information presented in the graph.
This unit focuses on two different strategies for multi-digit addition and subtraction to 100—jumping and splitting.	
15 + 24 =  *"I jumped to 15, then jumped by 10s to 25 and 35, then 4 more to 39."*  *"I jumped 15, 20, 25, 35, 36, 37, 38, 39."*	**Adding on a number line: Jumping** In Unit 2, using measuring tapes marked in sections of 5s and 10s evolved into using the number line as a model to solve double-digit computation. That work continues in this unit as students practice adding 2-digit numbers in multiples of 10 and then by 1s.
Andrew is 49 inches tall. His big brother, Matt, is 76 inches tall. How many inches will Andrew have to grow to be as tall as his big brother?  *"I hopped 1 to get to 50. Then I went 10 more and 10 more to get up to 70. Then I took a hop of 6 to get to 76. 1 + 10 + 10 + 6 = 27. He needs to grow 27 inches."*  *"I jumped back by 10s, as many 10s as I could. When I got to 56, I jumped 6 to 50 and then 1 more to 49. 10 + 10 + 6 + 1 is 27."*	**Subtracting on a number line: Jumping** When using the number line for subtraction, students find the difference between two points. Like making change, the difference is found by adding up from the smaller number to the larger number. The amount added is the difference. Students may jump from the larger number to the smaller number as well.

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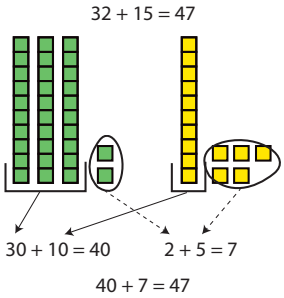
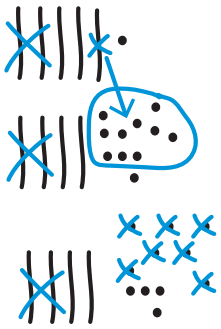
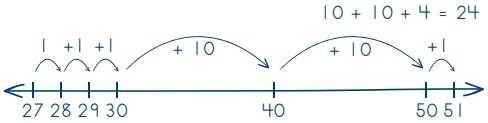
PROBLEM	COMMENTS
There were 32 presents in the closet and 15 on the table. How many presents were there in all? *"I added the tens (30 + 10 = 40) and then the ones (2 + 5 = 7). "Then I added them together to find the total sum (40 + 7 = 47). 47 presents!"* 	**Adding using the base ten model: Splitting** Base ten models like those shown encourage students to split numbers by place value and then add tens to tens, and ones to ones. In the example at left, the student used the tens and individual ones to represent each number. Next, the tens and ones in each number were added separately, resulting in two partial totals that were combined to get the total. This strategy demonstrates a strong grasp of place value concepts and lends itself well to mental calculations and estimation.
Dad ordered 51 presents for the party. There are 27 of these presents already on the table. The rest of the presents are still in the delivery truck. How many presents are in the truck? *"I drew 51 by making lines for the strips of 10 and dots for the pieces to show 1s. I crossed out the 2 tens from 27, but I needed to trade one of the tens pieces for 10 ones so I could subtract 7. I subtracted 7 by crossing out 7 dots. Then I counted the tens and ones that were left. 51 – 27 = 24. There are 24 left in the truck."* 	**Subtracting using the base ten model: Splitting** The strategy at the left is similar to the splitting strategy for addition because the student works first with the tens and then with the ones. In this example, the student made a sketch of the tens and ones of the larger number (51). By thinking about taking the smaller number away from the larger number, the student subtracted the 2 tens from 51 and then traded another ten for 10 ones to subtract the 7 ones. Here is the same problem solved with the jumping strategy on the number line:  Some students prefer using the number line because addition is easier for them and there is no need to trade tens for ones.

FREQUENTLY ASKED QUESTIONS ABOUT UNIT 3

Q: Why are students solving addition and subtraction problems in so many ways? Why don't they learn to do it the way I learned to do it in grade school?

A: The way many of us learned to add and subtract in grade school is referred to as the **standard algorithm**. An *algorithm* is simply a series of steps that you can follow to solve a particular kind of problem. The advantage of learning algorithms is that they work every time, always producing a correct answer if followed correctly.

Standard Algorithm for Addition	Standard Algorithm for Subtraction
$\begin{array}{r} {}^{1}13 \\ +\ 18 \\ \hline 31 \end{array}$	$\begin{array}{r} {}^{4}\cancel{5}{}^{1}\cancel{1} \\ \cancel{6} \\ -\ 37 \\ \hline 19 \end{array}$

The disadvantage of learning algorithms too soon is that students often don't understand what they are doing, and the value of the digits is ignored. As a result, they often make mistakes or forget how to carry out the steps correctly. The lessons in this unit draw students' attention to using the strategies discussed above while allowing students to solve problems in ways that make sense to them. Research suggests that students who choose their own strategies before learning an algorithm show better understanding of place value concepts and transfer their knowledge and skills more effectively to work with larger numbers.

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