Getting Ready to Teach Unit 5

Learning Path in the Common Core Standards

This unit extends the strategies that appeared in Unit 4 for unknown partners in addition and subtraction situations. The methods for finding totals and differences within 10 are used in this unit for totals within 20. Both the Level 2 strategy (Counting On) and the Level 3 strategy (Making a Ten) also appear in this unit. The problem types presented in Unit 3, for totals and differences within 10, appear again in this unit for totals and differences within 20.

Problem types, models, and drawings are all woven together in this unit so children can access prior knowledge as they work with greater numbers. When children see familiar models, strategies, and games, it is like meeting an old friend. They know how to do the activities and more easily make a small stretch to greater numbers.

***Math Expressions* VOCABULARY**

As you teach this unit, emphasize understanding of these terms.

- 10-partner
- 100-partner

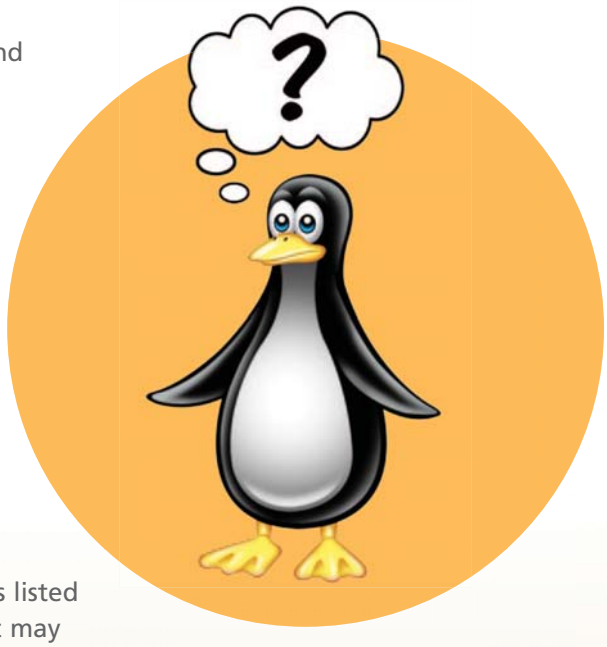
See the Teacher Glossary.

Help Children Avoid Common Errors

Math Expressions gives children opportunities to analyze and correct errors, explaining why the reasoning was flawed.

In this unit we use Puzzled Penguin to show typical errors that children make. Children enjoy teaching Puzzled Penguin the correct way, why this way is correct, and why Puzzled Penguin made an error. Common errors are presented in the Puzzled Penguin feature in the following lessons:

- **Lesson 5:** Does not understand whether a number is a partner or the total within a subtraction story problem.
- **Lesson 10:** Uses ones to help subtract tens, but leaves the answer as ones.



In addition to Puzzled Penguin, there are other suggestions listed in the Teacher Edition to help you watch for situations that may lead to common errors. As a part of the Unit Test Teacher Edition pages, you will find a common error and prescription listed for each test item.

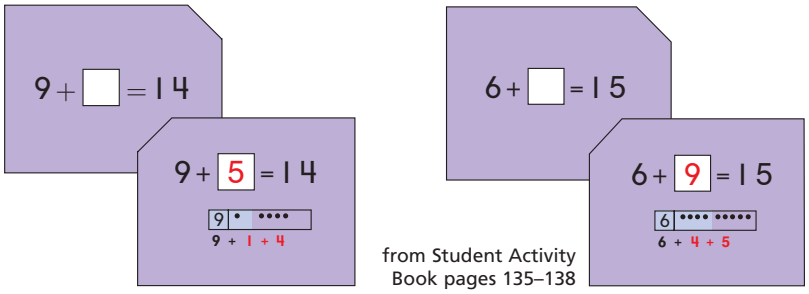
Unknown Partners

Lesson 1

Make a Ten for Unknown Partners In the last unit, children learned how to make a ten for unknown totals. In this unit, children learn how to make a ten for unknown partners. This is integrated with story problems.

Children use the Purple Make-a-Ten Cards to think through making a ten to find an unknown partner.

Purple Make-a-Ten Cards



from Student Activity Book pages 135–138

Totals of Ten Children should begin to observe that when they are working with the number 9 as a partner, they should think about using the number 1 as part of the unknown partner, because 9 and 1 make 10. With the number 8 as the given partner, they should think about using the number 2 as part of the unknown partner because 8 and 2 make ten. They should use the number 3 when they see 7 as a partner. Success with the Make a Ten strategy relies on children knowing the partners of 10: 1 + 9, 2 + 8, 3 + 7, 4 + 6, and 5 + 5.

Teen Story Problems Making a ten to find unknown partners is practiced using teen story problems.

> Noah has some blocks. He gets 6 more blocks.
> Now he has 15 blocks. How many blocks did Noah have before?

When children see the 6, they should think 4 because 6 and 4 make 10, and 10 and 5 make 15. Then they can reason that 4 + 5 = 9 and Noah had 9 blocks in the beginning.

from THE PROGRESSIONS FOR THE COMMON CORE STATE STANDARDS ON OPERATIONS AND ALGEBRAIC THINKING

Make a Ten These make-a-ten methods have three prerequisites reaching back to Kindergarten:

a. knowing the partner that makes 10 for any number,

b. knowing all decompositions for any number below 10 so that you can find the partner for the number that makes 10, and

c. knowing all teen numbers as 10 + *n* (e.g., 12 = 10 + 2, 15 = 10 + 5)

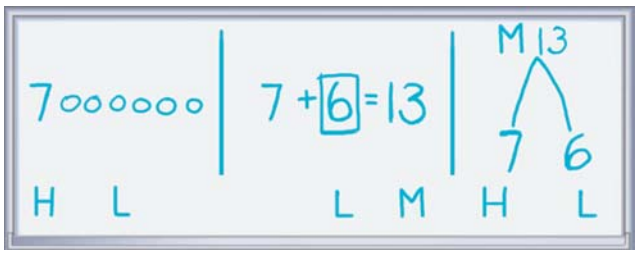
Make a Ten to Subtract

Lesson **2**

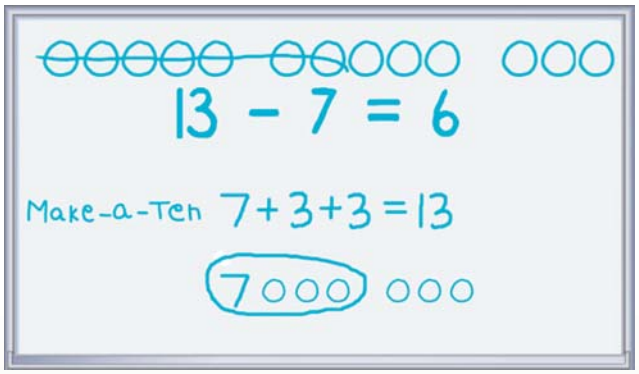
Teen Subtraction Story Problems In the previous lesson, children used addition to solve unknown partner problems. In this lesson, children are introduced to making a ten to subtract. Now they are thinking about subtraction and building on their understanding of subtraction as an unknown addend problem.

13 giraffes march in a parade.
It starts to rain, and 7 of them go home.
How many are left?

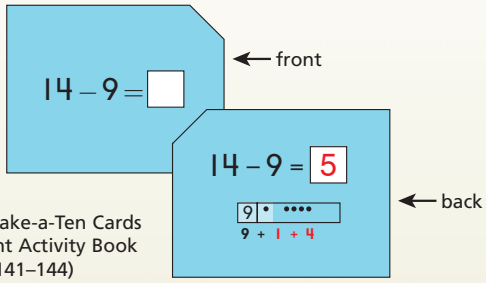
One method children use is counting on.



A new method is introduced using subtraction equations.



Children practice this new method using the Blue Make-a-Ten Cards.



Blue Make-a-Ten Cards (Student Activity Book pages 141–144)

Solving Teen Problems

Lessons 1 2 3 4 5

Problem Types *Math Expressions* integrates a research-based algebraic problem solving approach that focuses on problem types throughout the program: understand the situation, represent the situation with a math drawing or an equation, solve the problem, and check that the answer makes sense. See the Unit 3 Overview for a detailed explanation of this process.

The problems in Unit 3 emphasized problem types within 10. In this unit, children solve problems within 20. The same problem types are represented in both units. The problem types are listed below. You can find examples of the problem types in the Unit 3 Overview.

Add To with Result Unknown: Lessons 1, 4, and 5
Add To with Change Unknown: Lessons 1, 4, and 5
Add To with Start Unknown: Lessons 1, 4, and 5

Take From with Result Unknown: Lessons 2, 3, 4, 5
Take From with Change Unknown: Lessons 3, 4, 5
Take From with Start Unknown: Lessons 3, 4, 5

Put Together/Take Apart with Total Unknown: Lessons 3, 4, 5
Put Together/Take Apart with Addend Unknown: Lessons 1, 3, 4, 5
Put Together/Take Apart with Both Addends Unknown: Lessons 3, 4, 5

Algebraic Thinking In Lesson 5, children are introduced to a basic algebraic concept. In every equation, there is the possibility of an unknown number in three different positions: the beginning, the middle, or the end of the equation.

$8 + 5 = \square$ $\qquad$ $\square + 5 = 13$ $\qquad$ $8 + \square = 13$

Children write an equation that matches the structure (order) of the information in the problem. These equations are *situation equations*.

In some cases, children may write a related equation, the *solution equation*, to solve the problem. The solution equation shows the operation that can be used to solve the problem.

from THE PROGRESSIONS FOR THE COMMON CORE STATE STANDARDS ON OPERATIONS AND ALGEBRAIC THINKING

Problem Types Add To/Take From situations are action-oriented; they show changes from an initial state to a final state. These situations are readily modeled by equations because each aspect of the situation has a representation as number, operation (+ or −), or equal sign (=, here with the meaning of "becomes," rather than the more general "equals").

In Put Together/Take Apart situations, two quantities jointly compose a third quantity (the total), or a quantity can be decomposed into two quantities (the addends). This composition/decomposition may be physical or conceptual.

from THE PROGRESSIONS FOR THE COMMON CORE STATE STANDARDS ON OPERATIONS AND ALGEBRAIC THINKING

Situation and Solution Equations Learning where the total is in addition equations (alone on one side of the equal sign) and in subtraction equations (to the left of the minus sign) helps students move from a situation equation to a related solution equation.

Solving Problems with Three Addends

Lesson 6

Using Properties As children explore different strategies for adding three addends, they may be using one or both of the following properties informally.

The Associative Property of Addition states that addends can be grouped in any way and the sum will be the same.
$(3 + 2) + 7 = 3 + (2 + 7)$

The Commutative Property of Addition states that you can change the order of the addends and the sum will be the same.
$3 + 2 = 2 + 3$

Using Make a Ten Children also use the Make a Ten strategy to work through a problem with three addends.

Kenya walks 4 blocks on Monday, 3 blocks on Tuesday, and 7 blocks on Wednesday. How many blocks does she walk altogether?

- Let's write this story problem as an equation. We can use a box for the unknown total.

$$4 + 3 + 7 = \square$$

- Problems with three addends may seem hard. Does anyone have an idea to make it easier? Are there any 10-partners in this equation? yes, 3 and 7 Let's make a ten and then add. Since the second two numbers can be added to make a ten, $4 + 3 + 7$ is the same as $4 + 10$.

$$4 + \overbrace{3 + 7}^{10} = 14$$

Change the numbers for the same story problem and let children solve it using this 10-structured strategy. Offer help if necessary.

- Now let's say Kenya walked 6 blocks, 4 blocks, and 3 blocks. Who can write the equation? $6 + 4 + 3 = \square$
- Can we find any 10-partners? 6 and 4 make a ten, so $6 + 4 + 3$ is the same as $10 + 3$.
- Let's make the ten and then add:

$$\overbrace{6 + 4}^{10} + 3 = 13$$

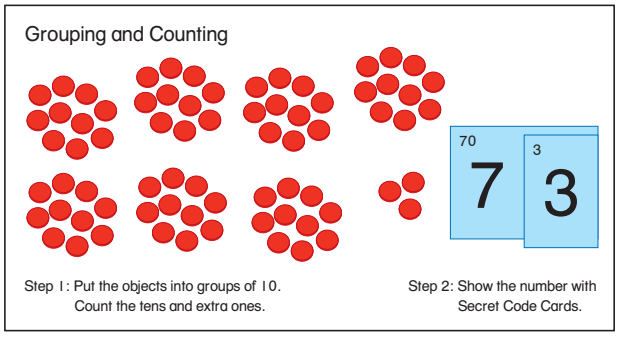
from THE PROGRESSIONS FOR THE COMMON CORE STATE STANDARDS ON OPERATIONS AND ALGEBRAIC THINKING

Properties of Operations Level 3 methods involve decomposing an addend and composing it with another addend to form an equivalent but easier problem. This relies on properties of operations. Students do not necessarily have to justify their representations or solution using properties, but they can begin to learn to recognize these properties in action and discuss their use after solving.

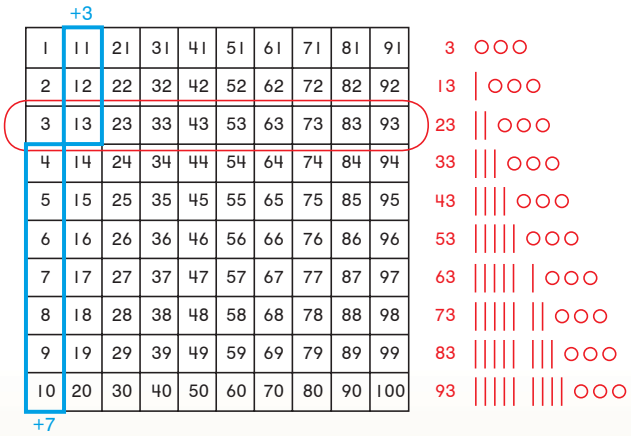
Multiples of 10

Lessons 7 8

Focus on 10 In Lesson 7, Children use what they know about 10 to count large quantities. They group large quantities into groups of ten and show the number with Secret Code Cards. This is the first step of adding and subtracting with multiples of 10.



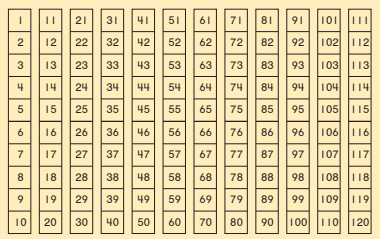
Using a Hundred Grid Children build a Hundred Grid in Lesson 8. They use the grid to model 2-digit numbers.



Children use this to move forward as they use the Hundred Grid to name the numbers 10 more than and 10 less than a given number.

Counting to 120 The 120 Poster is ideal for a variety of counting activities. You can use Student Leaders and give them the pointer to designate the number that will be the starting number for a counting sequence.

This poster supports all the counting sequences in the content standards for Grade 1. However, you can also use it to customize your own counting activities.



from THE PROGRESSIONS FOR THE COMMON CORE STATE STANDARDS ON NUMBER AND OPERATIONS IN BASE TEN

Counting and Place Value Grade 1 students take the important step of viewing ten ones as a unit called a "ten". They learn to view the numbers 11 through 19 as composed of 1 ten and some ones. They learn to view the decade numbers 10, …, 90, in written and in spoken form, as 1 ten, …, 9 tens. More generally, first graders learn that the two digits of a two-digit number represent amounts of tens and ones, e.g., 67 represents 6 tens and 7 ones.

Adding and Subtracting Multiples of 10

Lessons 9 10

Using a Hundred Grid In the previous unit, children began to prepare for multidigit operations by adding decade numbers (30 + 40) and 1-digit numbers to decade numbers (30 + 4). They also added 1-digit numbers to 2-digit numbers by counting on (38 + 4). This lesson extends this idea as children learn to add a decade number to any 2-digit number (38 + 10 and then 38 + 40). These activities are reinforced with the Hundred Grid, which allows children to see the ten-based patterns in sequence.

Add Tens The teacher writes exercises on the board. Children explain how to use the Hundred Grid to find the totals.

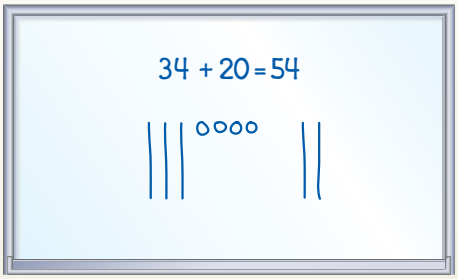
79 + 20

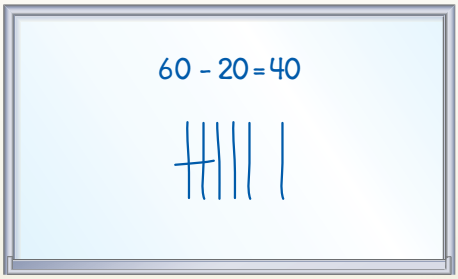
- Where do you start to count? 79
- Which way will you go and why? To the right; when I move to the right, each space is 10 more.
- How many spaces do you move to add 20? 2
- What is the total? 99

Subtract Tens Now the teacher asks children to think about how addition and subtraction are opposite operations and then discuss how to use the Hundred Grid to subtract tens.

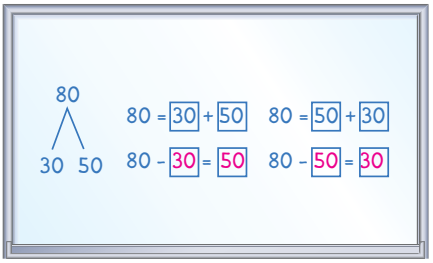
- Add 70 + 20. What is the total? 90 How would you use the Hundred Grid to find 70 − 20? Where do you start to count? Which way will you go and why? I start at 70; instead of moving right to add tens, I move left to subtract tens; when I move to the left, each space is 10 less.
- How many spaces do you move to subtract 20? 2
- What is 70 − 20? 50

Using Place Value Drawings Children use what they know about modeling equations to draw 10-sticks and circles to add and subtract tens. These models help children focus on place value.

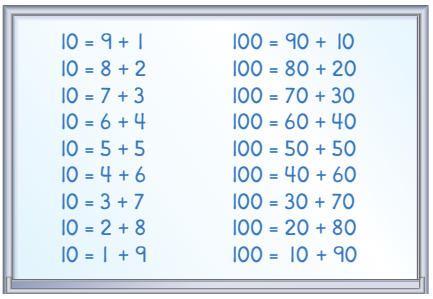




Relate Addition and Subtraction Children learn four related equations for adding and subtracting tens. Sometimes children can more readily work with numbers where the greater number is the first addend. The Commutative Property allows them to look at 30 + 50 and think 50 + 30. Then they can count on 60, 70, 80. The activities they did using the Hundred Grid helped children count on tens to add or subtract.



Finding Partners of 100 In Lesson 10, children connect partners of 10 to partners of 100. Children observe that just as 1 was important with a partner of 9, 10 is important with a partner of 90. This connection can help children as they add and subtract within 100.



Focus on Mathematical Practices

Lesson 11

The Standards for Mathematical Practice are included in every lesson of this unit. However, there is an additional lesson that focuses on all eight Mathematical Practices. In this lesson, children use what they know about addition and subtraction to solve problems about a garden.