

Getting Ready to Teach Unit 8

Learning Path in the Common Core Standards

In this unit, children use modeling skills and addition concepts to add with 2-digit numbers when grouping a ten is and is not required. This is not intended to be mastered at this grade level. It gives children an idea of what is coming in Grade 2. While children do subtract with multiples of 10 at this grade, they are not introduced to subtracting 2-digit numbers involving ungrouping 1 ten for 10 ones.

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 2:** Incorrectly aligns the tens and ones digits when writing and solving vertical forms
- ▶ **Lesson 5:** Writes the new ten as an additional digit in the answer and does not add it to the rest of the tens

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.

Math Expressions VOCABULARY

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

- New Group Above method
- New Group Below method
- Show All Totals method

See the *Teacher Glossary*.



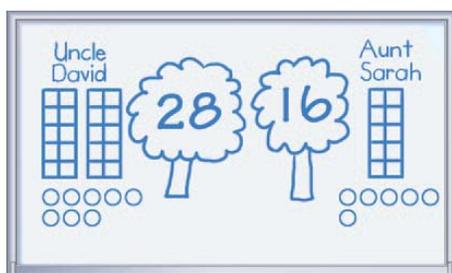
Explore 2-Digit Addition Methods

Lessons

1

2

The Concrete Stage Children group ones as tens using drawings in an orchard scenario. This is a conceptual activity that lays the foundation for grouping in addition. It is done with drawings but can also be acted out using base-ten manipulatives.



Children are presented with a situation where they are asked to pack apples in boxes of ten and leave the extras on the side. In the process of adding the apples picked by two people, they can clearly see that there are enough extra apples for another box of ten.

- How many boxes did Uncle David fill? **2 boxes**
- How many boxes did Aunt Sarah fill? **1 box**
- How many extra apples are there in all? **14** Are there enough extra apples to fill a new box? **yes** How do you know? **It only takes 10 apples to fill a box, and 14 is greater than 10.**

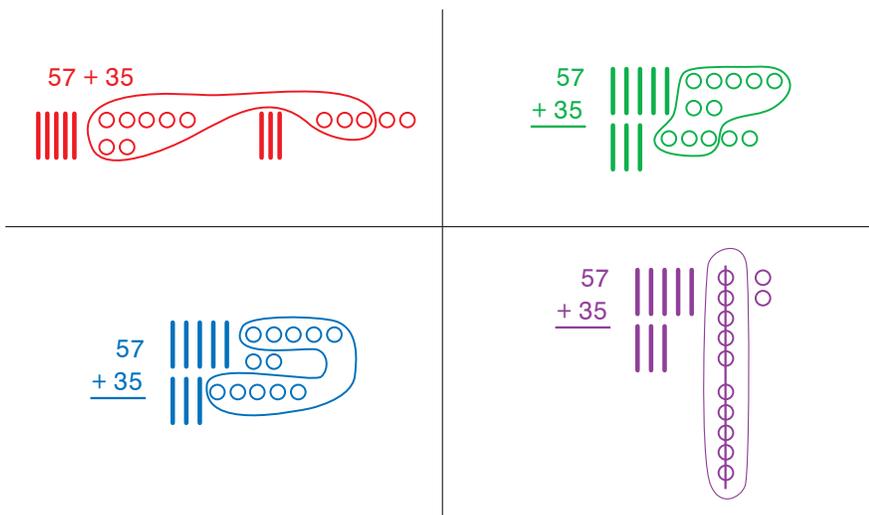
Group the Extra Apples Children ring 10 of the loose apples and pack a new box with these apples. After they have grouped the apples into a ten, ask them to give the total quickly, without counting. They should see 4 tens and 4 ones and translate this grouping into the number 44.

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

Computations Standard algorithms for base-ten computations with the four operations rely on decomposing numbers written in base-ten notation into base-ten units. The properties of operations then allow any multi-digit computation to be reduced to a collection of single-digit computations. These single digit computations sometimes require the composition or decomposition of a base-ten unit.

The Connecting Stage At this stage, children are encouraged to generate their own techniques for 2-digit addition problems. Some children will create methods of counting on with tens and ones, but most will rely on the stick and circles notation that they already know. Children figure out a way to adapt this notation to the new requirements of grouping. The following are some common representations for $57 + 35$. These drawings help children develop more advanced mental methods.

Possible Student Drawings



Any method that makes use of tens and ones is an acceptable method at this point. Children are asked to share and explain their methods so that many methods are available for children to try. From the beginning, children link a step in their drawing to a step in their numeric method. This helps the numeric methods take on quantitative meaning.



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

Place Value Understanding First graders use their base-ten work to compute sums within 100 with understanding. Concrete objects, cards, or drawings afford connections with written numerical work and discussions and explanations in terms of tens and ones.

The Symbolic Stage Do not expect all children to master written methods of numeric addition in this lesson or in the remaining lessons of the unit. Some may need to continue using stick-and-circle drawings. That is fine as long as each child has a workable method for adding 2-digit numbers. However, children who solve with sticks and circles still need to record their steps in the drawing on the numeric exercise, showing the new ten either above or below the tens column or using the Show All Totals Method. This will help them understand a numeric method and make the transition to numeric methods in due time.

Possible Student Written Methods

“New Group Below” and “Show All Totals” are research-based, child-friendly methods used in *Math Expressions*.

New Group Below (*Math Expressions*)

$$\begin{array}{r} 57 \\ + 35 \\ \hline 2 \\ \hline \end{array} \rightarrow \begin{array}{r} 57 \\ + 35 \\ \hline 92 \\ \hline \end{array}$$

Advantages: By grouping below, the child can see the 12 ones. The child adds the two numbers he or she sees ($5 + 3 = 8$) and then adds 1.

New Group Above

$$\begin{array}{r} \overset{1}{5}7 \\ + 35 \\ \hline 2 \\ \hline \end{array} \rightarrow \begin{array}{r} \overset{1}{5}7 \\ + 35 \\ \hline 92 \\ \hline \end{array}$$

Advantages: Many parents know this method.
Disadvantages: Some children say that adding the one ten above changes the problem (it does). The child has to add the 1 to 5, hold that number, and then add 3 to it.

Show All Totals (*Math Expressions*)

$$\begin{array}{r} 57 \\ + 35 \\ \hline 80 \\ \hline \end{array} \rightarrow \begin{array}{r} 57 \\ + 35 \\ \hline 80 \\ + 12 \\ \hline 92 \\ \hline \end{array} \rightarrow \begin{array}{r} 57 \\ + 35 \\ \hline 80 \\ + 12 \\ \hline 92 \\ \hline \end{array}$$

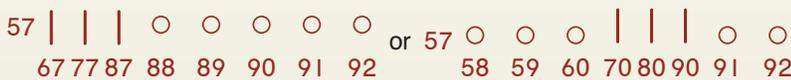
Advantages: Some children like to see the place values. The child can naturally move from left to right since that is how he or she reads. (This method can also be performed right to left, however.)

Make a Ten from One Number



“35 gives 3 to 57 to make 60. 60 and 32 is 92.”

Counting On By Tens



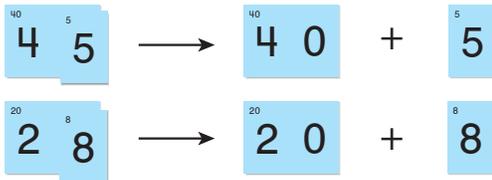
from THE PROGRESSIONS FOR THE COMMON CORE STATE STANDARDS ON NUMBER AND OPERATIONS IN BASE TEN

General Method Adding tens and ones separately as illustrated in the margin is a general method that can extend to any sum or multi-digit numbers. Students may also develop sequence methods that extend their Level 2 single-digit counting on strategies to counting on by tens and ones, or mixtures of such strategies in which they add instead of count the tens or ones.

Verify 2-Digit Addition Totals

Lesson
3

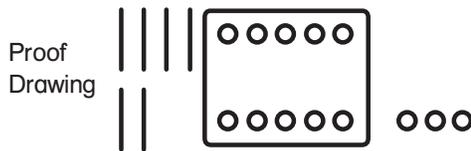
Secret Code Cards Children use the place value cards that they previously used for place value activities. The class makes two numbers and then figures out how to add the numbers without drawings. These cards can help children verify that their answer is correct.



They show this Secret Code Card solution method:

$$\begin{array}{r} 45 = 40 + 5 \\ + 28 = 20 + 8 \\ \hline 60 + 13 = 73 \end{array}$$

Proof Drawings One child works at the board to create a Proof Drawing of the problem (45 + 28) with sticks and circles to see if it matches their answer. The other children draw the same Proof Drawing at their seats. Children relate the Proof Drawing to the numeric method.



The Show All Totals Method Children discuss and practice this method.

Last week Aunt Sarah made 38 jars of peach jelly.
Uncle David made 57 jars of apple jelly.
How many jars of jelly did they make together? **95 jars of jelly**

I visualize the zeros hiding under the 8 and 7. So I know I have 30 and 50.

3 tens + 5 tens = 8 tens

8 ones + 7 ones = 1 ten + 5 ones = 15

9 tens + 5 ones = 95

Lessons

4

5

Practice

Cases of Addition In Lessons 4 and 5, children review and practice various methods for 2-digit addition. Children continue to use any method they choose. Be sure they can explain how the method works and find a correct answer.

They add:

- ▶ 2-digit and 1-digit numbers
- ▶ 2-digit numbers and a multiple of 10
- ▶ two 2-digit numbers

Common Mistakes In Lesson 5, children discuss the common mistakes that happen with 2-digit addition. The teacher plays the role of a confused learner, and children help by describing what went wrong and how to fix it.

24	24	32
+ 18	+ 18	+ 45
32	312	87

Child ignores the new ten.

Child puts the new ten in the answer.

Child makes an unnecessary new ten, which may be written above or below.

**Focus on
Mathematical Practices**

Lesson

6

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 grocery store.