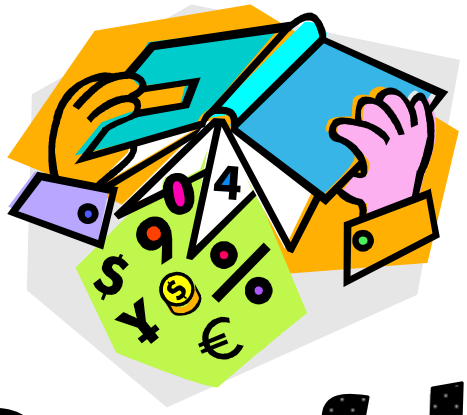
Mathematics:



'A Story of Units'

Parent Handbook

Grade 2

Module 4

Grade 2 • Module 4

Addition and Subtraction Within 200 with Word Problems to 100

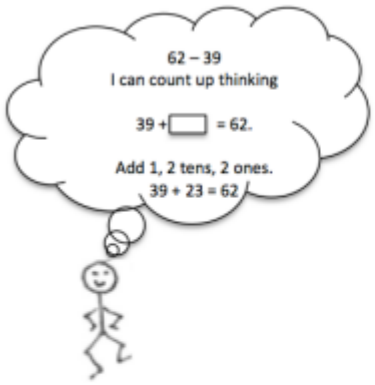
OVERVIEW

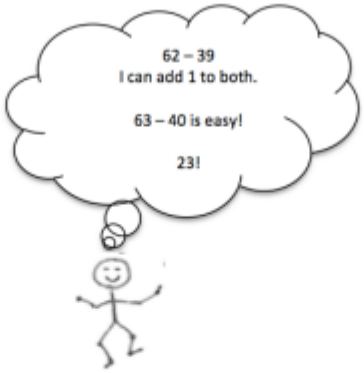
In Module 3 students were immersed in the base ten system, as they built a strong foundation through a concrete to pictorial to abstract approach. They bundled groups of 10, and saw that 10 like units could be bundled to produce a new unit that is ten times as large. They progressed from seeing 10 ones as 1 ten to understanding 10 tens as 1 hundred. Module 4 builds on that place value understanding to compose and decompose place value units in addition and subtraction within 200.

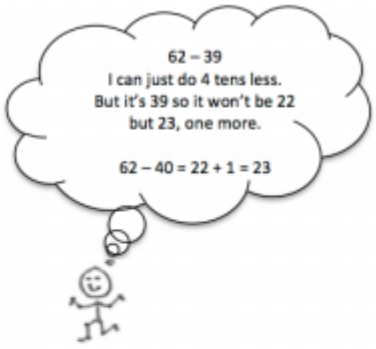
Module 4 is devoted to three major areas of work. The first two are building fluency in two-digit addition and subtraction within 100 and applying that fluency to one- and two-step word problems of varying types within 100. Students' increasing fluency with calculations within 100, begun in Grade 1, allows word problems to transition from being mere contexts for calculation into opportunities for students to see and analyze the relationships between quantities. Daily application problems and specific lessons in Topics A, C, and F provide students with guided and independent practice as they negotiate a variety of problem types, including the more complex comparison problems. Note that most two-step problems involve single-digit addends, and do not involve the most difficult comparison problem types.

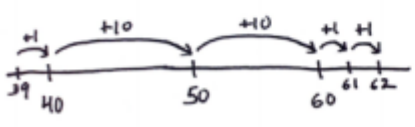
The third major area of work is developing students' conceptual understanding of addition and subtraction of multi-digit numbers within 200 as a foundation for work with addition and subtraction within 1000 in Module 5.

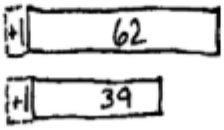
In Topic A, students work with place value strategies to fluently add and subtract within 100. The final lessons of Module 3 (finding 1 more, 1 less, 10 more, 10 less) transition into mental addition and subtraction of 1 and 10. Students mentally add and subtract 100 in Topics D and E, as well as during fluency activities throughout the module, as they did in Module 3. This knowledge is then extended and used to solve problems. For example, students might count on by ones and tens, e.g., 39 + □ = 62, so 40, 50, 60, 61, 62. They might use compensation, adding the same amount to the subtrahend as to the minuend to make a multiple of ten, e.g., 62 – 39 = 63 – 40. They might add or subtract a multiple of 10 and adjust the solution as necessary, e.g.,62 – 39 is 4 tens less than 62 but… one more (2.NBT.5). Students explain why these strategies work using place value language, properties of addition and subtraction, and models, such as the number line .

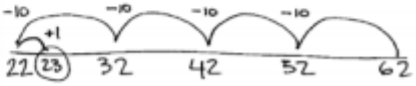




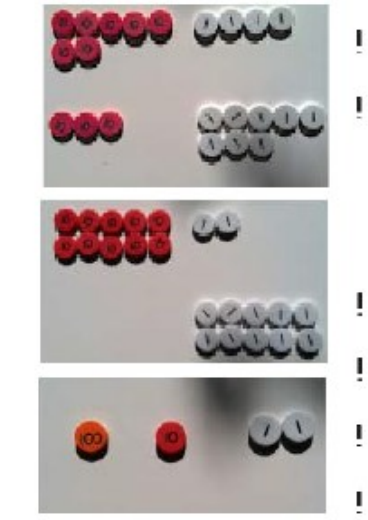




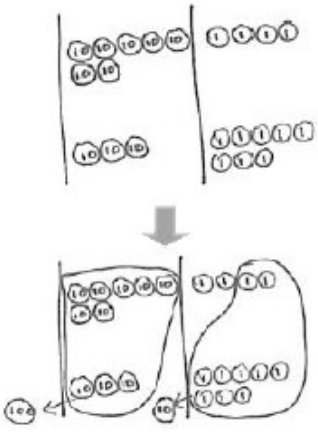




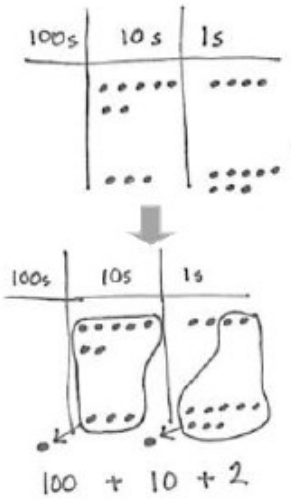
Topic A's strategies lead naturally to work with the written vertical algorithm for addition (Topic B) and subtraction (Topic C). In these two topics, students represent place value strategies with place value disks and math drawings (see images with strategy names below). Students work with composing 1 ten from 10 ones or decomposing 1 ten as 10 ones (with minuends within 100). After the mid-module assessment, students continue working with manipulatives and math drawings to make sense of problems in which they compose or decompose twice. Topic D focuses on addition, with the new complexity of composing 1 hundred from 10 tens within 200 in problems with up to four addends. Subtraction in Topic E involves subtracting when decomposing 1 hundred for 10 tens and 1 ten for 10 ones.



Place value disks



Place value chart with

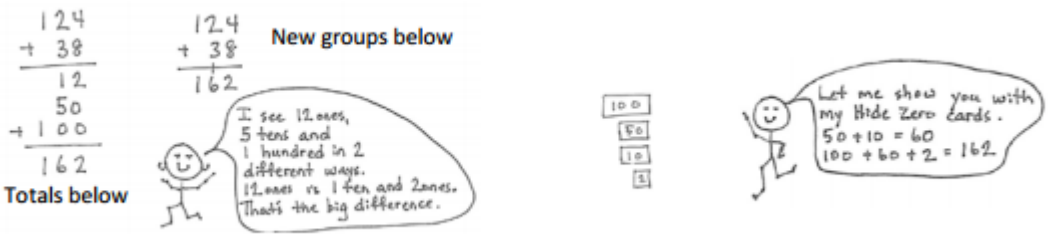


Chip model

Throughout the module, manipulatives and math drawings allow students to see numbers in terms of place value units and serve as a reminder that they must add like units (e.g., knowing that 74 + 38 is 7 tens + 3 tens and 4 ones + 8 ones). The focus is often on computational strategies with bare numbers (i.e., no context) so that total attention is given to understanding the value of each digit within a number, as well as why and how the written method works. Students use the place value chart as an organizer. Simultaneous use of a written method and a place value chart allows students to better recognize both the value of numbers when they are not on the place value chart, and like units. The same is true when students make math drawings and use place value language to relate each step of the drawing to a written method . The different representations serve to solidify the understanding of the composition and decomposition of units, moving from concrete to pictorial to abstract. Throughout the work, students are encouraged to explain their actions and analyses, and to use the relationship between addition and subtraction to check their work .

Throughout the module, students are encouraged to be flexible in their thinking and to use multiple strategies in solving problems, including the use of drawings such as tape diagrams, which they relate to equations. In Topic F, students are introduced to the totals below method (pictured below to the far left) and are challenged to explain why both it and the new groups below method (also pictured below to the left) work .

Abstract



- students should be practicing basic addition and subtraction facts so that they may recall them with speed and accuracy.

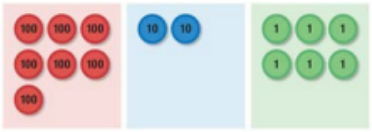
Terminology

New or Recently Introduced Terms

- Equation
- Minuend
- New groups below
- Place value chart (pictured below right)
- Place value or number disk (pictured to the right)
- Subtrahend
- Totals below

Familiar Terms and Symbols

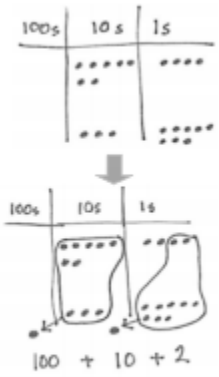
- Addend
- Addition
- Bundle, unbundle, regroup, rename, change (compose or decompose a 10 or 100)
- Difference
- Hundreds place (referring to place value)
- Place value (referring to the unit value of each digit in given number)
- Subtraction
- Units of ones, tens, hundreds, thousands (referring to place value; 10 ones is the same as 1 unit of ten)



Say Ten form modeled with number disks:
7 hundreds 2 tens 6 ones = 72 tens 6 ones

Place Value Chart with Headings
(use with numbers)

hundreds	tens	ones
7	2	6



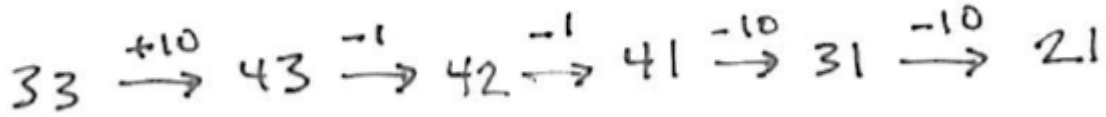
Chip model

Lesson 1

Objective: Relate 1 more, 1 less, 10 more, and 10 less to addition and subtraction of 1 and 10.

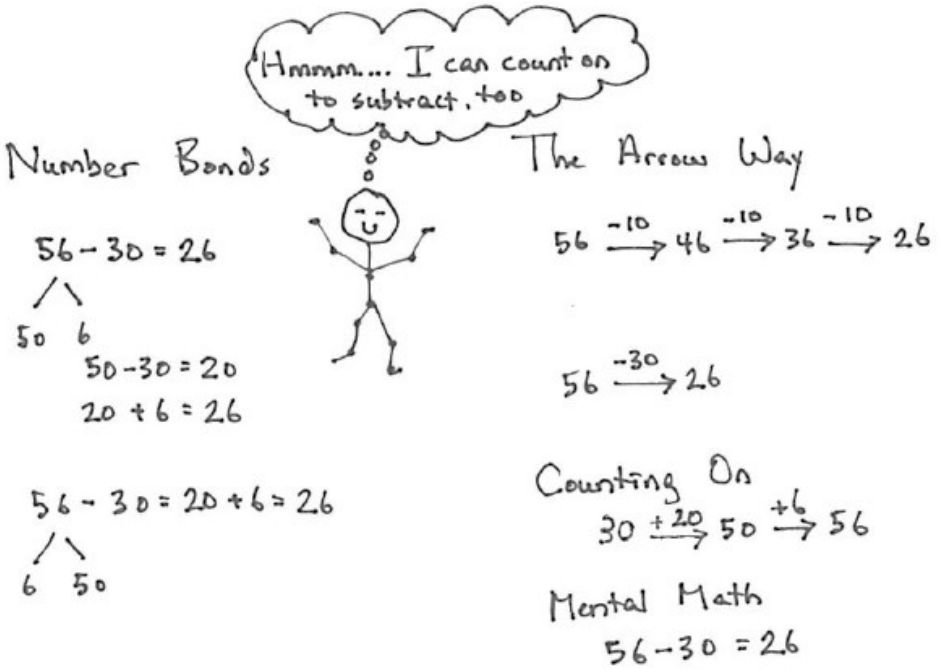
The Arrow Method

You add or subtract 1 or 10 and the arrows point to what the number becomes after you change it. It shows that you're changing the ones or the tens place and whether it's more or less. 10 more than 33 is 43, and 1 less is 42, and 1 less is 41. Then 10 less than 41 is 31, and 10 less than 31 is 21.



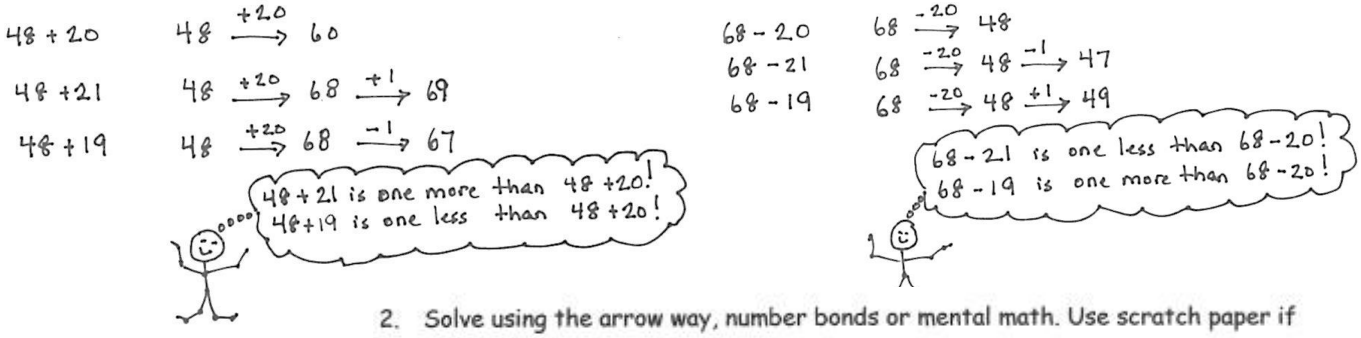
Lesson 2

Objective: Add and subtract multiples of 10 including counting on to subtract.



Lesson 3

Objective: Add and subtract multiples of 10 and some ones within 100.



.

2. Solve using the arrow way, number bonds or mental math. Use scratch paper if needed.

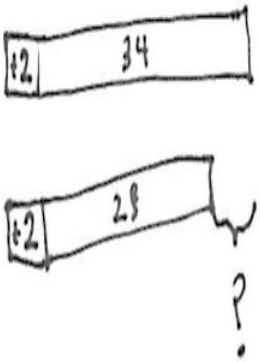
a. 49 + 20 = 69 49 +20 ▷ 69	21 + 49 = 70 20 + 50	49 + 19 = 68 50 + 18
b. 23 + 70 = 93 23 +70 ▷ 93	23 + 71 = 94 24 + 70	69 + 23 = 92 70 + 22

Lesson 4

Objective: Add and subtract multiples of 10 and some ones within 100.

Sometimes we make manipulate equations to make mental addition and subtraction easier. When we add the same amount to each number in a subtraction sentence, the difference stays the same. You can take from one added and give to the other to make a whole group of ten.

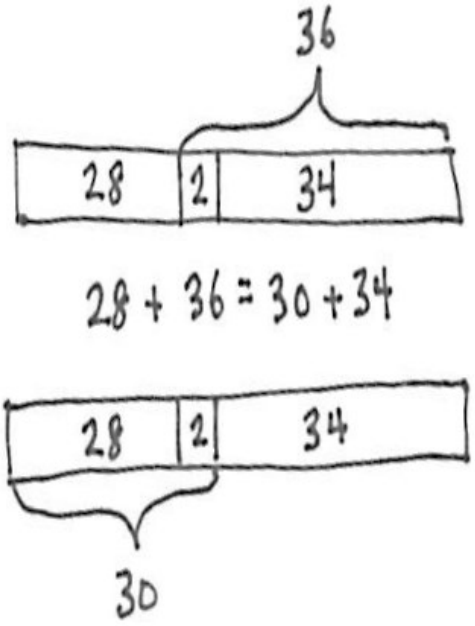
34 – 28 = 36 - 30



28 + 36 = 64
2 34

28 + 2 = 30

30 + 34 = 64

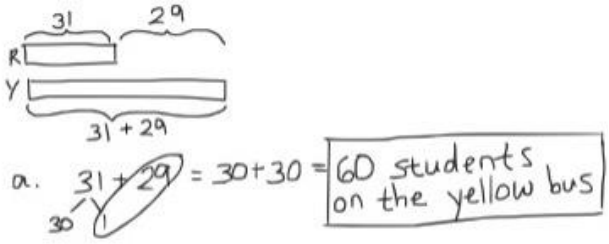


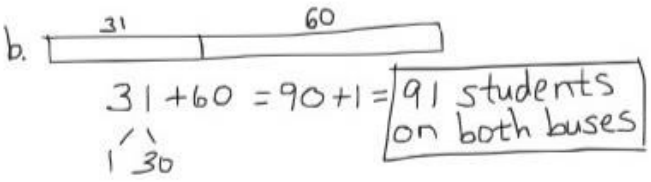
Lesson 5

Objective: Solve one- and two-step word problems within 100 using strategies based on place value.

a. There are 31 students on the red bus. There are 29 more students on the yellow bus than on the red bus. How many students are on the yellow bus?

b. How many students are on both buses combined?

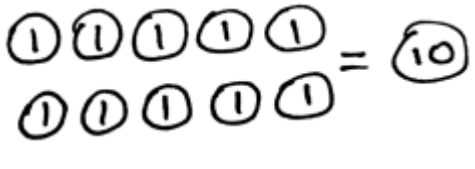


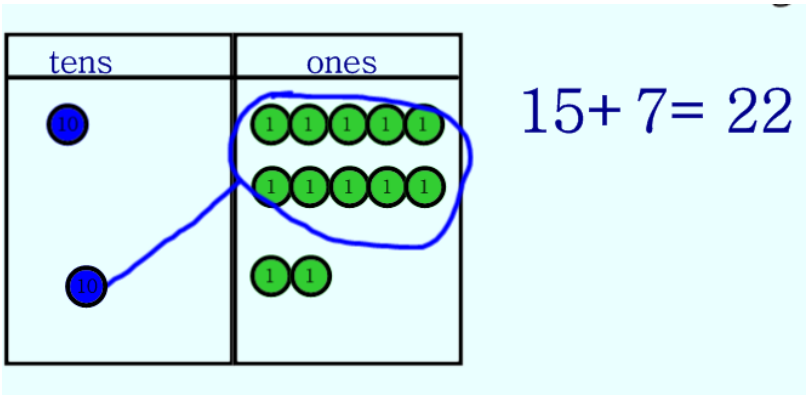


Lesson 6

Objective: Use manipulatives to represent the composition of 10 ones as 1 ten with two-digit addends.

You can bundling groups of ten using place value disk or mentally.

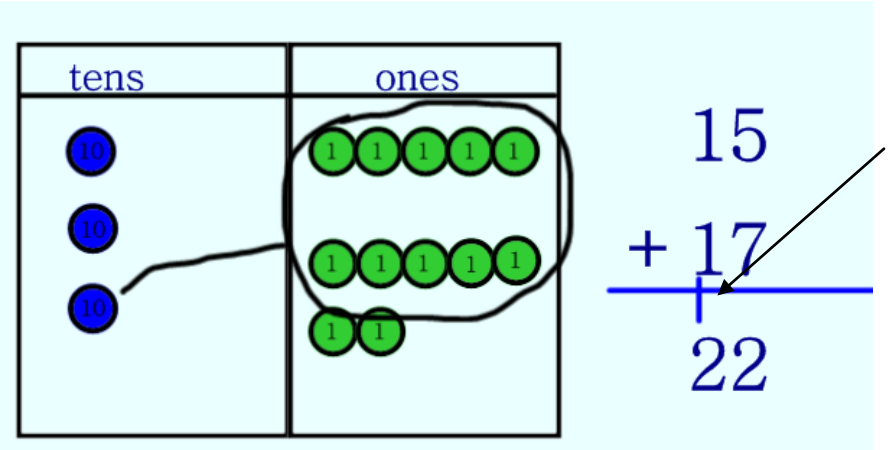




Lesson 7

Objective: Relate addition using manipulatives to a written vertical method.

Notice when bundling a ten we notate it underneath the tens column.

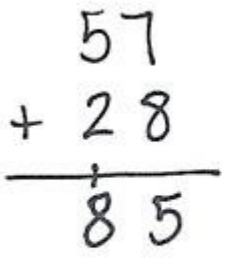


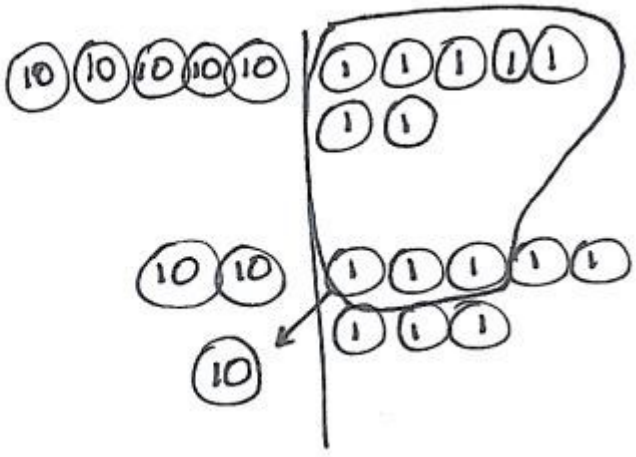
Notice when bundling a group of ten we notate it underneath the tens column.

This makes it easier for the eye to track and for students to see that 7+5=12 is the same as 1 ten 2 ones.

Lesson 8

Objective: Use math drawings to represent the composition and relate drawings to a written method.

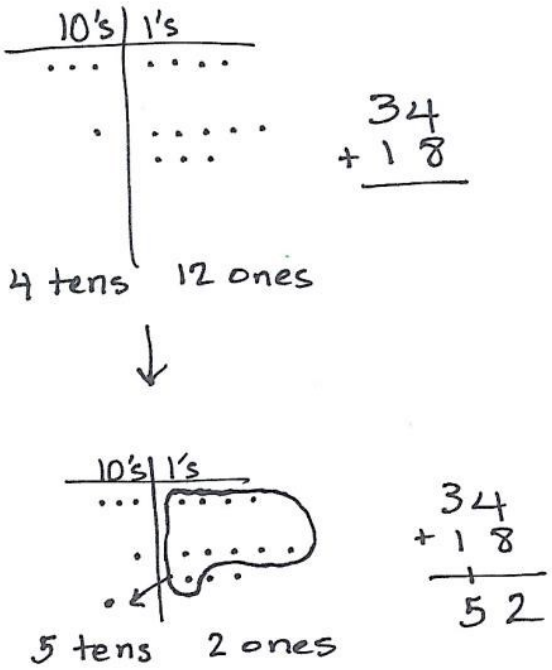




Lesson 9

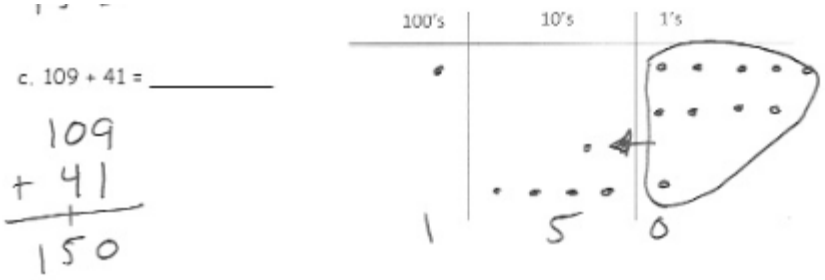
Objective: Use math drawings to represent the composition when adding a two-digit to a three-digit addend.

- 4 tens 12 ones can be simplified by bundling and renaming as 5 tens 2 ones or 52. They all have the same value.
- An algorithm is a way to solve problems using steps that help us work more quickly.



Lesson 10

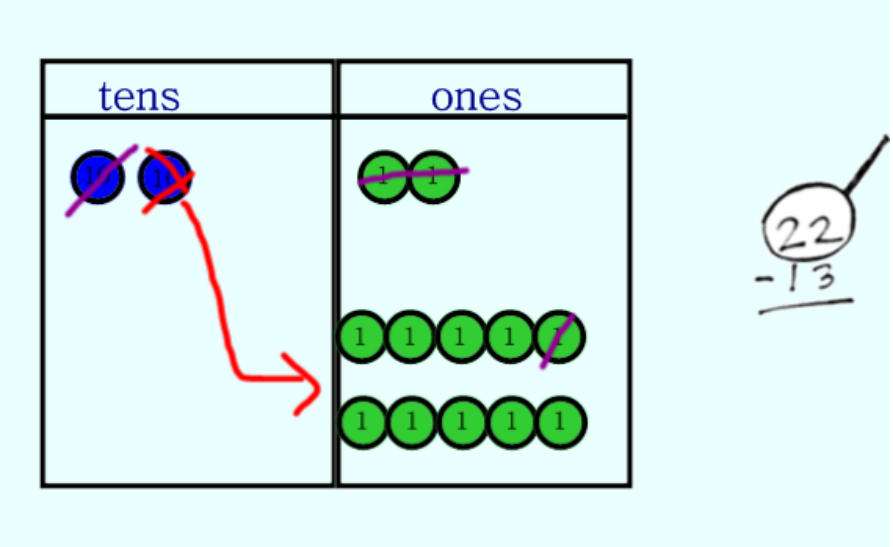
Objective: Use math drawings to represent the composition when adding a two-digit to a three-digit addend.



Lesson 11

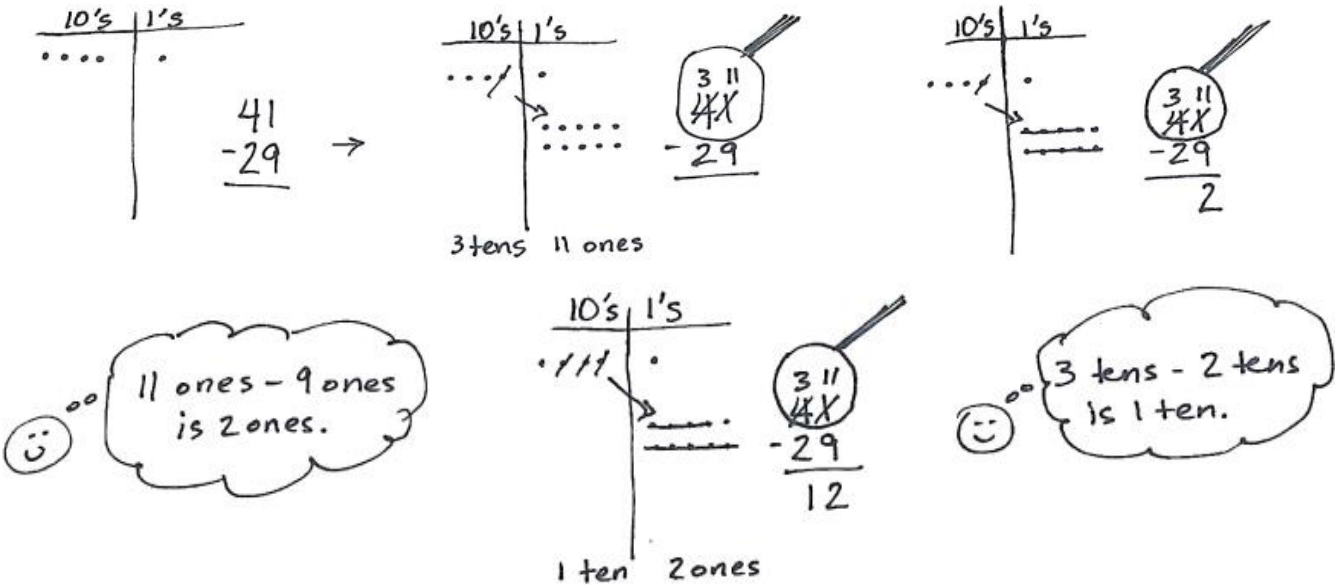
Objective: Represent subtraction with and without the decomposition of 1 ten as 10 ones with manipulatives.

- We draw a magnifying glass around the minuend to show it's the whole that we are subtracting from.



Lesson 12

Objective: Relate manipulative representations to a written method.

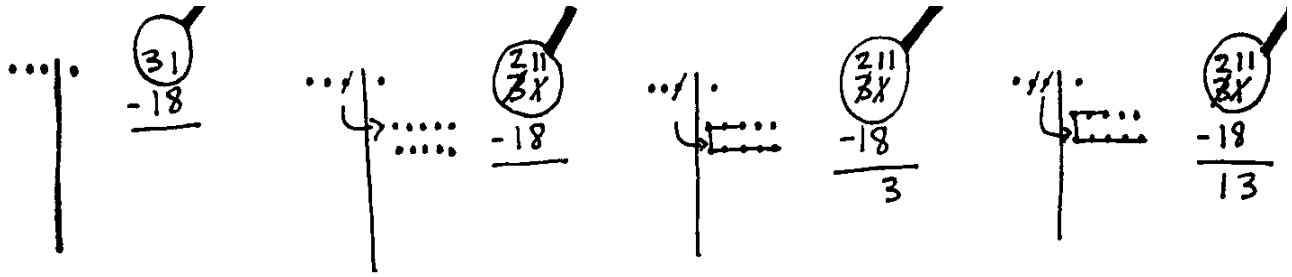


Note: This shows the step by step process of subtraction. Students do **not** need to recopy the problem to show the steps.

Lesson 13

Objective: Use math drawings to represent subtraction with and without decomposition and relate drawings to a written method.

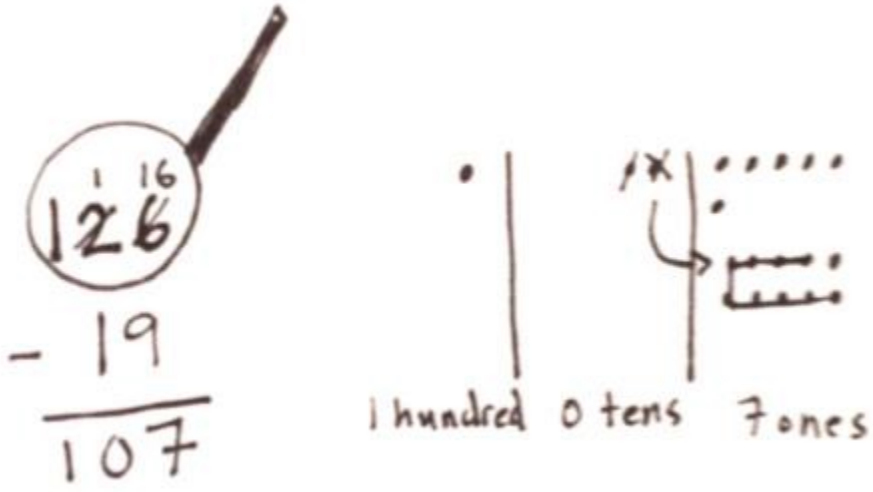
- The place value chart can be simplified to a line that separates each column.



Note: This shows the step by step process of subtraction. Students do **not** need to recopy the problem to show the steps.

Lesson 14

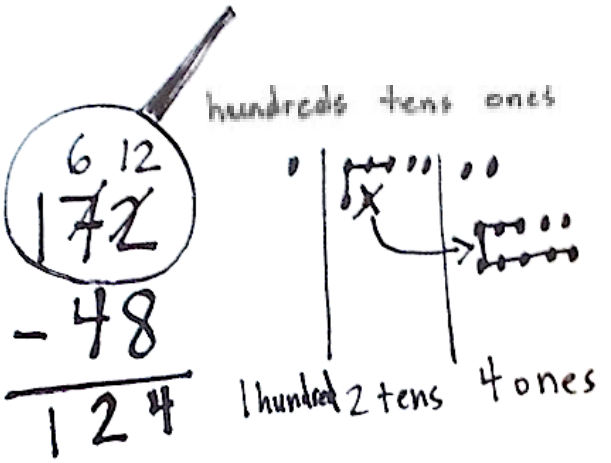
Objective: Represent subtraction with and without the decomposition when there is a three-digit minuend.

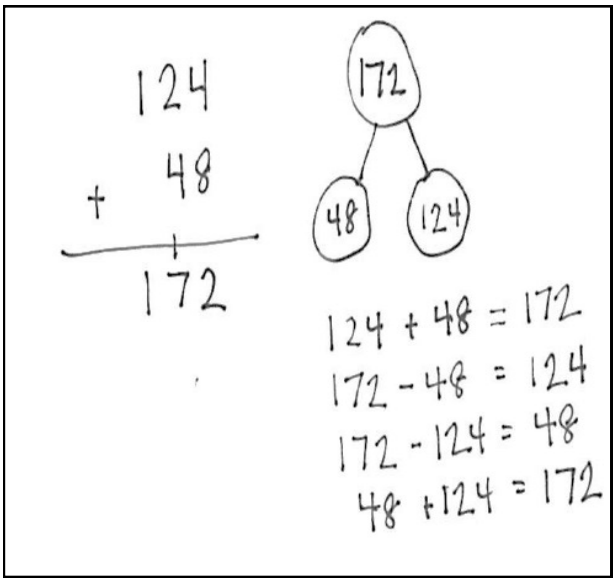


Lesson 15

Objective: Represent subtraction with and without the decomposition when there is a three-digit minuend.

- We can use related facts to check our work.





Lesson 16

Objective: Solve one- and two-step word problems within 100 using strategies based on place value.

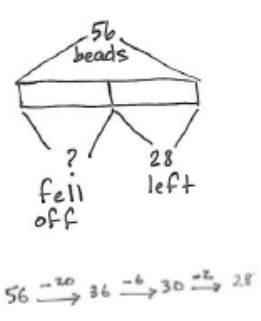
3 Steps to Solving a word problem

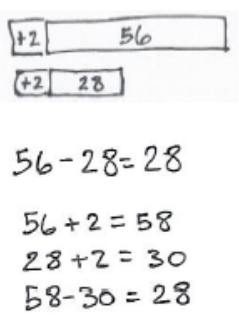
1.. **Model the Problem**

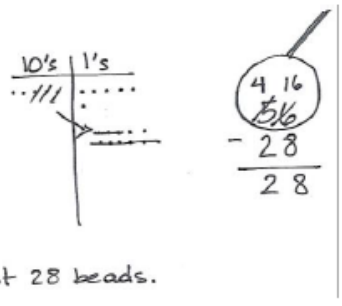
- Can you draw something?
- What can you draw?
- What conclusions can you make from your drawing?

2. **Solve and write a statement.**
3. **Assess the solution for reasonableness.**

Seneca put 56 beads on a necklace. Some beads fell off, but he still has 28 left. How many beads did he lose?

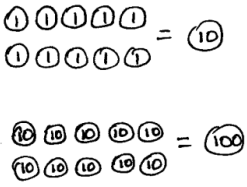


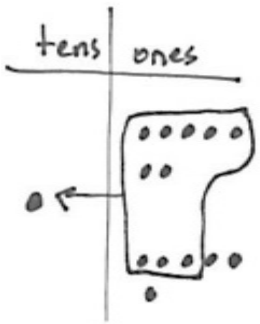




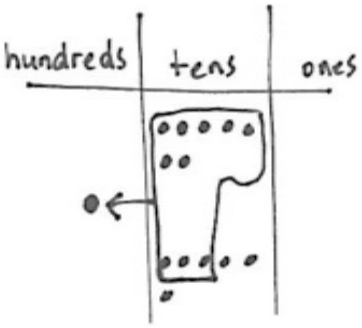
Lesson 17

Objective: Use mental strategies to relate compositions of 10 tens as 1 hundred to 10 ones as 1 ten.

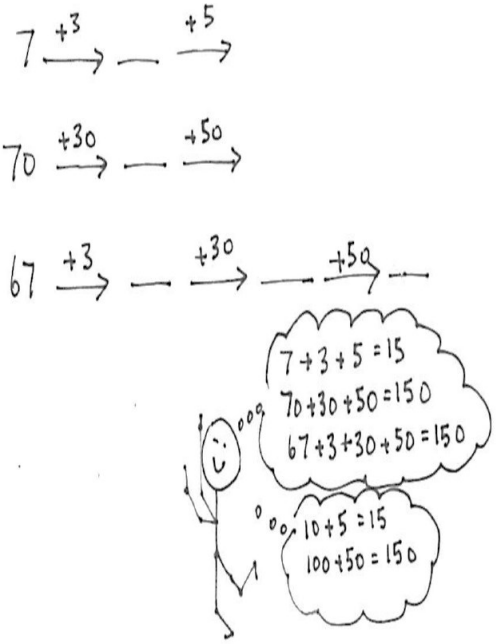




7 ones + 6 ones
= 1 ten 3 ones
= 13



7 tens + 6 tens
= 1 hundred 3 tens
= 130



Lesson 18

Objective: Use manipulatives to represent additions with two compositions.

Making a hundred is just like making a ten!

We can use partners to ten for both. → 6 + 4 = 10, just like 6 tens + 4 tens is 10 tens, or 1 hundred. → When we put together 10 ones we make a ten, and when we put together 10 tens we make a hundred. → We trade 10 of a smaller unit for 1 of the next bigger unit: 10 ones for 1 ten and 10 tens for 1 hundred.

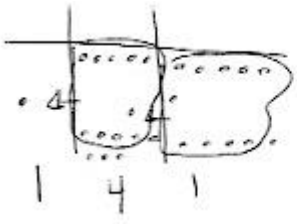
Hailey and Gio solve 56 + 85. Gio says the answer is 131. Hailey says the answer is 141. Explain whose answer is correct using numbers, pictures, or words.

56 + 85

Here we changed 10 ones for 1 ten

We changed 10 tens for 1 hundred

The total of the two part is 141



Hailey is correct

Lesson 19

Objective: Relate manipulative representations to a written method.

- Students can still use place value charts if they need the support.
- It would benefit your child to practice flash cards to increase their speed and accuracy with recalling addition and subtraction facts.

2. 38 fewer girls attended summer camp than boys. 79 girls attended.

a. How many boys attended summer camp?

$$\begin{array}{r} 79 \\ +\ 38 \\ \hline 117 \end{array}$$

117 Boys attended summer camp.

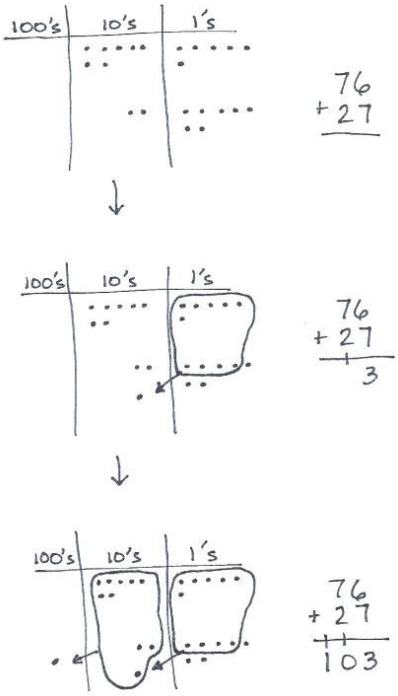
b. How many children attended summer camp?

$$\begin{array}{r} 117 \\ +\ 79 \\ \hline 196 \end{array}$$

196 children attended summer camp.

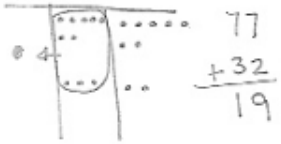
Lesson 20

Objective: Use math drawings to represent additions with up to two compositions and relate drawings to a written method.



2. Jessica's teacher marked her answer wrong for question 3. Jessica can't figure out what she did wrong. If you were Jessica's teacher, how would you explain her mistake?

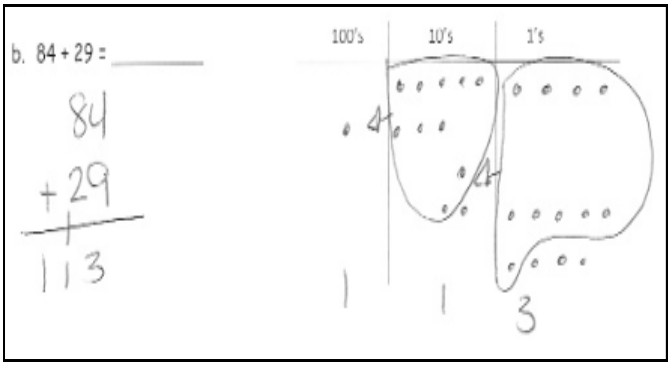
Jessica's work

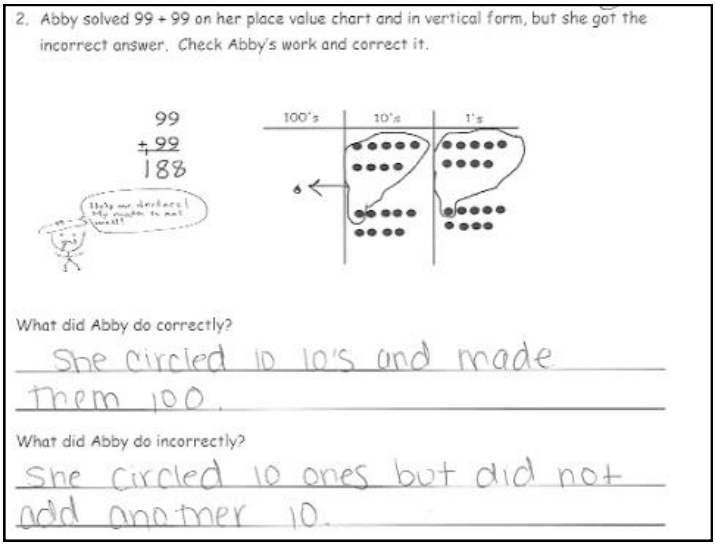


Explanation:
I would tell Jessica that she put the 1 in the wrong place. There is 1 hundred and no tens. The answer is 109.

Lesson 21

Objective: Use math drawings to represent additions with up to two compositions and relate drawings to a written method.

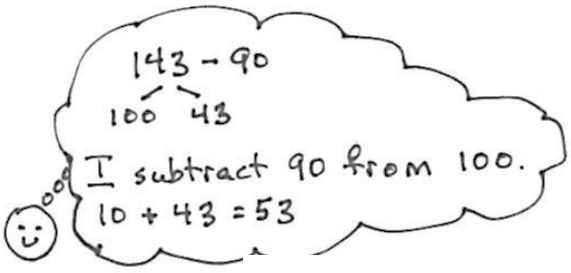


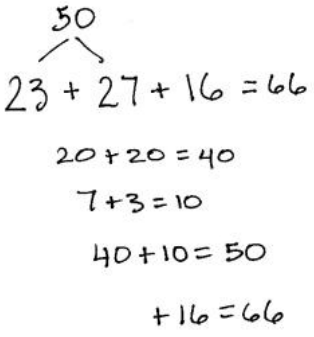


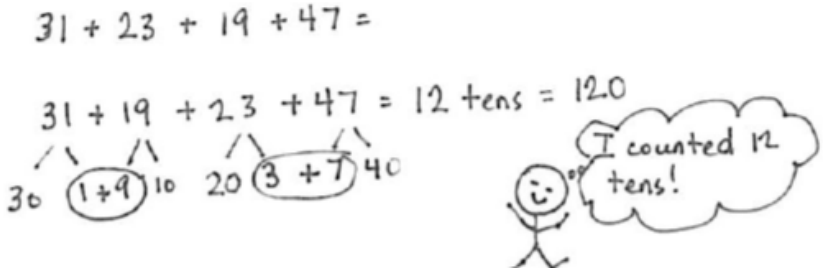
Lesson 22

Objective: Solve additions with up to four addends with totals within 200 with and without two compositions of larger units.

- Compatible numbers help us add. We always look to make a group of ten. This guides our mental math.







Lesson 23

Objective: Use number bonds to break apart three-digit minuends and subtract from the hundred.

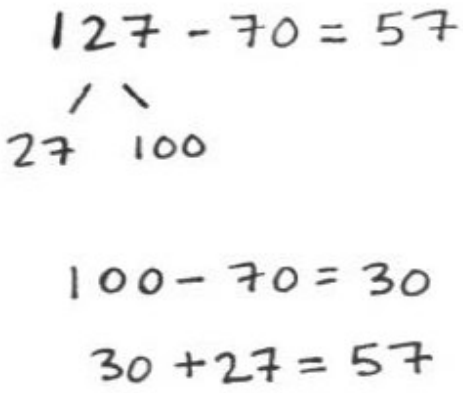
Can you take out the 100?

Break apart 127 into 100 and some more.

If you take out the 100, 27 are left in 127?

Now we can subtract easily!

I know that 100 – 70 is 30. I added the 27 back on and I got 57.
20 + 27 = 57.



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Lesson 24

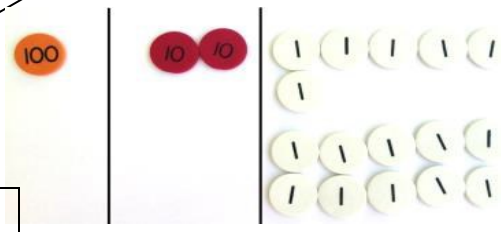
Objective: Use manipulatives to represent subtraction with decompositions of 1 hundred as 10 tens and 1 ten as 10 ones.

136 –57

1 hundred 3 tens 6 ones

Unbundle a ten to subtract

1 hundred 2 tens 16 ones



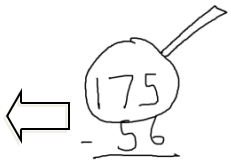
Unbundle a hundred to subtract

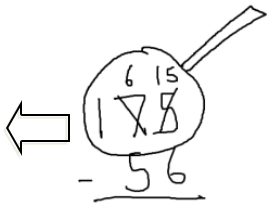
12 tens 16 ones

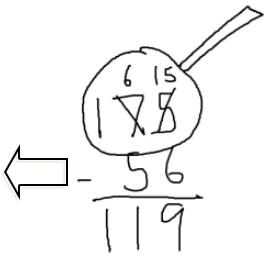
Now that you have unbundled you can take away 5 tens 7 ones (57)

Lesson 25

Objective: Relate manipulative representations to a written method.





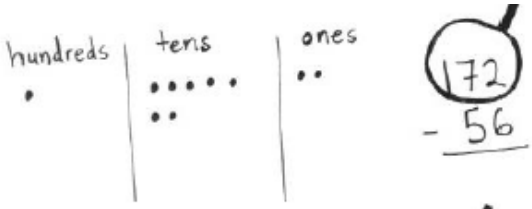


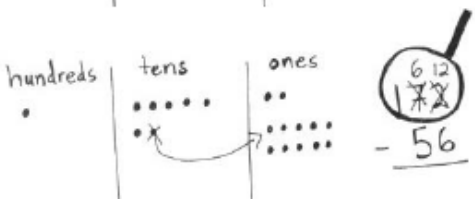
Lesson 26

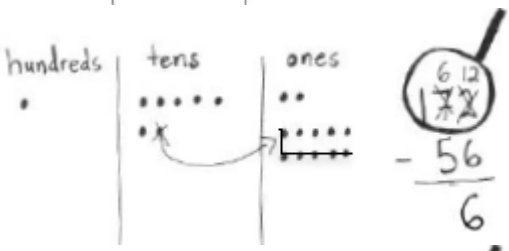
Objective: Use math drawings to represent subtraction with up to two decompositions and relate drawings to a written method.

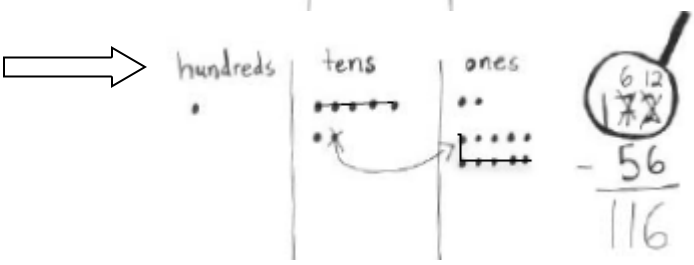
The dot diagram is a quick tool to show the process of unbundling to subtract.

Students should only draw one model that ends up looking like the bottom representation.



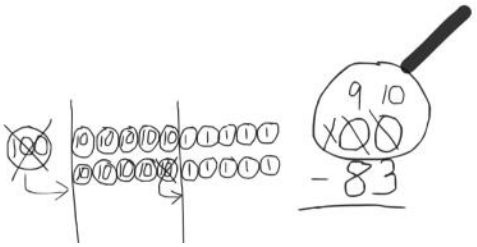




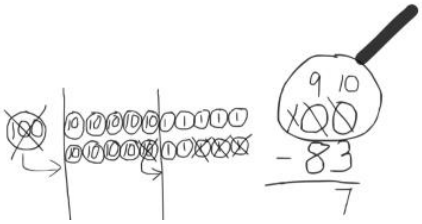


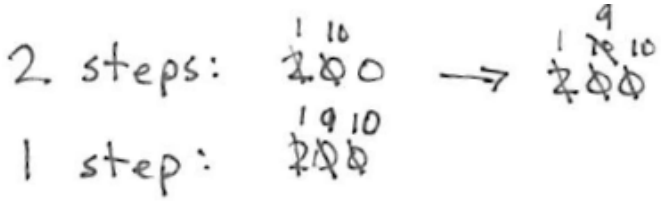
Lesson 27

Objective: Subtract from 200 and from numbers with zeros in the tens place.



Students have learned to unbundle a ten and a hundred to subtract. In this lesson students learn a shortcut for subtracting across two zeros.





Although it is more efficient to unbundle in one step students can continue to use two steps if they find more success with that strategy.

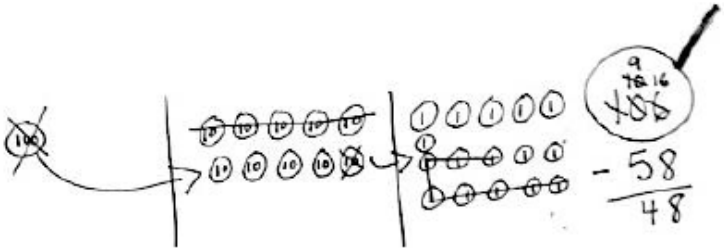
Lesson 28

Objective: Subtract from 200 and from numbers with zeros in the tens place.

Unbundle in one step:

There are no tens , so rename a hundred as 9 tens and 10 ones.

That makes it 9 tens and 16 ones, because we already had 6 ones.



Or

Unbundle in two steps:

We can change 1 hundred into 10 tens, and then change 10 tens into 9 tens 10 ones.

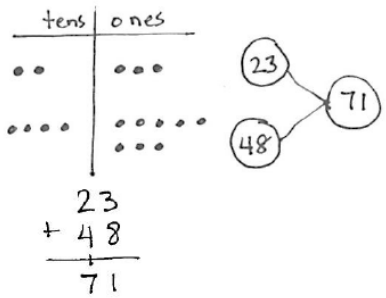
That makes it 9 tens and 16 ones, because we already had 6 ones.

Lesson 29

Objective: Use and explain the *totals below* written method using words, math drawings, and numbers.

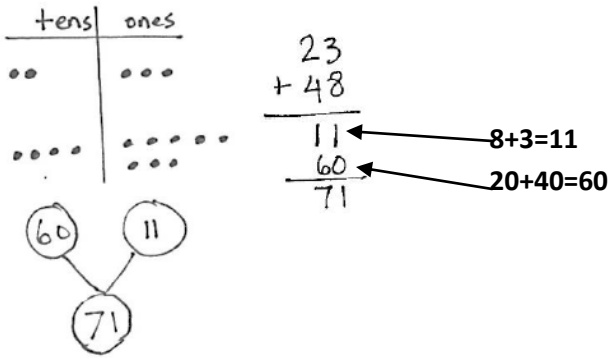
Method 1: New Groups Below

(standard algorithm)



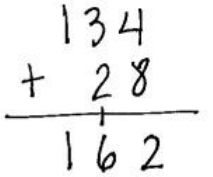
Method 2: Totals Below

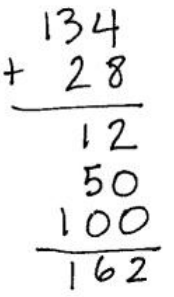
(add each unit separately)

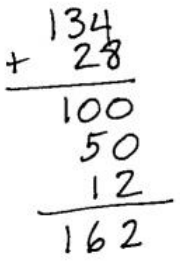


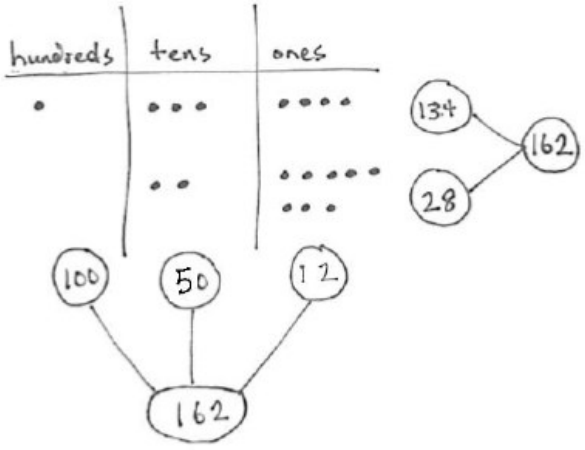
Lesson 30

Objective: Compare *totals below* to *new groups below* as written methods.









Lesson 31

Objective: Solve two-step word problems within 100.

1. Model the problem.

- Can you draw something?
- What can you draw?
- What conclusions can you make from your drawing?

2. Solve and write a statement.

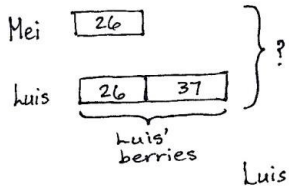
3. Assess the solution for reasonableness.

Solve a two-step *add to with result unknown* word problem using a tape diagram.

Mei picked 26 berries. Luis picked 37 more berries than Mei.

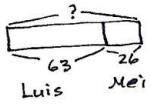
a) How many berries did Luis pick?

b) How many berries did they pick in all?



$$\begin{array}{r} 26 \\ +\ 37 \\ \hline 63 \end{array}$$

Luis picked 63 berries.



$$\begin{array}{r} 63 \\ +\ 26 \\ \hline 89 \end{array}$$

They picked 89 berries in all.

It' s important to become fluent with basic addition and subtraction facts. Quick 5-10 minute activities are essential for memorization. Here are some ways to assist your child with memorizing basic facts:

- Flash Cards (both you and your child should say the fact aloud)
- Counting up and down by ones and tens (begin at various numbers)
- Have quick routine math talks in the car, store, and anywhere that seems appropriate.
- Computer Aides such as xtramath.org