1:8 Subtracting Units

Teacher Notes

Math Milestones™

Central math concepts

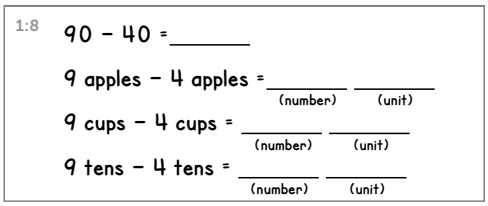
What can you count? Young students are familiar with counting *things*, like apples. But what about "tens"? Tens aren't physical objects, yet they can be counted. Who decides what can be counted and what can't? Students should have experience deciding what to count so they learn how counting extends from prominent objects like apples to abstract things like tens. Developing student agency in deciding what to count extends to deciding what units to count. A unit is what the number 1 refers to in a count. Here they count tens; in later grades they will count unit fractions as in "9 thirds - 4 thirds = 5 thirds."

As reflected in task **K:12 Make Ten and Some More**, when students were in kindergarten, they decomposed numbers 10–19 into ten ones and some more ones. That task only requires working explicitly with units of ones. In first grade however, students will begin their study of place value in earnest by working with a larger unit, called "a ten." That is, students learn to view ten ones as a unit called a ten.

One application of the tens unit is that it allows students to interpret the "decade numbers" 10, 20, 30, 40, 50, 60, 70, 80, 90 as referring to one, two, three, four, five, six, seven, eight, or nine tens (and 0 ones). This understanding in turn allows students to add or subtract decade numbers by performing single-digit calculations with tens units. For example, the sum 50 + 30 is 5 tens + 3 tens, which makes 8 tens; and 8 tens are 80. So, 50 + 30 = 80.

A linguistic challenge of the place value system is that in the English language, it takes some interpretation to understand that "fifty" means five tens, "twenty" means two tens, and so on. By contrast, the English names for hundred words indicate the place value unit more directly; for example, the name "three hundred" says almost exactly what it means (three hundreds). Additional aspects of naming numbers in relation to the place value system are detailed in the relevant *Progression* document† (see pp. 5, 6).

At first, using unit thinking to calculate with decade numbers might not be the method best preferred by all students. For example, given the problem 50 + 30 = ?, some students might prefer to approach the problem by skip-counting by tens ("sixty, seventy, eighty") to obtain the result 80. That method is valid and efficient for the stated problem, but basing calculation explicitly on place-value units will become increasingly important as students progress through the elementary grades. Not only that, but operations with fractions and decimals depend heavily on unit thinking. So it is important to connect a method like skip-counting by tens to the method of adding or subtracting decade numbers by performing single-digit calculations with tens units.



Answer

50. 5 apples. 5 cups. 5 tens.

Click here for a student-facing version of the task.

Refer to the Standards

1.NBT.C.6; MP.7, MP.8. Standards codes refer to www.corestandards.org. One purpose of the codes is that they may allow a task to shed light on the Standards cited for that task. Conversely, reading the cited Standards may suggest opportunities to extend a task or draw out its implications. Finally, Standards codes may also assist with locating relevant sections in curriculum materials, including materials aligned to comparable standards.

Aspect(s) of rigor

Concepts

Additional notes on the design of the task

Task 1:8 is designed to target conceptual understanding, even though it only asks for brief answers rather than asking for extended writing or making other language demands. Teachers can also question students about the thinking that led to their answers, individually or in a group setting (and students can question each other).

Helping students see how non-place-value-based methods connect to place-value- based methods can help students who use non-place-value-based methods transition to place-value based methods, and making those connections can also enable students who use place-value-based methods to better understand their own method. Conversations between and among students that foster such connections can be aided by manipulatives and diagrams.

Relevant prior knowledge

The following mathematics knowledge may be activated, extended, and deepened while students work on the task: subtracting a one-digit number from a one-digit number; interpreting decade numbers as naming single-digit numbers of tens units; and fluency with the count sequence within 100.

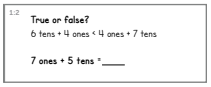
Extending the task

How might students drive the conversation further?

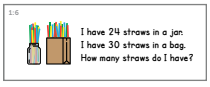
- Students could be asked about how the different parts of this task relate to each other (for example, the first part and the last part).
- Students could create their own versions of the task by beginning with a different problem involving subtraction (or addition) of decade numbers, and using different choices for the units in the second and third step. Students could give their version of the task to a partner and discuss each other's answers.

Related Math Milestones tasks

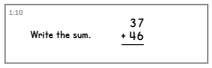
1:2



1:6



1:10



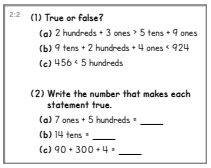
Task **1:2 Tens and Ones** is a conceptual task that involves connections between place value units and positional notation for two-digit numbers. Task **1:6 Two Groups of Straws** is a contextual problem whose solution involves the sum 24 + 30, which can be approached by adding tens and

Curriculum connection

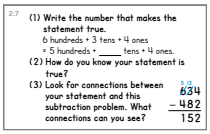
1. In which unit of your curriculum would you expect to find tasks like 1:8? Locate 2-3 similar tasks in that unit. How are the tasks you found similar to each other, and to 1:8? In what specific ways do they differ from 1:8?
2. Thinking about the curriculum unit you identified, at what point in the unit might a task like 1:8 help students converge toward grade-level thinking about the important mathematics in the task? What factors would you consider in choosing when to use such a task in the unit?*

tens, ones and ones. Task **1:10 Two-Digit Addition** is a computation task that involves the sum 37 + 46, which can be approached by adding tens and tens, ones and ones, and composing a ten.

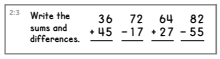
2:2


2:2 (1) True or false?
(a) 2 hundreds + 3 ones > 5 tens + 9 ones
(b) 9 tens + 2 hundreds + 4 ones < 924
(c) 456 < 5 hundreds
(2) Write the number that makes each statement true.
(a) 7 ones + 5 hundreds = ____
(b) 14 tens = ____
(c) 90 + 300 + 4 = ____

2:7

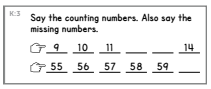

2:7 (1) Write the number that makes the statement true.
6 hundreds + 3 tens + 4 ones
= 5 hundreds + ____ tens + 4 ones.
(2) How do you know your statement is true?
(3) Look for connections between your statement and this subtraction problem. What connections can you see?
2 13
6 3 4
− 4 8 2
1 5 2

2:3

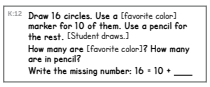

2:3 Write the sums and differences.
36 + 45 = ____
72 − 17 = ____
64 + 27 = ____
82 − 55 = ____

In later grades, task **2:2 Place Value to Hundreds** is a conceptual task that involves the extension of place value from tens to hundreds. Task **2:7 Subtraction Regrouping** connects place value concepts to calculation procedures for subtracting three-digit numbers. Task **2:3 Fluency within 100 (Add/Subtract)** is a fluency task involving calculation of two-digit sums and differences.

K:3


K:3 Say the counting numbers. Also say the missing numbers.
☞ 9 10 11 ____ ____ 14
☞ 55 56 57 58 59 ____

K:12


K:12 Draw 16 circles. Use a [favorite color] marker for 10 of them. Use a pencil for the rest. [Student draws.]
How many are [favorite color]? How many are in pencil?
Write the missing number: 16 = 10 + ____

In earlier grades, task **K:3 Say the Numbers (Teens, Decades)** involves the counting sequence for two-digit numbers. Task **K:12 Make Ten and Some More** involves the meaning of 16 as ten ones and 6 more ones.

† Common Core Standards Writing Team. (2015, March 6). *Progressions for the Common Core State Standards in Mathematics (draft). Grades K–5, Number and Operations in Base Ten*. Tucson, AZ: Institute for Mathematics and Education, University of Arizona.

* Math Milestones™ tasks are not designed for summative assessment. Used formatively, the tasks can reveal and promote student thinking.

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Teacher Notes

Math Milestones™

Anticipating and responding to student thinking about the task

Imagine how students might think about the task, and what you might see and hear while they work.

On this page, you can write your thoughts on the following questions.

Solution Paths

- What solution paths might you expect to see?
- What representations might you see? What correspondences between those representations might be noticed by students (or be worth pointing out to students) and discussed by them?
- What misconceptions or partial understandings might be revealed as students work on the task? How could you respond to these positively and productively?

Language

- What might you expect to hear from students engaged with the task? What does that language reveal about their mathematical thinking, and how might you respond to different ways of thinking?
- If students are using early English or using multiple languages in an integrated communication system, how might you help their classmates see those mathematical ideas as valuable?
- Even when using nascent language, students are thinking and communicating their thinking. What might it look like to respond positively and productively to the mathematics in their thinking before giving feedback on the language used?

Identity, Agency, and Belonging

- How can you engage students' interests, experiences, or funds of knowledge?
- How can you build students' self-confidence as learners, thinkers, and doers of mathematics?
- What choices are there for a student to make in the task? How can you build students' agency to the point where they notice and make these choices to solve problems?
- How might one use feedback to build student agency? Where might there be opportunities to build students' self-confidence?