Assessment: End-of-Unit Assessment

Problem 1

Benchmark addressed:

Benchmark 4: Solve subtraction problems with 3-digit numbers by using at least one strategy efficiently.

In order to meet the benchmark, students' work should show that they can:

- Use one of the following strategies accurately and efficiently:
  - Subtracting in parts, either by place value or in some other efficient way;
  - Changing one or both numbers to make the problem easier to solve, and adjusting for the change;
  - Adding up from the smaller to the larger number or subtracting back from the larger to the smaller number;
- Use clear and concise notation for recording their solutions.

Name Date

Landmarks and Large Numbers

End-of-Unit Assessment

Solve the following problems. Show your solution with clear and concise notation.

1. 1,405
   − 619

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Meeting the Benchmark

The following are examples of student work that meets the benchmark.

Steve subtracted 619 in two parts, first 600 and then 19.

1,405 − 600 = 805
805 − 19 = 786

Steve's Work

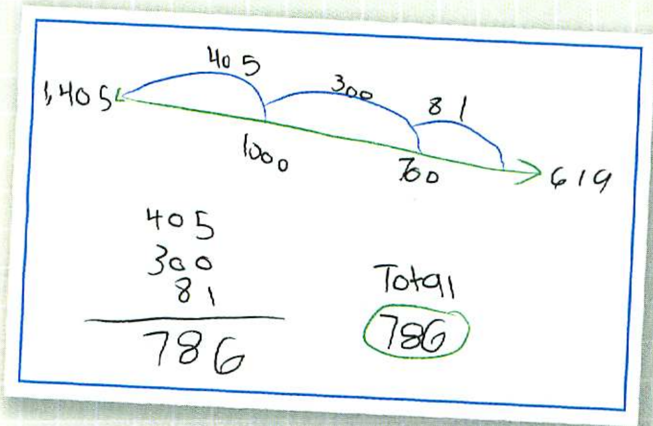
Anna changed 1,405 to 1,400, subtracted 600 first and then 19, and added back the 5 she had removed from 1,405 at the beginning. She actually combined two strategies here, first changing one number and then subtracting in parts.

1,400 − 600 = 800
800 − 19 = 781
781 + 5 = 786

Anna's Work

Steve and Anna are fluent in subtracting multiples of 100 and other numbers mentally.

Enrique drew a number line to show how he subtracted down from 1,405, using 1,000 and 700 as stopping-off places until he reached 619. He then added his jumps together to get his answer.

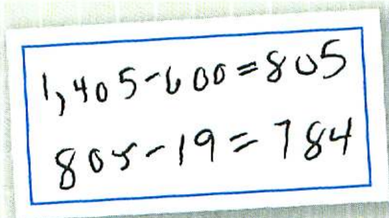


Enrique's Work

Other students may begin at 619 and add up to get to 1,405. Strategies such as these are efficient if they make use of large "chunks" of numbers, rather than, for example, jumping to each landmark of 100 along the way.

Partially Meeting the Benchmark

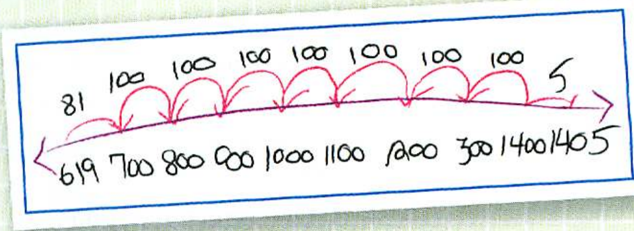
Some students may have a solid understanding of subtraction with multidigit numbers but may have made a computation error. Kimberly started the same way as Steve, but she subtracted 19 incorrectly.



Kimberly's Work

When students' work shows incorrect computation, ask whether they have gone back to double-check their work. Determine whether these are simply errors, or whether, for example, the student needs to review a few addition combinations as they relate to subtraction or some other aspect of subtraction.

Some students use good strategies but use them inefficiently. Ursula used a number line to solve the problem by adding up from 619 to 1,405. She made one jump of 81 to get to 700, then seven jumps of 100 to get to 1,400, and one more jump of 5 to get to 1,405.

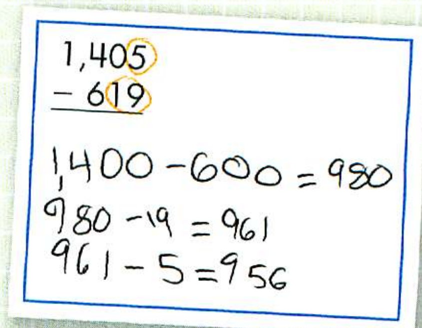


Ursula's Work

Grade 4 students are expected to add or subtract multiples of 100. These students should continue practicing subtraction as part of Ten-Minute Math. They can also continue using games and activities such as *Changing Places* and How Many Miles to 1,000?, from Investigation 1, to become more fluent with adding and subtracting multiples of 100.

Not Meeting the Benchmark

Some students may not yet have one strategy that they can use accurately and efficiently. Although Amelia seems to understand that she can make an easier problem by beginning with 1,400 − 600, she does not solve this problem accurately and does not understand that because she made the starting amount smaller by subtracting 5 from it, she must adjust by adding to her result.



Amelia's Work

Students who do not meet the benchmark will need to continue to practice whichever strategy is most accessible to them, which may be subtracting in parts, perhaps by place value, or adding up in place-value parts from the smaller number to the larger. Help them focus on one strategy rather than combining strategies (as Amelia does by changing one number and trying to subtract in parts) until they are more fluent. Continue to model whichever strategy you and the student choose and provide opportunities to practice it, through *Student Activity Book* pages, homework, and Ten-Minute Math. Students can also benefit by thinking about subtraction in a context so that they can keep track of the parts of the problem.

Problem 2a

Benchmark addressed:

Benchmark 3: Solve addition problems efficiently, choosing from a variety of strategies.

In order to meet the benchmark, students' work should show that they can:

- Interpret this story problem as an addition situation and choose one of the following addition strategies:
  - Breaking the numbers apart, either by place value (which could include using the U.S. algorithm) or in some other efficient way, and recombining them;
  - Changing one or both numbers to make the problem easier to solve, and adjusting for the change;
- Use their strategy accurately and efficiently, which may include mentally computing parts of the problem;
- Use clear and concise notation for recording their solutions.

2. Yuki is saving to buy a new bicycle. He is keeping track of how much money he saves each month on a chart. This is how much he has saved so far.

January	$28.85
February	$52.00
March	$36.54

a. How much has Yuki saved altogether?

Show your solution below with clear and concise notation.

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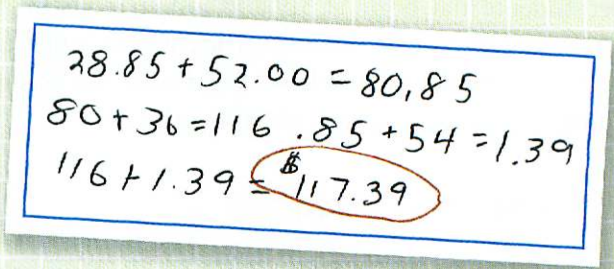
Meeting the Benchmark

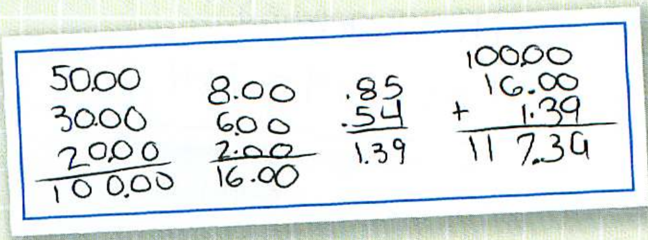
Because this problem involves money, many students break this problem apart by dollars and cents, combine each of these parts separately, and then recombine the two parts.

Bill began by mentally adding $28.85 and $52.00 to get $80.85 and then added $36.54 to this sum by breaking the numbers apart by dollars and cents.



Bill's Work

Sabrina broke each of the three numbers apart by place value, added each set of numbers, and combined the sums. She kept track of the place value of each set of numbers.



Sabrina's Work

Marisol broke the numbers apart by dollars and cents, and then used the U.S. algorithm.

$52.00
$28.00
+$36.00
$116.00

0.85¢
+0.54¢
$1.39 = $117.39

Marisol's Work

Students may use other approaches, such as creating an equivalent problem to add \$28 and \$52: 28 + 52 = 30 + 50.

Partially Meeting the Benchmark

Some students may have a solid understanding of addition with multidigit numbers but may have either made a computation error or used a strategy inefficiently. When students' work shows incorrect computation, ask whether they have gone back to double-check their work. Determine whether these are simply errors, or whether, for example, the student needs to review a few addition combinations or some other aspect of addition. If students are using good strategies, continue to work with them to combine steps. They can benefit by continuing to play *Close to 1,000.*

Some students may not be following through with their strategies, either not completing a final step such as recombining the parts of the problem or not compensating for a change made in the numbers. As with computation errors, ask the student to go back and double-check so that you can determine whether the error is an oversight or lack of understanding about how the strategy works.

Richard began adding the dollar amounts by first rounding \$28 to \$30. He then forgot to compensate for this change by subtracting the 2 that he added, which made his final sum \$2 more than it should be.

Round $28 up to $30

Dollars
1. 30$ + 52$ = 82$
2. 80$ + 30$ = 110
3. 2$ + 6$ = 8$
4. $110 + $8 = $118

cents (from 54¢)
1. 85¢ + 4¢ = 89¢
2. 89¢ + 1¢ = 90¢
   take 1¢ from 50¢
3. 90¢ + 49¢ = $1.39

Both
$1.39 + $118 = $119.39

Richard's Work

Damian loses track of which parts of the numbers he has added. He actually almost solves the problem accurately but adds in an extra \$50.

$20.00 + $30.00 = $50.00
$50.00 + $50.00 = $100.00
$8.00 + $2.00 = $10.00
80¢ + 20¢ = $1.00
$100.00 + $50.00 = $150.00
$10.00 + $1.00 = $11.00
$150.00 + $11.00 = $161.00
4¢ + 5¢ = 9¢
$161.00 + 9¢ = $161.09
$161.09 + 30¢ = $161.39
161.39 +
6.00 =
167.39

Damian's Work

The issue for both Richard and Damian is that they added only two numbers at a time. Grade 4 students should be adding more efficiently, as Marisol and Sabrina do.

Not Meeting the Benchmark

Some students may not yet have a strategy for adding several multidigit numbers that they can use accurately and efficiently. These students can benefit from continuing activities such as *Changing Places* and *Close to 1,000* and working with starter problems. Thinking about problems in a context can also help students keep track of the parts of the problem. Help them focus on one strategy they understand. They should be encouraged to use the largest "chunks" of numbers possible when they break numbers apart and should be given the opportunity to practice their strategies on *Student Activity Book* pages, homework, and Ten-Minute Math.

Problem 2b

Benchmark addressed:

Benchmark 4: Solve subtraction problems with 3-digit numbers by using at least one strategy efficiently.

In order to meet the benchmark, students' work should show that they can:

- Interpret this story problem as a subtraction situation that requires information from the previous problem, and choose one of the following subtraction strategies:
  - –Subtracting in parts, either by place value or in some other efficient way;
  - –Changing one or both numbers to make the problem easier to solve, and adjusting for the change;
  - –Adding up from the smaller to the larger number, or subtracting back from the larger to the smaller number;
- Use their strategy accurately and efficiently, which may include mentally computing parts of the problem;
- Use clear and concise notation for recording their solutions.

b. A new bicycle costs $149.95. How much more does Yuki need to buy the bicycle? Show your solution below with clear and concise notation.

Session 4.7 Unit 5 M29

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Meeting the Benchmark

Helena broke apart the sum from Problem 2a, $117.39, into dollars and cents and subtracted each part from $149.95.

149.95 − 117.00 = 32.95

32.95 − 0.39 = $\boxed{32.56}$

Yulsi needs 32.56 more dollers and cents to buy the bicycle.

Helena's Work

Note that the teacher should check Helena's knowledge of correct notation for money. However, it is clear that she does keep track of the place value.

Derek added up from $117.39; he first added $30 to get $147.39, then $2 to get $149.39, and then $0.56 until he reached $149.95:

117.39 + 30 = 147.39
147 + 2 = 149.39
149.39 + .56 = 149.95
30 + 2 + .56 = $32.56

Derek's Work

Yuson used a combination of strategies. She began by changing $149.95 to $150.00. In order to find the difference between $150.00 and $117.39, she then added $0.61 to $117.39 to get to $118.00 and then $32.00 to get to $150.00. Finally, she subtracted $0.05 from the sum of $32 and $0.61 to adjust for the original change.

149.95 + .05 = $150
117.39 + .61 = $118
118 + 32 = 150
32.61 − .05 = $32.56

Yuson's Work

Note that students who make a computation error in Problem 2a but correctly solve this part of the problem by using the incorrect sum meet the benchmark for Problem 2b.

Partially Meeting the Benchmark

Some students may have a solid understanding of subtraction with multidigit numbers but may have either made a computation error, used a good strategy inefficiently, or lost track of some small part of the problem.

Venetta begins Problem 2b with an incorrect sum from Problem 2a, which seems to be a simple error in computation. Her subtraction strategy is to find the difference between her sum ($115.39) and $149.95 by adding up, using the whole dollar amounts 116 and 120 as stopping-off places before she gets to 149 dollars. When she adds her parts back together, she mistakenly adds $0.39 instead of $0.61 and forgets to add $0.95 to make her final sum. Although Venetta understands how to use both the addition and subtraction strategies that she chooses, she makes a computation error and loses track of her steps. By asking her to explain her strategy to you, she may be able to see her mistakes and correct them herself.

$0.39 + $4.00 + $29.00 = 33.39
$115.39 + 61 = 116
116 + 4 = 120
120 + 29 = 149
149 + 95 = 149.95

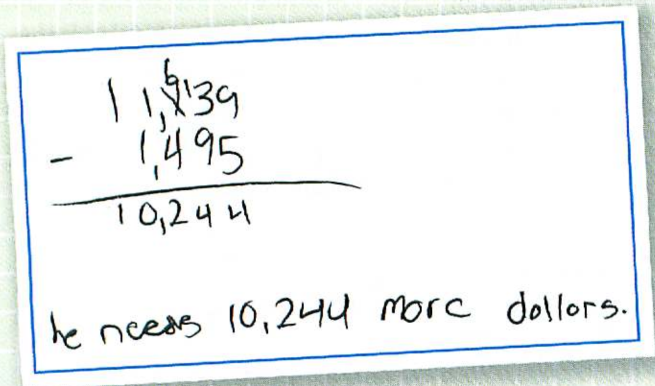
Venetta's Work

However, given the number of errors, it is likely that she needs practice with smaller numbers and should talk through problems, using a context. Students like Venetta can also use help organizing their written work to help them keep track, for example, by underlining or circling each amount she adds on.

Not Meeting the Benchmark

Some students may not yet have one strategy for subtraction that they can use accurately and efficiently. They may either begin a strategy and not be able to follow through with it, randomly add or subtract parts of numbers within the problem, or make large computation errors such as confusing the place value of digits without checking for reasonableness in their answers.

Jill confuses the place value of the digits, leaves out a digit in her interpretation of $149.95, and then subtracts what appears to be the smaller number (1,495) from the larger (11,739). Although she carries out this computation correctly, using the "borrowing" algorithm, she does not see that 10,244 dollars is not a reasonable solution to the problem.



Jill's Work

See the paragraph in the earlier section of this Teacher Note about Problem 1 (page 189) about how to help these students choose and practice a subtraction strategy that is accessible to them. Some students may also need to review place value with activities such as *Practicing Place Value* and *Changing Places,* review the notation for money, and have the opportunity to solve subtraction story problems in a variety of situations so that they can develop a stronger sense of the action of subtraction.