

Kenmore-Town of Tonawanda UFSD

We educate, prepare, and inspire all students to achieve their highest potential



Grade 2 Module 5 Parent Handbook

The materials contained within this packet have been taken from the Great Minds curriculum Eureka Math.

Addition and Subtraction Within 1,000 with Word Problems to 100

In this module, students build upon all their previous work with place value. They extend their work with addition and subtraction algorithms to numbers up to 1,000. Students continue to use drawings and models to strengthen and deepen their conceptual understanding. They also continue to work with various types of word problems with numbers up to 100.

Strategy Example: the arrow way of showing $570 - 110$. Notice that the solution builds on an easier problem first: $570 - 100$. Then, students can complete the problem by subtracting 10 more. (See reverse for more on the arrow way.)

$$570 \xrightarrow{-100} 470$$

$$570 \xrightarrow{-100} 470 \xrightarrow{-10} 460$$

☺ First I subtracted 100. Then I subtracted 10.

New Terms in this Module:

Algorithm: a step-by-step procedure to solve a particular type of problem

Compensation: a simplifying strategy where students add or subtract the same amount to or from both numbers to create an equivalent but easier problem, e.g., $610 - 290 = 620 - 300 = 320$

Compose: to make 1 larger unit from 10 smaller units

Decompose: to break 1 larger unit into 10 smaller units

New groups below: show newly composed units on the line below the appropriate place in the addition algorithm

Simplifying strategy: e.g., to solve $299 + 6$, think $299 + 1 + 5 = 300 + 5 = 305$

Familiar Terms:

Addend	Addition
Bundle	Difference
Equation	Number bond
Place value	Rename
Subtraction	Tape diagram
Total	Unbundle
Units of ones, tens, hundreds	

Strategy Example: In this example of compensation, the subtraction problem $514 - 290$ is made much simpler by adding 10 to both numbers before solving:

$$\begin{array}{r} 514 \\ -290 \\ \hline \end{array}$$

$514 - 290$

$$\begin{array}{r} +10 \\ 514 \\ +10 \\ -290 \\ \hline \end{array}$$

$524 - 300$

What Came Before this Module:

Students worked on fluency in adding and subtracting to 100 and built conceptual understanding for operations on numbers up to 200.

What Comes After this Module:

In Module 6, students begin to examine the foundations of multiplication and division. They learn about equal groups, arrays, and the idea that numbers other than 1, 10, and 100 can be units/groups.

+ How You Can Help at Home:

- Help your student practice counting both backward and forward by 10s and 100s.
- Given any two- or three-digit number, help your student practice finding 10 more or 10 less, and/or 100 more or 100 less than the number.

Key Common Core Standards:

- *Use place value understanding and properties of operations to add and subtract.*
 - Add and subtract within 1000, using concrete models or drawings and strategies.
 - Mentally add 10 or 100 to a given number 100–900, and mentally subtract 10 or 100 from a given number 100–900.
 - Explain why addition and subtraction strategies work, using place value and the properties of operations.

$$590 \xrightarrow{+10} 600 \xrightarrow{+30} 630 \xrightarrow{+200} 830$$

This is an example of how one might add $590 + 240$ using the arrow way. Notice that 240 has been decomposed, or chunked, into $10 + 30 + 200$ in order to make the adding easier.

$$\begin{array}{l} 780 - 390 \\ 780 \xrightarrow{-300} 480 \xrightarrow{-80} 400 \xrightarrow{-10} 390 \end{array}$$

This is a simple subtraction example of $780 - 390$. In this case, 390 has been decomposed into 300, 80, and 10.

Spotlight on Math Strategies:

The Arrow Way

Students will frequently use this strategy in this module of *A Story of Units*.

The *arrow way* is a strategy for both addition and subtraction that is heavily featured in this module.

At first glance, arrow notation, or the *arrow way* of doing mathematical operations, may seem complicated. However, it is a very helpful method, and it is actually very similar to what many of us have naturally learned to do mentally while adding and subtracting.

The arrow way involves chunking a number into more manageable mental pieces in order to add or subtract. Students use numbers that they have become confident working with, such as 100 and 10, in order to simplify the problem. They record their mathematical thinking as an expression with arrows in between the numbers to show the chunks of numbers that they are working with as they go.

This method is just one of several that students will be encouraged to use throughout this module. By employing various models and strategies, students deepen their facility with the mathematics they are learning and eventually build a tool kit of strategies to choose from as math becomes more complex throughout the elementary grades.

Sample Problem from Module 5:
(Example taken from Module 5, Lesson 9)

The table to the right represents the halftime score at a basketball game.

The red team scored 19 points in the second half.

The yellow team scored 13 points in the second half.

- Who won the game?
- By how much did that team win?

Red Team	63 points
Yellow Team	71 points

This problem gives students many options for solving. They can choose from the strategies they have learned in this module to do the addition and subtraction necessary to solve the problem.

Addition and Subtraction within 1,000 with Word Problems to 100

OVERVIEW

In Module 4, students developed addition and subtraction fluency within 100 and began developing conceptual understanding of the standard algorithm by means of place value strategies. In Module 5, students build upon their mastery of renaming place value units and extend their work with conceptual understanding of the addition and subtraction algorithms to numbers within 1,000, always with the option of modeling with materials or drawings. Throughout the module, students continue to focus on strengthening and deepening conceptual understanding and fluency.

Topic A focuses on place value strategies to add and subtract within 1,000 (**2.NBT.7**). Students relate *100 more* and *100 less* to addition and subtraction of 100 (**2.NBT.8**). They add and subtract multiples of 100, including counting on to subtract (e.g., for $650 - 300$, they start at 300 and think, “300 more gets me to 600, and 50 more gets me to 650, so... 350”). Students also use simplifying strategies for addition and subtraction: they extend the make a ten strategy to make a hundred, mentally decomposing one addend to make a hundred with the other (e.g., $299 + 6$ becomes $299 + 1 + 5$, or $300 + 5$, which equals 305), and use compensation to subtract from three-digit numbers (e.g., for $376 - 59$, add 1 to each, $377 - 60 = 317$). The topic ends with students sharing and critiquing solution strategies for addition and subtraction problems. Throughout the topic, students use place value language and properties of operations to explain why their strategies work (**2.NBT.9**).

In Topics B and C, students continue to build on Module 4’s work, now composing and decomposing tens and hundreds within 1,000 (**2.NBT.7**). As each topic begins, students relate manipulative representations to the algorithm, and then transition to creating math drawings in place of the manipulatives. As always, students use place value reasoning and properties of operations to explain their work.

Throughout Module 5, students maintain addition and subtraction fluency within 100 as they use these skills during their daily application work to solve one- and two-step word problems of all types (**2.NBT.5**, **2.OA.1**). The Application Problem precedes fluency activities in most lessons of Module 5 because this work with smaller numbers does not flow directly into the Concept Development. The focus of the Concept Development is adding and subtracting within 1,000: using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction, and relating strategies to a written method (**2.NBT.7**). Note that a written method can include number bonds, chip models, arrow notation, the algorithm, or tape diagrams. Many students will need to record these strategies to solve correctly. The lessons are designed to provide ample time for discussions that center on student reasoning, explaining why their addition and subtraction strategies work (**2.NBT.9**). For example, students may use the relationship between addition and subtraction to demonstrate why their subtraction solution is correct.

The module culminates with Topic D, wherein students synthesize their understanding of addition and subtraction strategies and choose which strategy is most efficient for given problems. They defend their choices using place value language and their understanding of the properties of operations (**2.NBT.9**).

Grade 2 Module 5 Topic A

Strategies for Adding and Subtracting Within 1,000

Focus Standards:

- 2.NBT.7 Add and subtract within 1000, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method. Understand that in adding or subtracting three-digit numbers, one adds or subtracts hundreds and hundreds, tens and tens, ones and ones; and sometimes it is necessary to compose or decompose tens or hundreds.
- 2.NBT.8 Mentally add 10 or 100 to a given number 100–900, and mentally subtract 10 or 100 from a given number 100–900.
- 2.NBT.9 Explain why addition and subtraction strategies work, using place value and the properties of operations. (Explanations may be supported by drawings or objects.)

Instructional Days Recommended: 7

In Topic A, students practice the simplifying strategies they learned in Module 4, but with numbers up to 1,000. They are asked to consider which strategy is most efficient for each problem they encounter.

In Lesson 1, students relate *100 more*, *100 less*, *10 more*, and *10 less* to addition and subtraction. They recognize that they must still add and subtract like units, and that the digit in the hundreds place changes when adding and subtracting 100, just as the digit in the tens place changes when adding or subtracting 10. Students see numbers in terms of place value units: $290 - 100$ is 2 hundreds 9 tens minus 1 hundred. They learn to record the addition and subtraction of multiples of 100 using arrow notation (i.e., the arrow way).

In Lesson 2, students add and subtract multiples of 100 by counting on by hundreds. For example, when adding 200 to 320, they may count up from 320: 420, 520. Students also develop flexibility in terms of using related addition problems. For example, to solve $519 - 200$, one student might think, “5 hundreds minus 2 hundreds is 3 hundreds, plus 19 is 319,” while another starts at 200, adds on 19, and then 3 hundreds to reach 519, so 319.

$$320 + 200$$

$$320 \xrightarrow{+100} 420 \xrightarrow{+100} 520$$

In Lessons 3 and 4, students continue to add and subtract multiples of 100 with the added complexity of some tens. Problems are chosen so that, at first, the tens digit is close to a multiple of 100 (e.g., 190, 290, 380) to make it easier to form the next hundred by decomposing addends. This prompts students to analyze and use relationships between numbers to develop a variety of simplifying strategies.

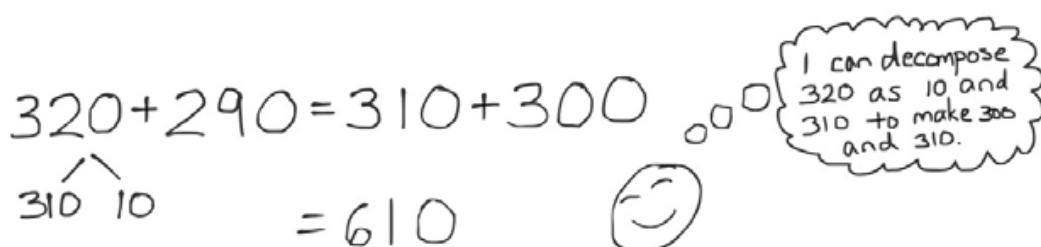
Students also use arrow notation to record their mental math. First, they add a multiple of 100, and then they count on by multiples of 10 to find the total (as shown at the right). Lesson 3 focuses on addition, while Lesson 4 emphasizes related strategies for subtraction.

$$320 + 270$$

$$320 \xrightarrow{+200} 520 \xrightarrow{+70} 590$$

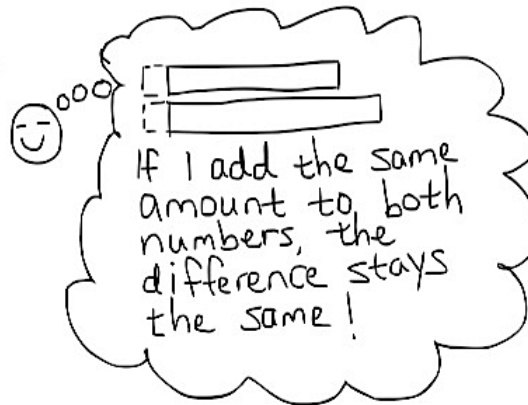
In Lesson 5, students apply the use of number bonds to decompose larger numbers, just as they did with numbers within 100. For example, when solving $320 + 290$, they can break 320 into 10 and 310 to make $310 + 300 = 610$ (as shown below), just as they would have decomposed to add 32 and 29 in Module 4. They realize the problem can be conceived as 32 tens + 29 tens. Note that arrow notation can also be used to solve $320 + 290$ by first adding 200, then 80, and then 10, or by adding 300, and then subtracting 10. Students work with problems, such as $298 + 137$, using a number bond to decompose 137 into 2 and 135, thus creating the equivalent but simpler equation $300 + 135 = 435$.

$$320 + 290 = 310 + 300$$

$$\begin{array}{r} 310 \\ \wedge \\ 310 \quad 10 \end{array} = 610$$


In Lesson 6, the ease of subtracting a multiple of 100 is highlighted again as students extend their work from Module 4 using compensation (i.e., the associative property) for subtraction. Students may add or subtract a multiple of 10 to make an equivalent problem that involves no renaming. For example, when subtracting $610 - 290$, the same number, 10, can be added to both numbers to create a multiple of 100 (as shown below). Students also solve problems such as $451 - 195$, adding 5 to both the minuend and subtrahend to make $456 - 200$.

$$\begin{aligned} 610 - 290 &= 620 - 300 \\ &= 320 \end{aligned}$$



Topic A closes with Lesson 7, which provides students the opportunity to solidify their new skills. They confront a variety of problems, solve them, and then share their solution strategies. Through spirited discussion, students critique the work of their peers while deepening their understanding of various strategies.

The strategies taught in Topic A are designed to develop students' conceptual understanding of addition and subtraction using models, drawings, properties of operations, and strategies based on place value. At the same time, students relate these strategies to written methods such as arrow notation and number bonds. This sets the stage for flexible thinking as students move into composing and decomposing units in Topics B and C.

**The sample homework responses contained in this manual are intended to provide insight into the skills expected of students and instructional strategies used in Eureka Math.*

Lesson 1

Objective: Relate 10 more, 10 less, 100 more, and 100 less to addition and subtraction of 10 and 100.

Homework Key

- | | | | |
|----|-------------|----|----------------------------|
| 1. | a. 232 | 2. | a. 300, 310, 320 |
| | b. 322 | | b. 500, 490, 480 |
| | c. 212 | | c. 443, 343, 243 |
| | d. 122 | | d. 701, 711, 721 |
| | e. 505 | | e. 417, 407, 397 |
| | f. 399 | | f. 818, 808, 798 |
| | g. 245 | 3. | a. 245; 345 |
| | h. 407 | | b. 291; 281 |
| | i. 100 less | | c. 407; 10; 397 |
| | j. 10 more | | d. 301; 291; 391; 491; 501 |
| | k. 319 | 4. | a. 479 |
| | l. 10 less | | b. 110 |
| | | | c. 140 |

Homework Example

1. Complete each *more* or *less* statement.

- | | |
|-------------------------------------|--------------------------------------|
| a. 10 more than 222 is <u>232</u> . | b. 100 more than 222 is <u>322</u> . |
| c. 10 less than 222 is <u>212</u> . | d. 100 less than 222 is <u>122</u> . |
| e. 515 is 10 more than <u>505</u> . | f. 299 is 100 less than <u>399</u> . |
| g. <u>245</u> is 100 less than 345. | h. <u>407</u> is 10 more than 397. |
| i. 898 is <u>100 less</u> than 998. | j. 607 is <u>10 more</u> than 597. |
| k. 10 more than 309 is <u>319</u> . | l. 309 is <u>10 less</u> than 319. |

4. Solve using the arrow way.

a. $370 + 110 = \underline{480}$

$370 \xrightarrow{+100} 470 \xrightarrow{+10} 480$

Lesson 2

Objective: Add and subtract multiples of 100, including counting on to subtract.

Homework Key

- | | | | |
|----|------------------|----|---------|
| 1. | a. 6, 5; 650 | 3. | a. 515 |
| | b. 520; 730; 640 | | b. 368 |
| | c. 768; 886; 939 | | c. 480 |
| | d. 400; 600; 500 | | d. 500 |
| 2. | a. 2, 0, 8; 208 | | e. Less |
| | b. 230; 250; 500 | | f. More |
| | c. 428; 218; 436 | | |
| | d. 400; 600; 800 | | |

Homework Example

1. Solve each addition problem using place value strategies. Use the arrow way or mental math, and record your answers. You may use scrap paper if you like.

a. 4 hundreds 5 tens + 2 hundreds = 6 hundreds 5 tens

$$450 + 200 = \underline{650}$$

$$b. 220 + 300 = \underline{520}$$

$$230 + 500 = \underline{730}$$

$$200 + 440 = \underline{640}$$

$$c. 400 + 368 = \underline{768}$$

$$386 + 500 = \underline{886}$$

$$700 + 239 = \underline{939}$$

$$d. 119 + \underline{400} = 519$$

$$\underline{600} + 272 = 872$$

$$62 + \underline{500} = 562$$

Lesson 3

Objective: Add multiples of 100 and some tens within 1,000.

Homework Key

- | | | | | | |
|----|----|---------------|----|----|-----|
| 1. | a. | 460; 500; 510 | 3. | a. | 54 |
| | b. | 720; 800; 810 | | b. | 60 |
| | c. | 750; 800; 820 | | c. | 61 |
| | d. | 630; 700; 720 | | d. | 62 |
| 2. | a. | 520; 600; 610 | | e. | 620 |
| | b. | 630; 690; 710 | | | |
| | c. | 600; 620; 610 | | | |
| | d. | 510; 550; 530 | | | |
| | e. | 720; 820; 920 | | | |

Homework Example

1. Solve each set of problems using the arrow way.

a.

$260 + 200$	$260 \xrightarrow{+200} \underline{460}$
$260 + 240$	$260 \xrightarrow{+200} 460 \xrightarrow{+40} \underline{500}$
$260 + 250$	$260 \xrightarrow{+200} 460 \xrightarrow{+50} \underline{510}$

Lesson 4

Objective: Subtract multiples of 100 and some tens within 1,000.

Homework Key

1. a. 230; 200; 190

b. 270; 200; 180

c. 350; 300; 270

d. 610; 580; 460

2. a. 130; 100; 70

b. 200; 180; 150

c. 300; 290; 270

d. 500; 490; 480

3. a. 36 tens

b. 30 tens

c. 28 tens

d. 28 tens

e. 280

f. 360

Homework Example

1. Solve using the arrow way.

a.

$$430 - 200 \quad 430 \xrightarrow{-200} 230$$

$$430 - 230 \quad 430 \xrightarrow{-200} 230 \xrightarrow{-30} 200$$

$$430 - 240 \quad 430 \xrightarrow{-200} 230 \xrightarrow{-40} 190 \quad \text{or} \quad 430 \xrightarrow{-200} 230 \xrightarrow{-30} 200 \xrightarrow{-10} 190$$

Lesson 5

Objective: Use the associative property to make a hundred in one addend.

Homework Key

1. a. 320
- b. 520
- c. 30
- d. 32
- e. 51
- f. 52

2. Number bond drawn
- a. Answer provided, 270
- b. $200 + 450 = 650$
- c. $520 + 300 = 820$
- d. $400 + 410 = 810$
- e. $100 + 140 = 240$
- f. $74 + 300 = 374$
- g. $800 + 151 = 951$

Homework Example

1. Solve each set of problems using the arrow way.

a.

$260 + 200$	$260 \xrightarrow{+200} \underline{460}$
$260 + 240$	$260 \xrightarrow{+200} 460 \xrightarrow{+40} \underline{500}$
$260 + 250$	$260 \xrightarrow{+200} 460 \xrightarrow{+50} \underline{510}$

Lesson 6

Objective: Use the associative property to subtract from three-digit numbers and verify solutions with addition.

Homework Key

1. Tape diagram drawn and labeled

- a. Answer provided; 150
- b. $430 - 200 = 230$
- c. $520 - 300 = 220$
- d. $670 - 300 = 370$
- e. $770 - 300 = 470$

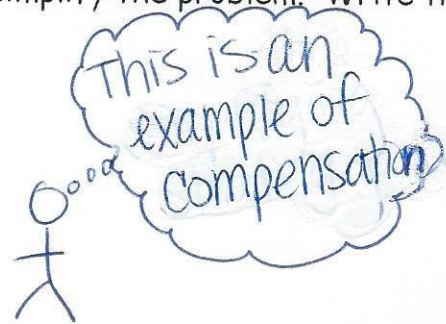
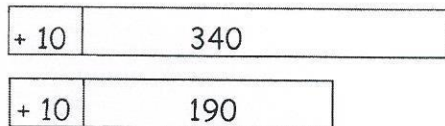
2. Tape diagram drawn and labeled

- a. Answer provided; 137; $137 + 100 = 237$
- b. $373 - 200 = 173$; $173 + 200 = 373$
- c. $444 - 300 = 144$; $144 + 300 = 444$
- d. $728 - 400 = 328$; $328 + 400 = 728$

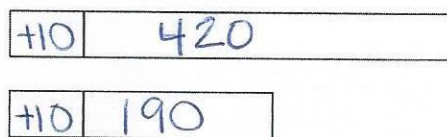
Homework Example

1. Draw and label a tape diagram to show how to simplify the problem. Write the new equation, and then subtract.

a. $340 - 190 = \underline{350 - 200} = \underline{150}$



b. $420 - 190 = \underline{430 - 200} = \underline{130}$



Lesson 7

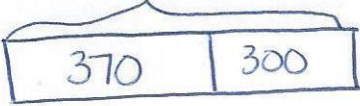
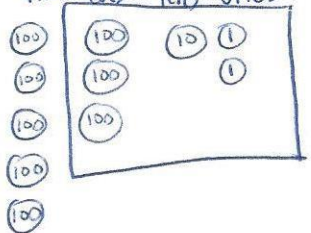

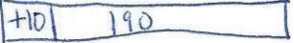

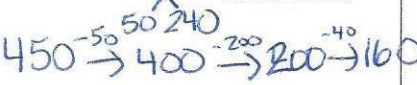
Objective: Share and critique solution strategies for varied addition and subtraction problems within 1,000.

Homework Key

1.
 - a. 670
 - b. 362
 - d. 312
 - f. 40
 - g. 460
 - h. 160
2.
 - a. 190
 - b. 180
 - c. 360
3.
 - a. Answers will vary.
 - c. Answers will vary.
 - e. Answers will vary.
4.
 - a. Answers will vary.
 - b. Strategies will vary; 677
 - c. Answers will vary.

Homework Example

1. Solve each problem with a written strategy such as a tape diagram, a number bond, the arrow way, the vertical form, or chips on a place value chart.

<p>a.</p> $370 + 300 = \underline{670}$ 	<p>b.</p> $\underline{362} = 562 - 200$ $562 \xrightarrow{-200} 362$	<p>c.</p> $\underline{312} + 500 = 812$ <p>Hundreds Tens Ones</p> 
<p>d.</p> $230 - 190 = \underline{40}$   $240 - 200 = 40$	<p>e.</p> $\underline{460} = 640 - 180$  $640 - 40 = 600$ $600 - 100 = 500$ $500 - 40 = 460$	<p>f.</p> $450 - 290 = \underline{160}$ 

Grade 2 Module 5 Topic B

Strategies for Composing Tens and Hundreds Within 1,000

Focus Standards:

- 2.NBT.7 Add and subtract within 1000, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method. Understand that in adding or subtracting three-digit numbers, one adds or subtracts hundreds and hundreds, tens and tens, ones and ones; and sometimes it is necessary to compose or decompose tens or hundreds.
- 2.NBT.9 Explain why addition and subtraction strategies work, using place value and the properties of operations. (Explanations may be supported by drawings or objects.)

Instructional Days Recommended: 5

Module 5, Topic B extends the work of Module 4, Topic B. In Module 4, students composed tens while adding and subtracting within 200. Module 5 expands upon this work as students compose tens and hundreds within 1,000. The work of Topic A transitions naturally into Topic B; students employ concrete and pictorial representations of the vertical algorithm when they encounter addition problems for which there is no clear simplifying strategy.

In Lessons 8 and 9, students continue to build their conceptual understanding as they relate manipulatives to the algorithm, recording compositions as new groups below in vertical form as they did in Module 4. As they move the manipulatives, students use place value language to express the action and physically exchange 10 ones for 1 ten and 10 tens for 1 hundred, if necessary. They record each change in the vertical form, step-by-step.

In Lessons 10 and 11, students move from concrete to pictorial representations as they draw chip models to represent addition within 1,000. As they did with the manipulatives, students record each action in their drawings step-by-step on the vertical form (pictured to the below).

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In Lesson 12, students are presented with a variety of problems for which they must choose an appropriate strategy to solve. Students are encouraged to be flexible in their thinking and defend their reasoning using place value language. They may choose to represent and solve problems using number bonds, the arrow way, place value disks, or chip models.

**The sample homework responses contained in this manual are intended to provide insight into the skills expected of students and instructional strategies used in Eureka Math.*

Lesson 8 - 9

Objective: Relate manipulative representations to the addition algorithm.

Homework Key (8)

1. a. 580
b. 690
c. 407
d. 809
e. 690
f. 580
g. 609
h. 960

2. a. 600
b. 620
c. 660
d. 700
e. 710
f. 560
g. 660
h. 700
i. 800
j. 810

Homework Example

1. Solve the following problems using your place value chart, place value disks, and vertical form. Bundle a ten or hundred, when necessary.

a. $505 + 75 = 580$

b. $606 + 84 = 690$

Lesson 9

Homework Key

1. a. 550
b. 771
c. 780
d. 692
e. 780
f. 801
g. 910
h. 921

2. a. 600
b. 620
c. 600
d. 710
e. 610
f. 700
g. 710

Homework Example

1. Solve the following problems using a place value chart, place value disks, and vertical form. Bundle a ten or hundred, when necessary.

<p>a. $205 + 345 = 550$</p> <p>$\begin{array}{r} 205 \\ + 345 \\ \hline 550 \end{array}$</p>	<p>b. $365 + 406 = 771$</p> <p>$\begin{array}{r} 365 \\ + 406 \\ \hline 771 \end{array}$</p>
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Lesson 10 - 11

Objective: Use math drawings to represent additions with up to two compositions and relate drawings to the addition algorithm.

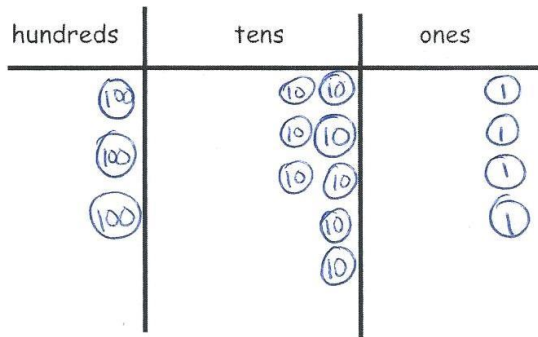
Homework Key (10)

1. a. 384
b. 750
c. 605
d. 900

2. a. 490
b. 481

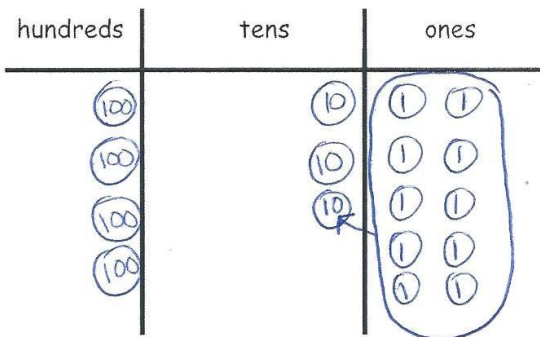
Homework Example

1. Solve using vertical form, and draw chips on the place value chart. Bundle as needed.



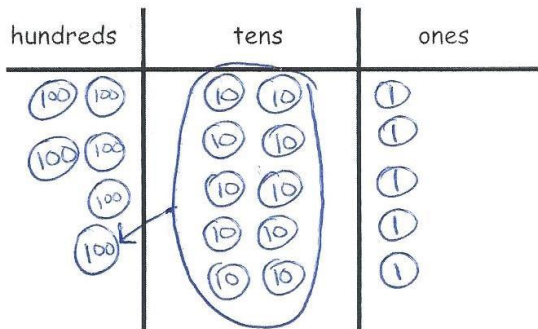
a. $124 + 260 = \underline{384}$

$$\begin{array}{r} 124 \\ + 260 \\ \hline 384 \end{array}$$



b. $426 + 324 = \underline{750}$

$$\begin{array}{r} 426 \\ + 324 \\ \hline 750 \end{array}$$



c. $362 + 243 = \underline{605}$

$$\begin{array}{r} 362 \\ + 243 \\ \hline 605 \end{array}$$

Lesson 12

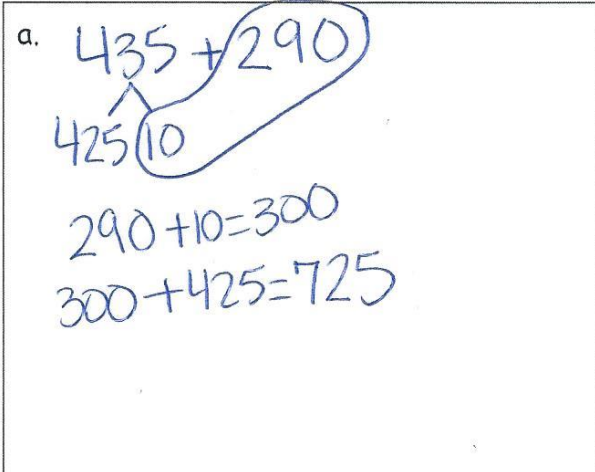
Objective: Choose and explain solution strategies and record with a written addition method.

Homework Key

- 725; strategies will vary.
 - 725; strategies will vary.
 - Explanations will vary.
- 757; strategies and explanations will vary.
 - 943; strategies and explanations will vary.
 - 761; strategies and explanations will vary.

Homework Example

- Solve $435 + 290$ using two different strategies.

a. $435 + 290$  $290 + 10 = 300$ $300 + 425 = 725$	b. $\begin{array}{r} 435 \\ +290 \\ \hline 725 \end{array}$
---	---

- Explain which strategy would be easier and why.

The first way is easier for me to solve. 290 is really close to 300, it was easy to take 10 from 435 to make 290 \rightarrow 300. After making 300, I can solve mentally $300 + 425$.

Grade 2 Module 5 Topic C

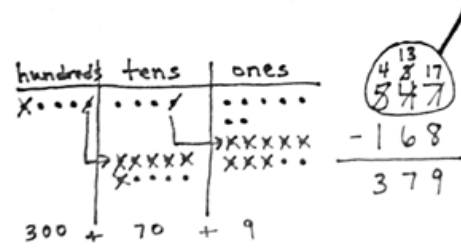
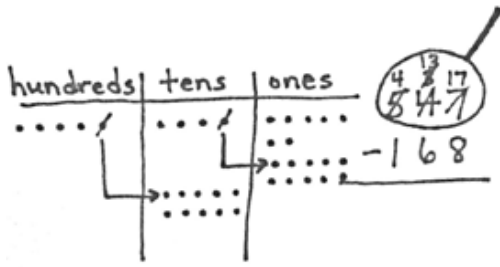
Strategies for Decomposing Tens and Hundreds Within 1,000

Focus Standards:

- 2.NBT.7 Add and subtract within 1000, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method. Understand that in adding or subtracting three-digit numbers, one adds or subtracts hundreds and hundreds, tens and tens, ones and ones; and sometimes it is necessary to compose or decompose tens or hundreds.
- 2.NBT.9 Explain why addition and subtraction strategies work, using place value and the properties of operations. (Explanations may be supported by drawings or objects.)

Instructional Days Recommended: 6

Topic C builds upon Module 4's groundwork, which is now decomposing tens and hundreds within 1,000 (**2.NBT.7**). In Lesson 13, students model decompositions with place value disks on their place value charts while simultaneously recording these changes in the vertical form. Students draw a magnifying glass around the minuend as they did in Module 4. They then ask familiar questions: *Do I have enough ones to subtract? Do I have enough tens?* When the answer is *no*, students exchange one of the larger units for ten of the smaller units. They record the change using the algorithm, following this procedure for each place on the place value chart.



In Lessons 14 and 15, students transition into creating math drawings, thus completing the move from concrete to pictorial representations. They follow the same procedure for decomposing numbers as in Lesson 13, but now, they use place value disk drawings (Lesson 14) and chip models (Lesson 15). Students continue to record changes in the vertical form as they relate their drawings to the algorithm, and they use place value reasoning and the properties of operations to solve problems with up to two decompositions (e.g., $547 - 168$, as shown above).

Lessons 16 and 17 focus on the special case of subtracting from multiples of 100 and numbers with zero in the tens place. Students recall the decomposition of 100 and 200 in Module 4 in one or two steps, using the same reasoning to subtract from larger numbers. For example, 300 can be decomposed into 2 hundreds and 10 tens, and then 1 ten is decomposed into 10 ones (two steps). Additionally, 300 can be renamed directly as 2 hundreds, 9 tens, and 10 ones (one step). In each case, students use math drawings to model the decompositions and relate them to the vertical form, step-by-step.

In Lesson 18, students work with three-digit subtraction problems, applying multiple strategies to solve. For example, with $300 - 247$, students learn that they can use compensation to subtract 1 from each number, making the equivalent expression $299 - 246$, which requires no renaming. Note that compensation is formally named in Module 5, although the concept was introduced in Module 4. Students may also use the related addition sentence, $247 + \underline{\quad} = 300$. The arrow notation is then used to solve, counting up 3 to 250, and then adding on 50, to find the answer of 53. For some problems, such as $507 - 359$, students may choose to draw a chip model and relate it to the algorithm, renaming 507 as 4 hundreds, 9 tens, 17 ones in one step. As students apply alternate methods, the emphasis is placed on students explaining and critiquing various strategies.

**The sample homework responses contained in this manual are intended to provide insight into the skills expected of students and instructional strategies used in Eureka Math.*

Lesson 13

Objective: Relate manipulative representations to the subtraction algorithm, and use addition to explain why the subtraction method works.

Homework Key

1. a. 4, 40, 140, 141
b. 3, 30, 330, 331

2. a. Answer provided
b. 115; $115 + 38 = 153$
c. 313; $313 + 49 = 362$
d. 308; $308 + 177 = 485$
e. 463; $463 + 290 = 753$
f. 277; $277 + 290 = 567$
g. 445; $445 + 428 = 873$
h. 252; $252 + 565 = 817$
i. 292; $292 + 681 = 973$
j. 509; $509 + 239 = 748$
3. 534 - 319

Homework Example

1. Solve using mental math.

a. $9 - 5 = 4$ $90 - 50 = 40$ $190 - 50 = 140$ $190 - 49 = 141$

b. $7 - 4 = 3$ $70 - 40 = 30$ $370 - 40 = 330$ $370 - 39 = 331$

2. Solve using mental math or vertical form with place value disks. Check your work using addition.

a. $153 - 31 = 122$

$\textcircled{153}$	122
$\text{\textasciitilde}31$	$+ 31$
122	153

b. $153 - 38 = 115$

$\begin{array}{r} 4 \ 13 \\ 153 \\ - 38 \\ \hline 115 \end{array}$	$\begin{array}{r} 115 \\ + 38 \\ \hline 153 \checkmark \end{array}$
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Lesson 14 - 15

Objective: Use math drawings to represent subtraction with up to two decompositions, relate drawings to the algorithm, and use addition to explain why the subtraction method works.

Homework Key (14)

1.
 - a. 193; $193 + 180 = 373$
 - b. 106; $106 + 357 = 463$
 - c. 139; $139 + 584 = 723$
 - d. 188; $188 + 673 = 861$
 - e. 9; $9 + 889 = 898$
2. Answers will vary.

Homework Example

1. Solve by drawing place value disks on a chart. Then, use addition to check your work.

<p>a. $373 - 180 = 193$</p>	<p>Solve vertically or mentally:</p> $\begin{array}{r} 2\cancel{7}^1\cancel{3} \\ -180 \\ \hline 193 \end{array}$	<p>Check:</p> $\begin{array}{r} 193 \\ +180 \\ \hline 373 \checkmark \end{array}$
<p>b. $463 - 357$</p>	<p>Solve vertically or mentally:</p> $\begin{array}{r} 4\cancel{6}^5\cancel{3} \\ -357 \\ \hline 106 \end{array}$	<p>Check:</p> $\begin{array}{r} 106 \\ +357 \\ \hline 463 \checkmark \end{array}$

Lesson 15

Homework Key

1. a. 125; $125 + 675 = 800$
- b. 247; $247 + 495 = 742$
- c. 367; $367 + 290 = 657$
- d. 479; $479 + 398 = 877$
- e. 313; $313 + 628 = 941$

2. a. 409; 928
- b. 373; 373

Homework Example

1. Solve by drawing chips on the place value chart. Then, use addition to check your work.

<p>a. $800 - 675$</p>	<p>Solve vertically or mentally:</p> $\begin{array}{r} 7 \quad 9 \quad 10 \\ 800 \\ - 675 \\ \hline 125 \end{array}$	<p>Check:</p> $\begin{array}{r} 125 \\ + 675 \\ \hline 800 \checkmark \end{array}$
<p>b. $742 - 495$</p>	<p>Solve vertically or mentally:</p> $\begin{array}{r} 6 \quad 13 \quad 12 \\ 742 \\ - 495 \\ \hline 247 \end{array}$	<p>Check:</p> $\begin{array}{r} 247 \\ + 495 \\ \hline 742 \checkmark \end{array}$

Lesson 16 - 17

Objective: Subtract from multiples of 100 and from numbers with zero in the tens place.

Homework Key (16)

1. a. 117
- b. 138
- c. 319
- d. 192
- e. 328

2. Answers will vary.

Homework Example

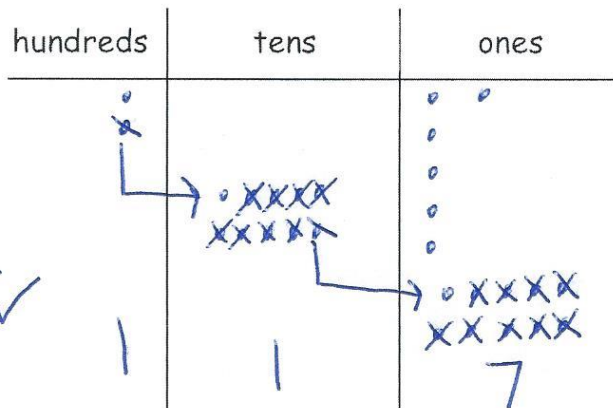
1. Solve vertically or using mental math. Draw chips on the place value chart and unbundle, if needed.

a. $206 - 89 = 117$

$$\begin{array}{r} \overset{1}{\cancel{2}}\overset{9}{0}\overset{16}{6} \\ - 89 \\ \hline 117 \end{array}$$

check

$$\begin{array}{r} 117 \\ + 89 \\ \hline 206 \checkmark \end{array}$$

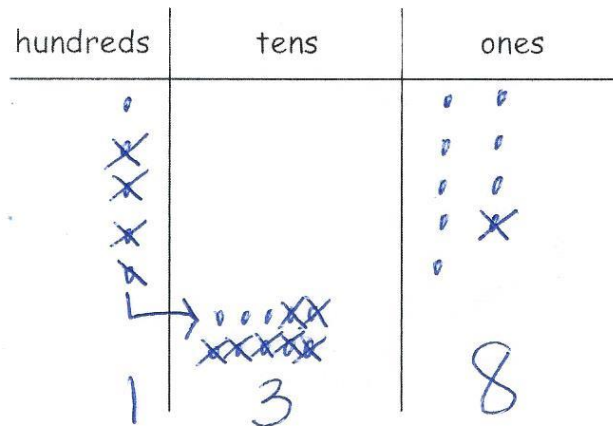


b. $509 - 371 = 138$

$$\begin{array}{r} \overset{4}{5}\overset{10}{0}9 \\ - 371 \\ \hline 138 \end{array}$$

check:

$$\begin{array}{r} 138 \\ + 371 \\ \hline 509 \checkmark \end{array}$$



Lesson 17

Homework Key

- 1. a. 77
- b. 181
- c. 158
- d. 391
- e. 299

2. $800 - 567 = 233$; $233 + 567 = 800$

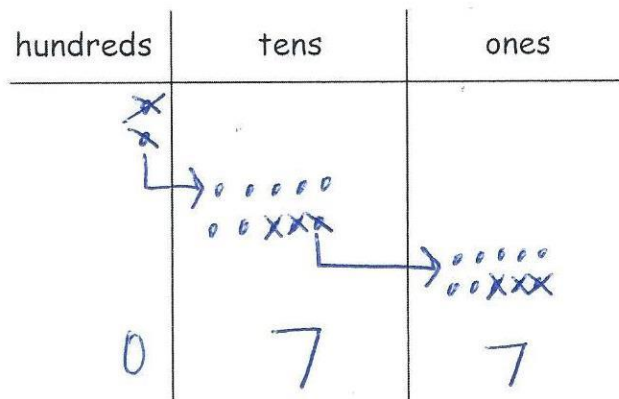
Homework Example

1. Solve vertically or using mental math. Draw chips on the place value chart and unbundle, if needed.

a. $200 - 123 = 77$

check

$123 + 77 = 200 \checkmark$



Lesson 18

Objective: Apply and explain alternate methods for subtracting from multiples of 100 and from numbers with zero in the tens place.

Homework Key

- 238
 - 668
- 440
 - 136
- 310; strategies and explanations will vary.
 - 262; strategies and explanations will vary.
- Explanations will vary.
- Simplifying strategy used; 222

Homework Example

- Use the arrow way and counting on to solve.

a. $700 - 462 = 238$ $462 \xrightarrow{+8} 470 \xrightarrow{+30} 500 \xrightarrow{+200} 700$ $700 - 462 = 238$	b. $900 - 232$ $232 \xrightarrow{+8} 240 \xrightarrow{+60} 300 \xrightarrow{+600} 900$ $900 - 232 = 668$
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- Explain why $300 - 186$ is the same as $299 - 185$.

Explanation:

The problems are the same because you are subtracting one from both numbers ($300 - 1 = 299$, $186 - 1 = 185$) to make a simpler problem that doesn't require unbundling. This is an example of compensation.

Grade 2 Module 5 Topic D

Student Explanations for Choice of Solution Methods

Focus Standards:

- 2.NBT.7 Add and subtract within 1000, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method. Understand that in adding or subtracting three-digit numbers, one adds or subtracts hundreds and hundreds, tens and tens, ones and ones; and sometimes it is necessary to compose or decompose tens or hundreds.
- 2.NBT.8 Mentally add 10 or 100 to a given number 100–900, and mentally subtract 10 or 100 from a given number 100–900.
- 2.NBT.9 Explain why addition and subtraction strategies work, using place value and the properties of operations. (Explanations may be supported by drawings or objects.)

Instructional Days Recommended: 2

Topic D focuses on the application of the tools and concepts presented in Topics A through C. Students synthesize their understanding of addition and subtraction strategies, and then use that understanding to determine which of those strategies to apply to a variety of problems, including number bond problems and problems with the unknown in all positions (e.g., $200 + \underline{\quad} = 342$ or $\underline{\quad} - 53 = 400$).

Students then discuss and analyze their chosen methods and determine which method is most efficient for the given problem type. For example, when digits are close to the next ten or hundred (e.g., $530 - \underline{\quad} = 390$), some students might use related addition and mentally add on tens and hundreds, while others might solve the same problem using arrow notation.

Working with these problems provides a sound foundation for future work with word problems. Listening to peer explanations can make certain strategies more accessible for students who struggle; it also allows for more time and practice to achieve mastery.

**The sample homework responses contained in this manual are intended to provide insight into the skills expected of students and instructional strategies used in Eureka Math.*

Lesson 19 - 20

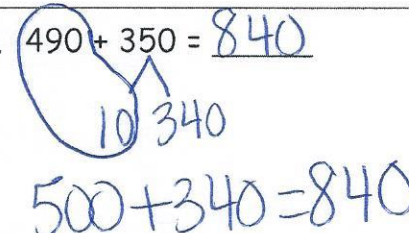
Objective: Choose and explain solution strategies and record with a written addition or subtraction method.

Homework Key (19)

1. a. 590; strategies and explanations will vary.
- b. 840; strategies and explanations will vary.
- c. 861; strategies and explanations will vary.
- d. 174; strategies and explanations will vary.
- e. 244; strategies and explanations will vary.
- f. 509; strategies and explanations will vary.

Homework Example

1. Solve and explain why you chose that strategy.

<p>a. $340 + 250 = \underline{590}$</p> $\begin{array}{r} 340 \\ + 250 \\ \hline 590 \end{array}$	<p>Explanation: <u>I used mental math and vertical form to solve this problem because they are easy numbers for me to add.</u></p>
<p>b. $490 + 350 = \underline{840}$</p>  <p>$500 + 340 = 840$</p>	<p>Explanation: <u>I used a number bond because I noticed that 490 only needs 10 more to make 500. Then I added 500 + 340 to get 840.</u></p>

Lesson 20

Homework Key

1. 700

- a. Strategies will vary.
- b. Strategies will vary.

2. 247

- a. Strategies will vary.
- b. Strategies will vary.

3. a. Strategy circled

- b. Circled strategy used to solve; 417
- c. Explanations will vary.

4. a. Strategy circled

- b. Circled strategy used to solve; 157
- c. Explanations will vary.

Homework Example

Solve each problem using two different strategies.

1. $456 + 244 = \underline{700}$

a. First Strategy

$$456 \xrightarrow{+4} 460 \xrightarrow{+40} 500 \xrightarrow{+200} 700$$

b. Second Strategy

$$\begin{array}{r} 456 \\ +244 \\ \hline 700 \end{array}$$

