

Numbers and Operations

★ Module 2 ★

Whole Number Operations

Lesson 2 Large Numbers: Subtraction

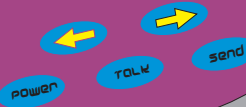


Teacher Notes

2.2

Objective

- ◆ Develop and use a variety of algorithms with computational fluency to perform whole number operations using subtraction (up to five-digit numbers), including **real-world problems**.



Prerequisites

Adding and subtracting whole numbers

Identifying place value

Vocabulary

Counting Up Method
Difference
Standard Method
of Subtraction
Regrouping
Subtrahend
Minuend
Column Subtraction
Method

Get Started

- Write the number 325 on the board.
- Ask students to write out five different combinations of hundreds, tens, and ones that represent the same number.
- Discuss a few of the combinations students have developed. Correct answers include: three hundreds, two tens, five ones; three hundreds, one ten, 15 ones, etc.
- Explain to students that writing and thinking of numbers as different combinations of place values will help them with this lesson on subtraction.

Expand Their Horizons

In Subtopics 1 and 2, students will use place value blocks to subtract numbers. For addition, students model the problem with blocks by setting out the blocks for each addend and then by combining with regrouping, if needed. To model subtraction problems, they will model the first number, or minuend, with blocks and then regroup so that the subtrahend can be removed or taken away.



Some students may be hesitant to regroup the 10 in 211 because that would leave no tens, but remind them that they have hundreds-blocks, any of which can be regrouped into tens-blocks.

Common Error Alert:

Sometimes students may “add” regrouped blocks by not exchanging them for the place value they are breaking into the next smaller place. One way to avoid this is to have them place the grouping of the smaller place value blocks on top of the block being regrouped; and then to remove that single block. For example, if they are regrouping one ten to 10 ones, ask them to place the 10 ones-blocks on top of the tens-block and then to remove the tens-block.

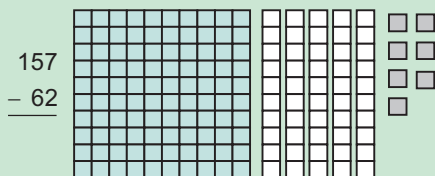


Students can check their answers using estimation and place value information. By looking at the numbers being subtracted, 301 and 142, they should quickly recognize that one of the hundreds-blocks in 301 has to be regrouped into tens. This will leave only two hundreds-blocks, one of which must be “taken away” to account for the 100 in 142. So, the answer should be 100 “something.”

Additional Examples

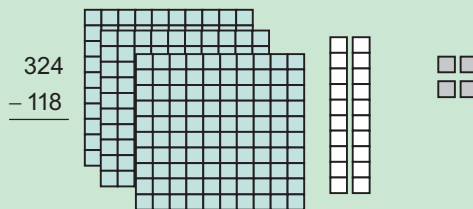
1. Solve.

$$\begin{array}{r} 157 \\ - 62 \\ \hline \end{array}$$

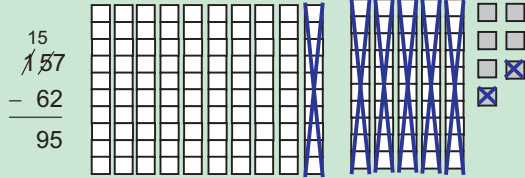


2. Solve.

$$\begin{array}{r} 324 \\ - 118 \\ \hline \end{array}$$

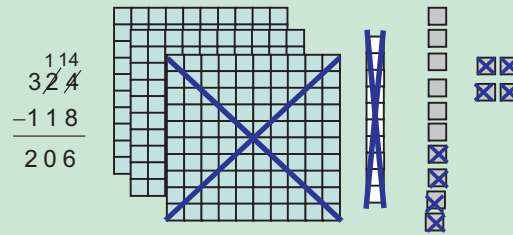


Regroup one hundreds-block to 10 tens and subtract.



The tens do not need to be regrouped, but the hundreds must be regrouped to take away 62. The remaining blocks are the difference, 95.

Regroup one tens-block into 10 ones and subtract.



The hundreds do not need to be regrouped after regrouping one 10. The difference is 206.

Subtopic 3

Column Subtraction Method

Expand Their Horizons

Subtopic 3 introduces the Column Subtraction Method. This is similar to the Column Addition Method, except that the notations for regrouping are made above the minuend to show where place values are being regrouped. This means that in some problems, place values may have more than one digit.

Common Error Alert:

Some students may think that because the notations for regrouping sometimes show more than one digit in a place value column they can start out by writing more than one digit in a column that will need regrouping. In order to avoid careless errors, remind students to take their time and write out each part of the problem with one digit in each place value column before beginning to regroup.

In any column, if the digit of the subtrahend is greater than the digit of the minuend, then regrouping from the next greater place value is required. Make sure students mark where they removed a place value from the greater place value before transferring that amount into the next column.

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Note that regrouping is not required to subtract the tens and ones column. Because there is no thousands-digit in the subtrahend, some students may want to “group” the one in the thousands with the four in the hundreds rather than stepping out that regrouping process, but remind them that this shortcut only works when there is no digit in the leftmost place values of the subtrahend, and this is a special case.



Point out to students that regrouping is not necessary in the tens column from the hundreds column. Some students may want to regroup because the digits are the same; remind them that they only regroup when the digit in the place value column for the subtrahend is GREATER than the digit of the minuend. They can have zero tens, hundreds, etc.

Additional Examples

1. The skateboard store had an inventory of 147 pairs of knee pads at the beginning of January. The store sold 79 pairs during the month. What was the inventory at the end of January?

Write the minuend and subtrahend in column formation and subtract within each column. Make adjustments as needed.

$$\begin{array}{r|c|c}
 0 & 13 & 17 \\
 \cancel{x} & \cancel{4} & \cancel{7} \\
 - & 7 & 9 \\
 \hline
 & 6 & 8 \\
 \end{array}$$

68 pairs of knee pads

2. For a fundraiser the marching band ordered 3,350 hats. They sold 1,872 of these hats. How many hats do they still have?

Write the minuend and subtrahend in column formation and subtract within each column. Make adjustments as needed.

$$\begin{array}{r|c|c|c}
 2 & 12 & 14 & 10 \\
 \cancel{x} & \cancel{3} & \cancel{5} & \cancel{0} \\
 - & 1 & 8 & 7 & 2 \\
 \hline
 & 1 & 4 & 7 & 8 \\
 \end{array}$$

1,478 hats

Subtopic 4

Counting Up Method of Subtraction

Expand Their Horizons

In this subtopic, students will apply the Counting Up Method. This method reverses the process of taking away the subtrahend from the minuend. The idea is to count up or to identify what is added to the subtrahend to get to the minuend value.

A separate addition notation is necessary as students mark what they are adding to the subtrahend and the adjusted value. Remind them to keep careful tallies and to think through what they choose to add. Adding up to the next place value is a good place to start. As they become more comfortable with the process, they will probably have fewer addition steps.



There are many strategies for deciding what to add first. Because the ones place of the subtrahend is zero, it may be easiest to add to get to 6,000 and then add the final five. Others may find it easier to add up to get each subsequent place value (adding five, then 20, then 700). Both methods are valid.



For this problem the DVD illustrates getting to the nearest 100 by adding both tens and ones; some students may choose to add the seven and the 20 separately.

Additional Examples

1. Grace earned \$1,246 for her last pay period. Her tax contribution for that pay period was \$379. How much was her pay after taxes?

$$\begin{array}{r} 1246 \\ - 379 \\ \hline \end{array}$$

	379	
+ 21	400	
+ 800	1200	
+ <u>46</u>	1246	
	<u>\$867</u>	

Grace's pay after taxes was \$867.

2. The Fast-2-U messenger company delivers to businesses and residences. Last month they made 4,568 deliveries, and 2,984 of these were to businesses. How many deliveries were to residences?

$$\begin{array}{r} 4,568 \\ - 2,984 \\ \hline \end{array}$$

	2984	
+ 16	3000	
+ 1000	4000	
+ <u>568</u>	4568	
	<u>1584</u>	

The total number of residential deliveries was 1,584.

Connections

The Counting Up Method is often used when cashiers are handing back change. If a total of \$4.25 were paid with a \$10 bill, a cashier could hand the customer the coin change (75 cents) and say "five" and then hand a five-dollar bill and say "ten." This is counting up the customer's change.

