

**Lesson Title:** *Finding the Sum and Difference of Two Whole Numbers Between 0 and 10,000*

**Objective:**

Students will be able to find the sum and difference of two whole numbers between 0 and 10,000.

**Language to Learn:**

Sum, add, total, altogether, difference, subtract, inverse operations, regroup, exchange

The students should be comfortable adding and subtracting two whole numbers up to three-digits long with and without grouping (carrying and borrowing). In this lesson the students will review how to regroup the sum of the digits in the ones place if the sum is greater than 9, and the sum of the digits in the tens place if the sum is greater than 9, and the sum of the digits in the hundreds place if the sum is greater than 9. The students will learn how to regroup the sum of the digits in the thousands place if the sum is greater than 9. An algorithm will be developed to teach that process, which is commonly called "carrying". The students will learn how to regroup when subtracting. An algorithm will be developed for subtraction, which is commonly known as "borrowing". We will start by reviewing addition of two three-digit numbers with carrying.

**Addition of two, three-digit numbers with regrouping.**

For this activity, have hundred cards, ten cards and one cards available to the students.

- Ask the students: Find the sum of 285 and 439.
- Ask the students: What operation are we using to find the sum of 285 and 439?
- Have the students set up a mathematical sentence:

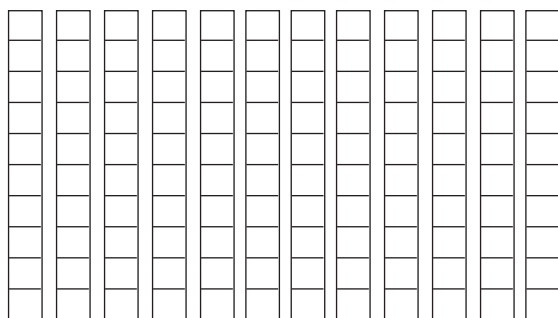
	hundreds	tens	ones
	2	8	5
+	4	3	9

The students learned that to add two three-digit numbers, they must start by adding the digits in the ones place. From the previous example:

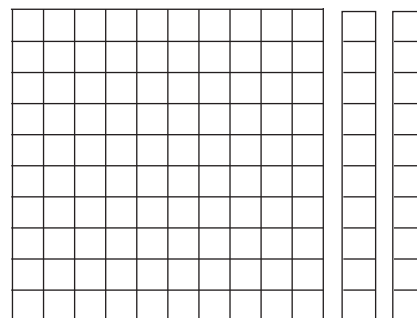
- The students should know that  $5 + 9 = 14$ .
- The students should know that 14 is 1 ten and 4 ones.
- Ask the students: Where should we place the number 4 from the ones place?
- Ask the students: Where should we place the number 1 from the tens place?
- Show the students the placement of the 1 and the 4.

	hundreds	tens	ones
		1	
	2	8	5
+	4	3	9
		4	

- Ask the students: What is the sum of the numbers in the tens place?
- Ask the students: Can you replace or regroup the 12 tens using hundred cards and ten cards?
- Show the students the visual representation of 12 ten cards = 1 hundred and 2 ten cards.



12 ten cards



= 1 hundred + 2 ten cards

- Ask the students: Are we allowed to place 2 digits in the tens place?
- Show the students how you are replacing the 12 ten cards with 1 hundred card and 2 ten cards.
- Elicit from the students that they can now place the 2 in the tens place and place the 1 in the hundreds place.

- Show the students the placement of the 1 and the 2.

	hundreds	tens	ones
	1	1	
	2	8	5
+	4	3	9
		2	4

- Ask the students: How many hundreds do we have altogether?
- Elicit from the students that they have 7 hundreds.
- Show the students the placement of the 7 in the hundreds place.

	hundreds	tens	one
	1	1	
	2	8	5
+	4	3	9
	7	2	4

If necessary, show the students the visual representation of adding  $285 + 439$  by representing the numbers in terms of hundreds, tens and ones cards, similar to adding the two two-digit numbers and grouping the cards together by their place value, making the proper exchanges for the tens and hundreds.

Continue the exercise with more examples. Elicit the algorithm from the students until they are comfortable with the process.

Addition of two, four-digit numbers with regrouping.

For this activity, have thousand cards, hundred cards, ten cards and one cards available to the students.

- Ask the students: Find the sum of 6,285 and 2,839.
- Ask the students: What operation are we using to find the sum of 6,285 and 2,839?

- Have the students set up a mathematical sentence:

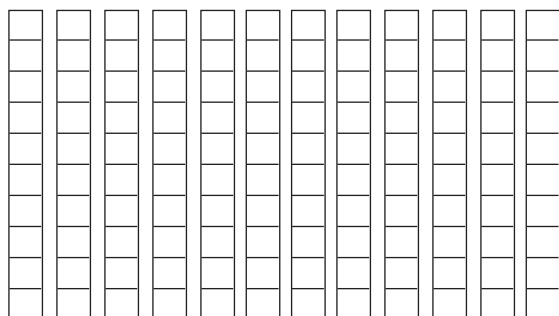
	thousands	hundreds	tens	ones
	6	2	8	5
+	2	8	3	9

The students learned that to add two three-digit numbers, they must start by adding the digits in the ones place. From the previous example:

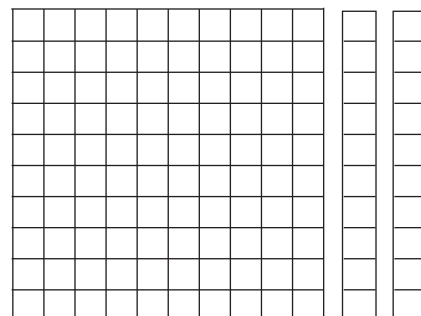
- The students should know that  $5 + 9 = 14$ .
- The students should know that 14 is 1 ten and 4 ones.
- Ask the students: Where should we place the number 4 from the ones place?
- Ask the students: Where should we place the number 1 from the tens place?
- Show the students the placement of the 1 and the 4.

	thousands	hundreds	tens	ones
	6	2	8	5
+	2	8	3	9
				4
				1

- Ask the students: What is the sum of the numbers in the tens place?
- Ask the students: Can you replace or regroup the 12 tens using hundred cards and ten cards?
- Show the students the visual representation of 12 ten cards = 1 hundred and 2 ten card.



12 ten cards



= 1 hundred + 2 ten cards

- Ask the students: Are we allowed to place 2 digits in the tens place?
- Show the students how you are replacing the 12 ten cards with 1 hundred card and 2 ten cards.
- Elicit from the students that they can now place the 2 in the tens place and place the 1 in the hundreds place.
- Show the students the placement of the 1 and the 2.

	thousands	hundreds	tens	ones
		1	1	
	6	2	8	5
+	2	8	3	9
			2	4

- Ask the students: How many hundreds do we have altogether?
- Elicit from the students that they have 11 hundreds.
- Ask the students: Are we allowed to place 2 digits in the hundreds place?
- Show the students how you are replacing the 11 hundred cards with 1 one thousand card and 1 ten card.
- Show the students the placement of the 1 in the hundreds place and the 1 in the thousands place.

	thousands	hundreds	tens	ones
	1	1	1	
	6	2	8	5
+	2	8	3	9
		1	2	4

- Ask the students: How many thousands do we have altogether?
- Elicit from the students that they have 9 one thousands.
- Have the students place the 9 under the thousands column.

	thousands	hundreds	tens	ones
	1	1	1	
	6	2	8	5
+	2	8	3	9
	9	1	2	4

- Ask the students to read the number that represents the sum.

If necessary, show the students the visual representation of adding  $6285 + 2839$  by representing the numbers in terms of hundreds, tens and ones cards, similar to adding the two two-digit numbers and grouping the cards together by their place value, making the proper exchanges for the tens and hundreds.

Continue the exercise with more examples. Elicit the algorithm from the students until they are comfortable with the process.

### **Subtraction of two, three-digit numbers with borrowing from the tens place and the hundreds place.**

For this activity, have hundred cards, ten cards and one cards available to the students.

When subtracting two three-digit numbers, we will concentrate on subtraction where the student has to borrow from the tens place and the hundreds place. A discussion of subtraction of two three-digit numbers with borrowing from the tens, hundreds, and thousands place will take place in the Advanced Grade Level group.

- Ask the students: Find the difference between 357 and 158.
- Ask the students: What operation are we using to find the difference between 357 and 158?
- Have the students set up a mathematical sentence:

	hundreds	tens	ones
	3	5	7
-	1	5	8

The students learned that to subtract two three-digit numbers, they must start by subtracting the digits in the ones place. From the previous example:

- The students should know that to subtract 8 from 7, they have to regroup (borrow) 1 ten from the tens place and add 10 ones to the ones place making the total of 17 ones.
- Show the students the written process of regrouping.

	hundreds	tens	ones
		4	17
	3	<del>5</del>	<del>7</del>
-	<u>1</u>	<u>5</u>	<u>8</u>

- Ask the students: What is  $17 - 8$ ?
- Have the students place the 9 under the ones column.

	hundreds	tens	ones
		4	17
	3	5	7
-	<u>1</u>	<u>5</u>	<u>8</u>
			9

- Ask the students: What is the difference of the numbers in the tens place?
- Ask the students: Can we take 5 tens from 4 tens?
- Elicit from the students that they have to regroup. They have to regroup 3 hundreds to 2 hundreds and 10 tens.
- Ask the students: If we add 10 tens to the 4 tens in the tens place, how many tens do we have in total? (14 tens)
- Ask the students: How many hundreds do we have in the hundreds column?(2)

	hundreds	tens	ones
	2	14	17
	<del>3</del>	<del>5</del>	<del>7</del>
-	<u>1</u>	<u>5</u>	<u>8</u>
		9	9

- Ask the students: In the ten's column, what is  $14 - 5$ ?
- Have the students place a 9 under the tens place column.
- Ask the students: What is the difference of the numbers in the hundreds place?
- Have the students place a 1 under the hundreds place column.

	hundreds	tens	ones
	2	14	17
	<del>3</del>	<del>5</del>	<del>7</del>
-	1	5	8
	1	9	9

- Ask the students: How can you check to see if your answer is correct?
- Elicit from the students that subtraction and addition are inverse operations of each other and the students could check by setting up an addition problem.

	1	9	9		1	5	8
+	1	5	8		1	9	8
	3	5	7		3	5	7

### **Subtraction of two, four-digit numbers with borrowing from the tens place and the hundreds place.**

For this activity, have hundred cards, ten cards and one cards available to the students.

When subtracting two four-digit numbers, we will concentrate on subtraction where the student only has to borrow from the tens and hundreds place. A discussion of subtraction of two four-digit numbers with borrowing from the tens, hundreds, and thousands place will take place in the Advanced Level group.

- Ask the students: Find the difference between 5,357 and 2,158.
- Ask the students: What operation are we using to find the difference between 5,357 and 2,158?
- Have the students set up a mathematical sentence:

	Thousands	hundreds	tens	ones
	5	3	5	7
–	2	1	5	8
			<hr/>	

The students learned that to subtract two three-digit numbers, they must start by subtracting the digits in the ones place. From the previous example:

- The students should know that to subtract 8 from 7, they have to regroup (borrow) 1 ten from the tens place and add 10 ones to the ones place making the total of 17 ones.
- Show the students the written process of regrouping.

	Thousands	hundreds	tens	ones
			4	17
	5	3	5	<del>7</del>
–	2	1	5	8
			<hr/>	

- Ask the students: What is  $17 - 8$ ?
- Have the students place the 9 under the ones column.

	Thousands	hundreds	tens	ones
			4	17
	5	3	<del>5</del>	<del>7</del>
–	2	1	5	8
			<hr/>	
				9

- Ask the students: What is the difference of the numbers in the tens place?
- Ask the students: Can we take 5 tens from 4 tens?
- Elicit from the students that they have to regroup. They have to regroup 3 hundreds to 2 hundreds and 10 tens.
- Ask the students: If we add 10 tens to the 4 tens in the tens place, how many tens do we have in total? (14 tens)
- Ask the students: How many hundreds do we have in the hundreds column?(2)

	Thousands	hundreds	tens	ones
		2	4	17
	5	<del>3</del>	<del>5</del>	<del>7</del>
-	<u>2</u>	<u>1</u>	<u>5</u>	<u>8</u>
			9	9

- Ask the students: In the ten's column, what is  $14 - 5$ ?
- Have the students place a 9 under the tens place column.
- Ask the students: What is the difference of the numbers in the hundreds place?
- Have the students place a 1 under the hundreds place column.

	Thousands	hundreds	tens	ones
		2	14	17
	5	<del>3</del>	<del>5</del>	<del>7</del>
-	<u>2</u>	<u>1</u>	<u>5</u>	<u>8</u>
		1	9	9

- Elicit from the students that they need to subtract 2 from 5 in the thousands column.
- Have the students place a 3 under the thousands column.

	Thousands	hundreds	tens	ones
		2	14	17
	5	<del>3</del>	<del>5</del>	<del>7</del>
-	<u>2</u>	<u>1</u>	<u>5</u>	<u>8</u>
	3	1	9	9

- Have the students read their answer.
- Ask the students: How can you check to see if your answer is correct?
- Elicit from the students that subtraction and addition are inverse operations of each other and the students could check by setting up an addition problem.

$$\begin{array}{r}
 3 \quad 1 \quad 9 \quad 9 \\
 + \quad 2 \quad 1 \quad 5 \quad 8 \\
 \hline
 5 \quad 3 \quad 5 \quad 7
 \end{array}$$

$$\begin{array}{r}
 2 \quad 1 \quad 5 \quad 8 \\
 + \quad 3 \quad 1 \quad 9 \quad 9 \\
 \hline
 5 \quad 3 \quad 5 \quad 7
 \end{array}$$

Have the students practice more subtraction problems and use addition to check their answers.

### ELL/ Intensive and Strategic Level Students

The ELL/Intensive and Strategic Level Students should have thousand, hundred, ten, and one cards available to them for this activity.

If needed, begin the addition activity by reviewing their basic facts that they should have memorized. Ask the students to fill in the table by finding the sum of the two given numbers and then by representing the sum as a sum of tens place and ones place.

The first two examples can be used as a model.

Addition Problem	Sum	Tens Place	Ones Place
$5 + 5 =$	10	1	0
$5 + 6 =$	11	1	1
$5 + 7 =$			
$5 + 8 =$			

This is a partial table. You can give the students a complete table to fill in, with all the addition facts whose sums are greater than or equal to ten and less than 20. The advantage of doing this is that they could look up the addition fact quickly, rather than constantly working with manipulatives. Stress that these facts must be memorized.

After the students have practiced their addition facts, start with a mini review of addition of two, two-digit numbers without carrying, and two three-digit numbers without carrying. Ask the students to explain the process of adding the two two-digit and three-digit numbers. Make sure that the students line up the columns for the ones, tens, and hundreds place. Make sure that the students start adding the ones place, tens place and hundreds place respectively.

If needed, continue with a review of addition of a two-digit and a one-digit number, whose sum in the ones place exceeds 9. You want to start with this type problem because they will be able to use their basic addition facts from above to help them exchange the sum in the ones place to an equivalent number represented as a number in terms of its tens place and ones place value. For instance, if the students were asked to find the sum of  $18 + 7$ :

- They would write the addition vertically, lining up the columns for the ones place and tens place.
- They would add the digits in the ones place. That is an addition fact that the students should know. ( $8 + 7 = 15$ )
- They would recognize that 15 is equivalent to 1 ten and 5 ones.
- They would record the 5 in the ones place column.
- They would carry the 1 into the tens place column.
- They would add the  $1 + 1$  in the tens place column.
- They would record the 2 in the tens place column.

The students should go through this process with several numbers, explaining the steps in the algorithm. They should verbalize the steps and write the process.

If needed, continue the review process by adding two two-digit numbers. The process is exactly the same. The only difference is that the students are adding more numbers in the tens place column. Have the students verbalize and write the process for adding two two-digit numbers.

If needed, continue with a review of adding two two-digit numbers and then two three-digit numbers. Have them first add two three-digit numbers where the sum of the ones digit is greater than 9. Once they have mastered that, have them add two three digit numbers whose sum of the ones digits is greater than nine and whose sum of the tens digits is greater than 9. Elicit the process of adding the numbers  $347 + 275$ .

Continue by having the students add two four digit numbers. Have the students first add the numbers without the necessity of any regrouping.

$$\begin{array}{r}
 3 \quad 6 \quad 5 \quad 7 \\
 + \quad 2 \quad 3 \quad 3 \quad 1 \\
 \hline
 \end{array}$$

Continue by having the students add two four-digit numbers where the sum of the digits in the ones place is greater than 9. Elicit the process of regrouping. Make sure that the student's line up the numbers and start by adding the numbers in the ones place.

$$\begin{array}{r}
 3 \quad 6 \quad 5 \quad 7 \\
 + \quad 2 \quad 3 \quad 3 \quad 5 \\
 \hline
 \end{array}$$

Continue by having the students add two four digit numbers where the sum of the digits in the ones place is greater than 9 and the sum of the digits in the tens place is greater than 9 . Elicit the process of regrouping in the ones and tens place.

$$\begin{array}{r}
 3 \quad 6 \quad 5 \quad 7 \\
 + \quad 2 \quad 2 \quad 4 \quad 5 \\
 \hline
 \end{array}$$

Continue by having the students add two four-digit numbers where the sum of the digits in the ones place is greater than 9, the sum of the digits in the tens place is greater than 9, and the sum of the digits in the hundreds place is greater than 9. Elicit the process of regrouping in the ones place, the tens place, and the hundreds place.

$$\begin{array}{r}
 3 \quad 6 \quad 5 \quad 7 \\
 + \quad 2 \quad 5 \quad 4 \quad 5 \\
 \hline
 \end{array}$$

By giving the last four examples, the students will review the process of regrouping the numbers in each place value column in a sequential manner.

Subtraction should proceed the same way as addition. The students should be given a table to record their basic subtraction facts. For example:  $17-9=$ ;  $15-8=$ . These subtraction facts should have been memorized. By having a table, the students can look up the facts more quickly than using cards or blocks.

Start with basic subtraction of two two-digit numbers. For instance  $37 - 19 =$ . Have the students verbalize and write the process:

- They should write the subtraction vertically, lining up the columns for the ones place and tens place.
- They should try to subtract the digits in the ones place.
- They should ask themselves the question: Can I take a larger number from a smaller number? Can I subtract 9 from 7?
- When the answer is no, they should recognize that they have to borrow.
- They should borrow 1 ten from the tens place, making the 3 a two, and they should add the ten to the ones place, making the 7 a seventeen.

It is very important for the students to describe this process. They should go through the actual motions of changing the numbers in the ones and tens place. Make sure that the students start the subtraction with the ones place, and then continue to subtract the numbers in the tens place, hundreds place, and thousands place.

- They should then compute  $17 - 9$  and record 8 under the ones place column. This is a subtraction fact that they should know
- They should subtract 1 from 2 in the tens place column.
- They should record the 1 under the tens place column.
- Have the students check their answer by using addition facts.

Continue with two three-digit numbers where the students first only borrow from the tens place. Go through the algorithm with the students. Then have the students subtract two three-digit numbers where they borrow from the tens place and the hundreds place. Have the students continuously verbalize the algorithm to help them internalize the process. Have the students constantly check their answers by using addition.

Continue the process with the students subtracting two four-digit numbers. Arrange the examples similar to the addition examples. First have the students subtract two four-digit numbers without regrouping. Then give the students an example where they have to regroup in the ones place, then the tens place and hundreds place, and lastly, the tens place, hundreds place and thousands place. Again, have the students verbalize the algorithm. Have the students constantly check their answers by using addition.

The students need to practice their addition and subtraction. Constant practice will help the students perfect their skills.

Make sure that you include examples where the students do not have to regroup in each place value column. Note that it is imperative that the students know when to regroup. The students should constantly ask themselves, "Do I need to regroup?"

### At-Grade Level and Advanced Level Student

The At-Grade Level and Advanced Level Students need to practice the addition and subtraction of two two-digit numbers, two three-digit numbers and two four-digit numbers. They should also check their subtraction answers by using addition.

We will extend the students knowledge of adding two four-digit numbers by introducing the concept of regrouping the thousands place.

- Ask the students to find the sum of:

$$\begin{array}{r}
 6 \quad 2 \quad 8 \quad 5 \\
 + \quad 3 \quad 8 \quad 3 \quad 9 \\
 \hline
 \end{array}$$

The process of adding the numbers will be the same as the introductory example. The only difference is that the students will need to regroup in the thousands place.

- Elicit from the students that they need to regroup in the ones place, the tens place and the hundreds place.

ten thousand	thousand	hundreds	tens	ones
		1	1	
	6	2	8	5
+	3	8	3	9
		1	2	4

- Ask the students: Are we allowed to place two digits in the thousands place?
- Ask the students: What number is equivalent to 10 one thousands?
- Elicit from the students that that 10 one thousands is equivalent to 1 ten thousand.
- Elicit from the students that they will replace 10 one thousands with one ten thousand.
- Show the students the placement of the 0 in the thousand column and create a new column call the ten thousand column

ten thousand	thousand	hundreds	tens	ones
	1	1	1	
	6	2	8	5
+	3	8	3	9
	1	0	1	2
			4	

- Ask the students to read the number that represents the sum.

Have the students practice addition of two four-digit numbers with regrouping in each place value column. After the students have mastered these types of problems, have the students try to add two five-digit numbers, where the sum of the digits in the ten thousands column does not exceed 9.

If the students have mastered subtraction of two, two-digit numbers through two four-digit numbers with regrouping from the tens place through the thousands place, try to introduce the students to subtraction of two, five-digit numbers where the students have to borrow from the tens place through the ten thousands place.

We must always keep in mind that if we have the opportunity to advance the students, we should do so. If the At-Grade Level and Advanced Level Students understand the concept and reasoning behind subtraction with borrowing from the tens place, the concept of borrowing from the hundreds place through the ten thousands place is a natural progression. Have the students explain the algorithm to you as they go through the process of subtracting two, three-digit numbers.