

## **Lesson Title:** Addition and Subtraction

Objective: Students will be able to add two numbers, write an addition and subtraction sentence, and translate a verbal problem into an addition or subtraction sentence.

### **Language to Learn:**

Add, total, sum, subtract, difference, from, take away, plus, remain

In the previous section, the students used the number line to move forward and backward a given number of units from an initial number. The concept of moving forward and backward is the same concept used in addition and subtraction.

Up until now the students have been adding by combining groups of objects and recording their total. They have been subtracting by removing objects from a given group of objects and recording the number of objects left.

It is important for the students to learn addition and subtraction by manipulating objects. Yet, it is also important for students to visualize addition and subtraction by using a number line. The number line will reinforce addition and subtraction concepts. When adding quantities, the value of the sum is a larger number. Larger numbers are to the right on a number line. When you subtract quantities, the value of the difference is smaller. Smaller quantities are to the left on the number line.

### **Addition Subtraction**

The students already know the direction to move when asked to move forward or backward a given quantity. They also know how to group objects together to get a sum and how to remove objects to get a difference.

The first activity will parallel grouping objects together to get a sum and using a number line representation to represent the same sum.

- Group the students into groups of three's.
- Give each student in the group a nametag.
- Name one student X, and the other students Y and Z. Each group should have a student called X, Y, and Z.
- Place a cup on each table filled with chips.
- Give each group the following table.
- Have each student X take 3 chips from the cup and record the number in column X.
- Have each student Y take 4 chips from the cup and record the number in column Y.
- Ask student Z: How many chips does student X and Y have altogether?

- Ask student Z to record the total number of chips from student X and Y in column Z.

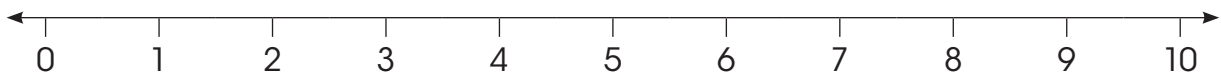
<b>X</b>	<b>+</b>	<b>Y</b>	<b>=</b>	<b>Z</b>
3	+	4	=	7

Repeat the exercise several more times. Record all the numbers in the proper column headings. By setting up a table, the students will reinforce addition facts while reaffirming their addition sentences. They are also subliminally seeing an equation with variables, which they will see in a later math course.

Have the students change nametags so that each student has a chance to record the total number of chips.

The next activity will translate the addition on the table to addition using the number line.

- Have each student take out their number line.



- Tell the class that they are going to demonstrate the addition sentence using the number line.
- Using the example of  $3 + 4 = 7$ , ask the students:
  - What number are we starting with?
  - What number are we adding to 3?
  - Which direction do we have to move on the number line when we add 4?
  - Ask the students: When we move 4 spaces to the right, what is the resulting number?
  - Tell the students that the resulting number is called the sum or the total.

Make sure that the students see you demonstrate the movement and the counting of the numbers on the number line. Have them follow your hand movements and count along with you as you move 4 spaces to the right. Have each of them practice the movements on their number line. Because the students will be practicing addition on the number line by translating their math sentences from the tables they created, it makes it easier for them to see if their number line movements were correct.

## Subtraction

The students just reinforced the concept that addition was moving forward, to the right. Subtraction will be accomplished by moving backward, to the left. A similar activity with the table can be used.

- Group the students into groups of three's.
- Give each student in the group a nametag.
- Name one student X, and the other students Y and Z. Each group should have a student called X, Y, and Z.
- Place a cup on each table filled with chips.
- Give each group the following table.
- Have each student X take 7 chips from the cup and record the number in column X.
- Have each student Y take 4 chips from student X and record the number in column Y.
- Ask student Z: How many chips does student X left?
- Ask student Z to record the total number of chips student X has left over.

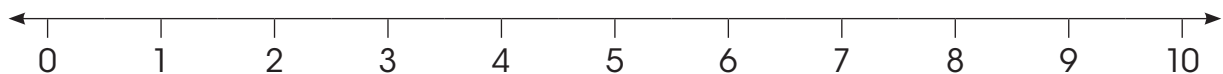
<b>X</b>	<b>-</b>	<b>Y</b>	<b>=</b>	<b>Z</b>
7	-	4	=	3

Repeat the exercise several more times. Record all the numbers in the proper column headings. By setting up a table, the students will reinforce subtraction facts while reaffirming subtraction sentences. Again, they are seeing an equation with variables.

Have the students change nametags so that each student has a chance to record the total number of chips.

The next activity will translate the subtraction on the table to subtraction using the number line.

- Have each student take out their number line.



- Tell the class that they are going to demonstrate the subtraction sentence using the number line.
- Using the example of  $7 - 4 = 3$ , ask the students:
  - What number are we starting with?

- What number are we taking away from 7?
- Which direction do we have to move on the number line when we subtract 4?
- Ask the students: When we move 4 spaces to the left, what is the resulting number?
- Tell the students that the resulting number is called the difference.

Make sure that the students see you demonstrate the movement and the counting of the numbers on the number line. Have them follow your hand movements and count along with you as you move 4 spaces to the left. Have each of the students practice the movements on their number line. Because the students will be practicing subtraction on the number line by translating their math sentences from the tables they created, it makes it easier for them to see if their number line movements were correct.

### **English Language Learner (ELL):** & **Intensive Level Student:**

The ELL and Intensive Level student should create many addition examples to record in the chart. Repeat addition questions using the following terms:

- What is the sum?
- What is the total?
- How many "items" (balls, dogs, apples etc.) do we have altogether (together)?
- What does 3 "plus" 4 "equal"?

The students should encounter a verbal problem; they should create a simple algorithm to help them solve the problem. For instance, if the students were told:

- John has 3 apples and Maria has 2 apples. How many apples did they have altogether?

Algorithm for solving a verbal problem:

- Have the students read the entire problem. When the students read the problem, make sure that they stop at the end of the sentence to "catch a breath" and reflect on what they just read.
- After reading the problem once, have the students read the problem again and now circle the relevant information and "key" words. The students should have circled "3 apples", "2 apples", and the key word "altogether".
- Have the students identify what they want to find. (How many apples did they have together?)
- Have the students to identify the operation that is associated with the key word (altogether).
- Have the students translate the verbal problem into a mathematical equation:  $3 + 2 =$

Once the students understand that they need to use addition, they should be able to set up a mathematical equation. If they are not at the point where they know the addition facts, they could either use a number line or a visual to help them arrive at a solution.

For the ELL and Intensive Level students, they will probably need more directed questions to help them set up an algorithm.

- Have the **students** read the problem and stop them at the end of each sentence to “catch their breath”.
- Have them read the first sentence again and stop.
- Ask the students: How many people are in this problem?
- Ask the students: What are their names?
- Ask the students: What does John have?
- After the students state that John has 3 apples, tell them that that is an important piece of information, therefore, we will circle it.
- Ask the students: What does Maria have?
- After the students state that Maria has 2 apples, tell them that that is an important piece of information, therefore, we will circle it.
- Have the students read the second sentence.
- Ask the students: What do we want to find in this problem?
- Have them circle the “key” words (altogether).
- Ask the students: What operation is used when we hear the word altogether?
- Ask the students if they can set up a mathematical equation to solve this problem?

After seeing several verbal problems, have the students try to set up the algorithm by asking themselves the relevant questions. To make sure that they are asking the questions correctly to themselves, you can have pairs of students role play teacher and student when solving these problems.

The same algorithm can be used for subtraction. Students should become familiar with the key words for subtraction.

- What is the difference?
- How many are left?
- How many remain?
- What is 7 “take away” 4?
- Subtract 3 from 7.
- From 7 subtract 3.

By using the algorithm, the students will be able to pull apart a problem and determine what is given, and what do I want to find. Algorithms will be used in later courses for more advanced problem solving. Starting students to think using a method is very important.

Note: The process of setting up an algorithm to solve a verbal problem should be used for all levels of students.

### **Strategic Level Student:**

The Strategic Level students should also practice translating verbal problems into mathematical equations. Those equations can also be put into an equation chart as created above.

It is important that the Strategic Level student go through the process of setting up an algorithm. They should ask themselves the same questions as the Intensive/ELL student. They also need to concentrate on details. The algorithm will help them zoom in on relevant information.

In addition to the activities of the ELL and Intensive Level student, the Strategic Level students could create verbal problems for each other. By creating the verbal problems, they have to pay attention to the details of the “key” words and the translation of the verbal problem into a mathematical equation.

### **At-Grade Level Student:**

The At-Grade Level student does not need to have as many directed questions on setting up an algorithm. In fact, when given a verbal problem, you might ask the students:

- How would you tackle this problem?
- What did you do to arrive at your solution?
- Can you explain how you got your answer?

They inherently might be sophisticated enough to explain their thought process. It would probably be very similar to the algorithm, in that, they would know what they had to find, and they would know what was given.

For the At-Grade Level Student you can include similar verbal problems.

- John had 3 cookies, Maria had 2 cookies, and David had 4 cookies. What is the total number of cookies John, Maria, and David had?
- There are 10 pencils on the desk. Maria took 1 pencil, John took 2 pencils, and David took 4 pencils. How many pencils are left on the desk?

The students can use their number line to help them find a solution to the problem. Again, they should find all the relevant information and the key words that relate to a mathematical operation. Have the students translate these verbal problems into mathematical equations.

### ***Advanced Level Student:***

The Advanced student should be given the same questions as the At Grade Level student. They should also be given the opportunity to explain how they arrived at their solution.

In addition to having problems similar to the At Grade Level student, the following problems can be given

- Maria had 3 cookies. Her mother gave her 2 cookies. She gave 1 cookie to her sister. How many cookies does Maria have now?

### ***All Groups:***

All groups should set up a glossary for addition and subtraction words.

<b>Addition Words</b>	<b>Subtraction Words</b>
add	take away
total	minus
sum	subtract
altogether	less

**Note:** This is not a complete list. The list should be completed with the students.