



# Addition and Subtraction of Rational Numbers—Part 2

## Student Activity



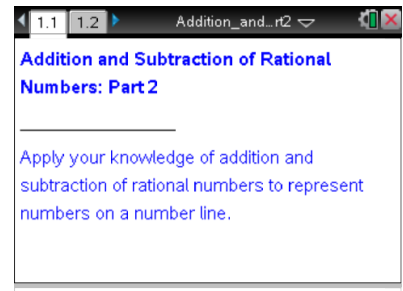
Name \_\_\_\_\_

Class \_\_\_\_\_

Open the TI-Nspire document

*Add\_Sub\_Rational\_Numbers\_Part2.tns*.

In this activity, you will represent addition and subtraction of positive and negative mixed numbers on a horizontal number line.



Move to page 1.2.

Page 1.2 shows a number line with two movable points:

- $a$  represented by a solid vector, and
- $b$  represented by a dotted vector.

The sum (or difference) of  $a$  and  $b$  is modeled using vectors above the number line:

- The **red** vector pointing to the right will always represent a positive number.
- The **blue** vector pointing to the left will always represent a negative number.
- The vertical solid line represents a target sum or difference ( $T$ ).
- As you manipulate the values of  $a$  and  $b$ , the actual value of the sum (or difference) is represented by a vertical dotted line that goes through the corresponding point on the number line.



**Tech Tip:** You can select a new target value by clicking on the left or right arrows below the label *New*. You can change the operation from addition to subtraction by clicking on the *Operation* arrows — left arrow for subtraction and right arrow for addition. After using either of the arrows, press **esc** in order to be able to grab and drag the points.



**Tech Tip:** Students can select a new target value by tapping on the left or right arrows below the label *New*. You can change the operation from addition to subtraction by tapping on the *Operation* arrows — left arrow for subtraction and right arrow for addition. To drag the points for  $a$  or  $b$ , touch the point and drag your finger while still touching the iPad.



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1. For each case listed in the table on the next page, you are given a value for point  $a$  and a value for  $T$ . Using the interactive number line model on Page 1.2, grab and drag point  $a$  to the given value on the number line.
2. Then, calculate the value of  $b$ , so that the sum (or difference) of  $a$  and  $b$  is equal to the target value  $T$ . Record your answers and calculations in the provided table on the next page:
  - a. Compute  $b$ , and show your work.
  - b. Draw a number line representation of the problem with given values of  $a$  and  $T$ , and mark the value of  $b$  on the number line.
  - c. Write an inequality that represents relationships between values  $a$ ,  $b$ ,  $T$ , and zero.
3. Check your calculations by moving point  $b$  to the location on the number line that you found. Does the *actual* sum equal the target sum (does the vertical dotted line match the vertical solid line)? What does it mean that the actual sum is equal to the target sum?



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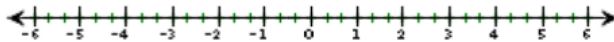
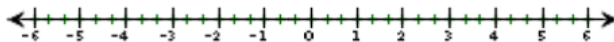

	Case	I. Number line representation.	II. Calculations.	III. Inequality
1)	$T = a + b = 2\frac{1}{3}$ $a = \frac{2}{3}$			
	Case	I. Number line representation.	II. Calculations.	III. Inequality
2)	$T = a + b = 2\frac{1}{3}$ $a = -1\frac{1}{3}$			
	Case	I. Number line representation.	II. Calculations.	III. Inequality
3)	$T = a + b = 2\frac{1}{3}$ $a = 4\frac{2}{3}$			



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	Case	I. Number line representation.	II. Calculations.	III. Inequality
4)	$T = a - b = 2\frac{1}{3}$ $a = \frac{2}{3}$			
	Case	I. Number line representation.	II. Calculations.	III. Inequality
5)	$T = a - b = 2\frac{1}{3}$ $a = -1\frac{1}{3}$			
	Case	I. Number line representation.	II. Calculations.	III. Inequality
6)	$T = a - b = 2\frac{1}{3}$ $a = 4\frac{2}{3}$			



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- 
4. On Page 1.2, select *Operation* to select addition. Select *New* until the Target value is negative. Be patient. This might take several selections. Record this value  $T = \underline{\hspace{2cm}}$ .
- a. Choose the value of  $a$  so that  $a < T$ . Record this value,  $a = \underline{\hspace{2cm}}$ . Calculate the value of  $b$ , and locate its position on the number line.
- b. Choose the value of  $a$  so that  $T < a < 0$ . Record this value,  $a = \underline{\hspace{2cm}}$ . Calculate the value of  $b$ , and locate its position on the number line.
- c. Choose the value of  $a$  so that  $a > 0$ . Record this value,  $a = \underline{\hspace{2cm}}$ . Calculate the value of  $b$ , and locate its position on the number line.
5. Select *Operation* to select subtraction. Select *New* until the Target value is negative. Be patient. This might take several selections. Record this value  $T = \underline{\hspace{2cm}}$ .
- a. Choose the value of  $a$  so that  $a < T$ . Record this value,  $a = \underline{\hspace{2cm}}$ . Calculate the value of  $b$ , and locate its position on the number line.
- b. Choose the value of  $a$  so that  $T < a < 0$ . Record this value,  $a = \underline{\hspace{2cm}}$ . Calculate the value of  $b$ , and locate its position on the number line.
- c. Choose the value of  $a$  so that  $a > 0$ . Record this value,  $a = \underline{\hspace{2cm}}$ . Calculate the value of  $b$ , and locate its position on the number line.
6. Refer to the number line on Page 1.2 to complete the **Addition and Subtraction of Mixed Numbers – Summary Chart**.

Explain your results for each case in the chart.