
Adding Up The Operations

ID: 11614

Time required
45 minutes

Activity Overview

In this activity, students will use the NumberLine application and the Home screen to explore addition and subtraction of positive and negative integers. This activity includes a TI-Navigator extension to help further students' understanding of number operations.

Topic: Numbers and Operations

- *Understand meanings of operations and how they relate to one another.*
 - *Understand the meaning and effects of arithmetic operations with fractions, decimals, and integers*
-

Teacher Preparation and Notes

- *Before beginning the activity, students should clear all lists and turn off functions. To clear the lists, press \square and scroll down until the arrow is in front of **ClrAllLists**. Press enter twice. To clear any functions, press ! and then press χ when the cursor is next to Y1 through Y4.*
- *The NumberLine App will need to be loaded. If it is not already loaded, go to **education.ti.com/73** to download.*
- *TI-Navigator is not required for this activity, but an extension is given for those teachers that would like to use it.*
- **To download the student worksheet and navigator files, go to education.ti.com/exchange and enter "11614" in the quick search box.**

Associated Materials

- *MGAct10_Operations_worksheet_TI73.doc*
- *MGAct10_Nav_TI73.act*
- *MGAct10_LrnChk_TI73.edc*

Suggested Related Activities

To download the activity listed, go to education.ti.com/exchange and enter the number in the quick search box.

- *Number Line (TI-73 Explorer with TI-Navigator) — 6677*
- *Getting Megative (TI-73 Explorer) — 8463*
- *Adding Integers – A Modeling Approach (TI-84 Plus family with TI-Navigator) — 6563*
- *Number Line Activity: Adding Integers (TI-73 Explorer with TI-Navigator) — 8338*

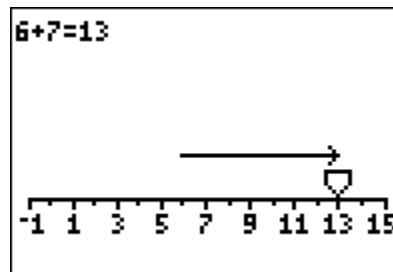
Problem 1 – Staying Positive

Students should have some prior experience with positive and negative integers. Often, addition of integers is better understood by students. Help them understand the direction of movement with the addition of a negative number.

Questions 1-6

Using the Number Line app will help students see the vectors of the addition problem. To use the app, press A and ; to highlight **NUMLINE**.

For exercise 1, students will likely want the **WINDOW** set with a maximum of 15. However, if they perform the calculation first, the window can be adjusted. Press \cong and change each setting as needed. Students can also set the **Start** value to 6. If they do set the start to 6, then they will press + 7 ϵ .

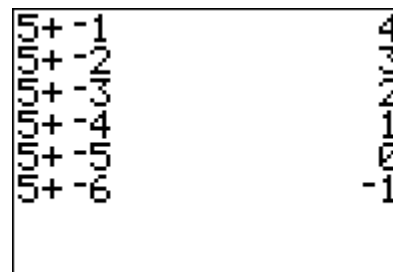


Also, ensure that students understand the difference between the – and _ keys.

If students feel confident with integer addition, they may not need the vector representation. They may feel comfortable working without the technology or working on the home screen.

Question 8

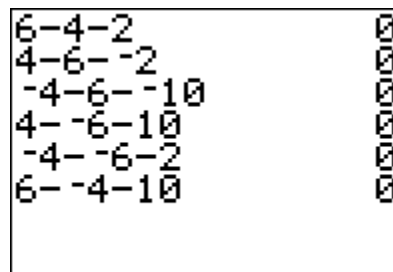
Additional examples may be needed for some students to develop the patterns requested. If needed, have students begin with 5 and add –1, then –2, then –3, and so on. Repeat with other examples to help students understand that adding a negative integer greater than the positive addend will result in a negative answer.



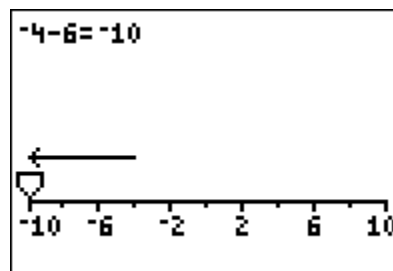
Problem 2 – Serious Subtraction

Questions 9-14

Again, help students see patterns in subtracting positive and negative integers. Students should eventually see that the amount to subtract, to make the sentence equal zero is the value that makes the two integers equal but with opposite signs.



For Exercise 11, set the **Start** value in the **WINDOW** to –4. Then, press – 6 ϵ . Then, looking at Exercise 13, make sure that students get both the – and _ when entering this problem.



Problem 3 – Opposite Number Sentences

Ensure that students understand that the top line in the sequence is the “starting” line. The arrow shows the end point after the first operation has been performed.

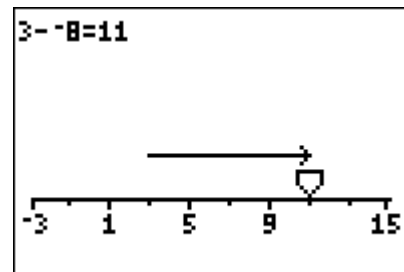
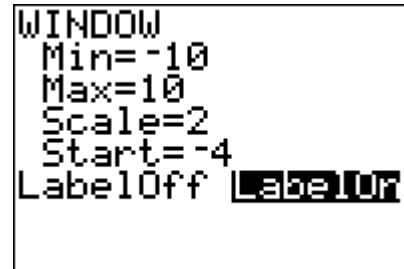
Questions 16 – 19

For additional practice, place students in pairs and have one generate a new vector for the other. They will need to cover up the equation that appears at the top of the screen.

To generate a new problem, change the window to indicate the starting value and the appropriate WINDOW. Then, the student should enter either an addition or subtraction sentence. Their partner should then write both an addition and subtraction sentence that is represented by the vector.

Question 20

Encourage students to continue exploring number sentences if needed to determine patterns that exist. Students developing their own rules to remember will help ensure they have a more solid understanding of integer addition and subtraction.



Solutions to Student Worksheet
Problem 1

1. Positive
2. Negative, 3
3. Positive
4. Negative, 6
5. Zero, 1
6. Positive
7. Answers will vary. Students should indicate that they found a number greater than the negative number with a positive sign.
- 8.

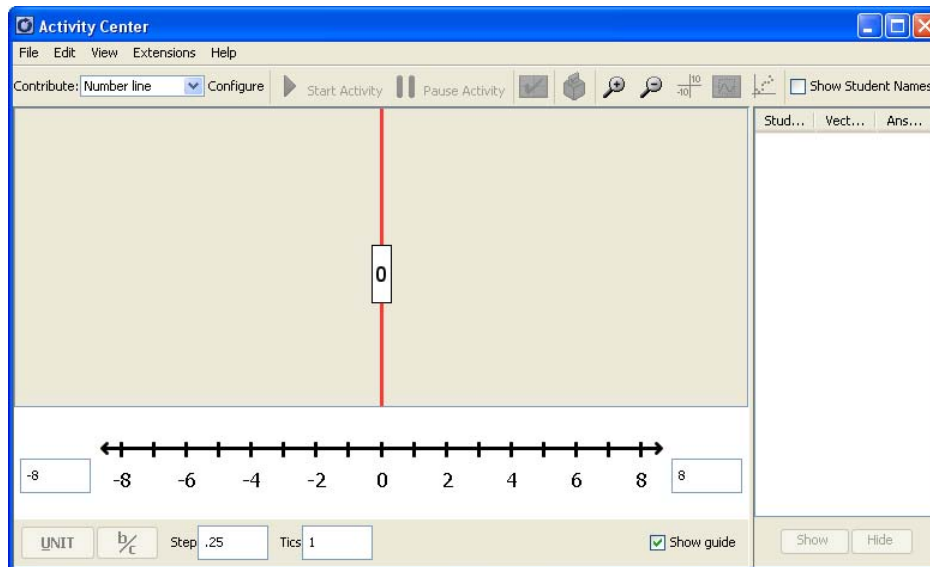
Problem	Result
Both Positive Addends	Positive
One Positive, One Negative	Varies. Depends on the absolute value of the integers involved.
Both Negative Addends	Negative

Problem 2

9. Positive, 2
10. Negative, -2
11. Negative, -10
12. Positive, -10
13. Positive, -2
14. Positive, 10
15. When you subtract a negative number, you add the number.
16. Addition: $-3 + 5$, Subtraction: $-3 - (-5)$
17. Addition: $4 + -7$, Subtraction: $4 - 7$
18. Addition: $4 + -8$, Subtraction: $4 - 8$
19. Addition: $-2 + 11$, Subtraction: $-2 - (-11)$
20. Add two positive integers: Positive answer
 Subtract two positive integers: varies, depends on absolute value of integers
 Add two negative integers: Negative answer
 Subtract two negative integers: varies, depends on absolute value of integers
 Add one positive and one negative integer: varies, depends on absolute value
 Subtract one positive and one negative integer: varies, depends on absolute value

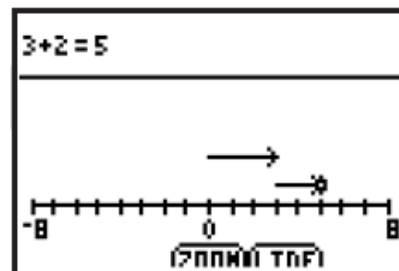
Extension – TI-Navigator™

1. Load the *MGWeek10_Nav_T173.act* activity settings file. This prompts student calculators to display a number line (from -8 to 8) along with the addition problem $3 + 2$.



Part A: Start the activity and ask students to **MARK** and draw a vector from 0 to 3, press ϵ , and **MARK** and draw a vector from 3 to 5. Next, have students press \cong , enter the result when adding 3 and 2, and press Γ to **SEND** the result into Activity Center.

Part B: Reference the vectors that were submitted to Activity Center to explain how vectors can be used to represent integer addition.



2. Stop the activity, click **Configure**, and change the prompt to $3 + 1$. Start the activity and repeat Parts A and B from the previous step.

Repeat using $3 + 0$ and $3 + (-1)$. Show students how to use vectors to add two numbers with opposite signs.

Repeat this activity several times until students are comfortable using vectors to find the sum of integers with different signs. Make sure that you include examples in which the first number is negative and the second number is positive.

3. Repeat the procedures described in Part I for the sums $-3 + 2$, $-3 + 1$, $-3 + 0$, and $-3 + -1$.
4. Subtraction of integers can also be explored using the number line in Activity Center. Use patterns such as $3 - 2$, $3 - 1$, $3 - 0$, $3 - (-1)$ to show how to subtract a negative number.
5. Use *MGWeek10_LrnChk_T173.edc* to assess student understanding of adding and subtracting integers.

Problem 1 – Staying Positive

In this problem, you will explore the patterns you see when adding positive and negative numbers. In Exercises 1-6, determine if the answer will be positive. If not, decide what must be added to the problem to make it greater than zero. If needed, use the Number Line application to create vectors on a number line.

- | | | |
|---|--|--|
| <p>1. $6 + 7$
Positive? Y or N
Add: _____</p> | <p>2. $4 + -6$
Positive? Y or N
Add: _____</p> | <p>3. $-5 + 7$
Positive? Y or N
Add: _____</p> |
|---|--|--|

- | | | |
|---|--|---|
| <p>4. $-3 + -2$
Positive? Y or N
Add: _____</p> | <p>5. $-8 + 8$
Positive? Y or N
Add: _____</p> | <p>6. $-9 + 12$
Positive? Y or N
Add: _____</p> |
|---|--|---|

7. Explain how you decided what should be added to each problem that was not initially positive. _____

8. What patterns did you notice in Exercises 1 – 6?

Problem	Result
Both Positive Addends	
One Positive, One Negative	
Both Negative Addends	

Problem 2 – Serious Subtraction

Determine if each will be positive or negative. What should be *subtracted* to make the problem equal zero. Again, use the Number Line app, if needed to identify patterns.

- | | | |
|---|--|---|
| <p>9. $6 - 4$
Positive Negative
Subtract: _____</p> | <p>10. $4 - 6$
Positive Negative
Subtract: _____</p> | <p>11. $-4 - 6$
Positive Negative
Subtract: _____</p> |
|---|--|---|

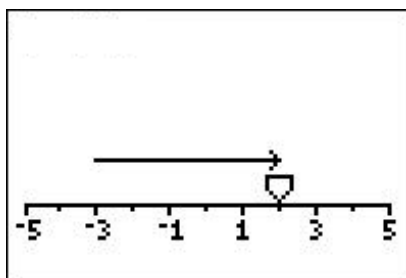
- | | | |
|---|--|---|
| <p>12. $4 - -6$
Positive Negative
Subtract: _____</p> | <p>13. $-4 - -6$
Positive Negative
Subtract: _____</p> | <p>14. $6 - -4$
Positive Negative
Subtract: _____</p> |
|---|--|---|

15. What happens when you subtract a negative number? _____

Problem 3 – Opposite Number Sentences

Write one addition number sentence and one subtraction number sentence that represent each vector below.

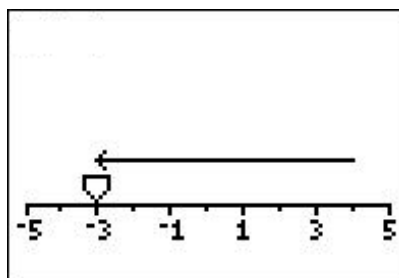
16.



Addition: _____

Subtraction: _____

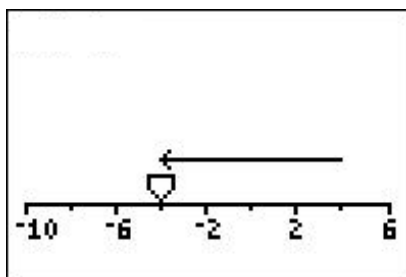
17.



Addition: _____

Subtraction: _____

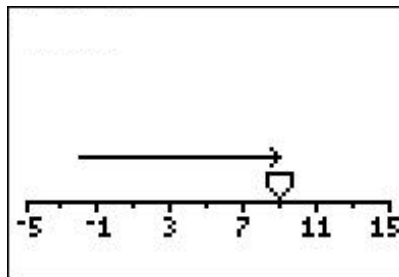
18.



Addition: _____

Subtraction: _____

19.



Addition: _____

Subtraction: _____

20. Write rules for other students to follow when adding and subtracting integers.

Add two positive integers: _____

Subtract two positive integers: _____

Add two negative integers: _____

Subtract two negative integers: _____

Add one positive and one negative integer: _____

Subtract one positive and one negative integer: _____