You're Getting Warmer

ID: 11595

Time required
45 minutes

Activity Overview

In this activity, students will use number lines to show the addition and subtraction of more than two integers. The first problem has students finding temperature and the second problem has students finding the location of a treasure chest.

Topic: Numbers and Operations

- *Understand numbers, ways of representing numbers, relationships among numbers, and number systems*
- *Develop meaning for integers and represent and compare quantities with them*

Teacher Preparation and Notes

- *If you would like students to look at a thermometer, these should be available.*
- *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 "11595" in the quick search box.***

Associated Materials

- *MGAct09_Integers_worksheet_TI73.doc*
- *MGAct09_Nav_01.act*
- *MGAct09_Nav_02.act*

Suggested Related Activities

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

- *Touchdown — 6676*
- *Absolute Value — 9855*
- *Integer Subtraction, What's the Difference? — 4481*
- *Integers! It All Adds Up! — 4479*

Problem 1 – Is it Freezing?

Students should have some prior experience with positive and negative integers.

Question 1

The purpose of this question is to help students make a connection between a real-world example and the direction numbers move on the number line.

```
62+9-18+14        67
```

Students can use the home screen to verify their solution to the problem. The key presses shown to the right are $6\ 2 + 9 - 1\ 8 + 1\ 4\ \varepsilon$.
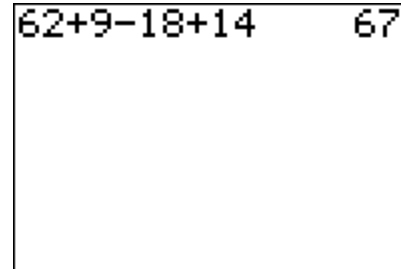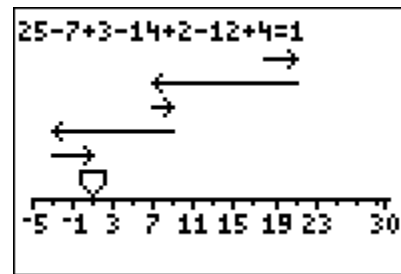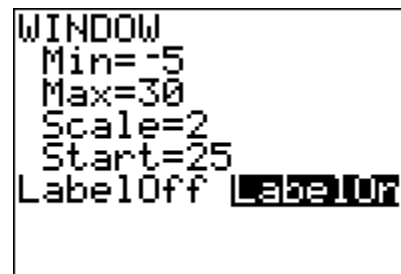
Questions 2-4

Students can either use the home screen or the NumberLine application. If they use NumberLine, show them how to adjust the Window to show an appropriate range of numbers for this problem. The Window to the right is a suggestion.

```
WINDOW
 Min=-5
 Max=30
 Scale=2
 Start=25
LabelOff LabelOn
```

The NumberLine screen to the right is obtained with the following key presses. First, start the NumberLine app by pressing A and scrolling down to **NUMLINE**. Press ε then any key to start. Press $\cong$ to set the window as indicated. Use the arrow keys $(:\ ;\ <\ >)$ and ε to change the settings as needed.

```
25-7+3-14+2-12+4=1
```

Once the window is set, press Γ. The arrow should start at 25. Press $- 7\ \varepsilon$ to see the change in Day 1. Continue in this manner for the remaining days. Press $+ 3\ \varepsilon - 1\ 4\ \varepsilon + 2\ \varepsilon - 1\ 2\ \varepsilon + 4\ \varepsilon$.

Problem 2 – Finding a Treasure

Questions 5-9

These exercises will allow students to explore the Commutative Property.

If needed, move the treasure chest or change the steps you can take to get to the treasure chest to allow for more exploration by students that need it. Again, remember that students will need to adjust their viewing window as needed for each exercise.

For a starting point of 2, the key presses to find the treasure could be $2 + 6 - 4 + 3$ ε. The other possibilities are shown as well. You may want to have students actually walk a number line on the floor to see that the order of the steps does not change where they finish.

Place students in groups of 3. Assign 3 different locations of the treasure for them to explore.

If a group uses the NumberLine app, help them see that the lines are all the same length and in the same direction, the difference is which happens first.
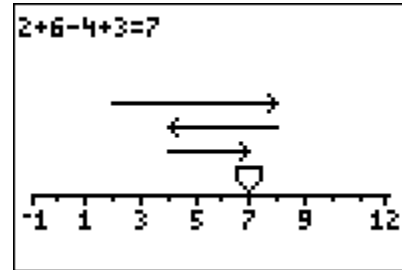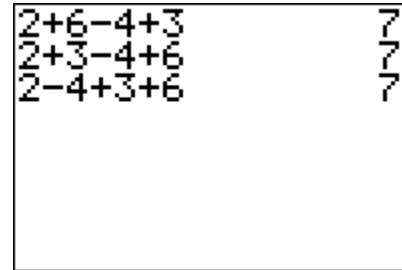
Problem 3 – How Did I Get Here?

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.

<u>Question 10</u>

The given screen was created by setting the window to –5, 5 with a start value of 4. Again, press A and scroll down to **NUMLINE** and press ε. To access the settings for the NumberLine, press ≅ and then change the values as needed.

If students have difficulty aligning the end of the arrows, provide a ruler so they can line them up. They can also use a sheet of paper to help keep the numbers aligned.
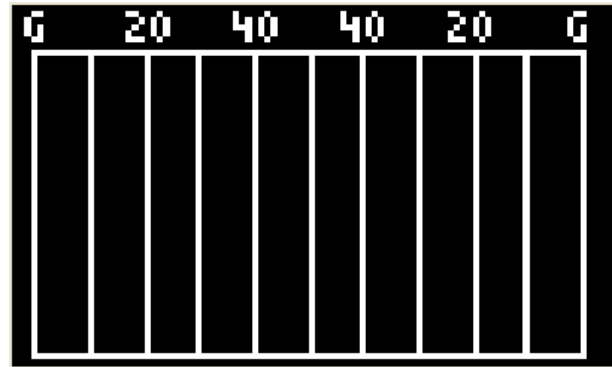
<u>Question 11</u>

Repeat the steps for Question 10 and use a starting point of –1.
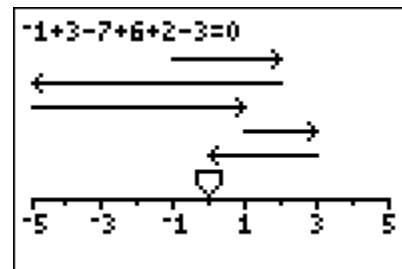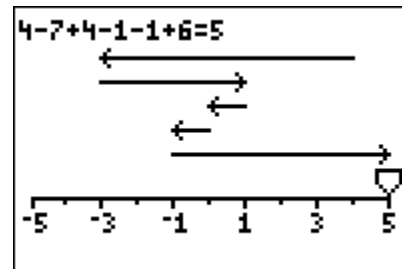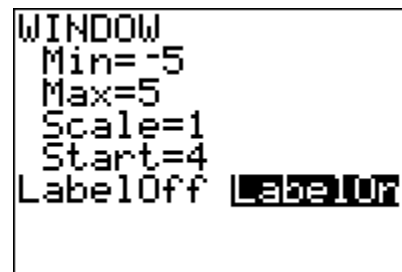
Extension – TI-Navigator™

1. Load the **MGAct09_Nav_01.act** activity settings file into Activity Center. The diagram displayed in Activity Center will resemble a football field. Assign each student a different *y*-value from the set {-9, –8.5, –8, …, 5, 5.5, 6}.

   By starting the activity, student cursors will be positioned in the middle of the field on the left most 20-yard line. They need to move up or down to the *y*-value to which they have been assigned.

   Explain to students that this will be their assigned row and that they are allowed to move left or right from this spot but not up and down. This will ensure that students remain spread out on the field during the activity. Now tell students that there has been a 70-yard kick off with a 10-yard return.

   Students are to use their left and right arrow cursors to locate the approximate location of the ball (rightmost 20-yard line). When everyone is ready, students can send their position.

   Discuss the results. If needed, remind students that positive integers are used to represent a gain and negative integers are used to represent a loss.

   Repeatedly stop and restart the activity, calling out different scenarios each time, such as a loss of 10 yards, a gain of 50 yards, and so on. Clear the activity data between plays and have students begin each play at the approximate location where the last play ended. You can include several special circumstances such as penalties, interceptions, punts, and fumbles to make the activity more interesting.

2. Load the **MGAct09_Nav_02.act** activity settings file into Activity Center. This will prompt student calculators to display a number line from –8 to 8.

   By starting the activity, students can draw up to four vectors to help them determine the result of an integer addition problem. For example, you can prompt them to use vectors to represent 5 + (–4) + (–2). Students can visually see the answer and send their vectors into Activity Center for review.
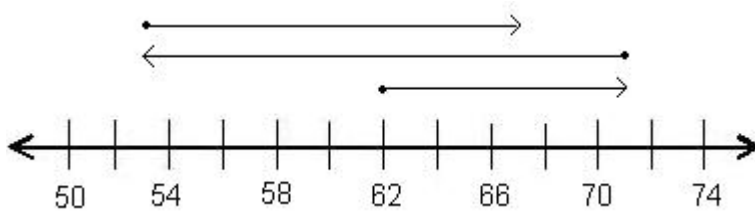
   You can also adjust the number of vectors to be drawn, the size of the number line, and the step size.

3. Use **Screen Capture** throughout the activity to monitor student progress.

Solutions to Student Worksheet
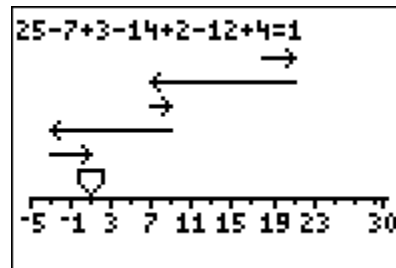
Problem 1

1. 67 degrees

2.

Day	Forecast	Temperature
Dec 14		25 degrees
Dec 15	7 degrees cooler than Dec 14	**18**
Dec 16	3 degrees warmer than Dec 15	**21**
Dec 17	14 degrees cooler than Dec 16	**7**
Dec 18	2 degrees warmer than Dec 17	**9**
Dec 19	12 degrees cooler than Dec 18	**-3**
Dec 20	4 degrees warmer than Dec 19	**1**

3. The temperatures switch from positive to negative and back from negative to positive.

4.

Problem 2

5. Starting location: –2.

6. Answers will vary depending on order of steps taken. The order should not matter. All students should have the same starting location.

7. Again, the order of steps should not matter. They can take the steps in any order and arrive at the treasure chest.

8. Yes, this will always work. The Commutative Property of Addition and Subtraction state why this works.

Problem 3

9. $4 - 7 + 4 - 1 - 1 + 6$

10. $-1 + 3 - 7 + 6 + 2 - 3$