Nasco Education

LESSON PLAN

Math

Developed with Kristin Hotter

Adding negative integers

Volume 21 | Gr. 5-8

Activity: 30 mins.
Additional practice (Bingo): 20-30 mins.

Content

Prior to this lesson, students should have an understanding of what a negative integer is. This lesson introduces students to the concept of adding negative integers between –20 and 20 through the use of two-sided counters. The use of a number line from –20 to 20 may be of additional use to students, but is not a requirement with this lesson. For additional practice, a worksheet and bingo activity are also included with the lesson plan download.

Objectives

Students will...

- Solve addition problems that include negative integers
- Analyze addition problems with negative integers to determine the sum's appropriate sign
- Use concrete models to solve abstract integer problems

Materials

- 2-Color Counters (40 per student or group of 2-3 students; **TB14927**, **TB22328**, **or TB23715**)
- Number Line from –20 to 20 (optional)
- Bingo template (attached with lesson plan download)
- Worksheet and answer key (attached with lesson plan download)

Common core state standards

CCSS.Math.Content.6.NS.C.6.A — Recognize opposite signs of numbers as indicating locations on opposite sides of 0 on the number line; recognize that the opposite of the opposite of a number is the number itself, e.g., –(–3) = 3, and that 0 is its own opposite.

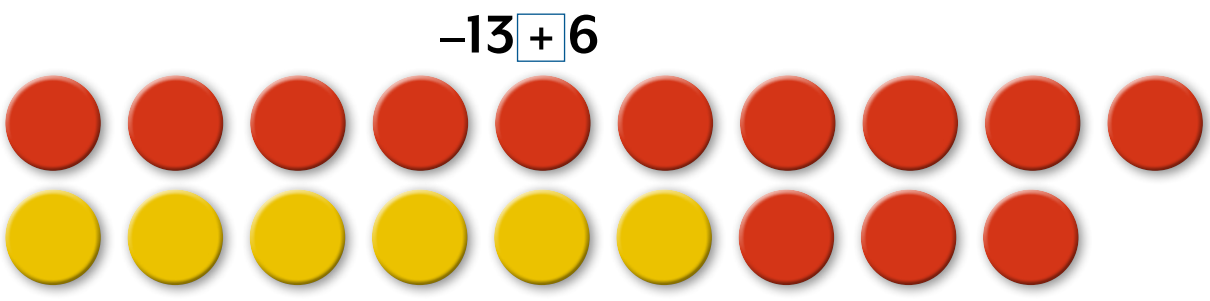
CCSS.Math.Content.7.NS.A.1 — Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram.

Introduction

1. Tell students that during this lesson, they will investigate what is actually happening when they add integers. Point out that they already have had a lot of experience in adding positive integers, since any number greater than 0 is positive and any whole number is an integer. This means that they were adding positive integers back when they were learning what 1 + 1 is. Now, they will learn how to add negative integers as well. Tell students that negative numbers are whole numbers that are less than 0.
2. Ask students to provide some examples of negative integers *(–1, –2, –3, etc.)*. Have students think of some real-life instances where they would need to use negative numbers *(when talking about negative temperatures, a debt that is owed, below sea level, etc.)*. Inform students that they will be working with integers that fall between the range of –20 and 20 during this lesson.

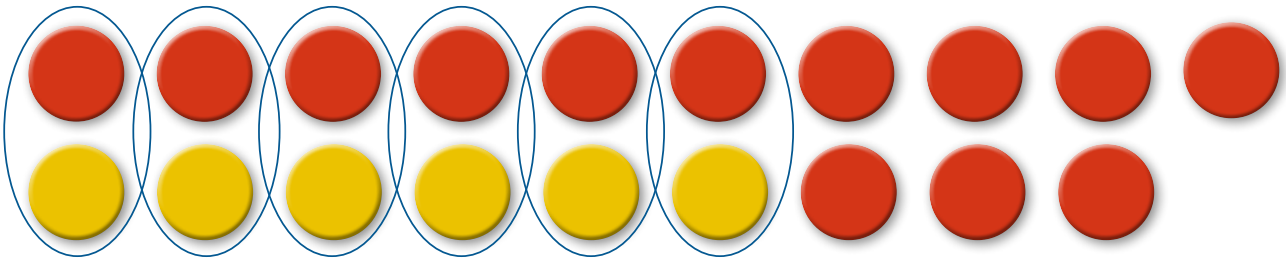
Activity 1

1. Distribute 40 two-sided counters to each student or group of students, then tell students what each side of the counter will represent. The red side of the counters will represent negative integers in every problem worked on during the lesson, and the yellow side will represent positive integers.
   NOTE: Substitute the colors of the two-sided counters to match those that you have. Be sure that one color is always used to represent positive integers, and the other color is always used to represent negative integers.
2. Write **–13 + 6** on the board, then put a box around the addition sign. Tell students you are doing this because it helps everyone see what kind of integers they are working with. If students get into the habit of putting a box around the operation sign, it will make their work later on much easier, so they should always do this.
3. Now ask students what two integers are in the problem *(–13 and 6)*. Ask what color counters they will use to represent –13 *(red)*. Have them count out 13 red counters, then ask which color they will use to represent 6 *(yellow)*. Have them count out six yellow counters. It is recommended that students place the two groups of counters in two lines, one directly above the other.



Activity 1 (continued)

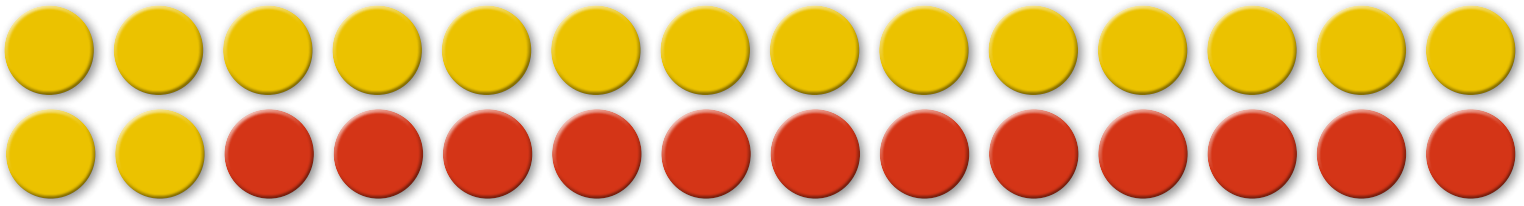
4. Ask students how many counters they have in front of them *(19)*, and which color they have more of *(red)*. Students might be thinking that 19 is the answer to the problem, but tell them there is another step to work through to get the final answer. Students will need to remove as many pairs of counters as they can until there are no more pairs to remove. A pair consists of one red counter and one yellow counter. Students will be able to remove six pairs of counters, leaving seven red counters.



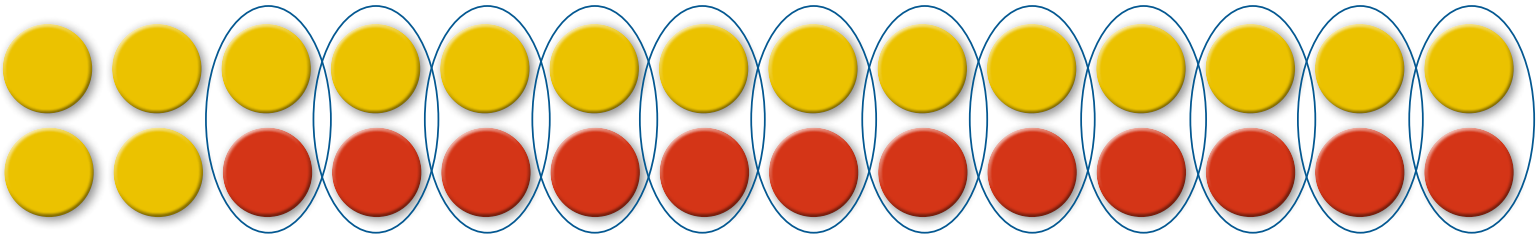
5. Tell students that the number of counters represents the integer. Ask students what the color red represents *(negative)*. This means that –13 + 6 = –7. Point out that at the beginning of the problem, they started out with more red counters than yellow counters, and the answer turned out to be negative. Ask students if this means that whatever color of counters they have more of at the beginning of the process will always tell them the sign of the final answer (*yes*). Work through more problems so that students see this.

6. Write **16 + (–12)** on the board. Ask students what should be done first *(put a box around the operation sign)*. Now ask what colors will be needed to represent the integers *(yellow for 16 and red for –12)*. Have them count out the appropriate number of counters for each integer, then ask which color they have more of *(yellow)*.

16 + –12



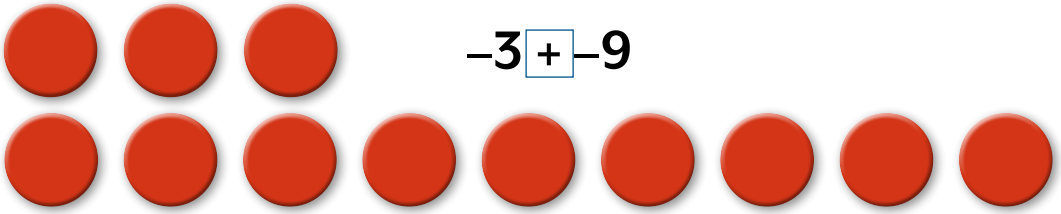
7. Students should have 28 counters in front of them, but remind them that 28 is NOT the final answer. See if they can tell you what step they need to do yet to complete the process *(remove as many red/yellow pairs as possible)*. Have students go ahead and do this. Modeling this for students may be beneficial; otherwise, ensure that they have done this correctly. They should have four yellow counters left.



8. Ask students to tell you what this represents *(positive 4)*. Point out that once again, the color they had more of in the beginning of the problem corresponded to the sign in the final answer.

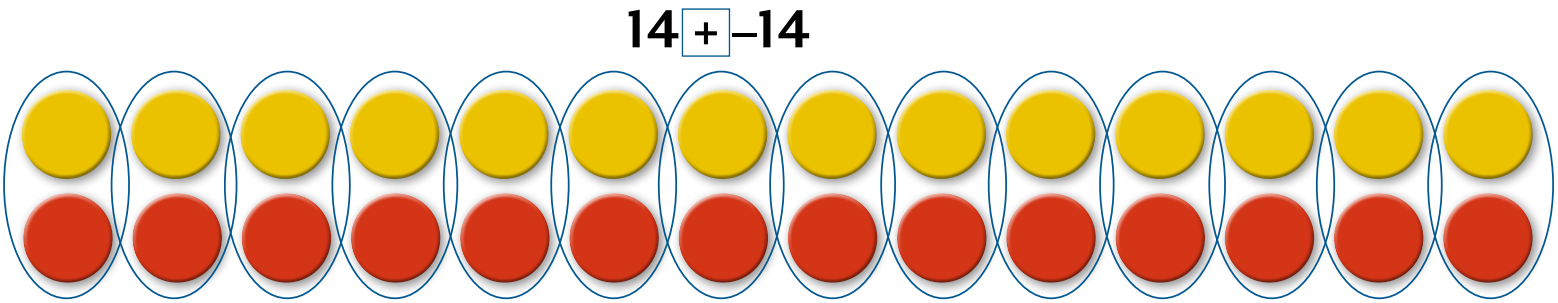
Activity 1 (continued)

9. Students have added a negative integer to a positive integer, and a positive integer to a negative integer. Now have students try a third type of problem: **–3 + (–9)**. Once again, ask students what is the first thing they should do *(draw a box around the operation sign)*, then ask how this problem is different than the previous problems *(both integers are negative)*.



10. Have students count out the appropriate number and color of counters for this problem. They should be using three red counters and nine more red counters. Once the counters are arranged, have students tell you what the next step is *(remove pairs of counters)*. Students should realize that there are no pairs to remove, as all the counters are red. So have them count how many counters there are to come up with the answer of –12. Tell students that when they are adding integers, either positive or negative, all they need to do is find the sum of the two numbers, in this case 12, and keep the sign, in this case negative.

11. Do one last problem together: **14 + (–14)**. Prompt students to tell you each step. They should begin by putting a box around the operation sign. Next, they need to count out 14 yellow counters for the first 14, then 14 red counters for the second 14. Now they should remove as many pairs as possible. They should be left with no counters in front of them, meaning the answer to the problem is 0



Check for understanding

Put the following problems on the board, one at a time, for students to solve either independently or in small groups. Remind students before starting each problem that they need to put a box around the operation sign so that they don't get it confused with the integer signs, then do this for students on the board. Let them work through the problem, then use this line of questioning to check for understanding.

8 + (–12)

1. What is the first thing that you did when solving the problem? *(Counted out eight yellow counters)*
2. What did you do next? *(Counted out 12 red counters)*
3. What is the third step that you did? *(Removed as many red/yellow counter pairs as possible)*
4. How many red/yellow pairs were you able to remove? *(8)*
5. What did you have remaining? *(4 red counters)*
6. What is the answer to the problem 8 + (–12)? *(–4)*

–6 + (–4)

1. What is the first thing that you did when solving the problem? *(Counted out six red counters)*
2. What did you do next? *(Counted out four red counters)*
3. How is this problem different than the last problem you did? *(I only had red counters)*
4. How many red counters did you have in all? *(10)*
5. What is the answer to –6 + (–4)? *(–10)*

–3 + 11

1. What is the first thing you did when solving the problem? *(Counted out three red counters)*
2. What did you do next? *(Counted out 11 yellow counters)*
3. What was your third step? *(Removed as many pairs of red/yellow counters as possible)*
4. How many pairs were you able to remove? *(3 pairs)*
5. What did you have left? *(8 yellow counters)*
6. What is the answer to –3 + 11? *(8)*

Additional practice (Bingo)

1. A blank bingo card is included. Hand each student a blank bingo card, then ask them to choose 24 numbers from –20 to 20 (including 0). They need to put one number in each blank bingo box. Remind them there will be numbers that they will not use.
2. Randomly use problems from the list below. Each problem has an answer from –20 to 20. Students need to solve the problem. They will cross out the sum if it is one they've chosen to include on their bingo card.
3. You may play with any bingo rule you choose (5 in a row, 4 corners, blackout, etc.).

Problem List:

–15 + (–5) = –20	–12 + (–7) = –19	–6 + (–12) = –18	–20 + 3 + –17	–7 + (–9) = –16	–4 + (–11) = –15
–7 + (–7) = –14	–19 + 6 = –13	–20 + 8 = –12	–6 + (–5) = –11	(–5) + (–5) = –10	8 + (–17) = –9
–5 + (–3) = –8	13 + (–20) = –7	7 + (–13) = –6	4 + (–9) = –5	6 + (–10) = –4	–15 + 12 = –3
8 + (–6) = 2	9 + (–10) = –1	11 + (–11) = 0	–12 + 13 = 1	–9 + 11 = 2	5 + (–2) = 3
–14 + 18 = 4	–3 + 8 = 5	14 + (–8) = 6	–7 + 14 = 7	–2 + 10 = 8	15 + (–6) = 9
14 + (–4) = 10	–3 + 14 = 11	–6 + (18) = 12	17 + (–4) = 13	20 + (–6) = 14	–3 + (18) = 15
–4 + 20 = 16	–2 + 19 = 17	14 + 4 = 18	20 + (–1) = 19	18 + 2 = 20	

Intervention

Have students draw out the counters as they build their problems. Ask them to also cross off pairs of counters as they remove them from the piles in front of them. They are asked to do this for the first few problems of the worksheet, but it would be beneficial if they continued to do this it through all of the problems.

Extension

1. Have students begin solving problems without the use of manipulatives. They should have picked up on the answer patterns while working through today's practice problems.
2. See how students are able to apply the concepts they've learned using the manipulatives to solve problems with sums outside of the range of –20 to 20.

Bingo game

Directions: Fill in your bingo card using numbers that fall between –20 and 20. The number 0 can be one of your choices. Place each number in any random square you choose. Each number should only be listed once on your card.

Note: You will not use every number that falls between –20 and 20.

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U27678_bingo game

Adding negative integers — **worksheet**

Volume 21

Name: _____ Date: _____

Part A Directions: Use your two-colored counters to solve the following problems. Draw a diagram to show what you are doing with your counters as you work with them.

1. –8 + (–6) = ____

2. 14 + (–9) = ____

3. –11 + 15 = ____

Part B Directions: Solve the following integer addition problems using your two-colored counters.

1. (–5) + 16 = ____

2. 7 + (–12) = ____

3. –8 + 8 = ____

4. 3 + (–18) = ____

5. –6 + 19 = ____

6. 7 + (–11) = ____

7. –5 + (–12) = ____

8. 3 + (–9) = ____

9. –8 + (–12) = ____

Adding negative integers — **answer key**

Volume 21

Part A Directions: Use your two-colored counters to solve the following problems. Draw a diagram to show what you are doing with your counters as you work with them.

1. –8 + (–6) = –14

There should be eight red counters in the top row and six red counters in the bottom row.

2. 14 + (–9) = –5

There should be 14 yellow counters in the top row and nine red counters in the bottom row. Nine pairs of yellow/red counters should be circled, leaving five red counters.

3. –11 + 15 = 4

There should be 11 red counters in the top row and 15 yellow counters in the bottom row. Eleven pairs of yellow/red counters should be circled, leaving four yellow counters.

Part B Directions: Solve the following integer addition problems using your two-colored counters.

1. (–5) + 16 = 11

2. 7 + (–12) = –5

3. –8 + 8 = 0

4. 3 + (–18) = –15

5. –6 + 19 = 13

6. 7 + (–11) = –4

7. –5 + (–12) = –17

8. 3 + (–9) = –6

9. –8 + (–12) = –20