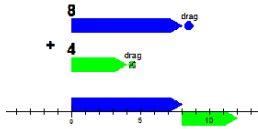


Exploring Subtraction of Integers

Review addition of integers using number line addition with the Geometer's Sketchpad. (Addition of Integers File)



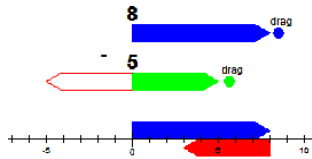
Review subtraction of integers with tiles by using a few problems from two activity sheets.

- Subtracting Integers Using Models I (Lesson Quest©)
- Subtracting Integers Using Models II (Lesson Quest©)

Distribute copies of number lines to students. Have them place the number lines in the communicators.

Model several subtraction problems on the smartboard using Subtraction of Integers.

The first problem illustrates $8 - 5$. Have students copy this drawing on their number lines on the communicators. Inform the students that the number line is illustrating that we are starting with $+8$ and we are removing or subtracting 5 from that. The middle arrow illustrates two arrows: $+5$ and -5 . The bottom drawing on the number line show the addition of $+8$ and -5 resulting in the same answer they expected for taking 5 from 8 . Students should be able to see that they are beginning with a lot of positives and only removing part of those. Therefore the answer will be positive.



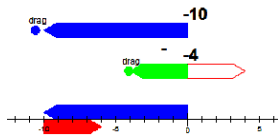
Change the number line by having a student come to the smartboard and move both drag buttons to show the subtraction of two other positive numbers. Keep the top blue arrow longer than the green arrow. Do several of these with students. Emphasize that they are beginning with a lot of positives and only removing part of those. Therefore the answer will be positive.

To assess students understanding have students answer a new problem and only look at the number line but not draw it.

- What is $+10 - 3$?
- How long is the blue arrow?
- How long is the green arrow?
- What addition problem would be illustrated?
- What is the answer to the problem?

Change the number line so that you are subtracting two negative numbers. Ask students to draw this picture on their number line. Inform the students that the number line is illustrating that we are starting with -10 and we are removing or subtracting -4 from that. The middle arrow illustrates two arrows: -4 and $+4$. The bottom drawing on the number line show the addition of $+10$ and $+4$ resulting in the same answer they expected for taking

-4 from -10.



Have students create several other problems with the number line with two negative numbers. Keep the top blue arrow longer than the second green arrow. Students should be able to picture these answer. Emphasize that they are beginning with a lot of negative and they are only removing part of those negatives. Therefore the answer will be negative.

Assess student understanding by asking a similar question. Can they visualize the number line without drawing it?

- What is $-9 - (-3)$?
- How long is the blue arrow?
- How long is the green arrow?
- What addition problem would be illustrated?
- What is the answer to the problem?

Change the number line so you are subtracting more positives than you have. Have students observe that they are starting with 5 and trying to subtract or remove 12 from this. Have students observe the arrows. What addition problem is being illustrated on the number line? Remind students of what they did with algebra tiles to complete this problem. (They added 7 zero pairs so they had +12 to remove. When they removed the +12 ($5+7$) they were left with the -7.)

Set up several other problems by having the students move the drag points. Students should notice that the blue arrow is always drawn and then the what the students need to subtract is always added to the picture in the opposite direction. The same idea works if the problem $-4 - (-9)$ is set up. We want to subtract or remove -9 from -4. We don't have enough negatives so we need to add 5 zero pairs. When we put the -4 and -5 together we have -9 to remove and we are left with +5 from the zero pairs.

Ask students to create several of these on the smartboard and record them on their communicator. Assess student understanding by giving them another problem. Ask them to picture it on the number line without drawing it.

- What is $-3 - (-8)$?
- How long is the blue arrow?
- How long is the green arrow?
- What will the addition problem look like?
- What is the answer?

Now change the number line to subtract numbers that are opposite. Set up $+4 - (-6)$. How is this number line the same? How is it different?

The blue line always shows us what we begin with.

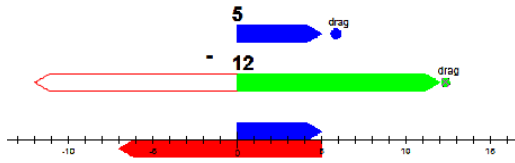
The green arrow shows us what we are subtracting or removing.

There is an opposite arrow to the green.

The blue and the opposite arrows are added on the number line to arrive at the answer.

Ask students to think about this problem with tiles. You start with +4 and try to remove -6. How many zero pairs do you need to add? (6) If you add 6 zero pairs you will have the -6

needed to remove. What will you be left with? You will be left with +6 from the zero pairs and the +4 you started with for +10. This is illustrated with the number line. Have the students create several other number line problems and record them on their number lines.



Assess student understanding by giving them another problem.

- What is $-3 - (+8)$?
- How long is the blue arrow?
- How long is the green arrow?
- What will the addition problem look like?
- What is the answer?

Student Homework Assignment