

Key Concepts

Lesson
8-3

Subtracting Integers

Objective Teach students to subtract both positive and negative integers.

Note to the Teacher *In this lesson, your students will continue to study how to do arithmetic with integers (both negative and positive). We will be studying subtraction in this lesson. The most difficult part of this topic is the confusion students experience regarding “where to put the minus sign.” To address this issue, it is helpful to begin with a classroom discussion about the ideas behind subtraction, demonstrating the technique with manipulatives like shaded squares.*

Opposites

Begin the discussion by reminding students that the **opposite** of any positive integer is the negative integer that is the same distance from 0 on a number line. So, the opposite of 6 is -6 , and the opposite of 25 is -25 . Conversely, the opposite of any negative integer is the positive integer that is the same distance from 0 on a number line. Thus, the opposite of -8 is 8, and the opposite of -31 is 31.

Subtracting Integers

Next discuss how to subtract a negative integer from another integer. Ask your students if they have any ideas about how to subtract a negative integer from a positive integer. Then ask them for ideas about subtracting a negative integer from another negative integer. As a hint, remind them that subtraction and addition are opposite operations. Guide the discussion by making sure the following idea is expressed.

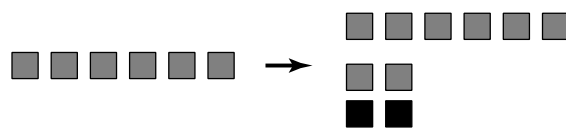
Key Idea	Subtracting a negative integer gives the same result as adding the opposite positive integer.
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Once this idea has been expressed, demonstrate to your students why this is true using shaded squares (or colored counters as shown in the Student Edition) in the following way. Have students think about collections of gray (positive) and black (negative) squares, as were discussed in the previous lesson. Suggest that subtracting a negative integer from another negative integer can be modeled by taking a group of black squares that model the first negative integer and removing the number of black squares (if there are enough in the model) that represent the second negative integer. When there are not enough black squares in the model, a sufficient number of pairs of gray and black squares need to be added to the model so that the required number of black squares can be removed. Point out that when a negative integer is subtracted from a positive integer there will not be any black squares in the model for the first integer. In this case, pairs of gray and black squares must be added to the model to begin the subtraction process.

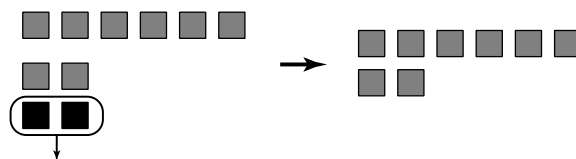
Now present several examples, some using models to find the solution and others done by direct calculation. One example of each type is given here.

Example 1 What is the value of $6 - (-2)$?

Solution To model $6 - (-2)$, first represent 6 as a collection of 6 gray squares. Since there are not 2 black (negative) squares that can be removed to model subtracting -2 , add two pairs of squares, one black and one gray in each pair. (Remind students that we removed pairs like these because they “canceled” each other; therefore, we can also add such pairs because adding them will not change the final result.)



There are now 8 gray squares and 2 black squares in the model. So we are able to show the subtraction of -2 by removing the 2 black squares, leaving 8 gray squares.



Therefore, the model shows that $6 - (-2) = 8$.

Example 2 Find $-5 - (-2)$.

Solution Use the fact that subtracting a negative integer gives the same result as adding the opposite positive integer. This means that $-5 - (-2)$ is equivalent to $-5 + (+2) = -3$.

To see this in terms of a model, we can represent -5 as a collection of 5 black squares and then simply remove 2 black squares. The result is a model showing 3 black squares, which represents -3 .



Have students solve subtraction problems involving negative integers by using shaded squares, colored counters, or some other type of manipulatives. Then have your students do the subtractions directly by themselves using the idea that subtracting a negative integer is the same as adding its opposite.

