Lesson 8: Applying the Properties of Operations to Add and Subtract Rational Numbers

Classwork

Example 1: The Opposite of a Sum is the Sum of its Opposites

Explain the meaning of: “The opposite of a sum is the sum of its opposites.”Use a specific math example.

|  |  |  |  |
| --- | --- | --- | --- |
| Rational Number | Rational Number | Sum | Opposite of the Sum |
|   |  |  |  |

|  |  |  |
| --- | --- | --- |
| Opposite Rational Number | Opposite Rational Number | Sum |
|   |  |  |

Exercise 1

Represent the following expression with a single rational number.

Example 2: A Mixed Number is a Sum

Use the number line model shown below to explain and write the opposite of as a sum of two rational numbers.

The opposite of a sum (top single arrow pointing left) and the sum of the opposites correspond to the same point on the number line.

Exercise 2

Rewrite each mixed number as the sum of two signed numbers.

|  |  |  |
| --- | --- | --- |
|  |  | * 1.
 |

Exercise 3

Represent each sum as a mixed number.

|  |  |  |
| --- | --- | --- |
| * 1.
 |  |  |

Exercise 4

Mr. Mitchell lost pounds over the summer by jogging each week. By winter time, he had gained pounds. Represent this situation with an expression involving signed numbers. What is the overall change in Mr. Mitchell’s weight?

Exercise 5

Jamal is completing a math problem and represents the expression with a single rational number as shown in the steps below. Justify each of Jamal’s steps. Then, show another way to solve the problem.

Lesson Summary

* Use the properties of operations to add and subtract rational numbers more efficiently. For instance,
* The opposite of a sum is the sum of its opposites as shown in the examples that follow:

Problem Set

1. Represent each sum as a single rational number.

|  |  |  |
| --- | --- | --- |
| * 1.
 | * 1.
 | * 1.
 |

Rewrite each of the following to show that *the opposite of a sum is the sum of the opposites.* Problem 2 has been completed as an example.

Use your knowledge of rational numbers to answer the following questions.

1. Meghan said the opposite of the sum of and is . Do you agree? Why or why not?
2. Jolene lost her wallet at the mall. It had in it. When she got home her brother felt sorry for her and gave her . Represent this situation with an expression involving rational numbers. What is the overall change in the amount of money Jolene has?
3. Isaiah is completing a math problem and is at the last step: . What is the answer? Show your work.
4. A number added to its opposite equals zero. What do you suppose is true about *a sum added to its opposite*?

Use the following examples to reach a conclusion. Express the answer to each example as a single rational number.

* 1.
	2.