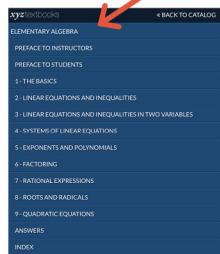


## INSTRUCTOR VIEW

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### Subtraction of Real Numbers 1.4

**Learning Objectives**  
In this section, we will learn how to:

- Subtract real numbers.
- Translate a phrase involving subtraction into a mathematical expression.

**Introduction**  
Use that the temperature at noon is  $20^\circ$  Fahrenheit and 12 hours later, at night, it has dropped to  $-15^\circ$  Fahrenheit. What is the difference between the temperature at noon and the temperature at midnight? Intuitively, we know the difference in the two temperatures is  $35^\circ$ . We also know that the word difference means subtraction. The difference between 20 and  $-15$  is written  $20 - (-15)$ .

It is true that  $20 - (-15) = 35$ . In this section we will see how our definition of subtraction confirms that this last statement is in fact correct. In the previous section we spent some time developing the rule for addition of real numbers. Because we want to make as few rules as possible, we can define subtraction in terms of addition. By doing so, we can then use the rule for addition to solve our subtraction problems.

**DEFINITION**  
To subtract a real number from another, simply add its opposite. Algebraically, the rule is written like this: If  $a$  and  $b$  represent two real numbers, then it is always true that

$$a - b = a + (-b)$$

To subtract  $b$  add the opposite of  $b$

**EXAMPLE 1** Subtract all possible combinations of positive and negative 7 and 5.

**SOLUTION**

$$\begin{array}{l} 7 - 2 = 7 + (-2) = 5 \\ -7 - 2 = -7 + (-2) = -9 \\ 7 - (-2) = 7 + 2 = 9 \\ -7 - (-2) = -7 + 2 = -5 \end{array}$$

Subtracting 2 is the same as adding  $-2$   
Subtracting  $-2$  is the same as adding 2

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