CHAPTER 7 SOLVING EQUATIONS

Section 7.1

READING AND SELF-DISCOVERY QUESTIONS 7.1

1. What happens when the same number is added to both sides of an equation?

   The equation is still equivalent (addition property of equality).

2. Can a variable term be added to both sides of an equation in the same way a constant can?

   Yes, the addition property of equality is applicable.

3. What is the goal of solving an equation?

   Finding the solution set that makes the equation true.

4. If an equation states that the opposite of the variable equals a number, what is the solution? For example, if $-x = 7$, what does x equal? (Be sure to respond in general terms and to not simply provide the value of x.)

   This equation format represents the logic of finding the opposite of the constant. By multiplying both sides of the equation by -1, we get x on one side and -1 times the constant on the other. -1 times a number is the opposite of the number. In this case, the opposite of 7 would be -7, since that number makes the equation true.

CRITICAL THINKING QUESTIONS 7.1

1. When solving an equation, why is it critical to perform the identical operation with the same number or variable on each side?

   You must follow the properties of equality for addition, subtraction, multiplication and division. Note: You can't let the variable take on the value of zero when performing multiplication or division.

2. How would you use the idea of a balanced seesaw to explain the process of solving an equation?

   You must do the same thing on both sides of the scale, e.g., you must add or subtract the same quantity from both sides to keep the scale balanced, or scale the quantities proportionally.

DEMONSTRATE YOUR UNDERSTANDING 7.1

1. Write a paragraph explaining how to solve the equation: $-5 = -2(5x) - 6x$

Remove the parentheses by multiplying -2 by 5*x*, which gives -10*x*. Then combine the terms with variables by subtracting 6*x* from -10*x*. This will simplify to -16*x* on the right side of the equation. The next step is to divide both sides of the equation by the coefficient of the variable: -16. This gives -5/-16 = *x* which is the same as 5/16 = *x*. It doesn't matter that the variable is on the right; we can rewrite it, if we want: x = 5/16. Finally, validate the solution by substituting 5/16 for *x* in the original equation.

IDENTIFY AND CORRECT THE ERRORS 7.1

In the second column, identify the error(s) you find in each of the following worked solutions. Describe the error made in the second column. Solve the problem correctly in the third column.

Problem	Describe Error	Correct Process
1. Solve: $x + 16 = -4$ **Worked Solution** *(What is wrong here?)* $x + 16 = -4$ $-16 \quad -16$ $\boldsymbol{x = -12}$	**The student subtracted rather than added on the right side of the equation.**	$x + 16 = -4$ $-16 = -16$ $x = -20$
Problem	**Describe Error**	**Correct Process**
2. Solve: $x + 8 = 6$ **Worked Solution** *(What is wrong here?)* $x + 8 = 6$ $+8 \quad +8$ $\boldsymbol{x = 14}$	**The student added 8 rather than adding -8.**	$x + 8 = 6$ $-8 = -8$ $x = -2$