CHAPTER 3 Introduction to Equations and Algebraic Expressions

Section 3.1

TERMINOLOGY 3.1

For each of the following terms, provide 1) a definition in your own words, 2) the formal definition (as provided by your text or instructor), and 3) an example of the term using a drawing or problem. A sample filled-out form is available in the Introduction.

Equation

Your definition	
Formal definition	
Example	

Addition Principle of Equality

Your definition	
Formal definition	
Example	

Solve

Your definition	
Formal definition	
Example	

Solution

Your definition	
Formal definition	
Example	

Check a Solution

Your definition	
Formal definition	
Example	

READING AND SELF-DISCOVERY QUESTIONS 3.1

1. How would you describe the *opposite* of a given number?

   The opposite of a number is a number that is the same distance from the zero as the original number, but on the opposite side of zero.

2. What happens when you add a number and its opposite?

   The sum of a number and its opposite is zero.

3. What is the difference between an expression and an equation?

   An equation always has an equal sign indicating that two expressions are equal. An expression never has an equal sign.

4. When we talk about the *solution* of an equation, what do we mean?

   We mean a number that, when substituted into the equation for the variable, results in a statement that is true. The number 5 is a solution to the equation $2x - 7 = 3$**, because** $2(5) - 7 = 3$ **is a true statement, because 3 = 3 is a true statement.**

5. If a number is added to one side of an equation, what else must be done?

   If the resulting equation is to be equivalent to the original equation, you must add the same number to the other side of the equation.

6. What single word best describes the process you use when you check to verify that a number is the solution of an equation?

Substitution or Validation (both are correct)

CRITICAL THINKING QUESTIONS 3.1

1. How are the equations $4x = 12$ and $x = 3$ related?

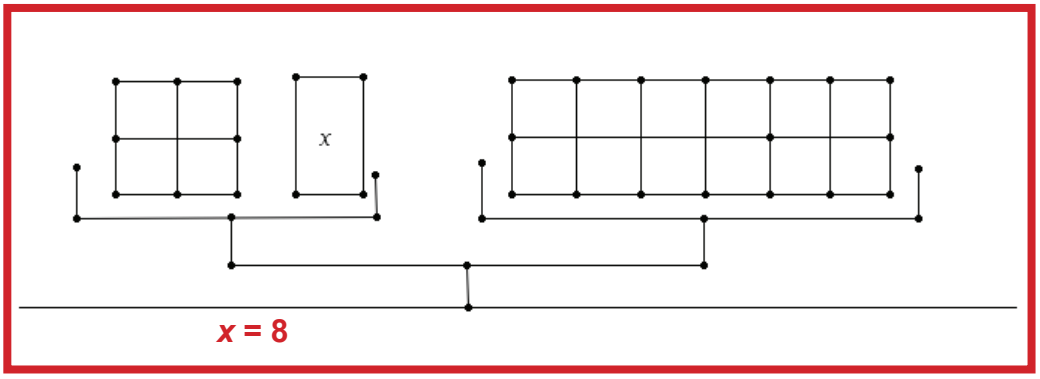
These two equations are equivalent because they have the same solutions, i.e., the number 3.

2. What do you do if you check your solution to an equation and it does not work?

You check your work, since you have made some kind of error.

DEMONSTRATE YOUR UNDERSTANDING 3.1

1. Draw an algebra balance scale for the equation $4 + x = 12$. Solve the equation and check your answer.



Answer: **4 + (8) = 12**
12 = 12

2. Solve: $5 + x = -8 - 2$

$5+x=-8-2$

$5+x-5=-8-2-5$

$x=-15$

Validate:

$5+(-15)=-8-2$

$-10=-10$

3. Is 4 a solution to $t + 6 = 11$? If not, what is the correct solution?

No, 4 is not a solution.

$$4 + 6 \stackrel{?}{=} 11$$
$$10 \neq 1$$

The correct solution is $t = 5$.

4. Make up an equation in the format $x + a = c$ that has 3 as a solution.

Answers will vary.

IDENTIFY AND CORRECT THE ERROR 3.1

In the second column, identify the error(s) you find in the following worked solution and describe the error made. Solve the problem correctly in the third column.

Problem	Describe Error	Correct Process
Solve: $-10 = x + 5$ **Worked Solution** *(What is wrong here?)* $-10 = x + 5$ $\underline{\qquad -5}$ $\mathbf{-10 = x}$	**The student failed to subtract 5 from BOTH sides of the equation.**	$-10 = x + 5$ $\underline{-5 \qquad -5}$ $-15 = x$