2.8. Equations

$$\textit{Left Side} = \textit{Right Side}$$

Equations are similar to equalities. An **equation** asks you to find a value of an unknown. To solve an equation means to find the value of the unknown.

Example 1: Find the missing value in the following equality:

$$\_\_\_\_\_ - 5 = 8$$

Solution: *We have to find a number that when reduced by 5 gives 8.*

$$\underline{\quad 13 \quad} - 5 = 8$$

Example 2: Find the unknown x in the following equation:

$$\underline{\quad x \quad} - 9 = 11$$

Solution: *We have to find a number* x *that when reduced by 9 gives 11.*

$$\underline{\quad 20 \quad} - 9 = 11$$

The unknown number x *is 20:*

$$x = 20$$

Practice 1: Find the missing values.

a) $\_\_\_\_\_ + 8 = 20$

b) $36 - 27 = x \quad \rightarrow \quad x = \_\_\_\_\_$

c) $x + 14 = 20 \quad \rightarrow \quad x = \_\_\_\_\_$

$$\textit{Left Side} = \textit{Right Side}$$

Example 3: Add 5 to the left and right sides of the equality:

$$25 - 10 = 15$$

Solution:

$$25 - 10 + 5 = 15 + 5$$

Test both sides:

$$\begin{aligned} \text{left side} &= \text{right side} \\ \underbrace{25 - 10} + 5 &= \underbrace{15 + 5} \\ \underbrace{15 \quad + 5} &= \quad 20 \\ 20 \quad &= 20 \end{aligned}$$

Practice 2: Verify that the equality

$$15 - 3 = 24 \div 2$$

holds true by evaluating each side separately. What would happen to the equality if we add 10 to the right side?

Example 4: Add 5 to the left and right sides of the equation:

$$x - 5 = 10$$

Solution: *If we add/subtract a convenient number, we'll get the value for* x*!*

$$\overbrace{x - 5 + 5}^{-5+5=0} = \underbrace{10 + 5}$$

$$x = 15$$

In order for the equality to hold true, x *must have the value of 15, and nothing else.*

Practice 3: Add 3 to the left and right sides of the equation:

$$x - 3 = 10$$

Practice 4: Add 10 to the left and right sides of the equation:

$$x - 10 = 0$$

Practice 5: Add 6 to the left and right sides of the equation:

$$x - 6 = 8$$

Practice 6: What number needs to be added to both sides to make the left side "x"?

$$x - 7 = 3$$

Practice 7: What number needs to be added to both sides to make the left side "x"?

$$x - 2 = 9$$