

2.8. Equations

Left Side = 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:

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

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

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

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

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

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

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

The unknown number x is 20:

$$x = 20$$

Practice 1: Find the missing values.

a) $\underline{\quad\quad} + 8 = 20$

b) $36 - 27 = x \quad \rightarrow \quad x = \underline{\quad\quad}$

c) $x + 14 = 20 \quad \rightarrow \quad x = \underline{\quad\quad}$

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

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:

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

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 !

$$\begin{array}{c} -5+5=0 \\ \underbrace{\hspace{1.5cm}} \\ x - 5 + 5 = 10 + 5 \\ \underbrace{\hspace{1.5cm}} \\ x = 15 \end{array}$$

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 ”?

$$x - 2 = 9$$