Variables, Expressions, and Equations

A **variable** is used to express the **unknown**; we usually use the letter **x**.

An **expression** is a collection of numbers, variables, and variable symbols [For example $+, -$].

Example 1:

Evaluate the expression:

$$x + 4 \qquad when \;\; x = 9$$

Here we replace x with 9 and simplify

$$x + 4 \quad \rightarrow \quad 9 + 4 = \_\_\_\_\_$$

An **equation** is a statement that two variable expressions are equal.

Example 2:

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a) $x + 2 = 5$ is an equation. Translated into words, it states that the quantity $x + 2$ is the same as 5, and asks **what number do you add 2 to, in order to get 5?**

Answer: $x =$ _____

Example 3:

Translate $\mathbf{14 - x = 10}$ into a word statement and then solve for $\boldsymbol{x}$.

Translation: What number do you subtract from 14 to get 10?

Answer: $\boldsymbol{x} =$ _____

Example 4:

Evaluate $\boldsymbol{x + 9}$ for the given values of $\boldsymbol{x}$.

a) $x = 6$

If $x = 6$, then $\boldsymbol{x + 9}$ becomes $6 + 9 = \mathbf{15}$.

b) $x = 2$

Answer: $\boldsymbol{x} =$ _____

c) $x = 10$

Answer: $\boldsymbol{x} =$ _____

Example 5:

Evaluate:

$$\frac{6x + y^2}{5x + 4y} \qquad for\ x = 2, y = 1$$

To evaluate this expression, we replace x with 2 and y with 1, then simplify. (Remember your order of operations, PEMDAS).

$$= \frac{6(2) + (1)^2}{5(2) + 4(1)}$$

$$= \frac{6(2) + 1}{5(2) + 4(1)} \qquad exponents\ first$$

$$= \frac{12+1}{10+4} \qquad then\ multiplication$$

$$\boxed{= \frac{13}{14}}$$

NOTE: Always check to see if the fraction can be reduced.

Example 6:

Is $x = 4$ a solution to the equation $3 - x = 1$?

First we replace x with 4, then simplify. Then determine if the equation is true.

$$3 - x = 1? \qquad replace\ x\ with\ 4$$

$$3 - 4 = 1 \qquad simplify$$

$$-1 = 1 \qquad Is\ this\ true?$$

NO, therefore $x = 4$ is not a solution to $3 - x = 1$.

Variables, Expressions and Equations

Practice Problems

1. Evaluate

$x + 7 \qquad for\ x = 9$

2. Evaluate

$\frac{x+2y}{x^2+y} \qquad for\ x = 3, y = 1$

3. Is $x = 3$ a solution to the equation $2x^2 - 1 = 35$?