Equations & Word Problems

Review

When numbers and variables are combined to form mathematical operations, it's called an **expression** e.g. $3 + x - 6$

In the expression $6x^2 + 3x$

- the **terms** are $6x^2$ and $3x$,
- the **coefficient** of x^2 is 6 and the coefficient of x is 3.
- A term that is just a number by itself is called a **constant** or constant term

The key to solving word problems is converting the words into the language of mathematics by assigning a variable to the quantity that you seek. Then build an equation to solve for that variable.

When solving an equation, check the answer by substituting it back into the original equation. If the original equation is not satisfied, then we made a mistake.

Questions:

Source: Art of Problem Solving, *Prealgebra,* Chapter 5

1. Simplify the following: $2r + 3r - 7y$
   Question 5.1.1a

2. Simplify the following: $-3(1 + 3t) - (t + 3)(1 + 4)$
   Question 5.1.2c

3. Solve the equation $\frac{x-3}{7} = 2$.

Question 5.2.4

4. Solve the equation $3(r - 7) = 24$.

Question 5.2.5

5. If $3x - 2 = 11$, then what is the value of $6x + 5$?

Question 5.3.3

6. Six plus half of a number equals four plus one-third of the same number. What's the number? Question 5.19

7. My sister and I are buying a television for our room. Because I am older, I will pay $45 more than my sister. If the television costs $299, then how much does my sister have to pay? Question 5.21

8. Three years ago, I was two-thirds as old as I will be eight years from now. How old am I now? Question 5.24

9. What integer is tripled when nine is added to three-fourths of it? Question 5.4.4

10. The sum of the ages of three children is 32. The age of the oldest is twice the age of the youngest. The two older children differ by three years. What is the age of the youngest child? Question 5.4.5

11. Tom multiplied a number by $2\frac{1}{2}$ correctly and got 50 as an answer. However, he was supposed to have divided the number by $2\frac{1}{2}$. What answer should he have found? Question 5.43

12. From a certain apple tree, Jenny picked $\frac{1}{4}$ of the apples and Lenny picked $\frac{1}{3}$ of the apples. Penny picked the rest of the apples. If Lenny picked 7 more apples than Jenny did, how many apples did Penny pick? Question 5.46

13. The five members of the computer club decided to buy a used computer, dividing up the cost equally. Later, three new members joined the club and agreed to pay their fair share of the purchase price. This resulted in a savings of $15 for each of the original five members. What was the price of the used computer? Question 5.47

14. The manager of a company planned to distribute a $50 bonus to each employee from the company fund, but the fund contained $5 less than what was needed. Instead, the manager gave each employee a $45 bonus and kept the remaining $95 in the company fund. How much money was in the company fund before any bonuses were paid? Question 5.49

15. My teacher gave me a number and told me to subtract 5 from the number and then multiply the result by 8. Unfortunately, I wasn't really listening. I thought she told me to subtract 8 first and then multiply the result by 5. I did those computations correctly, and came up with 70 as my answer. What is the correct answer to the question my teacher actually asked me? Question 5.50