



Problem of the Week

Problem C and Solution

Change Adds Up

Problem

Phil Banks loves to save coins. He has a particular coin bank that he has been filling for a long time with only nickels (5 cent coins) and dimes (10 cent coins). Recently, his bank was full so Phil counted his money and discovered that he had exactly \$10 in his bank. He also observed that he had 11 less dimes than nickels in his bank. How many coins were in Phil's bank?

Solution

Solution 1

In this solution we will solve the problem without using equations.

Phil had 11 less dimes than nickels. In other words, there are 11 more nickels than dimes. These 11 nickels are worth $11 \times 5 = 55\text{¢}$ or \$0.55. The remaining $\$10.00 - \$0.55 = \$9.45$ would be made up using an equal number of nickels and dimes. Each nickel-dime combination is worth 15¢ or \$0.15. By dividing \$9.45 by \$0.15 we determine the number of 15 cent combinations that are required to make the total. Since $\$9.45 \div \$0.15 = 63$ we need 63 nickel-dime pairs. That is, we need 63 nickels and 63 dimes to make \$9.45. But there are 11 more nickels. Therefore, there is a total of $63 + 63 + 11 = 137$ coins in his bank.

Solution 2

In this solution we will solve the problem using an equation.

Let d represent the number of dimes and $(d + 11)$ represent the number of nickels. Since each dime is worth 10¢ , the value of d dimes is $(10d)\text{¢}$. Since each nickel is worth 5¢ , the value of $(d + 11)$ nickels is $5(d + 11)\text{¢}$. The bank contains a total value of \$10 or 1000¢ . Therefore,

$$\text{Value of Dimes (in } \text{¢}) + \text{Value of Nickels (in } \text{¢}) = \text{Total Value (in } \text{¢})$$

$$10d + 5(d + 11) = 1000$$

$$10d + 5d + 55 = 1000$$

$$15d = 1000 - 55$$

$$15d = 945$$

$$d = 63$$

$$d + 11 = 74$$

There are 63 dimes and 74 nickels for a total of $63 + 74 = 137$ coins in his bank.

