



Problem of the Week

Problem D and Solution

Spare Change

Problem

Kees emptied his piggy bank of all its 34 coins with a total value of \$5.30. The coins are nickels, dimes or quarters only. There are twice as many quarters as dimes. How many of each type of coin does Kees have?

Solution

Let n be the number of nickels, d be the number of dimes and q be the number of quarters.

From the total number of coins we get the equation $n + d + q = 34$ (1).

From the value of the coins we get the equation $5n + 10d + 25q = 530$ (2).

We also know that $q = 2d$ (3).

Substituting equation (3) into equation (1) and simplifying

$$\begin{aligned}n + d + 2d &= 34 \\n + 3d &= 34 \quad (4)\end{aligned}$$

Substituting equation (3) into equation (2) and simplifying

$$\begin{aligned}5n + 10d + 25(2d) &= 530 \\5n + 60d &= 530 \\n + 12d &= 106 \quad (5)\end{aligned}$$

We can isolate n in equation (4) to get $n = 34 - 3d$.

We can isolate n in equation (5) to get $n = 106 - 12d$.

We equate the two n 's and solve for d :

$$\begin{aligned}34 - 3d &= 106 - 12d \\-3d + 12d &= 106 - 34 \\9d &= 72 \\d &= 8\end{aligned}$$

We now substitute $d = 8$ into equation (4) to solve for n :

$$\begin{aligned}n + 3d &= 34 \\n + 3(8) &= 34 \\n + 24 &= 34 \\n &= 10\end{aligned}$$

Finally, substitute $d = 8$ into equation (3) to find $q = 2(8) = 16$.

Therefore, Kees has 10 nickels, 8 dimes and 16 quarters.

