Problem of the Week
Problem A and Solution
What's in the Pouch?

Problem

Zoha's class is raising money for a local charity. The class puts any money raised into a pouch, and each Thursday their teacher creates a math problem about the money in the pouch.

The following note was attached to the pouch today.

> This pouch contains a total of $20.30 in Canadian money consisting of 4 coins and 3 bills.
> What are the specific bills and coins in the pouch?

What is the solution to the problem? Justify your answer.

Note: The coins available in Canada are nickels that are worth 5 cents, dimes that are worth 10 cents, quarters that are worth 25 cents, loonies that are worth $1, and toonies that are worth $2. Also, $1 is equal to 100 cents. The lowest denominations of bills are worth $5, $10, and $20.

Solution

The pouch cannot include a $20 bill since there is only 30 cents more than $20, and that would mean the pouch only contained 1 bill. Similarly, it cannot include two $10 bills since this would mean the pouch only contained 2 bills.

If it has one $10 bill and two $5 bills, then that would be a total of $20. This is three bills. In this case, there are 30 cents remaining, which can be formed by:

- 1 quarter and 1 nickel for a total of 2 coins
- 3 dimes for a total of 3 coins
- 2 dimes and 2 nickels for a total of 4 coins
- 1 dime and 4 nickels for a total of 5 coins
- 6 nickels for a total of 6 coins

So one possibility is that the pouch contains one $10 bill, two $5 bills, two dimes, and two nickels. However, we should check to see if this is the only possibility.

Could it have three $5 bills which is $15? This means there would be $5.30 remaining. The fewest number of coins you need to make $5 is two toonies and one loonie, which is a total of 3 coins. But you need at least 2 coins to make up 30 cents. So you need at least 5 coins to make $5.30, which is too many coins.

Any more attempts to come up with $20 would take more bills and coins. So the only possibility that meets the requirements of the problem is one $10 bill, two $5 bills, two dimes, and two nickels.