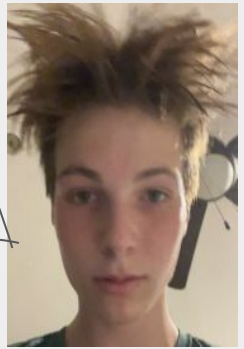
Counterfeit Coin Problem

Problem 1 Definition

You can have 9 of my gold coins if you figure out which one is the counterfeit/lighter one with the minimum amount of weighings!!!!!! Otherwise i nerf you!

That is so easy!! Im gonna take your money silly man



Solution

Let us see how many weighings we can do with 3 coins.

In the case of three coins we are able to compare any two coins, if they weigh the same we know it is the third, and if they do not weigh the same we know it is the lighter one.

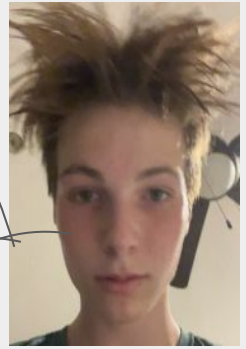
We now know that if we have 3 coins we can find the counterfeit one in 1 weighing. How can this be applied to our 9 coin case?

We can weigh two sets of three of the coins in order to determine in which set of three the lighter coin is. The result is that we can determine which coin is lighter in 2 moves.

Syoma Sad

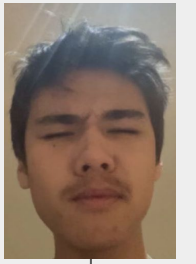
NOOOOOO i cant believe you solved it, time for me to call in some back up!!

Man that was so easy. You've been thwarted!



What?!?!?!??!?!??!?!?!??!?

Problem 2 Definition



Uh oh!

Well I have 12 coins, and I wont tell you if the counterfeit one is lighter or heavier!!!! If you can determine which is counterfeit in 3 moves, u will get my 12 coins, if not u have to give silly stoma his coins back.

We really got you now!!!!

How to do

How many coins should we compare on the first weighing?

If we do 1 we are left with way too many coins if they are equal weight. Same issue with 2-3.

Let's try 4 coins.

If the scale results in an even reading, we know the counterfeit coin must be in one of the 4 unweighted coins.

Same Weight Case.

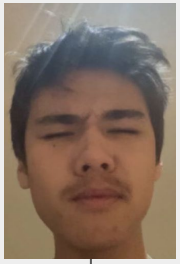
Place 3 unknown coins on the scale with 3 known real coins. If the unknown coins side is lighter/heavier this is the same case with 3 coins from before. If they're the same weight we know the remaining unknown coin is the counterfeit one.

What if the scale was not even?

Different Weight Case.

Remove three coins from the heavier side, move three coins from the lighter side to the heavier side, replace these coins with coins that were not weighed the first time. If the result is the same, it must be one of the coins not moved, we can compare either one of them against a known coin to determine which of the two is counterfeit. If the scale tips the other way, we know one of the coins we moved to the other side is lighter. Again the same case with 3. If the scales are even we know one of the ones removed was heavier. Once again, the case with 3 coins.

Story Conclusion



Darn it duderooni!

NOOOOOO, now i am not happy!

You really thought you could get me with that? You guys are so stupid!!!! This was so easy you losers, thank you for the coins!!!!

Patrick Fu Slide