

UW Math Circle
Puzzle Night!
March 19, 2015

1. You have two egg timers (like mini hourglasses), one that measures 3 minutes and one that measures 5 minutes. How can you use these two timers to measure exactly 4 minutes?
2. Pirate Jack has 10 piles of 10 gold pieces each, given to him by 10 pirate lords. But, one of the pirate lords gave him a stack of counterfeit gold pieces, each weighing 1 ounce less than the real gold coin. How can Jack determine which stack is counterfeit in just one weighing with a balance scale (if the balance scale tells him how much the sides differ by)?



3. There are twenty coins sitting on the table, ten are currently heads and ten are currently tails. You are sitting at the table with a blindfold and gloves on. You are able to feel where the coins are, but are unable to see or feel if they heads or tails. You must create two sets of coins. Each set must have the same number of heads and tails as the other group. You can only move or flip the coins; you are unable to determine their current state. How do you create two even groups of coins with the same number of heads and tails in each group?

4. There are one thousand lockers and one thousand students in a school. The principal asks the first student to go to every locker and open it. Then he has the second student go to every second locker and close it. The third goes to every third locker and, if it is closed, he opens it, and if it is open, he closes it. The fourth student does this to every fourth locker, and so on. After the process is completed with the thousandth student, how many lockers are open?



5. You have a large cubical block of cheese, 3 inches on each side, and you wish to cut it into 27 smaller 1-inch cubes of cheese. What is the minimum number of cuts it takes to do this?

6. You have two strings whose only known property is that when you light one end of either string it takes exactly one hour to burn. The rate at which the strings will burn is completely random and each string is different. How can you use these strings to measure 45 minutes?

7. You are given a pile of 12 stones, 11 of which are equal in weight and 1 that is slightly lighter or slightly heavier than the rest. If you have a balance scale, what is the minimal number of weighings it would take to find the heavier/lighter stone?

