

UW Math Circle  
September 28th, 2017  
Homework

1. Suppose you are given 3 4-sided dice and each side of each die has one letter printed on it. You roll all three dice at a time and get a three letter word. After eight rolls, you have the following three letter words:

CAT, SON, POD, RIG, PEG, TAP, DIN, APE

What are the letters on each die?

2. In a faraway swamp, there are two kinds of animals: leeches and toads. If you ask a leech a question, it will always lie to you, and if you ask a toad, it will always tell the truth. There are four animals living in the swamp named Dan, David, Debbie, and Diana. They made the following statements:

Dan: "Diana and I are different species."

David: "Debbie is a leech."

Debbie: "David is a leech."

Diana: "Of the four of us, at least two are toads."

How many of these animals are leeches, and how many are toads?



3. There are 5 coins, three of which are real. One is fake and lighter than the real coins and the other is fake but heavier than the real coins. How can you determine which coins are fake using only three weighings?



4. A new group of 5 pirates of different ages have a treasure of 100 gold coins. On their ship, they decide to split the coins using a different scheme: the oldest pirate proposes how to share the coins and the OTHER pirates (not including the oldest) will vote for or against it. If 50% or more of the pirates vote for it, then the coins will be shared that way. Otherwise, the pirate proposing the scheme will be thrown overboard, and the process is repeated with the pirates that remain.

Assuming that all 5 pirates are intelligent, rational, greedy, and do not wish to die, what is the maximum number of coins the oldest pirate can get?