

MATH 8: HANDOUT 11
MATH BATTLE I

1. In a wrestling tournament, there are 100 participants, all of different strengths. The stronger wrestler always wins over the weaker opponent. Each wrestler fights twice and those who win both of their fights are given awards. What is the least possible number of awardees?
2. A committee has 7 members. They keep some important documents in a safe. Can you come up with a way to put some locks on the safe and give the keys to these locks to the committee members so that at least three members need to be present to open the safe? (To open the safe, all locks must be unlocked)
3. Two math teams have to toss a coin to determine which team begins the competition. However, they only have a coin which is known to be loaded: if you toss it, chances of drawing heads and tails are different (and unknown). Can you find a way for these two teams to use this coin and still have a toss-up in which each team has equal chances of winning?
4. We have 4 numbers. If we consider all possible ways to choose two of these numbers and for each such choice, compute the sum of the two chosen numbers, we get the following collection:

2; 5; 9; 9; 13; 16

What are the 4 original numbers?

5. How many ways are there to write the number 2020 as a sum of 3 positive integers, e.g.

$$2020 = 1000 + 1000 + 20$$

$$2020 = 11 + 9 + 2000$$

Assume that the order of terms matters: $19 + 1 + 2000$ is **not** the same as $1 + 2000 + 19$.