Liar’s Dice

Rules: In Liar’s Dice, Four Players roll two dice each. They can look at their own dice, but keep them secret from the other players. One player makes an opening bid. A bid consists of a number from 1 to 6 and a quantity, for example, Three 5s. A bid of Three 5s means that when all players show their dice, there will be at least three total 5s.

The next player then either has to make a higher bid than the previous one, or challenge the previous bid. A higher bid must consist of a higher quantity of some number, or the same quantity of a higher number (so Three 6s and Four 1s are both higher than Three 5s). When you challenge a bid you say, “Liar!”, and everyone turns over their dice. If a bid is challenged and it turns out that it was right (i.e., there were at least Three 5s), then the player who challenged the bid loses a die and a new round begins. If the bid was wrong, then the player who made the incorrect bid loses a die and a new round begins. The round begins with whichever player lost a die, and if that player is eliminated, then with the player to their left.

Play two full rounds before trying to figure out the questions. What happens? Are you surprised?

Questions:

Suppose you have four players, each with two dice.

2) When they all roll, what are the chances that there is at least one 6?

3) If you look at your two dice and see {5,2}, then what are the chances that there are at least two 5s?

4) You are down to one die and the other three players still have two each, and you roll a 5. What are the chances that there are at least two 5s?

5) Why is this game much more complicated than just figuring out these probabilities? If you roll two 6s, are you better off bidding “One 6” or “Two 6s”?