Caden Roberts Lab 2

#azure #carmine proportion ending in azure

10	90	0.4865
20	80	0.4815
30	70	0.4875
40	60	0.5015
50	50	0.5220

Here is the table I got after stimulating the situation in Python. The odds azure is the final ball to be drawn is almost 50/50 regardless of the initial amount of azure and carmine. Because we can only remove a ball if it is the first ball we pull or if the same kind of ball was just drawn before, the low proportion azure can pop up occasionally and not be removed while the carmine quickly disappears, until they are almost equal in number. The lower the number of balls azure starts with, the harder it is to get rid of them. The higher the number of balls carmine starts with, the easier it is to get rid of them. We also remember that the first kind to reach 0 loses as the other can then take as many turns until being the last kind pulled as it takes. This trend works out to 50/50 odds of ending on azure. A great way to think about it is 1 azure and 9 carmine, and we just pulled a carmine. The odds of carmine winning here are 1/100 because there are 1/10 odds we pull the 1 azure and 1/10 odds we replace it to pull it again. This leads us to another possible scenario, 1 azure and 2 carmine and we just pulled carmine. Here, the odds of carmine winning are 1/9 because of the ⅓ odds to pull the azure once and then ⅓ odds to replace it and pull it again. In this situation 8/9 times the game will end up with just 1 azure and 1 carmine, which reflects a true 50/50 odds of winning.