Without Replacement of Cards

#	Heads	Ones or Sixes	Hearts
0	$\left(\frac{1}{2}\right)^3$	$\left(\frac{2}{3}\right)^3$	$\binom{39}{3}/\binom{52}{3}$
1	$3\left(\frac{1}{2}\right)\left(\frac{1}{2}\right)^2$	$3\left(\frac{1}{3}\right)\left(\frac{2}{3}\right)^2$	$13\cdot\binom{39}{2}/\binom{52}{3}$
2	$3\left(\frac{1}{2}\right)^2\left(\frac{1}{2}\right)$	$3\left(\frac{1}{3}\right)^2\left(\frac{2}{3}\right)$	$\binom{13}{2}\cdot 39/\binom{52}{3}$
3	$\left(\frac{1}{2}\right)^3$	$\left(\frac{1}{3}\right)^3$	$\binom{13}{3}/\binom{52}{3}$

#	Heads	Ones or Sixes	Hearts	Product
0	$\frac{1}{8}$	$\frac{8}{27}$	$\frac{703}{1700}$	0.0153159041
1	$\frac{3}{8}$	$\frac{4}{9}$	$\frac{741}{1700}$	0.0726470588
2	$\frac{3}{8}$	$\frac{2}{9}$	$\frac{117}{850}$	0.0114705882
3	$\frac{1}{8}$	$\frac{1}{27}$	$\frac{11}{850}$	0.00005991285
			Total	0.099493464

With Replacement of Cards

#	Heads	Ones or Sixes	Hearts
0	$\left(\frac{1}{2}\right)^3$	$\left(\frac{2}{3}\right)^3$	$\left(\frac{3}{4}\right)^3$
1	$3\left(\frac{1}{2}\right)\left(\frac{1}{2}\right)^2$	$3\left(\frac{1}{3}\right)\left(\frac{2}{3}\right)^2$	$3\left(\frac{1}{4}\right)\left(\frac{3}{4}\right)^2$
2	$3\left(\frac{1}{2}\right)^2\left(\frac{1}{2}\right)$	$3\left(\frac{1}{3}\right)^2\left(\frac{2}{3}\right)$	$3\left(\frac{1}{4}\right)^2\left(\frac{3}{4}\right)$
3	$\left(\frac{1}{2}\right)^3$	$\left(\frac{1}{3}\right)^3$	$\left(\frac{1}{4}\right)^3$

#	Heads	Ones or Sixes	Hearts	Product
0	$\frac{1}{8}$	$\frac{8}{27}$	$\frac{27}{64}$	$\frac{1}{64}$
1	$\frac{3}{8}$	$\frac{4}{9}$	$\frac{27}{64}$	$\frac{9}{128}$
2	$\frac{3}{8}$	$\frac{2}{9}$	$\frac{9}{64}$	$\frac{3}{256}$
3	$\frac{1}{8}$	$\frac{1}{27}$	$\frac{1}{64}$	$\frac{1}{13824}$
			Total	0.097728588