

Blog Entry © Wednesday July 1, 2026, by James Pate Williams, Jr., Calculation of the Probabilities of Poker Hands

We use the Mersenne Twister Pseudorandom Number Generator (PRNG). The seed is the time of day as an unsigned 32-bit integer.

```
#define MAGIC DD // DD in { 10 20 30 40 50 }
#define TOTAL 2598960 // number of possible hands
number of experiments = MAGIC * TOTAL
#define MAGIC 10
Poker Hand Cal_Probability Exp_Probability % Error
Royal Flush 0.0000008080 0.0000015391 47.5000000000
Straight Flush 0.0000111968 0.0000138517 19.1666666667
Four of a Kind 0.0002354403 0.0002400960 1.9391025641
Full House 0.0014543125 0.0014405762 0.9535256410
Flush 0.0019623234 0.0019654015 0.1566170713
Straight 0.0035440330 0.0039246468 9.6980392157
Three of a Kind 0.0211399560 0.0211284514 0.0544507576
Two Pair 0.0475051174 0.0475390156 0.0713060088
Pair 0.4228252070 0.4225690276 0.0606242716
High Card 0.5013216056 0.5011773940 0.0287745482
Runtime in seconds = 15.9970000000
```

C:\Users\James\OneDrive\PokerHandsCPP\x64\Release\PokerHandsCPP.exe (process 30496) exited with code 0 (0x0).
Press any key to close this window . . .

```
#define MAGIC 20
Poker Hand Cal_Probability Exp_Probability % Error
Royal Flush 0.0000015391 0.0000015391 0.0000000000
Straight Flush 0.0000125050 0.0000138517 9.7222222222
Four of a Kind 0.0002446556 0.0002400960 1.8990384615
Full House 0.0014454820 0.0014405762 0.3405448718
Flush 0.0019631314 0.0019654015 0.1155050901
Straight 0.0035309508 0.0039246468 10.0313725490
Three of a Kind 0.0211125604 0.0211284514 0.0752112471
Two Pair 0.0475408625 0.0475390156 0.0038850039
Pair 0.4225828601 0.4225690276 0.0032734193
High Card 0.5015654531 0.5011773940 0.0774294839
Runtime in seconds = 44.9700000000
```

C:\Users\James\OneDrive\PokerHandsCPP\x64\Release\PokerHandsCPP.exe (process 20836) exited with code 0 (0x0).
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```
#define MAGIC 30
Poker Hand Cal_Probability Exp_Probability % Error
Royal Flush 0.0000013467 0.0000015391 12.5000000000
Straight Flush 0.0000125435 0.0000138517 9.4444444444
Four of a Kind 0.0002420712 0.0002400960 0.8226495726
Full House 0.0014381778 0.0014405762 0.1664886040
Flush 0.0019646961 0.0019654015 0.0358914122
Straight 0.0035189973 0.0039246468 10.3359477124
```

Three of a Kind	0.0211089436	0.0211284514	0.0923295455
Two Pair	0.0475513410	0.0475390156	0.0259270051
Pair	0.4226960143	0.4225690276	0.0300511121
High Card	0.5014658684	0.5011773940	0.0575593328

Runtime in seconds = 62.3390000000

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#define MAGIC 40

Poker Hand	Cal_Probability	Exp_Probability	% Error
Royal Flush	0.0000014621	0.0000015391	5.0000000000
Straight Flush	0.0000119086	0.0000138517	14.0277777778
Four of a Kind	0.0002400576	0.0002400960	0.0160256410
Full House	0.0014482139	0.0014405762	0.5301816239
Flush	0.0019616019	0.0019654015	0.1933241973
Straight	0.0035311528	0.0039246468	10.0262254902
Three of a Kind	0.0211316257	0.0211284514	0.0150240385
Two Pair	0.0475294926	0.0475390156	0.0200320513
Pair	0.4226002805	0.4225690276	0.0073959244
High Card	0.5015442042	0.5011773940	0.0731896909

Runtime in seconds = 94.9000000000

C:\Users\James\OneDrive\PokerHandsCPP\x64\Release\PokerHandsCPP.exe (process 3448) exited with code 0 (0x0).
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#define MAGIC 50

Poker Hand	Cal_Probability	Exp_Probability	% Error
Royal Flush	0.0000014236	0.0000015391	7.5000000000
Straight Flush	0.0000120356	0.0000138517	13.1111111111
Four of a Kind	0.0002382338	0.0002400960	0.7756410256
Full House	0.0014458860	0.0014405762	0.3685897436
Flush	0.0019705651	0.0019654015	0.2627251370
Straight	0.0035294502	0.0039246468	10.0696078431
Three of a Kind	0.0211228953	0.0211284514	0.0262966200
Two Pair	0.0475144673	0.0475390156	0.0516381766
Pair	0.4225780774	0.4225690276	0.0021416084
High Card	0.5015869656	0.5011773940	0.0817218665

Runtime in seconds = 82.2770000000

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