

Poker Probability

1. **Two of a kind:**

$$\frac{\binom{13}{4} \cdot \binom{4}{1} \cdot \binom{4}{2} \cdot \binom{4}{1} \cdot \binom{4}{1} \cdot \binom{4}{1}}{\binom{52}{5}}$$

2. **Two Pair:**

$$\frac{\binom{13}{3} \cdot \binom{3}{2} \cdot \binom{4}{2} \cdot \binom{4}{2} \cdot \binom{4}{1}}{\binom{52}{5}}$$

3. **Full House:**

$$\frac{\binom{13}{2} \cdot \binom{2}{1} \cdot \binom{4}{3} \cdot \binom{4}{2}}{\binom{52}{5}}$$

4. **Three of a Kind:**

$$\frac{\binom{13}{3} \cdot \binom{3}{1} \cdot \binom{4}{3} \cdot \binom{4}{1} \cdot \binom{4}{1}}{\binom{52}{5}}$$

5. Straight:

$$\frac{\binom{10}{1} \cdot \left[\binom{4}{1} \cdot \binom{4}{1} \cdot \binom{4}{1} \cdot \binom{4}{1} \cdot \binom{4}{1} - 4 \right]}{\binom{52}{5}}$$

6. Four of a Kind:

$$\frac{\binom{13}{2} \cdot \binom{2}{1} \cdot \binom{4}{4} \cdot \binom{4}{1}}{\binom{52}{5}}$$

7. Flush:

$$\frac{\binom{4}{1} \cdot \left[\binom{13}{5} - 10 \right]}{\binom{52}{5}}$$

8. Straight Flush:

$$\frac{\binom{4}{1} \cdot 10}{\binom{52}{5}}$$