

6	9	13	7
12		10	5
3	1	4	14
15	8	11	2

Better Way to Count 2 Pair



6	9	13	7
12		10	5
3	1	4	14
15	8	11	2

counting 2-pair poker hands
to count, **choose**:

- **set** of 2 ranks for pairs
- suits for the **smaller** rank
- suits for the **larger** rank
- last card



6	9	13	7
12		10	5
3	1	4	14
15	8	11	2

counting 2-pair poker hands

example: **choosing**

$\{9, 4\}, \{\spadesuit, \heartsuit\}, \{\spadesuit, \clubsuit\}, 3\clubsuit$

specifies 2-pair hand:



6	9	13	7
12		10	5
3	1	4	14
15	8	11	2

counting 2-pair poker hands

example: **choosing**

$\{9, 4\}, \{\spadesuit, \heartsuit\}, \{\spadesuit, \clubsuit\}, 3\clubsuit$

specifies 2-pair hand:

$4\spadesuit, 4\heartsuit$



6	9	13	7
12		10	5
3	1	4	14
15	8	11	2

counting 2-pair poker hands

example: choosing

$\{9, 4\}, \{\diamond, \heartsuit\}, \{\diamond, \spadesuit\}, 3\clubsuit$

specifies 2-pair hand:

$4\diamond, 4\heartsuit, 9\diamond, 9\spadesuit$



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November 6, 2015

2pair-alt.5

6	9	13	7
12		10	5
3	1	4	14
15	8	11	2

counting 2-pair poker hands

example: choosing

$\{9, 4\}, \{\diamond, \heartsuit\}, \{\diamond, \spadesuit\}, 3\clubsuit$

specifies 2-pair hand:

$4\diamond, 4\heartsuit, 9\diamond, 9\spadesuit, 3\clubsuit$



Albert R Meyer,

November 6, 2015

2pair-alt.6

6	9	13	7
12		10	5
3	1	4	14
15	8	11	2

Unique representation

Now given a 2-pair hand

$4\diamond, 4\heartsuit, 9\diamond, 9\spadesuit, 3\clubsuit$

have **unique** sets of

- two ranks: $\{4, 9\}$
- suits for 4's: $\{\diamond, \heartsuit\}$
- suits for 9's: $\{\diamond, \spadesuit\}$
- unpaired card: $3\clubsuit$



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November 6, 2015

2pair-alt.7

6	9	13	7
12		10	5
3	1	4	14
15	8	11	2

A Bijection

which shows that the map from
 $[2\text{-set of ranks}] \times [2\text{-set of suits}] \times$
 $[2\text{-set of suits}] \times \text{remaining card}$
 to $\{2\text{-pair hands}\}$

is a **bijection**



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November 6, 2015

2pair-alt.8

6	9	13	7
12		10	5
3	1	4	14
15	8	11	2

counting 2-pair poker hands

to count, choose:

- set of 2 ranks for pairs $\binom{13}{2}$
- suits for the smaller rank $\binom{4}{2}$
- suits for the larger rank $\binom{4}{2}$
- last card $52 - 8 = 44$



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November 6, 2015

2pair-alt.9

6	9	13	7
12		10	5
3	1	4	14
15	8	11	2

Counting 2-pair poker hands and so # 2-pair hands is

#rank 2-sets · #suit 2-sets ·
#suit 2-sets · #remaining cards

$$\binom{13}{2} \cdot \binom{4}{2} \cdot \binom{4}{2} \cdot 44 \checkmark$$



Albert R Meyer,

November 6, 2015

2pair-alt.10