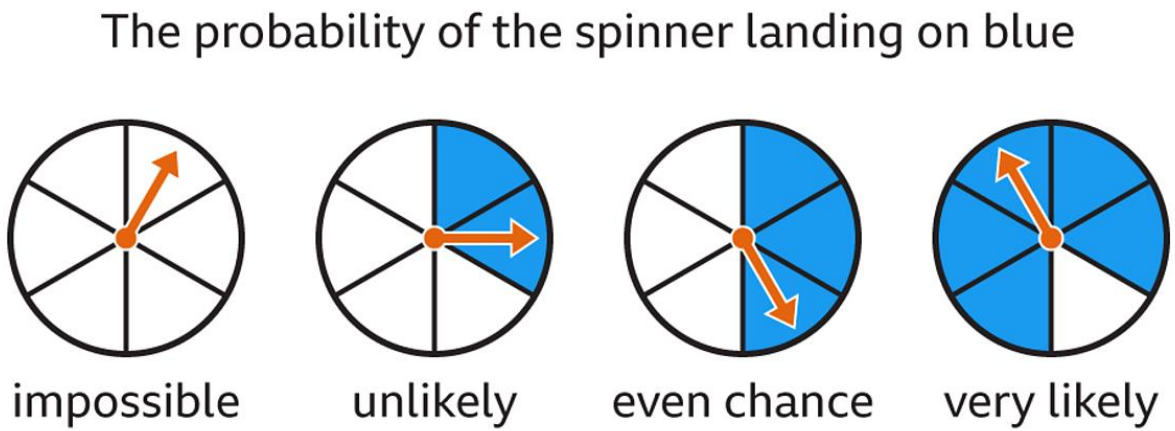
Probability using Permutations and Combinations



The formula for theoretical probability:

$$P(A) = \frac{n(A)}{n(S)}$$

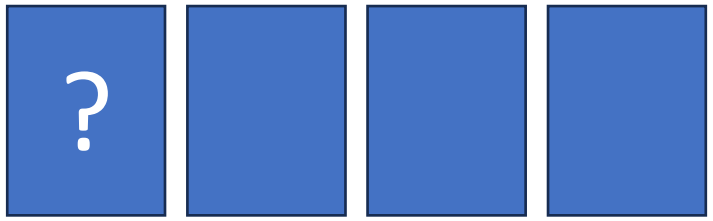
Count how many in A

Count how many in Sample Space

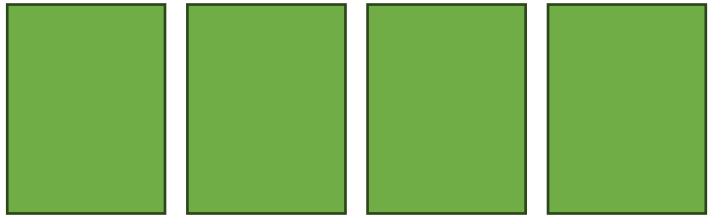
What is the probability that a 4-digit PIN doesn’t have a repeated number?

What is the probability that a 4-digit PIN doesn't have a repeated number?

How many PINS have no repeats?



How many PINS exist in total?



What is the probability that a 4-digit PIN doesn't have a repeated number?

How many PINS have no repeats?

10	9	8	7

How many PINS exist in total?

?			

What is the probability that a 4-digit PIN doesn't have a repeated number?

How many PINS have no repeats?

10	9	8	7

How many PINS exist in total?

10	10	10	10

$$P(no\ repeat) = \frac{n(no\ repeat)}{n(total\ PINs)}$$

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$$= \frac{{}_{10}P_{4}}{10^4}$$

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$$= \frac{5{,}040}{10{,}000}$$

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$$= \frac{{}_{10}P_{4}}{10^4}$$

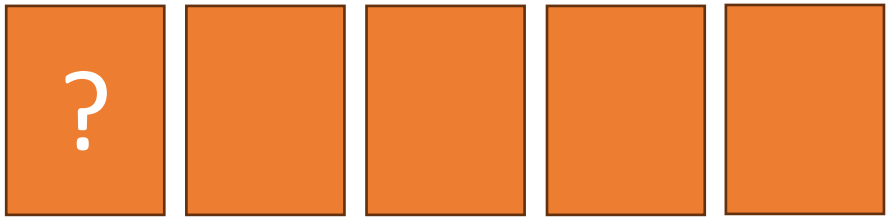
$$= \frac{5{,}040}{10{,}000}$$

$$= 0.504$$

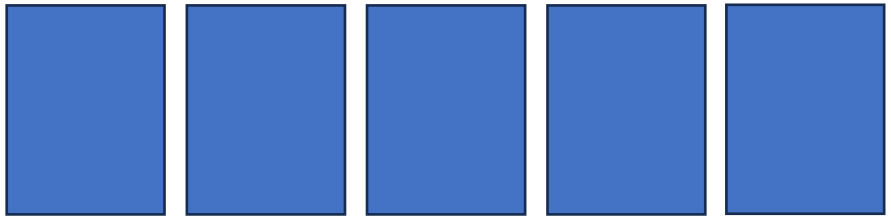
Five cards have the letters A,B,C,D,E on them. The cards are shuffled, what is the probability that A and B are together?

Five cards have the letters A,B,C,D,E on them. The cards are shuffled, what is the probability that A and B are together?

How many with AB together?



How many decks exist in total?



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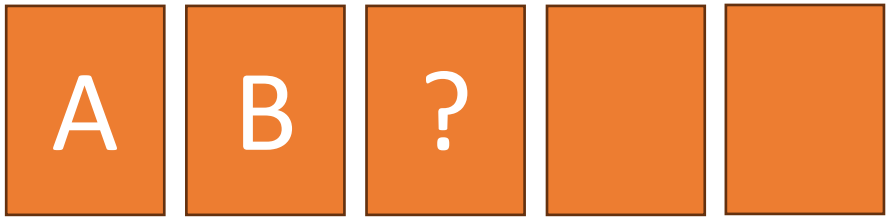

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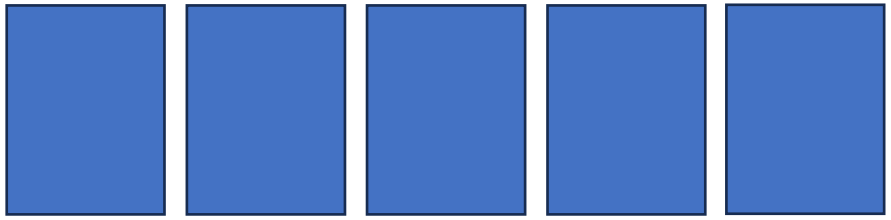

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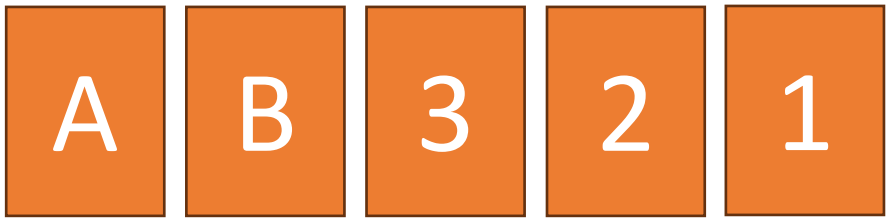
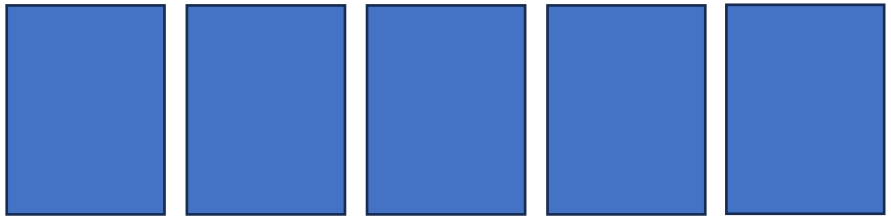


3! x ___ places x ___ can switch

How many decks exist in total?



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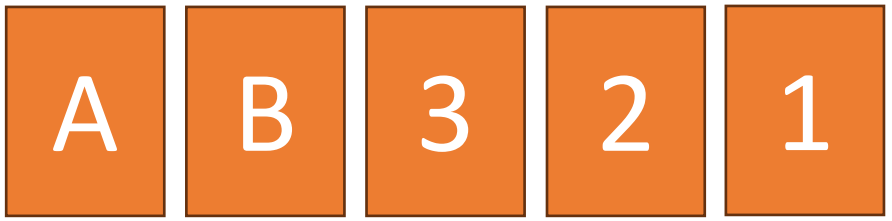
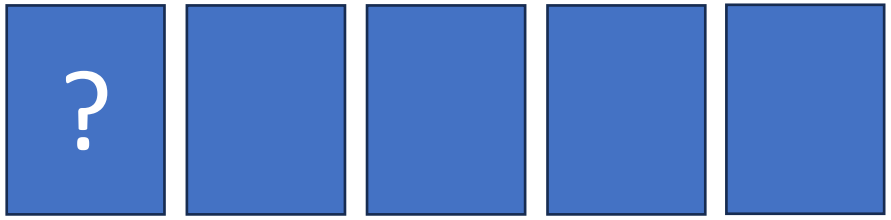


3! x 4 places x 2 can switch

How many decks exist in total?



Five cards have the letters A,B,C,D,E on them. The cards are shuffled, what is the probability that A and B are together?

How many with AB together?

A	B	3	2	1

3! x 4 places x 2 can switch

How many decks exist in total?

5	4	3	2	1

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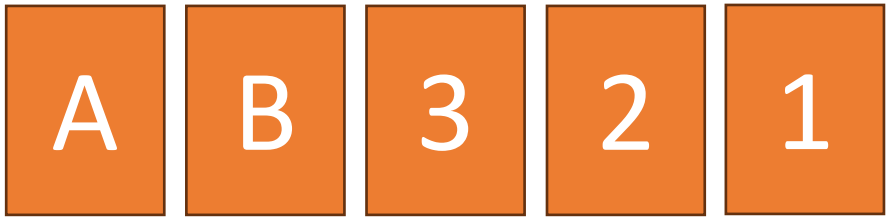
How many with AB together?



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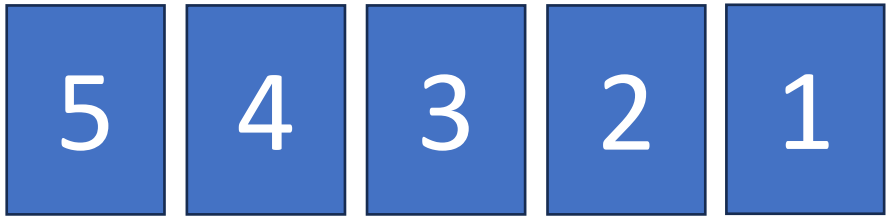

5!

$$P(AB) = \frac{n(AB)}{n(total)}$$

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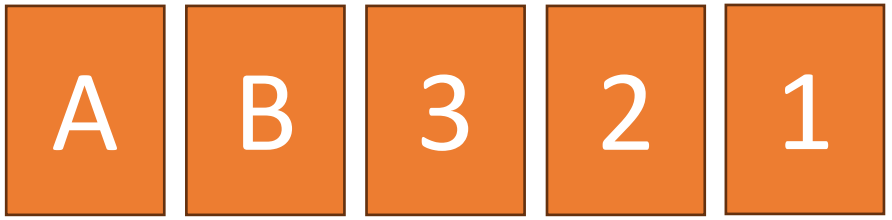

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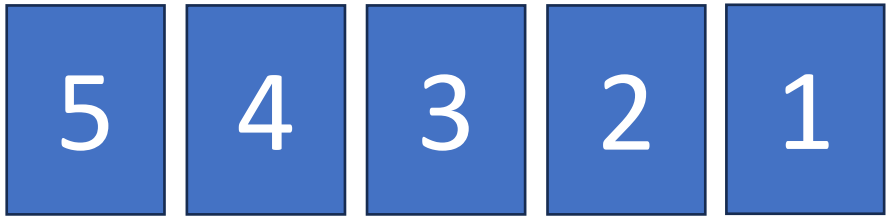

5!

$$P(AB) = \frac{n(AB)}{n(total)}$$

$$= \frac{3! \times 4 \times 2}{5!}$$

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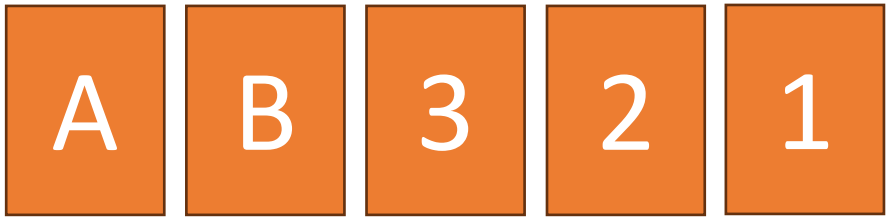
How many with AB together?



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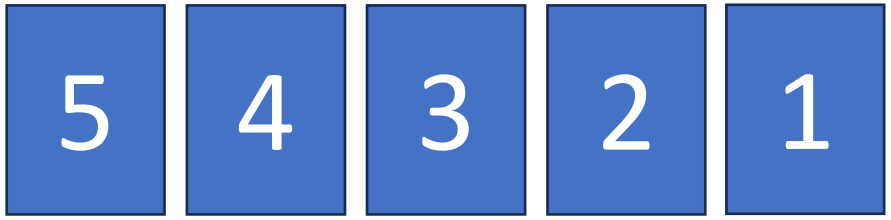

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$$P(AB) = \frac{n(AB)}{n(total)}$$

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$$= \frac{48}{120}$$

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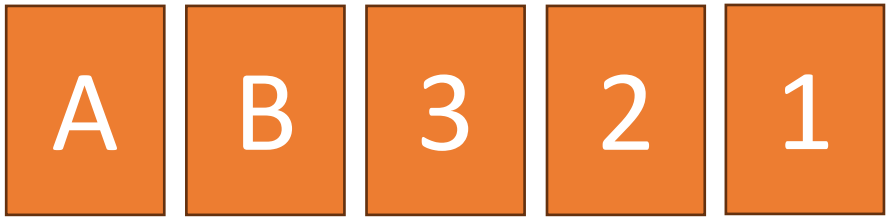
How many with AB together?



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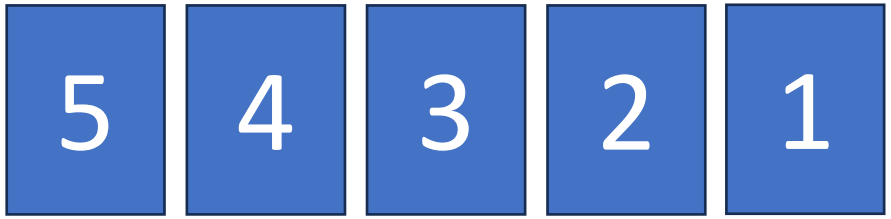

5!

$$P(AB) = \frac{n(AB)}{n(total)}$$

$$= \frac{3! \times 4 \times 2}{5!}$$

$$= \frac{48}{120}$$

$$= 0.4$$

In a team, there are 4 grade tens and 3 grade nines. Among them, 4 people need to be selected for a match. Find the probability of selecting an equal number of grade 9s and 10s for the game.

Google was convinced that polo was the only sport with a 4-person team.

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How many equal 9s and 10s?

9s $\binom{n}{r}$ 10s $\binom{n}{r}$

In total, how many groups?

$\binom{n}{r}$

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How many equal 9s and 10s?

9s	10s
$\binom{3}{2}$	$\binom{n}{r}$

In total, how many groups?

$$\binom{n}{r}$$

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$$P(equal) = \frac{n(equal)}{n(total)}$$

How many equal 9s and 10s?

9s	10s
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$$\binom{7}{2}$$

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9s 10s

$$\binom{3}{2} \quad \binom{4}{2}$$

$$= \frac{\binom{3}{2} \times \binom{4}{2}}{\binom{7}{2}}$$

In total, how many groups?

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$$= \frac{\binom{3}{2} \times \binom{4}{2}}{\binom{7}{2}}$$

$$= \frac{6 \times 3}{35}$$

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$$= \frac{6 \times 3}{35}$$

$$= \frac{18}{35}$$

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$$= \frac{6 \times 3}{35}$$

$$= \frac{18}{35} = 0.514$$