Combinations Continued

Tuesday, October 8, 2019 7:46 AM

Warm-up

A book store has just gotten 10 new books.

a) If the owner wants to display 7 of them beside each other at the front of the store, how many ways can it be done?

Permutation → order matters

⑩ ⑨ ⑧ ⑦ ⑥ ⑤ ④

$_{10}P_7 = 604{,}800$

b) If the owner wants to make a 5-book bundle deal, how many possible bundles are there?

Combination → order doesn't matter

$_nC_r \Rightarrow {}_{10}C_5 = 252$

n: 10 total; r: 5 choose

Deck of Cards

- 52 cards
- 4 suits (Clubs, Spades, Hearts, Diamonds)

  - 13 cards of each suit
- Cards are Ace, 2 - 10, Jack, Queen, King

In poker, you make 5 card hands. (order doesn't matter)

Ex

a) How many 5 card hands are possible?

$$_{52}C_{5} = 2,598,960$$

52 ↑ total

5 ↑ choose

b) how many hands with...

i) 3 black and 2 red cards?

$_nC_r$

$_{26}C_3 \times {}_{26}C_2$

$_{26}C_3$: ↑ Spades + Clubs

$_{26}C_2$: ↑ Hearts + Diamonds

$2600 \times 325 = 845,000$

ii) 3 jacks and 2 kings?

$_4C_3 \times {}_4C_2 = 24$

iii) Flush? (5 cards, same suit)

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in each suit: $_{13}C_5 = 1287$

Choose suit: $_4C_1 = 4$

Choose suit AND choose 5 cards

$1287 \times 4 = 5148$

iv) 4-of-a-kind (4 cards, same rank)

ex $\spadesuit 4, \clubsuit 4, \heartsuit 4, \diamondsuit 4 \mid$ K ← other

↑ 13 ranks of cards (A, 2-10, J, Q, K)

(A, 2-10, J, Q, K)

Choose rank and Choose Cards and Other Card

$13\ C_1 \times 4\ C_4 \times 48\ C_1$

$13 \times 1 \times 48$

$= 624$

lesson #5

#1-12 Skip #3