

Algebra 2

Monday 11-19-12

Class Notes

Ch. 7-1 Permutations & Combinations



order
matters
(more)



order does
NOT matter

FCP = Fundamental Counting Principle

EX. 1A Lunch $\Rightarrow$ 3 entrees
3 sides
Pg 483 4 drinks

16 Utah licence PLATE

3 digits, then 3 letters

- I, O, Q NOT used
- may repeat letters

$N!$ $\Rightarrow$ "N Factorial"

$0! = 1$ LOOK

PERMUTATION — order matters

ⓔX 3 books on shelf

— — — FCP

$$3 \cdot 2 \cdot 1 = 3! \text{ or } \frac{3!}{0!}$$

WAYS TO ARRANGE total
WAYS TO ARRANGE not selected

ⓔX 3 books of 7 total on shelf
(books) (spots)

selected not selected	<u>7</u> · <u>6</u> · <u>5</u>	4 · 3 · 2 · 1
	4 · 3 · 2 · 1	

or $\frac{7!}{(7-4)!}$

$$\Rightarrow \boxed{{}_N P_r = \frac{N!}{(N-r)!}}$$

$\uparrow \quad \uparrow$
 total selected

Suppose order does not matter,

(EX) BOOK 1 BOOK 2 BOOK 3

SAME AS BOOK 2 BOOK 1 BOOK 3

etc...

Since there are $3 \cdot 2 \cdot 1$ ways to arrange 3 books, reduce, by dividing the total "permutations" by $3!$ and call it A Combination

$$(EX) {}_N C_r = {}_7 C_3 = \frac{7!}{(7-4)! 3!}$$

EXTRA term
to make
 ${}_N C_r < {}_N P_r$

$${}_N C_r = \frac{N!}{(N-r)! r!}$$

ways to arrange total
(ways to arrange not selected) (ways to arrange selected)

(EX 3) Adopt 3 kittens from
Pg 485 litter of 11. How
many ways to choose?

P or C ?

$$nC_r = {}^{11}C_3 = \frac{11!}{(11-3)!3!}$$

$$\frac{11 \cdot 10 \cdot 9 \cdot \cancel{8 \dots}}{3 \cdot 2 \cdot 1 (\cancel{8 \cdot 7 \dots})}$$

$$\frac{11 \cdot 10^5 \cdot 9^3}{\underset{1}{3} \cdot \underset{1}{2} \cdot 1} = 55 \cdot 3 = \boxed{165}$$

WAYS
to
Choose

Homework: Pg 486 # 2-8

ex 30 students - choose group members

• Pres. • VP. • Sec. • Treas. • Rep. • Rec

$${}_{30}P_6 = \frac{30!}{(30-6)!} = \frac{30!}{24!}$$

order
is
important

$$30 \cdot 29 \cdot 28 \cdot 27 \cdot 26 \cdot 25 =$$

$$427,518,000$$

possible groups