

Counting Methods

Principles

AND Problems

- use Fundamental Counting Principle. (Multiply)

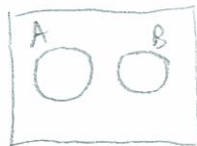
$$\boxed{a \cdot b \cdot c}$$

(Tree diagrams and Grids)

OR Problems

- Mutually Exclusive

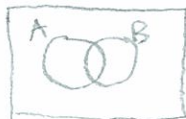
(add)



$$n(A) + n(B)$$

- Not Mutually Exclusive

(add, but subtract overlap)



$$n(A) + n(B) - n(A \cap B)$$

Permutations

- ORDER MATTERS

- Arrange n objects $\rightarrow \boxed{n!}$

- Arrange r objects out of $n \rightarrow \boxed{nPr}$
or Partial Factorial

- Deal with restrictions first

- Identical objects $\rightarrow \boxed{\frac{n!}{a!b!c!}}$

- Grouping

- treat group as a single object, then multiply by ways to arrange the group.

$$\boxed{\quad} \text{---} \text{---} \text{---} = 4! \cdot 2!$$

Combinations

ORDER DOESN'T MATTER

- use $\boxed{{}^nC_r} = \binom{n}{r}$

- AND is multiply

$${}^nC_r \cdot {}^nC_r$$

- OR is add

$${}^nC_r + {}^nC_r$$

- At Least or At Most

- hidden OR type ?'s

At Most 3 = one or two or three

$$\binom{n}{1} + \binom{n}{2} + \binom{n}{3}$$