PETUNE ®

For all your musical pet and pet orchestra needs!

$+$ $\times$

or   and

$|A \cup B|$ $|A \times B|$

"yes" $3!$

           6

"hoo"

hoo
oho
ooh

Permutations of sequence

$(1,1,2,3)$ NOT $(1,2,2,3)$ · has same items

$(2,3,1,1)$ $(3,2,1)$ · has each item in same quantity

$(1,3,1,2)$ $(3,3,2,2,1,1)$ · may have different order

       $(1,1,2,4)$

       $\{1,2,3\}$

(a,b,c)

(a,c,b)

(b,a,c)

(b,c,a)

(c,a,b)

(c,b,a)

To make a permutation of $\overset{distinct}{}$ n-item seq

  → · pick first spot

  → · permute what's left ($n-1$ items)

$() \to 1$ perm

$(x) \to 1$ perm

$\left. \begin{array}{c} n \\ \times \\ n-1 \\ \times \\ n-2 \\ \times \\ \vdots \\ 1 \end{array} \right\} n!$

$+$ $\times$ $\div$

or and duplicates

$$2,10,20,0,1 \qquad \frac{7!}{2!\,2!\,3!}$$

distinct options $= \dfrac{\text{all options}}{\text{duplication rate}}$

"wahoowa"

$$\frac{7!}{2!\,2!\,1!\,2!}$$

hoo	xyz
hoo	xzy
oho	yxz
ooh	yzx
oho	zxy
ooh	zyx

$x = h$
$y = 0$
$z = 0$

$$\frac{3!}{2!} = \frac{3 \cdot 2 \cdot 1}{2 \cdot 1} = 3$$

$$\frac{7!}{8}$$

$\overset{2}{k}$-element subset of $\overset{5}{n}$-element set

$$\frac{5 \cdot \cancel{3} \cdot 4 \cdot 3 \cdot 2 \cdot \cancel{1}}{\cancel{3} \cdot 2 \cdot \cancel{1} \cdot 2 \cdot \cancel{1}} = 10$$

put set in some order (seq) $1 \to$ $\{1,2,3,4,5\}$
                                          $(1,2,3,4,5)$
permute seq $n! \to$ $(3,2,5,1,4)$
keep first k elem $1 \to$ $(3,2)$ $/(n-k)!$
make back into set $1 \to$ $\{3,2\}$ $/k!$

$$= \frac{n!}{(n-k)! \, k!} = \binom{n}{k}$$

Pick an element $-n$
Pick a $k-1$ subset from other elems

$\{1,2,3,4,5\}$
$\{3\} \cup \{ \qquad \}$

$\{3,5\} \quad \{5,3\}$

$$\frac{5 \cdot 4}{k! = 2! = 2} = 10$$

$$\overbrace{\frac{n \cdot (n-1) \cdot (n-2) \cdots (n-k+1)}{k!}}^{k}$$

$$\frac{n \cdot (n-1) \cdot (n-2) \cdots (n-k+1) \cdot (n-k) \cdots 2 \cdot 1}{(n-k) \cdots 2 \cdot 1}$$

$$\binom{n}{k} \quad - k\text{-elem subset of } n\text{-elem set}$$

$$|P(s)| = 2^{|s|}$$

permutation $\dfrac{n!}{\text{duplicates} \dots}$

$$|s^k| = |s|^k$$

$$|A \cap B| = |A| \cdot |B|$$

Or $+$

anc $\times$

dup $\div$

disjunct   Tautology

$P \lor Q$ $\equiv T$

Case P

Case Q