A Table of the *Permutation Function* $_nP_r$

nPr	r										
n		0	1	2	3	4	5	6	7	8	9	10
	1	1	1									
	2	1	2	2								
	3	1	3	6	6							
	4	1	4	12	24	24						
	5	1	5	20	60	120	120					
	6	1	6	30	120	360	720	720				
	7	1	7	42	210	840	2,520	5,040	5,040			
	8	1	8	56	336	1,680	6,720	20,160	40,320	40,320		
	9	1	9	72	504	3,024	15,120	60,480	181,440	362,880	362,880	
	10	1	10	90	720	5,040	30,240	151,200	604,800	1,814,400	3,628,800	3,628,800

Example Use:

How many ways can you select 5 different people, **r**, from a total group,**n** , of 5 people on a bench. $_5P_5$**= 120**

How many ways can 10 runners take 1st, 2nd, and 3rd place in a race. $_{10}P_3$ **= 720**

ORDER MATTERS with Permutations

Combinations Formula – Table. ${}_nC_r$

nCr	r															
n	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	1	1														
2	1	2	1													
3	1	3	3	1												
4	1	4	6	4	1											
5	1	5	10	10	5	1										
6	1	6	15	20	15	6	1									
7	1	7	21	35	35	21	7	1								
8	1	8	28	56	70	56	28	8	1							
9	1	9	36	84	126	126	84	36	9	1						
10	1	10	45	120	210	252	210	120	45	10	1					
11	1	11	55	165	330	462	462	330	165	55	11	1				
12	1	12	66	220	495	792	924	792	495	220	66	12	1			
13	1	13	78	286	715	1,287	1,716	1,716	1,287	715	286	78	13	1		
14	1	14	91	364	1,001	2,002	3,003	3,432	3,003	2,002	1,001	364	91	14	1	
15	1	15	105	455	1,365	3,003	5,005	6,435	6,435	5,005	3,003	1,365	455	105	15	1

Example Usage:

How many ways can a committee of 4 be selected from 12 people? **N = 12, r = 4.** ${}_{12}C_4 = 495$

Do you notice how this tables relates to path way problems??

ORDER DOESN'T MATTER with Combinations. Like the Lotto 6/49!

Notice how ${}_6C_2$ is the same as ${}_6C_4$. Notice how ${}_{10}C_1$ is the same a ${}_{10}C_9$. Notice how ${}_3C_2$ is the same as ${}_3C_1$. Notice how 9C0 is the same as ${}_9C_9$.

See a pattern? ${}_nC_r$ is the same as ${}_nC_{(n-r)}$