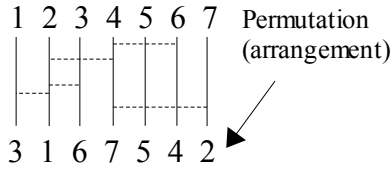


Discrete Mathematics – Day 10 – Sept. 22, 2003



7-Permutation
 1 2 3 4 5 6 7
 3 1 6 7 5 4 7
 7 6 5 4 3 2 1

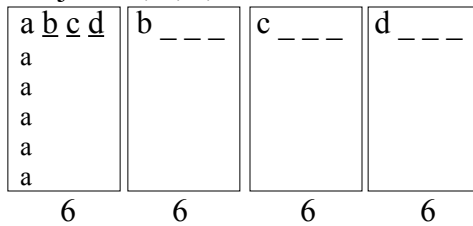
General problem solving strategy – sometimes a question can be thought of as just one question in a whole sequence of questions. Therefore its answer is just one answer in a whole sequence of answers. Try the simpler questions to see if you can find a pattern in the answer.

How many permutations or 7 elements are there?

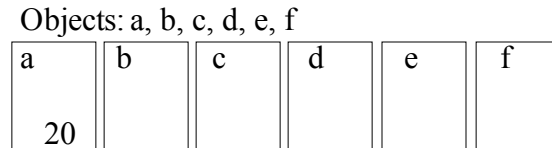
Counting
 $7! = 5040$

n	# of ways to arrange n objects
1	1
2	2 * 2
3	6 * 3
4	24 * 4
5	120 * 5
6	720 * 6
7	5040 * 7
8	40320 * 8
9	362880 * 9
10	3628800 * 10
...	...
n	* (n-3) * (n-2) * (n-1)

Objects: a, b
 arrangements: a b; b a
 Objects: a, b, c
 arrang: a b c; a c b; b a c; b c a; c a b; c b a
 Objects: a, b, c, d



Objects: a, b, c, d, e
 a _____ b _____ c _____ d _____ e _____ f _____
 24 * 5

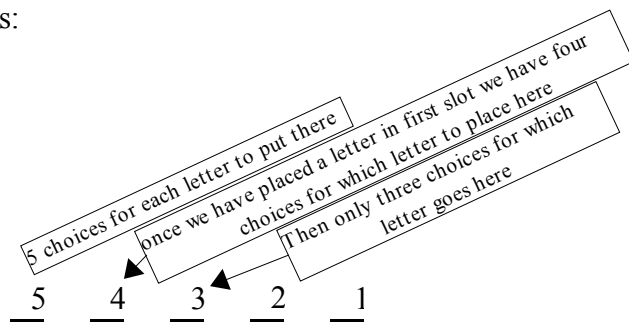
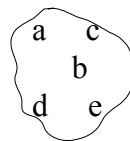


An important skill that makes it possible to find patterns is Systematic Listing and Counting

Thm: the number of ways to arrange n distinct objects is:

$$n * (n-1) * (n-2) * \dots * 2 * 1$$

Def: $n! = 1 * 2 * 3 * \dots * (n-1) * (n)$ say, “n factorial”



How many ways are there to place these 5 letters into these 5 slots? To find the total number of ways to put the letters into the slots multiply -> the *Product Rule* (pg 302)

If you need to complete a job with k tasks, and the tasks have $a_1, a_2, a_3, \dots, a_k$ ways to be performed, then the total number of ways to do the job is $a_1 * a_2 * a_3 * \dots * a_k$.

How many 4-digit odd numbers are there?

$$\frac{9}{1-9} \frac{10}{0-9} \frac{10}{0-9} \frac{5}{\{1, 3, 5, 7, 9\}} = 4500$$