Counting Principles

(how do we count a sample space?)

Independent Events

(the outcome of the second event does not depend on the outcome of the first event)

Find the sample space of rolling a number cube 2 times

11	21	31	41	51	61
12	22	32	42	52	62
13	23	33	43	53	63
14	24	34	44	54	64
15	25	35	45	55	65
16	26	36	46	56	66

Fundamental Counting Principle

If event 1 can occur *n* ways and event 2 can occur *m* ways, then the number of ways both events can occur is

$n \bullet m$

The local deli has 5 choices of meat, 3 cheeses, 4 dressings, and 8 other toppings for their sandwiches. How many different sandwiches with one meat, one cheese, one dressing, and one other topping can you order?

480

How many zip codes are possible in the United States

(pretend a zip code cannot start with a 0 or 1)?

80000

Did you know that ZIP stands for Zone Improvement Plan?

How many ways can you create a security code that starts with a letter and is followed by 3 digits? Digits can repeat.

26,000

What if the event is

dependent?

If the event is dependent,
we must first decide if

order matters

if

order matters

then use

permutations

if

order doesn't matter

then use

combinations

if

order doesn't matter…

$$ {}_nC_r = \frac{n!}{(n-r)!\ r!} $$

in sample space

number taken

Selecting a group of 4 students from 26

14,950

Picking five girls for a dance number from 17 who auditioned.

6,188

Picking 3 pieces of candy from a bag of 30 different types.

4,060

If

order matters...

$$ {}_nP_r = \frac{n!}{(n-r)!} $$

in sample space

number taken

Selecting a Vice President and President from a class of 30.

870

Rearranging the letters in TUESDAY

5,040

Selecting 2 leads for the school musical and 2 supporting characters from the 22 students who tried out.

175,560

what's in a name?