Multiplication Counting Principle:
The number of outcomes is the product of the number of choices for each step.

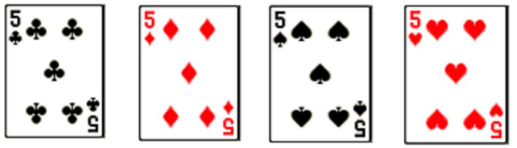
Factorial:
Is mostly used when you are using ALL of a given amount of items and order IS important.

Permutation:
The number of outcomes when order DOES matter.

Combination:
The number of outcomes when order DOESN'T matter.

In the card game of cribbage you get points if your cards add up to 15.

How many ways can you add up to 15 if you have the four 5's in your hand?



IT TAKES 3 of the cards to add to 15.

$_4C_3 = 4$

In both questions order is NOT important.

You also get points for having pairs of cards. How many pairs of 5 can you make if you have four 5's?

$_4C_2 = 6$

IT Takes only 2 of the cards to make a pair

Six students are to be selected for a debate. In the class there are 9 girls and 8 boys. Find the number of ways of selecting these six members if:

a) You will select six girls or six boys.

$_9C_6 + {}_8C_6 = 84 + 28 = 112$

b) You will select 3 girls and 3 boys.

$_9C_3 \cdot {}_8C_3 = 84 \cdot 56 = 4704$

Section 1-6: Probability

2 kinds of probability

Experimental Probability

Using the results of an experiment to predict future outcomes.

$$= \frac{\text{\# times an event occurs}}{\text{Total \# of trials}}$$

Theoretical Probability

Using knowledge of a situation to predict future outcomes.

$$= \frac{\text{\# of favorable outcomes}}{\text{Total possible outcomes}}$$

Sample Space

Sample Space:

The set of all possible outcomes

In a probability question the Sample Space will be the denominator of the answer.

The numbers from 1 to 20 are in a bag. You reach into the bag and randomly pull out a single number. Find each probability as a fraction without reducing.

Theoretical Probability

1. P(muliple of 4) $= \frac{5}{20}$
   4, 8, 12, 16, 20
2. P(factor of 18) $= \frac{6}{20}$
   1, 2, 3, 6, 9, 18
3. P(prime number) $= \frac{8}{20}$
   2, 3, 5, 7, 11, 13, 17, 19
4. P(even and multiple of 3) $= \frac{3}{20}$
   2 4 6 8 10 12 14 16 18 20
   3 6 9 12 15 18
5. P(odd or multiple of 5) $= \frac{12}{20}$
   1 3 5 7 9 11 13 15 17 19
   5 10 15 20
   can't count 5 & 15 twice

You will spin this spinner once. Find each probability as a fraction.

1. P(Factor of 12) $= \frac{5}{8}$
2. P(multiple of 3) $= \frac{3}{8}$
3. P(Prime #) $= \frac{4}{8}$

Theoretical Probab

1, 2, 3, 4, & 6

3 & 6

2, 3, 5, & 7

4. P(Red or Blue) $= \frac{6}{8}$ the 2 red spaces plus the four blue spaces
5. P(Blue and Mult of 4) $= \frac{2}{8}$ only two spaces are both blue AND a mult of 4
6. P(Prime # or Blue) $= \frac{7}{8}$ there are 4 spaces that are prime #'s (2, 3, 5, 7) and three other spaces that are blue that haven't been counted yet (4,6,8).

A survey of people's favorite fruit was conducted. The results are shown below.

Experimental Probability

	Apple	Pear	Orange	Banana	Total
Male	73	64	80	51	268
Female	68	75	83	56	282
Total	141	139	163	107	550

1. P(Apple) $= \frac{141}{550}$

2. P(Banana or Orange) $= \frac{270}{550}$

163 who like oranges together with 107 who like bananas

3. P(Female and Pear) $= \frac{75}{550}$

75 people are both a female AND like pears

4. P(Male or Apple) $\frac{336}{550}$

268 who are males plus the other 68 females who like apples

5. If 75 more people are surveyed approximately how many of them will say that Banana is their favorite?

$\frac{107}{550} = \frac{X}{75}$

Use the probability that someone says bananas to create a proportion in order to find out how many of the next 75 will say bananas.

$X = 14.59 \approx 15$ people