

## Probability Examples Using the Counting Methods

There are 5 women and 4 men in a group, what is the probability that 3 of the women and 2 of the men are chosen from that group to represent them at resort hotel?

We need to choose 3 of the 5 women, that's  ${}^5C_3$

We need to choose 2 of the 4 men, that's  ${}^4C_2$

So using the FCP, after we choose the women, we choose the men, the numerator is;  
 ${}^5C_3 * {}^4C_2$

The total number of things, the denominator, that can happen is  ${}^9C_5$ . Therefore,  
the probability of choosing 3 women and 2 men is  $\frac{{}^5C_3 * {}^4C_2}{{}^9C_5}$

**From 5 coaches and 15 athletes, in how many ways can a cmte of be formed with 2 coaches and 3 athletes?**

From 20 people, we will select 5, the denominator is  ${}_{20}C_5$

Of the 5 coaches, we want 2 that is,  ${}_5C_2$ . Then we want 3 athletes for the 15, that is  ${}_{15}C_3$ .

The probability is  $\frac{{}_5C_2 * {}_{15}C_3}{{}_{20}C_5}$

**A class contains 10 male and 12 female students. Two students are chosen at random, what is the probability that they are of the opposite sex?**

There are 22 students, so there are  ${}_{22}C_2$  ways of selecting two students. One must be male, one must be female. The number of ways males could be chosen is  ${}_{10}C_1$ , the females  ${}_{12}C_1$ .

Therefore the probability is  $\frac{{}_{10}C_1 * {}_{12}C_1}{{}_{22}C_2}$

**A coin is tossed 10 times, what is the probability of obtaining exactly 5 heads?**

**Tossing a coin results in 2 possibilities, heads or tails. Tossing it ten times results in  $2^{10}$  possibilities. Getting 5 heads is  ${}^{10}C_5$ ,**

**therefore the probability is  $\frac{{}^{10}C_5}{2^{10}}$**