The difference between OR and AND NAME:

When studying probability, we may want to find the probability that event A *and* event B occur at the same time, or the probability that event A *or* event B occurs. We'll need to make some distinctions between OR and AND.

We'll use AND if we mean both events will occur at the same time.

We'll use OR if we mean either one, or the other, or both events will occur. Let's look at some examples.

The probabilities on this worksheet can be figured simply by calculating

$$\text{Probability of an event} = \frac{\text{number of successes}}{\text{number of total possibilities}}$$

1a.) Consider rolling a six-sided die and tossing a coin. Write down the sample space.

1b.) What is the probability of rolling an even number AND tossing a heads? Write down the successes from the sample space.

1c.) What is the probability of rolling an even number OR tossing a heads? Write down the successes from the sample space.

Consider picking a single card out of a poker deck. A poker deck contains four suits: diamonds, hearts, spades, and clubs. The diamonds and hearts are red and the spades and clubs are black. Each suit has thirteen cards: Ace, 2, 3, 4, 5, 6, 7, 8, 9, 10, Jack, Queen, and King. This makes a total of 52 cards. A face card will be defined to be a Jack, Queen, or King.

2a.) You are interested in the probability of selecting a red Queen. Is this event represented by “red AND Queen” or “red OR Queen”?

2b.) Find the probability of selecting a red Queen. Write down the successes.

2c.) Find the probability that the card selected will be either red OR a Queen. Describe the successes.

2d.) Find the probability that the card selected will be either red OR a Queen, but not both. Describe the successes.

3a.) Consider the experiment of tossing a single coin. What is the probability that I toss heads OR tails? Count the successes and the possibilities. Since the successes include all the possibilities, what will you get for the probability?

3b.) In general, if two events A and B are the only two events that can occur, then P(A or B) is what numerical value? This should be equivalent to the answer you got above. Essentially, I am asking the same thing.

4a.) Consider the experiment of selecting one marble out of a bag with ten marbles: four green, two blue, three yellow, and one red. What is the probability I select a marble that is red AND green? Again, think about how many successes are in the bag. How many marbles are both red and green?

4b.) In general, if two events A and B cannot occur at the same time, then P(A and B) is what numerical value? Again, this should be equivalent to the answer you got above. Essentially, I am asking the same thing. This is a fact that is used quite a lot, called the "probability of two mutually exclusive events".