Probability

the # of desired results

P=   ------------------------------

Total # of possible results

- Probability will be any value between 0 and 1 inclusive-meaning that we can have a probability of 0 or 1 and everything in between but nothing greater than 1 or less than 0.

Coin Flip:

- If we were asked what the probability is of landing tails, we would say that we have a probability of 1/2 or .5 because there is one desired result out of a total two possible results.

AND & OR

- Whenever we are asked for the probability of one event **AND** a second even we will need to multiply the probability of the two events.

For example, we know that If we were asked what the probability is of landing tails, we would say that we have a probability of 1/2 or .5 because we will land tails half of the time, and half of the time we will land heads; however, if we are asked what the probability of landing tails twice is, we would have take the probability of landing tails once (½) and the probability of landing tails a second time (½) and multiply them: ½ *½ = ¼. Thus, we have a ¼ or .25 chance of landing tails twice in a row.

- When we are asked for the probability of event A **OR** event B happening, we will simply add the probabilities of both events.

For example, we are given that the probability of event A is ⅕ and the probability of event B is ⅖. If we are are asked what the probability is for event A or event B we will add the probability of event A (⅕) and the probability of event B (⅖): ⅕ + ⅖ = ⅗; thus, the probability of event A or event B is ⅗.

Rolling a die:

When we roll a die we have 6 possible events: 1,2,3,4,5, and 6.

If we were asked the probability of rolling a 5 we would have a probability of ⅙ because there is only one event in which we roll a five and there are a total of 6 possible results.

Similar to the coin flip, if we are asked to roll a die twice and get specific results we will multiply the probability of the two events we are asked for. For example, if we are asked for the probability of rolling a 1 AND a 1 on a second roll, we will take the probability of landing a 1 (⅙) and the probability of landing on 1 on a second roll (⅙) and multiply them: ⅙ * ⅙ = $\frac{1}{36}$

Cards:

Key Information:

-There are 52 cards in a standard deck of cards with
-4 suits: Spades, clubs, hearts, and diamonds
-Spades and clubs are black in color; Hearts and diamonds are red.
-Each suit has 13 cards: An ace, 2-10, and the three face cards: Jack, Queen, and King.

For example, if we were asked what the probability is of randomly selecting a red card, we would say that we look to see how many possible red cards we can pull and divide that by the total possible cards that can be pulled. Since both hearts and diamonds have red cards, we would add the number of cards in both suits: Since there are 13 cards in each suit, we will have total of 26 red cards out of 52 total possible cards which would result in a probability of $\frac{26}{52}$ = ½ or .5.

For example, if we were asked what is the probability of pulling a five, we would have to consider how many 5's we can pull and divide that number by the total possible cards that can be pulled. Since there are 4 suits in a standard deck of cards and each one contains a 5, then there are 4 cards out of 52 total possible cards that fit the description: $\frac{4}{52}$ = $\frac{1}{13}$ or .0769 (follow your professor's instructions on rounding).

Mutually Exclusive/Disjoint Events:

- Two events are mutually exclusive or disjoint when they cannot occur at the same time.

For example, if we were asked for the probability of landing tails or heads we would simply add the probability of landing head and the probability of landing tails since it is impossible for you to land heads and tails when you flip a single coin. Whenever events are not disjoint and we are asked for the probability of event A or event B, however, we need to subtract the probability of two events that occur simultaneously, which would looks like: P (A or B) = P(A) + P(B) - P(A and B).

For example, when we are asked for the probability of pulling a red card or a face card, we would normally add the probability of the first event-pulling a red card and we would add the probability of the second event- pulling a face card, but that would ignore the fact that face cards can also be red cards (Jack of Diamonds, King of Hearts, etc.). This would require that we also subtract the probability of event A AND B from the probability of event A OR B.

As a result, our calculation for the probability of red or a face card, the calculation would look like:

P (A)= $\frac{26}{52}$ The probability of getting a red card

P (B)= $\frac{12}{52}$ The probability of getting a face card

P (A and B)= $\frac{6}{52}$ The probability of getting a red card that is also a face card.

P(A or B) = ($\frac{26}{52}$ + $\frac{12}{52}$) - $\frac{6}{52}$ = $\frac{32}{52}$ or .615.