Mutually Exclusive Events

Suppose you wanted to calculate the probability of tossing a head or picking a seven from a deck of cards.

Notice that the events are independent of one another. They share no common outcomes. Since you only need to perform one or the other, but not both events, the events are said to be mutually exclusive.

To calculate the probability of mutually exclusive events, we use the following:

Mutually Exclusive Events

If Event A and Event B are independent events, then the probability of Event A or Event B occurring(but not both) is found by:

$$P(A \text{ or } B) = P(A) + P(B)$$

On test on exam

OR means add

→ Remember when adding fraction you MUST have common denominators

Example

$P(A) = \frac{1}{2}$

$P(B) = \frac{2}{7}$

$P(A \text{ or } B) = P(A) + P(B)$

$= \frac{1}{2} \cdot \frac{(7)}{(7)} + \frac{2}{7} \cdot \frac{(2)}{(2)}$ Common Denominator

$= \frac{7}{14} + \frac{4}{14}$

$P(A \text{ or } B) = \frac{11}{14}$

Looking back at our problem:

Coin — deck of cards

$$P(\text{head or seven}) = P(\text{head}) + P(\text{seven})$$

$$= \frac{1}{2} + \frac{4}{52}$$

Reduce

$$= \frac{1}{2} \left(\frac{13}{13}\right) + \frac{1}{13} \left(\frac{2}{2}\right)$$

$$= \frac{13}{26} + \frac{2}{26}$$

$$= \frac{15}{26}$$

Don't forget when adding fractions, you must have a <u>common denominator.</u>

Example 2:

A card is chosen from a deck of cards. What is the probability that the card chosen is an 8 or an ace?

Solution:

$$P(8 \text{ or ace}) = P(8) + P(\text{ace})$$

$$= \frac{4}{52} + \frac{4}{52}$$

$$= \frac{1}{13} + \frac{1}{13}$$

$$= \frac{2}{13}$$