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 <u>mutually exclusive events</u>, we use the following:

<u>Mutually Exclusive Events</u>
If Event A and Event B are independent events, then the probability of Event A <u>or</u> Event B occurring(but not both) is found by:

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

Looking back at our problem:

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

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

$$= \frac{1}{2} + \frac{1}{13}$$

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

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

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:

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

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

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

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

36 possible outcomes

1,6	2,6	3,6	4,6	5,6	6,6
1,5	2,5	3,5	4,5	5,5	6,5
1,4	2,4	3,4	4,4	5,4	6,4
1,3	2,3	3,3	4,3	5,3	6,3
1,2	2,2	3,2	4,2	5,2	6,2
1,1	2,1	3,1	4,1	5,1	6,1

4 a) $P(\text{sum of } 4) = \frac{3}{36} = \frac{1}{12}$