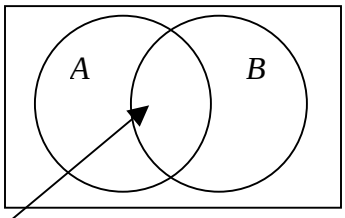
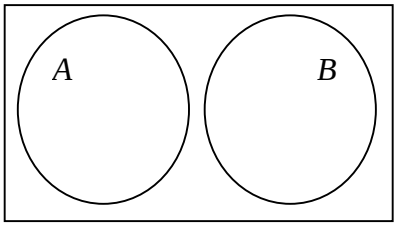
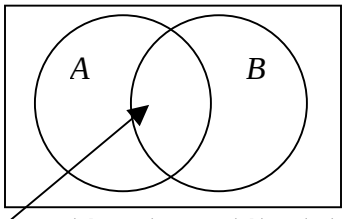
Disjoint vs. Independent

		Disjoint	
		Yes **If $P(A \cap B) = 0$** *Mutually Exclusive *No Overlap in Venn Diagram $P(A \cup B) = P(A) + P(B)$	**No** **If $P(A \cap B) \neq 0$** *Can Occur Together *Overlap in Venn Diagram $P(A \cup B) = P(A) + P(B) - P(A \cap B)$
Independent	**Yes** **If $P(B) = P(B\|A)$** *Knowing that A has occurred does NOT affect the probability that B occurs $P(A \cap B) = P(A)P(B)$	**Impossible** $P(A \cap B) = 0$ if disjoint, but $P(A)P(B) \neq 0$ because neither $P(A)$ nor $P(B) = 0$	 $P(A \cap B) = P(A)P(B)$ Ex. $P(\text{Queen} \cap \text{King})$ when drawing TWO cards WITH replacement
	No **If $P(B) \neq P(B\|A)$** *Knowing that A has occurred DOES affect the probability that B occurs $P(A \cap B) = P(A)P(B\|A)$	 $P(A \cap B) = 0$ Ex. $P(\text{Queen} \cap \text{King})$ when drawing ONE card	 $P(A \cap B) \neq P(A)P(B)$ Ex. $P(\text{Queen} \cap \text{King})$ when drawing TWO cards withOUT replacement