non-mutually exclusive or = add and = multiply

Example 2

The probability of a person living in Winnipeg having a library card is 72%. The probability of a person living in Winnipeg owning a pet is 47%. Determine the probability of a randomly selected Winnipegger having a library card or owning a pet. P(Library card) + P(Owning)

$\frac{72}{100} + \frac{47}{100} = \frac{119}{100} = 119\%$

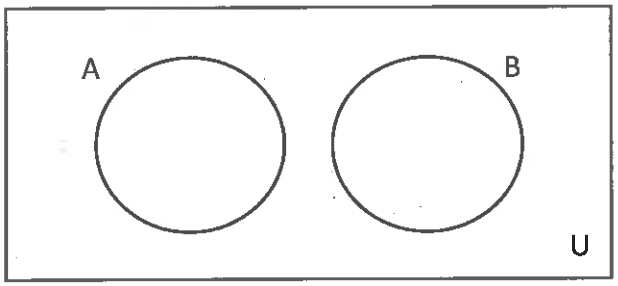
A probability cannot be over 100%.

As you will discover with your teacher, simply using the addition rule does not work in this case, as you end up with a probability of 119%! (Recall that probabilities cannot exceed 100%.) KEEP READING – we'll come back to this example.

This happens because a person could have a library card AND own a dog at the same time! People that have both a library card and a dog get 'counted twice' as successes. This is an issue that we will deal with as the main topic of this lesson: **Mutually Exclusive Events** vs. **Non-Mutually Exclusive Events**.

Mutually Exclusive Events (no overlap) — Disjoint

Events that are mutually exclusive ***have disjoint sets of outcomes***. There will be no outcome that satisfies both events. (Examples: Dead or alive, on or off.) A Venn diagram can be used to show two events that are mutually exclusive – there is no overlap between outcome sets.



Non–Mutually Exclusive Events (overlap)

A Venn diagram can also be used to show two events that are not mutually exclusive. Non-mutually exclusive events share common outcomes, which is shown by the intersection in a Venn diagram.