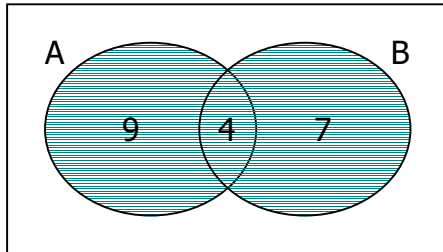


The Addition Rule

$$P(A \cup B) = P(A) + P(B) - P(A \cap B)$$



$(A \cup B)$

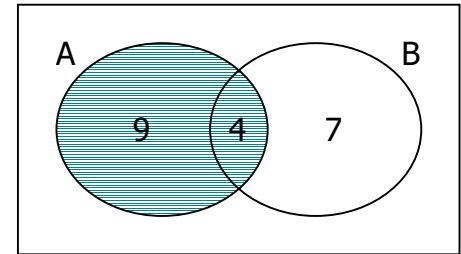
A or B – this is represented by the shaded area on the left. All numbers in A or B or both are counted.

$$9 + 4 + 7 = 20$$

A

Set A is represented by the shaded area on the right. All numbers in A are counted.

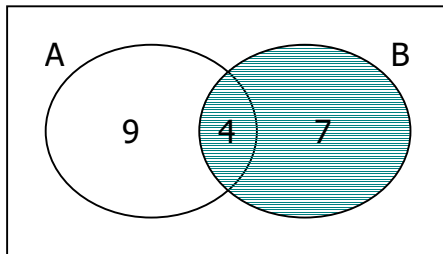
$$9 + 4 = 13$$



B

Set B is represented by the shaded area on the left. All numbers in B are counted.

$$4 + 7 = 11$$



If we combine set A and set B by counting all numbers in set A and then all numbers in set B we would have $9 + 4 + 4 + 7 = 24$.

The numbers in A *and* B have been counted twice. In other words, the intersection has been counted twice. To rectify this we remove one helping of the intersection. $24 - 4 = 20$.

So to count the numbers in A or B or both we can add the numbers in A and the numbers in B and then subtract the numbers in both.

$$P(A \cup B) = P(A) + P(B) - P(A \cap B)$$