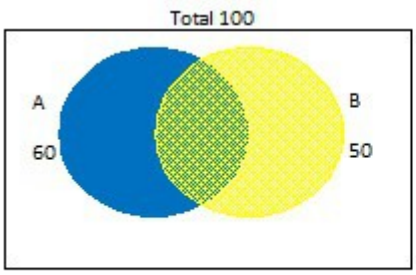
We will start with sets today. Your Veritas Prep GMAT book explains you the basics of sets very well so I am not going to get into those. If you have gone through the concepts, you know that we can use Venn diagrams to solve the sets questions.

First, let's look at why we should focus on terminology in sets question. Thereafter, we will put up a very nice question from our very own book which is simple but takes down many people (just like a typical GMAT question):

Say, there are a total of 100 people in a housing society. There are two clubs close to the society – A and B. You are given that of the 100 people of the housing society, 60 people are members of club A and 50 people are members of club B.



Question 1: How many people are members of both the clubs?

We are looking for the number of people in the green region. The answer here is not 10. It is 'cannot be determined' i.e. you cannot say how many people are members of both the clubs. The reason is that you do not know how many people belong to neither club.

Say, for all future questions (unless mentioned otherwise), you are given that 20 people belong to neither club. What can you say about the number of people who belong to both the clubs? Now, out of the pool of 100, 20 are out. Only 80 people are club members. Since 60 are members of club A and 50 people are members of club B which gives us a total of 110, there must be an overlap of 30 people i.e. 30 people must belong to both the clubs (80 = 60 + 50 – Both)

Question 2: How many people belong to only one club?
We found above that 30 people belong to both the clubs. So out of the 60 people of club A, 30 belong to only club A. Out of the 50 people of club B, 20 belong to only club B. So a total of 30+20 = 50 people belong to only one club, either A or B but not both. (60 – Both + 50 – Both = 30 + 20 = 50)

Question 3: Say, you don't know the number of people who belong to neither club. What is the minimum number of people who must belong to both the clubs?

We know that there are a total of 100 people. 60 belong to club A and 50 belong to club B which adds up to 110. Therefore, AT LEAST 10 people must have membership of both the clubs. Now if you increase the number of people who do not belong to either club, the number of people who belong to both will increase by the same number. Think in terms of the Venn diagram. If the 'Neither' number increases, the number of people who are members decreases. Hence, the overlap increases to keep A = 60 and B = 50.

Let's look at the promised question which will make this concept clear.

Question: Of the 400 members at a health club, 260 use the weight room and 300 use the pool. If at least 60 of the members do not use either, then the number of members using both the weight room and the pool must be between:

(A) 40 to 100
(B) 80 to 140
(C) 160 to 260
(D) 220 to 260
(E) 220 to 300

Solution: When we minimize “number of members who do not use either”, we are minimizing the “number of members who use both” as well.
Look at the equation:

Total = A + B – Both + Neither

Since the total sum 400 is constant, if we increase the ‘Neither’ i.e. 60, we will have to increase the ‘Both’ term too to maintain the sum of 400 (Assuming A and B are constant which they are since they are given to us).
Least value of ‘number of members who use neither’ is 60. We will get the least value of ‘number of members who use both’ when we put ‘Neither’ = 60.
400 = 260 + 300 – ‘Minimum value of both’ + 60

Minimum value of both = 220

On the same lines, if we maximize “number of members who use neither”, we are maximizing the “number of members who use both” as well.

What is the maximum number of people who use neither? Out of a total of 400 people, 300 people use the pool. Hence at least 300 people use at least one of the two facilities. This means that there can be AT MOST 100 people (total 400 – 300 who use pool) who use neither facility.

400 = 260 + 300 – ‘Maximum value of both’ + 100

Maximum value of both = 260

Answer (D)