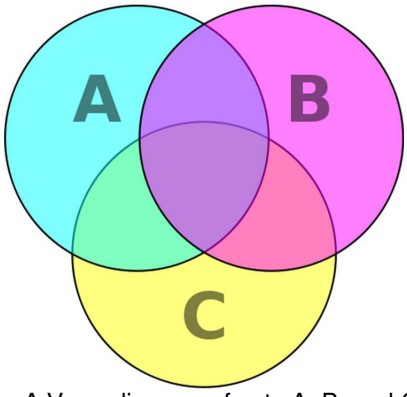
Venn Diagrams

Venn diagrams are diagrams that show all hypothetically possible logical relations between a finite collection of sets, sometimes calls set diagrams. They are used to illustrate simple set relationships in probability, logic, statistics and computer science. A 'set' is an aggregation of things with the same characteristic.



A Venn diagram of sets A, B, and C

Venn diagrams normally comprise overlapping circles. The interior of the circle symbolically represents the elements of the set, while the exterior represents elements which are not members of the set. For instance, in a two-set Venn diagram, one circle may represent the group of all wooden objects, while another circle may represent the set of all tables. The overlapping area or intersection would then represent the set of all wooden tables. Shapes other than circles can be employed, and this is necessary for more than three sets[1].

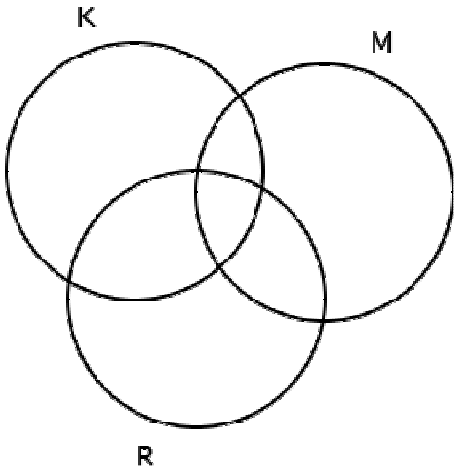
Based in logic, Venn Diagrams can help resolve otherwise difficult problems such as the following:

Superburger sells hamburgers with the choice of ketchup, mustard and relish. One day they sold 256 hamburgers; 140 had mustard, 140 had ketchup, 84 had ketchup and relish, 62 had mustard but no relish, 68 had ketchup and mustard, 38 had all three condiments and 20 had none.

a) The number sold with relish only is?

b) The number sold with no relish is?

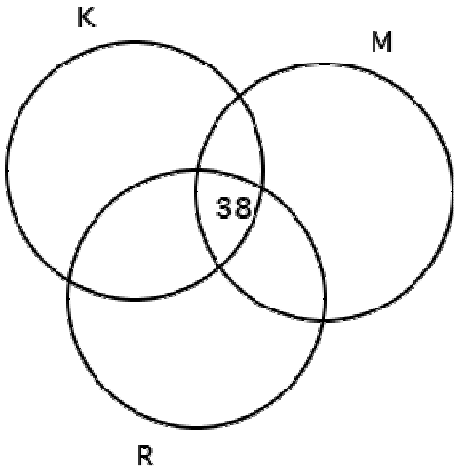
To solve this problem using a Venn diagram requires three circles that all over-lap:
Circle K: Burgers with Ketchup
Circle R: Burgers with Relish
Circle M: Burgers with Mustard



[1] For more on Venn Diagrams see: https://en.wikipedia.org/wiki/Venn_diagram

You start to fill Venn Diagrams with the most complicated information first.

38 had all three condiments. Put that number in like so:

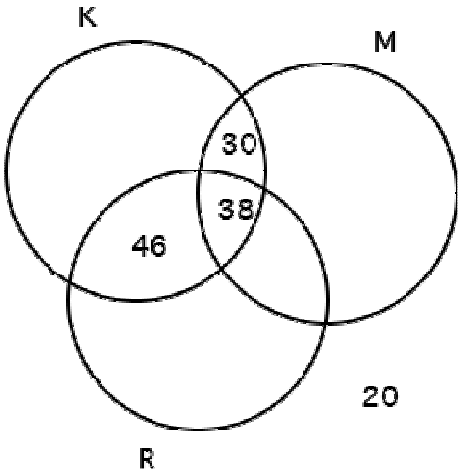


Now fill in sectors where you have other complementary information:

84 had ketchup and relish. The total number in the section that overlaps K and R should be 84.
38 is already in that circle, so 84 – 38 = 46 should be in the remaining piece.

68 had ketchup and mustard. The K and M overlap should total to 68 so, 68 – 38 = 30 should go in the remaining piece.

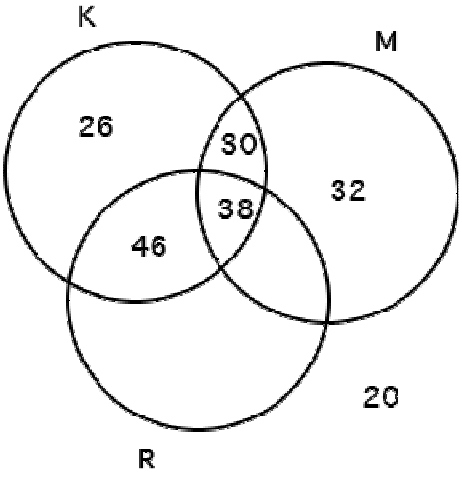
The 20 goes on the outside because it represents the burgers with nothing.



Selecting the next piece of information:

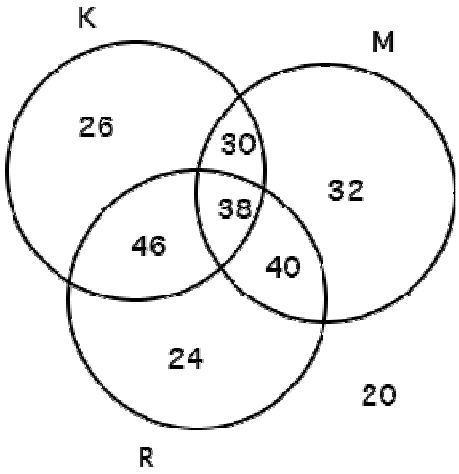
140 had ketchup: therefore the K circle should total up to 140. So 140 - 30 - 38 - 46 = 26 is the number that should go in the remaining K spot.

62 had mustard but no relish. 62 should be the total in the M but no R section. There is already 30 in that section, so 62 - 30 = 32 should go in the M but no R section



Now, using the information140 had mustard. In the remaining Mustard slot should go 140 - 32 - 38 - 30 = 40.

Now, for the final space. We know there are 256 total hamburgers. So, we need to take 256 subtract all of the numbers to see how may are left for that last space….
256 - 20 - 40 - 46 - 38 - 30 - 32 - 26 = 24



The Venn Diagram is now complete. You can answer the questions:

a) The number sold with relish only is?
The number that is in the R circle but no other circle: 24.

b)The number sold with no relish is?
Every number not in the R circle: 20 + 32 + 30 + 26 = 108

Whilst most project managers do not need to analyse the making of hamburgers, they do need to solve set problems when attempting to analyse complex information in critically important areas including quality (determining the type frequency and relationship between defects) and risk (the relationship and interaction between classes of risk).

Being aware of this form of analysis and the information that can be interpolated from partial data allows expert assistance to be sought when needed.