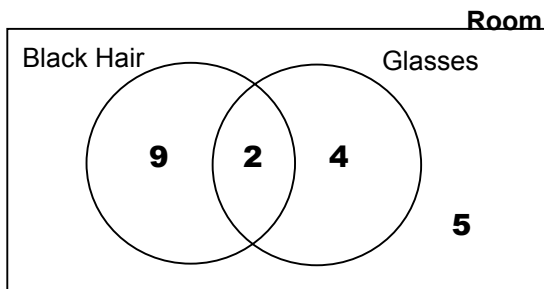


Venn Diagrams

In a room there are 20 people. 11 have black hair, 6 have glasses. 2 people have both black hair and glasses. Imagine that we draw two circles on the floor labelled "black hair" and "glasses" and ask the people to stand in the appropriate circle. The circles will have to overlap to allow for the two people with both. The numbers of people in each region of the room will be:

This is a Venn Diagram. The "room" represents the universal set – for a particular question, there is nothing outside. Each circle represents a set, the overlap is the intersection.



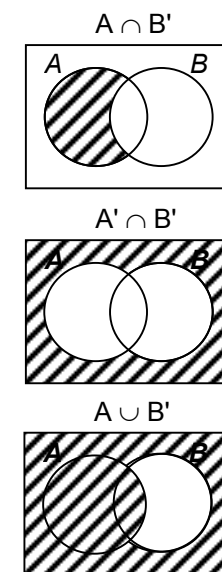
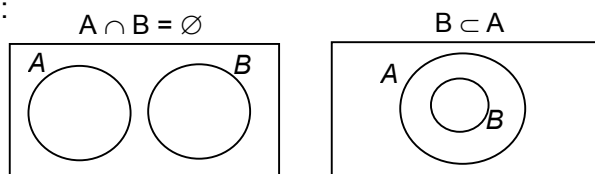
Points to note when filling in the numbers in a Venn Diagram:

- Start at the centre. If you are not told how many in the intersection, work it out like this: suppose you know there are 15 people in total in the two circles, 10 in circle A and 8 in circle B. $10 + 8 = 18$, 3 more than 15 – there are 3 in the intersection.
- When we were told that there were 11 people with black hair, this *includes* those with both black hair and glasses. Same with the 6 people with glasses.

Don't forget to fill in the outer region – although in some questions this set will be "empty."

The diagrams on the right show how a Venn diagram can be shaded to show various sets. To find an intersection, you can shade the two sets in different directions, and the intersection will be the area with cross shading. To find a union, shade the two sets in the same direction – the union is the complete shaded area.

Special cases:



Alternatives to $B \subset A$ are:
 $A \cap B = B$
 $A \cup B = A$

Sometimes you are asked to fill in the regions of the Venn diagram with the actual elements in a set:

$U = \{\text{positive integers less than } 10\}$
 $A = \{\text{integers that are multiples of } 3\}$
 $B = \{\text{integers that are factors of } 30\}$
List the elements of A and B and place them in the appropriate region in the Venn diagram. (Some of this has been done for you).

A = {.....,,} B = {.....,,,,}

YOU SOLVE