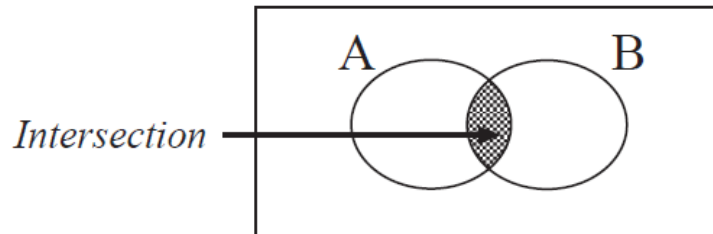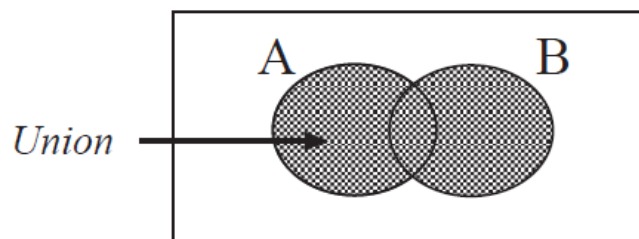## More Notations

ξ is the **universal set** = all elements (we are picking A and B from)
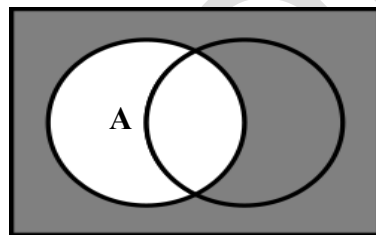
$A \cap B$ = the **intersection** of A and B = the overlap area of A and B

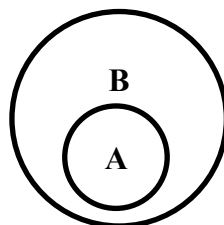$A \cup B$ = the **union** of A and B = the summation of A and B

A' = **Complement** of A = all elements **not** A

Mathematician created two more terms talking about special cases.

A⊂**B**

= A is a **subset** of B = A is inside B

A=∅

= A is an **empty set** = Set A has no numbers nor objects

Example 1

If $\xi = \{1, 2, 3, 4, 5, 6\}$ and $A = \{1, 2, 3, 4\}$, $B = \{4, 5\}$
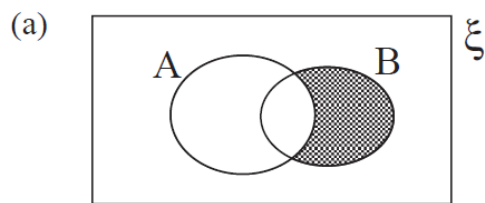
find (a) $A \cap B$, (b) $A \cup B$ (c) A' (d) B'

Is $B \subset A$?

(a) $A \cap B = \{4\}$

(b) $A \cup B = \{1,2,3,4,5\}$

(c) $A' = \{5,6\}$
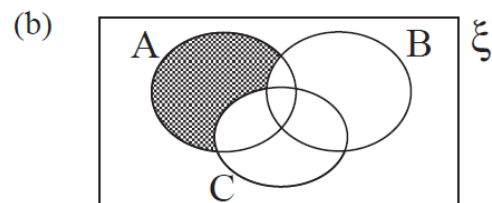
(d) $B' = \{1,2,3,6\}$

B is not a subset of A, because set A does not have 5.

Example 2

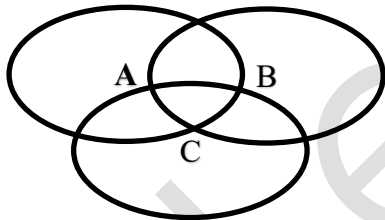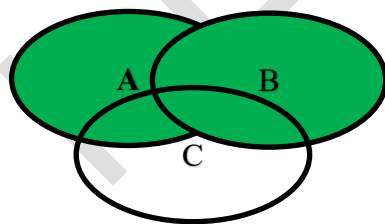Use set notation to describe the shaded regions of these diagrams.

(a)

$A' \cap B$

(b)

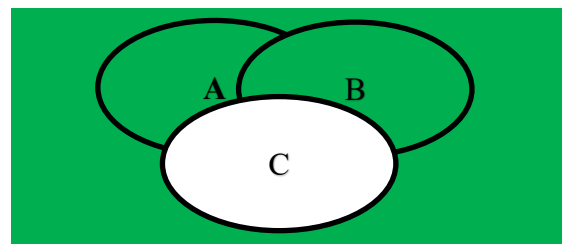

$A \cap (B \cup C)'$

Example 3

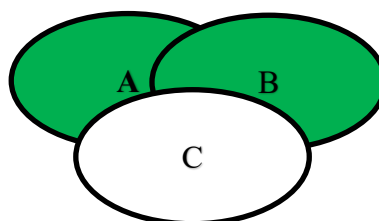*Shade $(A \cup B) \cap C'$ in the following diagram.*

Solution

$(A \cup B)$

C'

$(A \cup B) \cap C'$

Logic Problems and Venn Diagrams

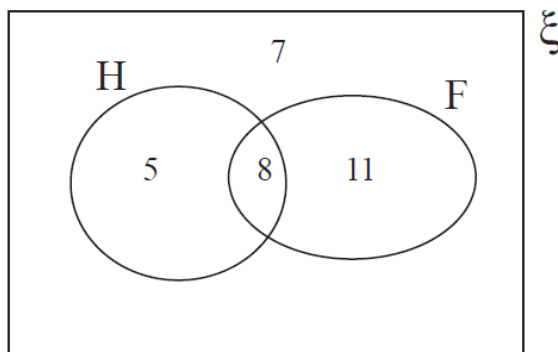We may also use Venn Diagrams to solve logic problems.

Example

8 students who play football and volleyball.

7 students who don't play both.

13 students who play hockey (either they play only hockey or play both hockey and football)

19 students who play football (either they play only hockey or play both hockey and football)

Exercise:

1. In a school canteen there are 45 children. There are 16 who have finished eating. The others are eating either fish or chips, or both fish and chips. There are 26 eating chips and 17 eating fish.

   (a) How many are eating fish and chips?

   (b) How many are eating fish without chips?

   (c) How many are eating only chips?

2. Youth club members can choose to play tennis, badminton or squash. The diagram below represents the possible combinations.
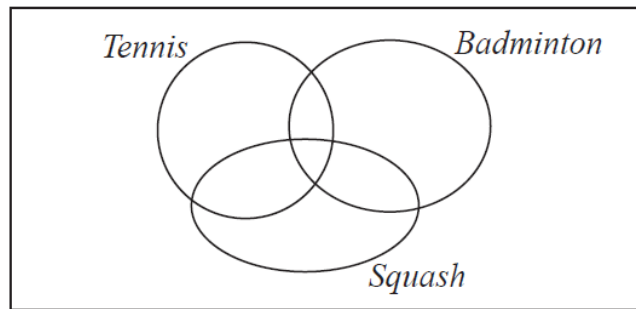
Color the following areas using one color for each question.

(a)   those who play all three sports,

(b)   those who play tennis and badminton, but not squash,

(c)   those who play only tennis.

3. All the members of a group of 30 teenagers belong to at least one club. There are 3 clubs, chess, drama and art.

> 6 of the teenagers belong to only the art club.
>
> 5 of the teenagers belong to all 3 clubs.
>
> 2 of the teenagers belong to the chess and art clubs but not to the drama club.
>
> 15 of the teenagers belong to the art club.
>
> 2 of the teenagers belong only to the chess club.
>
> 3 of the teenagers belong only to the drama club.

(a) How many students belong to the chess club and the drama club, but not the art club?

(b) How many of the group belong to each club?