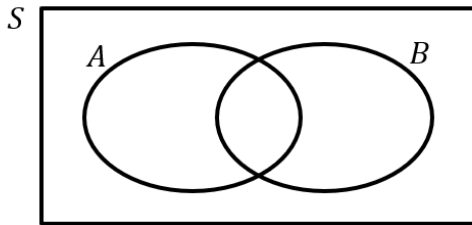
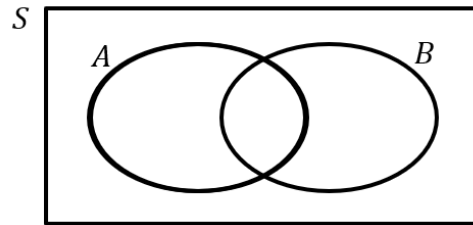


# Venn Diagrams

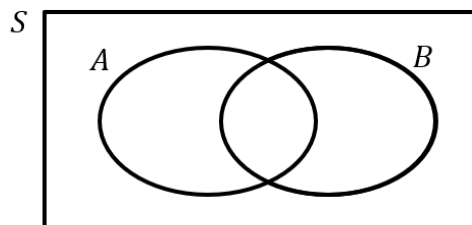
Venn Diagrams allow us to combine events, e.g. "A happened **and** B happened".



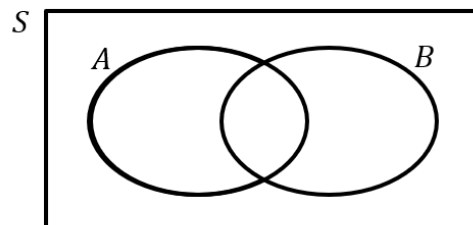
The event "**A and B**"  
Known as the **intersection** of A and B.



The event "**A or B**"  
Known as the **union** of A and B.



The event "**not A**"  
Known as the **complement** of A.



These can be combined,  
e.g. "**A and not B**".

## Example involving probabilities

We can either put frequencies or probabilities into the Venn Diagram.

Given that  $P(A) = 0.6$  and  $P(A \text{ or } B) = 0.85$ , find the probability of:

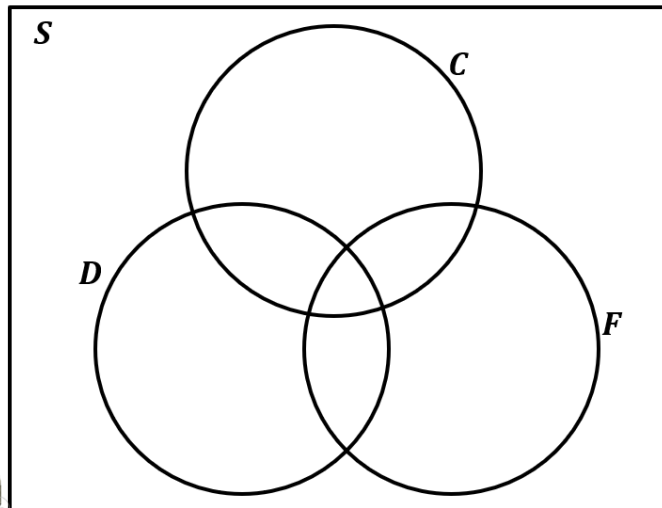
- $P(\text{not } A \text{ and } B)$
- $P(\text{neither } A \text{ nor } B)$

## Example involving frequencies

A vet surveys 100 of her clients. She finds that 25 own dogs, 15 own dogs and cats, 11 own dogs and tropical fish, 53 own cats, 10 own cats and tropical fish, 7 own dogs, cats and tropical fish, 40 own tropical fish.

Fill in this Venn Diagram, and hence answer the following questions:

- $P(\text{owns dog only})$
- $P(\text{does not own tropical fish})$
- $P(\text{does not own dogs, cats, or tropical fish})$



**Fro Tip:** Start from the centre frequency and work your way outwards using subtraction.

Jan 2012 Q6

The following shows the results of a survey on the types of exercise taken by a group of 100 people.

65 run	48 swim
60 cycle	40 run and swim
30 swim and cycle	35 run and cycle
25 do all three	

(a) Draw a Venn Diagram to represent these data.

**(4)**

Find the probability that a randomly selected person from the survey

(b) takes none of these types of exercise, **(2)**

(c) swims but does not run, **(2)**

(d) takes at least two of these types of exercise. **(2)**

