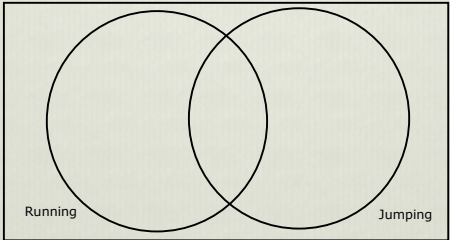# Venn diagrams

Teaching notes

Key question / task	Resources:

Key question / task

Venn Diagrams

Thirty pupils from Mr Evans' class will be competing in the Aberglas School sports day. Of these:

- 22 will be running in a race;
- 15 will take part in a jumping competition;
- 2 will not be running or jumping.

ε

Running   Jumping

How many pupils will be running but **not** jumping?

Resources:
- Question sheet
- PowerPoint presentation.

Reasoning: questions to discuss and explore
- 22 + 15 + 2 gives an answer greater than 30. Why?
- What is the sum of all the numbers written on the completed Venn diagram? Does this make sense?

Consolidation
- Learners could use marks, e.g. spots, on the Venn diagram to represent individuals.

Possible extension
- Learners could use algebra to generalise, e.g. if there are r pupils running, j pupils jumping and b pupils doing both, then the total number running or jumping will be $r + j - b$, OR What can you say if $b = 0$?
- Using a 3 set Venn diagram
- Using set notation – see commentary/notes below.

Commentary / notes:

In the first question (2 set Venn diagram) the most difficult aspect is understanding that the cross-section has been 'counted twice'. This can be explained by considering individual members within the sets.

Pupils working at all three levels at GCSE should be familiar with the symbol ε representing the universal set.

Pupils working at the Intermediate and Higher levels should be familiar with set notation. E.g. if R, J and T are used to represent events chosen randomly from running, jumping or throwing, learners will need to understand the events defined by:
$R \cup J$; $R \cap J$; R'; $(R \cup J)'$; $R \cup J'$ etc.

They should then be able to calculate the related probabilities.

Extension slide

Now let us also consider the pupils who will be taking part in the throwing competition. Each of the 30 pupils will take part in at least one competition.

As before:
- 22 will be running in a race;
- 15 will take part in a jumping competition;
- 2 will not be running or jumping.

Also:
- 5 will be taking part in all competitions;
- 3 will be running and throwing but not jumping;
- 1 will be jumping only.

ε

Running   Jumping

Throwing
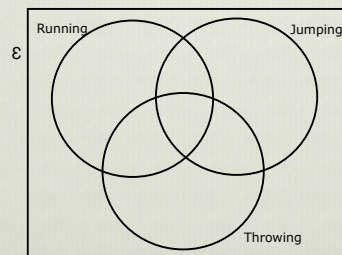
Complete the Venn diagram.

GCSE Subject Content		
Foundation	**Intermediate**	**Higher**
Understanding and using Venn diagrams to solve problems. Using Venn diagrams, or other diagrammatic representations of compound events.		

Learner Outcomes and Assessment (*to aid comment-only marking*)	
Reasoning strand – **Learners are able to:**	**Assessment guidance –** **Can learners:**
- Select appropriate mathematics and techniques to use; - Explain results and procedures precisely using appropriate mathematical language; - Interpret mathematical information; use diagrams to draw conclusions.	- Complete the 2 set Venn diagram? - Complete the 3 set Venn diagram? - Interpret the numbers in a Venn diagram? - Use a Venn diagram to calculate related probability? - Use set notation in the context of a Venn diagram?
Data strand – **Learners are able to:**	
- Express the probability of an event as a number; - Use a space sample diagram (Venn diagram) to calculate probability.	