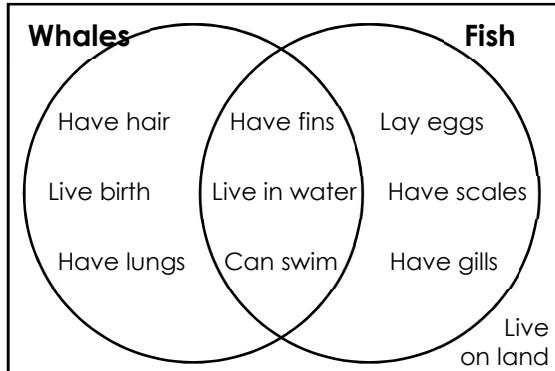# Part 5: Venn Diagrams

Venn diagrams (named after John Venn) are a way of representing the different sets of information. They can be used in situations other than probability for example:

We can see:
- The things that apply to whales only are having hair, live birth and having lungs.
- The things that apply only to fish are laying eggs and having sales and gills.
- The things that apply to both are having fins, living in water and being able to swim
- Living on land doesn't apply to either fish or whales.

We can also use Venn diagrams to represent probabilities.

Let's look at this table:

	Number of Students		
Eye Colour	Male	Female	Total
Brown	6	7	13
Blue	4	3	7
Total	10	10	20

We could change the headings to:

	Number of Students		
Eye Colour	Male	Not Male	Total
Brown	6	7	13
Not Brown	4	3	7
Total	10	10	20

And then we can show this in the Venn diagram, either as numbers or as probabilities. It is important to remember the numbers must always add up to the total, and the probabilities must add to one.
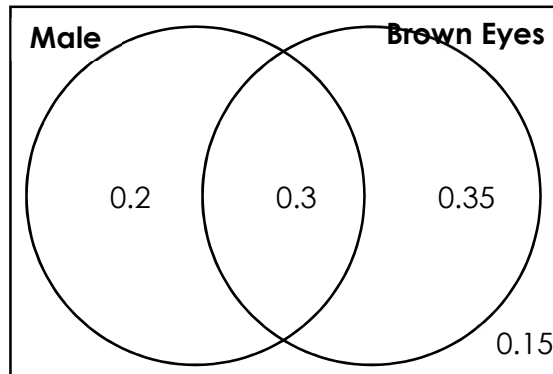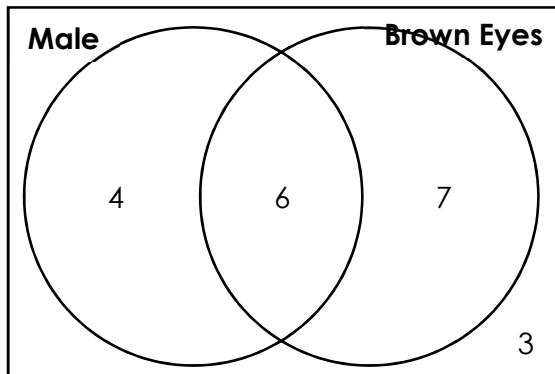
We can the data matches what is in the table:
- 6 students are male and have brown eyes
- 4 students are male but don't have brown eyes
- 7 students have brown eyes but aren't male
- 3 students aren't male and don't have brown eyes
- In the male circle there is 10 students in total (6+4)
- In the brown eye circle there is 13 in total (6+7)

This means we can then ask some questions like:
a. What percentage of the students are male?
   We can see the total for the male circle is 10 of the 20 in total, so this gives us 10/20 = 50% (or using the probability Venn diagram we could do 0.2 + 0.3).

b. What is the probability if choose a student at random they have brown eyes?
   We can see the total for the brown eyes circle is 13. There are 20 students in total, so this gives us 13/20 or 0.65. (or using the probability Venn diagram we could do 0.3 + 0.35)