- b) Reproduction internal or external fertilisation, oviparous (lay eggs) or viviparous (give birth to live young)
- c) Thermoregulation homeotherms ('warm blooded' kept at a constant temperature) and poikilotherms ('cold blooded' body temperature varies with external temperature).
- 1.6 Be able to demonstrate an understanding of the problems associated with assigning vertebrates to a specific group based on their anatomy and reproduction methods and why many vertebrates are difficult to classify.
 - The duck-billed platypus has a bill like a duck, tail like a beaver, its homeothermic, lays eggs but suckles its young. Not an easy one to classify! but its closer to a mammal than any of the other four vertebrate groups.
- 1.7 Be able to discuss why the definition of a species as organisms that produce fertile offspring may have limitations:
 - Some organisms do not always reproduce sexually and some hybrids are fertile.
 - Some organisms can reproduce asexually but are still classed as the same species.
 - Many closely related species can interbreed producing viable offspring and technically classed as a different species.
- 1.8 **HT only**: Be able to explain why binomial classification is needed to identify, study and conserve species, and can be used to target conservation efforts.
 - The binomial name of species consists of a type art Call name (handy for use any country with its own language)
 - The Latin name cannot be unused linguistically with 'local' or country names
 - Study and il entification produces accommon data base of condunation on species-organisms with a universal name.
 - Prevention on species organisms with a universal name. From the patabase, species at threat can be identified and preservation strategies put in place.
- 1.9 Be able to explain how accurate classification may be complicated by:
 a) variation within a species
 - b) HT only: hybridisation in ducks produces viable new species
 - c) HT only: ring species a group of related populations that live near each other, neighbouring populations may interbreed but those well separated geographically may not. Sorting out which are genuinely different species is not easy.
- 1.10 Be able to construct and use keys to show how species can be identified.
 - Does the organism do this or that? Structural features? etc. etc. working your way through an identification key.
- 1.11 Be able to explain how organisms are adapted to their environment and how some organisms have characteristics that enable them to survive in extreme environments, including deep-sea hydrothermal vents and polar regions
 - In studying these examples know and understand that organisms, including microorganisms have features (adaptations) that enable them to survive in the conditions in which they normally live and some cases understand that some organisms have adapted to live in environments that are very extreme.

- Examples of discontinuous variation in humans include eye colour, blood grouping,
 - Any graph of the number of individuals versus the characteristic will not show any systematic curve that you see with continuous variation graphs.
- 1.15 Be able to interpret information on variation using normal distribution curves
- 1.16 Be able to demonstrate an understanding of the causes of variation, including:
 - o a) genetic variation different characteristics as a result of ...
 - (i) mutation mutations that are inherited may change the characteristics of the species
 - (ii) reproduction the 'controlled randomness' of the possible gene combinations of the offspring inherited from their parents ensures that no offspring can be identical to either parent.
 - b) environmental variation different characteristics caused by an organism's environment (acquired characteristics) eg
 - sun tan caused by extra melanin pigment on exposure to lots of sunlight,
 - withering unhealthy plants drying to grow in dry soil, or too shaded light conditions
- 1.17 HT only: Demonstrate an understanding of how speciation occurs as a result of geographic isolation.
 - A species is group of similar organisms that conjute to give fertile offspring.
 - Speciation is the developmentor a new species and can happen when populations of the same original species becomes so different (genetically) that they can no longer interbreed to give fertile offspring.
 - Speciation can occur via isolation wo populations of a species
 - Control separated Control separately,
 - In the two geographical regions, the climate might be different, the other plants and animals may be different.
 - However, if each population can survive, by the process of natural selection, two distinct species can evolve (or perhaps one population remains the same, but the other has to adapt to a different environment).
- 1.18 Be able to explain how new evidence from DNA research and the emergence of resistant organisms supports Darwin's theory.
 - DNA research suggests that all life has common origins, we all have a line of ancestors going back hundreds of thousands or millions of years.
 - DNA analysis shows a close relationship between species that have relatively recently diverged from a common ancestor (a high percentage of our DNA is the same as the DNA of apes!).
 - Evolution has been driven by small changes in DNA over many generations and this gradually changes the nature of the species and due to speciation, can lead to new species.
 - Today we can see evolution in action and the survival of the 'fittest genes' eg