Key points to learn

1.Variation	Differences between individuals in a species. Caused by combination of genes and environment
2. Inherited characteristics	Features from genes you inherit eg hair colour, tongue rolling
3 Environmental characteristics	Features caused from conditions you have grown up in eg accent
4. Mutations	Changes in DNA code. Occur continuously
	Responsible for all different phenotypes
5. Phenotype	Characteristic displayed due to a genetic allele eg green eye
6. Evolution	Change in inherited characteristics over time due to natural selection
7. Darwin's Theory of evolution through natural selection	All living things evolved from simple life forms over 3 billion years ago
	1. Different phenotypes in species 2. Some phenotypes are better suited to environment 3. Individuals with better suited phenotypes survive and breed 4. Successful phenotypes are passed on to next generation Mutation of gene → Better at surviving → Breed → Pass on genes
8. Genome	All genetic information in organism

Key points to learn

9. New species	Evolve such different phenotypes that they can no longer breed
10. Selective breeding (artificial selection)	Choosing parents with desired characteristics so that their offspring show those characteristics
	Takes many generations to obtain desired characteristic reliably
	Desirable characteristics include: Disease resistant crops; more milk or meat; dogs with gentle nature; large or unusual flowers
11. Inbreeding	Selective breeding can lead to this. Where breeds are prone to disease or inherited defects
12. Genetic engineering	Modifying the genome of an organism by adding a gene from another organism. Examples: 1. Bacteria to produce insulin 2. *Possibly curing human inherited disorders*
13. GM Crops	**G**enetically **M**odified crops can be resistant to disease or have higher yield
	Concerns over effect on wild plants and insects. Also long term effects on human health
14. Processes of genetic engineering	*1. Enzyme isolates gene* *2. Gene loaded into vector eg virus* *3. Vector inserts gene into cell* *4. Genes transferred at early stage of development so organism develops with desired characteristics*

Trilogy B13: Variation and evolution

Part of: Inheritance, variation and evolution

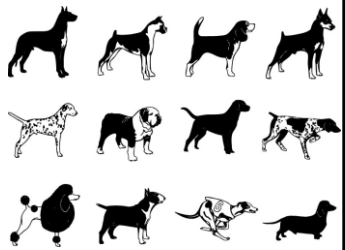
Knowledge Organiser

Big picture (Biology Paper 2)

- Biological response
  - The human nervous system
  - Hormonal coordination
- Ecology
  - Adaptations, interdependence and competition
  - Organising an ecosystem
  - Biodiversity and ecosystems
- Genetics and reproduction
  - Reproduction
  - **Variation and evolution**
  - Genetics and evolution

Background

It is hard to imagine that all life on Earth shares the same ancestors. The process of evolution through natural (and artificial) selection have both been in action for a very, very long time.

This topic considers how living things have and continue to evolve.

(Italicised statements are Higher Tier Only)