04 – [*theory of*] EVOLUTION  *Learning Intentions*

I understand that…	I can…	Mastery Check
4.1 – EVOLUTION OF LIFE		
4.1.2 Evidence shows that life has existed on Earth for around 3.5 billion years, during which time it has diversified.		
4.1.3 Existing cells are the products of evolution.		
4.1.4 Membranes may have formed spontaneously and the first simple cells may have used RNA as genetic information. Ribozymes may have played a role in this development.	☑ Describe the possible roles of RNA and ribozymes in the first simple cells.	
4.1.5 There is evidence that prokaryotic cells existed before eukaryotic cells.	☑ Describe this evidence, including fossil evidence. ☑ Explain how the ancestry of most existing eukaryotic cells probably involved endosymbiotic events.	
4.1.6 Comparative genomics provides evidence for evolution and helps establish the likely evolutionary relationship between different species.	☑ Describe the technique of DNA-DNA hybridisation. ☑ Describe how evidence from the following techniques may be used: • DNA-DNA hybridisation • Sequencing of common proteins (e.g. cytochromes) • DNA sequencing including rRNA gene sequencing in prokaryotes.	
4.1.7 Phylogenetic tree diagrams represent evolutionary relationships.	☑ Draw and analyse simple phylogenetic tree diagrams to represent evolutionary relationships.	

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4.1.8 Mutations accumulate over time. If the mutation rate is known, it can be used as a 'clock'.		
4.1.9 More closely related species have fewer differences in their DNA sequences and have separated more recently from a common ancestor than distantly related species.		
4.2 – REPRODUCTIVE ISOLATION MECHANISMS		
4.2.1 Different criteria are used to define a species depending on the mode of reproduction.		
4.2.2 A species that reproduces sexually can be defined by the ability of its members to actually or potentially interbreed to produce fertile offspring.		
4.2.3 Other criteria used to define a species include: • morphological similarity • biochemical similarity • sharing a common gene pool.		
4.2.4 Reproductive isolating mechanisms act to maintain distinct species.	☑ Describe pre-zygotic (prevention of zygote formation) mechanisms including: • temporal isolation • behavioural isolation • mechanical isolation • gamete isolation. ☑ Describe post-zygotic (prevention of fertile hybrids) mechanisms including: • hybrid inviability • hybrid sterility.	

I understand that…	I can…	Mastery Check
4.3 – EVOLUTION AND NATURAL SELECTION		
4.3.1 Mutation is a permanent change in the sequence of DNA nucleotides and is the ultimate source of genetic variation in a species.		
4.3.2 In a species that reproduces sexually there are additional sources of genetic variation.	☑ Explain the sources of genetic variation in a species that reproduces sexually.	
4.3.3 A gene pool comprises all the genetic information in an interbreeding population.	☑ Recognise that a large gene pool indicates considerable genetic diversity and is found in populations that are more likely to survive selection pressures.	
4.3.4 Natural selection is a process in which organisms that are better adapted to their environment are more likely to survive and produce offspring.	☑ Explain how natural selection results in evolution by causing a change in the frequency of alleles in a population.	
4.3.5 Evolutionary changes are affected by other factors besides selection, including: • sexual reproduction • genetic drift.		
4.4 – SPECIATION		
4.4.1 Speciation may result from an accumulation of genetic changes influenced by different selection pressures or genetic drift in geographically isolated populations. Different selection pressures may lead to divergent evolution or adaptive radiation.	☑ Describe the process of allopatric speciation. ☑ Recognize and give examples of divergent evolution and adaptive radiation.	
4.4.2 Similar selection pressures on unrelated species may lead to convergent evolution.	☑ Recognise and give examples of convergent evolution.	

I understand that…	I can…	Mastery Check
4.4.3 Succession is the gradual change in the mix of species in an area over time, following disturbance.	☑ Describe the process of primary and secondary succession.	
4.4.4 Species or populations that have a reduced genetic diversity have a higher risk of extinction.	☑ Give examples of species with low genetic diversity.	
4.5 – HUMAN IMPACT ON BIODIVERSITY		
4.5.1 Human activities can create new and significant selection pressures on a gene pool, leading to species extinction.	☑ Describe how these activities have caused or may threaten the extinction of species. ☑ Give examples of human activities that lead to climate or environmental change.	
4.5.2 Maintaining biodiversity is an ethical issue with long-term biological and/or environmental consequences.	☑ Recognise that humans have an obligation to prevent species extinction.