

Name:

CfE Higher Biology
Unit 1
Learning Log

Welcome to Higher Biology.

This booklet is your "learning log" for this unit.

Roughly for each week, it details what we hope to cover. The first table lists the learning outcomes.

What you need to learn this week:	T	R	R
RNA <ul style="list-style-type: none"> RNA is single stranded and contains ribose sugar instead of deoxyribose 			

Tick here once you've been taught this outcome. This will help you keep track of where you are and if you've missed any work.

Tick these boxes when you have reviewed this work once and then when you revise it again.

The second table lists the suggested activities you should complete each week.
e.g.

	Completed
Notes: Glow - Unit 1 - DNA, synthesis and release of proteins.	
Reading: Higher Biology Text Book (Torrance) Higher Biology Success Guide	
Questions: Higher Biology Text Book Multiple Choice Book Flash Revise Past Paper Essay (Section C)	
Additional Activity: Some weeks I may assign an extra activity.	

The notes section tells you where to find the Powerpoint for this unit to catch up on any work missed.

This is where you can find reading to expand your understanding of what is done in class

Activities to complete to help assess your understanding of the work covered in class. The answers can be found in the Study room at the back of Room 31.

Tick each activity as you complete it.

The "Comments" section is for you identify any problems or areas of difficulty you have and to plan how to address these problems.

Key area 1 - Structure and organisation of DNA

Learning Intention: We are learning to understand the structure of DNA and how it is organised in different types of cell

I can:	T	R	R
<p style="text-align: center;">(a) The structure of DNA</p> <ul style="list-style-type: none">• Name the molecules in a DNA nucleotide and identify them in a diagram• Name the type of bond on the backbone of the DNA molecule• Give the names of the 4 DNA bases• Describe the base pairing rule for DNA bases• Describe the role of hydrogen bonds in the DNA structure• State the name of the coiled structure adopted by DNA• Identify the positions of 3' and 5' carbons on a DNA nucleotide• Identify the positions of 3' and 5' ends on a DNA strand• Describe how 2 strands of DNA align themselves to each other <p style="text-align: center;">(b) Organisation of DNA</p> <ol style="list-style-type: none">1. Identify prokaryotes and eukaryote cells from diagrams2. Describe the key similarities and differences between prokaryote and eukaryote cells3. Describe structure of a plasmid and can name the types of cells where they are found4. Describe structure of circular chromosomes and identify the location and types of cells where they are found5. Compare the DNA found in mitochondria and nucleus of eukaryote cells6. Describe the DNA in linear chromosomes found in nucleus of eukaryote cells			

Key area 2 - Replication of DNA

Learning Intention: We are learning to understand the process of DNA replication and the use of polymerase chain reaction (PCR) in the amplification of DNA.

I can:	T	R	R
<p style="text-align: center;">(a) Replication of DNA</p> <ul style="list-style-type: none">• State 4 things that must be present for DNA replication• Describe the stages in DNA replication• Describe what a primer is and explain its role in DNA replication• Name 2 enzymes involved in DNA replication• Explain the role of each enzyme in DNA replication• Describe the direction of replication on each DNA strand• Explain why the direction of DNA replication is always in this direction <p style="text-align: center;">(b) Polymerase chain reaction (PCR)</p> <ul style="list-style-type: none">• Describe the purpose of PCR• Explain how primers are chosen for a particular PCR• Explain what is involved in the 'thermal cycling' of PCR• Describe the role of heat tolerant DNA polymerase (e.g. Taq polymerase) in PCR• Describe 3 practical applications of PCR			

Key area 3 - Control of gene expression

Learning Intention: We are learning to understand how genes on DNA are expressed and used to synthesise proteins

I can:	T	R	R
<ul style="list-style-type: none"> • Explain why only a fraction of genes in a cell are expressed • State which processes are regulated to control gene expression <p style="text-align: center;">Structure and functions of RNA</p> <ul style="list-style-type: none"> • Name the molecules in a RNA nucleotide and identify them in a diagram • Name the type of bond on the backbone of the RNA molecule • Give the names of the 4 RNA bases • Describe the base pairing rule for RNA bases • Describe 3 differences between RNA and DNA molecules • State what mRNA is and describe its role • Describe the structure of a ribosome • State what tRNA is and describe its role <p style="text-align: center;">Transcription of DNA</p> <ul style="list-style-type: none"> • State the location of transcription • State 4 things that must be present for transcription to occur • Describe the process of transcription • Describe the role of RNA polymerase • Identify introns and exons on a diagram • Explain what introns are • Explain what exons are • Explain the difference between primary and mature RNA transcripts • Describe RNA splicing <p style="text-align: center;">Translation of mRNA</p> <ul style="list-style-type: none"> • State the location of translation • State 4 things that must be present for transcription to occur • Define 'amino acid', 'polypeptide' and 'protein' • Describe the process of translation • Describe the structure of tRNA 			

<ul style="list-style-type: none"> • Describe the function of tRNA • Define 'codon' • Define 'anticodon' • Explain how the sequence of bases on mRNA acts as a code for protein synthesis • Describe the complementary pairing of bases between mRNA and tRNA • Explain how codons on mRNA recognise incoming tRNA • Explain the function of 'start' and 'stop' codons and identify them in a diagram • Name the bond formed between amino acids of a polypeptide • Describe the fate of tRNA as the polypeptide is formed <p>Expressing different proteins from one gene</p> <ul style="list-style-type: none"> • Explain the mechanism by which different proteins can be expressed from one gene • Define 'alternative RNA splicing' • Define 'post translational modification' • Explain why many different mRNA molecules are produced from the same primary transcript • Describe 3 post translational protein structure modifications <p style="text-align: center;">Protein shape and structure</p> <ul style="list-style-type: none"> • Describe the overall shape of protein molecules • Describe what can happen to polypeptide chains as they are transformed into protein • Identify the position and function of peptide bonds and hydrogen bonds in protein • Explain how interactions of amino acids can determine the final shape of a protein 			
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Key area 4 - Cellular Differentiation

Learning Intention: We are learning to understand the key ideas regarding cellular differentiation from meristems and stem cells and the use of stem cells in research and medicine

I can:	T	R	R
<p style="text-align: center;">Cellular differentiation</p> <ul style="list-style-type: none">• Explain what 'cellular differentiation' means• Define 'meristem'• Define 'stem cell'• Give 3 examples of specialised plant cells and describe the types of genes that are expressed in each• Describe the process of differentiation into specialised cells from meristems in plants• Describe the process of differentiation into specialised cells from embryonic and tissue (adult) in animals <p style="text-align: center;">Embryonic and tissue (adult) stem cells</p> <ul style="list-style-type: none">• Describe 3 examples of present or future therapeutic uses of stem cells• Describe 3 other areas in which stem cell research can be useful• Describe the main ethical issues relating to the different types of stem cell use• Explain how the use of stems cells is regulated			

Key area 5 - The structure of the genome

Learning Intention: We are learning to understand the nature of the genome

I can:	T	R	R
<p style="text-align: center;">The structure of the genome</p> <ul style="list-style-type: none">• Define 'genome'• Define 'gene'• Describe the structure of the genome• Explain the difference between coding and non-coding sequences of DNA• Describe the functions of non-coding sequences			

Key area 6 - Mutations

Learning Intention: We are learning to understand the nature, impact and importance of mutations

I can:	T	R	R
<p style="text-align: center;">(a) Mutations</p> <ul style="list-style-type: none">• Define 'mutation' and describe the effect of one <p style="text-align: center;">(b) Single gene mutation</p> <ul style="list-style-type: none">• Define 'single gene mutation'• Name 3 single gene mutations• Describe 3 single gene mutations• Name 3 single-nucleotide substitutions• Explain the difference between missense, nonsense and splice-site mutations• Describe the effects of missense, nonsense and splice-site mutations• Describe 2 possible effects of nucleotide insertions or deletions <p style="text-align: center;">(c) Chromosome structure mutations</p> <ul style="list-style-type: none">• Define 'chromosome structure mutation'• Name 4 chromosome structure mutations• Describe 4 chromosome structure mutations• Describe the effects of each of the 4 chromosome structure mutations <p style="text-align: center;">(d) The importance of mutation and gene duplication to evolution</p> <ul style="list-style-type: none">• Explain the importance of mutation and gene duplication to evolution <p style="text-align: center;">(e) Polyploidy</p> <ul style="list-style-type: none">• Define 'polyploidy'• Define 'whole genome duplication'• Explain the importance of polyploidy in evolution• Explain the importance of polyploidy for human food crops			

Key area 7 - Evolution

Learning Intention: We are learning to understand the key concepts and mechanisms involved in evolution

I can:	T	R	R
<p style="text-align: center;">(a) Evolution</p> <ul style="list-style-type: none">• Explain what 'genomic variations' are• Define 'evolution' <p style="text-align: center;">(b) Gene transfer</p> <ul style="list-style-type: none">• Describe how 'vertical gene transfer' can take place• Explain why vertical gene transfer can be referred to as inheritance• Describe how 'horizontal gene transfer' can take place• Explain the implication for evolution of prokaryotes carrying out horizontal gene transfer• Describe how viruses and prokaryotes can transfer DNA sequences horizontally into the genomes of eukaryotes• Explain the significance of viruses and prokaryotes transferring DNA sequences horizontally into the genomes of eukaryotes <p style="text-align: center;">(c) Selection</p> <ul style="list-style-type: none">• Define 'natural selection'• Give 2 examples of natural selection• Define 'sexual selection'• Give 2 examples of sexual selection• Explain what happens as a result of 'stabilising selection'• Explain what happens as a result of 'directional selection'• Explain what happens as a result of 'disruptive selection' <p style="text-align: center;">(d) Genetic drift</p> <ul style="list-style-type: none">• Explain what 'neutral mutations' are• Explain what the 'founder effect' involves• Define 'genetic drift'• Explain why genetic drift has a greater impact on small populations			

(e) Speciation

- Define 'species'
- Define 'speciation'
- Explain the role of isolation in speciation
- Name 3 types of isolation barriers
- Describe the difference between allopatric and sympatric speciation
- Give an example of allopatric evolution of a species
- Give an example of sympatric evolution of a species
- Explain the role of mutation in speciation
- Explain the role of selection in speciation
- Define 'hybrid zone'
- Explain the significance of hybrid zones

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Key area 8 - Genomic sequencing

Learning Intention: We are learning to understand the importance of genomic sequencing in relation to evidence for evolution and personal genomics in medicine

I can:	T	R	R
<p style="text-align: center;">(a) Genomic sequencing</p> <ul style="list-style-type: none"> • Define 'genomic sequencing' • Name 2 methods of genomic sequencing <p style="text-align: center;">(b) Evidence of evolution</p> <ul style="list-style-type: none"> • Explain what 'phylogenetics' is and how it can be used as evidence for evolution • Explain what 'molecular clocks' are and how they can be used as evidence for evolution • Explain the term 'last universal ancestor' • Explain how the evolution of prokaryotes and eukaryotes provides evidence for the sequence of events in evolution • Describe 2 sources of evidence that can be used to support the sequencing of events in evolution • Name the 3 domains of cellular life • Describe the evidence for the existence of the 3 domains of cellular life <p style="text-align: center;">(c) Comparisons of genomes from different species</p> <ul style="list-style-type: none"> • Describe the outcome of comparing the genome from different species • Explain what 'many genes are conserved across different organisms' means <p style="text-align: center;">(d) Personal genomics and health</p> <ul style="list-style-type: none"> • Describe 2 benefits of using analysis of an individual's genome in medicine • Describe 2 difficulties with personalised medicine 			

Unit Assessment Revision

What you need to learn:	R	R	R
<ul style="list-style-type: none">• Key area 1: DNA Structure and Organisation• Key area 2: DNA Replication• Key area 3: Control of Gene Expression• Key area 4: Cellular Differentiation• Key area 5: The Structure of the Genome• Key area 6: Mutations• Key area 7: Evolution• Key area 8: Genomic sequencing			

	UA 1 st Attempt	UA 2 nd Attempt	Unit 1 AB test	On target?

1. Areas of strength

2. Areas identified as needing further work

3. Tips learned to help answer future questions